Air Quality and Climate Change Action Plan 2016–2021

Technical Appendices

THE ROYAL BOROUGH OF
KENSINGTON
AND CHELSEA

The artwork on the front cover is by Nicholas Jones from Cardinal Vaughan Memorial School.

TECHNICAL APPENDICES

Appendix I: Benefits of Aligning Climate Change and Air Quality Action Plans

1. Interactions between air quality and climate change

- Emissions of carbon dioxide and air pollutants come from the same sources.

Both poor air quality and climate change have a direct impact on the health and well-being of humans and the natural environment. Air quality and climate change are fundamentally inter-related, as both emissions of carbon dioxide (CO_2) and air pollutants such as nitrogen dioxide (NO_2) and particulate matter (PM) arise from the same combustion processes, including those in homes, industry, vehicle engines and power generation.

Many common air pollutants are 'climate active', and reducing emissions will lessen the warming effect on our climate. A warming climate also threatens to make air quality worse, with the prevalence of harmful photochemical smogs likely to increase during longer, hotter summers.

2. Benefits of integrating approaches to air quality and climate change

- Current scientific evidence shows that air quality and climate change must be integrated now to achieve a low-carbon society, as they have a direct impact on the health and well-being of both humans and the natural environment.

- An integrated policy/strategy should be cheaper and more effective to implement than policies designed to address air quality and climate change separately; there are win-win measures which benefit both areas.

- An integrated policy reduces unintentional trade-offs: otherwise, policies which do not benefit both areas may benefit just one to the detriment of the other.

So far these issues have been treated separately, but policies to manage emissions must consider both air quality and climate change, otherwise a reduction in one set of emissions may be achieved at the expense of an increase in the other.[1] Therefore, an integrated and joint approach aims to prioritise actions that benefit both climate change and air quality and to properly assess and manage any disadvantages.

For example, vehicles with diesel engines are more efficient that those with petrol engines, so they tend to generate lower CO_2 emissions per mile travelled. However, diesel cars have significantly higher emissions of local air pollutants than their petrol equivalents. According to figures from the Department for Enrionment, Food and Rural Affairs (Defra), modern diesel cars have an impact on our health that is 20 times greater than equivalent petrol vehicles.

[1] *Air Quality and Climate Change: Integrating Policy Within Local Authorities*, Environmental Protection UK, 2011.

- Air quality helps to justify measures taken to reduce CO_2 emissions.

An important argument for an integrated climate change and air quality policy/strategy is that measures implemented to tackle these two issues can be justified in terms of both their immediate/short-term benefits and their long-term benefits. The benefits of reducing greenhouse gas (GHG) emissions will be felt in the future and are part of a global effort, while the local improvement of air quality can be felt immediately and in the area where the measures are introduced.

Appendix II: Air Quality and Climate Change Legislative Background and Commitments

1. Background to previous air quality legislation

Industry and manufacturing powered by coal created serious air pollution in industrial areas in the twentieth century, and the use of coal on the railways and for domestic heating led to poor air quality in towns and cities, which in certain foggy conditions led to smogs (a toxic mixture of smoke and fog) that sometimes persisted for days. In the 1950s several smog episodes led to thousands of deaths and prompted the government to enact the Clean Air Act in 1956 (see Appendix VI B).

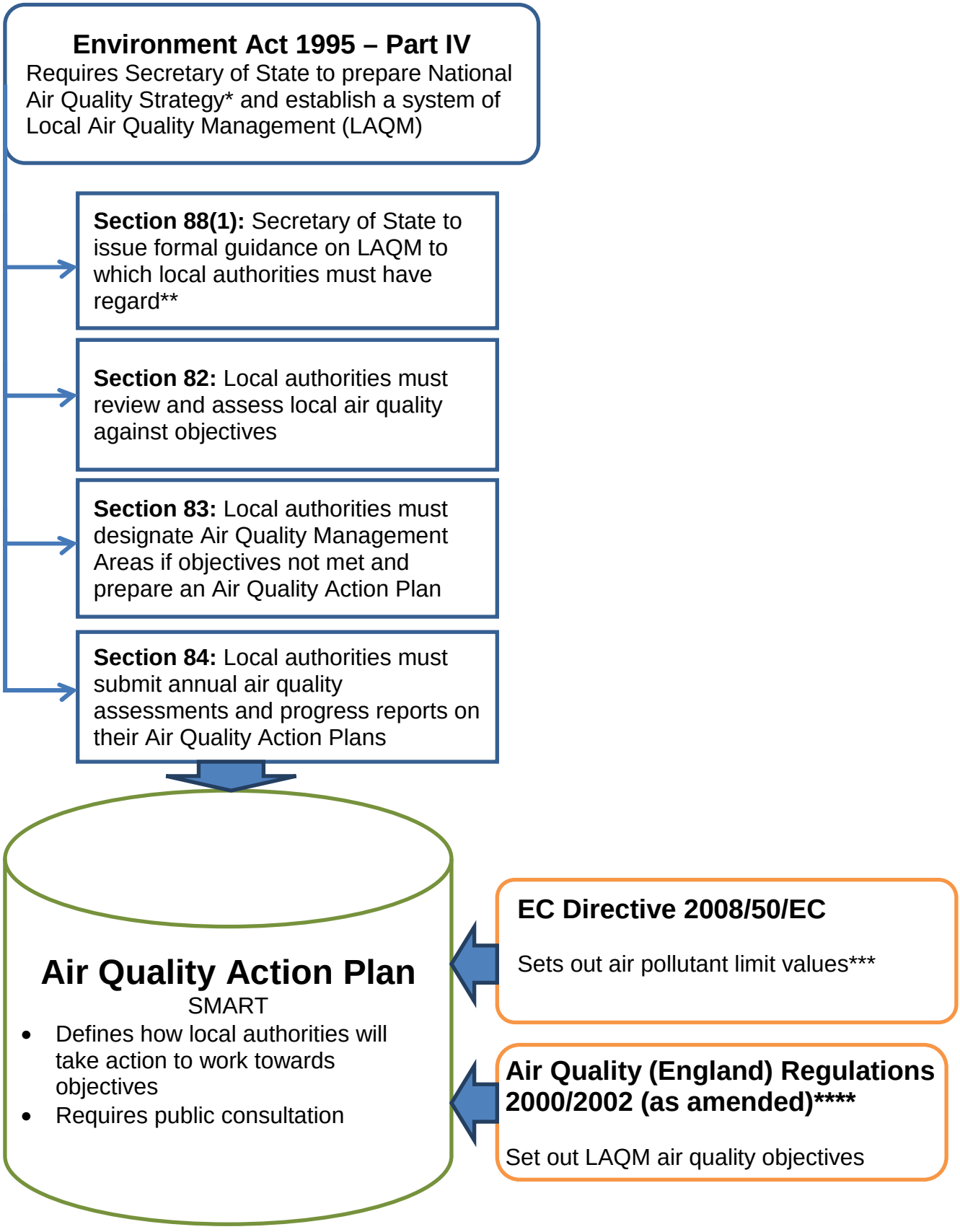
The subsequent decline of heavy industry, the impact of smoke control and the adoption of other forms of heating meant that smog caused by coal smoke subsided, but this was gradually replaced by exhaust fumes from road and rail traffic, particularly as car ownership increased and freight transport was transferred to road. Again the problem was most acute in towns and cities, but it was not until the end of the century, with mounting evidence of the health effects of exhaust emissions and fumes from the fuels themselves, that the Government acted. Eight pollutants, including lead, were identified as being particularly detrimental to health (see Appendix III) and two, NO_2 and PM10 – associated with petrol and diesel engines, but also gas use – were ubiquitous in large conurbations.

2. Air quality legislative background

The first legislation to comprehensively deal with modern air quality problems, other than the Clean Air Acts, which dealt largely with historic domestic and industrial coal smoke, was the Environment Act 1995. From this came the National Air Quality Strategy and guidance on how local authorities (LAs) should manage air quality in their areas.

Importantly, the Act required local authorities to declare Air Quality Management Areas (AQMAs) where objectives for key pollutants were being exceeded, and to implement a plan of action to work towards reducing their levels. It also imposed an obligation to review and assess air quality annually to monitor progress.

Overview of statutory air quality requirements



SMART – Specific, measurable, achievable, relevant, time-limited

* Current national strategy: The Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2011

** Current guidance is contained in:
Defra, *Local Air Quality Policy Guidance (PG09)*, February 2009
Defra, *Local Air Quality Management Technical Guidance (TG09)*, February 2009

*** The current relevant EU Directives are:
EC Air Quality Framework Directive (2008/50/EC) Ambient Air Quality and Cleaner Air for Europe
Daughter Directives (from previous 1996 Framework Directive):
- 1999/30/EC, limit values: sulphur dioxide (SO_2), NO_2, nitrous oxides (NO_x), PM, lead
- 2000/69/EC, limit values: benzene (C_6H_6), carbon monoxide (CO)
- 2002/3/EC, limit value: ozone (O_3)
- 2004/107/EC, limit values: heavy metals and polycyclic aromatic hydrocarbons (PAHs).

**** Latest amendment: Air Quality Standards Regulations 2010, transposing EU Directive 2008/50/EC. The Directive was primarily about measuring air pollution (in zones and agglomerations) and establishing limit and target values for the key pollutants.

***** Statutory consultees to include: Secretary of State, Environment Agency, Transport for London (TfL) (and Highways Department), Mayor of London, neighbouring local authorities, other public authorities (e.g. Public Health, HSE), local businesses, others as appropriate including the public (i.e. residents).

NB Also, the Greater London Authority (GLA) Act 1999 provides for the Mayor of London to publish an air quality strategy for the capital with advice to London's boroughs; boroughs "must take account of" advice.
Latest Mayoral Strategy: Clearing London's Air, 2010.

3. Background to climate change

Climate change is emerging as one of the major challenges and one of the biggest health threats of the twenty-first century. The Council acknowledges that urgent action is required to limit temperature rises to 2ºC above pre-industrial levels, a politically agreed threshold of dangerous climate change.[2] There is broad consensus that climate change is happening around the world at an unprecedented scale and speed. This is now evident from observations of increases in global average air and ocean temperatures, widespread melting of polar snow and ice and rising global

[2] This was listed in the 2009 Copenhagen Accord as the desirable temperature target and described as the maximum allowable level of warming to avoid dangerous anthropogenic interference in the climate.

average sea levels. The UN Intergovernmental Panel on Climate Change (IPCC)[3] has been unequivocal in attributing the observed increases in global temperature to man-made GHG emissions. The IPCC found that "emissions of greenhouse gases from fossil fuels and other anthropogenic drivers have been the dominant cause of observed warming since the mid-twentieth century".[4] Global average temperatures have risen by nearly 0.8ºC since the late nineteenth century, and have risen by about 0.2ºC per decade over the past 25 years.[5]

Changes to our climate have an impact on lifestyles, the economy and our natural and built environments. Furthermore, changes in the world's climate pose a major threat to our long-term well-being. The Council acknowledges that man-made climate change is a global challenge that requires a global response and a call for action at all levels, from governments, local authorities and citizens alike.

This was one of the winning artworks in a poster competition which ran during Climate Week (March 2015). It was created by Joshua, year four, from Holy Trinity School.

4. International, national and local commitments on climate change

The Council has been active in pursuing an environmental improvement agenda for many years. It has a long history of producing Environmental Policy Statements, dating back to 1990, and consequently seeing through programmes of actions.

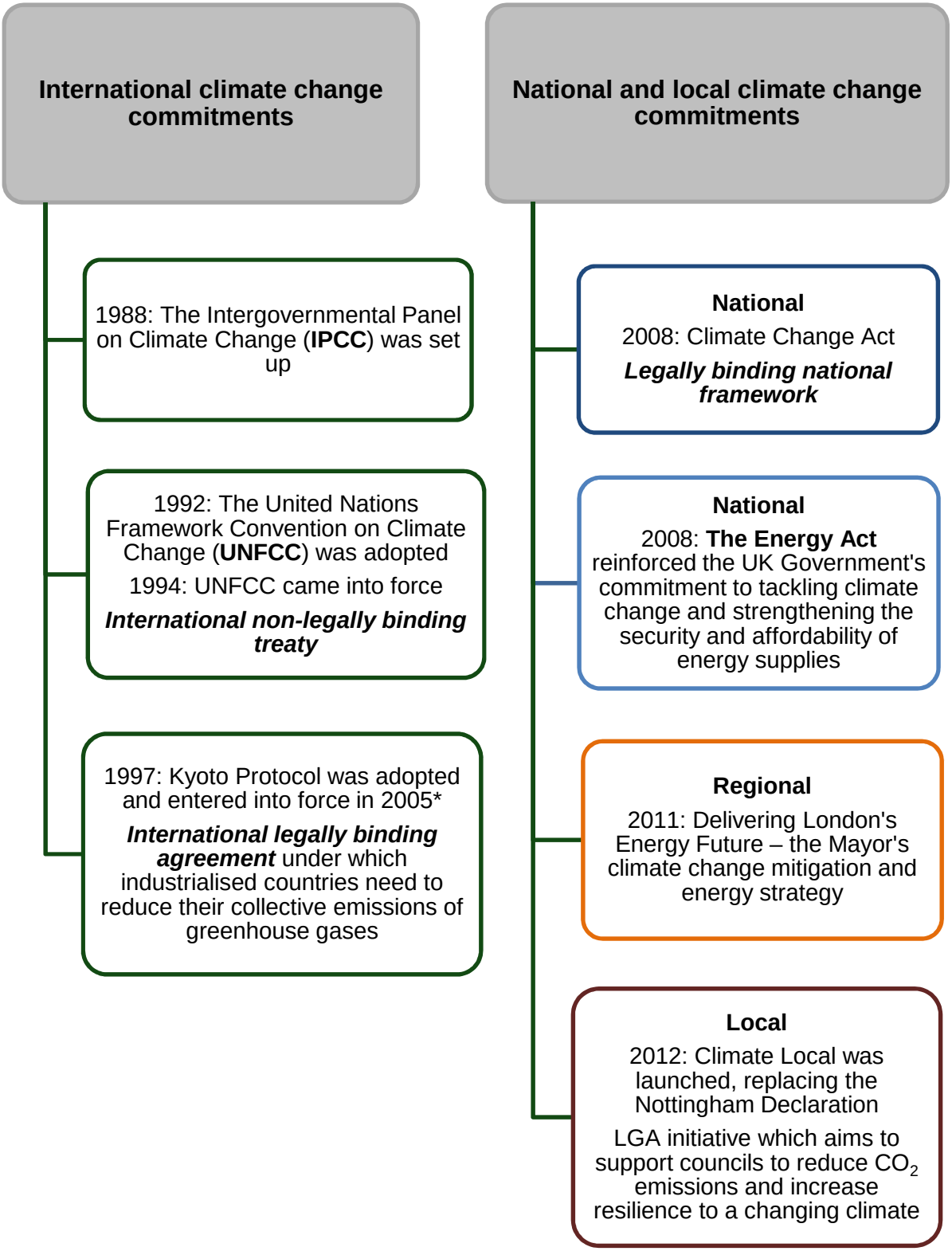
In 2006 the Council produced a five-year Environment Strategy which covered, thematically, a wide range of environmental concerns and demonstrated the

[3] The IPCC is the leading international body for the assessment of climate change. It was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988 to provide the world with a clear scientific view on the current state of knowledge on climate change and its potential environmental and socio-economic impacts.
[4] *Climate Change Synthesis Report*, *Fifth Assessment Report (AR5)* of the IPCC, 2014.
[5] Jenkins, G.J., Perry, M.C. and Prior, M.J. (2007). *The Climate of the United Kingdom and Recent Trends*. Metereological Office, Hadley Centre, Exeter, UK.

Council's leadership in developing sustainable solutions to local, regional and global environmental problems. The Royal Borough of Kensington and Chelsea (RBKC) made a formal commitment to tackle climate change by signing the Nottingham Declaration on Climate Change in January 2007. One year later, in 2008 it adopted a Climate Change Strategy and set up a Climate Change Programme to reduce in-house CO_2 emissions from its own operations by 40 per cent from a baseline year of 2007/08 by 2019/20. The Council met and exceeded its first interim target of 20 per cent, set for March 2014, achieving reductions of 21.6 per cent.

In March 2015, the Council signed the Local Government Association (LGA)'s climate change commitment, Climate Local, which superseded the Nottingham Declaration. This aims to support councils' efforts both to reduce CO_2 emissions and to increase resilience to a changing climate. Climate Local will support the Council to share good practice, build a network and identify other authorities undertaking similar initiatives, to support joint working and the sharing of experience and ideas.

Chart outlining the most important international, national, regional and local climate change commitments



* The Kyoto Protocol is one of the most complex treaties ever negotiated and committed some of the world's wealthiest nations (37 industrialised countries) and the European Union, including the UK, to legally binding targets to cut GHG emissions. The Protocol is concerned not only with CO_2 but with a 'basket' of six greenhouse gases – CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). For more information on the targets and timescales, see Appendix III.

Appendix III: Climate Change and Air Quality Objectives

1. Climate change objectives and targets

The IPCC's *Fifth Assessment Report* (AR5) – the *Synthesis Report* released in 2014 – confirms one more time that climate change is happening around the world and that the warming of the climate system is unequivocal. It also says that adaptation alone is not enough and that substantial reductions of GHG emissions are essential to limit the risks of climate change.

Table summarising the climate change targets

	Climate change target	
	GHG/CO_2 reduction target	**To be achieved by**
Kyoto Protocol	Industrialised countries: **5.2%** GHG reduction against 1990 levels	Over the five-year period 2008–2012
	EU: **8%** GHG reduction against 1990 levels	Over the five-year period 2008–2012
	UK: **12.5%** GHG reduction against 1990 levels	Over the five-year period 2008–2012
EU	**20%** GHG reduction against 1990 levels The EU is committed to producing **20%** of its total energy from renewable sources and to achieve at least a **20%** increase in energy efficiency	2020
	At least a **40%** GHG reduction against 1990 levels The EU is committed to producing **27%** of its total energy from renewable sources and to achieve at least a **27%** increase in energy efficiency	2030
	80–95% GHG reduction against 1990 levels	2050
London	**20%** CO_2 reduction against 1990 levels	2015 (interim target)
	40% CO_2 reduction against 1990 levels	2020 (interim target)
	60% CO_2 reduction against 1990 levels	2025
	At least **80%** CO_2 reduction against 1990 levels	2050
RBKC	Sustainable trend of reduction in CO_2 emissions in the borough	2020
Council's operations	**20%** CO_2 reduction compared with 2008	2014 (interim target)
	30% CO_2 reduction compared with 2008	2017 (interim target)
	40% CO_2 reduction compared with 2008	2020

2. National air quality objectives

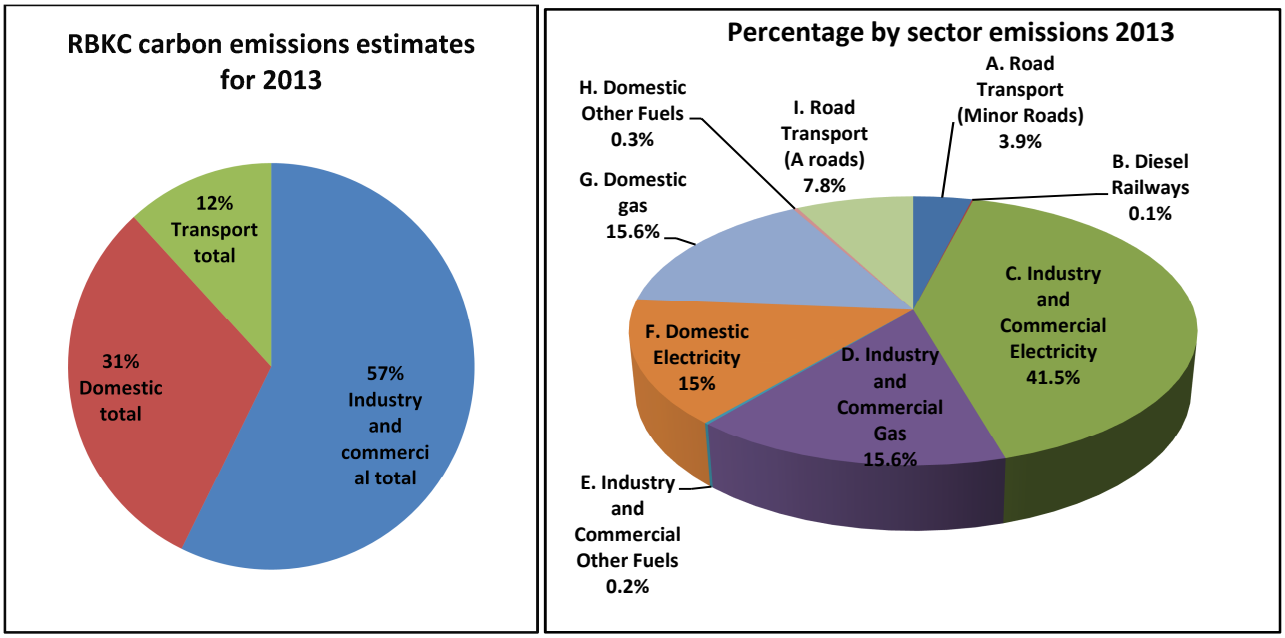
The Government (through Defra) has set objectives that local authorities must work towards achieving for eight key pollutants: benzene (C_6H_6), 1,3-butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), particles less than 10 microns in size (PM10), particles less than 2.5 microns in size (PM2.5) and sulphur dioxide (SO_2). The most significant pollutants in RBKC are NO_2, PM10 and PM2.5. In the table below, the dates for the objectives to be achieved by are shown in the right-hand column; the objective levels (or levels below these) must be maintained in subsequent years until such time as the objectives are revised.

Pollutant	Air quality objective		To be achieved by
	Concentration	Measured as	
Benzene			
All authorities	16.25 micrograms per cubic metre (µg/m^3)	Running annual mean	31 December 2003
England and Wales only	5.00 µg/m^3	Annual mean	31 December 2010
1,3-butadiene	2.25 µg/m^3	Running annual mean	31 December 2003
Carbon monoxide			
England, Wales and Northern Ireland	10.0 µg/m^3	Maximum daily running eight-hour mean	31 December 2003
Lead	0.5 µg/m^3	Annual mean	31 December 2004
	0.25 µg/m^3	Annual mean	31 December 2008
Nitrogen dioxide	200 µg/m^{3}not to be exceeded more than 18 times in a year	One-hour mean	31 December 2005
	40 µg/m^3	Annual mean	31 December 2005
Particles (PM10) (gravimetric)			
All authorities	50 µg/m^3, not to be exceeded more than 35 times in a year	24-hour running mean	31 December 2004
	40 µg/m^3	Annual mean	31 December 2004
Particles (PM2.5) (gravimetric) All authorities	25 µg/m^3(target)	Annual mean	2020
	15% cut in urban background exposure	Annual mean	2010–2020
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times in a year	One-hour mean	31 December 2004
	125 µg/m^3, not to be exceeded more than three times in a year	24-hour mean	31 December 2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31 December 2005

Appendix IV: Local CO_2 Emissions and Air Quality Monitoring Results

1. Local CO_2 emissions

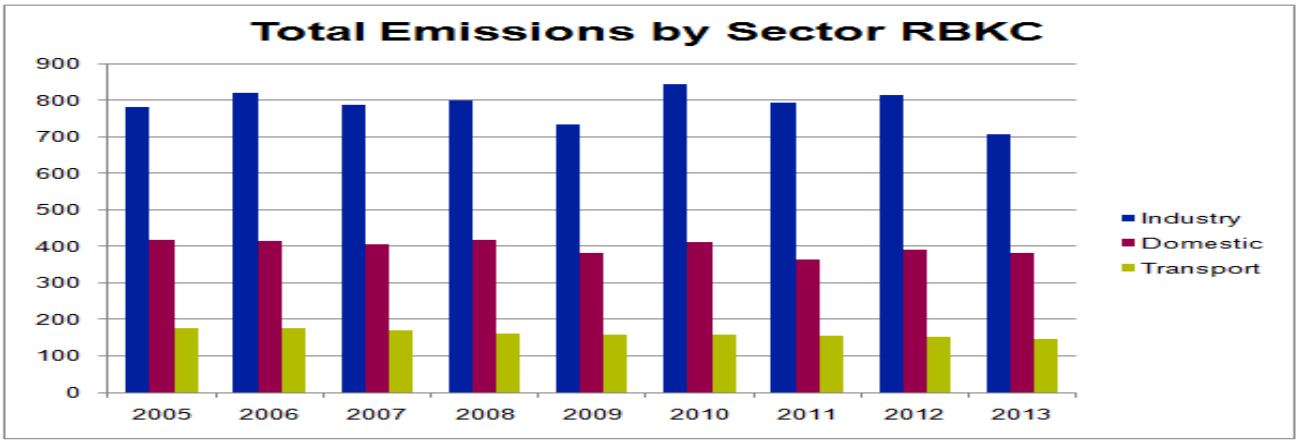
The latest data produced by the Department of Energy and Climate Change (DECC) for the year 2013 is set out in the charts below. Of the Royal Borough's CO_2 emissions, 57 per cent stem from industry and commerce (such as shops, offices and hotels), 31 per cent from domestic sources and 12 per cent from road transport.



Source: DECC, *UK local authority and regional carbon dioxide emissions national statistics: 2005–2013*

The industry and commercial sector continues to be the largest-emitting sector, accounting for 57 per cent of emissions. This sector includes all non-domestic assets; in RBKC these include offices, council operations, museums, hotels, retail units and schools. Transport emissions have fallen consistently since 2005, when these data were first collected. Over this period, the percentage of total emissions from each sector has been fairly consistent.

Kensington and Chelsea total emissions by sector, 2005–2013



The data for industry and commerce and domestic emissions are based on actual end meter readings. The figure for road transport is an estimate, modelled on road types and lengths and taking into account residents' vehicles and through traffic. The data exclude emissions from major industry and air transportation.

Total emissions 2013 (rank #1 representing the highest total emissions):

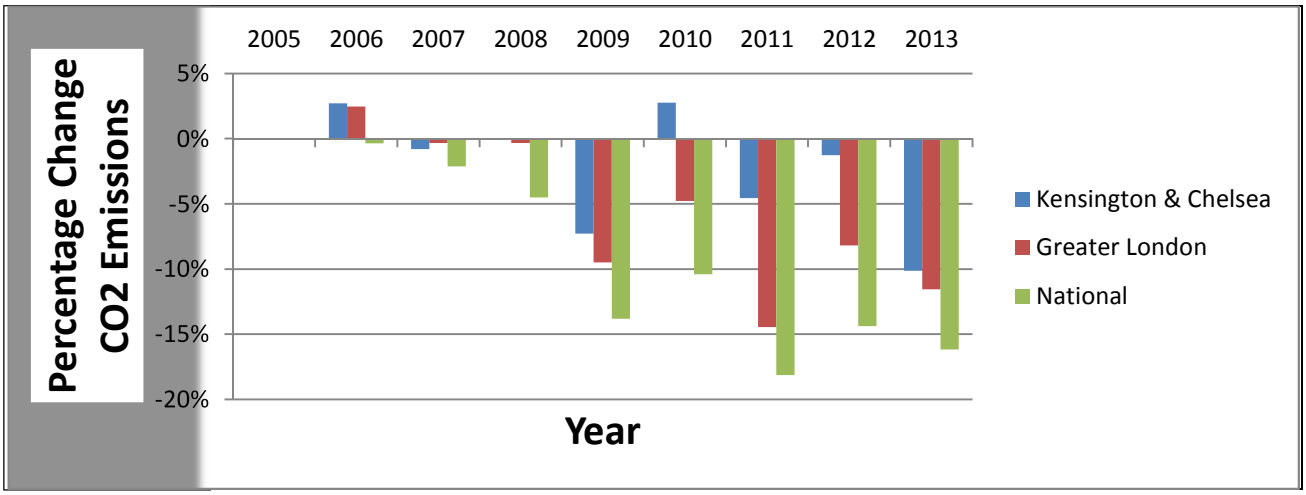
- Kensington and Chelsea ranks 102nd out of 407 local authorities (LAs) for highest CO_2 emissions in the UK.
- In Greater London, Kensington and Chelsea ranks 16th out of 33 LAs.
- The borough ranks 6th out of seven LAs in the Central London sub-region.[6]

Emissions per capita 2013 (rank #1 representing the highest emissions per capita):

- Kensington and Chelsea ranks 112th out of 407 LAs for emissions per capita in the UK.
- In Greater London and the Central London sub-region, the borough is ranked 3rd, behind the City of London (1st) and Westminster (2nd).

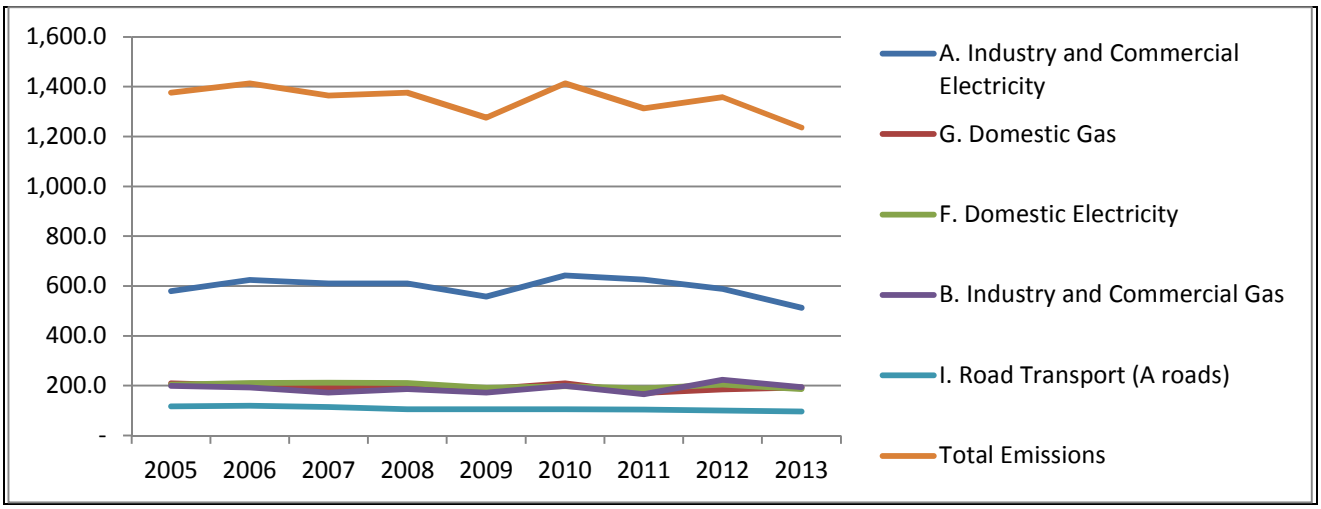
The trend of CO_2 emissions in RBKC in the period 2006–2013 was similar to that of Greater London. Since 2011, emissions in the borough, Greater London and nationally have been in decline from the baseline of 2005; however, decreases in RBKC have been smaller than nationally and in Greater London. Compared with similar London LAs, RBKC has seen less reduction in CO_2 emissions since 2010 using a 2005 baseline.

The graph below illustrates the percentage change in CO_2 emissions from the 2005 baseline, according to the latest DECC data published in June 2015.



[6] The Central London Activity Zone/sub-region was defined by the London Plan in 2011 as the boroughs of Camden, Islington, Kensington and Chelsea, Lambeth, Southwark, Westminster and the City of London.

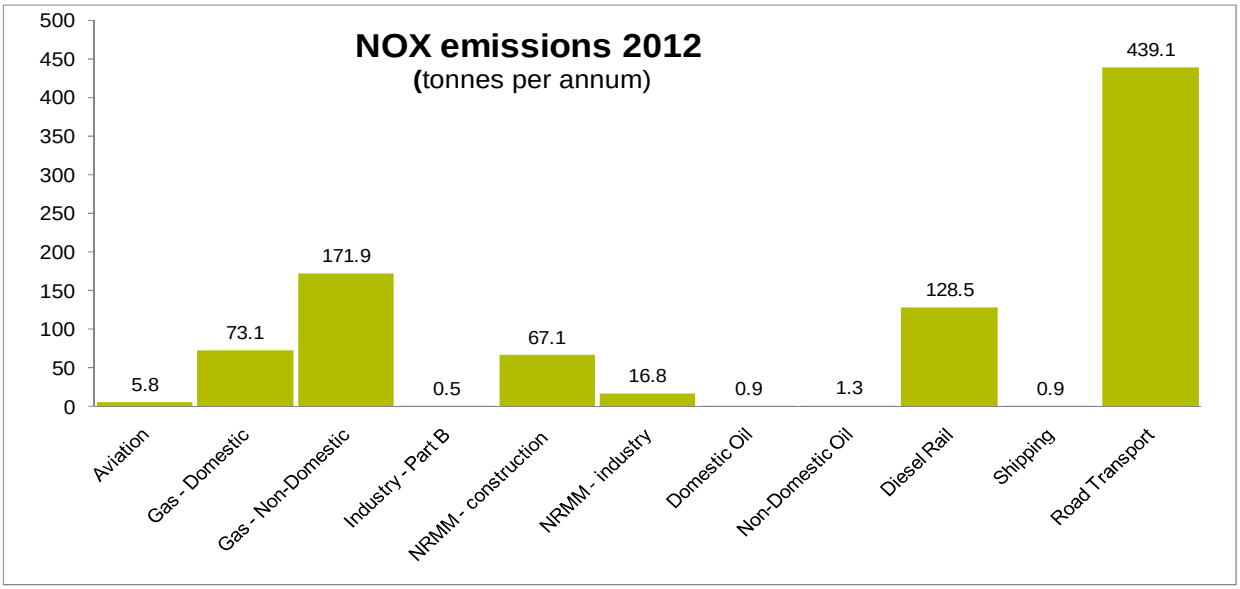
The graph below highlights the five sectors producing the most emissions in 2005–2013, compared with total emissions.



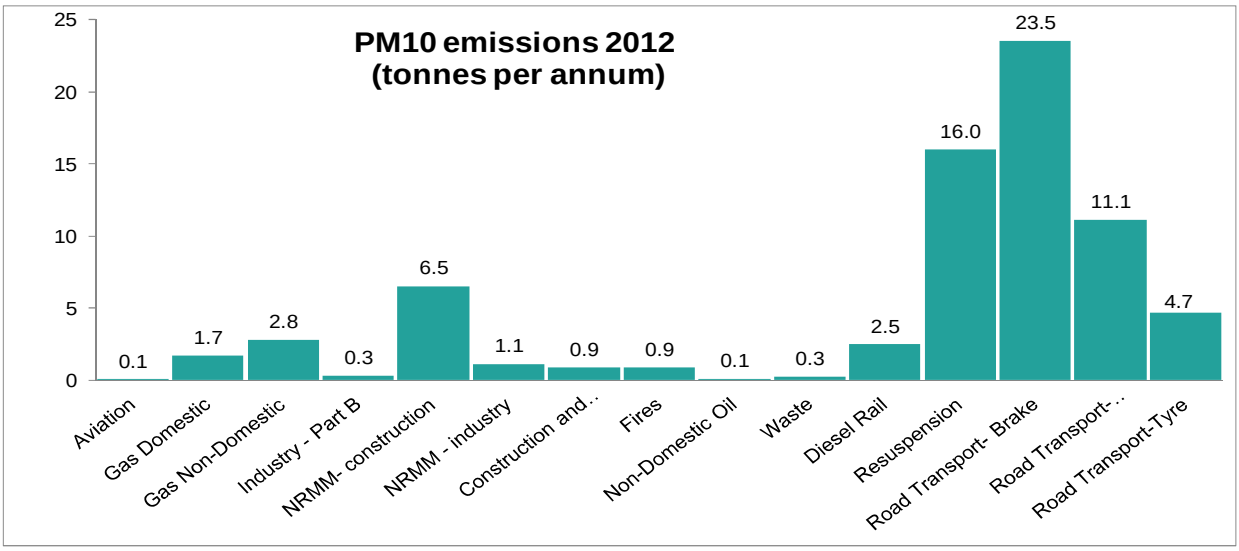
2. Local air quality and emission sources

The main sources of emissions of pollutants within the borough are transport, residential and commercial activities. A large proportion of emissions arise from beyond the borough's immediate area – from the urban area as a whole and further afield from national and European sources. The contributions of NO_x and PM10 from the various sources within the borough in 2012 (based on the London Atmospheric Emissions Inventory (LAEI) released in 2013) are shown below. A recent addition to the inventory is the estimated contribution from construction activities and non-road mobile machinery (NRMM).

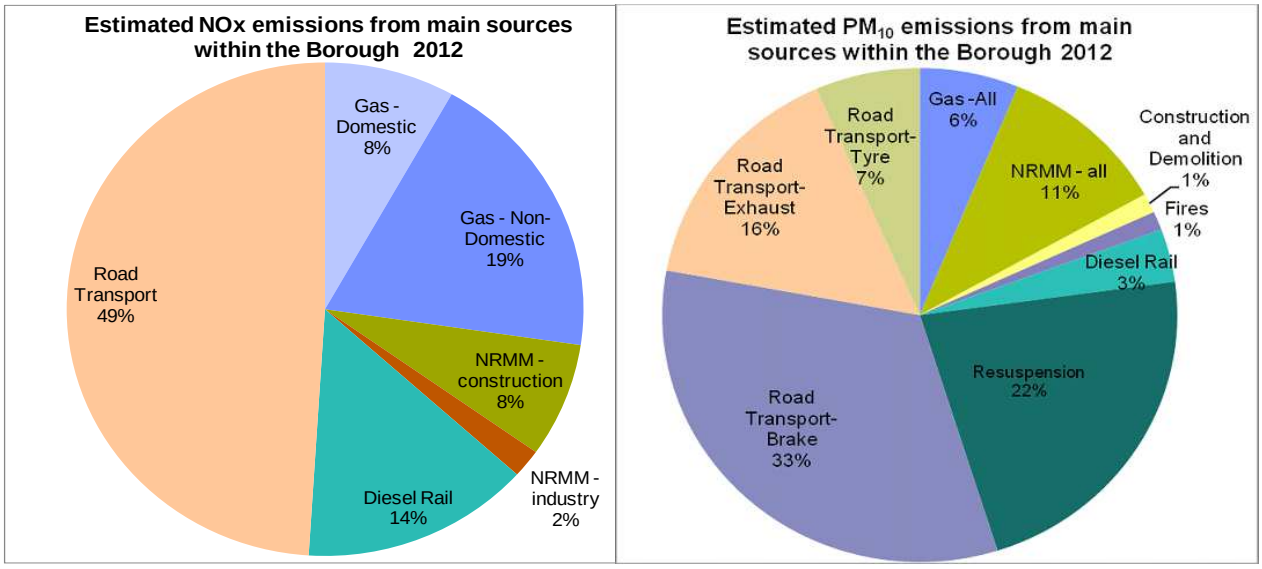
Overall, the largest source of NO_x emissions is road traffic, followed by gas consumption for heating and energy generation. Diesel trains are the next biggest single source; however, it is believed that the levels of emissions from trains may be overestimated.



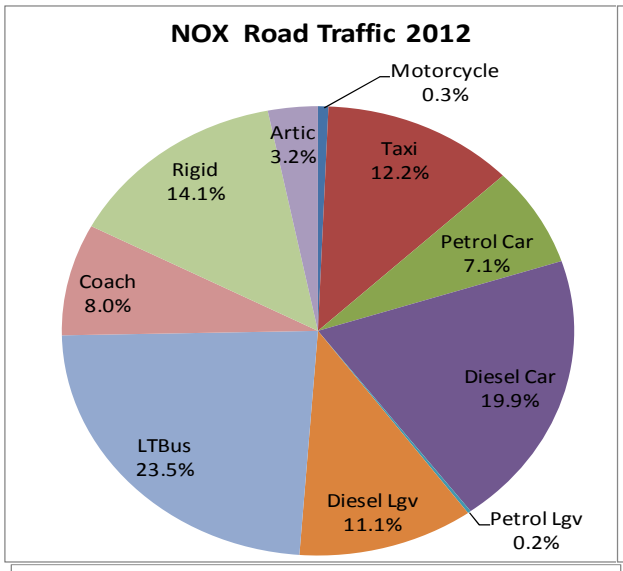
Emission sources of PM10 are much more varied. In addition, estimates of the contributions of tyre and brake wear and re-suspension of particles to PM10 levels have been included in the inventory. Brake wear accounts for the largest single source, followed by re-suspended particles and then road transport exhausts.

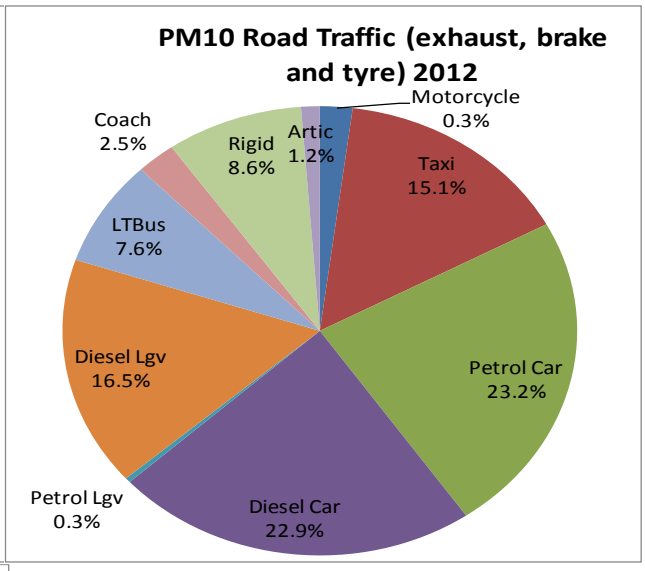


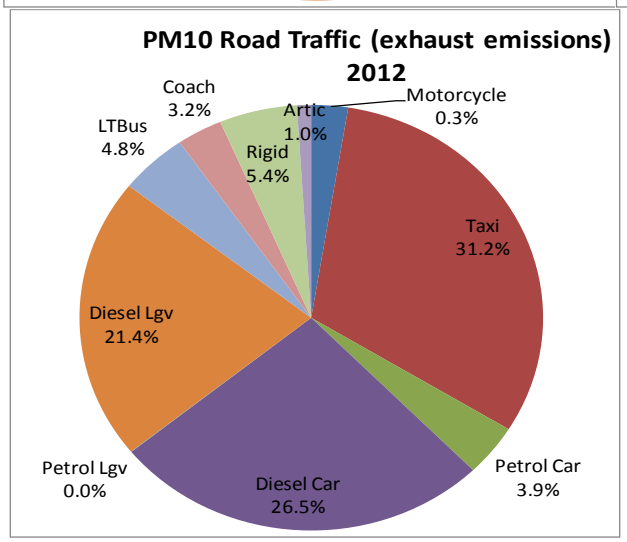
The charts below show the contributions of the main sources of NO_X and PM10 within the borough as percentages.



A further breakdown of road transport emissons in the following charts shows that diesel transport accounts for approximately 90 per cent of NO_x emissions and 95 per cent of PM10 exhaust emissions (75 per cent when brake and tyre wear contributions are included).

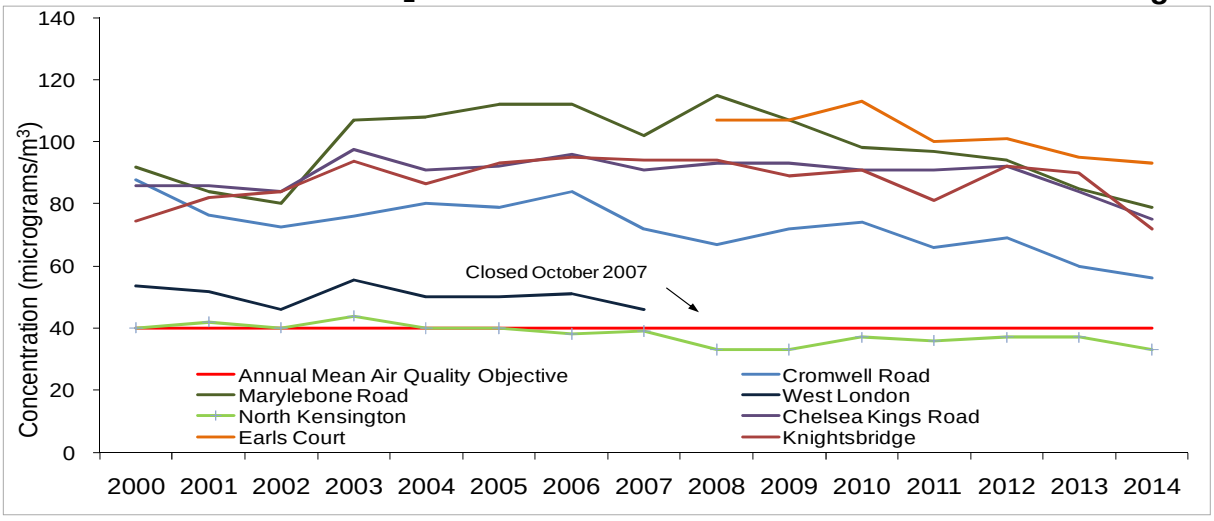




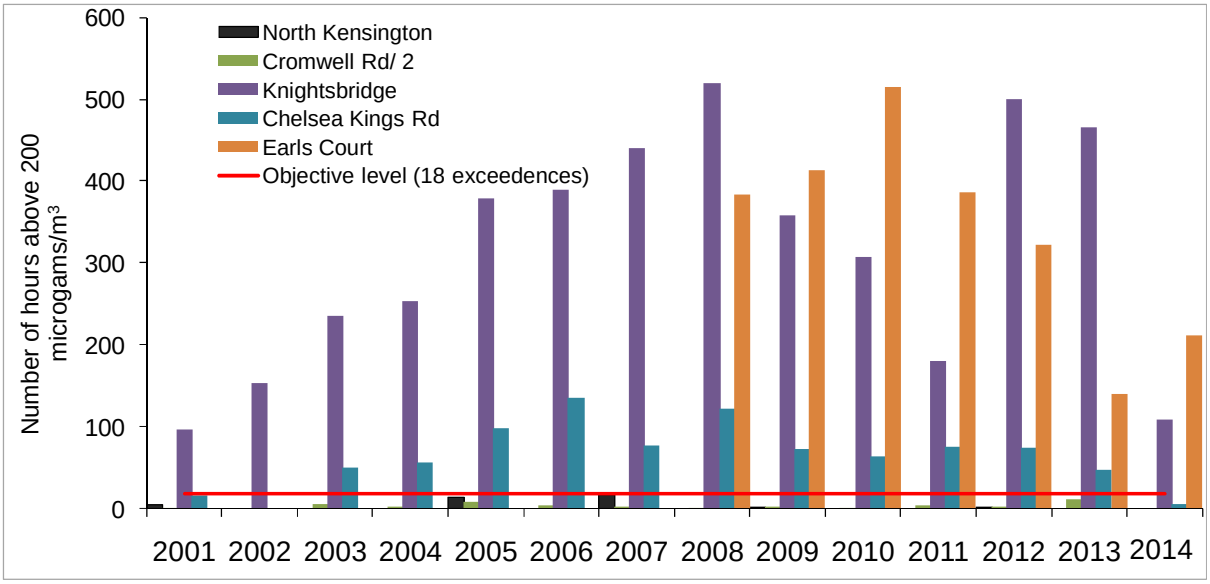


The two charts below show the results of NO_2 monitoring at council sites in the borough (and one other site in Westminster). The data in the first chart show that all sites, except the North Kensington urban background site, exceeded the annual mean objective, while the second chart shows that two of the five sites exceeded the hourly mean objective level in 2014.

Trends in annual mean NO_2 concentration measured at automatic monitoring sites

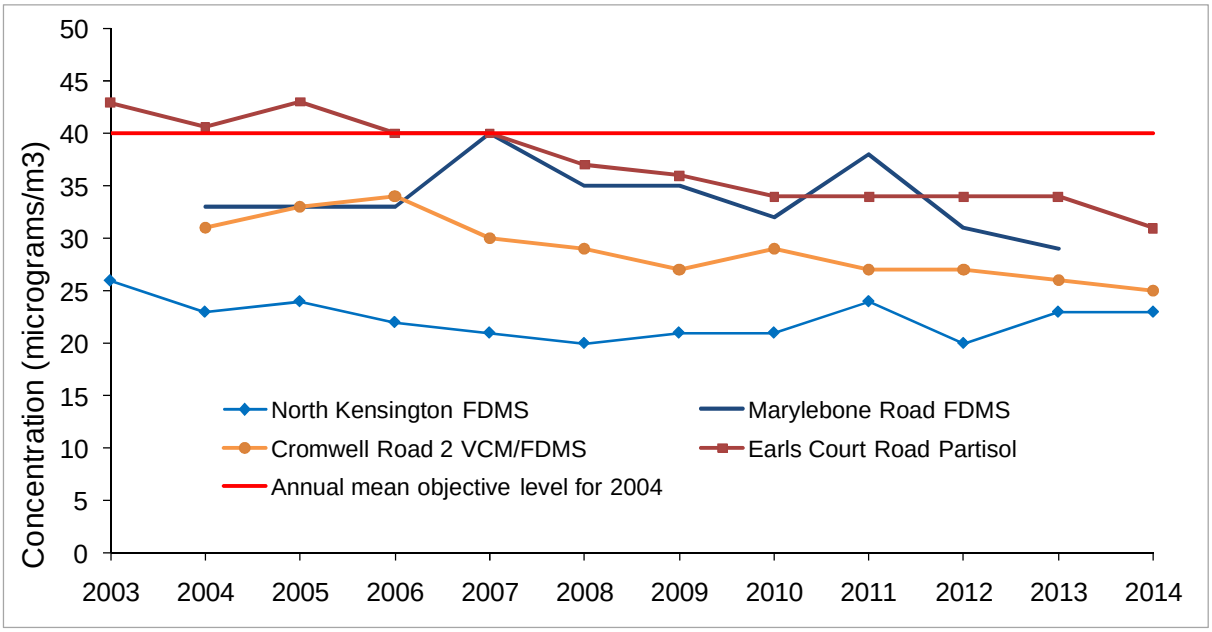


Trends in hourly mean NO_2 concentration measured at automatic monitoring sites

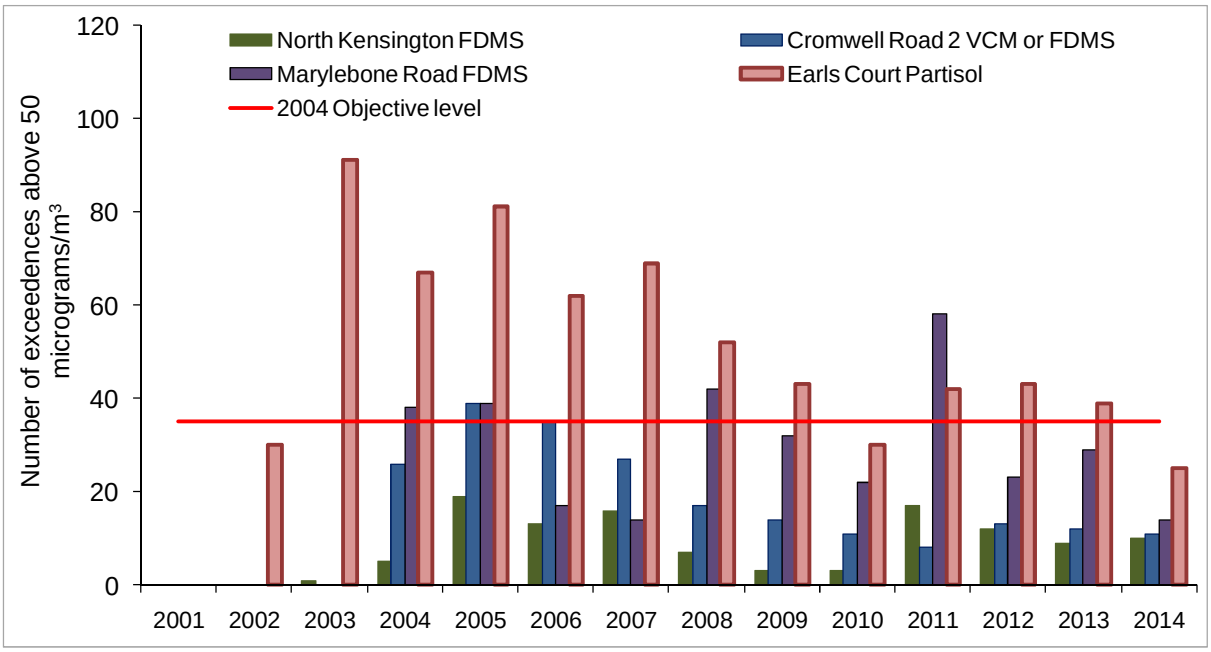


The charts below show PM10 data collected in the borough (and at one other site in Westminster). Annual mean levels of PM10 do not exceed the annual mean objective; however, monitoring of PM10 is more limited compared with NO_2 (Marylebone Road, though not in the borough, is also shown). The daily mean objective was also met for the first time in 2014 at all three sites in the borough. Both charts suggest a downward trend; however, the health effects of PM10 occur at levels below the objective level and therefore efforts to reduce concentrations must continue.

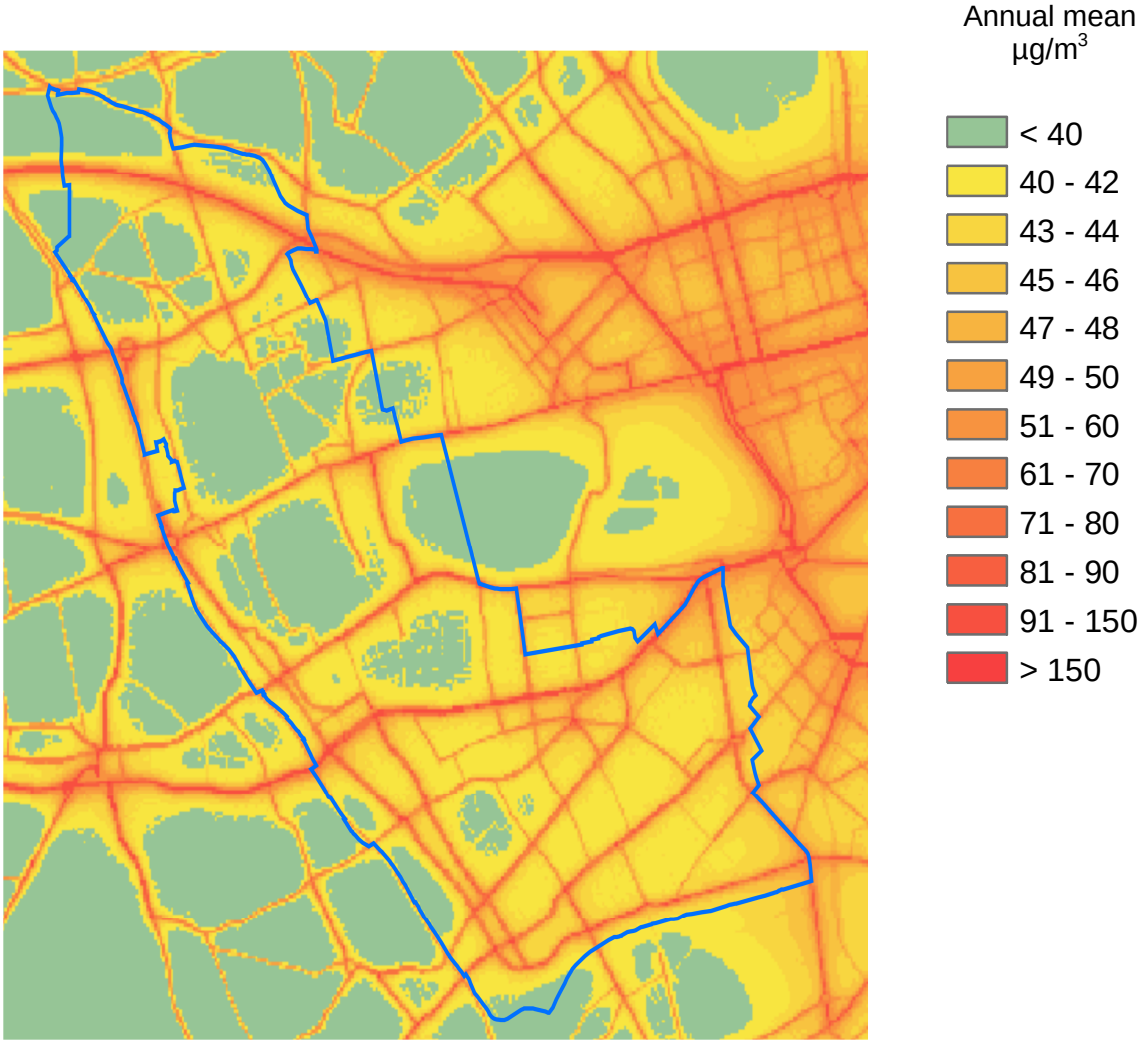
Trends in annual mean PM10 concentrations measured at automatic monitoring sites



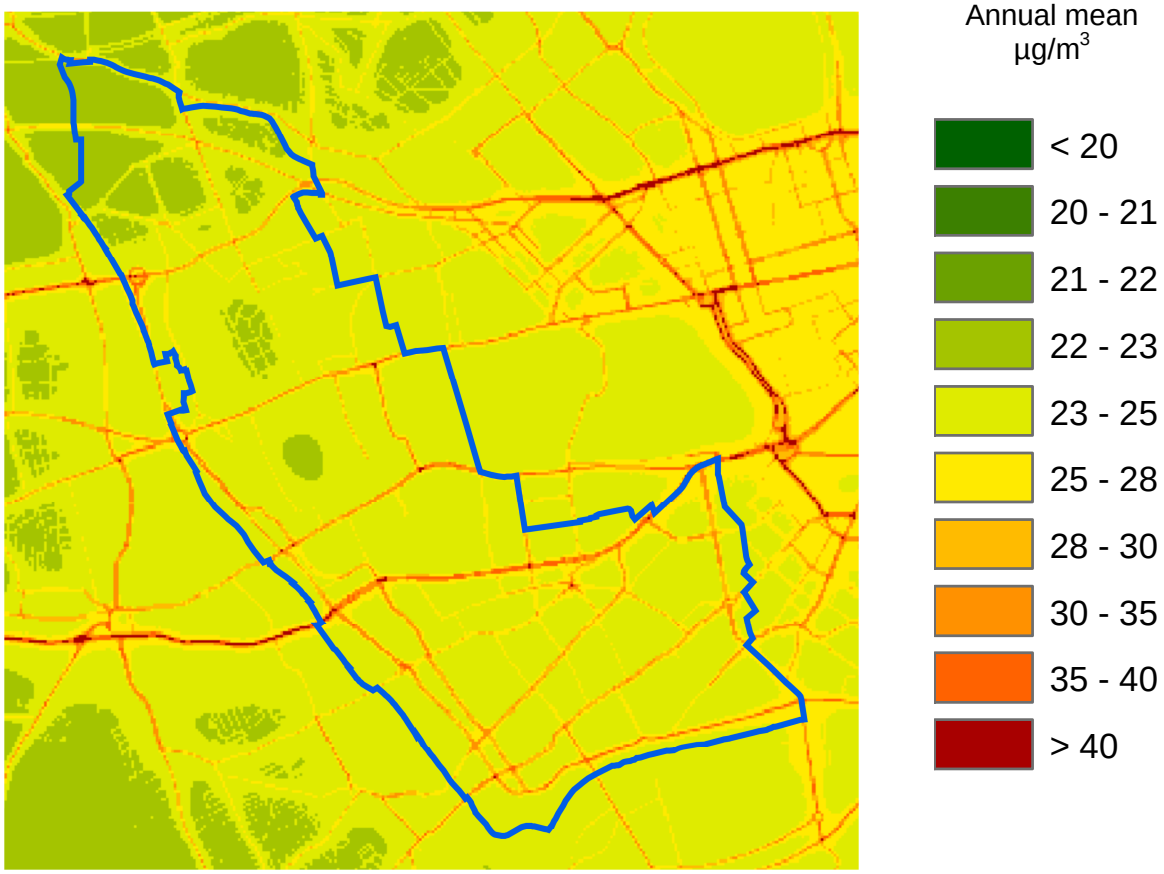
Trends in daily mean PM10 concentrations measured at all monitoring sites



Modelled annual mean nitrogen dioxide (2012)



Modelled annual mean particulate matter (2012)



Based on the LAEI 2010 (published 2013), GLA London DataStore

Appendix V: Health Impacts of Air Pollution and Climate Change

1. Health impacts of air pollution

Air pollution in London compares with some of the worst amongst European cities, with central London and the Royal Borough being particularly badly affected at a number of pollution hotspots. At some of these in Kensington and Chelsea, annual concentrations of nitrogen dioxide (NO_2) are more than double the objective of 40 µg per m^3. The high density of development in inner London and its complex network of roads mean that fuel combustion in buildings and traffic exhausts produce large amounts of NO_2 and fine particles (PM10 and PM2.5), which often do not disperse easily: under certain still weather conditions (typically inversions), the pollution is trapped sometimes for several days. For some pollutants, such as PM2.5, studies have been unable to identify a safe level at which there is no effect on health.

The impacts of these pollutants on the lungs, hearts and circulation of people exposed is becoming increasingly apparent. In July 2015, King's College London published a report[7] on the health impacts of air pollution in London based on their own research and others including the Committee on the Medical Effects of Air Pollutants (COMEAP), the Institute of Occupational Medicine and Public Health England. This report estimates that each year over 9,400 people in the capital die early because of air pollution; 200 early deaths in the Royal Borough alone. More than 3,500 of these early deaths are caused each year by fine particulate matter (PM2.5), some of which comes from outside the capital but most of which is emitted by vehicles and heating plant in London's buildings. Nearly 6,000 early deaths are due mainly to vehicle emissions, mostly from diesel vehicles. Alarmingly, air pollution is now estimated to be causing more deaths than passive smoking, traffic accidents or obesity, owing to its links with heart and lung disease and also cancer.[8]

Damage to health and reduced life expectancy are costing the economy up to £3.7 billion in London alone each year according to this 2015 King's report. The GLA published a report in September 2015, *Health Impacts of Cars In London*[9], which highlighted the main impacts of car use as being physical inactivity and air pollution. It identified the significant health benefits of walking short journeys that are currently undertaken by car.

Many more suffer from respiratory distress, increased asthma attacks and worsening bronchitic conditions, and evidence shows that high levels of air pollution can trigger an increase in admissions to hospital and contribute to the premature death of people who are most vulnerable to daily changes in levels of air pollutants. Very fine particles are also directly implicated in arterial and coronary disease. Ultra-fine particles have been found to pass from the lungs into the bloodstream and increase the likelihood of clots (sclerosis). Currently this contributory cause of heart attacks and strokes goes unrecorded on death certificates.

[7] *Understanding the Health Impact of Air Pollution in London*; King's College London; July 2015.
[8] Parliamentary Environmental Audit Committee – *Fifth Report: Air Quality*, March 2010; and October 2013 WHO announcement that diesel fumes are carcinogenic.
[9] Health Impacts of Cars in Lond, Greater London Authority, London; September 2015

The serious effect of poor air quality on children's lung development in areas where pollution is concentrated was identified in the United States some years ago. More recent research in London has confirmed these findings, in a large follow-up study of schoolchildren in East London (the EXHALE project). In the US it was found that the development of children's lungs could be reduced by as much as 10 per cent. This becomes increasingly significant in later life, when the loss early on is added to the natural reduction in lung capacity.

There was sufficient evidence by 2013 that diesel exhaust fumes inhaled deeply into the lungs are linked to certain cancers for the World Health Organization (WHO) to categorise diesel pollution as carcinogenic. In advising WHO, the International Agency for Research on Cancer (IARC) was convinced that diesel fumes cause lung cancer and probably also bladder cancer. IARC's research was based partly on calculations from extensive occupational exposure studies.

The Parliamentary Environmental Audit Committee in its report on air quality in 2014 called on the Government to update its air quality strategy (last revised in 2007) and in particular to address the serious impairment to health caused by air pollution. It also called on Public Health England to emphasise to local health and well-being boards the priority that should be given to air quality and health.

Between September and November 2015 Defra consulted on proposals to meet the NO_2 objectives for its submission to the European Court, to avoid enforcement action. However, the proposals acknowledged that the objectives were unlikely to be met in London before 2025. Londoners therefore face a further ten years of exposure to unhealthy levels of this pollutant.

A further concern is the health impact of bad indoor air quality, which adds to the effects of outdoor pollution. Some aspects have been publicised, such as the campaigns to reduce tobacco smoke (Smoke Free Homes) and to guard against carbon monoxide poisoning (Gas Safety and CO alarms). However, most people spend about 90 per cent of their time indoors, where levels of fine particles, nitrogen dioxide and volatile organic substances may on occasion be many times higher than outdoor concentrations. Other pollutants such as mould spores and dust mites in sufficient amounts also cause breathing problems in susceptible individuals. More advice to households is needed to reduce indoor air pollution, and that advice is to be made available through the Council's website and other media.

2. Health impacts of climate change

According to WHO, climate change affects the social and environmental determinants of health, such as clean air, safe drinking water, mental health, nutrition, health equity, sufficient food and secure shelter. Between 2030 and 2050, climate change is expected to cause approximately 250,000 additional deaths per year around the world, from malnutrition, malaria, diarrhoea and heat stress.[10]

In 2009, the UCL–*Lancet* Commission on Managing the Health Effects of Climate Change called climate change "the biggest global health threat of the 21st century", and six years on

[10] WHO, *Climate Change and Health*.

a new multi-disciplinary international Lancet commission[11] reached the same conclusion, adding that "tackling climate change could be the greatest global opportunity of the 21st century".

Reducing greenhouse gas emissions protects the human health from the direct and indirect impacts of climate change. According to experts, there are many health co-benefits of GHG mitigation. For example, reductions in emissions (e.g. from burning fossil fuels) will reduce air pollution and the incidence of respiratory disease, while safer active transport cuts road traffic accidents and reduces rates of obesity, diabetes, coronary heart disease and stroke.

In the recent *Lancet* Commission report, *Health and Climate Change: policy responses to protect public health*, published in 2015, solar power is proposed as an ideal alternative energy solution, "providing reliable energy that does not harm cardiovascular or respiratory health in the same way that diesel generators do". Furthermore, new houses and buildings will reduce exposure to heat and cold and disease risks from mould, allergies and infectious and vector-borne diseases if they are designed to provide protection from extreme weather events, with better insulation and heating efficiency.

Climate projections show that London will experience warmer, wetter winters and hotter, drier summers in the future. As well as the gradual change in overall climate, we can expect to see more frequent and intense episodes of extreme weather, meaning that we will need to consider adapting our buildings, communities and lifestyles to prepare for more frequent heatwaves, flooding and droughts.

The UK Climate Impacts Programme (UKCIP) has published a set of scenarios[12] of possible future climate change for south-east England for the 2020s, 2050s and 2080s, compared with the baseline period of 1961–1990.

- Winters will become warmer by 1–2ºC by the 2050s and by up to 3.5ºC by the 2080s.
- Summers in the 2050s will be 1.5–3.5ºC hotter and as much as 5ºC hotter by the 2080s.
- Higher summer temperatures will become more frequent, and very cold winters will become increasingly rare. Daily maximum temperatures of 33ºC, which currently occur about one day per summer in the south-east, could occur ten days per summer by the 2080s (medium-high emissions scenario).
- In central London, the urban heat island effect currently adds up to a further 5–6ºC to summer night temperatures, and this will intensify in the future.Winters will become 10–20 per cent wetter by the 2050s and up to 30 per cent wetter by the 2080s. Summers may become drier by 20–40 per cent in the 2050s and may be 50 per cent drier by the 2080s.
- Heavy winter rainfall could occur twice as frequently by the 2080s. Mean winter wind speeds may increase by as much as 10 per cent by the 2080s, though this is very uncertain.

The known health effects of weather and climate are set out below; these are expected to increase due to climate change.

[11] 2015 *Lancet* Commission on Health and Climate Change, *Health and climate change: policy responses to protect public health,* 23 June 2015

[12] These scenarios were based on climate models run by the UK Meteorological Office's Hadley Centre, and were produced by the Tyndall Centre in April 2002.

Health outcome	Known effects of weather/climate
Heat stress	Deaths from heart- and lung-related diseases increase with hotter and colder temperatures. Heat-related illnesses (heat cramps, heat exhaustion and heat stroke) and deaths increase during heatwaves.
Morbidity and mortality related to air pollution	Weather affects air pollution concentrations. It also affects the distribution, seasonality and production of air-transported allergens.
Morbidity and mortality resulting from weather disasters	Floods and windstorms cause direct effects (deaths and injuries), infectious diseases, long-term mental health problems and indirect effects (temporary limitations on access to health and social care services).
Pest populations	With warmer and wetter conditions, populations of rodents and parasitic insects will increase and spread to new habitats, increasing the incidence of the diseases they carry.
Vector-borne diseases	Higher temperatures shorten the development time of pathogens in vectors and increase the potential for transmission to humans.
Water- and food-borne diseases	The risk of bacterial pathogens increases with rising temperatures. Increases in drought conditions may affect water availability and water quality due to extreme low flows. Extreme rainfall can affect the transport of disease organisms into the water supply.
Cataracts, skin cancers and sunburn	More cloud-free days and higher temperatures may increase the potential risk of over-exposure to UV radiation.
Cold stress	Warmer winters may mean a reduction in cold-related morbidity and mortality.
Accidents and injuries	Warmer winters may also mean a reduction in accidents and injuries due to slips and falls on icy surfaces.

Source: *London's Changing Climate: In sickness and in health*, London Climate Change Partnership, 2011

Indirect effects of climate change

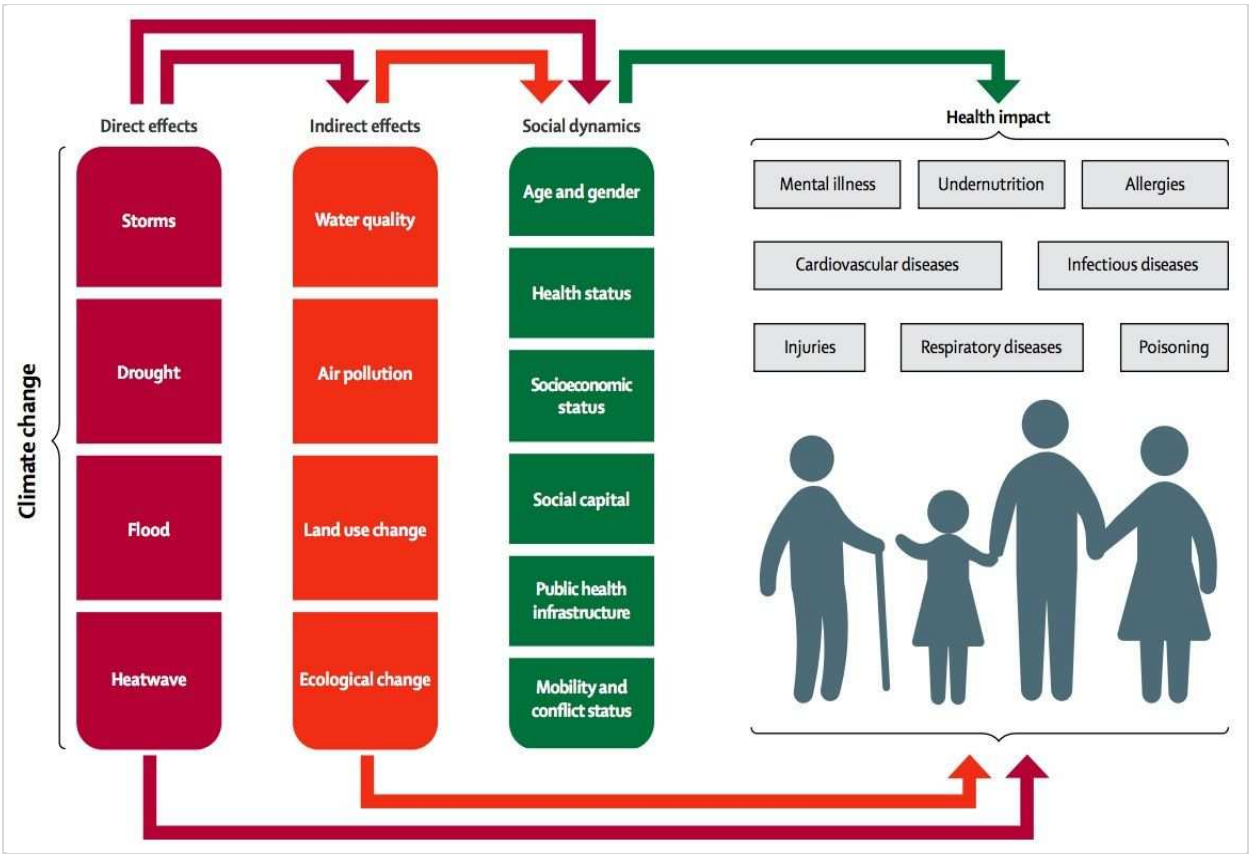
- Large-scale impacts and systemic shocks will have negative impacts on health due to migration, conflict and associated stress, anxiety and depression.
- Devastation of land and competition for diminishing resources will also contribute to migration and inter-regional conflicts.

Causes of increased health inequalities

Groups most at risk include:

- low-income groups
- people who are elderly, very young, chronically ill or socially isolated (increased risk of heat-related mortality)
- those living in south-east England (worst effects of water shortage, in part due to population growth)
- urban populations (greater temperature rises due to air pollution and urban heat island effects).

The figure below shows the direct and indirect effects of climate change on health and well-being



Source: *The direct and indirect effects of climate change on health and wellbeing. The Lancet Commission on Health and Climate Change. Health and climate change: policy responses to protect public health,* June 2015.

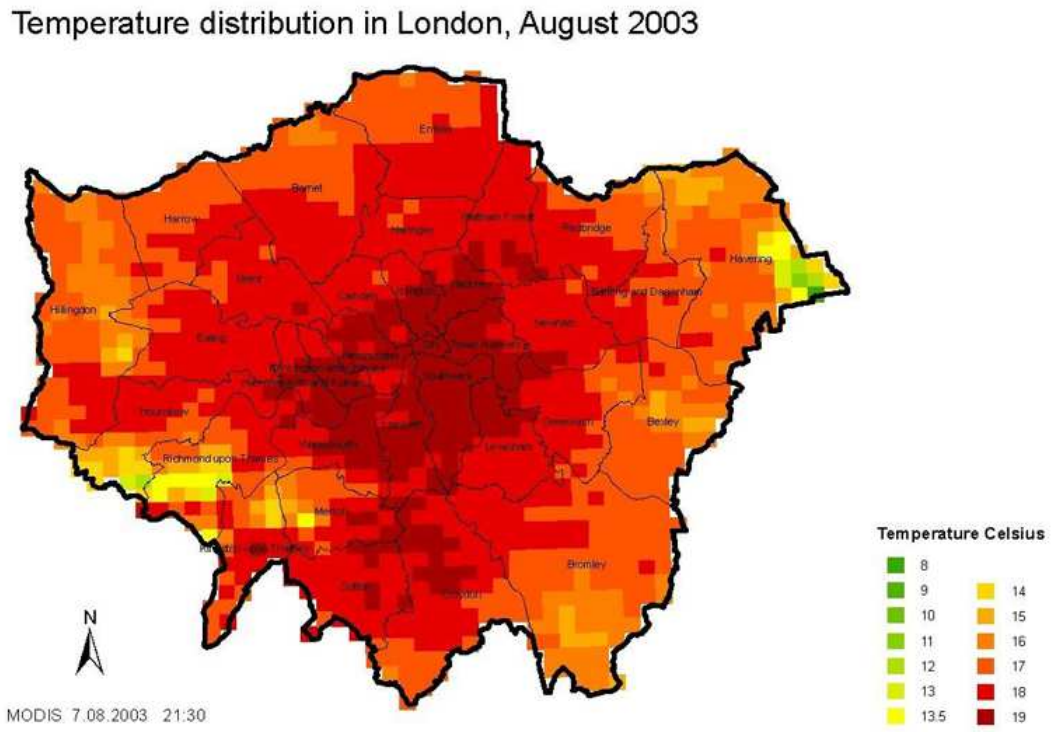
There are complex interactions between both causes and effects. Ecological processes, such as impacts on biodiversity and changes in disease vectors, and social dynamics can amplify these risks. Social responses also ameliorate some risks through adaptive actions.[13]

Overheating

Even though London is more resilient to rising temperatures than other UK regions, its inhabitants seem to suffer more than others when temperatures exceed 24°C.[14] London's population has a diverse social structure and climate change will be likely to affect vulnerable social groups disproportionately (e.g. those on lower incomes may be more significantly affected).

Heat-related mortality currently accounts for around 1,100 premature deaths per year in the UK, with London being the worst area affected as a result of the urban heat island effect. In London, for example, we may have to help residents adapt to increased frequency and intensity of heatwaves with the risk of more deaths, particularly amongst older people, from heat stress (hyperthermia), dehydration, food poisoning and insect-borne diseases.

[13] 2015 *Lancet* Commission on Health and Climate Change, *Health and climate change: policy responses to protect public health,* 23 June 2015.
[14] Armstrong et al., *Association of mortality with high temperatures in a temperate climate: England and Wales*, 2010.



Distribution of surface temperature for 1km^2 grid squares across London at 2130 hrs on 7 August 2003

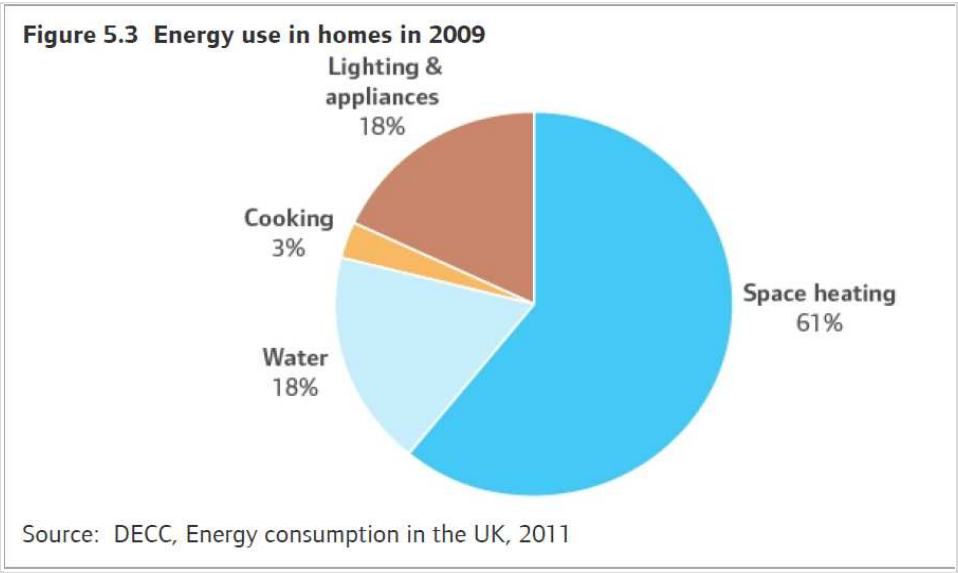
London, in particular, will be very vulnerable due to the massing of development on the floodplain of the River Thames and the urban heat island effect. On the other hand, warmer, wetter winters may bring benefits, with fewer cold-related deaths in vulnerable groups of people. Although initially the benefits of reduced cold far outweigh the adverse risks of heat, according to the London Climate Change Partnership, this balance narrows noticeably by the 2080s.

Appendix VI: Emission Sources

A. Homes and buildings: energy efficiency

As much as 40 per cent of the UK's energy consumption and CO_2 emissions come from the way our buildings are lit, heated and used. In 2013 buildings accounted for about 81 per cent of all London's CO_2 emissions and 88 per cent of all CO_2 emissions in RBKC. Buildings and other developments can also degrade the environment, through poor waste management or inefficient use of resources.

The graph below shows the energy used in a typical home in the UK.



Reducing CO_2 emissions from buildings and making sure that planning policies help to protect and improve the natural and built environment is a government priority.[15] The Government has included policies in the National Planning Policy Framework to explain how developments should be planned to reduce CO_2 emissions and protect the environment. It includes the following provisions:

- Local planning authorities are required to make sure that new developments are energy-efficient.
- All new homes are required to be zero-carbon from 2016.
- All buildings have improved Energy Performance Certificates (EPCs) that are more informative and user-friendly.

In addition, all EU member states must adhere to the EU's Energy Performance of Buildings Directive.

[15] Department for Communities and Local Government (DCLG), *2010 to 2015 government policy: energy efficiency in buildings*.

With a population of around 160,000,[16] Kensington and Chelsea is one of the most densely populated boroughs in the UK.[17] Much of its built form consists of Georgian-, Victorian- and Edwardian-era housing, sitting alongside a number of twentieth-century estate developments. Around 80 per cent of homes are flats.[18] Around 75 per cent of private dwellings were built before 1919, which means that they are more likely to be in disrepair, lack modern facilities and be difficult to heat.

The table below shows the different types of housing tenure as a percentage of all dwellings.

	Kensington and Chelsea	**London**	**England and Wales**
Social rented	24.6	24.1	17.6
Owner-occupied	36.5	49.5	64.3
Private rented	35.8	25.0	16.7

Energy consumption in housing accounts for 31 per cent of the Borough's total CO_2 emissions. In 2013, domestic emissions of CO_2 were 2.45 tonnes per capita, the second highest in the capital after the City of London. Also in 2013, 10.7 per cent of households in Kensington and Chelsea were fuel-poor. This figure has fallen from 11.4 per cent in 2009 and is above the average London rate of 9.8 per cent of households.[19]

The table below shows the baseline figures related to energy use for 2013.

	Kensington and Chelsea	**London**	**England**
Households in fuel poverty	10.7% (8,565 estimated number of fuel-poor households)	9.8%	16.4
Domestic emissions per capita (tonnes)	2.45	1.80	2.04
Average Standard Assessment Procedure (SAP) rating in the private sector	60		52.9
Average SAP rating in the social sector	68.4		62.4

*The Standard Assessment Procedure (SAP) is the methodology used by the Government to assess and compare the energy and environmental performance of dwellings.

The table below shows estimated CO_2 emissions (domestic per capita values) from 2011 to 2013, according to DECC's latest data, published in June 2015.

Area	**CO_2 emissions, domestic per capita (tonnes)**		
	2011	2012	2013
Kensington and Chelsea	2.29	2.51	2.45

Source: DECC, *UK Local Authority and regional carbon dioxide emissions national statistics*

[16] Office for National Statistics (ONS), *Neighbourhood Statistics*, 2011.
[17] The Royal Borough of Kensington and Chelsea Community Strategy 2008–2018, p.7.
[18] Census 2011 – December Release Summary, RBKC.
[19] Sub-regional Fuel Poverty data 2013, Low income high costs indicator (LIHC), DECC.

The private housing sector consists largely of wealthy homeowners in high-value properties and one of the largest private rented sectors in London. The average SAP rating (energy) for Kensington and Chelsea's private sector is 60 (Band D on a scale A–G, where A is best), which is above both the London and national averages. Worryingly, however, it is predicted that over 7 per cent of the borough's private sector stock has SAP ratings of below 30 (Bands F or G). Many of the least energy-efficient homes in the borough are in the private rented sector. National legislation on minimum energy standards to be introduced from 2018 will prohibit landlords from letting properties in Band F and G or below if not upgraded.

The RBKC Core Strategy highlights the requirement that all new buildings and extensions over a certain size must achieve minimum environmental standards (e.g. BREEAM 'Very Good').

The Council's own housing stock is managed by the Kensington and Chelsea Tenant Management Organisation (KCTMO). There are over 50 different registered social landlords (RSLs) active in the borough, but the majority of properties are owned by just 12. Properties in the social housing sector are mainly smaller units and are located (particularly the Council's stock) in large purpose-built estates, including some high tower blocks built post-war. A number of the Council's own housing estates are in significant need of improvement, as stock is ageing and maintenance costs are high.

B. Homes and buildings: Clean Air Act and Smoke Control Areas

Original legislation
The first Clean Air Acts were introduced in the 1950s and 1960s to tackle the gross air pollution caused in large part by reliance on coal burning to heat homes and other buildings. As electrical and gas heating steadily displaced coal and open hearths were converted or sealed up, smogs and smoke haze disappeared. Local orders made under the Clean Air Acts were intended to ensure that any remaining fireplaces and solid fuel boilers were used only to burn smokeless fuel.

Authorised fuel
In 1993 a new Clean Air Act replaced the previous legislation and subsequently the Council made a new Smoke Control Order covering the entire borough. This restricts the type of solid fuel that can be burned on open hearths to authorised fuel, which is effectively smokeless coal. Smokeless coal is manufactured to remove most of the sulphur and volatile organic compounds that cause smoke. No other solid fuel is permitted to be burned, including logs, compressed wood chip blocks or ordinary house coal. It is a specific offence to burn unauthorised fuel (section 20, Clean Air Act 1993) with a maximum penalty of £1,000, though the use of a small quantity of paper and match wood used as tinder for lighting a fire is not regarded as a significant offence.

The entire borough is also covered by an Air Quality Management Area (AQMA), made under the provisions of the Environment Act 1995. This is intended to address poor air quality caused by excessive concentrations of nitrogen dioxide and fine particles. Fine particles can be released by wood being burned in uncontrolled conditions in open fireplaces.

The only permitted burning of timber, or timber products, in a domestic setting is in an authorised (”exempt appliance”) wood-burning stove using specified fuel, usually kiln-dried timber. Guidance on exempt appliances and authorised fuels can be found on Defra’s website: www.uksmokecontrolareas.co.uk.

Restaurants using charcoal grills or pizza ovens must use only ‘restaurant grade’ charcoal or wood products as specified for exempt appliances.

Increase in wood burning in the borough
The Council is aware that an increasing number of fireplaces are being opened up and reused as a domestic feature. There is also evidence from a wood burning survey carried out across London by the Environmental Research Group at King’s College in 2009–2011 that domestic wood burning is increasing (the survey included results from North Kensington). The group’s analysis showed that brown and black carbon from wood burning detected in particulate matter was dominated by city sources. Levels were greatest at weekends and during the winter months, suggesting secondary/discretionary domestic burning. PM10 from wood burning was estimated to be 1.1 µg per m^3; this is highly significant when compared with the reduction in PM10 achieved by the first two phases of the London Low Emission Zone (LEZ) of 0.17 µg per m^3.

It is concerning that domestic wood burning is taking place where people live and at times when they are at home. Wood burning also tends to happen when smoke dispersion is poor

i.e. during winter and at night. There is a strong possibility that wood burning in densely populated residential areas may lead to PM exposure comparable to that associated with traffic sources.

The Council intends to raise awareness of the harm caused by burning unauthorised fuels and will use its powers under the Clean Air Act (by notice: section 51) where potential offences are brought to its attention.

C. Transport: diesel-engine cars and their exhaust emissions

Diesel emissions
Over the past ten years the number of diesel-engine cars has increased from 1.6 million to more than 11 million, and they now account for one-third of the vehicle fleet. Diesel was originally encouraged by the Government with a road tax incentive and lower prices for diesel fuel, for climate change reasons. It remains true that on average diesel engines are more robust, last longer and are more energy-efficient, producing less CO_2 per mile, than their petrol equivalents. However, diesel engines emit considerably more of the two harmful pollutants NO_2 and PM, and this is critical in cities with AQMAs.

Combustion characteristics
In terms of combustion and resulting exhaust emissions there are marked differences between petrol and diesel engines. Diesels rely on compression and high temperatures for combustion. The higher combustion temperatures inevitably generate more oxides of nitrogen (NO_x), which are oxidised in the atmosphere to form nitrogen dioxide. Petrol engines with spark ignition operate at lower temperatures and therefore intrinsically produce less NO_x.

Diesel engines produce substantially more particulate matter, although the formation of this during internal combustion, including ultra-fine particles, is not well understood. It is thought that the sequence and dynamics of combustion in the cylinder head of a diesel engine may more readily form carbon particles, which subsequently absorb other compounds from the initial mixing with exhaust gases. It is also known that diesel fuel is an efficient solvent of lubricating oils present on the cylinder walls, and so the lubricants may be providing an added source of hydrocarbons.

The efficiency of combustion is critical not only in optimising power output, but also in reducing harmful emissions. Modern indirect multi-shot fuel injection diesel engines, together with turbo-charging, potentially lead to a ‘cleaner’ burn, but this is only realised if the timing of ignition is correct for speed, load and temperature. Advancing the start of combustion leads to higher temperatures and therefore more NO_x, while retarding the start of combustion causes incomplete combustion and more smoke, particles and unburned hydrocarbons; achieving precisely the optimum combustion conditions is therefore critical. Older engines with mechanically controlled injection systems were less efficient at reaching the right balance, whereas in newer engines electronically controlled injection that responds to a number of variables is more efficient at achieving optimum combustion. Nonetheless, diesel emissions remain worse than petrol emissions.

Emission controls
With the introduction of stricter controls imposed by Euro standards, particle filters/traps are reducing diesel exhaust pipe emissions; however, these work less well in urban driving conditions and tend to become saturated more quickly. There is also some evidence that particle filters are being removed to improve engine performance.

In the borough diesel cars alone contribute 20 per cent of NO_x vehicle emissions, compared with 7 per cent from petrol cars. Diesel taxis and vans add a further 23 per cent.

Contributions of PM10 to vehicle emissions (including exhaust, brake and tyre wear) in the borough are: diesel cars 23 per cent, petrol cars 23 per cent, and diesel taxis and vans 32 per cent.

The table below of Euro standards, taking into account the performance of both engine types, demonstrates how even older petrol-engine cars emit less NO_x than more recent diesels.

Euro standard	Implementation date	NO_x (g/km)	PM (g/km)	Euro standard	Implementation date	NO_x (g/km)	PM (g/km)
Diesel				**Petrol**			
Euro 1	July 1993	–	0.14	Euro 1	July 1993	–	–
Euro 2	January 1997	–	0.08	Euro 2	January 1997	–	–
Euro 3	January 2001	0.50	0.05	Euro 3	January 2001	0.15	–
Euro 4	January 2006	0.25	0.025	Euro 4	January 2006	0.08	–
Euro 5	September 2010	0.18	0.005	Euro 5	September 2010	0.06	0.005
Euro 6	September 2015	0.08	0.005	Euro 6	September 2015	0.06	0.005

The Euro 3, 4 and 5 NO_x emissions standards for petrol are three or more times more stringent than for diesel. The PM10 emission limit for petrol cars applies only to a small number of vehicles (that employ diesel-type technology), as normally PM10 emissions would be expected to be low. The PM10 Euro 5 diesel standard is nearly as low as for these petrol cars, hence the exemption from the diesel surcharge.

Emissions on the road

However, testing of vehicles under real-life driving conditions in London confirms that while modern petrol vehicles are in fact very low emitters of NO_x and NO_2, diesel cars are not performing as well as their Euro standard suggests. There is little real-world difference in NO_x emissions between Euro 4 and Euro 5 diesels. For example, Euro 4 diesels should emit around 5 grams of NO_x per kilogram of fuel used and Euro 5 diesels around 4 grams. In practice, vehicles of both standards have been found to be emitting between 15 and 17 grams.

Perhaps encouragingly, testing of a limited sample of Euro 6 diesel cars shows a definite reduction in real-world NO_x emissions compared with previous standards. All newly registered diesel cars needed to be Euro 6-compliant by September 2015.

Since the revelation that the car manufacturer VW has been using software to alter the apparent emissions of its vehicles under test to show lower readings than those actually produced in real conditions, confidence in the testing regime has been further eroded and will only be restored when testing is shown to be reliably representative of on-road conditions.

Proposed ULEZ and differential charges for residents' parking permits

The Mayor of London proposes introducing an Ultra Low Emission Zone (ULEZ) in 2020, which would differentially charge drivers of diesel vehicles more to enter the Zone. Vehicles travelling through the borough to and from central London would be liable to daily charges if they are not in the very low emission category. The Mayor also wants to develop and promote the concept that parking charges should vary not only by location and duration of stay, but also by the environmental impact of the vehicle.

Section 122 of the Road Traffic Regulation Act 1984 requires LAs to have regard to the

National Air Quality Strategy when exercising any of their functions under the Act, including charging for parking rights. In recognising the larger emissions contribution from diesel cars, and taking into account air quality objectives, the Borough has set the price structure for residents' parking permits with a differential for diesel vehicles amounting to an £18 surcharge annually.

D. Construction sites: control of emissions and dust nuisance

Redevelopment sites
Construction sites and building activity contribute as much as 15 per cent of the total particulate matter emissions in London. Within the borough there are several major construction sites that will be active for a number of years, including the development of railway land at North Pole depot; redevelopments of Kensington Row, occupying a large area on the west side of Warwick Road; the extensive redevelopment of Earls Court Exhibition Centre and adjoining land; and the conversion of Lots Road Power Station into residential and commercial premises.

Dust nuisance
Demolition and building work potentially gives rise to air polluted with fine particles of PM10 and PM2.5 as well as coarser particles, which are visible as dust and grit and if present in excessive quantities may cause eye and throat irritation. Because it is heavier, larger particulate matter is usually deposited within a fairly short distance from where it is generated and is more likely to soil clothing and contaminate vegetation and surfaces of properties nearby. If the effects are serious, as assessed by an environmental health officer, this type of contamination may amount to a statutory nuisance. The Council may then serve an abatement notice on the builder or developer to prevent the nuisance continuing (under section 80 of the Environmental Protection Act 1990).

Fine particles
The finer PM10 particles, or the smaller PM2.5 ones, remain invisible and suspended in the air and may travel considerable distances, and concentrations of these particles have a long-term health impact. Sources of particulate matter from redevelopment include soil and excavated material, stockpiled materials such as sand and aggregates, powders such as cement and plaster and the machining of materials such as tiles, timber and metals. Vehicles and equipment working on-site may also create re-suspended dust.

The problem pollutants PM10 and PM2.5 are also emitted from the engines of mechanised equipment on-site. Non-road mobile machinery (NRMM), which is often diesel-powered, includes mobile elevating work platforms (MEWPs), fork-lift and dump trucks, generators, cranes, excavators and piling rigs. Until recently, these were not required to meet the same emission standards as vehicles licensed for road use; however, new emission requirements for such machinery are now being introduced by the Mayor of London.

Best practice guidance
In London, guidance on the control of dust and emissions from construction and demolition work has been available since 2006 and was updated in 2014. Before development begins, the guidance stipulates a prior risk assessment of the likely sources and activities giving rise to dust and emissions, and the implementation of measures to avoid or minimise them. Examples of such measures are the covering of stockpiles, the machining of building components off-site, dust suppression on haul roads and wheel washing of vehicles leaving sites.

One of the requirements of the latest guidance, which is now Supplementary Planning Guidance, is that NRMM should meet NO_x emission standards. In addition, NRMM should meet certain emission standards for both NO_x and PM which relate to standards for road

vehicles. For example, from 2015 any major construction site must meet Stage IIIA standards set out in EU Directive 97/68/EC (as amended). At the time of writing, specific draft requirements and exemptions for NRMM have been circulated for consultation.

The control of on-site emissions is enforced through the planning application process by setting conditions and also through legally binding agreements made under section 106 of the Town and Country Planning Act 1990 (as amended). For major sites, the Council requires the developer to set up air monitoring instruments so that contractors are alerted to levels of PM10 approaching a pre-agreed level, and through remote recording, so that any breaches of the threshold are apparent to the Council's officers.

Control of other activities

Certain activities on building sites, i.e. concrete crushing using mobile machinery and concrete batching plants, are controlled by the local authority where the equipment is based, as a 'Part B' process (Environmental Protection Act 1990 and Pollution Prevention and Control Regulations 2000). Any burning of infected timber is regulated by the Clean Air Act 1993, which prohibits the making of dark smoke from bonfires. The Council strongly discourages the burning of any building waste on-site, in view of the AQMA covering the whole borough.

E. Industrial emissions

There are very few industrial processes in the borough and they are on a small scale. However, polluting emissions from these processes can have an impact on local air quality if not properly controlled. Under the Local Air Pollution Prevention and Control (LAPPC) regime, the Council is responsible for regulating the operators of small processes (so-called Part B premises) and employs a specialist to inspect and monitor them, in accordance with a specified risk assessment to determine the frequency of inspections.

There are only three types of premises in the borough engaged in activities that need regulation and which require an environmental permit in order to operate legally: petrol storage at filling stations (six premises), dry cleaners (28) and waste oil burners in servicing and repair garages (two).[20] The permit specifies conditions for minimising and controlling the escape of emissions to air.

Operators have a legal duty to install and manage systems to comply with these conditions, and failure to abide by them may lead to enforcement action. As well as compliance, a fee must be paid to obtain a permit.

Statutory controls
Statutory controls for each process fall under the Pollution Prevention and Control Act 1999 and the Environmental Permitting Regulations 2007; in addition, dry cleaning operations must comply with the EU Directive on solvents (2004). General guidance on policy and procedures is available from Defra in a *General Guidance Manual*, while guidance is also available for petrol filling stations (PG 1/14 (06), *Guidance for Unloading of Petrol into Storage at Petrol Stations*) and for dry cleaners (PG 6/46 (04), *Guidance for Dry Cleaning*). In all cases the purpose of controls is to minimise the escape of noxious fumes, either as petrol vapour and solvents containing volatile organic compounds or metallic compounds, sulphur dioxide, hydrogen chloride, PCBs and dioxins.

Since 2011 petrol filling stations have also been required to install vapour recovery equipment at the pumps to reduce emissions to air when petrol is dispensed into customers' fuel tanks.

[20] The list of premises with permits can be obtained from the Environmental Health Directorate.

Appendix VII: Achievements of Previous Climate Change Strategy and Air Quality Action Plan

1. Previous Climate Change Strategy achievements

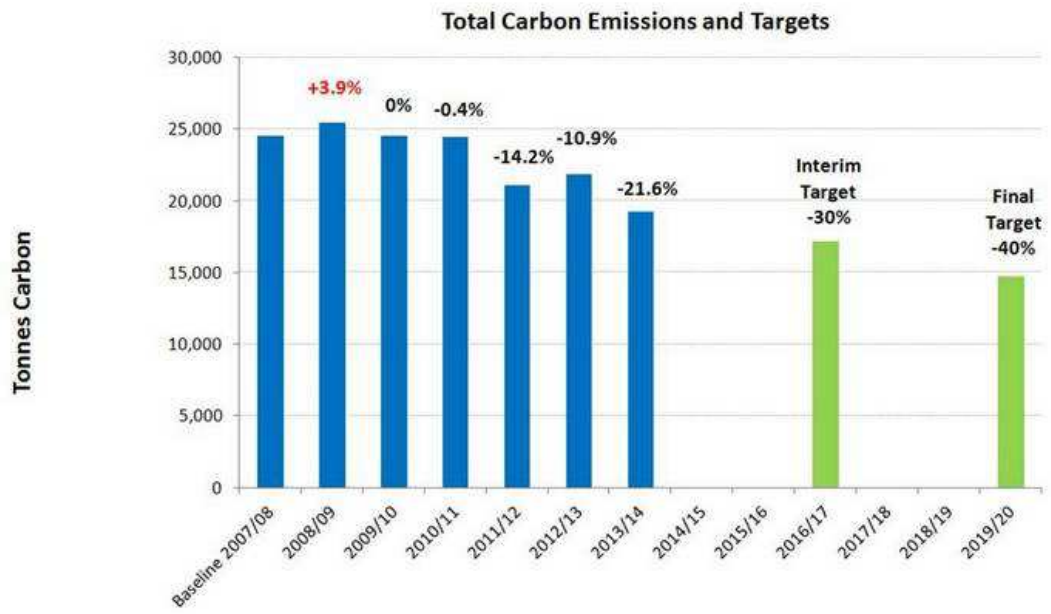
Achievements relating to the Council's stock and own operations

The Council aims to reduce CO_2 emissions from its own operations by:

- 30 per cent by 2017 from its 2008 levels, creating annual savings of £1.15 million;
- 40 per cent by March 2020 from its 2008 levels, creating annual savings of £1.5 million.

Progress

In 2013/14 the Council passed its first interim target of 20 per cent set for March 2014, reducing its CO_2 emissions by 21.6 per cent compared with the 2008 baseline. We estimate that while reducing its carbon footprint the Council has made cumulative financial savings of over £2 million since 2009. The savings are primarily derived from reduced energy usage, reduced fuel consumption and improved resource efficiency.

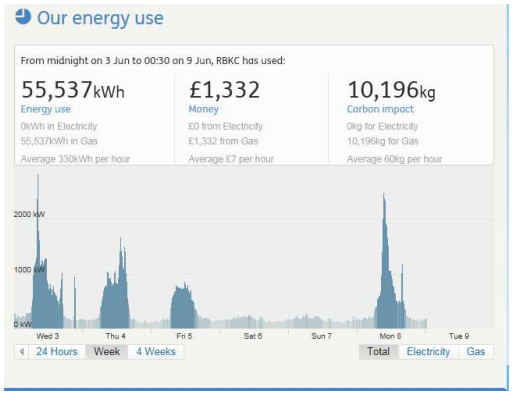


Solar panels

In 2011 the Council installed more than 200 solar panels on the roof of Kensington Town Hall, which are saving over 30 tonnes of CO_2 emissions annually.

Transparency

Since 2013 the Council has displayed live energy performances for key buildings on its website.



Street lighting

The Council has reduced emissions from street lighting by over 750 tonnes since 2008 and continues to invest in innovative, efficient lighting while maintaining the attractive appearance of the borough.

New developments

The Council continues to pursue BREEAM standards in new developments: for example, the new Kensington Academy and Leisure Centre are aiming for BREEAM 'Excellent'.

The Council is helping schools to achieve positive change: for example, boilers have been adjusted to their needs and LED lighting has been installed at various schools.

Achievements for the community

The Council organised Climate Week from Monday 2 March to Sunday 8 March 2015. The Borough hosted a range of internal and external events during the week:

- **140** residents took part in Climate Week events
- **60** people completed our energy survey/feedback form
- **50** children took part in an eco treasure hunt
- **50** staff took part in events
- **15** hours of giant eco snakes and ladders were played

- **10** events throughout the week

- **6** sacks of clothes donated to Oxfam from the Shwopping campaign
- **3** gardens visited on the community kitchen garden tour
- **1** winner of the Climate Week internal quiz.

Greener Living Guide
In 2012, the Council published a very successful 44-page *Greener Living Guide* aimed at all RBKC residents.

Green Doctors – home energy visits
As part of the Council's strategy to increase engagement with the community and its continuing efforts to reduce CO_2 emissions across the borough, around 250 home energy efficiency visits were made to KCTMO properties. Residents identified as being elderly, on benefits and/or disadvantaged were prioritised for visits by "Green Doctors". Green Doctors are independent and impartial experts, offering practical support and advice on energy saving to reduce people's energy use and fuel bills.

We were able to measure the reductions in CO_2 emissions and the financial savings achieved during the pilot project from the first 70 home visits and interventions installed. This work resulted in:

- 474 measures in 70 KCTMO properties
- prevention of 7,260kg of CO_2 being emitted a year
- saving residents £1,787 a year on energy bills
- saving 668 litres of water a year.

We will continue to report the savings for all visits once the results are ready.

2. Previous Air Quality Action Plan achievements

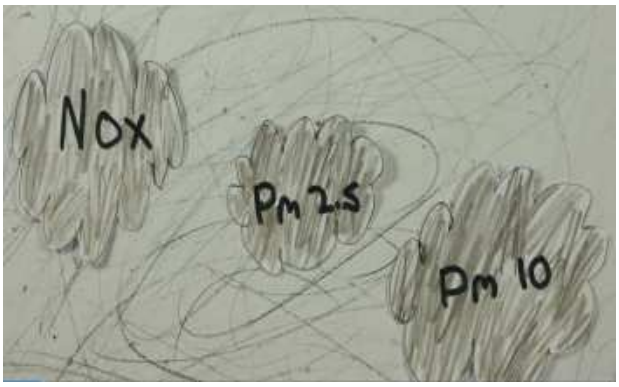
Health and air quality
Regular meetings with Public Health England continue to be held to further develop air quality awareness-raising opportunities and project collaboration. The Environmental Quality team has collaborated with the Public Health team at a "Public Health Presents" event to raise awareness of air pollution amongst colleagues across Westminster, Hammersmith and Fulham and Kensington and Chelsea. Funding from the Public Health team has supported the continued dissemination of the AirTEXT alerting system to vulnerable and interested individuals.

AirTEXT: Daily health bulletins with information on air pollution, the UV index, pollen and minimum and maximum temperatures are available to subscribers; information about signing up can be found at www.airtext.info/ and leaflets are distributed at air quality promotional events. We have 277 direct subscribers; the number of users is likely to be much higher as many sign up without registering e.g. SMS Twitter users. A page on the Council's intranet is used to upload and distribute daily health bulletins to Council staff for personal use and to be cascaded to partner organisations outside the Council.

Awareness-raising

Green screen and education events: The Clean Air for London Fund has successfully been used for local air quality improvement initiatives, including green screens to block air pollution and an educational programme in two schools. Green screens are vertical barriers planted with a variety of fast growing species to provide total plant cover. The fund has also helped in promoting air quality issues to the local and business community. Case studies of CAF2* schools engagement have been published in *Air Quality Bulletin* and school newsletters and on the Council, London Air Quality Network (LAQN) and GLA websites.

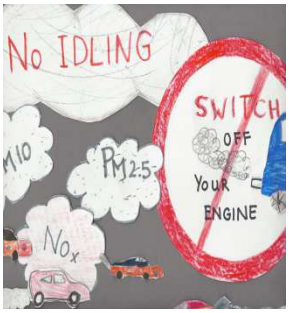
*CAF2 : Clean Air Fund – round 2



Construction

Risk assessments for demolition and construction work are routinely requested for large developments. Monitoring of PM10 is required for larger sites and mitigation in line with the Mayor of London's Supplementary Planning Guidance on Construction and Demolition is also required. Demolition and construction management plans outlining mitigation measures must be approved before work commences.

School travel plans



Our Transportation Department continues to promote idling engine awareness in schools through school transport plan initiatives. Awareness is focused on the contribution that idling exhaust fumes can make to poor air quality and their impact on asthma.

To date, 67 per cent of schools (46 schools out of 69) in the borough have reviewed their travel plans and have received free training resources and funding from the Road Safety and Travel Plan Team. The percentage of pupils cycling, walking and scooting to school has increased from 41 per cent in 2011–2012 to 53 per cent in 2013-2014. In 2013–2014, 28 schools were awarded TfL's Sustainable Travel Accreditation, six schools received the gold level, six the silver level and 30 schools the bronze level. A further three schools had an active travel plan. In total, 46 schools were engaged in the school travel plan process. In 2013–2014 three of our local schools received special awards from TfL in recognition of their excellent work in promoting road safety and sustainable travel.

Idling engines

Our Highways Enforcement Team conducts checks at known troublespots. Areas likely to cause nuisance are also targeted, such as cab ranks, bus stops, coach stops and areas around schools. Leaflets have been distributed to car/van/bus/coach drivers who are sitting in stationary vehicles for extended periods running their engines.

The Council received 32 complaints about vehicles idling between 1 April 2014 and February 2015. The actual offence is failing to turn off an engine when requested to do so by an authorised officer, but drivers invariably cooperate and so no fixed penalties were issued in 2014/15.

Car clubs

The Council has provided 170 car club parking bays on-street, which are used by the City Car Club and Zipcar. This means that virtually all residents are within a three-minute walk of at least one on-street car club bay. In addition there are a number of off-street car club bays around the borough. More than 50 per cent of the fleet is already within VED band A–B, and in 2016 the Council plans to adjust the schedule of permit charges to incentivise improvements to the air quality performance of the car club vehicle fleet.

The findings of a review commissioned by RBKC, *14 Cost Effective Actions to Cut Central London Air Pollution*,[21] highlighted the significant savings of CO_2 and air pollutants that could be achieved through the expansion of car club schemes (nearly 27,000 tonnes annually), with campaign days saving slightly less (20,000 tonnes per year).

[21] https://www.rbkc.gov.uk/pdf/air_quality_cost_effective_actions_full_report.pdf

Diesel surcharge
The council has reviewed the surcharge levied on diesel vehicles that do not meet Euro 5 emissions standards, which affects most diesel cars produced before 2011. We will increase the 2014/15 surcharge of £19 to £40 from April 2016 and will remove the exemption for Euro 5 vehicles, so that it will apply to Euro 6 vehicles only from April 2017. Electric vehicles continue to be charged at the lowest parking permit rate.

Council travel plan The proportion of staff driving to work has decreased from 13.4 per cent in 2008 to 4.3 per cent in 2014, which is a considerable achievement. At the same time the proportion of staff cycling to work as a main mode of transport has increased from 5.1 per cent (2008) to 7.4 per cent (2014), despite some fluctuations over the four years.

For the past seven years we have offered bike mechanic sessions for staff to have their bicycles checked free of charge. The sessions take place at two main sites, six times a year.

Appendix VIII: Glossary

AQ Air quality

AQAP Air Quality Action Plan

AQMA Air Quality Management Area

AQS Air Quality Strategy

BE Business Engagement

BRE Building Research Establishment

BREEAM BRE Environmental Assessment Method

C_4H_6 1,3-butadiene

C_6H_6 Benzene

CABB Cleaner Air Better Business

CAF2 Clean Air Fund (Stage 2)

CC Climate change

CCAL Campaign for Clean Air in London

CCZ Congestion Charge Zone

CENEX Centre of Excellence for Low Carbon and Fuel Cell Technologies

CERC Cambridge Environmental Research Consultants Ltd

CH_4 Methane

CHD Coronary heart disease

CHP Combined heat and power (unit)

Cns Consultants

CO Carbon monoxide

CO_2 Carbon dioxide

COMEAP Committee on the Medical Effects of Air Pollutants

COPD Chronic obstructive pulmonary disease

CpS Corporate Services (RBKC)

CRP Cross-River Partnership

DEC Display Energy Certificate

DECC Department of Energy and Climate Change

Defra Department for Environment, Food and Rural Affairs

DfT Department for Transport

DPH Director of Public Health

EC European Commission

EC&O Earls Court and Olympia venues

EcoI Ecology Section (RBKC)

Ed Directorate for Education (RBKC)

EH Directorate for Environmental Health

EPC Energy Performance Certificate

ERG Environmental Research Group, King's College London

ERT Environment Round Table

EST Energy Saving Trust

EV Electric vehicle

FPN Fixed Penalty Notice

GLA Greater London Authority

GHG Greenhouse gas (emissions)

GP General practitioner

HDV Heavy diesel vehicle

HECA Home Energy Conservation Association

HFCs Hydrofluorocarbons

HGV Heavy goods vehicle

HPA Health Protection Agency

HPU Health Protection Unit

HSE Health and Safety Executive

IARC International Agency for Research on Cancer

IAQ Indoor air quality

IPCC Intergovernmental Panel on Climate Change

KCTMO Kensington and Chelsea Tenant Management Organisation

LA Local authority

LAEI London Atmospheric Emissions Inventory

LAPCC Local Air Pollution Prevention and Control

LAQM Local Air Quality Management

LAQN London Air Quality Network

LCCC London City Car Club Consortium

LDF Local Development Framework

LEA Local Education Authority

LES Low Emission Strategies

LEZ Low Emission Zone

LFEPA London Fire and Emergency Planning Authority

LGA Local Government Association

LIP Local Implementation Plan

LPG Liquefied petroleum gas

L/ZEV Low- or zero-emission vehicle

MAQF Mayor’s Air Quality Fund

MoL Mayor of London

MTS Mayor of London's Transport Strategy

NAQS National Air Quality Strategy

NI National Indicator

N_2O Nitrous oxide

NO_2 Nitrogen dioxide

NO_x Nitrous oxides

NRMM Non-road mobile machinery (for construction sites)

O_3 Ozone

PAHs Polycyclic aromatic hydrocarbons

PCBs Polychlorinated biphenyls

PCSO Police Community Support Officer

PFCs Perfluorocarbons

PI Directorate for Planning (RBKC)

PM10 Particulate matter with an aerodynamic diameter of 10 micrometres

PM2.5 Particulate matter with an aerodynamic diameter of 2.5 micrometres

RSL Registered social landlord

RBKC Royal Borough of Kensington and Chelsea

RV Refuse collection vehicle

SPD Supplementary Planning Document

SAP Standard Assessment Procedure (to apply an energy rating to dwellings)

SF_6 Sulphur hexafluoride

SMEs Small and medium-sized enterprises

SMART Specific, measurable, achievable, relevant, time-limited

SO_2 Sulphur dioxide

SRA Strategic Rail Authority

SSD Strategy and Service Development

SUni Southampton University

SWELTRAC South and West London Transport Conference

TfL Transport for London

TMO Tenant Management Organisation

Tr Directorate for Transportation and Highways (RBKC)

UDP Unitary Development Plan

µg per m^3 Micrograms per cubic metre

UKCIP UK Climate Impacts Programme

ULEZ Ultra Low Emission Zone

UN United Nations

UNFCC United Nations Framework Convention on Climate Change

VED Vehicle Excise Duty

WHO World Health Organization

WL Directorate for Waste and Leisure (RBKC)

The artwork above is by Jessica from Holy Trinity School.

THE ROYAL BOROUGH OF
KENSINGTON
AND CHELSEA