

December 2010

Clearing the air

The Mayor's Air Quality Strategy



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**Greater London Authority
December 2010**

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Mayor's Foreword



My vision of London is that it enjoys the attributes of a small city - a high quality of life in a beautiful, safe and clean environment – while profiting from the advantages of being a major world city.

Thankfully London's air is no longer clogged with the industrial effluent that caused its infamous pea-soupers, but there is still a need for robust and sustained action to clean up the air. Independent research commissioned by City Hall detailed in this document has quantified for the very first time just how serious the exposure to particles and fumes is to the health of Londoners and how it can be a contributory factor in the premature deaths of vulnerable people with existing illnesses.

We have strong initiatives in place that are already working well: a London wide Low Emission Zone drawing a boundary around our city that discourages the most polluting vehicles from driving in London; an increasing number of buses running on hybrid engines; and record investment into cycling, including my flagship public bike hire scheme launched this year.

But we are determined to go further. This strategy sets out tough new standards addressing the main sources of pollutants to set London firmly on course to meet legal limits - and more importantly, to drive long-term improvements to air quality.

For example, by 2012 when London welcomes the world to our city, no licence will be issued for a taxi over 15 years old ensuring that the oldest, most polluting vehicles will be removed from our roads. This is the first time that there will have an age limit on London's taxis. In addition, we will ask all aspiring cabbies to undertake an eco-driving course in order to qualify into this profession, known the world over for excellence. I am also committed to working with the taxi industry to find a permanent fix by creating an affordable zero-emission black cab by 2020.

From spring next year, Londoners will be able to sign up to Source London, a brand new electric vehicle membership scheme tailored to make electric driving an easier choice. With a 100 per cent congestion charge discount for low emission vehicles, there is a real financial incentive for Londoners to drive the cleanest vehicles available. In addition, the new bus we are delivering for London, due to enter service in 2012, will incorporate the latest hybrid technology and will be both 40 per cent more fuel efficient than

conventional diesel buses and 15 per cent more fuel efficient than current London hybrid buses.

We are also pioneering new and innovative technologies. Buses which use the latest hydrogen fuel cell technology, emitting nothing but water vapour, will shortly be operating on London's roads creating the UK's only zero-emission bus route. These vehicles will run through the most polluting parts of the city, which we are also treating with a sticky solution that traps harmful particles and gently disperses it at the time of the next rainfall.

Clearing up the air in a city as large and complex as London is no easy challenge, especially as harmful pollutants are also blown into London from sources beyond our direct control and influence. At the core of these proposals is the message that everyone needs to play their part to take the steps to improve air quality, and that those who contribute more to the problem - buses, taxis and vans - should be expected to do more to provide the solution. Air quality is an issue that affects all cities and towns across the country. We are calling on central Government to implement new policies and provide funding for several initiatives to tackle this issue across the UK and therefore also in London.

Being the number one city in the world to invest in, to do business in and visit, goes hand in hand with our ability to create an environment in which we can all thrive. Through this strategy we are demanding the highest standards that a great city like ours is entitled to expect.

A handwritten signature in black ink, appearing to read 'Boris Johnson', with a long horizontal flourish extending to the right.

Boris Johnson
Mayor of London

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1. Setting the scene

1.1. Introduction

- 1.1.1. Air quality matters to Londoners. Air pollution not only harms the environment but also health and wellbeing. The 2010 Londoner Survey¹ found that pollution from traffic was the top environmental concern for Londoners. Poor air quality can cause serious health problems and reduces the quality of life for all of us. Its impacts are most severely felt by vulnerable people such as children, older people and those with existing heart and lung conditions. In addition, people living in areas near major roads – which are often some of the most deprived parts of London - are exposed to particularly high levels of pollution.
- 1.1.2. As recently as the 1950s London was infamous for its pollution. In December 1952 a dense fog covered Greater London for several days, leading to a sudden rise in mortality rates. Whilst Londoners had experienced similar periods of smog, this episode led to an estimated 3,500-4,000 more deaths than would have been expected under normal conditions². The great smogs of that decade forced Governments to introduce legislation to reduce emissions of air pollutants. While significant improvements have been made, air pollution remains a real challenge for all cities, especially large conurbations, where the sources of pollutants are more geographically concentrated, coupled with far greater populations exposed to them.
- 1.1.3. Two pollutants cause most concern within London³: particulate matter (PM₁₀) and nitrogen dioxide (NO₂). Levels of PM₁₀ declined in the 1990s though the rate of improvement has been slower in the last decade, a trend that has also been experienced throughout Europe⁴. Similarly, levels of NO₂ in London fell until 2002 but have been relatively unchanged ever since.
- 1.1.4. The challenge of cleaning London's air is made more difficult because a significant amount of the pollution sources are not within London. Much is blown in from the surrounding regions, but some comes from much further away, from as far afield as the Sahara Desert. Around 40 per cent of NO₂ pollution comes from emission sources outside London. Equally, data from central London indicates that about 40 per cent of PM₁₀ originates from outside London. Sources within the UK that contribute to London's poor air quality tend to be located in the southeast of England. It is likely that these areas are also affected by pollution from London and the Mayor will work with authorities there to ensure that air quality improvement plans have wider benefits and that best practice on reducing emissions is shared. In addition, the Mayor will encourage planning authorities and the Environment Agency in the south east of

England to ensure that major new developments outside London do not worsen air quality in the capital. The challenge we face is not just one for London but requires considerable effort on the part of all layers of government, businesses and individuals.

1.1.5. Great strides have already been taken in London to improve air quality. Measures already announced or underway that will reduce emissions in London include:

1. Development of electric vehicle infrastructure
2. Congestion charging and the London Low Emission Zone (LEZ)
3. Smarter travel initiatives to encourage a shift to greener modes of transport
4. Funding and supporting car clubs (especially hybrid and electric cars)
5. Maintaining roads in good repair to reduce the contribution of particulate matter from road surface wear
6. Smoothing traffic
7. Bus emissions programme, so that older buses have been fitted with particulate traps and diesel-electric hybrid buses are introduced as quickly as possible
8. Publication and implementation of the London Best Practice Guidance for controlling dust and emissions from construction.

1.1.6. Together with natural fleet replacement, these measures are expected to do a great deal to reduce emissions of both PM₁₀ and nitrogen oxides (NO_x) and those that are being continued are included in this Strategy. However, further measures are needed to make more substantial inroads to reducing pollution.

1.2. What is air pollution?

1.2.1. Air pollution refers to substances in the air which directly affect human health, welfare, plant or animal life. Air quality is measured in terms of concentrations – the amount of a pollutant that is present in the air that you breathe. Most pollution emitted in London is from road transport and from domestic and commercial heating systems. By reducing these emissions in London, the contribution of these sources to concentrations will also fall.

- 1.2.2. Most air quality legislation in Europe and the UK is derived from health-based evidence provided by the World Health Organisation (WHO). The WHO has published various guidelines for both global air quality and European air quality based on the latest research from around the world. These guidelines are neither standards nor legally binding criteria; they are designed to offer guidance in reducing the health impacts of air pollution based on expert evaluation of current scientific evidence. Nevertheless, many administrations use these guidelines as the basis for their own air quality standards.
- 1.2.3. The European Union has issued an air quality Directive (2008/50/EC – the “Air Quality Directive”)⁵ that sets standards for a variety of pollutants that are considered harmful to human health and the environment. These standards, which are based on WHO guidelines, include limit values, which are legally binding and must not be exceeded. These limit values comprise a concentration value for the pollutant, an averaging period over which it is measured, the date by which the limit values are to be achieved and in some cases an allowable number of exceedences of the value per year. The Directive also includes target values, which are set out in the same manner as limit values, but which are to be attained where possible by taking all measures that do not entail disproportionate costs.
- 1.2.4. The Directive, including the emission concentration limit values, has been transposed into English law by the Air Quality Standards Regulations 2010 (“the 2010 Regulations”). These Regulations include criteria for determining how achievement with the limit values should be assessed, including consideration of locations and length of exposure in relation to the averaging period of the limit values. In particular, the Regulations state that compliance with limit values does not need to be assessed at:
- Any location situated within areas where members of the public do not have access and there is no fixed habitation; and
 - On the carriageway of roads and on the central reservations of roads, except where there is normally pedestrian access to the central reservation.

In addition, the 2010 Regulations state that sampling points directed at the protection of human health must be sited to provide data on areas where the highest

concentrations occur to which the population is likely to be exposed for a period which is significant in relation to the averaging period of any limit value.

This Strategy seeks to meet the requirements of the 2010 Regulations and conforms to the assessment criteria set out in them.

1.2.5. The Government's National Air Quality Strategy provides the Government's policy framework for air quality management and assessment in the UK. It identifies air quality standards and objectives for key air pollutants which are designed to protect health and the environment. It also sets out how different sectors (industry, transport and local government) can contribute to achieving the air quality objectives, though it includes little direct guidance on policy, nor does it constitute an action plan.

1.2.6. The Mayor has a legal responsibility to prepare and to keep under review an Air Quality Strategy for the Greater London area. The Greater London Authority Act 1999 (the GLA Act) requires the Mayor to include in his Air Quality Strategy policies and proposals:

- for the implementation in Greater London of the policies contained in the strategy prepared and published by the Secretary of State in accordance with section 80 of the Environment Act 1995 (National Air Quality Strategy), and
- for the achievement in Greater London of the air quality standards and objectives prescribed in regulations made under section 87(2)(a) and (b) of that Act; this is done in the Air Quality (England) Regulations 2000 ("the 2000 Regulations").

The Air Quality Strategy may also contain such other policies and proposals relating to the improvement of air quality in Greater London as the Mayor considers appropriate. The GLA Act requires the Strategy to contain information about the following matters: Greater London's current air quality and its likely future air quality; the measures which are to be taken by the Mayor, Transport for London and the London Development Agency for the purpose of implementing the Strategy; and the measures which other persons or bodies are to be encouraged by the Mayor to take for the purpose of its implementation.

1.2.7. The air quality standards and objectives prescribed in the 2000 Regulations, which are based on EU limit values, are for seven local pollutants:

- Benzene
- 1,3 Butadiene
- Carbon monoxide
- Lead
- NO₂
- PM₁₀ and PM_{2.5}
- Sulphur Dioxide

1.2.8. Five of these pollutants, most notably sulphur dioxide and lead, which have historically been a problem in London, are now at concentrations that do not affect human health. However, levels of PM₁₀ and NO₂ continue to exceed the national air quality standards and objectives in some areas. Ozone is another pollutant for which concentrations are still too high and which causes summer smogs during hot, sunny periods. However, formation of ozone can take place over several hours or days and may have arisen from emissions many hundreds, or even thousands of kilometres away⁶. For this reason ozone is not considered to be a 'local' pollutant. Therefore this Strategy focuses on interventions that will reduce concentrations of PM (PM₁₀ and the smaller fraction PM_{2.5}) and NO₂ in particular (see Box 1), although in most cases these interventions will result in reduced concentrations of the other five 'local' pollutants. This Strategy will also result in lower emissions of NO_x, which contribute to the formation of ground-level ozone in London.

1.2.9. In June 2010, the 2010 Regulations came into force and introduced a new control framework for PM_{2.5}, as required by the Air Quality Directive⁵. This sets a national exposure reduction target defined as a percentage reduction in annual average concentrations of PM_{2.5} in urban background locations across the country, to be achieved by 2020.

- 1.2.10. The sources of PM_{2.5} tend to be very similar to the sources of PM₁₀, particularly road transport. Therefore, many of the measures in this Strategy will address concentrations of both PM₁₀ and PM_{2.5}. As further monitoring of PM_{2.5} is undertaken in London more information will become available. This will make it possible, if necessary, to target action directly in the locations where PM_{2.5} is a particular problem.

Box 1: Pollutants of concern in London

Particulate matter (PM₁₀ and PM_{2.5}): Particulate matter (PM) is a complex assemblage of non-gaseous material of varied chemical composition. It is categorised by the size of the particle (for example PM₁₀ is particles with a diameter of less than 10 microns (µm)). Most PM emissions in London are caused by road traffic, with engine emission and tyre and brake wear being the main sources. Construction sites, with high volumes of dust and emissions from machinery are also major sources of local PM pollution, along with accidental fires and burning of waste. However, a large proportion of PM comes from natural sources, such as sea salt, forest fires and Saharan dust, as well as from sources outside London caused by human activity. Small particles tend to be long-lived in the atmosphere and can be transported great distances. This imported PM forms a significant proportion of total PM in London.

Nitrogen dioxide (NO₂): All combustion processes produce oxides of nitrogen (NO_x). In London, road transport and heating systems are the main sources of these emissions. NO_x is primarily made up of two pollutants - nitric oxide (NO) and nitrogen dioxide (NO₂). NO₂ is of most concern due to its impact on health. However NO easily converts to NO₂ in the air - so to reduce concentrations of NO₂ it is essential to control emissions of NO_x.

1.3. The policy context

- 1.3.1. The Mayor has powers to ensure London boroughs meet their statutory Local Air Quality Management requirements. Under the Local Air Quality Management (LAQM) framework set by the Government under the Environment Act 1995 ("the 1995 Act"), the boroughs must regularly review and assess air quality within their boroughs and designate Air Quality Management Areas (AQMAs) where UK standards and objectives are currently not being met. Information provided in reports produced by boroughs through the LAQM process has contributed to the policy development process for this Strategy. Where a borough has declared an AQMA, an Air Quality Action Plan (AQAP) is required to be produced that works towards achievement of

the air quality standards and objectives. Currently all 33 London boroughs have designated AQMAs and the associated AQAPs must have regard to the Mayor's Air Quality Strategy. This Strategy includes measures that build on initiatives being taken by boroughs through their AQAPs.

1.3.2. This Strategy has been developed in conjunction with the Mayor's draft Replacement London Plan, Transport Strategy, draft Climate Change Mitigation and Energy Strategy, draft Climate Change Adaptation Strategy and draft Municipal Waste Management Strategy. The policies in this Strategy are consistent with policies in those final and emerging Plans and Strategies, as well as the Mayor's other statutory strategies.

1.4. Objectives of this Strategy

1.4.1. The overarching aim of this Strategy is to reduce air pollution in London so that the health of Londoners is improved. The most effective means to do this is to achieve the European Union (EU) air quality limit values as soon as possible. This will also achieve compliance with nationally prescribed air quality standards and objectives, as required by the GLA Act. The relevant EU limit values for PM₁₀, PM_{2.5} and NO₂ are shown Table 1.1. The obligation refers to the actual levels of concentrations set in the Directive. The time period is the period over which the concentrations are averaged and the permitted exceedences is the number of days that the set level of concentrations can be exceeded in a calendar year. Failure to meet limit values could lead to the European Commission taking legal action against Member States and possible fines being imposed.

Table 1.1: EU limit values for PM_{2.5}, PM₁₀ and NO₂ from the EU Air Quality Directive 50/2008.

Pollutant	Obligation	Time period	Compliance date	Permitted exceedences each year
Particulate Matter (PM ₁₀)	Limit value of 50 µg/m ³	24 hours	1 January 2005	No more than 35
	Limit value of 40 µg/m ³	1 year	1 January 2005	n/a
Nitrogen dioxide (NO ₂)	Limit value of 200 µg/m ³	1 hour	1 January 2010	No more than 18
	Limit value of 40 µg/m ³	1 year	1 January 2010	n/a
Fine particles (PM _{2.5})	Limit value of 25 µg/m ³	Annual mean	1 January 2015	n/a
	Stage 2 indicative limit value of 20 µg/m ³	Annual mean	1 January 2020*	n/a
	Exposure concentration obligation of 20µg/m ³ *	3 year average exposure indicator (AEI)	1 January 2015	n/a
	Exposure reduction target relative to the 2010 AEI (0% to 20% reduction) **	3 year average exposure indicator (AEI)	2020	n/a

* Will be reviewed by European Commission by 2013.

** The three-year running annual mean or AEI is calculated from the PM_{2.5} concentration averaged across all urban background locations in the UK (ie. the AEI for 2010 is the mean concentration measured over 2009, 2010 and 2011).

1.4.2. The national standards and objectives for PM₁₀ and NO₂ set out in the 2000 Regulations are the same as the limit values above, subject to two exceptions:

- The compliance date for the PM₁₀ national objectives under the 2000 Regulations was 31 December 2004.

- The compliance date for the NO₂ national objectives under the 2000 Regulations was 31 December 2005.

1.4.3. The 2010 Regulations designate the Secretary of State for the Environment, Food and Rural Affairs as the competent authority responsible for securing compliance with the Air Quality Directive in England, and impose a duty on her to secure compliance with EU limit values set under the Directive. London boroughs have their local air quality management duties as regards national objectives set under the 1995 Act; the Mayor has his own responsibilities under the GLA Act concerning his Air Quality Strategy. The Mayor has power of direction over the boroughs and the Secretary of State has powers of direction over both. The Government intends exploring the scope for and implications of simplifying provisions into one legislative framework, to streamline the relationship between EU limit values and national objectives. The Mayor would support the simplification of objectives so that all layers of government are working to achieve the same objectives.

1.4.4. The 2010 Regulations, which came into force in June 2010, require limit values for PM_{2.5} to be met across the country. On the basis of current modelling projections, the UK national exposure reduction target for 2020 is likely to be ten per cent relative to an average based on 2009, 2010 and 2011 levels, though this will not be confirmed until the measurement data for those years has been collated in early 2012.

1.4.5. While the dates for compliance with limit values in the Air Quality Directive has already passed, it enables EU Member States to apply to extend the date for compliance with the limit values for PM₁₀ until June 2011 and for NO₂ until January 2015, provided certain conditions are met, including that an air quality plan to meet the limit values by the extended deadline is in place. Should time extensions be granted, Member States are required to comply with interim limits, or 'margins of tolerance', in the period up to the new compliance date.

1.4.6. In April 2009, the Government submitted an application to the European Commission to obtain an extension for the PM₁₀ limit values for eight areas across the UK, including Greater London. In December 2009, the Commission rejected the Government's application for London, on the grounds that it did not provide enough detail as to how the limit values would be achieved by 2011. In April 2010, the Government submitted a reapplication to the Commission, which included updated modelling that showed that London would be compliant with the PM₁₀ limit values in

2011. The GLA contributed data and policy information to the Government's application for a time extension to the PM₁₀ limit values. The GLA's modelling also shows that London will be compliant with PM₁₀ limit values in 2011. However, to provide further reassurance that these limit values will be met from 2011 and to further reduce the health impacts of poor air quality, this Strategy includes a number of measures that will reduce PM₁₀ levels even further.

1.4.7. Greater London is the only region in the country that requires a time extension to meet the PM₁₀ limit values. This is because the major cause of high concentrations of PM₁₀ is road transport, and London has more traffic than other cities in the country. A number of other EU countries are experiencing similar problems; 25 of the 27 Member States have exceeded the PM₁₀ limit values in at least one part of the country – normally the major cities.

1.4.8. The Government intends to apply to the European Commission in 2011 for a time extension to the NO₂ limit values until 2015⁷. NO₂ is a national problem and the application will cover many regions and cities in the UK, not just Greater London. This Strategy includes measures that aim to meet the limit values for PM₁₀ and NO₂ by the proposed extended compliance dates, in line with the Government's policy approach, and sooner if possible.

1.5. Vision

The Mayor's vision for air quality:

To protect the health of Londoners and enhance their quality of life by significantly improving the quality of the air we breathe in London. This will:

- Make London a more pleasant place to live and work in
- Reduce the burden on health services in the capital
- Enhance London's reputation as a green city – making it more attractive to tourists and businesses
- Make London cleaner whilst safeguarding its biodiversity.

This Air Quality Strategy sets out how the Mayor will achieve his vision. It explains the actions that the Mayor will take to reduce air pollution in the capital using the powers available to him and sets a framework for boroughs to take action. It also sets out how the Mayor will encourage other organisations and authorities, including the European Union, central and local government and the business community, to take action to improve air quality in London by implementing this Strategy.

1.5.2. The first priority is to achieve in Greater London EU limit values for local air pollutants, PM₁₀ and NO₂; and the objectives set by the Government in its Air Quality Strategy. This will be achieved by the continuation of the measures listed at paragraph 1.1.5 above that are already announced or underway, as well as by undertaking the further measures included in this Strategy, namely:

- Reducing emissions from transport by:
 - Encouraging smarter choices and sustainable travel behaviour
 - Promoting technological change and cleaner vehicles
 - Reducing emissions from the public transport and public transport fleets
 - Using emissions control schemes to reduce emissions from private vehicles.
- Targeting air quality priority locations by:
 - Adopting local measures, including trialling new processes (such as the use of dust suppressants)
 - Using action days to encourage behaviour change and reduce pollution in priority areas.
- Reducing emissions from homes, business and industry by:
 - Promoting and delivering energy efficiency schemes
 - Using the planning system to reduce emissions from new developments

- Updating and implementing best practice on construction and demolition.
- Increasing awareness of air quality issues by:
 - Improving access to information about the health impacts of poor air quality
 - Directing information about poor air quality to those most at risk.

A full list of policies and proposals is available at Appendix B to this Strategy.

1.5.3. Once limit values have been achieved, it is important that further action is taken to reduce concentrations, as poor air quality below limit value levels still has the capacity to damage human health and biodiversity. For this reason many of the measures in this Strategy will reduce concentrations of PM₁₀ across London, even though all of outer London already complies with limit values for PM₁₀. It also sets out measures that will continue to improve air quality in the longer-term up to 2031.

1.6. Policy development and analytical process

1.6.1. A number of potential measures were considered for inclusion in this Strategy. The likely impact of these on reducing emissions to air was considered using an emissions model. The most effective potential measures were then analysed in more detail, taking into account their feasibility and the extent to which they would contribute to meeting other Mayoral objectives such as reducing carbon dioxide emissions, improving transport choices or promoting economic growth.

1.6.2. The Mayor has a legal responsibility in preparing and revising his Air Quality Strategy to have regard, among other matters, to the effect the Strategy would have on: the health of people in Greater London, health inequalities in Greater London, climate change and the consequences of climate change and the achievement of sustainable development in Greater London. These criteria and others, including consistency with national policies, the Mayor's other strategies and the availability of resources, were considered in the appraisal of potential measures. Appendix A shows how the Strategy considers these issues. An Integrated Impact Assessment was undertaken to inform development of this Strategy, and the impact of the proposals and policies on a range of indicators covering health, the environment, the economy and equalities, and social inclusion was taken into account. Box 2 sets out the policy development principles incorporated in this Strategy.

Box 2: Policy development principles

Targeted – policies and proposals should be targeted at the key sources of emissions to maximise effectiveness and ensure value for money.

Smart – policies and proposals should be smart, securing improvements using incentives and ‘easier wins’ first, but recognising that, in some cases, more challenging measures may be needed.

Cross-cutting – the Strategy should capture the potential air quality benefits from measures in other Mayoral strategies and, in turn, the policies and proposals included here should be structured to maximise cooperative benefits for other Mayoral policy objectives.

Flexible – policies and proposals should retain some flexibility to enable the Mayor and those involved in delivery to respond effectively to the challenges and issues that emerge and to take account of changing best practice.

Collaborative – many policies and proposals in this Strategy require the co-operation of others in order for them to be successfully delivered. In London, the Mayor, boroughs and other stakeholders each have their role to play in improving air quality. Consideration is also given to the encouragement of measures that could be implemented by other authorities, including the Government and the European Union.

Fair – policies and proposals should reflect the need for everyone to play their part. However, those producers of high levels of emissions should be expected to contribute more towards improving London’s air quality. Where possible, compliance costs for individuals and businesses should be minimised with disincentives balanced with incentives.

Timely – urgent action is required to meet EU limit values. It is therefore important that short-term, targeted measures are introduced early, alongside longer-term measures that will bring about sustained and widespread improvements in air quality in Greater London.

1.7. The health impacts of poor air quality

1.7.1. In recent years, a number of studies have established the link between poor air quality and health in urban areas. In particular, it is clear that long-term exposure (that is, exposure across the entire life span of an individual) can contribute to the development of chronic diseases and can increase the risk of respiratory illness (see Box 3).

1.7.2. Modelling⁸ shows that the measures in the Strategy will result in significant reductions in pollution concentrations across Greater London, which will have important health benefits. The Mayor will also work with boroughs to implement measures to reduce levels of emissions at locations where exposure to pollution is high. Research has shown that people living in deprived areas are disproportionately affected by air pollution, in part because these areas tend to be near busy roads which have higher levels of air pollution caused by road traffic. Measures included in this Strategy will reduce emissions along main roads, improving the health of people who live at these locations, which will help to reduce health inequalities. The Mayor will also work with London boroughs to identify those areas where people may be most at risk from air pollution and, wherever possible, focus air quality improvement action in these areas.

Box 3: The health impacts of poor air quality

Particulate matter (PM): PM aggravates respiratory and cardio vascular conditions. Research shows that particles with a diameter of ten microns and smaller (PM_{10}) are likely to be inhaled deep into the respiratory tract. As smaller particles can penetrate deeper in the respiratory tract, the health impacts of $PM_{2.5}$ are especially significant.

Nitrogen dioxide (NO_2): At high levels NO_2 causes inflammation of the airways and long-term exposure can affect lung function and respiratory symptoms. It can also increase asthma symptoms. The health impacts of NO_2 are however less well understood than those of PM_{10} .

Further information can be found in the study commissioned by the GLA into the health impacts of poor air quality in London.

- 1.7.3. Over recent years, a number of approaches have been taken to estimating the health impacts of poor air quality. In particular, there were uncertainties about the impacts of different types of pollution, the impacts of previous exposure to high concentrations, and the duration of exposure required to have an effect on health. In 2009, the Government's advisory group, the Committee on the Medical Effects of Air Pollutants (COMEAP), published a report into long-term exposure to PM_{2.5} and its impact on mortality⁹. The report examines evidence from cohort studies in the USA and other emerging research, and concludes that air pollution has a greater effect on mortality in the UK than previously thought. However, there is still considerable uncertainty around the precise link between pollutant concentrations and mortality.
- 1.7.4. In 2010, the House of Commons Environmental Audit Committee¹⁰ published its report on air quality in the UK, which included evidence that estimated that air pollution could be contributing to as many as 50,000 deaths in the UK per year. This is broadly in line with results of a study commissioned by the Mayor, which suggested that around 4,300 deaths per year in London are partly caused by long-term exposure to PM_{2.5} (which is widely acknowledged as being the pollutant which has the greatest effect on human health)¹¹. Both studies used the COMEAP approach to reach these conclusions. Some of these deaths may be due in part to gradual damage to health from exposure to high levels of pollution in the past – so that even if there was no pollution present in the atmosphere, there would still be some deaths as a result of past damage. It should also be noted that this study is based on total PM_{2.5} levels within London, some of which is due to non-human sources and some of which, as in any major city, is likely to be background pollution, including pollution blown in from outside the capital. Clearly eradicating the problem will be a huge challenge, though tackling it must be a priority.
- 1.7.5. The contribution of air pollution to the severity of illness and to the costs on health services and wider society are not yet well understood by the medical and scientific community. There is no agreed methodology for assessing the costs that air quality imposes on the National Health Service (NHS).
- 1.7.6. A number of surveys have been carried out to estimate the willingness of people to pay to avoid the adverse health impacts of poor air quality. These have been used as the basis for estimates of the health costs of air pollution. No London specific studies have been carried out, but the Government estimates that the economic cost of the health impacts of poor air quality in the UK is around £15 billion, within a range of

£8-17 billion¹². This would suggest that in London the economic cost of the health impacts of poor air quality could be as high as £2 billion. Accordingly, reductions in emissions and exposure are likely to generate significant savings in health budgets and therefore are worth investing in purely on the basis of preventative health care.

1.7.7. The House of Commons Environmental Audit Committee has recommended that the Government should urgently quantify the impact of morbidity and the cost to the NHS of poor air quality. The Mayor also believes that it is important that research into the costs to society of mortality caused by poor air quality is accelerated, so that methodologies can be incorporated into cost benefit assessments for policies. The Committee also called on the Government to improve understanding of the health effects of exposure to NO₂. The Mayor strongly supports these recommendations, and encourages the Government to include this information, along with information on mortality, in methodologies for formally assessing the costs and benefits of policy options so that investment in air quality improvement policies can be better justified.

1.8. The impacts of poor air quality on the natural and built environment

1.8.1. Poor air quality can also affect biodiversity. Research has shown that local traffic emissions contribute substantially to exceedance of levels of pollution which damage vegetation at roadside conservation sites¹³. Long-term exposure to pollution can restrict the growth and development of plants and trees. Increased nitrogen deposition is known to reduce plant diversity in natural and semi natural ecosystems¹⁴. Effects of pollution are seen through visible symptoms of tree decline, discolouring and susceptibility to diseases. This is a particular risk at designated Special Areas of Conservation (SACs) within London, such as Epping Forest and Wimbledon Common, though other sites could also be at risk. Reductions in concentrations of NO_x in particular would therefore contribute to the protection of these habitats and help to achieve the objectives of the Mayor's Biodiversity Strategy.

1.8.2. Some of the clearest visible evidence of air pollution is provided by building soiling. Particles are deposited on building surfaces, leading to them being discoloured. NO_x deposited on buildings can also make them vulnerable to accelerated weathering. No studies have identified a financial cost on the impact of air pollution on biodiversity or the built environment in London. These might, however, be significant as a result of the increased need for building maintenance and cleaning.

1.9. Air pollution and climate change

- 1.9.1. Improving air quality can also help combat climate change. Ozone, which is caused by pollutants such as NO_x and volatile organic compounds (VOCs) reacting in sunlight, is a powerful greenhouse gas which contributes to global warming directly and by reducing carbon uptake by vegetation. Black carbon, which is part of the overall mass of particulate matter emitted by diesel engines through incomplete combustion, contributes to climate change by absorbing heat. By making vehicles, homes and workplaces more energy efficient, this Strategy will also contribute to achieving the objectives of the Mayor's draft Climate Change Mitigation and Energy Strategy.
- 1.9.2. Climate change will also have an impact on air quality. Longer, hotter summers could increase the frequency and severity of summer smogs, though wetter winters may reduce contributing emission concentrations.

1.10. Delivering the Strategy – the role of the Government and other organisations

- 1.10.1. The Mayor is committed to taking affirmative action to improve air quality in London and considers the measures included in this Strategy to be practicable and feasible. The GLA's modelling shows that by 2011, measures included in this Strategy will enable EU limit values for PM₁₀ to be achieved in all locations in Greater London. However, action by the Mayor alone will not allow limit values for NO₂ to be met in parts of inner London and around Heathrow Airport by 2015. This is because:
- A significant amount of the pollution that contributes to poor air quality in the capital - especially in central London – is blown in from outside Greater London.
 - The Mayor has limited powers to promote policies and incentives that affect the type of vehicles using London's roads. Therefore action to encourage the manufacture and use of cleaner vehicles is needed by the Government and the EU.
 - The Mayor has limited powers to control certain emissions that affect air quality in Greater London, such as those produced by the overground rail network, airport operations and industrial processes.
- 1.10.2. The GLA Act recognises that others have their part to play in implementing the Strategy and requires the Mayor to include information about the measures that other bodies and persons are to be encouraged by him to take for that purpose. For these reasons, this Strategy includes measures that the Mayor encourages and expects other

organisations, including the Government, to implement to improve air quality in London. The Mayor and the Government are working together on a shared approach to tackle air pollution in London. The Mayor will submit to the Government information on measures that he will take to reduce concentrations of NO₂ in London, to assist the Government in developing its action plan, which will be required to be submitted as part of the NO₂ time extension application to the European Commission. Further investment in air quality improvement measures is required by the Government to reduce concentrations of NO₂ in London.

- 1.10.3. There are measures included in this Strategy that are required to be implemented by boroughs. The GLA will continue to work closely with them to ensure that they have the necessary technical support and data to manage local air quality effectively. The Mayor will also continue to work with authorities in the health sector, so that emissions reduction measures are coordinated to ensure that improvements in air quality have the maximum possible benefits for health.

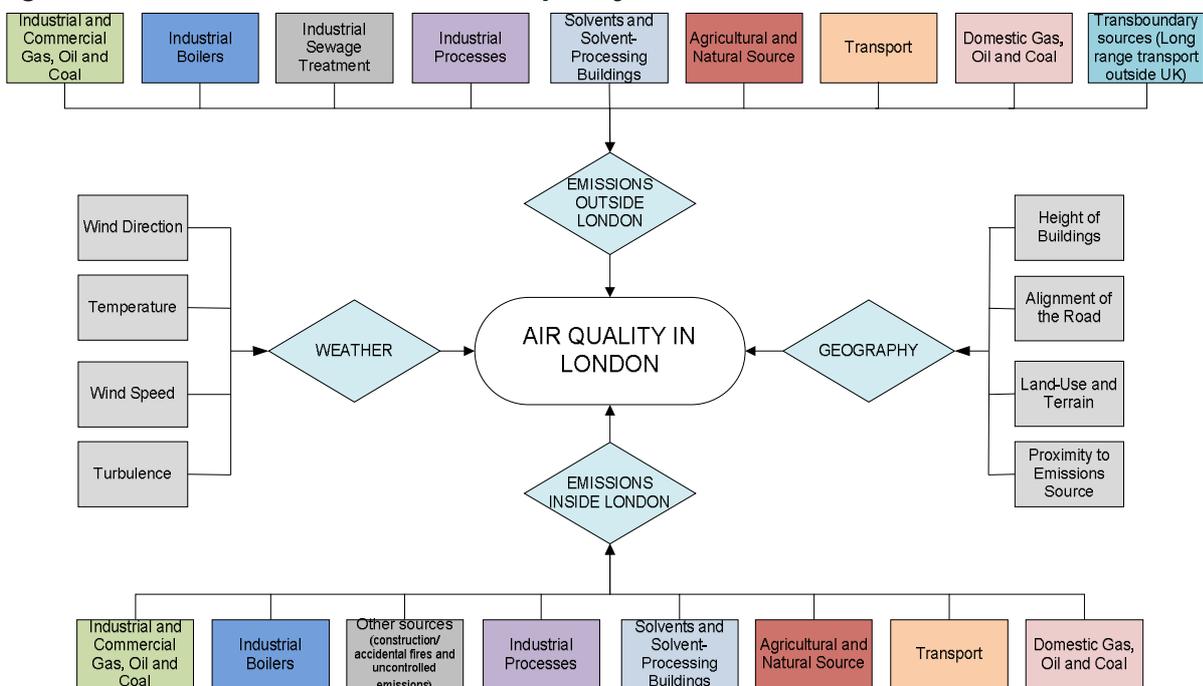
2. London's air quality

2.1. What influences London's air quality?

2.1.1. This chapter gives an overview of the emissions that affect London's air quality (notably PM₁₀ and NO₂), the sources of air pollution emissions and concentrations, recent trends in London's air quality and forecasts of future air quality in London. Understanding these elements helps to ensure that the implementation of the policies and proposals in this Strategy will direct remedial action to the right areas and be effective in reducing emissions to improve London's air quality. Further detail is set out in Appendix C.

2.1.2. London's air quality is affected by a number of factors, including the weather, geography and emissions sources from both inside and outside London (as shown in Figure 2.1).

Figure 2.1: Influences on London's air quality



Weather and climate

2.1.3. The weather can have a significant impact on London's air quality. The air temperature and amount of sunlight can affect chemical reactions that result in new pollutants (known as secondary pollutants) being formed in the atmosphere. Rain can remove pollution from the air and also wash away or dampen dust that may otherwise be re-suspended into the air. Wind can disperse emissions, but can also carry pollution into Greater London from Europe and further afield, depending on wind direction.

2.1.4. Winter pollution episodes tend to occur during periods of low wind and cold ground level temperatures, which trap pollution in London. In the winter of 2007, London experienced its worst wintertime NO₂ episode in ten years¹⁵. Summer pollution episodes can also occur during hot sunny periods, which favour the production of new secondary pollutants and when the prevailing wind is carrying already polluted air from the continent. The influence of weather and climate change on levels of air pollution in London can also be seen through modelling. In the summer heatwave of 2003, London experienced four separate pollution episodes, each lasting one week. These conditions were replicated across much of Europe. The Air Quality Expert Group (AQEG) estimates that there were 700 additional deaths¹⁶ in the UK during this period due to prolonged and elevated levels of ozone and PM₁₀.

2.1.5. Due to inevitable climate change, London is expected to experience more variable weather conditions such as longer, hotter summers and wetter winters, though the occurrence of these is difficult to predict. Increased rainfall in the winter months means that winter air pollution episodes should become less common, although longer and hotter summers are likely to increase the frequency and severity of summer pollution episodes. Whilst prediction of seasonal weather patterns is uncertain this Strategy provides the medium-term policies which will result in reductions of emissions that can contribute to climate change.

Geography

2.1.6. The geography of a location can also influence air quality. In general, air pollution levels decrease further away from sources as the emissions are dispersed. At roadside locations pollution levels usually decrease rapidly away from the kerb. In the urban environment, buildings can have a significant impact on the dispersion of pollution, trapping emissions within the 'street canyon', causing elevated pollution levels. This effect is dependent on the strength and direction of the wind compared to the alignment of the road, the orientation and location of junctions, and the height of

nearby buildings. Other aspects of the streetscape, including street planting and barriers, may affect dispersion of pollutants and influence local air quality. Pollution tends to be highest close to major roads across London, in central London, and near Heathrow airport and surrounding roads.

2.2. Sources of air pollution in London

2.2.1. Both human activity and natural sources can affect air pollution in London. Road, air and rail transport, shipping, domestic and commercial heating, industry and power generation all generate polluting emissions; while natural sources including wind-blown sea salt, sand or soil also contribute to air pollution levels.

2.2.2. Pollution can travel great distances; for example, $PM_{2.5}$ can reach London from sources such as the Sahara up to 8,000 km away¹⁷. Therefore the incidence of emissions of air pollution originating from outside London is also important in understanding pollution concentrations within London. Indications are that emissions from outside London may account for around 40 per cent of NO_2 concentrations in London¹⁸. Data from the air quality monitoring site in Marylebone Road in central London indicates that about 40 per cent of PM_{10} concentrations there originate from outside London, rising to 55 per cent during air pollution episodes when daily mean concentrations¹⁹ are above $50\mu g/m^3$. Tackling these 'non-London' emissions at source is therefore also important to cleaning up London's air. Sources such as aviation, rail, shipping and industrial sites do not constitute a significant portion of London-wide emissions to air, but they can make a critical contribution to local air pollution hotspots.

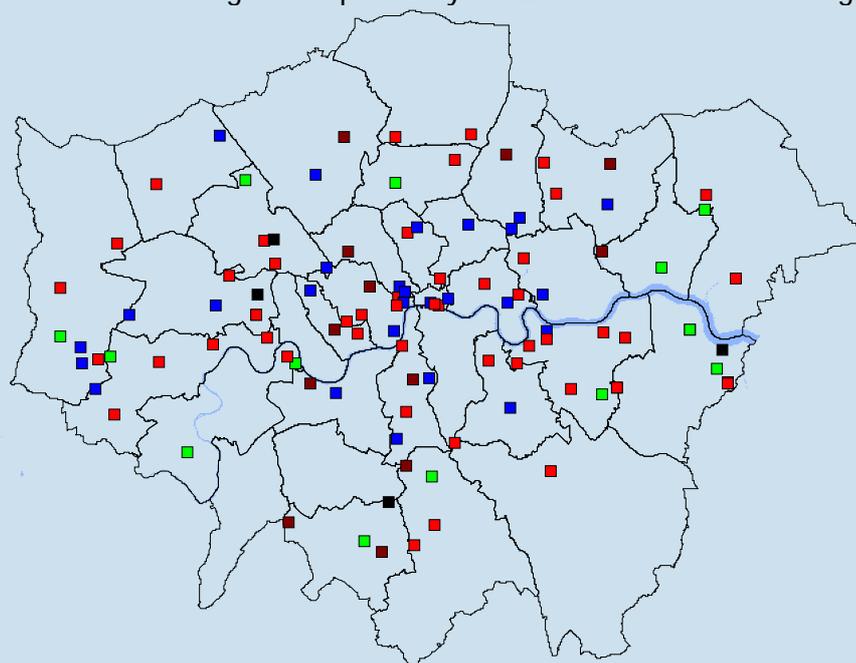
2.2.3. Many sources of emissions contribute to London's air quality. In the immediate vicinity of roads, however, particularly within 20m or so, road traffic emissions sources dominate the pollution profile; therefore, this Strategy recognises that reduction of emissions from road traffic is vital to improving air pollution.

Box 4: How we monitor air quality and emissions in London

London's air quality is continuously monitored at over 100 different locations including kerbside, roadside, urban background, suburban and rural sites (see definitions below). The majority of these sites are operated and funded by Boroughs as part of their Local Air Quality Management duties and they provide vital information about current and historic trends of air pollution in London.

The London Air Quality Network (LAQN) is coordinated through King's College Environmental Research Group and the data is disseminated through a number of media including their website (www.londonair.org.uk), email alerts, news feeds and mobile phone applications. The site includes data from other monitoring sites in London including Defra sites (which are used for the purposes of reporting UK compliance with EU Limit Values), as well as some located outside London.

The locations of monitoring sites reported by the LAQN are shown in the figure below.



LAQN Monitoring Sites (2006-2009)
by Site Type (# Sites)

Industrial	(4)
Kerbside	(16)
Roadside	(63)
Suburban	(16)
Urban Background	(37)

Monitoring Sites Classification

Kerbside	Sites with sample inlets within 1m of the kerb of a busy road. Sampling heights are within 2-3m of the ground.
Roadside	Sites with sample inlets between 1m and 5m of the kerbside. Sampling heights are within 2-3m of the ground.
Urban Background	Urban locations away from major sources and broadly representative of town/city-wide background concentrations, e.g. urban residential areas.
Suburban	Sites typical of residential areas on the outskirts of a town or city.
Rural	Rural locations distanced from major population centres, roads, industrial areas or other pollution sources.
Industrial	Sites where industrial emissions make an significant contribution to pollution levels

Box 5: The London Atmospheric Emissions Inventory

The GLA compiles the London Atmospheric Emission Inventory (LAEI) on an annual basis and this database provides information on emissions from all identifiable pollution sources in Greater London. The current LAEI includes emissions data for the 'base year' 2008 and projections for years 2011 and 2015. The monitoring data and the LAEI form the basis of the policy analysis for this Strategy.

The 2008 version of the LAEI includes an update of Heathrow emissions including both ground based and elevated aircraft related emissions, as well as airside vehicles, car parks and stationary sources such as heating/energy plant. DfT statistics on aircraft movements between 2002 and 2008 were used to estimate the changes in aircraft related emissions.

Since the production of the public consultation draft of the MAQS, Heathrow Airport Ltd has undertaken an update of the Heathrow Emissions Inventory (HEI), although this was not available in time for modelling undertaken to inform this Strategy. Whilst there are some methodology changes to emissions estimates undertaken for the HEI update, the main change is reallocation of aircraft operations since the opening of Terminal 5. This change is not spatially incorporated within the LAEI 2008 update, and Terminal 5 with its associated aprons is not represented within that inventory.

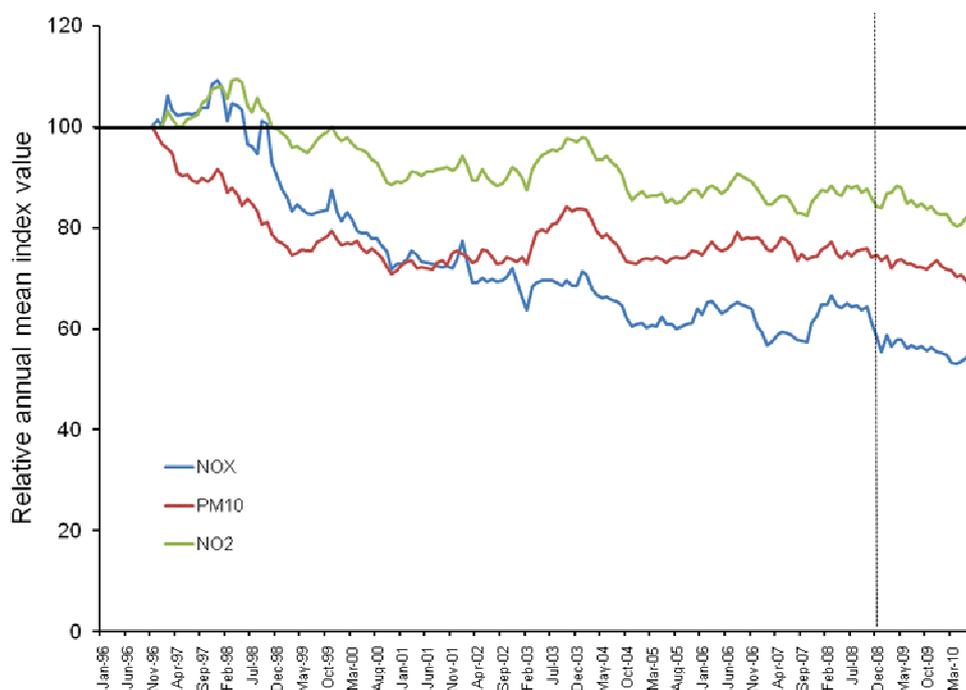
In terms of PM₁₀ emissions estimates, information provided for the HEI update indicates that the LAEI overestimates emissions. The main differences are a much greater level of ground level aircraft emissions in the LAEI, with lower emissions from elevated aircraft sources. The LAEI estimates for ground level emissions are conservative (worst case) at around 20 per cent higher than provided in the HEI update.

A comparison of emissions totals from the LAEI and HEI indicates that NO_x emissions from Heathrow are slightly underestimated within the LAEI compared with the HEI update. However, ground level aircraft emissions estimates are higher within the LAEI, and these sources are more important in terms of modelling of concentrations around the airport. Overall, the LAEI 2008 total ground based NO_x emissions are two per cent higher than the HEI and this is not significant in terms of the modelled NO₂ concentrations provided within this Strategy.

2.3. Recent trends in air quality – monitoring and modelling

2.3.1. The LAQN index, developed by King's College Environmental Research Group, provides a long-term trend for London's air quality based on monthly and smoothed measurements at a mixture of roadside and background sites at inner and outer London locations, as well as Marylebone Road. Whilst the LAQN index does not compare readily to EU Limit Values, it does provide a useful picture of the overall improvements in London's air quality since 1996 (see Figure 2.2). This shows that reductions in PM₁₀ concentrations have slowed in recent years, though there appears to have been a more rapid reduction since 2009. The LAQN index shows that NO_x concentrations have continued to reduce over time but NO₂ concentrations have levelled off, although there are also some reductions indicated since 2009. These more recent decreases are the subject of ongoing investigation and are important to understand the planning of future policy development.

Figure 2. 2: LAQN Index for NO_x, NO₂ and PM₁₀ 1996 – 2010



(NB Data is provisional from 2009 onwards)

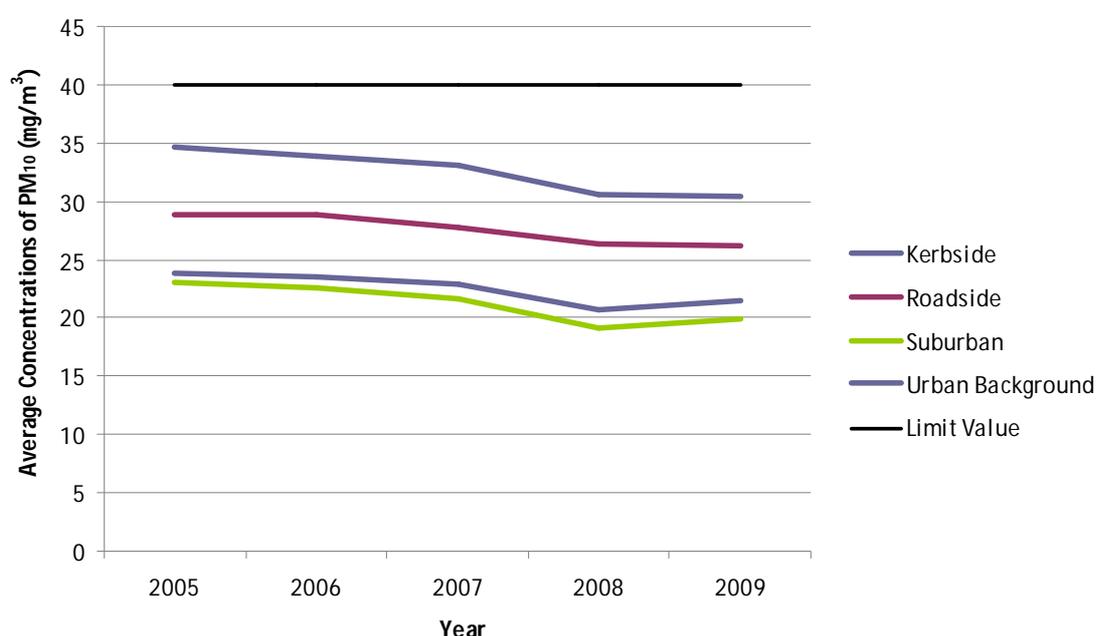
Particulate Matter (PM₁₀)

2.3.2. Concentrations monitored across London indicate that while PM₁₀ levels in London declined in the 1990s, the decline has been slower in the last decade. This trend has been seen throughout Europe. However, these trends in PM₁₀ concentrations do not reflect the predicted reductions in emissions. Despite research, there is no clear explanation for this disparity and it is something that needs to be better understood.

2.3.3. The differences between monitored and expected trends may be related to an incomplete understanding of many different aspects of PM₁₀ emissions, including: the importance of regional background levels, the primary sources of PM₁₀ in urban environments including tyre and brake wear, the performance of Euro standards in the urban drive cycle, the relative importance of secondary formation of particles including resuspension from the road surface back into the atmosphere, and the representation of the vehicle fleet and other emissions sources within emissions inventories.

2.3.4. The EU limit value for annual mean PM₁₀ (40µg/m³) has been consistently met since 1997/8 at the majority of monitoring sites in the London network. Average monitoring data for 2005 to 2009 based on all LAQN sites shows that the trend in average PM₁₀ concentrations in London since 2005 (averaged across all site types) has reduced by around 12 per cent at kerbside sites and eight per cent at background locations (Figure 2.3) although ongoing trends are less clear.

Figure 2.3 Trend in annual averaged PM₁₀ concentration in London since 2005 (µg/m³)



2.3.5. In 2009 the annual PM₁₀ limit value was met at all but one monitoring site across London (Vauxhall Bondway Interchange which is partly affected by local ventilation sources). The more stringent EU limit value for daily mean PM₁₀ concentrations is met at the majority of monitoring locations in London, but in the past few years has been exceeded intermittently at a small number of sites. The causes of exceedences vary for each site, but include proximity to waste management sites (due to resuspension of particles from vehicles or processes on site) or temporary local circumstances such as road works or construction. Other exceedences have been at kerbside monitoring sites next to some of London's busiest roads (including the Marylebone Road monitoring site).

2.3.6. During 2010 (as of October), the majority of monitoring sites continue to meet the EU Limit Values (daily and annual) for PM₁₀ except at three locations related to waste sites, and two kerbside sites (Vauxhall Bondway and Upper Thames Street). Although these sites are not used by Defra for reporting of compliance nationally, as part of this

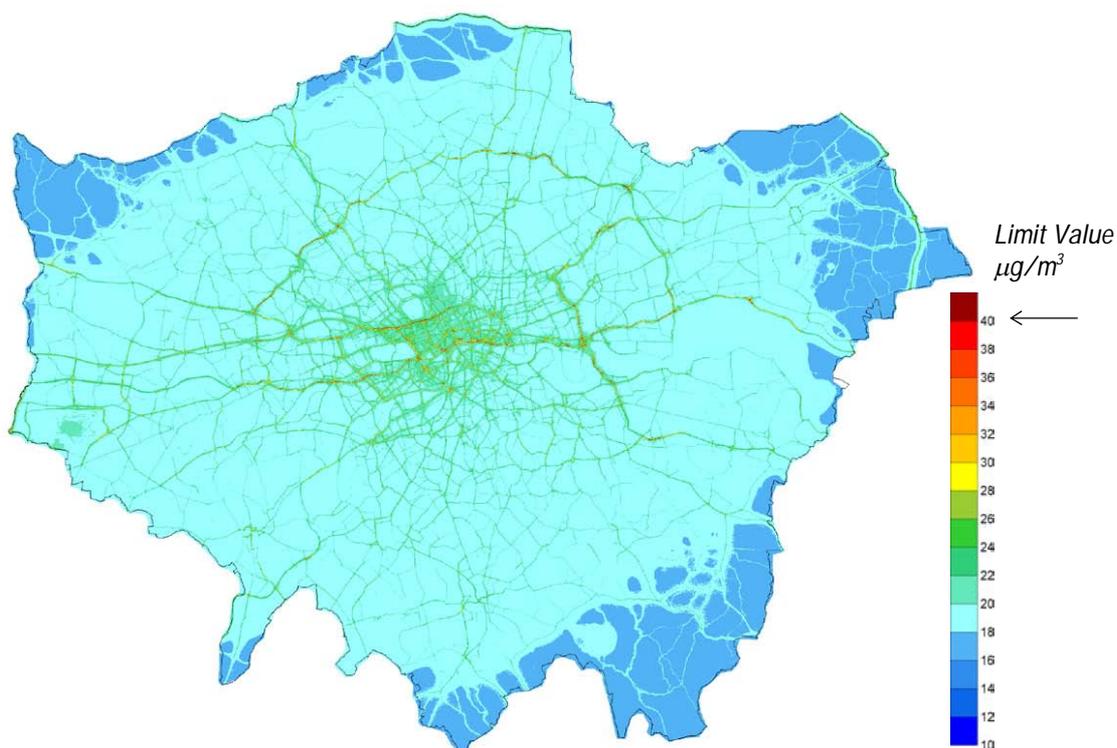
Strategy targeted local measures are being considered in order to reduce monitored levels at these locations.

2.3.7. Whilst London's air quality monitoring network is extensive it is only feasible to monitor at selected locations across London. Modelling of pollutant concentrations can be undertaken on a much wider basis and is used to determine the air quality in London and help identify other areas where pollution is high, such as close to major roads.

2.3.8. To inform development of this Strategy, updated modelling has been undertaken based on 2008 emissions and monitoring from across London. The general methodology for this modelling is provided in Appendix C. The results for PM₁₀ in 2008 are shown in Figure 2.4 and Figure 2.5.

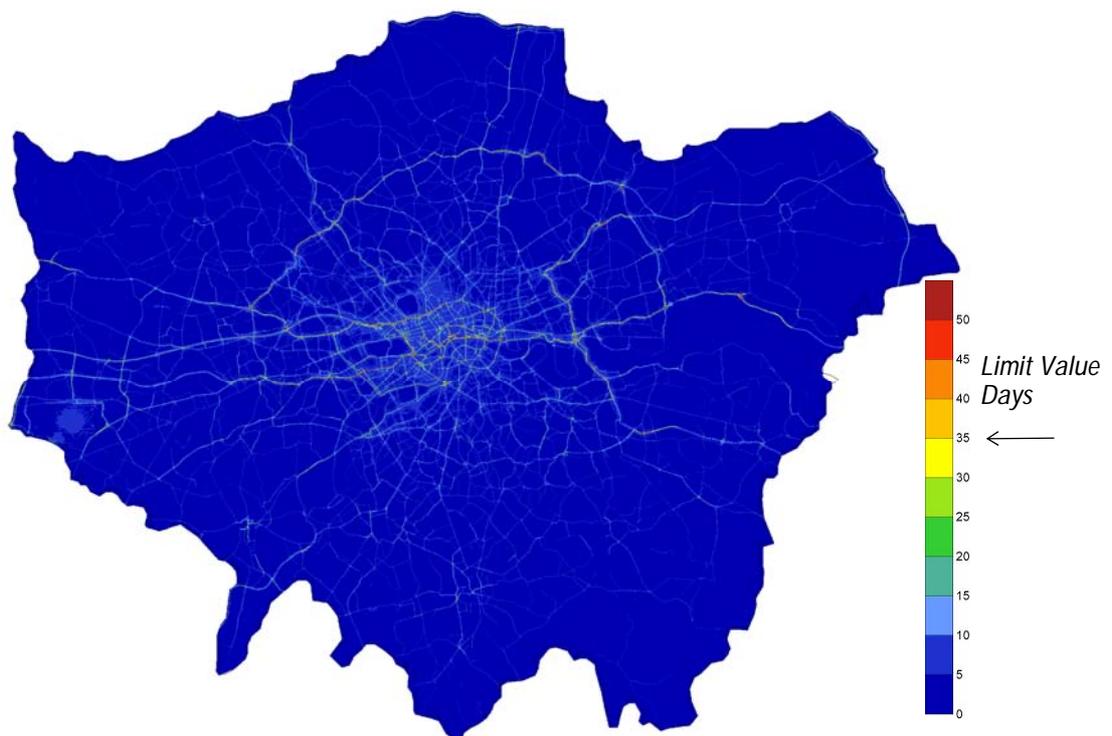
2.3.9. The modelling shows that the vast majority of London already meets the EU Limit Value for annual mean PM₁₀ (shaded blue, green, yellow and orange in Figure 2.4). It can be seen that the highest concentrations are close to and restricted to major roads. Whilst pollutant concentrations of greater than 40 µg/m³ are shown on the map, the vast majority of these occur within the carriageway of roads and at kerbside of junctions. Even if these locations still exceeded 40 µg/m³ in 2010, they would not represent a breach of the Air Quality Standards Regulations 2010.

Figure 2.4 Modelled PM₁₀: annual average concentrations⁸ (µg/m³) for the year 2008



2.3.10. Almost all of London already meets the EU limit value for daily mean PM₁₀ concentrations except at the kerbside of some of London's busiest roads (highlighted red in figure 2.5). The modelling results are in line with monitoring throughout London. As with PM₁₀ annual mean concentration modelling, there remain some locations that are shown to have exceeded the daily mean limit value in 2008. However, even if these locations still exceeded the daily mean limit value in 2010, they would not represent a breach of the Air Quality Standards Regulations 2010.

Figure 2.5: Modelled Number of days when average PM_{10} concentrations⁷ were above $50 \mu\text{g}/\text{m}^3$ in 2008



Fine Particulate Matter ($PM_{2.5}$)

2.3.11. The EU limit values for $PM_{2.5}$ were only transposed into domestic law in 2010; however, as the focus on $PM_{2.5}$ as an air pollutant has increased in recent years in relation to health impacts, the number of $PM_{2.5}$ monitoring sites across London has also increased. There are twelve sites which are able to provide a long-term trend with concentrations being monitored for three or more years since 2003. Of these monitoring sites, eleven have recorded decreasing concentrations. Concentrations at the kerbside site in Marylebone Road have remained relatively stable since 2003.

2.3.12. Concentrations monitored at all sites since 2003 met the $PM_{2.5}$ limit value of $25 \mu\text{g}/\text{m}^3$, which has a compliance date of 2015. Aside from the kerbside site in Marylebone Road and a roadside site in Greenwich, all monitored concentrations since 2003 have also met the stage 2 limit value of $20 \mu\text{g}/\text{m}^3$, which has a target date of 2020.

2.3.13. The EU exposure concentration obligation of $20\mu\text{g}/\text{m}^3$, to be met by 2015, only applies at background locations and not roadside or kerbside locations. Between 2003 and 2008, concentrations were monitored at a few such locations for three or more consecutive years; all had concentrations below the exposure concentration obligation.

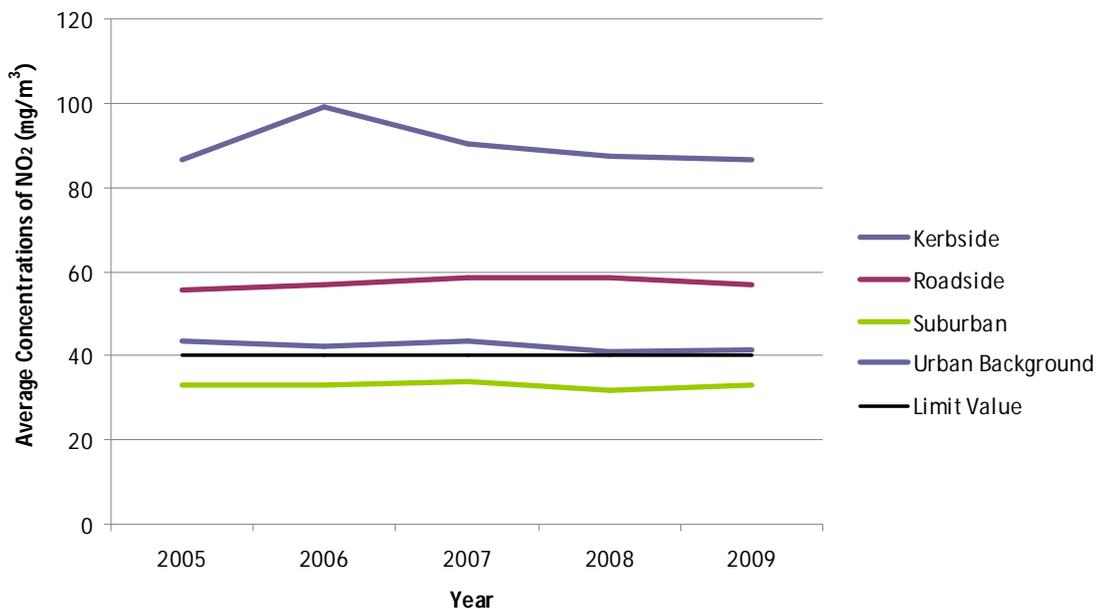
2.3.14. Modelling of $\text{PM}_{2.5}$ concentrations is not yet routinely undertaken in the UK, the main obstacle being the limited monitoring data set with which to verify modelling results. However, due to the importance of $\text{PM}_{2.5}$ in emerging air quality policy, modelling has been undertaken to support the development of this Strategy.

2.3.15. Air quality modelling for 2008 indicates that the $\text{PM}_{2.5}$ stages 1 and 2 EU limit values ($25\mu\text{g}/\text{m}^3$ in 2015 and $20\mu\text{g}/\text{m}^3$ in 2020, respectively) were met across almost all of London including all urban background locations. It is encouraging that London is predicted to meet the $\text{PM}_{2.5}$ EU limit value at locations where there is relevant public exposure as this is the fraction of particulate matter that is widely acknowledged by the scientific and medical community as being the main airborne pollutant of concern for human health.

Nitrogen Dioxide (NO_2)

2.3.16. Monitored NO_2 concentrations across London indicate that in general, levels declined until 2002 but have been relatively stable since. Recent average trends in London across different types of monitoring sites in London are shown in Figure 2.6, and further historic trends based on the LAQN index are shown in Figure 2.2.

Figure 2.6: Trend in annual averaged NO₂ concentrations in London at monitoring sites since 2005 (µg/m³)



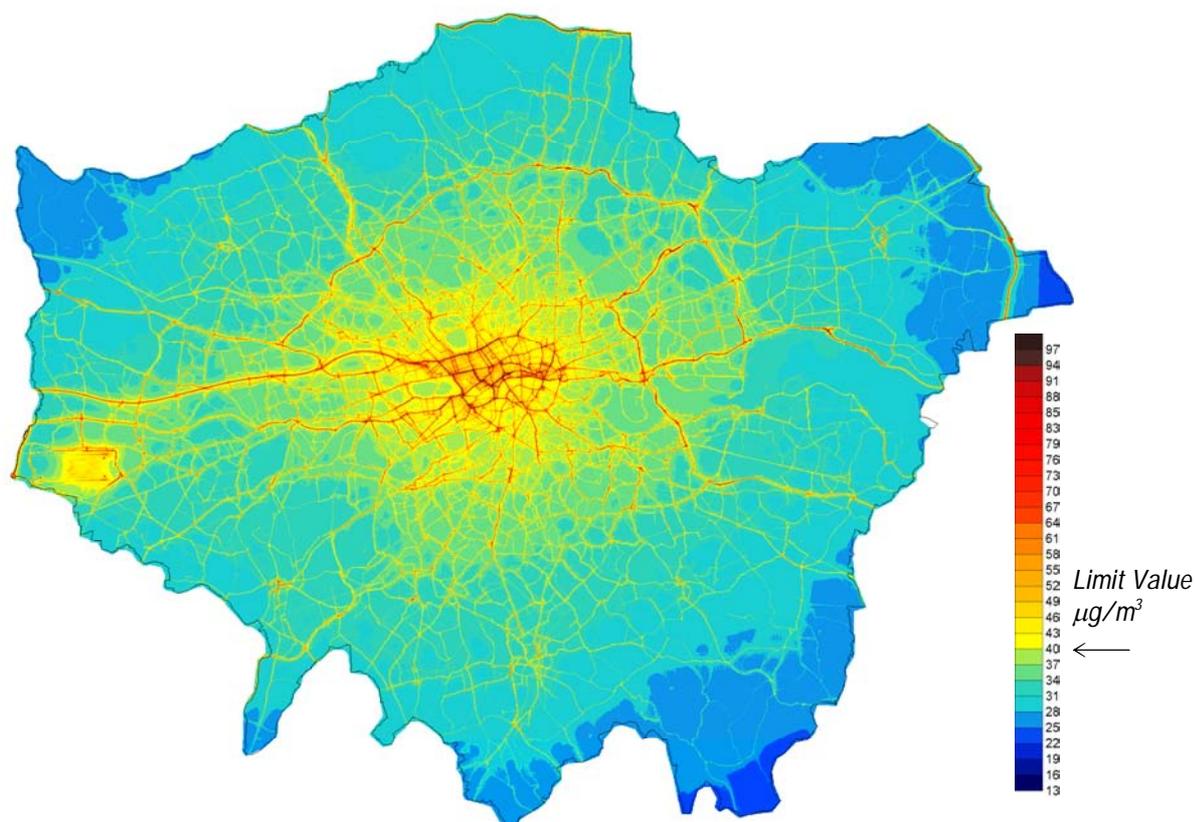
2.3.17. Outside central London, roadside concentrations have not declined since about 1997, and have been at a steady level over recent years. Annual mean concentrations monitored at the kerbside site in Marylebone Road have increased by around 30 per cent since 2002.

2.3.18. The EU limit value for annual mean NO₂ has been consistently met since 1999 at urban background monitoring locations in outer London. Urban background (also classed as Airport on Heathrow Airwatch) sites near Heathrow Airport are generally below the EU limit value, except along the northern perimeter of the airport. However, urban background concentrations monitored in inner London and at roadside locations across London, including outer London, have exceeded the limit value since 1999 and continue to exceed that limit value. This lack of a decline in NO₂ concentrations is typical of all urban environments and is observed in other European cities; it is not just a London problem.

2.3.19. Dispersion modelling of NO₂ concentrations provides a wider picture of air quality across London than can be represented by monitoring alone. Modelling for NO₂ in 2008 shows that there remain areas that exceed the annual mean NO₂ (2010) EU limit value, (shaded yellow and red in Figure 2.7). In some of these locations the limit value

is exceeded by a factor of two or more. Concentrations at a number of kerbside or roadside monitoring sites near busy roads also exceed the hourly mean EU limit value, although these short-term concentrations can be strongly influenced by local conditions and sources (e.g. road works and traffic diversions) and are generally confined to locations within a few metres of main roads. This is not untypical for an urban environment and is also observed in other UK and European cities.

Figure 2. 7: Modelled NO₂ annual average concentrations⁸ ($\mu\text{g}/\text{m}^3$) for the year 2008



2.4. Projected future 'base case' air quality – modelling

2.4.1. Air quality modelling has been used to project future air quality across London excluding the impact of the new policies and proposals identified within this Strategy. This future base case modelling scenario is based on trends of expected changes in emissions from transport and non-transport sources, including vehicle replacement and improved emissions standards. The base case incorporates Transport for London (TfL) and the Department for Transport's (DfT) latest projections for traffic flows and speeds, fleet composition and emissions factors. The model provides an indication of the scale of the air quality challenge that needs to be met by this Strategy. The methodology for the modelling is outlined in Appendix C.

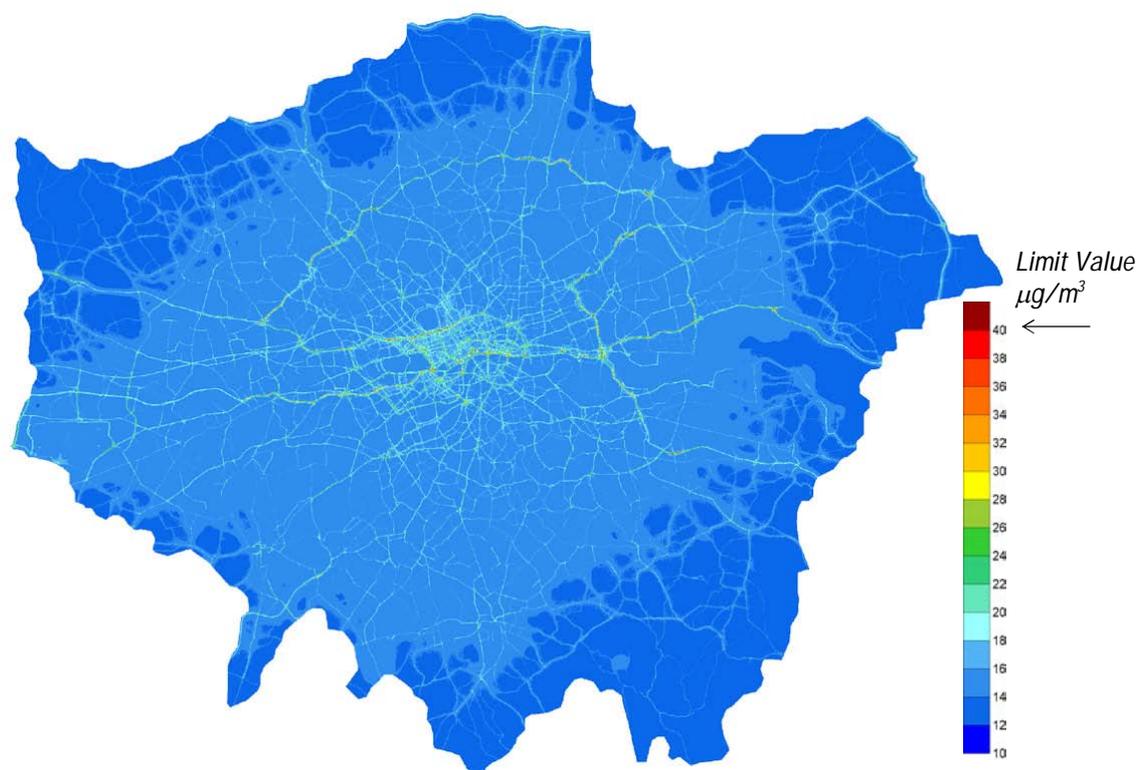
2.4.2. The Government is in the process of applying to the European Commission for time extensions for compliance with the PM₁₀ limit values until 2011 and NO₂ limit values until 2015. Accordingly, the future base case scenarios for this Strategy have been modelled for 2011 for PM₁₀ and 2015 for NO₂.

2.4.3. Future base case modelling includes the removal of the Western Extension (WEZ) to the Congestion Charging Zone, and the introduction of hybrid buses into the TfL bus fleet. The impact on London's air quality of the full policies and proposals identified in Chapters 3 and 4 of this Strategy (those that are reasonably quantifiable) is described in Chapter 5.

Particulate Matter (PM₁₀) concentrations

2.4.4. Predicted concentrations of annual mean PM₁₀ for London in 2011 are shown in Figure 2.8 and indicate that London will continue to meet the EU limit value for annual mean PM₁₀. There remain a small number of locations within the carriageway of roads and at kerbside of junctions where pollutant concentrations are predicted to be greater than 40 µg/m³. However, the limit values apply to locations where pollution will most affect people, such as on pavements, rather than in the middle of the road. The locations with predicted concentrations above 40 µg/m³ do not therefore constitute a breach of the Air Quality Standards Regulations 2010.

Figure 2.8: Modelled PM₁₀ annual mean concentrations⁸ (µg/m³) for the year 2011



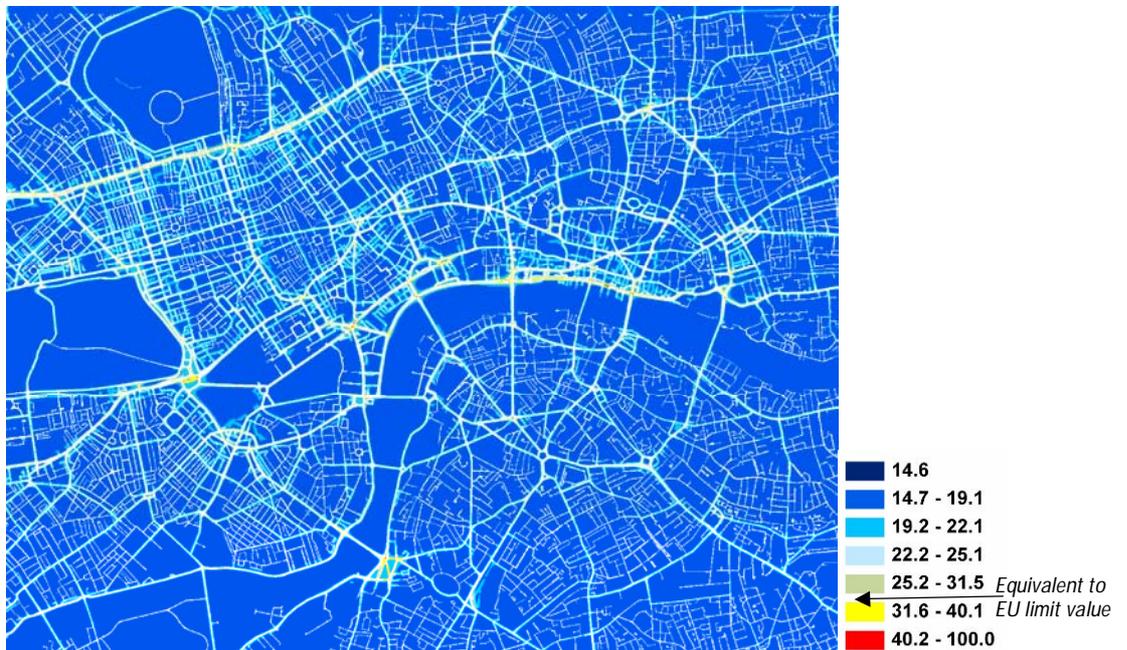
2.4.5. Predicted annual mean concentrations of PM₁₀ for London in 2011 are shown in Figure 2.9²⁰. Modelling suggests that there will be no locations representative of the exposure of the general population that will exceed 40 µg/m³ in 2011, so there will be no breach of the 2010 Air Quality Standards Regulations or EU limit value. However, there remain some areas near the busiest roads in central London where the margin between modelled concentrations and the limit value is very small. These locations are:

- Marylebone Road
- Euston Road
- Marble Arch
- Hyde Park Corner

- Victoria Embankment
- Upper Thames Street
- Tower Hill.

2.4.6. The high concentrations at these locations are caused by a number of factors including the make up of the vehicle fleet passing through the location, traffic speed and local road geography. In order to address these priority locations the Strategy focuses on three interconnected corridors. These are Marylebone Road/ Euston Road, Marble Arch to Hyde Park Corner and Embankment to Tower Gateway.

Figure 2.9: Modelled PM₁₀ annual mean concentrations for 2011 (µg/m³) without the Strategy⁸



2.4.7. The identification of these priority locations is based on the modelling undertaken for this Strategy and has not included concentrations within the road carriageway, which is consistent with the approach set out in the Air Quality Standards Regulations 2010. However, the model additionally considers locations representing worst case concentrations including junctions and kerbside. This analysis provides a useful initial focus for further action to reduce PM₁₀ levels to increase the certainty of meeting the EU limit values. However it is still desirable to continue lowering London wide PM₁₀ concentrations below the EU limit values to reduce health impacts and to improve quality of life. The majority of the policies in this Strategy aim to provide for improvements in air quality beyond the requirements of limit values for PM₁₀.

Fine Particulate Matter (PM_{2.5}) concentrations

2.4.8. Projecting forward to 2015 indicates that annual mean PM_{2.5} limit values are likely to be met throughout London even without further action to reduce emissions. Modelling also indicates that the EU PM_{2.5} exposure concentration obligation of 20µg/m³ in background locations is likely to be met in the target year of 2015.

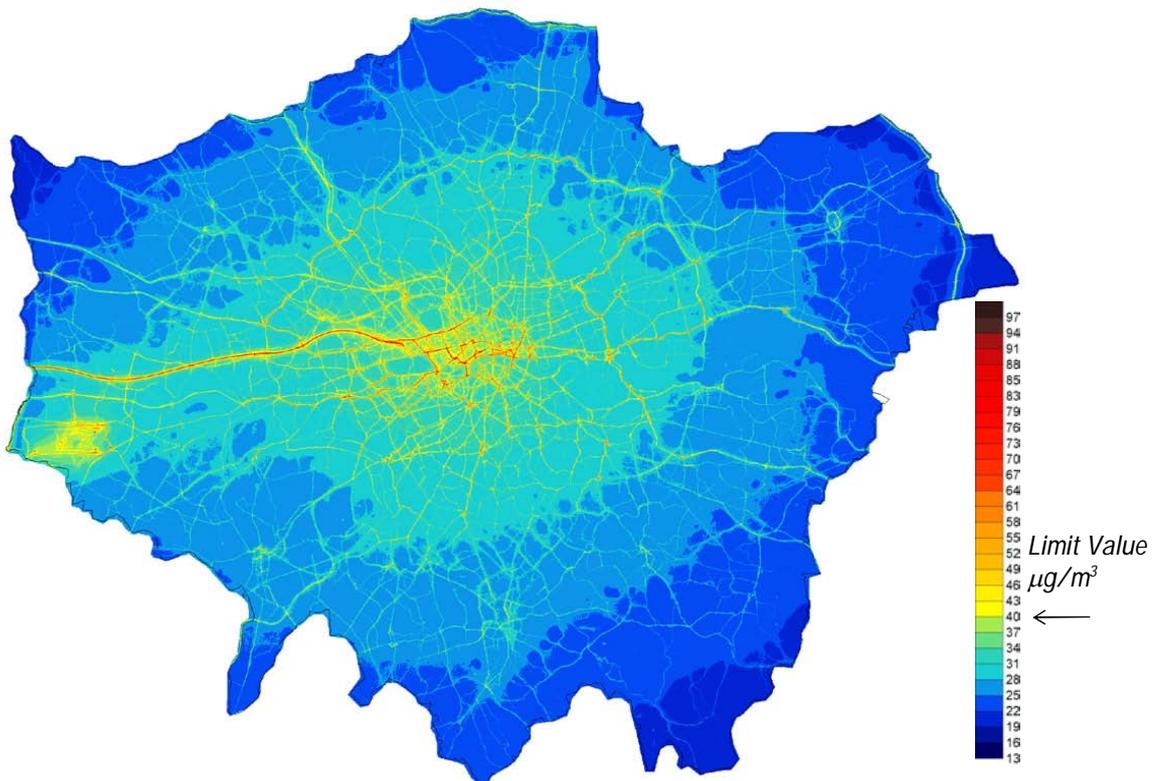
2.4.9. As with PM₁₀, to determine how challenging the PM_{2.5} targets are in London, the relative contributions of emissions inside and outside London need to be considered. Emissions from outside London contribute greatly to high concentrations of PM_{2.5} in central London and it is not expected that these will fall significantly in the next few years.

Nitrogen Dioxide (NO₂) concentrations

2.4.10. Projecting forward to 2015, Figure 2.10 indicates that the annual mean NO₂ concentrations will exceed the limit value across less than five per cent of London (shaded yellow, orange and red in Figure 2.10), including roads in central and inner London and in the vicinity of Heathrow airport. Modelling for 2015 also indicates the limit value for hourly mean NO₂ concentrations may also be exceeded near a few major roads in central London

2.4.11. Action taken by the Mayor alone to improve air quality in Greater London will not be sufficient to meet the limit values by the proposed extended target date of 2015. The level of NO₂ in London is contributed to significantly by sources outside London as well as sources within London over which the Mayor has limited control. Effective action to reduce NO₂ concentrations therefore needs to be taken at national and European level if EU limit values for NO₂ are to be met in Greater London.

Figure 2.10: Modelled NO₂ annual mean concentrations⁸ (µg/m³) for the year 2015 (baseline)



2.5. Focus on sources of emissions in London

2.5.1. London's air quality is affected by sources of pollution from inside and outside London. This section focuses on the projected sources of emissions within London if no further action to improve air quality is taken beyond that which has already been announced or is underway.

Particulate Matter (PM₁₀) Emissions

2.5.2. The areas identified as being at most risk of exceeding the PM₁₀ EU limit value in 2011 are within central London, so this section focuses on PM₁₀ emissions in that area, although problems are recognised close to some waste sites (see policies 3 and 10).

2.5.3. Road transport is the dominant source of PM₁₀ emissions within central London, contributing around 79 per cent in 2008, 80 per cent in 2011 and 75 per cent in 2015.

The contribution to PM₁₀ emissions of different vehicle types also varies significantly at different locations in London, according to variations in the composition of traffic using the roads. Figures 2.11 and 2.12 show the contributions from all sources to PM₁₀ emissions in central London.

2.5.4. Significant sources of PM₁₀ within central London include cars (responsible for 23 per cent of central London emissions, growing to 27 per cent in 2015), taxis (responsible for 25 per cent in 2008 and largely unchanged by 2015) and LGVs (responsible for 10 to 20 per cent). Considerable efforts have been made to reduce the emissions from buses (through the Bus Emissions Programme for London's buses and LEZ) and bus emissions now contribute less than 10 percent to PM₁₀ in central London. Proposals for reducing emissions from these sources are set out in Chapter 3.

2.5.5. Around 35 per cent of PM₁₀ emissions in 2008 from road transport in central London come from tyre and brake wear, and this is projected to increase to around 40 per cent in 2011, and 55 per cent in 2015 as exhaust emissions of PM₁₀ are expected to reduce. Emissions of PM₁₀ from car tyre and brake wear are now greater than those from car exhaust emissions and over the next five years, this is also expected to become the case with heavier vehicles such as HGVs and buses. This reflects the fact that measures have been taken to reduce emissions from exhausts but similar reductions have not been achieved for tyre and brake wear emissions, largely because there are no technical improvements affecting tyre and brake wear on the market.

Figure 2.11: PM₁₀ emissions from all sources⁸ in central London in 2008

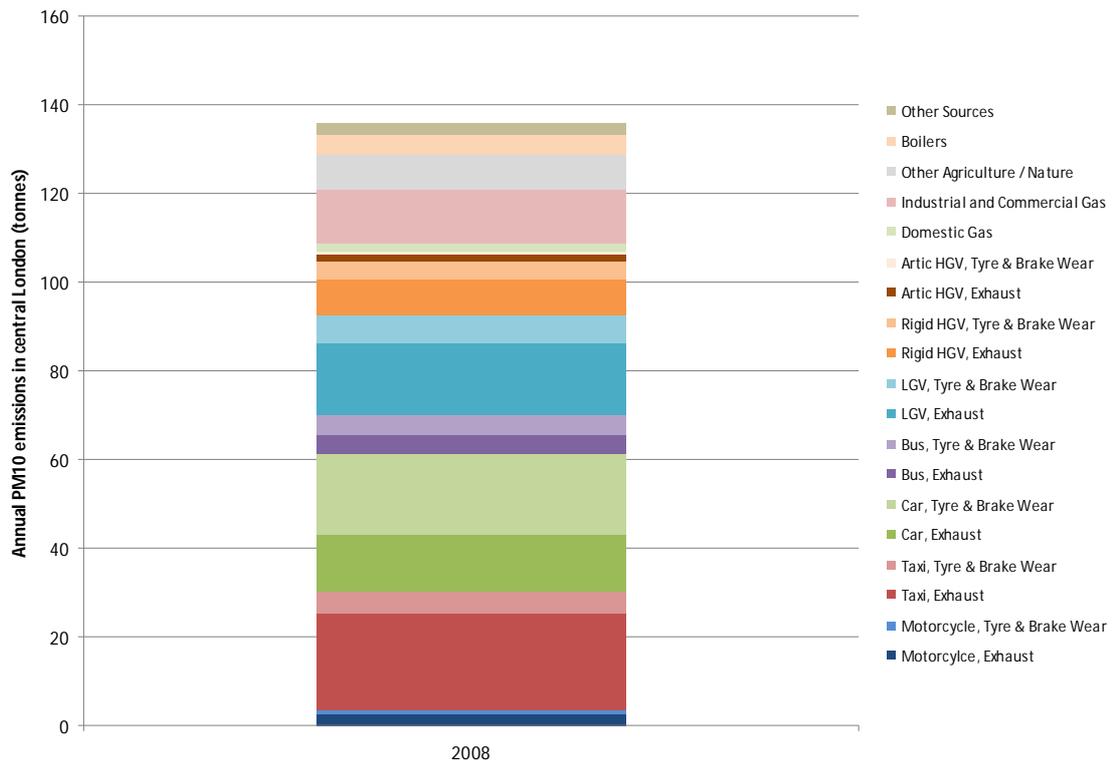
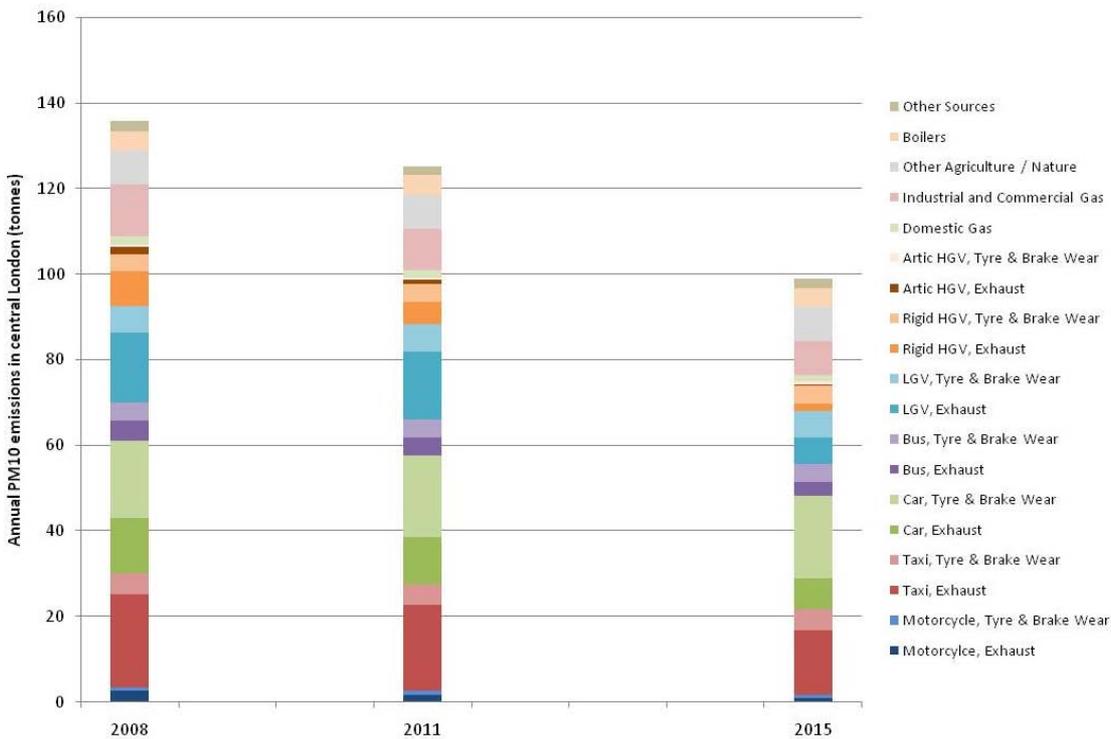


Figure 2.12: PM₁₀ emissions from all sources⁸ in 2008, 2011 and 2015 in central London



Fine Particulate Matter (PM_{2.5}) Emissions

2.5.6. Road transport is the main source of PM_{2.5} emissions in London, contributing around 80 per cent in 2008, with a slightly lower proportion in 2015 (see Figure 2.13 and 2.14). The remaining 20 per cent comes from non-transport emissions, with industrial and commercial gas combustion contributing the biggest proportion in central London. LGVs, cars and taxis each contribute around 20 per cent of PM_{2.5} emissions in central London in 2008, whilst buses contribute about five per cent. Cars and taxis contribute around 25 per cent of road transport emissions in 2015, with the contribution of LGVs reducing to less than 15 per cent. Tyre and brake wear are important sources of PM_{2.5}, contributing around a quarter of road traffic PM_{2.5} emissions in 2008, and this proportion is estimated to be larger at about 40 per cent by 2015.

Figure 2.13: PM_{2.5} emissions⁸ from all sources in central London in 2008

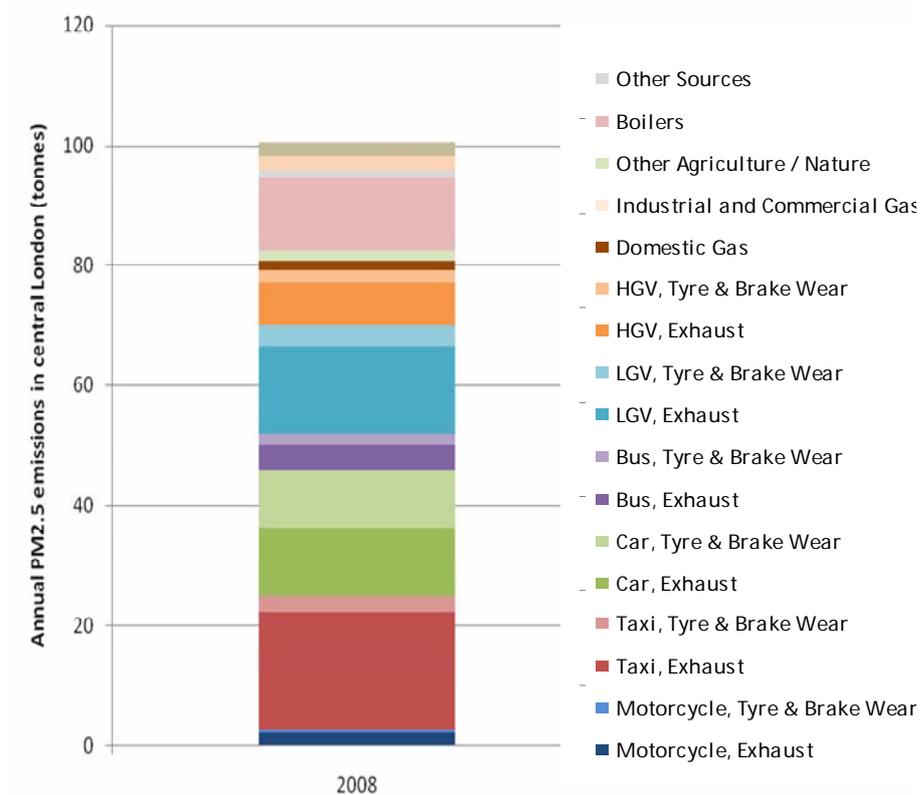
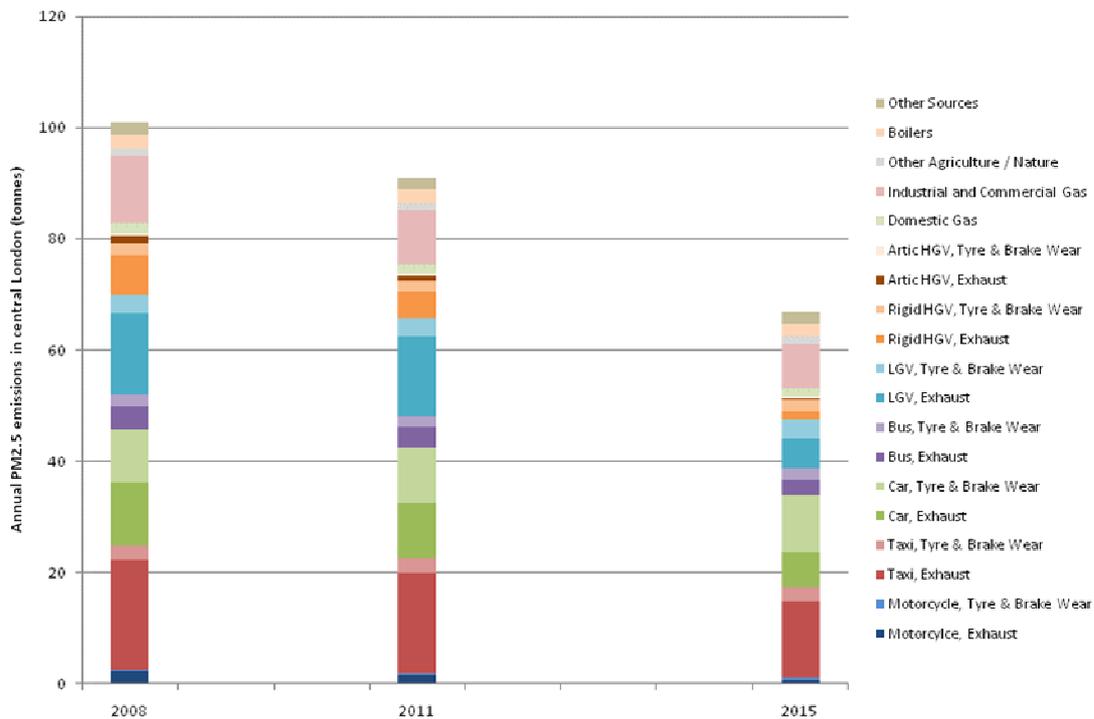


Figure 2.14: PM_{2.5} emissions from all sources⁸ in 2008, 2011 and 2015 in central London.



Nitrogen Oxides (NO_x) emissions

2.5.7. Emissions from road transport and domestic gas dominated Greater London's NO_x emissions in 2008, contributing 46 per cent and 22 per cent respectively (as shown in Figures 2.15 and 2.16). By 2015, road transport is expected to contribute around 30 per cent to NO_x emissions in Greater London, whilst the proportion of domestic gas is expected to be greater (about 27 per cent). NO_x emissions from commercial gas, industry, airports, and rail are all estimated to contribute around seven to eight per cent of emissions in 2008, growing to around 10-11 per cent by 2015.

2.5.8. The contribution to NO_x emissions from these different sources varies significantly in different parts of London. Emissions from domestic gas are of increasing significance in inner and outer London but contribute less than 10 per cent in Central London. Gas use from workplaces is more significant in central London, contributing around 30 per cent in 2008 and 2015. Emissions from airports and rail in central London are negligible overall (about one per cent or less respectively). Road transport

emissions are responsible for a higher proportion of emissions (about 60 per cent) in central London than in outer London.

- 2.5.9. Road transport contributes a significant proportion of NO_x emissions within London, estimated at 46 per cent in 2008, and about 30 per cent by 2015, based on existing forecasts of changes to vehicle exhaust emissions and fleet. In central London, road transport is a much more significant source at 60 per cent because the contribution from other sources, especially industry, domestic gas, rail and airports is comparatively lower there.
- 2.5.10. Across Greater London, cars contribute the highest proportion of road transport emissions (around 35 per cent in 2008, and 30 per cent in 2015), whilst HGVs are also significant (about 30 per cent in 2008 and 25 per cent in 2015), along with buses which are estimated to contribute 21 per cent in 2008, and just under 30 per cent in 2015.
- 2.5.11. However, when looking at road transport emissions within central London (Figure 2.17), buses become the most significant source of NO_x emissions at around 40 per cent in 2008, growing to just below 50 per cent in 2015. Cars contribute around 20 per cent, as do heavy good vehicles, and taxis and vans each contribute about 10 per cent of emissions of NO_x.
- 2.5.12. The contributions to NO_x emissions of different vehicle types also vary by location depending on the type of road use. For example, a road which also serves as an important bus route will have a higher proportion of bus related emissions, whilst a road on the London Freight Network will have a significant proportion of emissions from heavy good vehicles. The policies set out in Chapter 3 aim to reduce the emissions from road transport across London but also recognise that improvements to emissions from different parts of the vehicle fleet will be more important in some areas.

Figure 2.15: NO_x emissions⁸ from all sources in Greater London in 2008

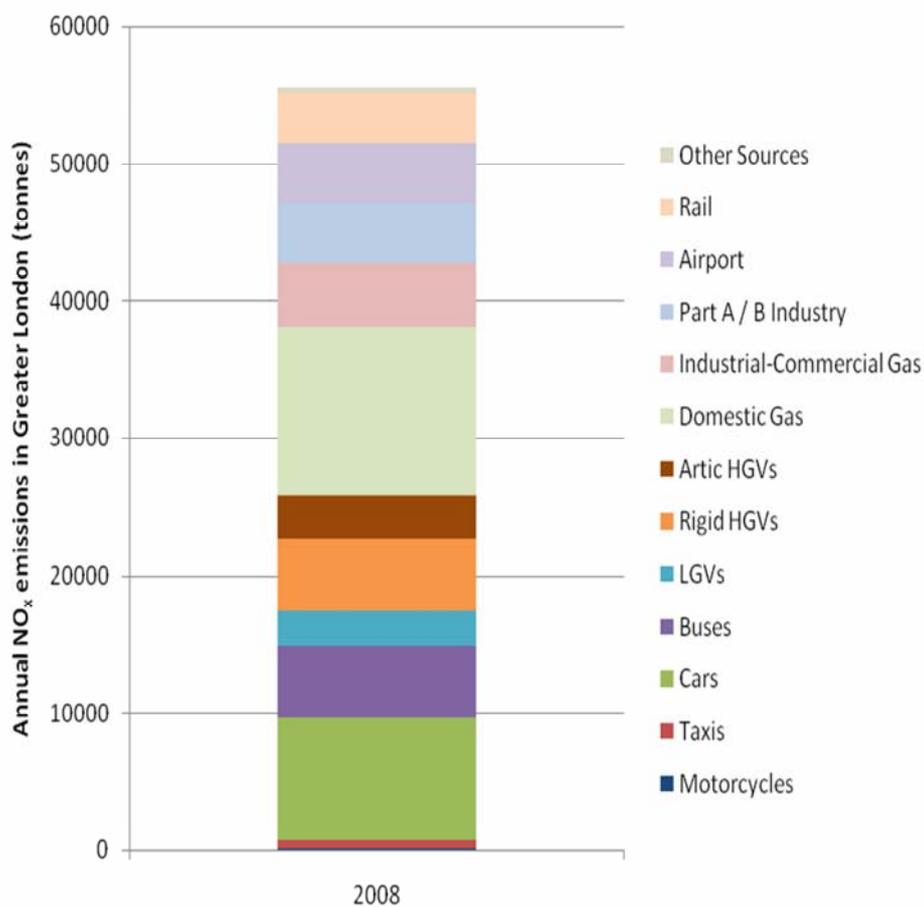


Figure 2.16: NO_x emissions from all sources⁸ in Greater London in 2008, 2011 and 2015

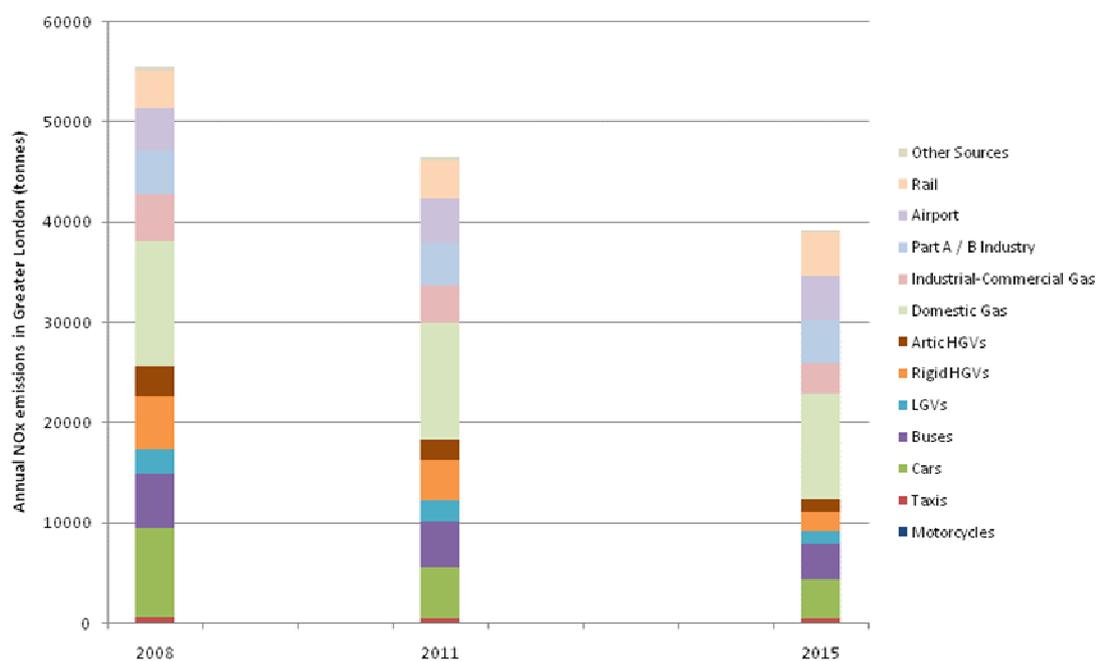
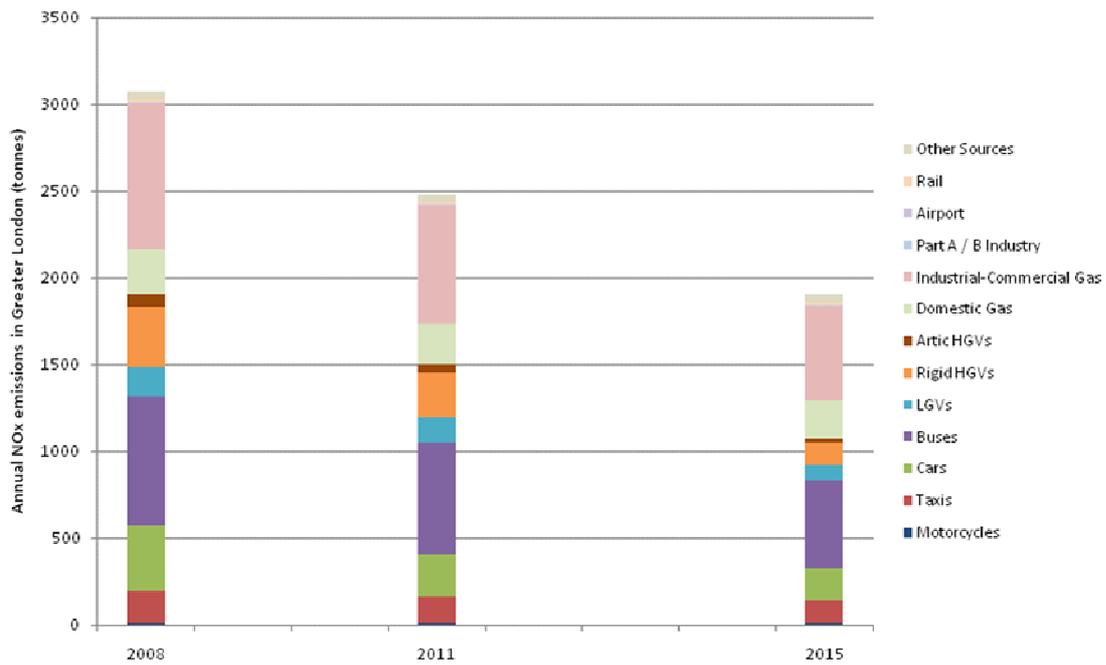


Figure 2.17: NO_x emissions⁸ in Central London in 2008, 2011 and 2015



3. Transport Measures

3.1. Actions underway or planned

3.1.1. The Mayor, through the GLA group, is already committed to taking bold action to reduce air pollution from London's transport system. Through TfL's Business Plan, billions of pounds are being invested in transport measures that will directly or indirectly help reduce emissions of PM and NO_x. Much of the detail of these measures is set out in the Mayor's Transport Strategy. Measures already proposed or underway include:

- Promoting mode shift to cleaner forms of transport, including ongoing investment in public transport through schemes including Crossrail and the tube upgrades and significant increases in cycling and walking infrastructure, including the Barclays Cycle Hire scheme in central London and twelve Barclays Cycle Superhighways.
- Bus emissions programme – introduction of diesel-electric hybrid buses
- Encouraging and funding car clubs, especially those which provide plug-in hybrid and electric cars
- Maintaining roads in good repair to reduce the contribution of particulate matter from road surface wear
- Smoothing traffic through better traffic management and street works coordination through measures including the London Permit Scheme
- Making it easier for boroughs to implement and enforce 20 mph zones
- Operation of the London LEZ, which reduces emissions from the oldest, most polluting diesel vehicles
- The continuation of the original central London Congestion Charging scheme which reduces traffic congestion and associated emissions and helps promotes mode shift.
- Promotion of electric vehicles – working with partners, the Mayor aims to reach 100,000 electric vehicles on London's roads by 2020, if not sooner.

- 'Greening' of transport fleets – for example, phased replacement for Dial-a-Ride vehicles and the introduction of electric vehicles into the GLA Group fleet.
- Freight Delivery and Servicing Plans - being promoted by TfL to reduce unnecessary freight mileage and increase freight efficiency.

3.1.2. In spite of these measures and the improvements in recent years that have already been seen, transport in London remains the most significant source of air pollutant emissions, contributing substantially to the overall concentrations of air pollution and adversely affecting public health. Consequently, further reductions in air pollutant emissions from transport are needed. While action to reduce transport emissions alone cannot remove the causes of poor air quality in London, it can play an important role in working towards the achievement of the EU limit values and delivering health benefits for Londoners.

3.2. Policies and proposals

3.2.1. The Mayor proposes a further package of air quality improvement measures for transport. This package is designed to deliver value for money. It will secure important reductions in emissions of PM, NO_x and also CO₂ while seeking to minimise as far as possible compliance costs for those that would be affected by the proposals. It also seeks to manage the additional costs to TfL to avoid shifting investment from other planned projects which are essential to support London's long-term growth and economic development. The package consists of:

- **Encouraging smarter choices and sustainable travel behaviour** (Policy 1): these are broad measures that are relatively easy to implement that will have positive air quality impacts across London.
- **Promoting technological change and cleaner vehicles** (Policy 2): these measures will deliver a new generation of cleaner, greener private vehicles.
- **Identifying priority locations and improving air quality through a package of local measures** (Policy 3): these will focus on particular areas at most risk of not meeting EU limit values as well as promoting action by boroughs and others across a range of locations with particular air quality challenges.

- **Reducing emissions from public transport** (Policy 4): these measures will focus on ensuring that public transport fleets lead by example in reducing emissions.
- **Emissions control schemes (such as additions to the London LEZ)** (Policy 5): these measures will promote further improvements in London's vehicle fleet.

3.2.2. In view of the urgent need to meet the limit values, some of these measures have been developed in parallel with the Strategy and their implementation is already underway. Other measures still require further development.

3.2.3. The scale and scope of the action taken in implementing this package of air quality improvement measures will be dependent on the resources available. In developing his Strategy the Mayor has taken account of TfL's planned investment. While the Mayor is fully committed to improving London's air quality through the transport measures set out in this chapter, these can only be delivered in full if financial support from the Government is forthcoming. Given that air quality is a problem in a number of urban areas across the country including London, and NO₂ limit values are not being met in most major cities in the UK, it is appropriate that the Government should take the necessary measures to implement this Strategy.

3.2.4. The Government is applying for an extension until 2015 for compliance with EU NO₂ limit values. The Mayor has a reasonable expectation that adequate resources will be made available by the Government to ensure compliance with these limit values within the proposed timetable. The Mayor will monitor progress by the Government in this respect and keep the relevant policies and proposals in this Strategy that require Government action under review. If this extension is not granted, the Mayor will consider whether consequential amendments or revisions are required to be made to this Strategy in order to meet the objectives of the National Air Quality Strategy and EU limit values.

Policies and Proposals

<p>Policy 1 – Encouraging smarter choices and sustainable travel</p>
<p>Vision Reduced vehicle emissions through people making smarter choices about which mode they use to travel and using vehicles as efficiently as possible.</p>
<p>Policy The Mayor, working with boroughs and stakeholders, will support Londoners and those working in and visiting the capital in making behavioural changes to the way they travel to reduce emissions and will promote more efficient use of vehicles.</p>
<p>Proposals</p> <p><i>Promoting smarter travel</i></p> <p>Working with boroughs, the Mayor will develop further smarter travel schemes and initiatives, including workplace and school travel plans.</p> <p>Working with boroughs, the Mayor will encourage increased levels of cycling through a number of schemes including the central London Barclays Cycle Hire scheme; cycle training; and delivering Barclays Cycle Superhighways from inner to central London.</p> <p>Working with boroughs, the Mayor will encourage individuals to walk more by improving the quality of the walking environment, and the provision of information, e.g. through the further roll out of the Legible London way-finding system.</p> <p><i>Promoting more efficient 'eco-driving'</i></p> <p>The Mayor will reduce emissions from vehicles over which he has influence by implementing eco-driving²¹ training for bus drivers and GLA group drivers.</p> <p>Through implementation of measures in his Transport Strategy, the Mayor will smooth the flow of traffic which will reduce emissions caused by vehicles stopping and starting.</p> <p><i>No unnecessary idling</i></p> <p>The Mayor will make London a 'no idling zone' for parked vehicles with a particular focus on buses, coaches, taxis, private hire vehicles, and delivery vehicles. He will work with</p>

boroughs and other stakeholders to target locations where idling is a particular problem, gathering information on persistent idling vehicles, providing a mechanism for reporting problem idling and improving enforcement.

The Mayor will work with the Government to ensure that the fixed penalty for idling represents a genuine deterrent.

Enabling more efficient freight movement

The Mayor, working with boroughs and businesses, will use the Freight Operator Recognition Scheme (FORS) and Delivery and Servicing Plans (DSPs) to promote best practice for reducing emissions from freight vehicles. This will include better freight management, the use of eco-driving and development of consolidation facilities.

The Mayor, working with boroughs and businesses, will support modal shift of freight from road to rail and water, through promotion of best practice and use of the planning process to protect wharves. The Mayor will also promote the local movement of small consignments by electric vehicles, cycle or on foot.

The Mayor will work with London Councils on possible changes to the London Lorry Control Scheme so that the scheme can reduce emissions of air quality pollutants and carbon dioxide, as well as minimising noise.

The Mayor will work with boroughs and developers of major schemes through the review and enforcement of Best Practice Guidance on construction and demolition sites to ensure that construction related freight is sustainably managed and disruption to other road users is minimised.

Car clubs and car sharing

The Mayor, working with boroughs, will provide on-street infrastructure (e.g. parking spaces and charge points) to support car clubs, especially those using electric or hybrid vehicles.

The Mayor, working with boroughs and employers, will promote car-sharing by making better use of journey planning technology.

Providing the right information to the public

The Mayor will provide clear information about emissions from the public transport fleet to enable people and businesses to make more informed transport choices.

The Mayor will encourage the Government to introduce schemes to provide consumers with clear emissions information for cars at point of sale.

Spatial planning

The Mayor will implement the policies and proposals of the London Plan to support a shift to public transport, including only supporting development that generates high levels of trips at locations with high levels of public transport accessibility; and continuing to explore opportunities to integrate development with interchange enhancement, particularly around major rail and underground stations.

The Mayor will support car-free developments and will use the planning process to encourage a shift towards developments that reduce the need to travel by car by encouraging infrastructure to be included within design requirements that will enable sustainable travel choices such as cycling.

The Mayor, working with boroughs will support the retention and development of appropriate logistics facilities in suitable locations which can reduce the mileage and potential congestion associated with long delivery trips, act as delivery hubs and provide more suitable sustainable onward delivery such as by waterways, electric vehicles, cycle or by foot.

Output

TfL estimates that as a result of the measures set out above and those in the Mayor's Transport Strategy, private car use in Greater London will reduce by approximately six per cent by 2031.

TfL estimates that delivering the Mayor's target to increase cycling mode share from two to five per cent by 2026 would remove around a tonne of PM₁₀ and nearly 50 tonnes of NO_x. Approximately 90,000 tonnes of CO₂ would also be saved.

Eco-driving and better route planning can deliver reductions in vehicle fuel consumption of between five per cent and ten per cent, with the potential for associated reductions in

emissions of air pollutants.

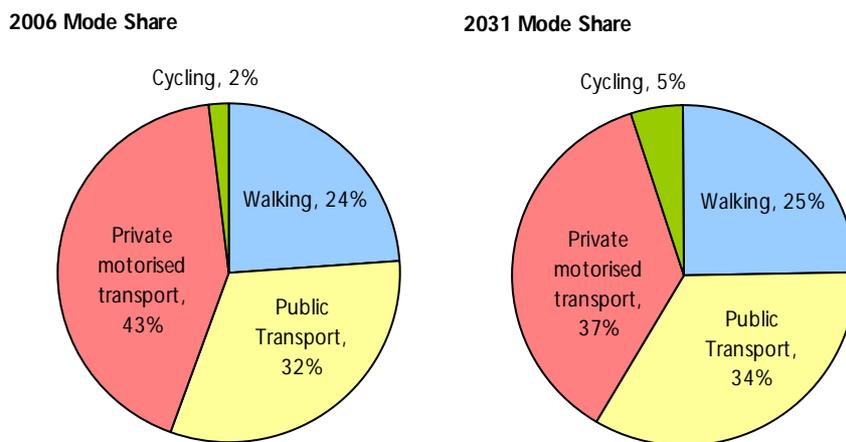
3.3. Why we need change

3.3.1. Plans for the sustainable development, regeneration and growth of London need to take account of the potential effects on existing and future air quality in order to reduce air pollution where it is currently high, and mitigate adverse air quality impacts in future years.

Promoting smarter travel

3.3.2. Too many people in London still choose to use cars for short journeys when more sustainable modes – public transport, cycling and walking – would be practical (see Figure 3.1). In order to achieve a continuing and greater shift towards more sustainable modes, it is important to provide Londoners with the necessary information and support to choose non-car modes. There have already been significant successes in this area. For example, Smarter Travel Sutton has used a range of initiatives, including personalised travel planning and work place and school travel plans which have resulted in roughly an 80 per cent increase locally in the rate of cycling in three years.

Figure 3.1: Mode share (by trips)²² within London in 2006 and 2031



3.3.3. More widely, TfL promotes smarter travel choices across London through workplace and school travel plans. In addition, TfL is introducing a number of schemes which can help encourage motorists to leave their car at home and use more sustainable modes of transport. These include the introduction of the Mayor’s Barclays cycle hire scheme in central London, the Barclays Cycle Superhighways, the biking boroughs programme and 66,000 new cycle parking spaces. More than 100,000 people signed up for the Barclays cycle hire scheme in its first three months and more than 1.5 million trips were made during that period.



Figure 3.2: Barclays cycle hire scheme

No unnecessary idling

3.3.4. Vehicles idling while parked cause unnecessary use of fuel and an increase in emissions. Idling of vehicles such as taxis, buses and coaches around transport interchanges, stands, ranks and parking areas can cause short-term high pollution levels of both NO₂ and PM₁₀. Persistent idling can also create a noisy environment,

especially for residents. Currently, it is an offence to leave a vehicle engine idling unnecessarily whilst parked under the Road Traffic (Vehicle Emissions) (Fixed Penalty) (England) Regulations 2002. These regulations enable local authorities in England to issue Fixed Penalty Notices to drivers who allow their vehicle engines to run unnecessarily while the vehicle is stationary – however it is problematic to define ‘unnecessarily’ and the penalty charge is fixed at £20, which is too low to be a powerful disincentive.

Car clubs and car sharing

3.3.5. Car clubs are becoming increasingly popular with over 100,000 members in London alone. Car clubs enable those who require occasional access to a car to have this on a pay-as-you-go basis without the need to own a vehicle. Thus members have an incentive to avoid non-essential car journeys. The Mayor, TfL and London boroughs have worked to promote car clubs through funding and by providing dedicated parking spaces. Since May 2008, the Mayor and TfL have invested more than £1million in the development of car clubs in London. As a result, London has around 80 per cent of all car clubs in the UK. Car clubs primarily use new vehicles (some use hybrids and electric vehicle trials are already underway) that are well maintained, keeping their emissions comparatively low. However, more can be done to accelerate the adoption of the cleanest vehicles and new technologies.

Enabling more efficient freight movements

3.3.6. As population and employment continue to grow, the demands for freight and servicing are expected to increase. Growth in freight movements is therefore expected, with the number of vans forecast to grow by 30 per cent between 2008 and 2031. It is therefore important that while the economic needs of businesses and residents are met, this is achieved in ways that, so far as reasonably practicable, minimise emissions of air pollutants. Tools such as Delivery and Servicing Plans (DSPs) enable activity to be better understood and managed by businesses and freight operators.

Additionally operators can join schemes such as the Freight Operator Recognition Scheme (FORS) to benchmark their performance and benefit from tools to reduce fuel usage.



Figure 3.3: LondonWaste has made use of FORS advice to achieve reductions in fuel use

Box 6: Freight Operator Recognition Scheme (FORS)

Through FORS, TfL continues to offer fuel efficiency workshops specifically tailored towards helping operators reduce the quantities of fuel they consume. In addition, FORS provides online fuel efficiency training for drivers and its members are able to access discounted Safe and Fuel Efficient Driving (SAFED) training.

These benefits supplement the FORS benchmarking system which encourages operators to monitor accurately their fuel use. The results seen by operators who embrace the concept can be striking – LondonWaste discovered that they were inflating their average Miles per Gallon (MPG) to



such an extent that they were able to justify the purchase of 18 new 44 tonne Enhanced Environmental Vehicles (EEV). The introduction of these vehicles has seen them improve their MPG further, and thus reduce their emissions by around 30 per cent.

Another FORS member, PHS Datashred, found that it was able to achieve a 10-12 per cent reduction in fuel consumption after following FORS fuel advice. FORS also advocates the adoption of electric vehicles and is in the final developmental stages of a Fuel Savings Calculator designed to allow businesses to experiment with which interventions may best suit their operation, the air quality benefit associated with each and crucially the associated cost and payback periods.

Smoothing traffic flow and providing the right information

3.3.7. In addition to measures to smooth traffic flow, including more effective management of roadworks, it is important to provide road users with better and timely information to enable them to avoid problem areas and thus further reduce the impacts of congestion.

Spatial Planning

3.3.8. Developments such as new offices, retail and housing often place significant demands on London's transport system or if located in areas of poor public transport connectivity can lead to increased car trips. This needs to be addressed to ensure that adverse air quality impacts of new developments are mitigated as far as possible and that development is both sustainable and viable.

3.4. What needs to be done

Promoting smarter travel

3.4.1. TfL ran a smarter travel scheme in 2008/09 which included advertising, merchandise, website development, PR and partnership-building. Since then, TfL has funded 340 smarter driving training sessions for employees in Richmond-upon-Thames, via Smarter Travel Richmond. These are 50 minute workplace based in-car lessons with a fully qualified instructor. TfL, working with boroughs and other stakeholders, will continue to promote smarter travel initiatives building on experience from these schemes. TfL will also continue travel planning work with schools and employers. There will be a focus on promoting walking and cycling, for example

through better information for walking; promotional events; improved and more inviting public spaces; Barclays cycle superhighways; and event days to encourage cycling. In addition, the Mayor has announced that by 2012 the Barclays cycle hire area will be extended beyond central London to include all of the Borough of Tower Hamlets as well as North Shoreditch in the Borough of Hackney. Altogether 2,000 more cycles and 4,200 extra docking points will be installed across the existing and new Barclays cycle hire area. Combined with improvements to public transport, this is expected to achieve long-term behavioural change resulting in a significant mode shift from private car use to more sustainable lower or zero-emission modes.

Promoting more eco-efficient driving

3.4.2. TfL will implement emissions-efficient driver training for bus drivers and operators of GLA Group vehicles. TfL will also work with bus operators to promote best practice of monitoring driving performance and emissions, such as through new on board systems.

Smoothing traffic flow and providing the right information

3.4.3. The Mayor's Transport Strategy sets out proposals to smooth traffic flow.

'Smoothing traffic flow' is the term used for the Mayor's broad approach for managing road congestion and, in particular, improving traffic journey time reliability and predictability. This should improve conditions for all road users. It includes measures to maximise the efficient and reliable operation of the existing road network and to minimise the impact of planned interventions on the road network, including those that have the potential to disrupt traffic flows, such as roadworks, which are being addressed by the London Permit Scheme among other measures. This requires utility companies and other organisations that want to dig up London's busiest roads to apply for a permit before they begin work. This enables TfL to plan and coordinate the timing of roadworks.

Box 7: Case study - Lane rental scheme

The Mayor, through TfL is proposing to implement a 'lane rental' scheme for works promoters and statutory undertakers wanting to excavate the most congested roads in the capital. The rental charge reflects the cost to the economy of taking temporary possession of road capacity. It aims to incentivise works promoters to reduce the number and duration of roadworks, and quicken the development of techniques that will minimise traffic disruption. The scheme identifies key junctions, times of the day and network links, where roadworks can cause significant traffic congestion and delay. The lane rental scheme, together with penalties for delay, will help to ensure that any organisation wanting to dig up London roads would make every effort to cause as little disruption as possible. The Mayor is encouraging the Government to push through the necessary legislation to enable the scheme to commence in 2012.

Providing the right information

3.4.4. The Mayor will provide information on emissions to air from the public transport fleet. Providing information in an easily accessible way, so that people can make comparisons between modes and even particular vehicles, will enable more informed choices about their journeys and the vehicles they use.

3.4.5. Information on CO₂ emissions is available at the point of purchase for new cars. This is displayed by the car retailer. While similar information is available for air quality emissions, this is not currently displayed in the same way as for CO₂. New cars will be designed to meet the latest Euro standards, but emissions of NO_x and PM₁₀ differ between petrol and diesel engines and also hybrid technologies, while older cars have varying emissions levels depending on year of manufacture and engine type. Providing better and more accessible information will encourage the uptake of newer, cleaner vehicles. The Government now makes emissions information for new cars available in the Vehicle Certification Agency's New Car Fuel Consumption and Emissions Figures booklet and website. The Mayor will work with the Government on options to make this information more easily available at the point of sale for all car makes and models in a consistent format.

No unnecessary idling

3.4.6. The Mayor, working with the boroughs, bus and coach operators and other organisations will establish a No-Idling Zone throughout London. Within this, there would be a focus on parked buses, coaches and taxis as well as particular problem

areas such as around schools, transport interchanges and major tourist attractions. Boroughs have a patchwork of powers they can use to enforce against idling vehicles but these need to be streamlined and made more flexible to make them more effective.

- 3.4.7. The London Borough of Camden is currently enforcing against idling coaches and buses using powers under the Camden (Coach Parking Places) (No. 1) Order 1992. The 1993 amendment to that order allows Camden to fine drivers leaving their engines running unnecessarily.
- 3.4.8. Under the order, a penalty can be issued when a vehicle is parked with the engine running at coach pay and display parking places in designated streets. A contravention will also occur when a vehicle is parked with the engine running at certain bus stands. Camden has authorised its Community Enforcement Officers to focus on particular problem locations such as outside the British Museum and in South End Green. The Mayor is keen to work with Camden and other boroughs, particularly in central London, to extend this approach to address idling across the whole of London.
- 3.4.9. TfL will work with boroughs and encourage the Government to improve enforcement processes and increase penalty charges. The £20 penalty for idling compares unfavourably with the £120 penalty charge issued for parking offences. The Mayor urges the Government to increase the penalty charge for idling offences, so that it is in line with that for parking offences. Raising awareness of the problem is also important, and the Mayor will work with the Government on information campaigns, for example focussing on parents who leave their cars running when picking up their children from school.
- 3.4.10. Already, TfL works actively with bus operators to enforce the no idling policy at bus stations and stands, which is a contractual requirement. This message will continue to be reinforced through contracts and during driver training and is included within the bus driver's manual. Immediate action is and will continue to be taken if unnecessary idling is observed.
- 3.4.11. Taxi idling, especially at rail termini and taxi ranks, is a particular issue. The current design of taxi ranks makes it difficult to prevent idling as taxis are required to move forward every few minutes and the stop-starting of engines can be worse for emissions. The Mayor will work with transport operators and the boroughs to address

this where practical, potentially by making taxi passengers walk along the rank to the taxi rather than the taxi moving up the rank, and by working with the taxi trade and transport operators to develop better management of these areas by methods such as marshalling and fixed fare sharing. Targeted action will also be taken at the priority locations identified in Policy 3.

- 3.4.12. In addition, informing businesses and organisations, residents, and the general public where to direct complaints about persistent idling will help raise awareness and understanding of the problem. The Mayor will set up a point of contact where members of the public can provide information on problem areas for idling, including the location of problem areas and the vehicle types that are causing the problem.

Enabling more efficient freight movements

- 3.4.13. There is no single approach to reduce emissions from the freight sector, as it is a diverse industry serving a wide range of customers. TfL will work with the industry and boroughs to study the different markets and to develop appropriate policy instruments to allow operators in all parts of the industry to make their operations cleaner. This could include the promotion of a shift to rail and river, working with operators on Delivery and Servicing Plans (DSPs), further development of FORS and incentives for the cleanest vehicles. The Mayor will work with the freight industry to investigate the potential of consolidation facilities in London to minimise the number of freight deliveries that need to be made. If lorries and vans were able to stop at consolidation centres outside central London and transfer their goods onto low emission vehicles for delivery, this could reduce congestion, emissions of air quality pollutants and carbon dioxide and save money for businesses.
- 3.4.14. Currently around 80 per cent of deliveries in London are made between 7am and 5pm. Encouraging controlled out-of-hours freight activity would contribute to less congestion and reduced emissions. Any move towards a greater proportion of out-of-hours freight deliveries must be balanced with maintaining quality of life for Londoners and keeping night-time noise in residential areas to a minimum.
- 3.4.15. The London Lorry Control Scheme (LLCS) has played an important role in reducing the impact of night-time noise from the largest freight vehicles. It was introduced in 1985 and manages the routes used by freight vehicles over 18 tonnes mgw (maximum gross weight) between 9pm and 7am and at weekends. At many sites in London, planning conditions have been used to control night-time deliveries and

where nuisance occurs, boroughs may use Noise Abatement Notices to stop activity (see Box 8). Currently freight vehicles may have to make detours through London at night to obey these regulations which can result in longer journeys, greater fuel use and higher levels of emissions. The alternative is that freight vehicles will tend to deliver during the daytime, particularly in the morning peak period, when they add to congestion and air pollutant concentrations are higher.

- 3.4.16. Over the last 25 years there have been improvements in technology to reduce noise from heavy vehicles and changes in working practices which are not reflected by the current LLCS arrangements. The Mayor is working with London Councils to explore options to amend the LLCS so that it better contributes to the full range of environmental objectives, including noise, air quality and climate change.

Box 8: Case Study: The Silent Trial Approach in Wandsworth

In 2007 Sainsbury's, the Noise Abatement Society and the London Borough of Wandsworth undertook a pilot to explore the feasibility of undertaking out of hours deliveries in London without disturbing local residents. Using a 'Silent Approach' based on a Freight Transport Association toolkit, it was agreed that night-time restrictions on vehicles delivering to Sainsbury's would be lifted between 1.30am and 3am.

During the trial, the London Borough of Wandsworth received no noise-related complaints from local residents and Sainsbury's had positive feedback from customers in-store. There were also significant environmental benefits, with Sainsbury's calculating it used 25,000 fewer litres of fuel and saved 68 tonnes of CO₂ per year. On average, each journey from the depot (round trip) was reduced by 60 minutes.

The measures used during the trial included requiring all engines to be switched off when stationary, the use of dock curtains to 'seal' noise from inside the trailer, no loading of empty roll cages, rubber matting to be installed at appropriate locations to reduce the noise of roll cages and providing a telephone line for complaints (if made) to be evaluated and acted upon immediately.

Car clubs and car sharing

3.4.17. The Mayor, through TfL and working with the boroughs will promote the use of car clubs through measures including the provision of additional dedicated parking spaces. He will also focus on incentivising the adoption of the cleanest vehicles and new technologies including electric and electric-hybrid cars by working with partners to provide a publicly accessible network of electric vehicle charging points on streets and in public and retail car parks. TfL, building on technologies such as Journey Planner, will work with employers to promote car sharing by developing mechanisms that link potential drivers and passengers.

Spatial Planning

3.4.18. Through implementation of the policies and proposals of the London Plan, the Mayor will support a shift to public transport and walking and cycling through the planning of new developments. High trip-generating developments should be located in areas of high current or planned public transport accessibility, connectivity and capacity and all developments will be planned in a way to increase the attractiveness and potential mode share of walking and cycling.

3.4.19. Car free and low car developments are now widespread across central London boroughs. Locating these developments in areas of high connectivity and near to amenities reduces reliance on cars which, if combined with car club provision gives flexibility when private transport may be needed. Innovative approaches will continue to be used and promoted to facilitate reduced reliance on cars.

Demand management

3.4.20. The Mayor is committed to the continued operation of the original central London congestion charge zone and will monitor the impact of any discounts, such as the Greener Vehicle Discount, to ensure that the congestion and environmental benefits of the scheme are being maintained. Beyond this the Mayor may consider road user charging schemes if other measures at his disposal are deemed insufficient to meet his overall transport goals and where there is a reasonable balance between the objectives of any scheme and its costs and other impacts.

Policy 2 – Promoting technological change and cleaner vehicles

Vision

Improved air quality through a new generation of cleaner, greener private and commercial vehicles operating in London with a long-term aspiration of zero tailpipe emissions.

Policy

The Mayor, through TfL, working with the Government and boroughs will promote the transfer to and use of low emission vehicles for private and freight transport.

Proposals

Supporting the uptake of low emission vehicles and delivering a switch to electric vehicles

The Mayor will support the uptake of low emission vehicles through the Electric Vehicle Delivery Plan and London Hydrogen Action Plan.

The Mayor will encourage the Government to incentivise low emission vehicles through further changes to Vehicle Excise Duty and other tax regimes, with a focus on improved air quality as well as reductions in CO₂.

The Mayor, working with the private sector and the freight industry, will promote the uptake of cleaner freight vehicles through green procurement standards.

The Mayor will encourage the implementation of pricing differentials based on vehicle CO₂ and air pollutant emissions for resident parking permits and parking charges

Scrapping or retrofitting older, more-polluting vehicles

The Mayor will encourage the Government to implement a scrappage scheme to target particular vehicles such as taxis, as well as introducing a grant scheme for retrofitting vehicles with pollution abatement equipment.

The Mayor will encourage the European Commission, the Government and vehicle manufacturers, to promote the continuing development of new technologies to reduce vehicle emissions, including the use of tyres which wear less, more sophisticated

emissions abatement technology and automatic hybrid fuel-switching.

The Mayor will use GLA Group procurement processes to encourage the uptake of low-emitting tyres when these are available on the market.

Outputs

The Mayor's vision is for London to be the electric vehicle capital of Europe, working with partners to get 100,000 electric vehicles on London's streets by 2020, if not sooner. This equates to around two per cent of the total fleet. Reductions in emissions would be significant and London would continue to benefit from increasing proportions of electric vehicles in the fleet thereafter.

3.5. Why we need change

3.5.1. Cars are currently responsible for approximately 35 per cent of NO_x exhaust emissions and 50 per cent of London's PM₁₀ (including tyre and brake wear). Even with continued mode shift, a significant share of journeys will still be in private vehicles and it is important that encouragement is given to the use of the greenest possible vehicles, particularly in areas where there are fewer alternatives.

Emissions from tyre and brake wear

3.5.2. Currently tyre and brake wear accounts for approximately 50 per cent of PM₁₀ emissions from road transport sources across Greater London and about 35 per cent in central London. It also contributes to PM_{2.5} concentrations in London. In working towards achieving PM emissions limit values and delivering health benefits, tackling tyre and brake wear emissions will become increasingly important as this source will make up a greater proportion of PM emissions in the future.

3.6. What needs to be done

3.6.1. TfL will implement the Mayor's Transport Strategy, which sets out a range of proposals to encourage use of sustainable modes of transport and a reduction in the need to travel. By reducing traffic volumes, both tailpipe emissions and emissions from tyre and brake wear to air will be reduced.

3.6.2. Alongside measures to reduce traffic, action is needed to encourage a switch to cleaner vehicles to reduce the impact of the vehicular traffic that will remain on the network.

Supporting the uptake of low emission vehicles

3.6.3. There are currently over 2,000 electric vehicles registered in London, and over 250 charge points. The Mayor is committed to a step-change in the number of electric vehicles and in May 2009 launched the 'Electric Vehicle Delivery Plan for London'. It details his plans to make London the electric vehicle capital of Europe. It also aims to introduce electric vehicles into the GLA group fleet.

3.6.4. The Mayor is aware that mass-market introduction of electric vehicles is dependent on joint working. He will therefore continue to catalyse the uptake of electric vehicles by working through the London Electric Vehicle Partnership, the Mayor's Electric 10, and integrating with the nationwide Low Carbon Vehicle Partnership and the C40 Electric Vehicle Network.

3.6.5. To support the uptake of electric vehicles including cars, vans, motorcycles and scooters, the Mayor is aiming to work with partners to deliver a network of at least 1,300 publicly accessible charge points located on streets, at supermarkets, in public car parks and transport hubs, and at retail and leisure facilities. The Mayor's aim is for no Londoner to be, on average, more than one mile from a publicly accessible charge point. TfL is also working with businesses and other organisations to install workplace charge points.

3.6.6. In November 2010, the Mayor launched a one-stop website for electric vehicles (www.sourcelondon.net). In early 2011, TfL will launch the new pan London scheme, Source London, to provide a single point of access to the public network of electric charging points. Electric vehicle drivers currently have to register in every borough they charge in. Source London will instead bring together the publicly accessible charge points in London into one network.



Registered customers of Source

London will be able to use any of the publicly accessible charge points on the network, identified by the Source London brand.

3.6.7. In February 2010 the Office for Low Emission Vehicles (OLEV) awarded a TfL-led public and private London consortium £9.3 million from the Plugged in Places (PiP) grant fund to deliver the charging infrastructure in the capital with at least 1,300

points installed on street, at stations, in supermarket car parks, and in workplaces by 2013.

- 3.6.8. In addition, through the draft Replacement London Plan, the Mayor has proposed requirements for the provision of charge points in new developments, including a requirement for charge points or wiring for future charge point installation to be provided. One in five parking spaces in new residential developments will be fitted to allow for the installation of charge points. More information is available in the draft Replacement London Plan.
- 3.6.9. The Mayor is aware that policies and actions to increase the uptake of electric vehicles in London may lead to an increased demand for electricity. However, Government studies confirm that the demand generated by electric vehicles can be met without substantial additional generating capacity provided that the demand for charging is managed and targeted at off-peak periods where there is currently surplus capacity.
- 3.6.10. The Mayor plans to create a 'Hydrogen network' of refuelling infrastructure in London by 2012. This aims to encourage a minimum of 150 hydrogen-powered, zero-emission vehicles on the roads by 2012, including 50 to be operated by the GLA Group. The Mayor and the London Hydrogen Partnership are also working with BAA on ways to use hydrogen and fuel cell technologies at Heathrow Airport.
- 3.6.11. Action will be needed beyond London. The Mayor will encourage the Government to promote changes to the Vehicle Excise Duty (VED) regime to incentivise further a switch to lower emission private vehicles. Incentives could also be provided through the tax regime to encourage the early uptake of the cleanest heavy-duty vehicles.
- 3.6.12. Emissions of air pollutants from diesel cars are higher than from petrol cars, and the improvements expected from higher Euro standards for diesel cars have not been realised, especially with regards to NO_x and NO₂ emissions. In July 2010, sales of new diesel vehicles outstripped petrol cars for the first time in the UK. Greater incentives from Government are needed to encourage an increased rate of update of newer and cleaner vehicles along with disincentives to reflect the impact of diesel cars.

Scrapping or retrofitting older, more-polluting vehicles

3.6.13. In 2009 and 2010, the Government administered a vehicle scrappage scheme to stimulate the national car market, which the Mayor supported. The Mayor believes that the Government needs to do more. The introduction of further schemes would help to achieve the objectives of this Strategy and bring about a cleaner fleet in London. The Mayor will continue to press for further scrappage schemes, including schemes that will target the vehicle types that contribute most to poor air quality in urban areas, including taxis and vans. The Mayor welcomes the Government's recent announcement of a grant for electric vehicle purchase that will commence early in 2011.

Box 9: Electric Vehicle Procurement

TfL is undertaking two major procurement activities which will create the UK's largest procurement frameworks to date for electric vehicles and electric vehicle charge point infrastructure. The agreements will speed up delivery of electric vehicles and charging infrastructure by creating a shortlist of approved suppliers, making it easier and cheaper for TfL, London boroughs and other partners to buy charge points and vehicles and enabling orders to be placed whilst benefiting from resulting economies of scale.

Other organisations, predominantly local authorities, will also be able to take advantage of both London frameworks and realise the financial benefits delivered by bulk procurement. The total value of the TfL electric vehicle framework is £67 million and the TfL electric vehicle charging point framework is worth £30 million in total. The procurement frameworks to supply electric vehicles and charge points will be finalised by early 2011. Both frameworks will run until 2015.

Improving the emissions from all vehicles through new technologies

3.6.14. Euro air quality standards play an important role in driving improved performance on emissions. They were developed to ensure that natural fleet replacement results in significant reductions in pollutant emissions. They are also used by policymakers to specify requirements within different policies and schemes. Their ongoing development is therefore vital, with a focus on ensuring they are as effective as possible in delivering the benefits in reduced emissions that they have been designed to achieve, particularly when combined with abatement technologies.

- 3.6.15. Research into the application of Euro standards has highlighted that the higher standards do not deliver the expected improvements in emissions of NO_x, especially for diesel cars and LGVs. Over the past few years, the amount of NO₂ emitted directly by these vehicles has increased and overall NO_x emissions (which include NO₂) have tended to stabilise (rather than reduce), whilst improvements have been seen in HGVs and buses, more so since the introduction of the Euro IV standards for these vehicle types.
- 3.6.16. TfL tests every type of bus in service over a simulated London route cycle at Millbrook Proving Ground to assess its emissions performance. The test recreates the conditions of a Route 159 bus travelling from Brixton to Baker Street with all the accompanying gear changes, calls at bus stops, acceleration, braking and waiting time at traffic lights. This route was chosen as it is representative of a typical London bus journey. Using this real-world test cycle enables TfL to determine more accurately the emissions performance of buses in use in London rather than rely on standard emission factors and ensures that emissions reductions from tightening Euro standards are delivered in service. By gathering representative emissions data for every type of bus and using vehicle fleet profiles and vehicle kilometre data from the bus network, TfL can assess the environmental impact of the bus fleet with regard to both local pollutants and greenhouse gases. This methodology also enables environmental strategies such as the roll-out of hybrid buses to be assessed for both impact and cost effectiveness.
- 3.6.17. The Mayor will encourage the Government and the European Commission to ensure that future Euro standards deliver improvements in emissions in order to improve air quality in London. The Mayor will also seek to make the case for improvements to the testing and enforcement processes for Euro standards; for example, the vehicle approval processes and testing standards could better reflect the actual on-urban road emissions of vehicles, as opposed to those derived from the figures obtained in laboratory conditions or based on drive cycles that are not representative of urban driving conditions.
- 3.6.18. There are currently no regulations to address tyre and brake wear in the same way that exhaust emissions are regulated by Euro standards. Reducing the number of vehicles on the road network will deliver benefits in this regard but encouraging the use of lighter vehicles and smoother driving techniques will also help reduce tyre and brake wear emissions. In addition, some hybrid and electric vehicles have lower tyre

and brake wear emissions. Further research, led by the Government and the European Commission, is required in this area to support potential action in partnership with the vehicle and tyre manufacturing industry to reduce the impact of tyre and brake wear on air quality and health. Should low-emitting tyres and brakes become available, the Mayor will encourage their uptake through GLA procurement processes.

Policy 3 – Identifying priority locations and improving air quality through a package of local measures

Vision

Improved air quality in the areas which currently have the highest concentrations of pollutants and which do not meet or are most at risk of not meeting EU limit values.

Policy

The Mayor, through TfL and working with the boroughs, will introduce targeted local measures to improve air quality at locations with high air pollution concentrations.

Proposals

Priority locations for PM₁₀

The Mayor will take targeted action at those locations that do not meet or are most at risk of exceeding PM₁₀ EU limit values to reduce concentrations.

Further identification of priority areas

Through TfL and the GLA, the Mayor will work with boroughs to identify other locations that have poor air quality (PM₁₀ and NO₂) which would benefit from targeted action for emissions reduction. TfL will work with boroughs and other stakeholders to establish a range of measures available to be applied at these locations, which boroughs will be required to include in their Local Implementation Plans and other relevant programmes.

Major transport interchanges

The Mayor will encourage boroughs and other delivery agents, including Network Rail and airport operators, to put in place measures to tackle poor local air quality associated with major transport interchanges particularly in relation to road use.

The Mayor will work with airport operators, London boroughs and the Government to further mitigate the air quality impacts of existing operations at airports.

The Mayor will oppose additional runway capacity at Heathrow airport.

The Mayor will support the expansion of competitive rail-based alternatives to aviation, including the development of a national high speed rail network.

Outputs

The transport measures outlined in this Strategy will reduce emissions to air and concentrations of air pollutants across London, including at priority locations. The proposed local measures will deliver important reductions in concentrations at locations where levels are particularly high.

Based on evidence from other cities, a reduction of up to $2.5\mu\text{g}/\text{m}^3$ at the priority locations in PM_{10} can be reasonably expected – equivalent to reductions of between ten and 20 per cent in concentrations. Nevertheless, in order that a cautious and realistic assessment is made, it has been assumed that only half of the exceedence days that modelling suggests could be avoided by these measures will actually be avoided. This would translate into a reduction in daily exceedences at the priority locations of up to six days. This is significant in the context of meeting the EU limit values. For example, in 2009 only a small number of days needed to be removed for the Marylebone Road priority location to meet the EU limit values for PM_{10} (see also box 11).

Reductions in NO_2 concentrations need to be tackled at every level from European and national through to the local level. Through the sub-regional transport plan process (whereby TfL is working with boroughs across London) a range of measures to reduce NO_2 will be identified that can be developed and tailored to different location types.

3.7. Why we need change

Priority locations for PM_{10}

3.7.1. Modelling has identified a small number of sites that are most at risk of exceeding the EU daily mean limit value in 2011 for PM_{10} . At some of these sites, the potential exceedence areas are small – for example, small sections of pavement near a junction – yet the cause is a complicated mix of factors including the make-up of the vehicle fleet passing through the priority location, traffic speed, local geography and other

factors affecting air quality in a much broader area. These factors are taken into account in the approach to air quality improvements adopted in this Strategy where interventions will be focused on three interconnected corridors that include the specific locations at most risk of not meeting the extended 2011 deadline for EU limit values for PM₁₀. These are:

- Marylebone Road and Euston Road
- Victoria Embankment through Upper Thames Street to Tower Hill
- Marble Arch to Hyde Park Corner.

3.7.2. These priority locations will be kept under review and additional locations could be included in the scope of local measures if needed to ensure compliance with the EU limit values by 2011.

Focus areas for NO₂

3.7.3. Analysis shows that in the base case, annual mean concentrations of NO₂ will exceed the limit value in 2015 across less than five per cent of the London area, but this includes 45 to 65 per cent of roadside locations, unless further action at both London and national level is taken to reduce emissions. The predicted exceedence areas are shown in Chapter 2. Modelling of hourly concentrations is not undertaken directly due to the inherent uncertainties of such predictions. Monitoring studies indicate however that without further action, the one-hour mean limit value for nitrogen dioxide may be exceeded close to a number of major roads in London. Further London-wide and local measures will therefore be needed to reduce NO_x emissions. Sub-regional transport plans prepared by TfL with boroughs will help identify focus areas where additional local measures could be taken, in particular where there is significant exposure to high pollution, such as at residential locations or shopping areas next to roads.

Further identification of poor air quality locations

3.7.4. This Strategy aims to enable the attainment of the EU limit values in Greater London and the Mayor continues to work with Government to achieve this common objective. Modelling for this Strategy has identified locations where concentrations exceed limit values, though some of these do not constitute breaches of the 2010 Regulations.

3.7.5. There are other locations in Greater London which have comparatively poor air quality in respect of both PM₁₀ and NO₂ concentrations, though they are not necessarily at risk of exceeding the EU limit values. It will be important that boroughs undertake action to improve air quality at priority sites that they have identified through their local monitoring. Through TfL and the GLA, the Mayor will work with the boroughs to identify these locations and boroughs will be required to include proposals to improve air quality in their Local Implementation Plans and other relevant programmes. Where locations related to industrial activity are identified, it will be important to work with site operators, borough enforcement teams and the Environment Agency to develop solutions. Policy 10 addresses these issues.

Box 10: Industrial and waste sites

This Strategy focuses on locations where there is poor air quality exposure to the general public. Industrial sites, however, sometimes generate high levels of both PM₁₀ and NO₂. Activity on the sites is a major cause of pollution, though vehicles servicing the sites also contribute. TfL will work with the Environment Agency and boroughs to reduce the impact of site activities on surrounding roads and access points.

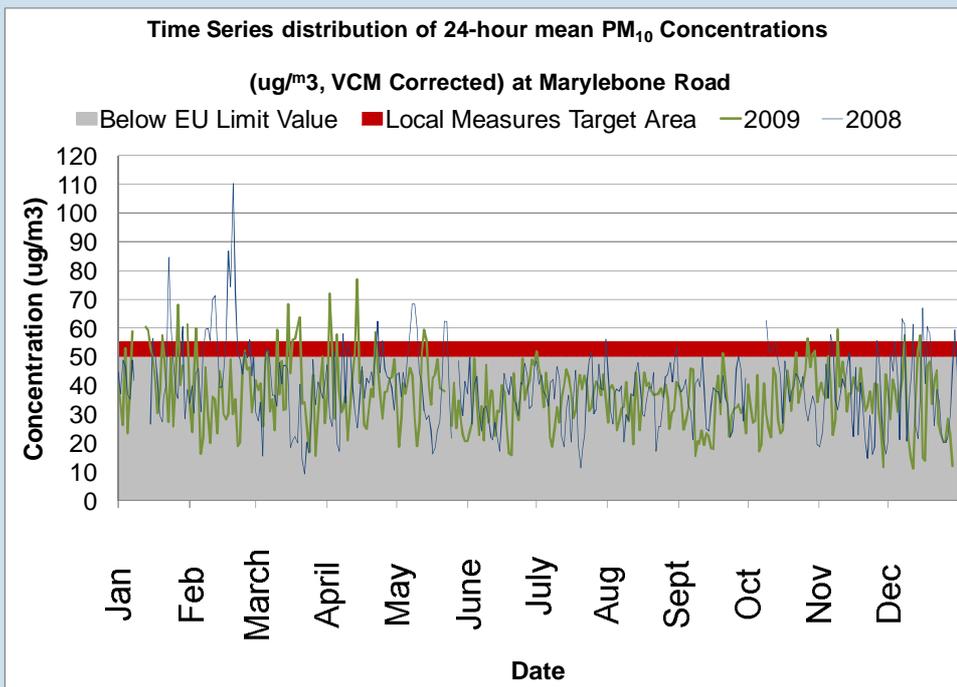
3.8. What needs to be done

3.8.1. Experience from around the world shows that there is a range of effective measures that can be implemented on a local basis to improve air quality. TfL commissioned a study²³ of potential measures to address concentrations at PM₁₀ and NO₂ priority locations based on international best practice. A number of possible measures have been identified which can be deployed as necessary and appropriate. In some cases this is subject to funding from the Government becoming available.

Priority locations for PM₁₀

3.8.2. To complement the London-wide measures included in this Strategy, the Mayor will apply targeted local measures to help London meet the EU limit values for PM₁₀ as soon as possible and investigate further measures to implement in the future. Targeted local measures are a pragmatic step allowing the areas with highest concentrations to be tackled swiftly in parallel with London-wide and modally focused measures. Several of the proposed local measures are being commenced before the end of 2010. They will also help improve the urban realm and quality of life and therefore support the delivery of a green London for the 2012 Olympic and Paralympic Games.

Box 11: What can local measures do?



Readings in the grey area are within the EU daily limit value, readings outside it are exceedences (some of which last for more than one day). The red band indicates the exceedences that need to be eliminated for the EU daily limit value to be met. This graph shows conditions in 2008 and 2009.

Around 40 per cent of central London's PM₁₀ concentrations come from outside London, but this varies day-to-day. On some days the contribution from external sources alone is greater than the daily mean EU limit value. Clearly, in these circumstances London-based measures will not prevent exceedences of the limit values in Greater London. In this context, it is necessary that action is also taken by the Government.

However, there are other days where a location only just exceeds the EU limit value (shown by the red band). In these circumstances a reduction in local emissions or concentrations (for example, by preventing re-suspension) will help achieve compliance.

In 2008 and 2009 there were 63 and 47 days respectively with PM₁₀ concentrations measured between 45 – 55 ug/m³, respectively. Studies undertaken across many European and other cities suggest that a package of local measures could reduce PM₁₀ concentrations by 10-20 per cent (or around 2-3 ug/m³) within the priority locations on days with high pollution levels. This could be effective at reducing concentrations to below PM₁₀ daily limit values on around ten to 15 of these days and help provide additional confidence that EU limit values for PM₁₀ will be met and compliance maintained.

Initial package of local measures – action to be taken now

3.8.3. TfL is already implementing or trialling several local measures identified in the study.

Road cleaning and the application of dust suppressants

3.8.4. Cleaning of road surfaces and the application of dust suppressants can be applied to reduce surface particulate matter and resuspension (particles being released back into the atmosphere). Evidence from international examples suggest that applying these measures regularly in targeted areas can have a beneficial impact, reducing PM₁₀ concentrations by ten to 20 per cent although these measures have not been tested in London. Trials at priority locations including Marylebone Road and Upper Thames Street began in autumn 2010, including air quality monitoring in order to help understand the impacts. If these trials prove successful, these measures could be deployed in other areas.



Figure 3.4: Dust suppressant and road sweeper at Victoria Embankment

No-idling enforcement

3.8.5. TfL will work with boroughs and industry to understand better where unnecessary idling contributes to poor air quality and improve enforcement against idling parked vehicles in and around the priority locations.

3.8.6. This will involve TfL working with bus operators to prevent engine idling at bus stations and bus stands. It is a long-standing instruction to bus drivers that engines must be switched off at such locations and, if idling is observed by TfL staff or bus company supervisors, immediate action is taken. The requirement to switch off engines is reinforced during driver training and is included within the bus driver's manual, the "Big Red Book" issued by TfL to all bus drivers. It is also a contractual requirement that engines must be switched off at stands and bus stations.

3.8.7. TfL will continue to discourage the practice of coach drivers running their engines whilst stationary and reiterate this message through communication channels, including the Coach Parking Map and the TfL website. TfL will also support The Confederation of Passenger Transport, the national trade association for the coach

and bus industry, in adopting measures to reduce idling and promote engine switch-off.

- 3.8.8. TfL will continue to work with the taxi industry to ensure that unnecessary idling is reduced throughout central London and particularly at key pick-up points within and around priority locations.

Changing timings and removing signals

- 3.8.9. All traffic light signals within the priority locations operate under the Urban Traffic Control (UTC) system using Split-Cycle Off-set Optimisation Technique (SCOOT). As part of the Mayor's Smoothing Traffic Flow Programme, these locations are reviewed on a rolling basis every three to five years and in response to changes to the network. In 2009/10 TfL completed over 1,000 signal timing reviews achieving approximately a six per cent reduction in stop/start delays at traffic signals.

- 3.8.10. TfL will continue to keep under review the traffic light timings within priority locations in order to capture potential air quality benefits through reducing congestion and queuing.

Capture benefits of new powers to manage road works

- 3.8.11. The Mayor has introduced a permit scheme for road works enforced by penalty charge notices coupled with improved information systems. This will result in improved co-ordination and raise awareness about planned roadworks, allowing the travelling public to make alternative arrangements at the times affected. This will also result in better planning of road space use during road works and reduce the effects of the works on traffic flows, reducing overall emissions of air pollutants.

- 3.8.12. In addition, minor roadworks within or adjacent to priority locations will require traffic management in order to reduce short-term queuing which often culminates in more significant and widespread queues due to the many different locations of minor works. These cause increased idling of vehicles and start-stop traffic.

- 3.8.13. TfL will work with utility companies and street works contractors to ensure that areas around street works are cleaned and excess dust and debris removed, as these contribute to increased levels of particulates.

- 3.8.14. The Mayor also proposes introducing a lane rental scheme whereby targeted sections of the Transport for London Road Network would be subject to a charge for

any lane occupation. This will encourage the shifting of road works to quiet periods and more use of 'no dig' technologies. The cumulative effect will be to reduce the congestion caused by roads and hence reduce emissions of air pollutants.

Construction site vehicle cleaning; reduced stacking of construction delivery vehicles to reduce idling

3.8.15. As set out in Policy 6, the GLA will work with boroughs to improve the enforcement of construction and demolition Best Practice Guidance for construction sites close to the priority locations. This could include cleaning, the use of dust suppressants on major sites and ensuring vehicles working on and travelling to/from construction sites are properly cleaned before leaving the site. This will help to prevent dust leaving the site on vehicles and later becoming re suspended. The GLA and boroughs will work with developers to improve planning for construction-related deliveries and waste removal to prevent stacking of vehicles and associated idling.

Regular weekend road closures to promote walking and cycling

3.8.16. A programme of planned weekend closures will be integrated with the TfL policy to encourage walking and cycling. These will be planned to minimise the disruption to other road users. These events will help increase walking in the capital, provide for a convivial city with strong local communities as well as resulting in temporary reductions in local concentrations of polluting emissions to air. It is also hoped that this will support broader modal shift and deliver longer-term benefits for quality of life and air quality. Planning these events will require consultation and close working with boroughs, local communities and other stakeholders before implementation.

Deployment of lower emission buses

3.8.17. TfL will continue to work with bus operators to focus the use of lower emission buses in the fleet on routes which travel through the priority locations. New hybrid buses that have been funded by the green bus fund are being rolled out on bus routes within central London where there are high modelled concentrations of air pollutants.

Integrating air quality improvements in planned public realm schemes

3.8.18. Air quality concentration reductions, and measures to reduce exposure, can be delivered through existing public realm improvement schemes. One example is the Euston Circus scheme, part of the Mayor's London's Great Outdoors programme, which is focused on improving conditions for pedestrians at the junction of Tottenham Court Road and Euston Road. While schemes such as this are not focused on improving air quality, they present a number of opportunities to reduce indirectly air pollutant emissions through improved traffic management and road layout changes. TfL will work with boroughs and developers involved in such schemes to ensure the potential air quality benefits are considered throughout the design process.

Managing the flow of traffic to improve air quality

3.8.19. At priority locations right turns are already traffic light controlled, often with filter lanes provided, and other right turns across traffic are normally not allowed due to the presence of a raised central reservation or barrier. TfL will continue to develop options for the road layout and performance that, among other objectives, may improve air quality.

Potential future actions

3.8.20. A number of the potential local measures identified through a study commissioned by TfL²³ will require further funding and scoping work to determine the detailed format and application. Given the complexities in balancing the competing demands on the road network, it may be necessary to first pilot some of these measures in order to understand their broader effects.

Trial of green walls

3.8.21. TfL will identify potential sites that could host a Green Wall, and work with suppliers and infrastructure managers to explore the feasibility of installation at these sites. It is likely that third party funding will be needed for such walls. TfL will also seek opportunities to include appropriate green infrastructure in new developments.

Investigate potential to reduce speed limits

3.8.22. TfL will investigate the potential to reduce speed limits on some of the fastest roads in the capital to help reduce emissions and improve air quality. The aim would be to reduce the range of acceleration/deceleration patterns in order to minimise exhaust emissions and tyre and brake wear. Some boroughs have expressed an interest in reducing speed of traffic and 20 mph zones or ClearZones are already being rolled out in London. TfL will work with boroughs to help identify appropriate locations and

additional measures needed to reduce speed limits, taking account of the potential wider effects on the road network. The potential air quality and wider effects (eg. on journey times) of speed limit reductions on some roads is unclear and will be examined as part of further work with boroughs on speed limits.

Speed over distance cameras

3.8.23. TfL is investigating the feasibility of speed over distance cameras as an alternative method of speed enforcement. Although primarily a safety measure, the benefits for air quality improvement in London should be assessed.

Focus areas for NO₂

3.8.24. While the local measures described above have been designed principally to reduce local PM₁₀ concentrations, some will also reduce concentrations of NO₂.

3.8.25. Measures to reduce NO₂ concentrations generally need to be London-wide or modal in nature given the scale of the challenges involved, but further packages of measures designed to address particular local problems will also be helpful in seeking to meet EU limit values and delivering focused health benefits.

3.8.26. All levels of government will need to play a role. With their own air quality responsibilities established through the LAQM process, it is appropriate that the boroughs should play a major role in developing solutions to reduce NO₂ concentrations. The Mayor will support these actions through the GLA and TfL. Through sub-regional working, TfL will develop a toolkit of potential actions such as demand management, smoothing traffic, cycling, walking, and urban realm improvements. This will enable a greater level of sharing best practice. Boroughs will be required to include proposals to improve air quality in their Local Implementation Plans (LIPs) and other relevant programmes.

3.8.27. In developing local measures for NO₂, it is important to understand the nature of the NO₂ challenge that London faces. Whereas PM₁₀ reduction measures need to target daily mean exceedences at a few locations to secure additional confidence in meeting the EU limit values, the main challenge for NO₂ is the achievement of the annual mean limit value, though the hourly mean is a problem at many kerbside locations. Any local measures for NO₂ reduction, therefore, need to deliver more permanent changes aimed, for example, at reducing overall levels of traffic and congestion or queuing. Another important distinction is that exceedences of the annual mean NO₂ limit value extend over a very wide area of London. Particular care

will need to be taken to ensure that local traffic management measures do not simply divert problems elsewhere.

The Western Extension Zone of the Congestion Charging Scheme

3.8.28. The Mayor has confirmed the removal of the Western Extension Zone of the Congestion Charging Scheme. Any impacts on air quality are not expected to be significant. Increases in air quality pollutant emissions arising from additional traffic would be mitigated by a number of other measures set out in this Strategy including taxi age limits. If appropriate, local measures could also be applied in the area.

Major transport interchanges

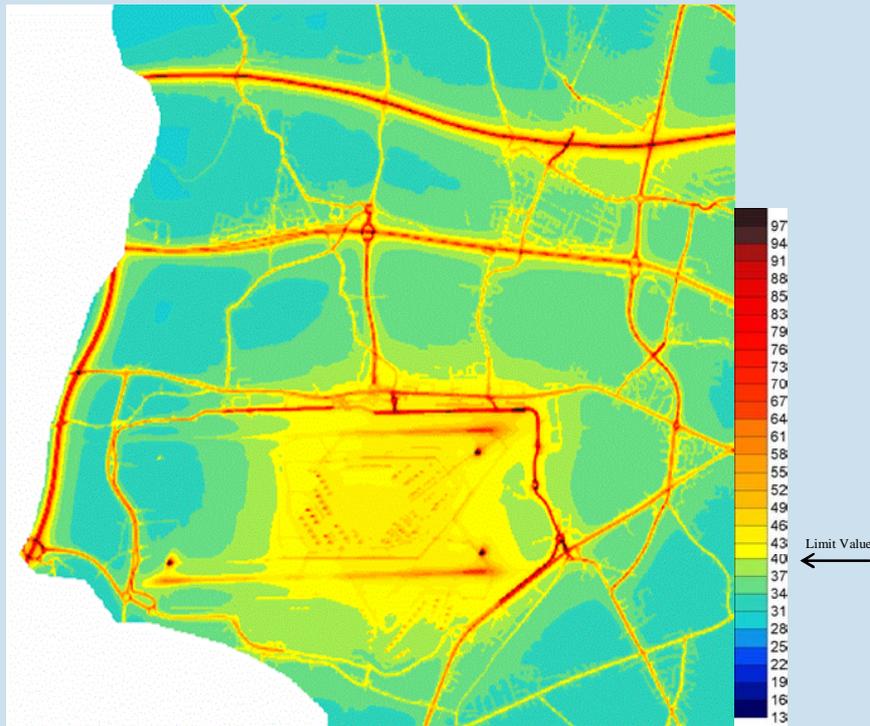
3.8.29. Some major transport facilities such as train stations and airports have poor air quality caused, in large part, by associated local road traffic (e.g. taxis). TfL will work with the Government and delivery agents, such as Network Rail, station and airport operators, to explore measures to address local air quality problems at these locations. Major rail termini and airports are a particular concern in this regard.

Box 12: Ground based aviation, airport operations, and surface access at Heathrow airport

NO₂ concentrations are a cause for concern at and around Heathrow Airport, with the highest concentrations beyond the airport boundary occurring close to roads in the vicinity of the airport. Ground-level aircraft operations emit large amounts of NO_x, as do landside vehicles including cars, taxis, coaches, and freight. Many roads in the area, including the M25, M4 and A40 carry traffic accessing the airport for both passenger and freight related journeys, as well as other general traffic.

Air quality concentrations are routinely reported on the Heathrow Airwatch website (www.heathrowairwatch.org.uk) which is funded by a joint working partnership consisting of the London Boroughs of Hillingdon and Hounslow, Slough and Spelthorne Borough Councils, Heathrow Airport Ltd and British Airways. Monitoring data for 2008 – 2010 shows that sites close to the airport boundary are below the EU limit value, whilst sites near airport-related roads tend to exceed it.

Modelling of NO₂ concentrations in west London, including Heathrow, clearly shows that the highest concentrations are predicted close to main roads. It is important that airport-related road traffic sources of emissions, including private cars and freight are tackled. However, concentrations of NO₂ are also predicted to be high within the airport boundary and it is important to continue to work to reduce emissions from airport operations in order to improve local air quality.



Annual mean NO₂ concentrations at Heathrow Airport (2008)

Heathrow has not yet reached its authorised capacity, serving 66 million passengers per annum (mppa) in 2009. This is predicted to rise to 80mppa by 2015 when Terminal 5 becomes fully operational. This could have a significant adverse impact on local NO_x emissions and concentrations of NO₂ close to the airport and surrounding roads without strong and appropriate mitigation measures.

Reducing emissions from aircraft

The Committee on Aviation Environmental Protection (CAEP) encourages reductions in aircraft emissions by specifying that engines must be manufactured to meet set emission standards. The European aviation industry, through the Advisory Council of Aeronautics Research in Europe (ACARE), has established a target for 2020 of reducing NO_x emissions of new aircraft by 80 per cent from 2000 levels. To encourage the use of aircraft with the lowest NO_x emissions, Heathrow Airport Ltd has introduced a NO_x factor to their landing charges, which varies for each aircraft according to its level of emissions. The Mayor considers that further measures need to be developed as required to encourage the use of cleaner aircraft and will engage with Heathrow Airport Ltd, the Government and the aviation industry to push for this.

Reducing emissions from airport operations

Heathrow Airport Ltd is making progress in reducing emissions from on-site operations. Measures implemented include using more fixed electrical ground power and pre-conditioned air so that auxiliary generators, which can emit high levels of PM₁₀ and NO_x, are not needed.

Heathrow Airport Ltd runs the Cleaner Vehicles Programme (CVP), a voluntary scheme, to incentivise companies to reduce emissions from their fleets. The proportion of vehicles in the Heathrow Airport Ltd airside fleet that are new, or run on alternative fuels, is also being increased. Vehicles that operate at Heathrow must have a Vehicle Apron Pass from Heathrow Airport Ltd, with criteria used to ensure that only the least polluting vehicles are allowed to operate. Even though vehicles operating on private land are not subject to the Low Emission Zone, Heathrow Airport Ltd is working towards all of its vehicles meeting the LEZ emission standards with only a few exceptions.

The Mayor will encourage Heathrow Airport Ltd to continue implementing these and other measures to reduce the adverse impact of operations on local air quality around Heathrow Airport.

Reducing emissions from surface access

BAA supports a reduction in the use of private vehicles to get to and from Heathrow, providing funding for public transport provision including the Heathrow Express railway, Crossrail and free bus travel around the airport via a grant to TfL. BAA has proposed Airtrack, an additional rail service to access the airport. While these types of measures are positive steps and the overall proportion of public transport trips to the airport is growing, the overall increase in travel expected to Heathrow means there would still be an extra three million trips per year to Heathrow by private car in the time period 2010 to 2015 with consequential adverse effects on air quality.

For this reason additional measures are being considered to promote the use of public and other sustainable transport to gain access to the airport as well as to reduce local NO₂ concentrations through targeted local action where possible. Already Heathrow levies a differential charge on black cabs, currently covering LPG only, entering the airport and there are plans to review this, investigating how the future operation of the scheme can reflect the long-term plans of the Mayor to further encourage cleaner taxis.

Heathrow is also a major employment hub and so measures have been taken to encourage the use of public transport and multiple occupancy car journeys. Heathrow operates Europe's biggest car share scheme with over 2,500 airport employees regularly sharing their vehicle when travelling to work.

There is also potential to use public transport as a replacement for short-haul domestic and European flights through existing and possible future high-speed rail services.

Box 13: Working with London City Airport

London City Airport has been granted planning permission for the expansion in the number of flights from the airport and it is important that measures are put in place to ensure that future airport operations do not contribute to a deterioration in local air quality conditions.

London City Airport lies outside the AQMA boundary for NO₂ and PM₁₀ declared by the London Borough of Newham and monitoring carried out by the Airport in 2009 showed that there were no exceedences of the limit values for NO₂.

London City Airport has entered into a legal agreement with the London Borough of Newham which will establish robust environmental controls and guarantee that sufficient resources and enforcement mechanisms are put in place to protect air quality around the Airport.

London City Airport benefits from excellent public transport links with about 50 per cent of passengers in 2009 travelling by the Docklands Light Railway, and only three per cent travelling by private car, with a significant of the remainder travel by taxi or PHV. The airport has committed to providing a £2.5 million contribution towards further enhancements and improvements of the DLR and has submitted a Travel Plan for approval to the London Borough of Newham which aims to encourage sustainable modes of transport for both staff and passengers.

London City Airport has also developed an Air Quality Action Plan. This includes 17 measures that will be put into place to minimise NO_x emissions from airport-related sources, including aircraft operations, ground-based aircraft support equipment, airside vehicles and taxis. Example measures include a commitment to equip new stands with Fixed Electrical Ground Power during any future stage of apron improvement, a staged programme to retrofit diesel plant that does not meet Stage II emission limits emissions limits, and the introduction of minimum emissions standards within future tender specifications for operators of airside vehicles. London City Airport has also encouraged airlines to invest in new aircraft types.

The Mayor remains committed to working with the London Borough of Newham and London City Airport to ensure that local air quality does not deteriorate as a result of any future airport expansion, and to continue to reduce emissions from airport related sources.

Box 14: Working with the Highways Agency

Part of the motorway network falls within the Greater London area and these roads are under the control of the Highways Agency. Reducing emissions from the M25, M4, M1 and M11 will help to improve London's air quality. A number of schemes or programmes to reduce congestion and improve safety are already in place or planned and some of these will improve air quality. These include:

- Widening of the M25 motorway in order to reduction congestion and emissions in the areas is ongoing between Junctions 27 and 30, due for completion by 2012.
- As part of the Managed Motorway Schemes, dynamic hard shoulder (DHS) or hard shoulder running (HSR) schemes are due to start in 2014 on the M4 between Junction 3 at Heston to Junction 12 at Reading, and in 2013 on the M25 between Junction 23 and 27. The schemes use sensors along the motorway carriageway to detect traffic speeds and volumes and help to monitor congestion. During busy periods, including peak hours, or when sensors detect that congestion may be likely, traffic controllers are able to manage the speeds on different sections of the motorway using the variable mandatory speed limit (VMSL) signals which are placed on gantries. Where needed, the hard shoulder is used as an additional running lane, whilst speeds are managed on all lanes at a maximum of 60 mph.
- Local network management schemes (LNMS) which could potentially reduce emissions include speed limit reductions, use of average speed cameras, junction improvements, and merging traffic management.
- The Mayor, through TfL, will work with the Highways Agency to identify other locations that would benefit from these types of further action.

Policy 4 – Reducing emissions from public transport

Vision

Improved air quality through a cleaner, greener transport system in London, including a new greener bus for London and lower emission taxis.

Policy

The Mayor, through TfL and working with the Government, boroughs and transport operators, will minimise emissions from London's public transport system.

Proposals

Buses

The Mayor will work with TfL to ensure that 300 hybrid buses are in service by the end of 2012 and TfL will accelerate roll-out of hybrid buses beyond 2012 depending on available resources.

The Mayor will introduce the 'New Bus for London' which will be hybrid and will deliver significant improvements in the reduction of climate change and air quality pollutant emissions. The new bus will incorporate the latest hybrid technology and will be both 40 per cent more fuel efficient than conventional diesel buses and 15 per cent more fuel efficient than current London hybrid buses.

The Mayor will ensure that, subject to Government support, by 2015 all buses in London will meet the Euro IV standard for NO_x, through the specification of new buses and retrofitting of older buses in order to meet the proposed LEZ Phase 5 standard.

The Mayor will implement the London Hydrogen Transport Plan, which will include five hydrogen fuel cell hybrid buses joining the fleet in 2010/11, and EU funding for a further three buses has been secured.

Taxis

The Mayor will accelerate the uptake of cleaner, newer vehicles into the taxi fleet by introducing age-based limits for taxis. From 1 January 2012, no licence will be issued for a taxi over 15 years old. The age limit will be introduced on a rolling basis throughout the year as affected taxi licence plates expire. The impact of the age limit will be monitored and may be subject to review in the future.

The Mayor will introduce a requirement for all new taxis entering the fleet to meet a minimum Euro 5 standard from 1 April 2012.

The Mayor will collaborate with the taxi manufacturing industry to develop an affordable taxi capable of zero-emission operation by 2020. To this end, the Mayor will work with manufacturers to ensure that all new taxis available by 2015 have 60 per cent better fuel economy than vehicles produced in 2010.

To accelerate the deployment of more fuel-efficient and environmentally-friendly vehicles into London's taxi fleet, the Mayor will establish a financial incentive scheme that will offer a reduction on the purchase price of qualifying vehicles to London's taxi drivers.

The Mayor, through TfL and working with the taxi industry and boroughs, will reduce idling and empty running, facilitate additional taxi ranks and suspend stopping and waiting restrictions where possible. The Mayor will also support the development of new technologies which encourage taxi sharing and enable electronic hailing.

The Mayor, through TfL, will introduce by the end of 2011 a requirement that all new taxi drivers must undertake a mandatory eco driving course before becoming licensed. The Mayor will work with the taxi trade to encourage and incentivise existing drivers to take such courses and promote efficiency driving techniques to reduce emissions.

The Mayor, through TfL will work with the taxi industry to update the annual taxi inspection regime as soon as possible but no later than April 2013. It will change from its current form of one combined mechanical and licensing inspection to two MOTs per annum with a basic annual taxi-related inspection undertaken by TfL, covering taxi-specific areas such as taximeter and vehicle interior and signage requirements not covered by MOT tests.

The Mayor will work with the taxi manufacturing industry to identify tyre and brake pads that will reduce emissions of PM₁₀. These components will be mandated for all London taxis and will significantly reduce the 35 per cent of PM₁₀ emissions in central London that result from road transport tyre and brake wear.

Private Hire Vehicles (PHVs)

The Mayor will introduce into the licensing regime age-based limits for PHVs. A 10 year

rolling age limit will be applied for vehicles being re-licensed from 2012 onwards.

The Mayor will require new PHVs entering the fleet to meet a minimum Euro 4 standard from 2012 and be five years old or newer.

The Mayor, through TfL, will work with the PHV industry to introduce eco-driving training from 2012 to promote efficient driving techniques to reduce emissions.

Rail

The Mayor, working with the Government, Network Rail and the rail industry, will support the electrification of the whole national rail network in London.

The Mayor will ensure that new diesel rolling stock for London Overground meets the latest European standards for emissions.

River

The Mayor, working with river-based transport providers, and the Port of London Authority will encourage the use of ultra-low sulphur diesel (ULSD) and other clean fuel technologies on passenger river services. New contracts for Clipper service require the use of ULSD instead of marine diesel fuel.

GLA, borough and public sector fleets

The Mayor, through the functional bodies, and working in partnership with the Government, boroughs and other public sector bodies, will develop a 'low emissions strategy' for all of London's public sector vehicles with the objective of achieving zero tailpipe emissions.

Outputs

The measures laid out in this section will reduce emissions from the public transport fleet in London. TfL estimates that achieving the Euro IV standard through retrofitting for NO_x across the entire bus fleet by 2015 will save around 800 tonnes of NO_x across London.

Age limits for taxis would provide environmental, safety and passenger amenity benefits. Around 1,200 black cabs are likely to be more than 15 years old in 2012. A new taxi in 2012 will emit less than a quarter of the amount of PM₁₀ of a vehicle more than 15 years old. Introducing age limits will save eight tonnes of PM₁₀ in 2011 and will deliver particular

benefits in central London where taxis account for a significant percentage (over 30 per cent) of PM₁₀ exhaust emissions.

While it is not possible at this stage to quantify the impact of measures to promote cleaner public sector vehicle fleets, it is important that such organisations set a clear example and adopt best practice.

3.9. Why we need change

- 3.9.1. Emissions from the public transport fleet have reduced significantly over the past ten years. London Underground trains run on electricity, resulting in no direct emissions, and air quality is monitored to ensure that staff and the travelling public are not exposed to harmful levels of dust. All London Overground trains (which are under TfL contract management), except for the Gospel Oak – Barking line, are electric and do not emit air pollutants. For the Gospel Oak – Barking line, new diesel trains are currently on order which will meet the latest European standards, a significant improvement compared to the current rolling stock.
- 3.9.2. Buses have also achieved dramatic improvements with respect to emissions, particularly in relation to PM₁₀ emissions, with reductions of 90 per cent (from the start of the bus retrofit programme in the late 1990s until its completion in 2003/04). However, buses (and coaches) continue to account for around 25 per cent of all NO_x emissions within central London and around ten per cent across Greater London as a whole. With approximately 8,500 buses in operation there is significant potential to reduce NO_x emissions by targeting a relatively small number of vehicles.
- 3.9.3. Despite the success of the Taxi Emission Strategy in ensuring that taxis are equivalent to Euro 3 for PM and NO_x, taxis are responsible for over 30 per cent of transport PM₁₀ exhaust emissions within central London (based on 2008 figures) and will continue to be so without additional action. It is therefore important to make further improvements to the taxi fleet. Experience suggests that PM abatement equipment is not always effective on the oldest taxis. As with buses, important benefits can be delivered by targeting action on a relatively small number of the worst polluting vehicles.
- 3.9.4. Given that the Mayor expects others to take action to improve their emissions it is important that he takes a lead in promoting best practice by reducing the emissions

from vehicles more directly under his control or influence. More widely, the public sector and transport operators share a broader responsibility to demonstrate best practice. Consequently further action must be taken to ensure that the public transport fleet is as green as possible.

3.10. What needs to be done

3.10.1. By improving emissions from buses, taxis, PHVs and the GLA and boroughs' own vehicle fleets, overall levels of emissions, particularly of PM and NO_x, can be reduced. To do this it will be necessary to introduce new requirements for the vehicles used as buses, taxis and PHVs and to promote new technologies which will help achieve long-term improvements in air quality.

Buses

3.10.2. For buses, significant action is already underway to reduce further their emissions of air quality pollutants, including the introduction of hybrid buses to the fleet. TfL plans to deliver 300 hybrid buses by the end of 2012, having benefited from two £5 million grants from the Government's Green Bus Fund. The pace of the roll-out of hybrid buses beyond 2012 will be dependent on funding being available and the rate at which vehicle production costs fall as volumes increase. TfL will work closely with bus operators and manufacturers to maximise the number of hybrids introduced after 2012. The New Bus for London will be hybrid. Subject to Government funding, TfL expects that all buses will meet the Euro IV standard for NO_x by 2015 in order to meet the proposed LEZ phase 5 requirements. This will involve the retrofitting of approximately 2,800 buses.



Figure 3.5: Prototype of the New Bus for London

3.10.3. In addition, the Mayor will continue exploring the potential of new technologies, such as hydrogen, which may deliver further emissions improvements and other benefits. Through the London Hydrogen Transport Plan, five hydrogen fuel cell hybrid buses will join the London buses fleet in 2010/11, and EU funding for a further three has been secured. These buses will emit nothing but water vapour from their exhausts.

It is also expected that London's first hydrogen refuelling facility will be available from 2010.

Taxis and PHVs

- 3.10.4. To further promote the use of newer, cleaner taxis, the Mayor will use the taxi and PHV licensing regime to remove the oldest vehicles from the fleet by introducing age limits for these vehicles. From 2012, a rolling 15 year age limit will be set for taxis so that no taxis over 15 years old will be licensed to operate in London unless by a special exemption. For PHVs, a ten year rolling age limit will be introduced from 2012. This reflects the differential values of the vehicles used for private hire and taxis and the broader structures and licensing requirements of the two industries. In addition, all new taxis entering the fleet will be required to meet the Euro 5 emissions standard from 2012. Similarly, new PHVs entering the fleet from 2012 will be required to meet the Euro 4 standard and be five years old or newer.
- 3.10.5. The Mayor will also amend the annual taxi inspection regime from its current form of one combined mechanical and licensing inspection to two MOTs per year, to ensure that taxis are operating as efficiently and cleanly as possible. This will be complemented by a requirement for all new taxi drivers to undertake an eco-driving course before becoming licensed drivers, which can reduce emissions and help drivers use their vehicles more economically, at no cost to themselves. Any changes to the taxi licensing regime will be consulted on with the industry.
- 3.10.6. The Mayor will seek to eliminate situations where taxi drivers are effectively forced to keep engines running – for example at taxi ranks at stations and while empty running. This could be achieved by facilitating additional taxi ranks, suspending stopping and waiting restrictions where possible and encouraging new technologies to enable taxi sharing and electronic hailing.
- 3.10.7. The Mayor believes that London's famous taxi trade can and should lead the world in moving towards a zero emission future. He will work with the trade and manufacturers to create a viable road map to this end. The taxi must be affordable for drivers and enhance the passenger experience. The aim is to produce a taxi with a 60 per cent improvement in fuel economy by 2015 (based on current levels) and capable of zero tail pipe emission operation by 2020. The introduction of such vehicles will deliver significant air quality benefits. There are a variety of promising propulsion and power technologies which could see hybrid, plug-in electric, full-electric and fuel cell

taxis on London's roads in the future. The Mayor will establish a financial incentive scheme that will offer a reduction on the purchase prices of qualifying vehicles to London's taxi drivers. The scheme will be available to drivers for a limited time and for a pre-defined number of new vehicles meeting strict environmental requirements. Details of the scheme, its associated environmental criteria and terms and conditions will be announced in 2011. In addition, the GLA is working with partners to deliver 20 fuel cell taxis on London's streets by 2012. The Mayor will also work with the vehicle manufacturing industry to develop zero emitting vehicles that are suitable as PHVs by 2020.

London Underground

3.10.8. TfL monitors air quality in tunnels and stations to ensure that staff and the travelling public are not exposed to harmful levels of particulates (mainly dust) and other air pollutants. Particulate levels are well below the Workplace Exposure Limit set by the Health and Safety Executive. Measures taken to reduce particulate generation include regular cleaning of trains and tunnels to prevent dust build-up, and fitting improved braking systems on rolling stock.

River

3.10.9. River transportation is an often-overlooked source of emissions. The Mayor will work with river-based transport providers to encourage the use of ultra-low sulphur diesel and cleaner technologies on passenger river services.

Rail

3.10.10. Approximately 150km of railway track in London remains unelectrified. The Mayor welcomes the announcement by the Government that commuter services on Great Western Main Line will be electrified by 2016. The Mayor also encourages the Government to upgrade the Gospel Oak to Barking line which travels through many parts of inner London, as set out in Network Rail's Electrification Route Utilisation Strategy. In addition, the Government should provide funding for further electrification of the Great Western route to Bristol and Swansea and the Midland Main Line to Nottingham and Sheffield to allow electric trains from these places to run to and from London. Network Rail and the Government should also consider electrification of the Chiltern Line, the Dudding Hill line and various short routes in the Acton/Kew area.

GLA, borough and public sector fleets

3.10.11. The Mayor will work with the GLA group and boroughs to facilitate the adoption of best practice and cleaner vehicles. This will include exploring opportunities to promote best practice more widely through procurement and the combined purchasing power of the public sector. Recognising that he must set an example, the Mayor will specify green standards for GLA group fleets. The first step in this direction is the already-initiated procurement framework for low emission vehicles for the GLA Group. This has been specifically designed to be used by other public sector bodies in London, including London boroughs. A number of boroughs have already expressed interest in taking part in this framework, which will be consistent with the principles of the Low Emissions Strategies Programme (LESP) (see Box 15).

Box 15: Procurement Guidance

The Low Emission Strategies Programme (LESP) is developing guidance for public sector organisations on the use of procurement to reduce road transport emissions. The aims of this guidance will be to:

- Identify procurement policies and practices, capable of influencing road transport emissions
- Identify transferable tools and techniques that can be used to support innovative policy implementation
- Develop new, cross-sector working relationships
- Highlight examples of best/good practice.

The GLA is working with the LESP on the development of this guidance, which will be published in 2011, and will encourage public sector organisations in the capital to make use of it. Further information is available at: www.lowemissionstrategies.org

Box 16: Understanding the potential of alternative fuels

There is a wide range of alternative fuels available, at various stages of development. TfL is examining the options available, to establish the potential of different fuels for London's surface transport modes up to 2020. The aim of this work is to assist the Mayor, through TfL, in deciding where to focus resources to achieve optimal environmental returns on financial investment.

Policy 5 – Schemes that control emissions to air

Vision

Improved air quality by discouraging the most polluting vehicles from driving within London along with incentives to adopt the cleanest vehicles.

Policy

The Mayor, through TfL, will continue to operate the London Low Emission Zone (LEZ) for HGVs, buses and coaches and will tighten the standards to include NO_x - subject to technical feasibility and Government support. The Mayor will introduce emissions standards for PM for heavier LGVs and minibuses alongside a tougher standard for PM for HGVs, buses and coaches.

Proposals

Phases 1 and 2 of the LEZ will continue to operate to reduce emissions from the heaviest vehicles. The implementation of the next phase of the scheme (3 January 2012), introducing a further tightening of emission standards (to Euro IV for PM) for HGVs, buses and coaches, will deliver further benefits for air quality.

The Mayor will include heavier LGVs and minibuses in the LEZ from 3 January 2012 requiring them to meet a Euro 3 standard for PM.

In 2015, the Mayor will, subject to Government support in establishing a suitable certification and testing regime and subject to Government funding, introduce an emissions standard for NO_x (Euro IV for NO_x across London) into the Low Emission Zone for HGVs, buses and coaches.

The Mayor will work with boroughs to assess the feasibility and cost effectiveness of a central London LEZ in the Congestion Charging zone.

Outputs

The introduction of new LEZ standards (Euro 3 for PM) for LGVs and minibuses in 2012 would reduce emissions of PM₁₀ in 2011 by around 22 tonnes and emissions of NO_x by around 270 tonnes.

Tightening the standards of the London wide LEZ to include a Euro IV for NO_x standard in 2015 for HGVs and coaches is expected to save around 380 tonnes of NO_x in that year.

As highlighted in Policy 4, the retrofitting of buses to comply with this would save around 800 tonnes of NO_x. Significant earlier benefits are expected through pre-compliance.

3.11. Why we need change

3.11.1. Measures to promote behavioural change, technological improvements, localised action, and reduced emissions from the London transport system and public sector fleets will not be enough to meet EU limit values by themselves; so further action to reduce emissions from private vehicles is needed. Policy 2 set out a range of measures to promote a switch to cleaner vehicles but additional measures to discourage the use of the most polluting vehicles are needed.

3.11.2. Air quality will be improved through the continuing operation of the LEZ. From January 2012, the LEZ will be extended to larger vans and minibuses, requiring these vehicles to meet the Euro 3 for PM standard to drive within Greater London without charge. Also from 2012, the next phase of the LEZ will require HGVs, buses and coaches to meet the tighter Euro IV standard for PM to continue to drive within Greater London without charge. This will further reduce PM₁₀ emissions and also emissions of NO_x to a lesser extent. However, further reductions in NO_x emissions are needed across London, particularly from these heavy diesel vehicles which are responsible for a significant proportion of NO_x emissions in London (approximately 2,700 tonnes or 24 per cent).

3.12. What needs to be done

3.12.1. The Mayor will introduce into the LEZ a London-wide standard (Euro IV) for NO_x emissions in 2015 for HGVs, buses and coaches to reduce emissions across Greater London, subject to statutory consultation. Critically, support from the Government is required in the form of a national certification and testing scheme for NO_x abatement equipment as well as funding to implement the scheme. To enable an operator to retrofit their vehicle to meet this standard, rather than purchase a newer vehicle, a certification scheme for NO_x abatement equipment is required. Without this certification scheme, which would be relatively simple to introduce and could be modelled on the existing TfL scheme for PM abatement equipment, operators have no certainty that equipment they buy will be effective, and TfL, which operates the scheme, would have no easy way of establishing the efficiency of particular NO_x abatement equipment. The Mayor welcomes the Government's commitment to

investigate the feasibility of a national LEZ framework for NO_x and an associated certification scheme for retrofit equipment²⁴.

- 3.12.2. In order to minimise costs to business by providing the maximum amount of compliance time, the Mayor will announce any proposed alterations to the existing LEZ as early as possible. The Mayor will encourage the Government to provide funding to be made available to help small businesses meet emission standards through a scrappage scheme or similar grant scheme for abatement equipment. This will be important to minimise compliance costs for operators.
- 3.12.3. London boroughs may wish to explore establishing their own emission control schemes in response to local circumstances. Where appropriate and consistent with Mayoral strategies, the Mayor will consider supporting these, for example through the LIP process and other measures. To ensure London-wide inter-operability and to minimise compliance costs the Mayor would work with boroughs to establish guidelines for introducing a local zone should there be interest in doing so.
- 3.12.4. The original central London congestion charging zone has been identified as a potential location for a local low emission zone due to the high concentrations of PM₁₀ and NO₂ in the area and because it is already an established 'zone'. TfL will work with boroughs and also other stakeholders to assess the feasibility and cost effectiveness of potential options.
- 3.12.5. Reducing emissions of NO_x is a challenge for many other parts of the UK. In this context, to avoid confusion about standards, and to minimise compliance costs for operators, the Mayor will encourage the Government to introduce a common framework for LEZ schemes across the country. Such a common framework would need to take account of, and reflect, the approach within London in order to ensure that action already underway is not compromised. The Mayor supports the recommendation of the House of Commons Environmental Audit Committee¹⁰ that the Government should complete research into the options for a national framework for LEZs as soon as possible and he is willing to assist the Government further in its considerations. The Mayor will also press the Government to take a major role in funding further LEZ schemes, including any in London.

4. Non-transport measures

4.1. The policy development process

4.1.1. Since the creation of the GLA in 2000 a number of measures have been implemented to reduce emissions from non-transport sources. The London Plan has ensured that new developments are more sustainable; and the GLA and London Councils published Best Practice Guidance on construction and demolition in 2006, and have promoted its implementation on construction sites across the capital. However, there is still more that can be done.

4.1.2. Not all of the policies in this chapter can be quantitatively assessed in the same way as most of the transport policies, though this does not diminish their importance.

4.2. Policies and proposals

4.2.1. The Mayor is proposing a further package of measures for non-transport sources. This package is designed to deliver value for money – delivering important reductions in emissions of PM, NO_x and also CO₂ while seeking to minimise as far as possible compliance costs for those affected. The package consists of:

- **Reducing emissions from construction and demolition** - through the review and full implementation of the Best Practice Guidance for construction and demolition sites across London.
- **Making new developments 'air quality neutral or better'** - by making better use of the planning system to ensure no new development has a negative impact on air quality in London.
- **Maximising the air quality benefits of a low to zero carbon energy supply** - by using the planning process to ensure that low to zero carbon energy supply does not have a negative impact on local air quality.
- **Energy efficiency schemes** – by implementing programmes that will make London's buildings more energy efficient.
- **Improving air quality in the public realm** - by planting urban vegetation and by discouraging anti-social burning of waste.

- **Encouraging innovation** – by making London a centre for new ideas that will improve air quality.
- **Raising awareness** - by highlighting the impact of poor air quality on health to encourage Londoners to take action to reduce emissions and by making them aware of any potential personal health risks.

Policy 6 – Reducing emissions from construction and demolition sites

Vision

Responsibly managed construction and demolition sites that pose no health risk to people working or living nearby.

Policy

The Mayor will work with London boroughs, the GLA group and the construction industry to encourage implementation of the Best Practice Guidance for construction and demolition sites across London.

Proposals

The Mayor will work with London Councils to review and update the Best Practice Guidance (BPG) for construction and demolition sites and then create Supplementary Planning Guidance to assist implementation.

The Mayor will ensure that strategic planning applications include BPG implementation.

The Mayor will require the GLA Group to include full implementation of the BPG in its procurement policy (including through the supply chain).

Outputs

It is difficult to assess accurately the potential impact of measures to reduce emissions from construction and demolition sites, as the number of sites within London fluctuates, as do their size and nature. However, reducing emissions from these sites could reduce emissions of PM₁₀ significantly, which would be particularly critical in and around areas with already high levels of air pollution.

4.3. Why we need change

4.3.1. London Councils and the GLA published the Best Practice Guidance (BPG)²⁵ on construction and demolition in 2006. This Guidance provides clear advice for air pollution mitigation measures to be included within a Code of Construction Practice (CoCP) during demolition and construction. These mitigation measures fall broadly under the headings of effective site planning, construction traffic measures, demolition works and site activities. Reducing emissions through implementation of the BPG will work towards improving local air quality, which will have benefits not just for people who live near construction sites but also for workers on sites who are exposed to emissions at close proximity day in day out.

4.3.2. Most boroughs are already implementing the BPG to a significant extent, either through planning conditions or section 106 agreements. It is now standard practice for mitigation measures from the BPG to be included in CoCPs that developers must adhere to. Such measures include dust dampening, hard surfacing haul roads, minimising dust generating activities, covering skips and ensuring stockpiles are securely sheeted.

4.3.3. However, the BPG is not being fully implemented on all construction sites within London. This is partly because the BPG is not a statutory document in the planning process and boroughs are not obliged to consider it. Even where planning authorities have included implementation of the BPG as a requirement, they sometimes lack resources to provide advice and enforce it as necessary.

4.3.4. In particular, the element of the BPG that promotes retrofitting older non-road mobile machinery (NRMM) with particulate traps on all high-risk sites to reduce emissions has not been implemented to date. This is because some sections of the construction industry have concerns over the cost-effectiveness of this equipment and

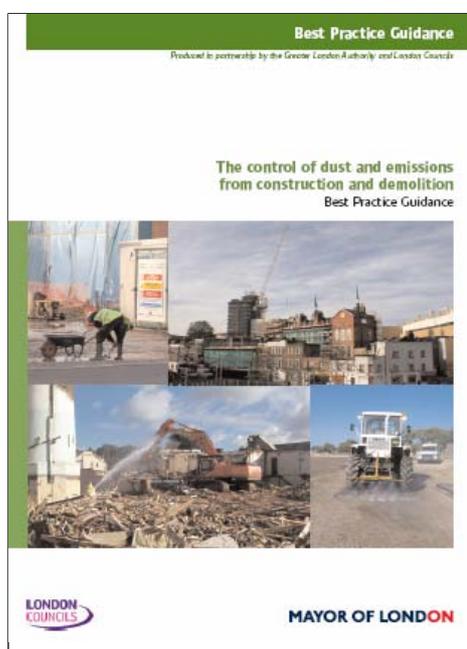


Figure 4.1: GLA and London Councils Best Practice Guidance

health and safety issues regarding hot surfaces, sight-lines and noise. However, the lifespan of NRMM can be as long as for road vehicles, so there is a need to ensure that emissions from older plant are reduced.

4.3.5. This is recognised by the United Nations Economic Committee for Europe (UNECE), which has a long history of drafting emissions regulations that have been adopted by other administrations, including the EU. It is currently considering the creation of an approval scheme for retrofit equipment. The Mayor supports this work, which will encourage the widespread use of retrofit equipment, even though the potentially long timescale for the UNECE's work may mean that it will have little impact on the achievement in London of limit values over the next few years. The Mayor recognises the need for authorities in the UK to promote the retrofitting of NRMM. This is even more important in the light of a proposal from the European Commission that would allow companies producing NRMM to sell a limited amount of machinery that does not meet the latest emissions standards up to the end of 2013, instead of 2011 as originally planned. This will slow the introduction of newer, cleaner plant.

4.3.6. As there are a number of large construction sites across London at present, there is an opportunity to work with industry to reduce emissions from construction and demolition activities further.

4.4. What needs to be done

4.4.1. The BPG is an important tool to reduce emissions from building demolition and construction sites, which are often located in areas of dense population. For that reason, the Mayor is committed to full implementation of the Guidance by all developers across London.

4.4.2. There are some very good examples of best practice implementation throughout London. Box 17 below highlights examples of initiatives that are being implemented in London boroughs. Through the LAQM process and the updated BPG, the Mayor will encourage the spread of such best practice. The Mayor will work with the Considerate Constructors Scheme to help promote best practice.



- 4.4.3. The GLA is looking for opportunities to work with Crossrail to undertake a demonstration project that examines the operation of retrofit equipment on NRMM on a London construction site. The knowledge gained from this demonstration, as well as other relevant experiences, studies and reports, both from the UK and abroad, will be used to inform a wider review and update of the BPG, to be completed in 2011 in cooperation with London Councils, boroughs and the construction industry.
- 4.4.4. This review is expected to be minor, allowing new techniques and best practice that have been developed since 2006 to be included. The review would also create the opportunity for the BPG to become a more streamlined document contained within Supplementary Planning Guidance, which would be easier for boroughs to enforce. In particular, it will provide clear advice on which elements should be regarded as mandatory and should therefore be actively enforced by boroughs, and which elements are advisory. The Mayor, through the GLA, will encourage boroughs and other developers to include the BPG in their agreements and CoCPs. The GLA Group will also include the BPG within procurement policies for all construction projects. Finally the GLA will promote awareness of the BPG through workshops and information on its website.

Box 17: Best practice initiatives implemented across London to minimise the impacts of construction and demolition

- The London Borough of Islington, through section 106 funding, has created two Construction Impact Manager Officer (CIMO) roles that actively manage large construction sites within the borough. A database of complaints and construction sites has been set up and the CIMOs respond to the complaints and proactively work with other key stakeholders such as the Highways department, the planning team and developers. Since the creation of the roles in 2007, the council has received positive feedback from the public and has responded to over 800 complaints. At present there are over 40 sites being dealt with and there are plans to purchase monitoring equipment and carry out more enforcement activities throughout the borough.
- The City of London has published its own Code of Practice that includes the requirements of the BPG and specifically refers to it. Demonstrable compliance with the Code of Practice is specified within section 106 agreements for larger sites within City of London. Construction is closely monitored within the City and specific staff within the team visit sites daily.
- The Royal Borough of Kensington and Chelsea has published draft Supplementary Planning Guidance on air quality that highlights the BPG and encourages developers to risk assess construction sites and incorporate its measures within their environmental plans.

Policy 7 – Using the planning process to improve air quality	
Vision	A planning process that ensures that new developments contribute to achievement of the Mayor’s air quality objectives.
Policy	The Mayor will ensure that new developments in London shall as a minimum be ‘air quality neutral’ through the adoption of best practice in the management and mitigation of emissions.
Proposals	<p>The Mayor will use his planning powers to:</p> <p>Develop a checklist to guide boroughs and developers in the assessment of the potential emissions from new developments.</p> <p>Minimise increased exposure to existing poor air quality, particularly within AQMAs or where a development is likely to be used by large numbers of people who are particularly vulnerable to poor air quality.</p> <p>Ensure air quality benefits are realised through developer contributions and mitigation measures as secured through planning conditions, section 106 agreements or the Community Infrastructure Levy, where appropriate.</p> <p>Provide guidance for boroughs in producing their Supplementary Planning Documents on air quality to assist them in determining planning applications.</p>
Outputs	Ensure that measures to improve air quality are embedded in the planning process

4.5. Why we need change

4.5.1. The planning process can play an important role in ensuring that proposed new developments do not detrimentally affect local air quality (see Box 18 for details on strategic planning in London). Air quality can be a material consideration in the determination of a planning application²⁶ and the planning process should be used to

protect and improve local air quality and ensure developments are appropriately and sensitively designed to mitigate negative impacts on air quality. The planning process presents further opportunities to mitigate air quality impacts through appropriate planning conditions and use of planning obligations under section 106 agreements for processes not already included in other legislative environmental controls.

4.5.2. Air quality assessments are often required for new developments. These focus on the impact of the development on pollutant concentrations. This concentration modelling is important, as it shows clearly the impact a development will have on the achievement of limit values. Concentration modelling, though, is not always sensitive to small changes in emissions. The cumulative impact on air quality of a number of developments will therefore not always be identified. For this reason attention needs to be paid to emissions predictions for new developments, alongside concentration modelling.

Box 18: Strategic Planning in London and the London Plan

Strategic planning in London is the shared responsibility of the Mayor and boroughs. The London Plan is the Mayor's spatial development strategy for London and Borough's local development documents have to be in general conformity with it. The Draft Replacement London Plan (DRLP) policy 7.14 specifically addresses how development and land use can help achieve the air quality objectives. Other DRLP policies that will help achieve the air quality objectives include:

- Accommodating London's growth within its current physical boundaries will help support denser patterns of development, with benefits from improving the viability of public transport and improving energy efficiency.
- Policies to encourage provision of jobs closer to where people live, particularly in Outer London
- Policies in Chapter 4 to encourage the shift to a low carbon economy and make London a centre for innovation.
- Policies in Chapter 5 to promote energy efficiency (policies 5.3 and 5.4), use of innovative energy sources and technologies (5.8) and urban greening (5.10 and 5.11).
- Policies in Chapter 6 to encourage coordination between transport and land use planning (6.1), to encourage modal shift to public transport and sustainable modes (6.1, 6.2, 6.3, 6.9, and 6.10), to encourage car clubs and greater use of electric –powered cars (6.13 and detailed parking policies), to smooth traffic flows (6.11) and to improve the sustainability of freight (6.14).

4.6. What needs to be done

Tackling emissions associated with new developments

4.6.1. Within AQMAs, the planning system should be used to deal with the cumulative effects on air quality of development. For developments that require an air quality assessment, both at strategic and local planning level (such as those that fall within the criteria for an Environment Impact Assessment, or as described in Highways Agency Advice, Government planning advice and EPUK's Planning Advice) the Mayor encourages boroughs to require emissions assessments for new developments to be carried out alongside concentration modelling and included within submitted planning applications. For some sources, such as construction work, it may not be possible to make detailed estimates of emissions, but an outline risk assessment would in many cases still be useful. The GLA will work with boroughs and London Councils to develop a checklist of emissions sources that should be included in assessments, under the following categories:

- Construction stage (including associated traffic);
- On-site (eg. Water and space heating systems); and
- Off-site (eg. transport-related).

4.6.2. The checklist will be published on the GLA website to enable developers to carry out air quality assessments and boroughs to analyse and evaluate assessments. Such assessment of emissions will enable boroughs to identify where emissions reductions targets can be achieved. It would also be used in conjunction with concentration modelling to show whether new developments could exacerbate local poor air quality and to identify offsetting mitigation opportunities if necessary, as discussed in National guidance Planning Policy Statement 23 (PPS23).

4.6.3. It is also important to mitigate negative impacts from construction and on-site sources. The Mayor encourages boroughs to include relevant elements of the construction and demolition BPG within planning agreements (see Policy 6). Energy efficiency measures and low NO_x emission boilers can reduce projected on-site emissions.

Minimising increased exposure to existing poor air quality

- 4.6.4. A key consideration for any planning authority is whether a proposed development will result in increased exposure to existing poor air quality. As noted in PPS23, exposure to poor air quality should be minimised by avoiding introduction of potentially new sensitive receptors in locations where they will be affected by existing sources of air pollution (such as road traffic and industrial processes). Particular attention should be paid to development proposals such as housing, elderly persons' homes, schools and nurseries.
- 4.6.5. Development proposals should ensure that where provision needs to be made to reduce emissions from a development, these are usually made on-site. Where it can be demonstrated that on site provision is impractical or inappropriate, wider measures with equivalent air quality benefits should be considered by means of planning obligations, conditions or the Community Infrastructure Levy, either on a scheme by scheme basis or through joint area based approaches. This approach is consistent with PPS23 (under the Town and Country Planning Act 1990). There are excellent examples of boroughs that have secured section 106 agreements that have had positive impacts on local air quality or have been used to offset potential detrimental effects to local air quality (see Box 19).
- 4.6.6. Many boroughs are now requiring developers to fund Low Emission Strategies. The Low Emissions Strategy concept is an important tool for mitigating the transport impacts on air quality of a proposed development. Defra, in association with the Low Emissions Strategy Partnership²⁷ has produced best practice guidance to reduce transport emissions through the planning process and the Mayor encourages boroughs to use this guidance.
- 4.6.7. In order to secure contributions, this approach should be set out in strategic documents such as Core Strategies and Area Action Plans for individual London Boroughs. At a strategic level, the draft London Plan includes policies to enable this to happen. The Mayor will also use this approach for developments that are referred to him and will promote best practice through training workshops with boroughs.
- 4.6.8. Some boroughs have produced Supplementary Planning Documents (SPDs) on air quality which needs to be taken into account in development proposals and which can be used in determining planning applications. The Mayor will provide guidance for boroughs on SPDs, which will cover:

- Circumstances in which an air quality assessment would be required for a new development
- Guidance on the process of air quality assessments, including assessment of on site and off site emission sources
- Guidance on suitable mitigation measures, including use of section 106 funding and the Community Infrastructure Levy.

4.6.9. The Mayor will encourage boroughs to publish such Supplementary Planning Documents to ensure that air quality is fully embedded within the planning process.

Box 19: Best practice initiatives implemented across London

Examples of mitigation measures achieved through Section 106 Agreements include: The London Borough of Waltham Forest adopted a SPD in 2008 that provided a funding contribution formula to the implementation of the Air Quality Action Plan. This is based on the type of development proposal (eg. commercial or residential). Formulae such as these provide a helpful framework to assess the developer's contribution based on the impacts of the proposed development.

For example, the London Borough of Greenwich has secured:

- A 'low emission zone' for the development and construction of the Warren development.
- Site travel plan and funding for air quality monitoring for the Tripcock Point development.
- Greenwich Millennium Village – emission based parking policies.
- Ten electrical vehicle charging points.
- For a superstore opening in the Zone, requirement for 50 per cent of delivery vehicles and 50 per cent of home delivery vehicles to meet the Euro V standard.
- For the superstore to report to the Council on the implementation of the Low Emission Zone measures and targets five and ten years after opening.

Policy 8 – Maximising the air quality benefits of low to zero carbon energy supply
Vision A low to zero carbon energy supply for London that does not worsen local air quality and creates opportunities to improve local air quality.
Policy The Mayor will ensure that low to zero carbon energy sources in London do not contribute to the deterioration of local air quality through the adoption of best practice in the management and mitigation of emissions.
Proposals The Mayor will use his planning powers to: Apply emissions limits for both PM and NO _x for new biomass boilers (including use of biofuels) and NO _x emission limits for Combined Heating and Power Plant (CHP) across London. These emission limits will be regularly reviewed as new evidence becomes available and abatement technology improves. This will be applicable at a strategic and local level. Require an emissions assessment to be included as part of the standard air quality assessment that is submitted at the planning application stage for new developments that include biomass boilers or CHP. Require biomass and CHP operators to monitor and provide evidence on a yearly basis in the form of an annual maintenance report to show continued compliance with emission limits.
Outputs Ensure that the Mayor's commitment to supporting the installation of low to zero carbon technologies, including decentralised energy production, does not lead to the deterioration of local air quality in London.

4.7. Why we need change

- 4.7.1. The Mayor is committed to reducing London's carbon emissions and has set a target of generating 25 per cent of London's energy from decentralised sources by 2025. The primary opportunity in London is for heat networks fed by low to zero carbon technologies such as combined heat and power (CHP) systems at a range of sizes. A mix of energy sources can feed these systems, primarily mains gas, waste derived fuels and biomass. Biomass can also be used in individual boilers to provide a renewable source of heat. While these technologies will play a key role in reducing London's carbon emissions, consideration also needs to be given to their impact on air quality.
- 4.7.2. According to the size of the plant and the fuel used, emissions from CHP and biomass boilers are subject to a range of regulatory controls under the Environmental Permitting Regulations (2010)²⁸. Large plant (Part A1 installations generally over 50MWth in size) are regulated by the Environment Agency in England and Wales. Local Authorities can provide input through the planning process and ongoing discussions with the Environment Agency. Smaller plant (Part B2 installations generally between 20 and 50MWth input) are regulated through the Local Authority Pollution Prevention and Control regime, which now sits within the Environmental Permitting (England and Wales) Regulations structure²⁸. Local authorities control these smaller combustion processes and can stipulate emission limits based on preventing, or where that is not practicable, reducing emissions to air.
- 4.7.3. Emissions from plant below 20MW input capacity are not directly regulated as part of the Environmental Permitting Regulations, although there are some regulations and legislation that cover some aspects of their operation. For example, the Clean Air Act²⁹ (CAA) covers emissions of dust, smoke and in some cases fumes. It requires the use of approved biomass appliances in smoke control areas (all of London is declared a smoke control zone) and also includes provisions for local authorities to approve chimney heights for developments. However, as emissions from the combustion of biomass and CHP are largely invisible and odourless, the CAA does not include provisions to deal with the harmful pollutants associated with these installations (such as NO_x and PM). Therefore there is a need for an additional control framework for appliances not covered by the current regulatory system to allow local authorities to assess the impact of emissions from smaller plant that that would otherwise not be assessed.

Biomass Boilers

4.7.4. Depending on the type of fuel used and the design of the particular device, unabated biomass boilers can emit at least 20 per cent more PM₁₀ than gas-fired boilers and sometimes significantly more, though they are cleaner than oil-fired boilers. There is therefore a risk that without the requirement for appropriate controls, the widespread inclusion of biomass boilers in developments could compromise the achievement of local air quality objectives in London. Research has shown that biomass boilers can be effectively fitted with abatement equipment (such as ceramic or fabric filters) for PM. Such equipment is available on the market, though for smaller biomass boilers, the cost of retrofitting can be as high as 30 per cent of the installation costs. The cost of abatement equipment for PM is expected to fall over time. However, at present there is no viable abatement equipment to reduce NO_x emissions from all but the larger biomass boilers. This is critical as NO₂ exceedences are likely to persist longer than PM₁₀ exceedences and currently there is no abatement equipment for the types of biomass boilers that typically get proposed in London.

Combined Heat and Power Plants

4.7.5. The use of gas, and in future years, biomass fuelled CHP systems within London can introduce additional pollutant sources that would otherwise not be located close to potentially sensitive receptors; this is a concern for areas in London that already have high pollutant concentrations. Natural gas-fired CHP can emit a number of pollutants, including NO_x, while liquid fuel CHP can emit NO_x and PM.

4.7.6. CHP comes in a range of different technologies and sizes depending on the need of the energy consumer. The installations that will most likely be included in development proposals in London (such as mixed use, residential and commercial developments) are below 20 MWth and are not regulated as Part A2 or B processes. These technologies use reciprocating spark ignition or compression ignition (using liquid fuels) engines. Emissions are capable of being reduced through the 'lean burn process' and post combustion treatments such as catalytic and non-catalytic converters, although their applicability varies according to the engine technology and size.

4.8. What needs to be done

4.8.1. The Mayor considers that the planning system should be used to strike a balance between ensuring London drives down its carbon emissions and making sure that development does not have a negative impact on air quality. This policy addresses those processes and appliances outside the scope of existing regulation and identifies

the existing guidance that should be used to identify impacts from low to zero carbon energy sources.

Biomass boilers

4.8.2. For planning applications that include proposals for the use of biomass boilers, the Mayor will require that an assessment of its emissions is undertaken. Guidance issued by Defra³⁰, and more recently, Environmental Protection UK and Local Government Regulation (formerly LACORS)³¹ provides a suitable assessment method that should be followed. This guidance recognises that biomass boilers can be valid tools to help developers meet their carbon dioxide reduction targets, but uses a risk-based approach to help local authorities mitigate any negative air quality impacts from their use. The guidance covers:

- The location of the boiler;
- Comparison with the type of boiler it is replacing (if relevant);
- The standard of the boiler; and
- The type of fuel to be used.

4.8.3. The Mayor considers that new developments which include biomass boilers should provide evidence that the impact of the boiler has been included within the air quality assessment and suitable mitigation measures have been included in the plans. Such an assessment should follow EPUK/Local Government Regulation guidance. Examples of best practice mitigation include design optimisation (such as flue location, stack height, design, optimisation and control of fuel to air requirements), use of Best Available Technology, selection of high quality, low nitrogen content fuel and that the plant is regularly serviced and maintained.

4.8.4. The Mayor will use his planning powers to ensure that new biomass boilers meet emission limits for PM and NO_x. These limits will ideally be lower than those set by the Government as part of the Renewable Heat Incentive (RHI), as included within the RHI consultation document, though this depends on the availability of emissions data. The RHI emissions limits are currently proposed at 30g/GJ for PM and 150g/GJ for NO_x. The Mayor will work with the Government to ensure that data submitted by

operators to receive funding through the RHI can also be used for enforcement of emission limits in London.

- 4.8.5. At the planning application stage it will be required that developers include evidence (such as emissions test data from the plant manufacturer) to demonstrate that the proposed plant is capable of meeting the NO_x and PM emission standards within the air quality assessment that accompanies such applications. It will be up to individual operators/developers to decide how the emission limits will be met. This could be through fitting abatement technology for PM₁₀ (such as ceramic or fabric filters) or use of the most efficient biomass boilers.
- 4.8.6. Once the development is operational, the operator of the site will be required to submit evidence to the local planning authority to show continued compliance with the emission limits. This requirement will be included within a planning condition for the submission of a management/ operating plan to the local authority. The operating plan should include details of how inspections and /or maintenance checks will be carried out annually and this can be used to demonstrate compliance with the emissions standards.
- 4.8.7. The Mayor will keep the emission limits under review and amend them as abatement technology develops and new evidence becomes available. The emission limits will be published on the GLA website following further consideration of available abatement equipment and will be given statutory planning status by being included in the London Plan Minor Alterations.
- 4.8.8. The Mayor will encourage the Government to introduce type approval for PM (and NO_x, when available) abatement equipment to ensure that when abatement equipment is fitted, both customers and the approving authority can be confident of its effectiveness. In the circumstance that new standards are proposed, the operator will only be required to meet the standards set at the time of planning approval and as contained within the planning conditions.
- 4.8.9. The Mayor expects local authorities, through their planning processes to implement a similar approach and to be satisfied there are no adverse impacts on local air quality before granting planning permission for biomass boilers when considering local planning applications. The Mayor will include this process within the

Supplementary Planning Document guidance that he will produce to assist boroughs when considering planning applications (as outlined in Policy 7).

Combined Heat and Power Plants

- 4.8.10. The Mayor will use his planning powers to ensure that new CHP installations that are not currently covered by the existing emissions regulatory regime will meet emission standards for NO_x. For planning applications that include proposals for gas fired CHP (and in the future alternative fuels), evidence, such as emissions test data from the manufacturer, must be submitted to demonstrate that the proposed plant is able to achieve emissions standards. This assessment will be coupled with the standard dispersion pollutant modelling that is submitted to the planning authority at the application stage. The approach would be enforced through the planning process when the Mayor determines strategic applications and it is expected that London boroughs would also adopt this approach.
- 4.8.11. The Mayor will work with boroughs and appliance manufacturers to determine the emissions standards. It will be up to the developer/operator to demonstrate that the proposed plant is capable of achieving, and maintaining the emissions standards. These emission standards will be published on the GLA website and will be given statutory planning status by being included in the London Plan Minor Alterations. Mitigation design measures will be taken into account when considering the suitability of the proposed CHP. Most modern engines are equipped with a computerised engine management system (EMS) which continuously controls and balances the combustion process. Therefore an operator can adjust the EMS to produce specific operating conditions, including NO_x emissions to ensure compliance with emission limits. Other *in situ* abatement methods and post combustion treatment through the use of catalysts may also be appropriate. Over time, further technology may become available to allow more stringent standards to be set.
- 4.8.12. A planning condition will be imposed on the developer/operator to supply to the planning authority, on an annual basis, evidence (such as an annual maintenance report) to demonstrate that the emissions standards are still being met. As with the standards for biomass boilers, CHP emissions standards will be reviewed regularly once more data becomes available and new technologies are developed. In the circumstance that new standards are set, the operator will only be required to meet the standards set at the time of planning approval and as contained within the planning conditions.

Policy 9 – Energy efficient buildings
Vision Energy efficient buildings in London in which the need for energy use from heating is minimised.
Policy The Mayor will encourage the retrofitting of existing homes and workplaces to make them as energy efficient as possible in order to reduce NO _x emissions from gas heating systems.
Proposals The Mayor will work through the GLA, the London Development Agency (LDA) and with London Boroughs, London Councils and the Energy Saving Trust (EST) to deliver RE:NEW, a pan-London programme to retrofit residential properties to improve energy and water efficiency. The Mayor will work with the GLA group, London boroughs and other public sector organisations in London to implement the RE:FIT programme to improve energy efficiency in public sector buildings. The Mayor will work with commercial landlords and tenants through the Better Buildings Partnership to share knowledge in the commercial sector on implementing sustainable upgrades. The Mayor will work with businesses through the Green500 scheme to reduce their energy use. The Mayor will support London boroughs to deliver RE:CONNECT - Low Carbon Zones that demonstrate the potential for energy savings which will reduce emissions of NO _x resulting from physical measures and community engagement. The Mayor will set CO ₂ reduction targets for new developments which will be achieved using the Mayor's Energy Hierarchy. The energy efficiency measures will result in reductions of NO _x emissions.

Outputs

The delivery of the RE:NEW and RE:FIT schemes would save a total of over 660 tonnes of NO_x in 2011 and over 1270 tonnes of NO_x in 2015.

4.9. Why we need change

- 4.9.1. Most buildings in London use gas heating systems. While gas is a relatively clean fuel and improvements have been made in recent years to make heating systems more efficient, gas burning is still responsible for considerable emissions of both NO_x and carbon monoxide (CO), as well as CO₂, which contributes to climate change.
- 4.9.2. The Mayor is committed to driving down London's CO₂ emissions by 60 per cent of 1990 levels by 2025 through measures included in his draft Climate Change Mitigation and Energy Strategy. Using energy more efficiently is a crucial component of delivering this. Better energy efficiency will result in less gas use and consequently a reduction in emissions of NO_x.
- 4.9.3. Gas use from heating systems, including water-heating systems, is responsible for more than 20 per cent of all NO_x emissions in London. As emissions from other sources are expected to fall, by 2015 it is predicted that gas used for heating will account for as much as a quarter of all NO_x emissions in London. There is thus an urgent need to use gas more efficiently when heating homes and other buildings in London.
- 4.9.4. Too many buildings in London lose heat through the building fabric because they are poorly insulated. This combined with many buildings having old, inefficient heating systems, means that more gas is used to heat space and water than is actually needed, leading directly to emissions of NO_x. Simple measures to improve the energy efficiency of London's homes and public and commercial buildings would therefore have benefits in terms of reducing emissions of NO_x and CO₂ as well as reducing energy bills for Londoners and London's public sector organisations and businesses.
- 4.9.5. Energy could also be saved by replacing old domestic boilers which are inefficient with new energy efficient models. The Mayor welcomed the implementation by the Department of Energy and Climate Change (DECC) of a boiler scrappage scheme in 2010. Up to 125,000 householders with old, 'G-rated' boilers were entitled to £400 of the cost of a new 'A-rated' boiler. These 'A-rated' boilers tend to be more energy-

efficient, so emit lower levels of NO_x. The scheme has now closed to new applicants and the Government has indicated that no further funding will be made available for the scheme. Nevertheless, the Mayor will lobby the Government to extend this scheme so that more Londoners will have the opportunity to upgrade their inefficient boilers.

4.9.6. Improving water efficiency in homes and workplaces will also reduce the need to use gas for water heating, thereby improving air quality.

4.10. What needs to be done

4.10.1. The Mayor is already using the planning process in London to ensure new buildings are sustainable. However, new buildings account for just two per cent of London's building stock in any year. Much more can be achieved in the short-term by making energy efficiency improvements in London's existing homes and buildings.

Retrofitting homes

4.10.2. To retrofit London's homes with energy efficient, renewable and water saving measures and attract the required funding into London, the Mayor is working through the GLA, the LDA and with London Councils, boroughs and the Energy Saving Trust to deliver RE:NEW, a pan-London model for retrofitting homes. This initiative aims to overcome the barriers to retrofitting homes in London on a large scale. RE:NEW will build on existing energy efficiency schemes and help co-ordinate the plethora of schemes that are offered at a borough level into a more integrated and coherent energy efficiency programme for householders. This will help to increase the likelihood of households taking up the measures on offer under RE:NEW and attract funding from commercial partners.



4.10.3. The RE:NEW partnership carried out three technical trials during summer 2009 to determine the package of easy measures on offer, the logistical and cost implications of the programme, and how households will be referred for follow-up insulation visits. RE:NEW also carried out a series of demonstration projects from November 2009 to

April 2010 in nine boroughs to test delivery on a large scale and inform the final RE:NEW delivery model. The trials and demonstration projects have retrofitted approximately 9,000 homes, and initial results show uptake rates of up to 35 per cent.

4.10.4. From 2010 to 2012, the RE:NEW model will be rolled-out to all boroughs, aiming to install energy and water efficiency measures in 200,000 homes by 2012. By 2015, it aims to deliver a package of easy measures and energy efficiency advice to 1.2 million homes, insulate remaining loft and cavity walls where practical and top-up those lofts that only have a small amount of insulation. RE:NEW will then aim to provide support to all London home-owners to have whole-house retrofits by 2030.

4.10.5. Achieving these targets will require integration between RE:NEW and existing energy efficiency schemes in boroughs. The programme will also need to attract the necessary levels of funding from energy suppliers, the Government and other private funding streams if these targets are to be met.

4.10.6. The Mayor will look to the Government and London boroughs to coordinate funding between 2012 and 2015 and to continue the expansion of the RE:NEW approach across London. A wide-scale rollout of RE:NEW will depend on the development of a cost-effective delivery model, the Government's willingness to provide London with an equitable share of funding, and energy suppliers' commitment to fund in London.

Low Carbon Zones

4.10.7. To complement the RE:NEW programme, the Mayor, working with boroughs, is



delivering RE:CONNECT; ten Low Carbon Zones in London neighbourhoods. The zones aim to show the extent of savings achievable when the full range of low/zero carbon technologies and services available are concentrated at the neighbourhood scale, and local communities are fully engaged.

Twenty-nine applications for funding support were received demonstrating the strength of interest that exists in developing community-focused carbon-saving projects.

4.10.8. The zones have a target to deliver a reduction of 20.12 per cent in CO₂ emissions by 2012, and the measures applied will also result in reductions in NO_x emissions. They aim to bring together London boroughs, community organisations, residents, businesses and utilities to work in partnership. It is proposed that the Low Carbon Zones become focal points of borough-led and Mayoral schemes, allowing them to leverage greater funding from government and energy suppliers.

Retrofitting public sector buildings

4.10.9. Just as emissions of NO_x from domestic heating can be reduced, London's workplaces can also be made more energy efficient. The Mayor would support the extension of the Government's domestic boiler scrappage schemes to commercial properties to increase further energy efficiency.

4.10.10. The Mayor, working through the LDA, has developed RE:FIT (previously the Buildings Energy Efficiency Programme) to improve energy efficiency of public sector buildings. RE:FIT uses an innovative commercial model to retrofit public sector buildings.



4.10.11. London is the first city in the world to appoint an approved panel of Energy Service Companies (ESCOs) that undertake audits of buildings to identify potential energy saving measures and then install them. A project management office at the LDA also provides hands-on support and guidance to participating organisations to help them through the entire retrofitting process, from procurement and contracting to support on monitoring delivery. This helps to overcome barriers around the public sector's capacity to install energy saving measures at scale.



4.10.12. The programme is based on an Energy Performance Contracting approach where the public sector building owner identifies a portfolio of buildings they would like to retrofit, sets a target percentage for energy savings and a payback period. An ESCo is appointed from the framework panel and implements the energy conservations

measures and guarantees the resulting energy savings. This guarantees the payback of the initial investment with the delivery risk transferred to the ESCo.

- 4.10.13. This programme is designed to achieve energy savings of over 25 per cent per building. The energy saving measures installed by ESCos vary in cost and payback periods. By combining these in a package and guaranteeing set savings on energy bills, ESCos can deliver an overall attractive payback proposition. This therefore mitigates the risks associated with investing money with long payback periods.
- 4.10.14. The GLA group has completed a pilot of RE:FIT in 42 of its buildings, including fire stations, police stations and TfL offices. Installation of energy efficiency measures is complete in ten fire stations and ten police stations and almost complete in 22 TfL buildings. The measures will deliver average CO₂ emissions reductions of 28 per cent across the pilot buildings. The average payback period of the energy efficiency measures being installed is seven years, and this will deliver guaranteed energy savings worth over £1 million per year.
- 4.10.15. A further 58 GLA group buildings will be retrofitted under the scheme and the Mayor has recently announced the extension of the programme to the rest of the public sector. Twenty 'early adopter' organisations have already signed up to the programme to retrofit their buildings including the London Boroughs of Barking & Dagenham, Croydon and Sutton; Guy's and St Thomas' NHS Foundation Trust; the University of London; and Kew Gardens.

Retrofitting commercial properties

- 4.10.16. In addition to overcoming the barriers to improving energy efficiency in public buildings, the Mayor is also addressing the barriers between landlords and tenants through the Better Buildings Partnership (BBP). The BBP has brought together 14 of the largest and most influential commercial landlords in London, who collectively own a significant proportion of London's commercially rented floorspace. For the first time, these companies are developing sustainability solutions not just for their own portfolios but also for the entire market.
- 4.10.17. The BBP members have already produced a 'Green Lease Toolkit' that provides practical and flexible templates for owners and occupiers of commercial buildings. These can be used to establish agreements on managing the environmental aspects of

their buildings at any time during a lease period, as well as for new leases and lease renewals.

4.10.18. In addition to the Green Lease Toolkit, the BBP has developed toolkits and guidance in three other key areas; sustainability benchmarking; the role of property agents in enabling sustainability; and carrying out low carbon retrofits. The toolkits are all publicly available at: www.betterbuildingspartnership.co.uk and will be promoted to the wider London property sector.

4.10.19. The Mayor has supported businesses to reduce their energy use through the Green500 scheme which offers energy audits, identifying where energy efficiencies can be made, as well as practical support and advice on how to implement energy saving measures and encourage staff to adopt more energy efficient behaviours at work. To date, over 200 businesses have joined the programme.

Policy 10 – Improved air quality in the public realm

Vision

A green city in which people can enjoy spending time outdoors without risk to their health and the annoyance of unpleasant pollutants.

Policy

The Mayor will encourage the improvement of air quality in the public realm by planting urban vegetation to trap particulate matter, using his influence to increase green cover in the private and public realms and by discouraging anti-social burning and the illegal use of wood burning stoves to reduce smoke annoyance.

Proposals

The Mayor will work with the London Boroughs and other organisations to:

Include air quality improvement measures in schemes being implemented as part of the London's Great Outdoors programme.

Increase green roofs and living walls across London, through the planning system (particularly on major new developments) and by raising awareness of the multiple benefits of living roofs and walls.

Plant trees in areas of poor air quality under the 'right place, right tree' principle through the Mayor's Street Trees programme and other schemes.

Put information on the GLA website and support borough campaigns to make people aware of how to burn waste safely and responsibly.

Provide information to Londoners on the type of wood burning appliances that can be used legally in the capital.

Outputs

Vegetation could reduce PM₁₀ concentrations locally by around 20 per cent³².

Improved education and enforcement of anti-social bonfires will reduce complaints from residents and improve quality of life.

4.11. Why we need change

Public spaces

4.11.1. In many locations in London, pollution from road traffic tends to be greatest close to ground level on busy streets, where it is most likely to affect large numbers of people. This is a particular problem on still, summer days, when there is nothing to cause the particles to disperse. It is also a particular problem in 'street canyons', which are roads flanked by tall buildings on either side, which prevent the pollutants from dispersing. This can lead to significant concentrations of PM_{2.5}, PM₁₀ and NO₂ in the most built-up areas in London.

Anti-social burning of waste

4.11.2. Another problem, particularly in suburban London, is anti-social burning of waste. Every year, London boroughs receive many complaints from residents about smoke annoyance caused by the burning of tyre and plastic waste and even garden waste. Outer London boroughs can receive as many as 500 complaints per year from residents. Such fires generate high levels of particulate pollution. While much of this is heavy and falls quickly to earth, smaller particles have the potential to remain airborne. Under certain conditions they can accumulate, causing local air quality to worsen.

4.11.3. Most complaints about annoyance from waste burning are made in summer, when people tend to spend more time in their gardens and washing is drying outside. Many boroughs have provided information through leaflets or websites about responsible burning of waste. However, where people persist in burning waste so that it causes annoyance, the enforcement processes can be complex. Under section 80 of the Environmental Protection Act 1990, local authorities can serve an abatement notice once they are satisfied that a nuisance exists. However, local authorities are often unwilling to proceed with this prosecution option, as it is highly resource intensive to prove that the smoke constitutes a statutory nuisance, or to prove conclusively the source of the smoke annoyance. A study looking at data from 2000 showed that while local authorities in the UK received almost 30,000 complaints about burning of waste, only 300 notices were served and only five prosecutions brought to court.³³

Accidental fires

4.11.4. Another source of pollution in urban areas is accidental fires. While this is not a pollution source that can be easily monitored or modelled, when a major fire occurs it can increase concentrations over a wide area. Monitoring shows that large industrial

fires in London can cause concentrations of PM₁₀ to be as high as 130 µg/m³, which in a densely populated city, have the potential to damage health.

Wood burning stoves

4.11.5. There is anecdotal evidence that in parts of London, especially outer London, home owners are increasingly installing wood burning stoves in their homes. These small stoves are not generally subject to planning controls. While wood is generally considered to be a 'carbon neutral' fuel, wood burning in urban areas can contribute significantly to local pollution. All London boroughs have declared their whole areas to be Smoke Control Zones, under the Clean Air Act 1993. Wood is not allowed to be burnt as a fuel in these areas, unless the appliance being used has been tested to ensure that it can burn wood without creating smoke. Defra maintains a register of these 'exempt' appliances on its website, but it is thought that many Londoners are unaware that they live in a Smoke Control Zone and are installing non-exempt appliances.

Waste sites

4.11.6. The Environment Agency is responsible for the regulation of waste transfer and disposal sites in London, as in the rest of England and Wales and Environment Agency Officers liaise directly with boroughs about these sites. The Environment Agency has powers to serve notice, prosecute, and in extreme circumstances, revoke an operational permit.

4.11.7. In 2006 the Thames Region of the Environment Agency (which includes London) established a working group in response to reported high levels of particulate pollution around a number of waste transfer stations in London. These sites are jointly regulated by the Environment Agency and boroughs. The group includes representatives from the Environment Agency, the GLA and the relevant boroughs. It addresses a number of complex regulatory and planning issues, including on-site processes and transport access to the sites.

4.11.8. The Group also commissioned the Environmental Research Group at King's College London to carry out analysis of monitoring data around two of the multi-operator sites in an attempt to establish the sources of pollution. The results of these studies can be used as evidence by the Agency and boroughs to enable more efficient and targeted dust mitigation measures to be implemented. To date this approach has resulted in operators installing wheel washing facilities, moving operations inside

buildings, installing water spray systems to damp down sites, regular road sweeping on and off the public highway, operator self-monitoring and even changing the types of waste accepted at the sites.

4.11.9. At the same time the Environment Agency has for several years used its mobile air monitoring laboratories to pinpoint sources of particulate emissions around these sites. Working in conjunction with King's College London they have developed a better understanding of the emissions and effectiveness of different abatement techniques. As a result of this work the Environment Agency is currently preparing a best practice guidance document that outlines how abatement techniques, such as wheel washing, dust suppression and road sweeping, can be effective in minimising pollution from these sites.

4.12. What needs to be done

Public spaces

4.12.1. In November 2009, the Mayor launched his manifesto for public space, London's Great Outdoors. This sets out how over the next three years over £225 million will be invested in projects to ensure that London has a truly great public realm. This will be delivered through two programmes, 'Better Streets' and 'Better Green and Water Spaces'.

4.12.2. The Mayor will ensure that the Better Streets programme includes measures that will improve air quality in London. This could include the planting of street vegetation which helps to trap particles. Other schemes would encourage mode shift to clean forms of transport such as cycling and walking. It is likely that some of the schemes will include traffic management elements, which could make traffic run more smoothly so that it is less polluting. Central London is also the focus of the Mayor's urban greening programme. In the Climate Change Adaptation Strategy the Mayor has committed to increase green (i.e. vegetation) cover in the Central Activities Zone by 5 per cent by 2030 and an additional 5 per cent by 2050.

4.12.3. Through the Mayor's Street Trees Programme, over 5,000 trees have already been planted in 24 boroughs in London. The Mayor has pledged that at least 10,000 trees will be planted on streets in 40 priority areas by the end of March 2012. Poor air quality has been one of the criteria used to determine these locations. Some research has shown that at a local level, trees can reduce concentrations of PM₁₀, as the leaves and branches act as a filter to trap toxic particles. Care will be taken to ensure that

trees are not planted so that they form a canopy that traps pollutants causing local concentrations to increase, using the 'right tree, right place' principle.

4.12.4. The Mayor will also seek other opportunities to encourage the planting of trees in urban areas. For example, the Mayor is committed to work with partners to increase tree canopy in Greater London from the current coverage of 20 per cent to total land cover to 25 per cent by 2025. This equates to approximately two million additional trees. The GLA will seek to remain informed of the latest research into which types of tree are most effective at trapping particles, to ensure that the benefits of tree-planting are maximised where possible.

4.12.5. The Mayor will use the planning process to encourage the development of green roofs and living walls on major new developments and to influence boroughs' Local Development Frameworks. The GLA will promote other opportunities to increase green roof cover on existing buildings, by working with both the public and private sectors. As well as acting as a filter to trap toxic particles, green roofs and walls have other benefits. For example, they can keep buildings warm in winter and cooler in summer, reducing the need for heating or cooling, which contributes to lower emissions of NO_x. They also make urban areas more pleasant places in which to live and work and are important for both biodiversity and reducing surface runoff of rainfall. TfL is in the process of identifying suitable locations to trial green walls, green screens and low barriers. If trials are successful, a further roll out will be considered.

Waste burning

4.12.6. The Mayor will work with boroughs to encourage people to use alternatives to burning when disposing of waste. These include composting or using borough waste disposal services. Where people feel that burning is the best option, the Mayor will work with boroughs to educate people about doing this responsibly and safely and will put advice on the GLA website.

4.12.7. If following these awareness campaigns problems of antisocial waste burning persist, the Mayor will urge the Government to introduce legislation that would allow local authorities to create byelaws to impose restrictions on burning of waste in residential areas – for example during daylight hours in the summer. Boroughs have powers under section 80 of the Environmental Protection Act 1990 to serve an abatement notice if burning of waste causes a statutory nuisance. However, these are

rarely enforced, largely because proving that burning constitutes a statutory nuisance can be a time consuming process and boroughs have limited resources.

- 4.12.8. Restrictions or selective bans would be easier to enforce and easier for residents to understand. These restrictions could be imposed borough-wide or in selected areas, such as AQMAs. However, the restrictions should focus on antisocial burning of waste and clearly would not restrict the responsible lighting of fires on special occasions such as Bonfire Night.
- 4.12.9. Introducing powers to apply such byelaws might require primary legislation, though amendments to the Clean Air Act (1993) could be made so that it covered domestic as well as commercial waste. The GLA will explore these options with boroughs and the Government.

Accidental fires

- 4.12.10. In recent years the London Fire Brigade has undertaken major fire prevention campaigns and has also improved response times to calls. As a result, the number of major fires in London has fallen in recent years, and 2008/09 had the fewest number of major fires in London for 40 years. The London Fire Brigade will continue its efforts to ensure that this trend continues, which will minimise the harmful pollution from fires in urban areas in London.

Wood burning stoves

- 4.12.11. The GLA will work with partners including boroughs and EPUK to educate homeowners about the legal use of wood burning stoves in London. This will include putting information on the GLA website, such as Defra's list of 'exempt' appliances.

Waste management

- 4.12.12. The joint working between the Environment Agency, borough officers and site operators, has achieved considerable air quality improvements at a number of sites. However there is still work to do to ensure that these and other sites in London do not produce emissions which contribute to unacceptable levels of local air pollution. The Mayor's draft Municipal Waste Management Strategy advocates an increase in recycling and energy recovery as opposed to landfill. It is important that the Mayor works with partners to manage the challenges and opportunities presented by this new approach to assist in achieving air quality improvements for local residents.

Policy 11 – Encouraging innovation

Vision

London to be a centre for testing innovative approaches to improve air quality.

Policy

The Mayor will promote research into the causes and effects of air pollution in London, testing new techniques for improving air quality and encouraging their use when they are proven to be effective.

Proposals

The Mayor will use the Local Air Quality Management process to promote the use of new techniques to improve air quality in London.

The Mayor will support continued improvement to the London Atmospheric Emissions Inventory (LAEI) to ensure that boroughs and other organisations have access to accurate emissions information to help develop effective policies.

The Mayor will support the improvement of the air quality monitoring network in London so that it provides accurate and up to date information about air quality trends and current conditions in London.

The Mayor will work with boroughs and the business sector to identify funding opportunities for measures that will lead to air quality improvements.

The Mayor will encourage the Government to support and fund research and development of innovative techniques that could improve air quality in London.

Outputs

Research and trialling of techniques to improve air quality in London and elsewhere.

Quicker dissemination of information about innovative and effective measures to improve air quality in London and shorter periods from trial to implementation.

Further development of London as a centre for the green economy

4.13. Why we need change

4.13.1. Much of this Strategy is focussed on meeting EU limit values in the period up to 2015. Given this requirement, it is important that London makes the best use possible of existing resources, quickly implements new technologies and deploys innovative techniques to promote behavioural change.

4.13.2. London is already a centre for innovation in air quality improvement methods, with some of the world's leading air quality research organisations based in the capital. Boroughs are also renowned for their willingness to apply new techniques to improve local air quality. However, there is still not enough research into issues that are relevant to London, and there is a need for a structured network for disseminating results. Examples of areas in which London practitioners urgently need research to be carried out include:

- Causes and impacts of tyre and brake wear on air quality (including research into different types of tyres and vehicle brake systems).
- The behaviour and health risks of resuspended particulates.
- Which types of street vegetation are most effective at trapping or blocking pollution from road sources.
- Possible uses of materials or chemicals such as photocatalytic paint and titanium-coated fabrics to reduce NO₂ concentrations.
- Air quality impacts of the increased use of biofuels in vehicles and in biomass boilers.
- Development of biomass boilers and abatement equipment to lower emissions of air pollutants from these sources.

4.14. What needs to be done

- 4.14.1. Through the Mayor's statutory role in reviewing all boroughs' Local Air Quality Management (LAQM) documents, the GLA is at the centre of a network of air quality expertise in London. The GLA has access to information about new techniques being tested across London and beyond. The GLA will organise workshops for sharing best practice and will encourage the development and use of on-line forums to encourage discussion. The Mayor will also use his role in appraising LAQM documents to help boroughs develop targeted solutions to their particular problems.
- 4.14.2. The Mayor will seek to ensure that the LAEI and air quality monitoring networks are maintained and enhanced. The LAEI will be regularly updated to help ensure the accuracy of borough monitoring and modelling and the GLA will work with boroughs and the Government to review and improve the air quality monitoring network in London, which is largely funded and administered by the boroughs. It is vital that air quality monitoring stations are sited where people are most likely to be exposed to pollution. Access to accurate information about real-world concentrations, emissions sources and trends in air quality is required to ensure that boroughs and others involved in air quality management can develop appropriate policies. The Mayor will also work with boroughs to identify their priority areas for air quality so that joint action can be taken to make improvements. Through the LIP process, the Mayor will ensure that measures to improve air quality at these locations are prioritised.
- 4.14.3. Across the country, the worst air quality problems are in major urban areas. The Mayor will encourage the Government to ensure that air quality issues that are relevant to urban areas such as London are properly examined. The Government has announced that the Expert Panel on Air Quality Standards is to be abolished while the Air Quality Expert Group (AQEG) and the Committee on the Medical Effects of Air Pollutants (COMEAP) will both be reconstituted as committees of experts. The Mayor will seek assurances from the Government that reorganisation will not prevent vital research from being progressed.
- 4.14.4. While Government-led research is important, London needs to retain its position as a leader in air quality research and innovation. Many of the measures included in this Strategy are highly innovative – such as the application of dust suppressants at priority locations and the inclusion of a NO_x standard in the Low Emission Zone. The GLA is currently working with research organisations and boroughs to develop an improved structure for coordinating research in London. Its purpose will be to:

- Promote collaboration between research scientists and policy makers.
- Develop research programmes.
- Disseminate research results throughout the London air quality community.
- Lobby at national and European level for resources to progress air quality research.

4.14.5. The GLA group, boroughs and the business sector also need to make full use of funding opportunities when developing innovative techniques to improve air quality in London. The Mayor is working with the Technology Strategy Board on programmes that will deliver some of the technological improvements set out in this Strategy. Similarly, London's Science and Industry Council, Catalyst, aims to strengthen links between London's research organisations and businesses, and the Mayor will work with Catalyst to ensure that new technologies that could improve air quality are developed in the capital. In addition, the Mayor will lobby Research Councils UK, the strategic partnership of the UK's seven Research Councils to ensure that air quality is a priority in future research programmes.

4.14.6. Defra runs an Air Quality Grant programme which helps local authorities implement measures that will improve local air quality. It is important that boroughs get a fair share of this programme, and the Mayor will encourage Defra to ensure that it effectively supports the objectives of this Strategy. The Mayor will also consider creating a ring-fenced fund to ensure that funding for local measures, awareness raising schemes and research projects by both the GLA Group and external organisations is available.

4.14.7. The GLA group participates in a number of European Commission projects and the Mayor will ensure that it continues to profit from EU funding to progress projects that will improve air quality. The Mayor also urges boroughs to apply for funding for innovative measures to improve air quality. In the last two years, the Commission has funded schemes in major European cities focussing on:

- Freight planning;
- Car sharing;

- Home energy efficiency; and
- Air quality information.

4.14.8. London should be taking a lead in such schemes. Working with London Councils, the GLA will provide boroughs with regular updates on possible EU and Government schemes and sources of funding and will provide advice on bidding for these to ensure that opportunities to improve air quality are maximised. Where appropriate, the GLA will also promote joint applications between boroughs and the GLA group.

Policy 12 – Raising public awareness of air quality issues	
Vision	Londoners taking responsibility for improving air quality and being able to enjoy time outdoors without risk to their health.
Policy	The Mayor will encourage individuals to take action to improve air quality and will encourage the provision of targeted information about air quality to people most at risk from the health effects of air pollution.
Proposals	<p>The Mayor, through the GLA and the functional bodies, will work with London boroughs, the Government and the private sector to:</p> <p>Develop a central air quality website for London on the GLA website, which will include data, technical information and advice on how to improve air quality.</p> <p>Support the development and take-up of targeted information schemes such as airTEXT through lobbying, publicity campaigns and funding streams.</p>
Outputs	<p>Reduce the health impacts of air pollution.</p> <p>Increased awareness of actions that individuals can take to improve air quality.</p> <p>airText aims to have 250,000 subscribers within the next five years.</p>

4.15. Why we need change

4.15.1. The Mayor is committed to improving air quality in London to improve the health of Londoners. Air pollution can cause respiratory disorders, aggravates asthma and has been shown to impair development of lung formation in children³⁴. Those

particularly at risk are the elderly, the young and those with existing respiratory problems and chronic illnesses like asthma and chronic obstructive pulmonary disease (COPD). There are approximately 690,000³⁵ asthma sufferers in London and 230,000 with COPD³⁶. Recent research has also shown that exposure to poor air quality can cause the onset of asthma in adults, not just exacerbate the problem. In 2008/09 breathing problems were responsible for 12 per cent of all non life-threatening calls made to the London Ambulance Service³⁷, the second most common cause for such calls.

4.15.2. Raising public awareness has two main purposes. Firstly, it is important to demonstrate to Londoners the link between poor air quality and health, ensuring that people understand how taking action to reduce emissions can improve their health and that of their family. Secondly, it is important to make people most at risk aware of pollution episodes so that they can adapt their behaviour to reduce the health impacts of pollution.

4.16. What needs to be done

4.16.1. The House of Commons Environmental Audit Committee's 2010 report into air quality¹⁰ stressed the need for the health impacts of air quality to be better communicated by all levels of government. It also urged the Government to improve information to the public about how people can limit their exposure to pollution and take action to improve air quality.

4.16.2. The Mayor will work with national and local government to raise awareness of air quality and health issues through publicity campaigns and the use of new media. The GLA has recently developed a website that is designed to raise the profile of air quality in London. It describes the impact of poor air quality, sets out what the Mayor and others (including boroughs) are doing to improve air quality and provides tips on how individuals and businesses can reduce emissions. The website also includes links to other useful websites, including borough sites and the London Air Quality Network website, administered by King's College, which includes real time and historic data about air quality in London. The Mayor will also work with boroughs, the Government and businesses on events that will promote and reward best practice and raise awareness of what is being done to improve air quality.

4.16.3. Websites can be used to encourage individuals to change their behaviour and purchasing choices to improve air quality. For example, the London Borough of

Camden's Travefootprint website (www.travefootprint.org) provides information about emissions of air quality pollutants and CO₂ for actual journeys.

4.16.4. There are many excellent examples of borough campaigns aimed at encouraging the general public to take local action to improve air quality. The London Borough of Wandsworth has recently run a campaign to raise awareness of the impacts of engine idling. Aimed specifically at primary schools, the borough has created a leaflet with smarter driving tips and primary schools now have signs asking drivers to turn off their engines when dropping off or collecting children from school. This has been followed up by a lesson plan aimed at key stage 2 pupils (in particular eight and nine year olds) that has been very well received by teachers and pupils alike. In the future it is envisaged that officers will visit the schools to talk to parents about limiting engine idling. This scheme is a good example of raising public awareness and will help other boroughs to establish similar schemes.



4.16.5. Targeting those most at risk is important. Research has shown that informing the vulnerable population can encourage behavioural change and can give a feeling of empowerment, preparedness and the ability to help prevent the impacts of pollution where the individual's quality of life is improved.

4.16.6. The airTEXT alert system is another innovative example of raising public awareness and the Mayor encourages this scheme. The system was set up as a pilot project, funded by the European Space Agency and trialled in the London Borough of Croydon in 2005. It now operates across London providing air quality information and health advice when forecasts are made for moderate or high pollution levels (according to the Department of Health classification). Alerts are sent via SMS, telephone or email to people with illnesses like asthma, bronchitis, emphysema and heart disease for which symptoms can be exacerbated by air pollution. airTEXT is also looking for innovative new ways of increasing awareness of air pollution in London.

- 4.16.7. Over 6,500 people have signed up to the service, including patients identified by their GP. The London boroughs of Croydon, Sutton, Ealing, Islington, Haringey and Wandsworth have successfully met with pharmacies and PCTs within their boroughs to promote the use of airTEXT and have also signed up for a subscription to the Life Channel in GP surgeries to advertise this service. Other boroughs have publicised airTEXT at chest and asthma clinics, NHS Walk-In Centres, as well as in locations such as libraries and council offices and on public transport. The Mayor will work with the NHS in London, through the implementation of the Health Inequality Strategy, to ensure that the health sector in London plays a full role in publicising the scheme, for example by distributing leaflets with asthma medication and by making doctors and nurses treating at-risk patients aware of it, so that they can pass on relevant information.
- 4.16.8. The Mayor will work with the Government and other potential partners to continue the airTEXT service and supports its aspiration to sign up a further 250,000 participants over five years. The Mayor believes that major employers in London including the GLA group could benefit from promoting airTEXT to their staff. The Mayor will also consider the feasibility of extending this type of service during the 2012 Olympic Games to inform competitors and spectators of local air quality conditions.
- 4.16.9. Another service that has been established within London is the walkit website (www.walkit.com) which is an interactive urban journey planner for walkers run by a small independent company. For some parts of London, this website includes route options that avoid current pollution hotspots. In April 2009 just under 4,000 of the individual journey requests were for the 'low pollution' option. There is growing interest in using this sort of website as a tool to reduce exposure to poor air quality. The Mayor supports this self-management tool and will work with boroughs to promote such schemes, while investigating what information could be included on the TfL website.



5. Implementing the Mayor's Air Quality Strategy

5.1. What the Strategy will deliver

5.1.1. The Mayor's Air Quality Strategy, in conjunction with his other relevant strategies, will achieve significant reductions in emissions of air pollutants in Greater London, in particular from road transport.

5.1.2. The figures below focus on measures for which emissions reductions can be quantified. In addition to these measures, however, local action will deliver further important air quality improvements in key areas where there are currently high concentrations of air pollutants and the impacts of these measures is described in Chapter 3. Some of the benefits of measures due to start in 2012 and beyond will be realised earlier, in 2011, due to pre-compliance. Pre-compliance occurs when a standard or limit is adopted in advance of legal or other requirements, e.g. an LGV operator purchasing a Euro 3 LGV in advance of the proposed requirement to meet the Euro 3 standard in 2012 prescribed in the LEZ scheme.

5.1.3. A number of measures are already announced or underway in London, such as tighter LEZ standards for HGVs, buses and coaches, smarter travel schemes and measures to smooth traffic flow. These are included in the baseline for the modelling. The following policies included in this Strategy have been quantified and modelled to determine the likely impact of the Strategy on emissions of PM₁₀ and NO_x and their overall impact on reducing concentrations of PM₁₀ and NO₂ in Greater London:

- Eco driving and better journey planning for road transport by 2015
- London Freight Plan to reduce vehicle kilometres by 2015 including Delivery and Servicing Plans (DSP), the Freight Operator Recognition Scheme (FORS), use of consolidation centres and increased use of river and rail
- Electric vehicle delivery plan which is expected to deliver infrastructure for the rapid uptake of electric vehicles
- Roll out of hybrid and lower emission buses across the network from 2012
- Fitting of NO_x abatement equipment to older buses by 2015
- Age limits for black cabs and PHVs from 2012

- Introduction of LEZ Phase 3 from 2012
- Introduction of LEZ Phase 5 (Euro IV for NO_x) for HGVs, buses and coaches in 2015
- Implementing energy efficiency programmes for homes and workplaces (eg. Re:NEW and RE:FIT).

5.1.4. As yet, full details of some proposals, such as changes to the London Lorry Control Scheme and roll-out of a zero-emission taxi are not yet completely developed. It is therefore not possible to include the impact of these measures in the modelling with any accuracy.

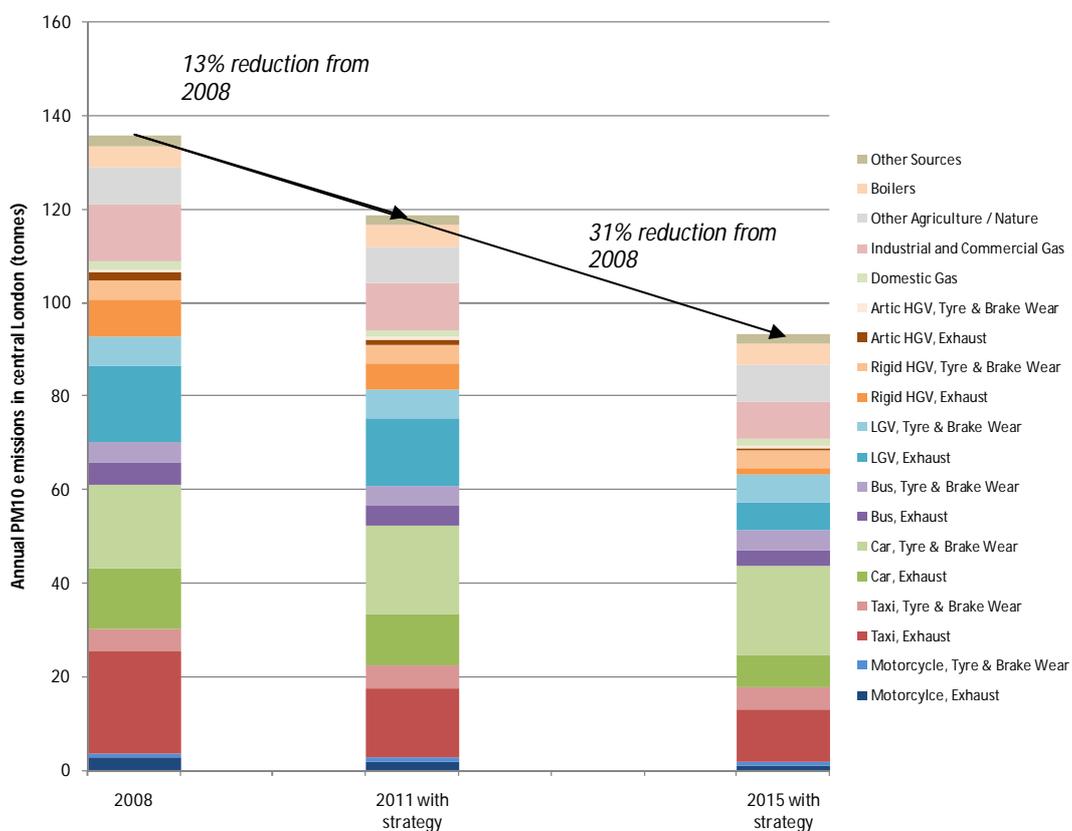
5.1.5. Other policies in the Strategy, including those related to planning, raising public awareness of sustainable modes of transport, and wider implementation of the GLA and London Council's Best Practice Guide for construction and demolition are not readily quantifiable but these will also contribute to improvements in London's air quality.

Particulate Matter (PM₁₀)

5.1.6. Most areas of Greater London already meet the annual mean EU limit values for PM₁₀ and all areas will meet it in 2011. There are currently, however, a small number of areas in London that may be at risk of exceeding the EU limit values for daily average PM₁₀ in 2011, depending on certain conditions, without further measures being taken. Such measures are included in this Strategy and provide even greater confidence that all parts of Greater London will meet these EU limit values in 2011.

5.1.7. Implementation of the policies and proposals in the Strategy along with natural fleet turnover is expected to reduce PM₁₀ emissions in central London by around 13 per cent by 2011 and by about a third by 2015 (compared to 2008) – see Figure 5.1. In central London, emissions are estimated to reduce from about 135 tonnes in 2008, to 119 tonnes in 2011, and to about 93 tonnes in 2015. These reductions will be achieved through the range of measures included in this Strategy, in addition to the air quality improvement measures that are at present being undertaken.

Figure 5. 1 Estimated reductions in PM₁₀ emissions from all sources in central London



5.1.8. HGV emissions will fall by approximately three tonnes in 2011 and eight tonnes in 2015. These reductions will result from the tightening of the LEZ standard in 2012, further implementation of the London Freight Plan (including DSPs and FORS) and natural fleet turnover of the vehicle fleet to newer, lower emission vehicles. The modelling does not take into account any potential benefits that would result from the introduction of LEZ Phase 5 (NO_x standard which may lead to further fitting of PM₁₀ abatement as a compliance option), nor from proposed improvements to the London Lorry Control Scheme.

5.1.9. Taxi PM₁₀ exhaust emissions are expected to reduce significantly (by around 50 per cent between 2008 and 2015), due to the impact of the extended Taxi Emissions Strategy, including the proposed introduction of age limits from 2012 and expected

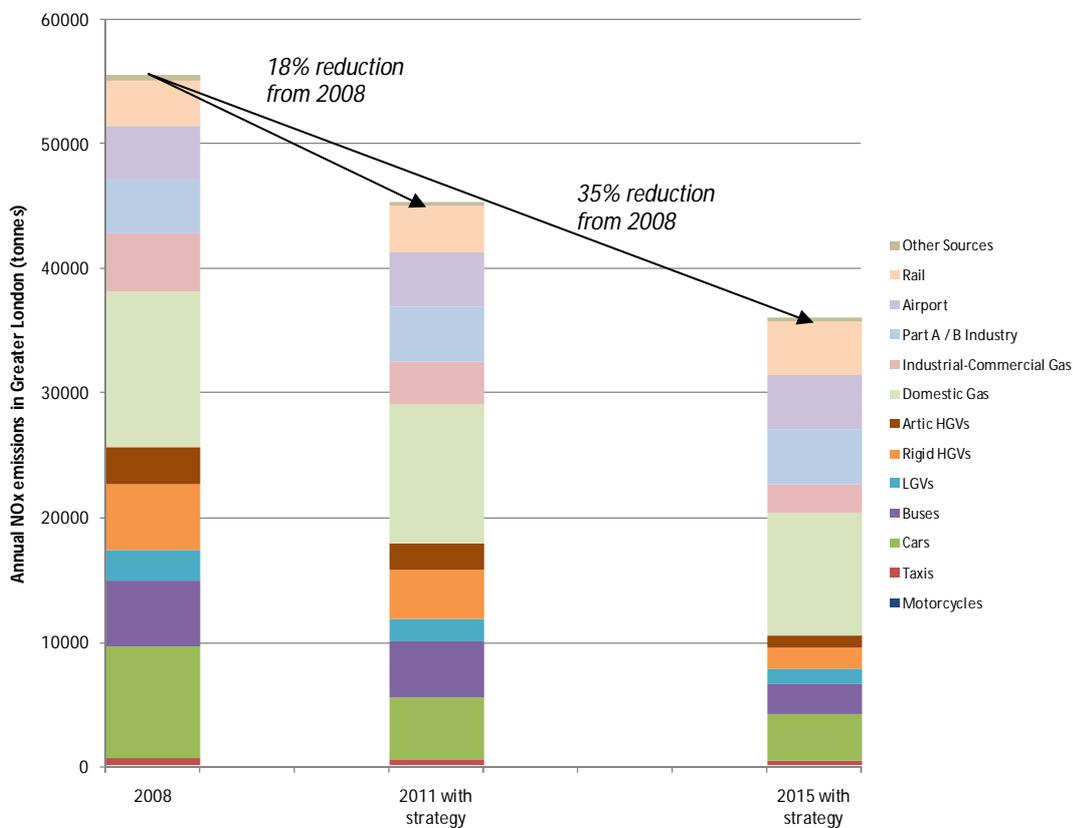
turnover, and reductions in taxis idling. The reduction in taxi-related PM₁₀ exhaust emissions is estimated to be seven tonnes in 2011 and 11 tonnes in 2015. Reductions in emissions of PM₁₀ resulting from the proposed age limit for private hire vehicles in Greater London amount to one tonne in 2011 and four tonnes in 2015. The modelling does not take into account further proposed incentives for lower-emission taxis or the proposed move towards zero-emission vehicles.

- 5.1.10. The introduction of LEZ Phase 3 for heavier vans and minibuses will reduce PM₁₀ emissions from these vehicles by about ten per cent (equivalent to twenty-two tonnes of PM₁₀) in 2011. The inclusion of these vehicles in the LEZ will provide ongoing benefits compared to the baseline.
- 5.1.11. Bus and coach PM₁₀ emissions do not show the same magnitude of reduction between 2008 and 2015, as action to reduce significantly PM₁₀ emissions from London's bus fleet has already been undertaken through the fitting of particulate traps so that all buses meet the Euro IV standard for PM. This achieved PM₁₀ bus emissions reductions of 90 per cent, from the start of the bus retrofit programme in the late 1990s until its completion in 2003/04.
- 5.1.12. Measures including promoting smarter travel choices and eco-driving, encouraging a shift to more sustainable transport modes, support for cleaner vehicles such as electric vehicles and smoothing traffic flow will collectively reduce PM₁₀ emissions by about 11 tonnes in 2015.
- 5.1.13. Tyre and brake wear emissions are projected to remain at similar levels to those between 2008 and 2015 (about 40 tonnes in central London), due to the technical difficulties of tackling this source of emissions, as discussed in Chapter 3. It is expected that other initiatives outlined in the Strategy will have an impact, but some of these are difficult to quantify at this stage and are not therefore included in the projections.
- 5.1.14. The Strategy also projects reductions in PM₁₀ emissions more widely across Greater London. Modelling suggests that, compared to 2008, emissions of PM₁₀ in Greater London will be reduced by around ten per cent by 2011 and by around 20 per cent by 2015. This does not take into account particulate matter from sources outside London

Nitrogen Oxides (NO_x)

5.1.15. Modelling shows that NO_x emissions in Greater London will fall from 56,000 tonnes in 2008 to 45,000 tonnes in 2011 and 36,000 tonnes in 2015 as a result of the quantified measures in this Strategy and natural fleet turnover. This amounts to a reduction in NO_x emissions across London of 35 per cent by 2015 (compared to levels in 2008) – see Figure 5.2. This reduction will be achieved by implementation of the range of measures included in the Strategy, as well as by measures already being undertaken and natural fleet turnover.

Figure 5. 2 Estimated reduction in NO_x emissions from all sources in Greater London (including planned measures and natural vehicle fleet turnover).



- 5.1.16. The largest reductions in NO_x exhaust emissions will be from HGVs, which are projected to reduce by almost 70 per cent from 2008 to 2015 across London. The reductions in HGV emissions are in the order of 2,200 tonnes by 2011 and 5,700 tonnes by 2015. This reflects the tightening of the LEZ standards in 2012, implementation of the London Freight Plan (including DSPs and FORS) as well as natural HGV fleet turnover. The proposed LEZ Phase 5 (Euro IV NO_x standard for HGVs, buses and coaches) contributes about 280 tonnes to the overall reduction in HGV related emissions of NO_x.
- 5.1.17. NO_x emissions from buses and coaches are expected to fall significantly between 2008 and 2015 – by around 2,800 tonnes. Fitting SCR abatement equipment to pre Euro IV buses will reduce NO_x emissions by around 800 tonnes and the introduction of hybrid and lower emission buses (including the new bus for London) will reduce NO_x emissions by around 180 tonnes in 2015. The introduction of a NO_x standard to the LEZ in 2015 would reduce NO_x emissions from coaches by over 100 tonnes.
- 5.1.18. The introduction of LEZ Phase 3 for heavier vans and minibuses will reduce NO_x emissions from these vehicles by about 270 tonnes in 2011, to about 50 tonnes in 2015. The London Freight Plan (including DSPs and FORS) will reduce LGV emissions of NO_x in 2015 by about 80 tonnes.
- 5.1.19. Reductions in emissions of NO_x due to the proposed age limit for private hire vehicles (included in the 'cars' category in figure 5.2) amount to 25 tonnes in 2011 and 50 tonnes in 2015.
- 5.1.20. Taxi NO_x exhaust emissions are also expected to reduce significantly (by around 40 per cent between 2008 and 2015), due to the taxi emissions proposals, including the introduction of age limits for taxis in Greater London from 2012, reductions in taxis idling and expected fleet turnover. The reduction in taxi-related NO_x emissions through age based limits alone is estimated to be 50 tonnes in 2011 and 40 tonnes in 2015 with total reductions (including idling and turnover) estimated at 190 tonnes in 2011, and 260 tonnes in 2015. Further reductions would be expected from the development of a taxi capable of zero tail pipe emissions by 2020 (it is not yet possible to estimate the impact of this proposal).
- 5.1.21. Significant reductions in NO_x emissions are also expected from non-transport sources. The RE:NEW and RE:FIT programmes are primarily aimed at reducing

domestic and commercial CO₂ emissions, but will also result in reductions of NO_x emissions. It is estimated that almost 370 tonnes of NO_x will be saved in 2011, and 670 tonnes of NO_x in 2015 through RE:NEW, and 300 tonnes saved through the RE:FIT Programme, Green500, Better Buildings Partnership and RE:CONNECT in 2011, growing to 600 tonnes of NO_x savings in 2015. Together with expected reductions in energy use, a 20 per cent reduction in NO_x emissions from domestic, and a 50 per cent reduction of NO_x emissions from commercial gas use is expected by 2015.

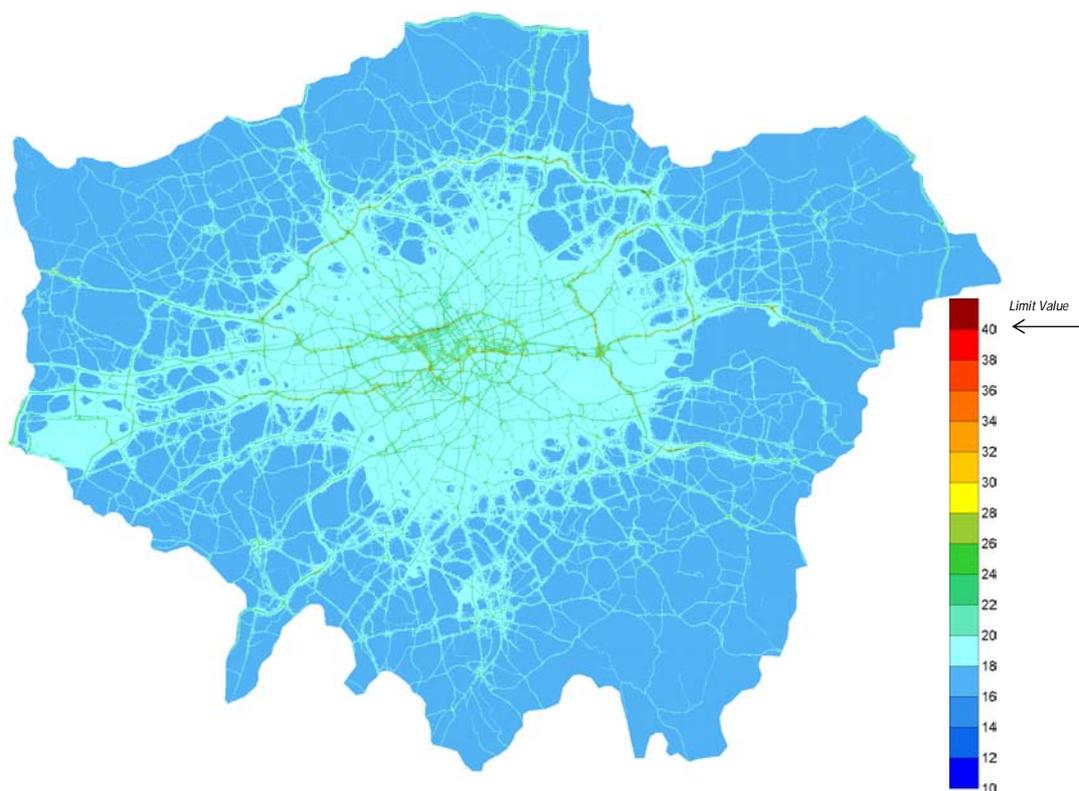
5.1.22. Modelling incorporates a small reduction in airport-related NO_x emissions (around two per cent in 2015) and a 16 per cent reduction in rail-related emissions by 2015 (equivalent to about 60 tonnes of NO_x) through the use of cleaner engines. However it is likely that measures taken by Government, airport operators and rail operators (including increased electrification of overground rail in London) will reduce emissions further.

5.2. What this will achieve for air quality in London

Particulate Matter (PM₁₀)

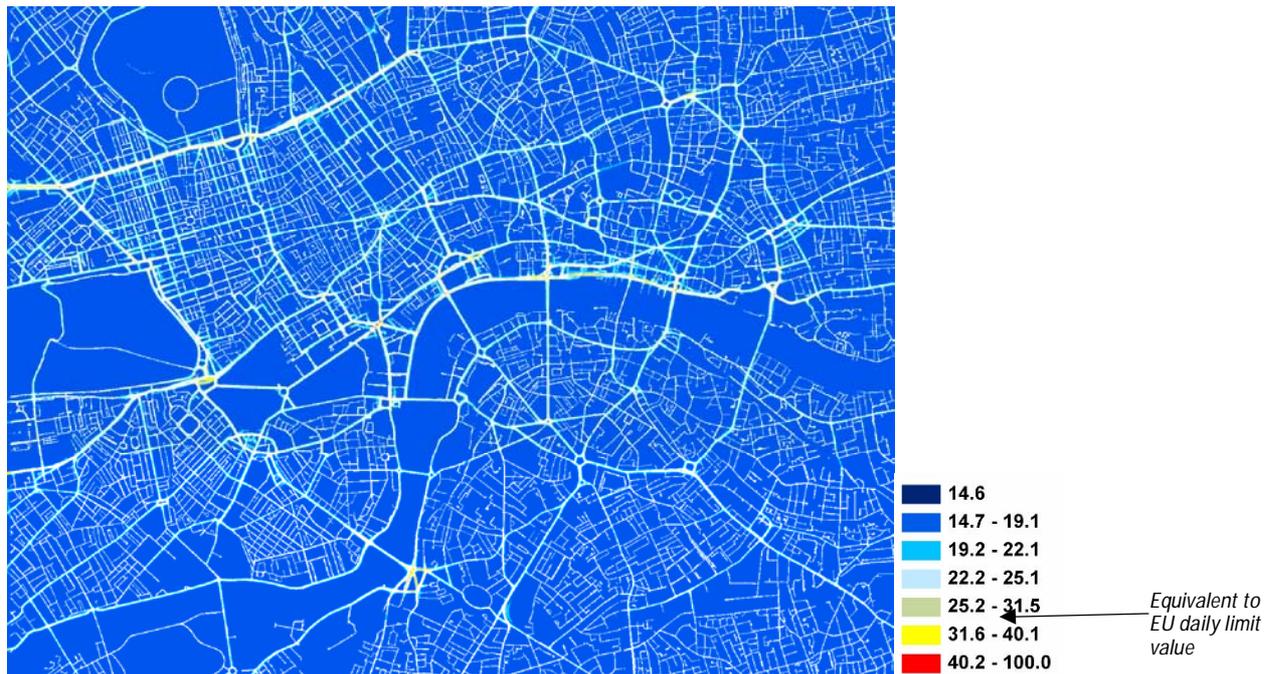
5.2.1. By 2011, all of Greater London is expected to meet the EU Directive requirements for the annual limit value for PM₁₀ of 40µg/m³ (as shown in Figure 5.3). On this basis Greater London is predicted to be compliant with the PM₁₀ annual limit value. It should be noted that some high concentrations shown on the map below are modelled within the road carriageway. These have been assessed as being compliant with the EU Limit Values and the Air Quality Standards Regulations 2010, due to the rapid reductions of concentrations at kerbside locations compared to in the carriageway.

Figure 5. 3 PM₁₀ annual mean concentrations (µg/m³) for 2011 with full implementation of GLA measures in the Strategy



5.2.2. Figure 5.4 below shows projected compliance in London with the daily mean limit value for PM₁₀ in 2011³⁸. At some locations where the margin of compliance will be narrow, targeted measures are being implemented to provide greater confidence of compliance in 2011 (as set out in Policy 3). The impact of these measures, however, is not shown in Figure 5.4 below.

Figure 5. 4 PM₁₀ daily mean concentrations for 2011 (µg/m³) with full implementation GLA measures in the Strategy – central London



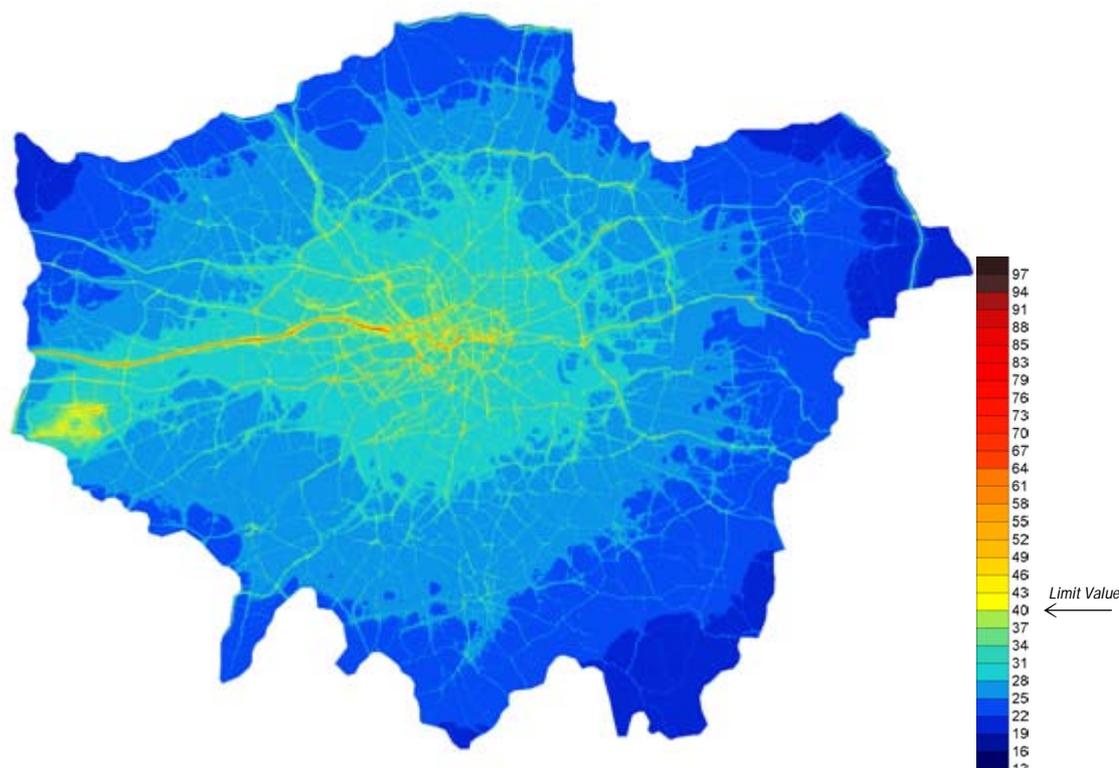
5.2.3. Evidence from other European cities suggest that local measures could reduce concentrations of PM₁₀ at a local level by around ten to 20 per cent, equivalent to reducing the number of exceedences of the daily limit value by around six days. Including heavier LGVs and minibuses in the LEZ, along with the measures included in this Strategy to reduce emissions from taxis, PHVs and buses are also expected to reduce the number of exceedence days at priority locations by around four to six days. Therefore the combined maximum impact of the Strategy at these locations would be a reduction in the number of exceedence days by around ten to twelve. This is significant in the context of meeting the EU daily limit values for PM₁₀, where only a small number of exceedence days need to be removed at priority locations. This will provide greater confidence that the daily PM₁₀ limit value will be achieved everywhere in Greater London by 2011.

Nitrogen Dioxide (NO₂)

5.2.4. This Strategy provides a significant step forward in reducing NO_x emissions within London, resulting in lower concentrations of NO₂ and health benefits for all Londoners. Modelling shows that with the proposals to be taken by the Mayor alone, some roadside locations in inner London and next to major roads, along with roadside

areas near Heathrow Airport, are expected to exceed the NO₂ limit values in 2015 (shaded yellow, red, orange and black in Figure 5.5). However, some of these exceedences are in the highway carriageway and therefore would not constitute breaches of the limit values in the Air Quality Standards Regulations 2010 (see para 1.2.4). Locations further from the roadside of main roads including background and urban background locations are expected to meet the objective for NO₂ in 2015. The Mayor considers that measures that he will implement, combined with those that he expects others, including the Government, to implement, will achieve the objectives of the National Air Quality Strategy and relevant EU limit values in Greater London.

Figure 5. 5 NO₂ annual mean concentrations (µg/m³) with full implementation of GLA measures in the Strategy in 2015



5.2.5. Modelling indicates that the GLA measures included in this Strategy (those that are quantifiable) together with natural fleet turnover will reduce the number of roads in London which would exceed the EU NO₂ limit value in 2015 by between ten and 15 per cent, providing a significant improvement in air quality.

- 5.2.6. The measures within this Strategy are predicted to result in reductions in NO₂ concentrations at roadside locations outside central London of around 4 µg/m³, with greater reductions of around 10 µg/m³ on average at some locations in central London. At some locations, however, including kerbsides closest to major roads in central London, limit values will still be exceeded in 2015 to the extent that a further reduction in emissions of 40 to 60 per cent will be needed to meet them. In inner London, reductions of between ten and 30 per cent will be required near some major roads to meet limit values for NO₂. Accordingly, and as provided for in Policy 3 and Policy 14, the Mayor will work closely with boroughs through the LIP process to explore options and develop potential local interventions for emissions reductions at these locations.
- 5.2.7. Sources of NO₂ in London not subject to the Mayor's control, along with NO₂ emissions originating outside London, contribute significantly to poor air quality in the capital. The reduction of NO₂ concentrations in Greater London (and other UK urban locations) to meet limit values therefore requires remedial action to be taken by the Government. For example, if NO_x emissions from railways, airports and industrial sources – sources over which the Mayor has little control – were halved by 2015, this would result in a further reduction of 6,000 tonnes of NO_x emissions in London. It is for these reasons that this Strategy includes policies and proposals whereby the Mayor will encourage organisations, including the Government and boroughs, to implement measures that are necessary to meet NO₂ limit values in London by 2015 or sooner. The Mayor will keep under review the progress made in the implementation of such measures and will give consideration to revising the Strategy where necessary to achieve relevant limit values.

5.3. Delivering the Strategy

- 5.3.1. The Strategy includes a number of measures that are aimed at enabling Greater London to achieve European Union limit values for PM₁₀ and NO₂ and ensuring that London's air quality continues to improve.
- 5.3.2. The Mayor, through the GLA and the functional bodies, will be directly responsible for delivering a number of the measures included in this Strategy. For example:
- The transport policies in this Strategy will principally be delivered by TfL through the Mayor's Transport Strategy.

- Both TfL and the LDA are investing millions of pounds in public realm improvement projects, which will include measures to improve air quality.
- The LDA is delivering major energy efficiency schemes for homes and workplaces.
- All the functional bodies are making their buildings more energy efficient and their vehicle fleets cleaner.

5.3.3. Other organisations, notably the Government, boroughs and businesses will need to take action if EU limit values are to be achieved in London.

5.3.4. The Mayor is aware that many of the objectives and proposals set out in this Strategy can only be delivered by working with other organisations and individuals. Importantly, many of the measures are aimed at helping individuals make small but significant changes to their behaviour

5.3.5. The Mayor, through the GLA and the functional bodies will: promote understanding and awareness of air quality issues; provide a framework for action and implementation; fund specific measures; supply information, technical advice and support; and press for wider support and change from, among others, the Government. This section describes how the Mayor will work in partnership with other organisations. Appendix B sets out in more detail which organisation will take the lead on each of the proposals included in this Strategy, as well as an outline timescale for implementation.

Policy 13 – Working with Government and other authorities
<p>Policy</p> <p>The Mayor will encourage the development and implementation of proposals and action plans by the Government and other authorities aimed at achieving EU emissions (PM₁₀, PM_{2.5} and NO₂) limit values in Greater London.</p>
<p>Proposals</p> <p>The Mayor will encourage the Government to develop and implement a national plan containing measures that will reduce NO_x emissions in Greater London and the level of NO_x emissions from outside London that contribute to poor air quality in the capital.</p> <p>The Mayor will encourage the Government to identify and allocate additional resources that can be made available to fund the measures included in this Strategy for the achievement of EU limit values in London.</p>
<p>Outputs</p> <p>Joint working between the Mayor and the Government that will lead to improved air quality in London.</p>

5.3.6. The Mayor has been working closely with the Government to develop measures that will improve air quality in London. Modelling shows that London will be compliant with PM₁₀ limit values in 2011.

5.3.7. The GLA's modelling, however, shows that even with affirmative action by the Mayor, areas of inner London and around Heathrow would exceed NO₂ limit values and are at risk of continuing to exceed those limit values in 2015. The modelling shows that by 2015, a reduction in NO_x emissions of around 50 per cent from 2008 levels would enable NO₂ limit values to be met in the vast majority of London. The measures available to the Mayor included in this Strategy, along with natural fleet turnover, will reduce NO_x emissions by 35 per cent by 2015. It is clear, therefore, that national air quality control measures as set out below to reduce emissions of air pollutants are required in order to meet limit values. During 2011, it is expected that the Government will submit an application to the European Commission for a time

extension until 2015 for meeting the NO₂ limit values. The Mayor will work to assist the Government in developing an action plan as part of that application.

5.3.8. The Mayor will discuss with the Government how it can help to fund and deliver the policy objectives and proposals in this Strategy. The current GLA and functional body settlement from the Government did not include provision for this level of action on improving air quality, as it had been expected that local and national interventions along with natural turnover would have resulted in greater improvements than have been achieved. Over the coming months, the Mayor will continue to work with Government to develop a joint action plan for air quality in the capital that is adequately resourced.

5.3.9. The Mayor's powers are limited as regards the extent to which he can influence the type of vehicles using London's roads. In addition, the Mayor has no power to reduce the emissions that originate from outside London that contribute significantly to London's poor air quality. As well as action better suited to being taken at the national level (for example using the tax regime to further incentivise cleaner vehicles and removing perverse incentives for more polluting vehicles), specific support is needed from the Government to facilitate measures within Greater London, such as a national certification and testing scheme for NO_x abatement equipment to enable a NO_x standard to be introduced to the LEZ. The Mayor will therefore encourage the Government to put in place a number of measures, including:

- **Extended scrappage schemes for particular vehicles** - In 2009, the Government introduced a vehicle scrappage scheme to stimulate the national car market. The scheme, which allowed up to 400,000 older vehicles to be replaced, involved the Government giving a £1,000 grant to motorists of cars over ten years old and vans over eight years old. The Mayor has asked that the Government extend the scrappage scheme, so that it would target vehicles that contribute significantly to pollution in urban areas, including heavier vans, minibuses and taxis. This would support the introduction of LEZ Phase 3 in 2012, as well as the introduction of age-based standards for taxis.
- **Grants for vehicle retrofit** – Vehicle retrofit is a cost-effective means for many operators of heavy vehicles (HGVs, buses and coaches) to make their fleets cleaner. Since these vehicles are the most individually polluting, a Government scheme that encouraged retrofit would significantly improve air quality in urban

areas, particularly if linked to LEZ schemes or tax incentives. British companies are market leaders in vehicle retrofitting technology and a scheme that encourages retrofitting would assist the continued growth of this sector of British industry. The Mayor has asked the Government to consider the introduction of such a scheme.

- **Consumer labelling schemes for vehicles at point of sale** – Car showrooms now routinely include information regarding CO₂ emissions levels of new vehicles. This has greatly enhanced public understanding of the impact of their buying decisions on the environment and has led to CO₂ levels becoming a factor in consumer choice. While all new vehicles have to meet Euro standards for emissions, these vary depending on the type of vehicle (diesel, petrol, hybrid etc.). It should also be made clear which vehicles have zero tailpipe emissions (eg. electric vehicles). Some car manufacturers are already using their own labelling scheme to inform purchasers of the emissions from new vehicles. The Mayor believes that the Government should work with motor manufacturers to develop a single scheme that would allow comparison across the whole car market. This would help consumers make informed decisions based on the impact the vehicle would have on air quality, while raising public awareness of air quality issues.
- **Use of tax regime** – At present, the tax regime for cars (VED) is based on emissions of CO₂. Diesel cars tend to have lower levels of CO₂ emissions than their petrol equivalents, so the VED regime effectively encourages the purchase of diesel models. However, diesel cars tend to have higher emissions of air quality pollutants. The Mayor believes that the VED regime for cars should include an air quality element based on Euro standards. For heavy vehicles, the Government's Reduced Pollution Certificate scheme has been used to encourage the early uptake of Euro V vehicles and vehicle retrofit. This scheme should be expanded to include vans and minibuses. In addition, the Government should use the scheme to encourage the early uptake of Euro VI vehicles, which emit significantly lower levels of NO_x than Euro V vehicles.
- **Increase in the fixed penalty for vehicle idling** – Currently the £20 penalty charge for idling compares unfavourably to the £120 penalty charge issued for parking offences. Consequently, penalty charges for idling offences should be brought into line with parking penalty charges, to provide a stronger deterrent and to encourage enforcement.

- **Funding for development of low-emitting vehicles and related technologies** – Through its Plugged in Places programme, the Government is providing £9 million of funding to develop the infrastructure for electric vehicles in London. However, there needs to be a significant increase in funding for development of electric vehicles and other low-emission technology such as hydrogen fuel cells, as well as the roll out of supporting charging and refuelling infrastructure.
- **Electrification of the London overground rail network** - In 2015, it is expected that the rail network will be responsible for 12 per cent of all NO_x emissions in London – around 4,000 tonnes. An electrification programme would reduce emissions significantly across London.
- **Reducing emissions from airport operations** – The Government should work with airport operators and the aviation industry to ensure that airside fleets are upgraded, more use is made of fixed electrical ground power and pre-conditioned air so that auxiliary generators are not needed and continued improvements are made to aircraft efficiency.
- **Restructuring of funding for energy efficiency schemes** – The GLA Group is investing £100 million in climate change mitigation and environment programmes over the next four years. These programmes require further investment to support achievement of the Mayor's targets for reducing CO₂ emissions and to reduce NO_x emissions. This will require the programmes to develop new financing and investment models that will enable them to attract the necessary levels of public and private sector funding. The Mayor is actively discussing the development of such models with industry, financial institutions, the Government and the boroughs. Changes to Government incentives and regulatory structures will be essential to deliver reductions in the percentage of NO_x being emitted by heating systems in buildings.
- **Extending the boiler scrappage scheme** – In 2010, the Government announced a boiler scrappage scheme. This entitles up to 125,000 householders with old, 'G-rated' boilers to £400 of the cost of a new 'A-rated' boiler. These 'A-rated' boilers tend to be more energy-efficient, so emit lower levels of NO_x. However, in order for the scheme to deliver significant benefits for both CO₂ and

NO_x emissions, the Mayor believes the scheme should be extended to commercial properties.

- **Promoting the development and certification of abatement equipment for biomass boilers** – Biomass boilers are becoming an increasingly popular low-carbon heating option. However, in some urban areas with poor air quality, it will be necessary to limit air pollutant emissions from biomass boilers. PM abatement equipment for all sizes of biomass boiler is available on the market. However, to allow developers to have confidence that the equipment they buy will be effective and to allow planning authorities to be sure that suitable emission reductions will be made, the Government needs to develop a certification scheme for biomass boiler abatement equipment, in the same way that a certification scheme for PM vehicle abatement equipment has been developed.
- **Improved monitoring network in London** – In recent years, monitored concentrations of NO₂ have not decreased in urban areas in line with modelling forecasts. High quality monitoring stations in areas of poor air quality are required to assist understanding of this issue, so that policies in urban areas can be more effectively developed.
- **Support for publicity campaigns** – The House of Commons Environmental Audit Committee has recommended that the Government should raise the profile of air quality issues by making clear the health benefits of reduced pollution. The Government should undertake information campaigns which highlight the health risks associated with poor air quality and which will help individuals to change behaviour.
- **Support for targeted information to vulnerable people** – Schemes such as airText which provide air quality information to people at risk of health effects related to pollution are vital in helping them manage their conditions. This could lead to cost savings for the NHS in terms of reduced need for treatment, and the Mayor will encourage the Government to fund the expansion of such schemes and information campaigns. The Government has committed to using NHS communication channels to communicate both the impact of air pollution and what action can be taken to reduce it³⁹. The Mayor will support this engagement in London.

- 5.3.10. As these measures are dependent on Government action, the GLA does not have sufficient data to allow accurate modelling of their likely effects on air quality in London. They are therefore not included in the analysis carried out for this Strategy. Nevertheless, the Mayor has a reasonable expectation that the Government will implement such measures, and that combined with other policies and proposals in the Strategy, they will achieve the objectives of the National Air Quality Strategy and relevant EU limit values in Greater London. The Government is responsible for modelling national measures that will be included in the Government's time extension application for NO₂ limit values. When the results of this modelling are available, the Mayor will consider the implications for the achievement in Greater London of the NO₂ limit values and if necessary will revise this Strategy.
- 5.3.11. The Government has published proposals for a Public Health Service (PHS) which will have responsibility for health protection functions in England. The Mayor will work with the Government to ensure that air quality improvement measures are integrated into PHS national and local health protection programmes and that awareness campaigns and targeted information are adequately resourced.
- 5.3.12. In addition, the Government should take the lead on commissioning and supporting research projects. Knowledge gaps hinder effective policymaking. At the moment, for example, there is insufficient understanding of the sometimes unpredictable relationship between emissions and concentrations, the impact of tyre and brake wear on air quality and the air quality impacts of biofuel use. The Mayor will work with research organisations to support research and trials that can contribute to the improvement of air quality in London.
- 5.3.13. Together with the proposals in Chapters 3 and 4 of this Strategy, and reduced pollution blown into London from outside the capital as a result of national measures, it is likely that the measures listed above would lead to all of outer and inner London being compliant with NO₂ limit values in 2015. This would mean that only a few locations in central London would still be in breach of NO₂ limit values in 2015. At these locations the Mayor is proposing further close joint working with the Government and boroughs to apply targeted local measures to ensure limit values are met by that date. The measures would focus on NO_x at source, including targeted programmes for roads and the adjoining built environment in the affected areas. The end result of all these interventions would deliver NO₂ compliance by 2015, but it

must be strongly emphasised that timely implementation, adequately resourced will be necessary to deliver this objective.

Policy 14 – Working with boroughs

Policy

The Mayor will assist boroughs in carrying out the exercise of their statutory duty to improve air quality in London.

Proposals

The Mayor will use the Local Implementation Plan (LIP) process to ensure that air quality improvement measures are included in borough transport plans.

The Mayor, through the GLA and the functional bodies, will organise workshops and participate in borough forums to share best practice on air quality improvement measures and to ensure joint working at locations with high pollution concentrations.

Outputs

Comprehensive borough plans to improve air quality which are consistent with the Mayor's Air Quality Strategy.

5.3.14. The Mayor has a statutory duty to produce an air quality strategy for London and it is therefore his responsibility to set the strategic direction for the improvement of air quality in the capital. However, many of the measures included in this Strategy need to be implemented by London's boroughs. Air quality policy cuts across a number of different policy areas within boroughs, including the environment, planning, transport and health sectors. It is therefore vital that air quality improvement plans are developed and implemented by all relevant teams within boroughs and the Mayor will promote this approach.

5.3.15. Reducing emissions from the transport network is key to improving air quality in London. This Strategy, together with the Mayor's Transport Strategy and London Regional Transport Plans will provide the overarching framework for the development of Local Implementation Plans (LIPs). However, it is important that the LIPs also link effectively with Local Area Agreements, Local Development Frameworks, Local Strategic Partnerships and Air Quality Action Plans to ensure delivery of wider community and economic development priorities.

5.3.16. In light of the fact that road transport is the major source of both PM₁₀ and NO_x emissions in London, borough teams dealing with transport and air quality need to work closely together. TfL's LIP Guidance to boroughs includes requirements for specific outputs that will ensure that air quality management and transport management are systematically joined up. These include:

- Cycle parking
- Electric vehicle charge points
- Cleaner local authority fleets
- Net increase in street trees
- Packages of local measures to improve air quality at locations at risk of not meeting EU limit values for PM₁₀ and NO₂
- Inclusion of air quality improvement measures as part of traffic and urban realm improvement projects.

5.3.17. The transport measures implemented by boroughs to achieve these outputs should be included in their Air Quality Action Plans.

5.3.18. TfL is already working closely with central London boroughs to develop and implement the package of local measures for air quality priority locations. The Mayor will look to spread best practice when these measures are implemented so that they can be applied at other locations across London as necessary. The boroughs and the GLA are also working closely together to deliver energy efficiency programmes (see Policy 9). Many boroughs have signed up to National Indicators that commit them to making energy efficiency improvements.

5.3.19. Boroughs will continue to be responsible for local planning processes, within the framework set by the London Plan. Through the requirements they set, boroughs can ensure that new developments are 'air quality neutral' or better. The GLA will work with boroughs to assist in the development of methodologies that will allow an accurate assessment of the impacts on emissions of new developments and will

provide advice on reducing emissions on-site (energy efficiency), off-site (transport impacts) and in the construction phase (see Policy 6).

5.3.20. London boroughs, like other local authorities in the United Kingdom, must adhere to statutory Local Air Quality Management (LAQM) processes. These set out procedures for assessing air quality and developing plans where air quality is deemed to be a problem. The Mayor is a statutory consultee for all the documents produced by boroughs as part of their LAQM procedures. This is the primary means by which the Mayor, through the GLA, monitors the actions taken by boroughs to improve air quality and ensures that they are consistent with his Air Quality Strategy. Ultimately the Mayor has powers to direct London boroughs in their air quality duties.

5.3.21. However, it is the Mayor's intention to use the LAQM procedures constructively as a means of sharing information on air quality issues and providing support. The Mayor's assessment of LAQM reports submitted by boroughs will aim to provide constructive advice, rather than focusing only on processes. Through the LAQM process, the GLA will ensure that best practice is widely communicated across the boroughs. The Mayor will also encourage boroughs to revise their Air Quality Action Plans where appropriate so that they are consistent with this Strategy. It is particularly important that boroughs develop air quality improvement measures to help meet NO₂ limit values as soon as possible.

5.3.22. In 2010, the Government's in-house policy consultants published a review of the LAQM process across the UK⁴⁰. This recommended few overall changes to the LAQM process but suggested that the GLA should discuss with boroughs a different pattern and content of assessment and reporting requirements in the capital, with the aim of enabling more effective action planning and implementation. Any potential changes could then be discussed with Defra. The Mayor will take this forward with boroughs.

5.3.23. There is a lot of excellent activity underway to tackle air pollution across London. To capitalise on this activity, the GLA will organise annual workshops for exchange of ideas with and between boroughs. In addition, the GLA will offer to participate in air quality groups run by London Councils and will offer to attend Air Quality Borough Cluster Group meetings, which address air quality issues at the sub-regional level.

Private Sector

- 5.3.24. Many of the policies and proposals in this Strategy will beneficially affect the business community in London. Fundamentally, their implementation will make London a cleaner and more pleasant place for businesses and their customers. These outcomes will be as a result of incentives or disincentives introduced to encourage the use of cleaner vehicles, or more fuel-efficient driving and delivery practices. Other measures, such as the RE:NEW and RE:FIT energy efficiency programmes will be partly shaped and implemented by the private sector.
- 5.3.25. It is important that businesses recognise the economic benefits that can result from improved air quality. Many measures that encourage fuel efficiency, both in buildings and in vehicles, reduce bills and therefore save money as well as reduce emissions. Companies that actively aim to reduce their impact on the environment also tend to benefit from an improved image. Furthermore, London's economy will benefit from the healthier workforce that will result from improved air quality.
- 5.3.26. Improving the environment also presents opportunities for London's businesses. The Mayor will work with the business community to identify and develop new business patterns, such as consolidation facilities. Schemes such as this could be profitable while reducing delivery costs for businesses, congestion and emissions.
- 5.3.27. A report published by Ernst and Young⁴¹ in March 2009 suggested that the Mayor's plans to make London greener could bring 10,000 to 15,000 jobs and contribute £600 million a year to the capital's economy. Measures included in this Strategy, such as building retrofitting and developing the infrastructure for low-emission vehicles, will develop the skills of the London workforce and keep London at the forefront of new, high-technology industries. This will allow London to maintain its edge over other cities in terms of attracting successful and innovative companies. Developing the green economy will not only improve health and quality of life in London, it will help to develop new industries and create new jobs in the capital. Measures in the Strategy will also help the UK maintain its reputation as a market leader in areas such as low emission vehicle technologies and pollution abatement technology.

Individuals

5.3.28. Many of the things individuals do every day – how we choose to travel or the type of car we drive - can contribute to air pollution. If each of us took just a few small actions such as using public transport instead of a car to go the shops or fitting insulation to reduce heat loss from the home, the cumulative effect would be enormous. A survey in 2010 showed that air pollution from traffic was the most important environmental concern for Londoners. However, often people are not aware of the impact their own decisions can have in contributing to the problem. Many of the policies and proposals in this Strategy are designed to provide information and support to Londoners to help them make these decisions. As part of this process, the GLA has developed and will maintain a website which will provide practical advice to Londoners (see Policy 12).

5.4. Monitoring progress and reporting

Policy

The Mayor will monitor changes to air quality in London and will take additional action where necessary to implement the policies and proposals of the National Air Quality Strategy and achieve relevant EU limit values in Greater London.

Proposals

The Mayor, through the GLA, will make information about air quality in London available to the public on the GLA website in a clear format.

The Mayor will publish an annual Progress Report on his Air Quality Strategy and will revise the Strategy should changes be necessary to achieve national air quality policy objectives and relevant EU limit values.

Outputs

Clear progress reports showing changes to air quality in London, allowing clear evidence-based policy making.

5.4.1. This Strategy sets out a range of initiatives designed to improve air quality in London. It also describes the complex technical nature of the challenges faced, including areas where the available information and level of scientific understanding

are incomplete. It is important that progress towards meeting air quality limit values is monitored, and that the wider air quality community continues to undertake research so that a truly collaborative approach to tackling poor air quality in London can be taken.

- 5.4.2. The Mayor, along with boroughs and other partners, supports an air quality monitoring network for measuring pollution concentrations at a range of sites across London. Air quality information is available in a number of formats, including real-time information on the Internet. The Mayor will consider ways to make this information even easier for people to use and interpret. This will allow people in London to track London's progress towards meeting the air quality limit values.
- 5.4.3. The Mayor will also continue to fund the London Atmospheric Emissions Inventory, which will allow the actual impact of the policies in this Strategy to be quantified, alongside changes to wider factors influencing air quality in London (see Policy 11). The emissions inventory will also provide for future strategic and local air quality studies on behalf of the GLA and boroughs.
- 5.4.4. It will be important to monitor and report on the effectiveness of measures included in this Strategy. The GLA Act requires the Mayor to prepare a State of the Environment Report at least every four years, which must include information on air quality and emissions, particularly from road traffic. The GLA will also publish annual progress reports that will set out how measures have been implemented and show progress towards meeting limit values. The Strategy will be kept under continuous review and if it becomes clear that changes are necessary in order to meet relevant air quality limit values, consideration will be given to making and implementing any required revisions.

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- ²⁰ Calculation of annual mean concentrations are used as a proxy to assess the daily limit value. For this Strategy, 31.5µg/m³ is recognised as a suitable proxy for exceedence of the daily limit value.
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Chinese

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Hindi

यदि आप इस दस्तावेज की प्रति अपनी
भाषा में चाहते हैं, तो कृपया निम्नलिखित
नंबर पर फोन करें अथवा नीचे दिये गये
पते पर संपर्क करें

Vietnamese

Nếu bạn muốn có văn bản tài liệu
này bằng ngôn ngữ của mình, hãy
liên hệ theo số điện thoại hoặc địa
chỉ dưới đây.

Bengali

আপনি যদি আপনার ভাষায় এই দলিলের প্রতিলিপি
(কপি) চান, তা হলে নীচের ফোন নম্বরে
বা ঠিকানায় অনুগ্রহ করে যোগাযোগ করুন।

Greek

Αν θέλετε να αποκτήσετε αντίγραφο του παρόντος
εγγράφου στη δική σας γλώσσα, παρακαλείστε να
επικοινωνήσετε τηλεφωνικά στον αριθμό αυτό ή ταχυ-
δρομικά στην παρακάτω διεύθυνση.

Urdu

اگر آپ اس دستاویز کی نقل اپنی زبان میں
چاہتے ہیں، تو براہ کرم نیچے دئے گئے نمبر
پر فون کریں یا دیئے گئے پتے پر رابطہ کریں

Turkish

Bu belgenin kendi dilinizde
hazırlanmış bir nüshasını
edinmek için, lütfen aşağıdaki
telefon numarasını arayınız
veya adrese başvurunuz.

Arabic

إذا أردت نسخة من هذه الوثيقة بلغتك، يرجى
الاتصال برقم الهاتف أو مراسلة العنوان
أدناه

Punjabi

ਜੇ ਤੁਹਾਨੂੰ ਇਸ ਦਸਤਾਵੇਜ਼ ਦੀ ਕਾਪੀ ਤੁਹਾਡੀ ਆਪਣੀ ਭਾਸ਼ਾ
ਵਿਚ ਚਾਹੀਦੀ ਹੈ, ਤਾਂ ਹੇਠ ਲਿਖੇ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ ਹੇਠ
ਲਿਖੇ ਪਤੇ 'ਤੇ ਰਾਬਤਾ ਕਰੋ:

Gujarati

જો તમને આ દસ્તાવેજની નકલ તમારી ભાષામાં
જોઈતી હોય તો, કૃપા કરી આપેલ નંબર ઉપર
ફોન કરો અથવા નીચેના સરનામે સંપર્ક સાધો.

