‘Invisible’ air pollution is the second biggest public health risk

Barbican Association
London: 26 April 2012

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Record smog episode: looking to Parliament

First sighting of Boris' Pollution Suppressor

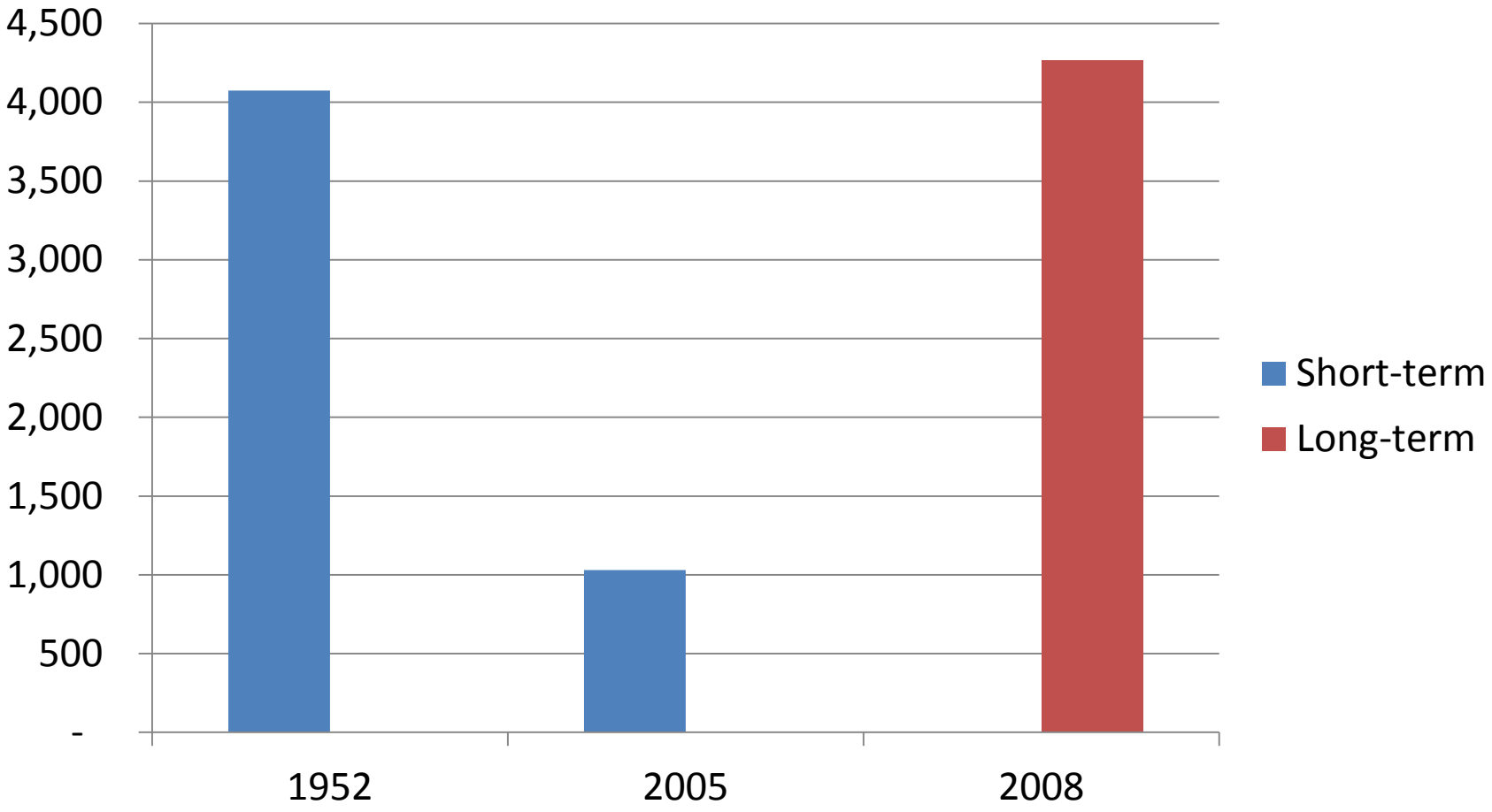
Summary

- Great Smog of 1952
- Is air quality still a problem?
- Health impact in London and nationally
- Schools near our busiest roads
- Legal framework
- Sources of air pollution in London (and elsewhere)
- Key issues
- Manifestos for the Mayoral and London Assembly elections

London and the UK should be leading the world in tackling air pollution as it did after the Great Smog of 1952

As many early deaths now as we <u>thought</u> in 1952

Deaths in London attributable to short-term exposure to visible air pollution and long-term exposure to 'invisible' air pollution



Great Smog of 1952 – What happened?

- 5-8 December 1952: Great Smog. Estimated 4,075 premature deaths (and perhaps up to 12,000 in total)
- Until the 1960s London suffered from terrible coal smoke smogs

Great Smog of 1952 – What changed?

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THE TIMES

Monday April 20 1953

POLLUTED AIR OVER THE TOWNS

I—LESSONS OF THE LONDON FOG

By a Special Correspondent

In the winter of 1952-53 this country had more than its usual share of fogs, and not a little anxiety has been caused thereby. In particular, the calamitous fog which hung over London for four days last December has directed some attention to the evils of atmospheric pollution. Yet the concern felt at the death of 4,000 persons, which it caused in that week, in no way equalled the interest and anxiety aroused by the fog incidents in the Meuse Valley, near Liége, in 1930, and at Donora, Pennsylvania, in 1948, resulting in 60 and 20 deaths respectively. These were regarded as national disasters and were subjected immediately to full public inquiries by competent experts. The London episode, after four months, still awaits the thorough investigation it deserves.

Fogs occur under known meteorological conditions, one of which is the presence of solid or liquid nuclei, on which moisture can condense, consisting in this country and on the oceans of minute droplets of sea spray or salt crystals. Fog is a natural phenomenon and is intractable by human agencies. Except for reducing visibility on sea and land, nature-made fogs are comparatively innocuous in themselves. It is when they get contaminated by man-produced impurities in cities and industrial areas that they become dangerous. Fortunately it is only rarely that there occur the meteorological conditions under which town fogs of such catastrophic composition and intensity as those referred to above can be produced. But the emission into the atmosphere of the polluting matter which makes them so destructive goes on continuously from day to day throughout the year.

SOURCES OF POLLUTION

The incidence of atmosphere pollution depends on many diverse factors, and much, though by no means adequate, study has been directed to this complex subject. But the overriding facts are simple. Pollution of the air, apart from a minor quantity arising from local contamination with noxious dusts and gases inherent in mining and manufacturing operations, is caused by the combustion of fuels, in this country mainly of coal. The polluting substances comprise a group of solids—unburned or partially burned coal dust, ash dust and grit, coke particles, and tarry soot—and gaseous sulphur oxides. The solid contaminants are carried forward suspended in the flue gas in amounts depending on the efficiency of the combustion appliance and process and on the velocity of gases, which, in turn, is conditioned by the design of the flue system and the chimney draught. The formation of the sulphur oxides by the oxidation of sulphur contained in coal and oil fuel is unavoidable, and, being gases, they necessarily remain in the emissions from the chimney unless previously extracted.

While the amount of pollution has not diminished, its character has changed since the beginning of the century. The dense smoke emitted from many millions of domestic chimneys, particularly during kindling, when tar is distilled from the coal and the fire is not hot enough to burn it, has been reduced in quantity to

- The Government failed to act after the Great Smog
- Newspapers, such as The Times, pushed for cleaner air
- First Clean Air Act was a Private Members Bill which the Government later supported reluctantly
- Public and media pressure was instrumental in getting the Clean Air Act passed
- At this point London led the world in the effective control of air pollution

Is air quality still a problem?

- "The rate of decline in some air pollutants is now levelling off and improvements are increasingly costly to achieve. However, air pollution still reduces life expectancy by an **average of six months**, with social costs estimated at £8 to 17 billion per year." Defra, July 2010. **CAL emphasis**

- "Air pollution in the UK has **declined significantly over recent decades** through measures to reduce pollution from transport, industrial and domestic sources. However, the rate of reduction is now levelling off for some key pollutants such as oxides of nitrogen." Defra, December 2010

- *"Our air* – **air quality is good across 99% of the UK**, but air pollution continues to harm human health particularly in some urban areas." Defra, July 2010

- "Air pollution shouldn't harm you if you're healthy." Some health alerts

‘Epidemiology 101’ – Public health statistics

- Public health risks:
  - *“There are between 15,000 and 22,000 alcohol-related deaths every year in England. Most of these deaths are premature: on average, every man in this group loses 20 and every woman 15 years of life compared with the average.”* DoH, June 2008
  - *“Obesity is responsible for 9,000 premature deaths each year in England, and reduces life expectancy by, on average, 9 years.”* DoH, September 2007
  - *“Smoking is responsible for 87,000 deaths in England each year.”* DoH, December 2008. *“Men who quit smoking by 30 added 10 years to their life.”* NHS, July 2010
- 2,222 people killed in road accidents in GB in 2009. DfT, 2010
- Using the same ‘language’, there were 29,000 premature deaths in the UK in 2008 attributable to long-term exposure to anthropogenic (i.e. man-made) $PM_{2.5}$ at an average loss of life of 11.5 years

Health impact in London and nationally

Short-term exposure

- **COMEAP 1998** (based on 1995/1996 pollution levels)
  - **8,100** GB urban 'deaths brought forward' annually due to PM_{10} (using +0.75% per 10 $\mu g/m^3$, 24 hour mean)
  - **3,500** GB urban 'deaths brought forward' annually due to SO_2 (using +0.6% per 10 $\mu g/m^3$, 24 hour mean)
  - **700 to 12,500** urban and rural GB 'deaths brought forward' during summer only due to O_3 (+3.0% per 50$\mu g/m^3$, 8 hour mean)

Long-term exposure

- **COMEAP 2010**
  - **29,000** premature deaths in the UK in 2008 attributable to long-term exposure to anthropogenic $PM_{2.5}$ (6% per 10 $\mu g/m^3$ increase in [annual mean] $PM_{2.5}$)
  - 36.5 million life years over the next 100 years. Average across new births of six months
  - Air pollution may have contributed to all 200,000 cardiovascular deaths at an average of two years

National range

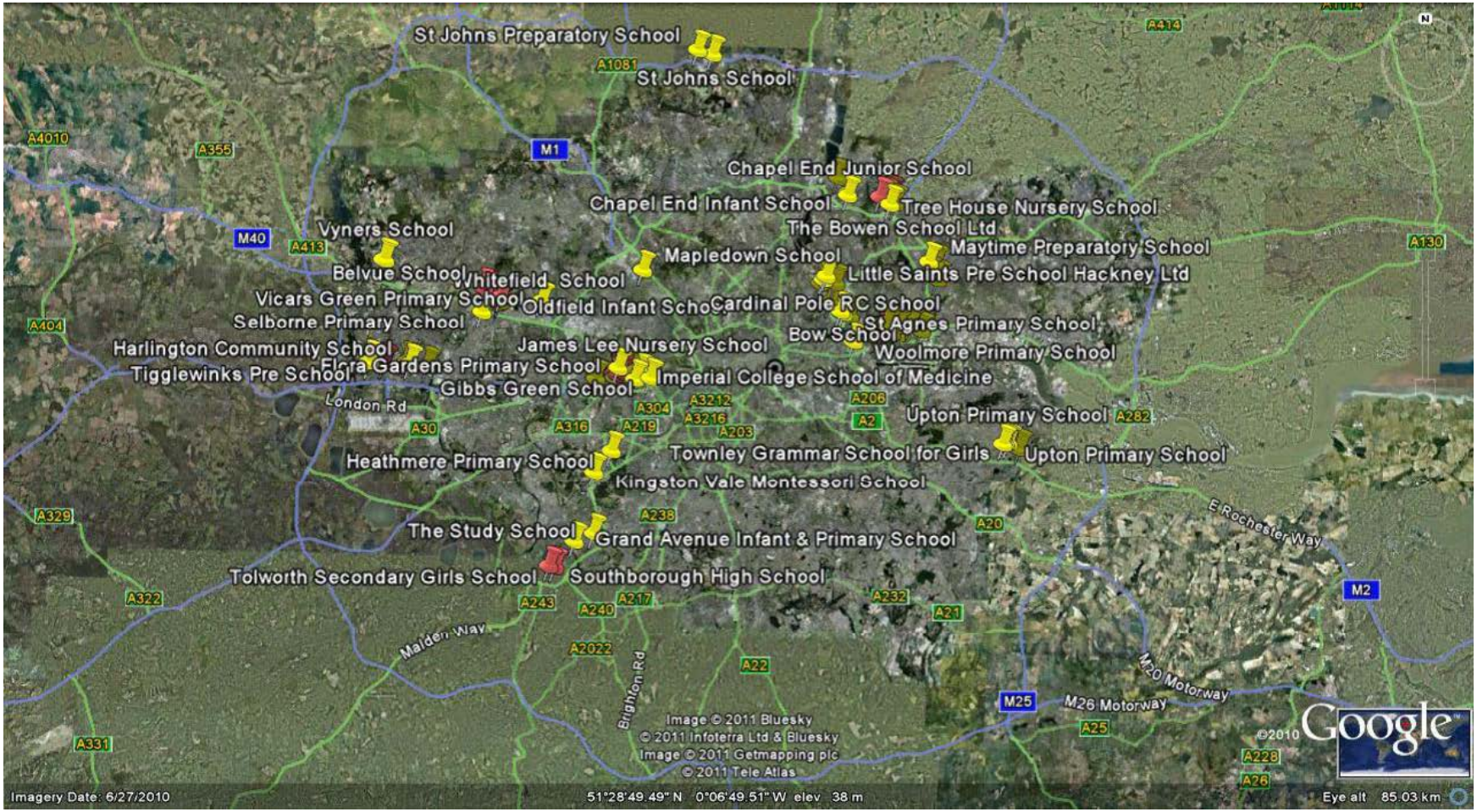
- **29,000 to 53,100** premature deaths attributable to air pollution

London

- **4,267** premature deaths in 2008 attributable to long-term exposure to $PM_{2.5}$. Ave 11.5 yrs
- Range 756 (1%) to 7,965 (12%). Assumes population weighted exposure of 15.34 $\mu g/m^3$
- Air pollution may have contributed to 15,800 cardiovascular deaths at ave three years

London schools within 150m and 400m of busy roads

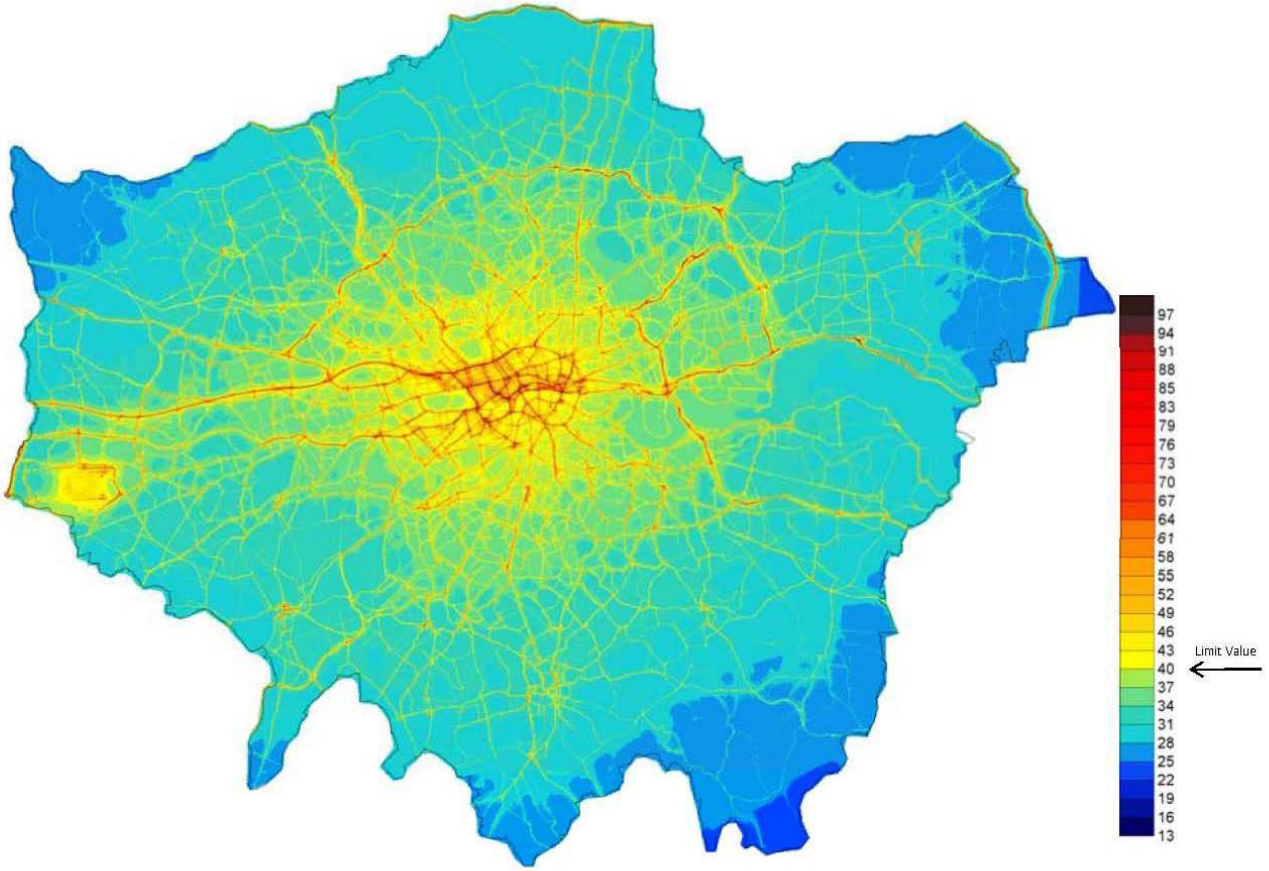
Roads carrying over 100,000 vehicles per day



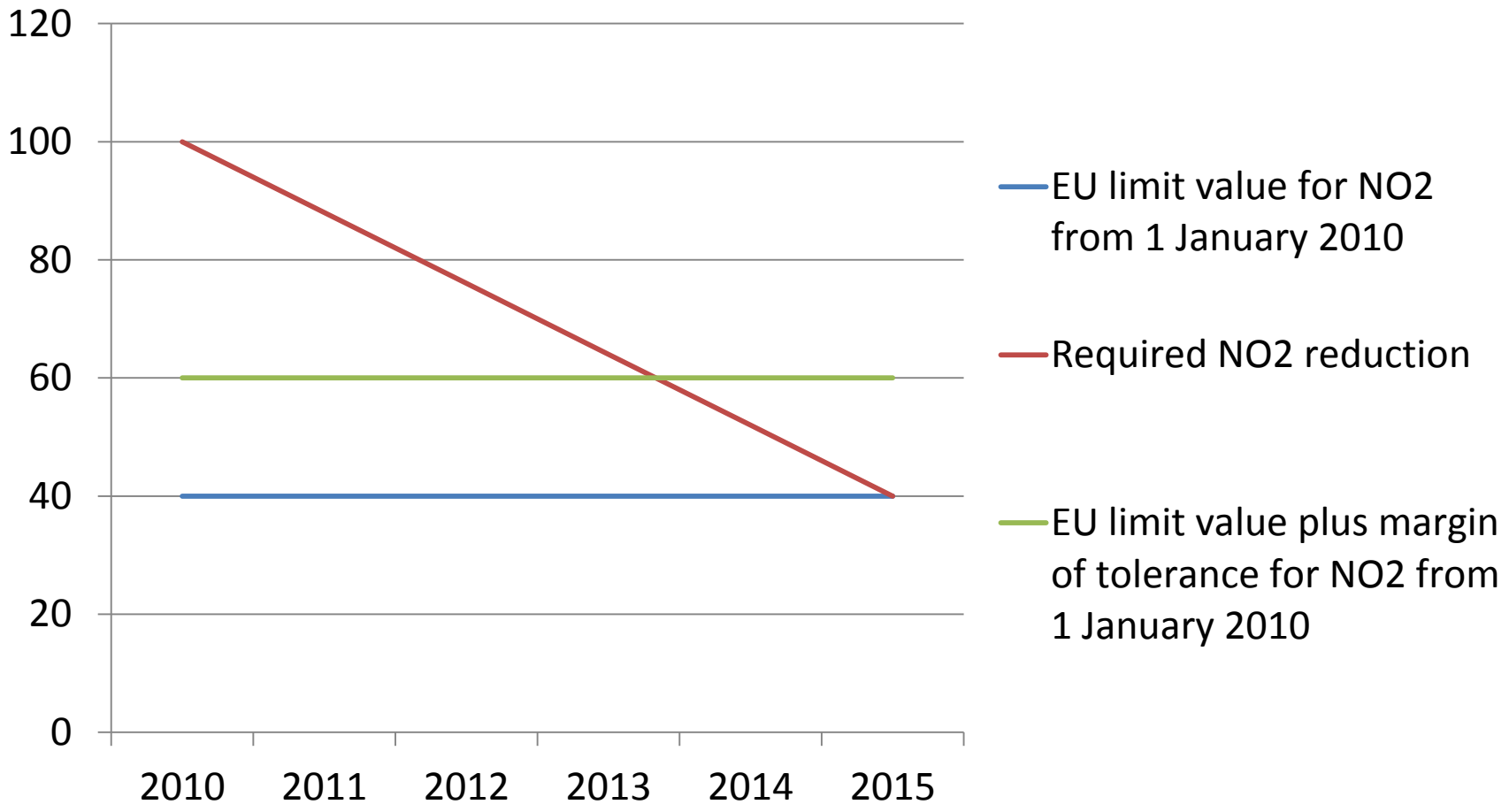
EU legal standards compared to WHO guidelines

Pollutant	Legal standard		WHO guideline	
	Short term	Annual mean	Short term	Annual mean
Fine particulate matter ($PM_{2.5}$)	1. 25 μg/m^3 annual mean to become limit value in 2015 2. 20 μg/m^3 exposure concentration obligation based on 3-year average 3. Exposure reduction target in percentage by 2020		25 μg/m^3 24-hour mean	10 μg/m^3
Particulate matter (PM_{10})	35 days over 50 μg/m^3 since 1 January 2005 (or 11 June 2011)	40 μg/m^3 since 1 January 2005 (or 11 June 2011)	50 μg/m^3 24-hour mean	20 μg/m^3
Nitrogen dioxide (NO_2)	18 hours over 200 μg/m^3 since 1 January 2010	40 μg/m^3 since 1 January 2010	200 μg/m^3	40 μg/m^3

Concentration and trends – Mayor's Air Quality Strategy
NO_2 annual mean concentrations for 2008



Concentrations of nitrogen dioxide (NO_2) in micrograms per cubic metre ($\mu g/m^3$)



Sources of air pollution in London
Mayor's Air Quality Strategy 2010

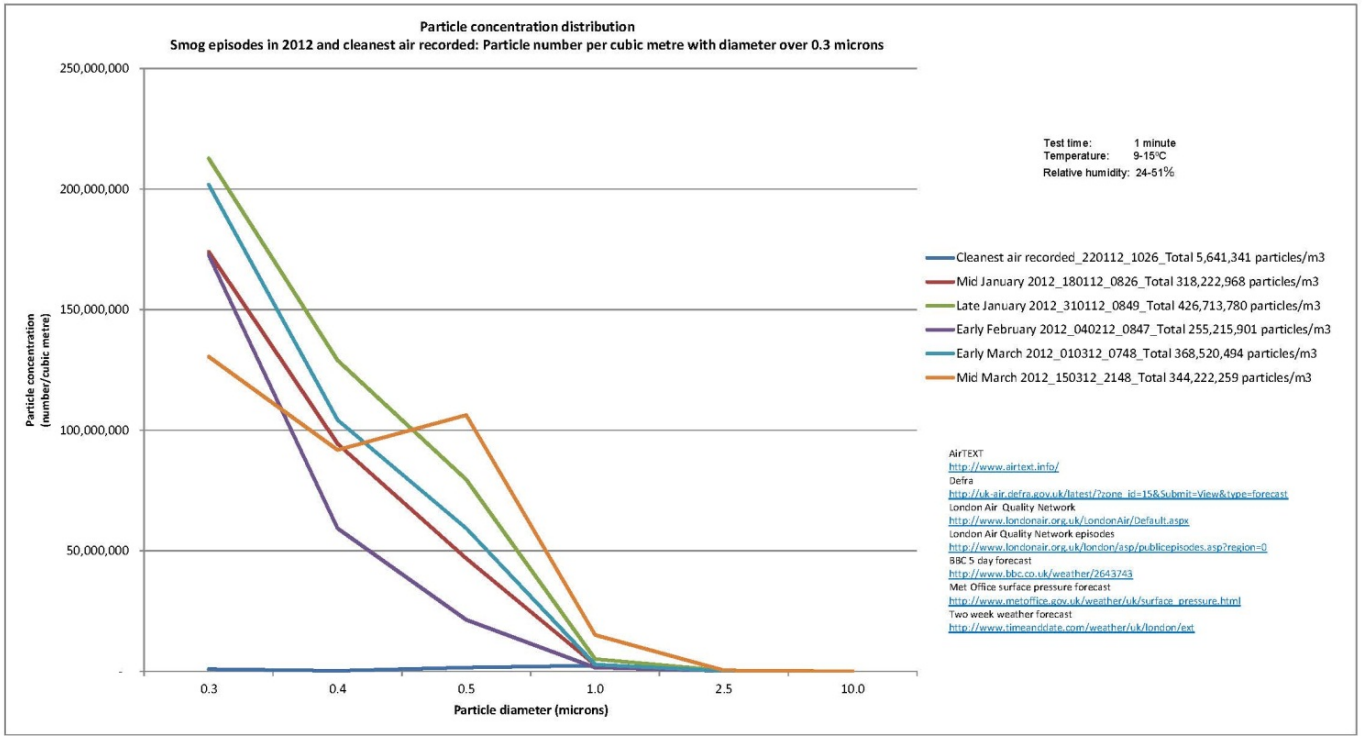
- Emissions (not concentrations). Based on 2008 estimates
- PM_{10} (Central London)
  - Road transport 79%. Cars 23%; taxis 20%; LGVs 10%. Buses <10%
  - Tyre and brake wear 35%
- $PM_{2.5}$ (Greater London)
  - Road transport 80%; industrial and commercial gas combustion
  - LGV, cars and taxis 20% each. Buses 5%
  - Tyre and brake wear 25%
- Oxides of nitrogen
  - Road transport 46%; domestic gas 22%
  - Commercial gas, industry, airport and rail 7-8%
  - Cars 35%; HGVs 30%; buses 21%
- DfT 2009: Diesel versus petrol cars (g/mile): 21.7x PM_{10}; 2.1x NOx

Key issues

- Mayoral election
  - Pollution Suppressor
  - Smog alerts
  - Commitments. Boris's backward steps and lack of promises
- Legal compliance with PM_{10} and NO_2 legal standards
- Olympic and Paralympic Games
  - Olympic Route Network
  - Impact of smog episodes like 2003 or 2006
- Health and Wellbeing Boards
- Year of Air in 2013

Key issues: Smog episodes in 2012

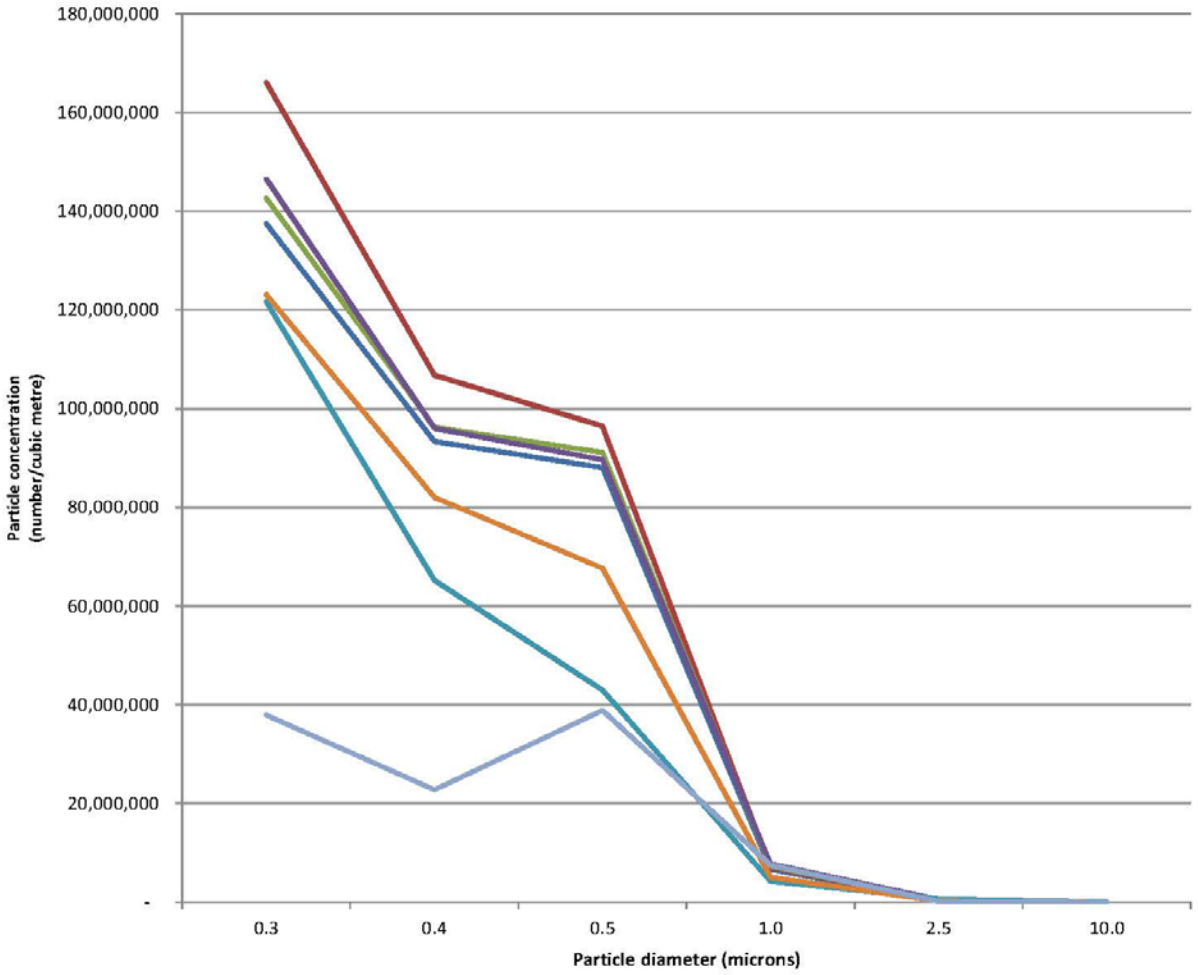
POLLUTION CHECK **SMOG EPISODES 2012** **ERRORS AND OMISSIONS EXCEPTED**



© Clean Air in London 11:03 18/03/2012 PC17_170312_Smog episodes

Particle concentration distribution

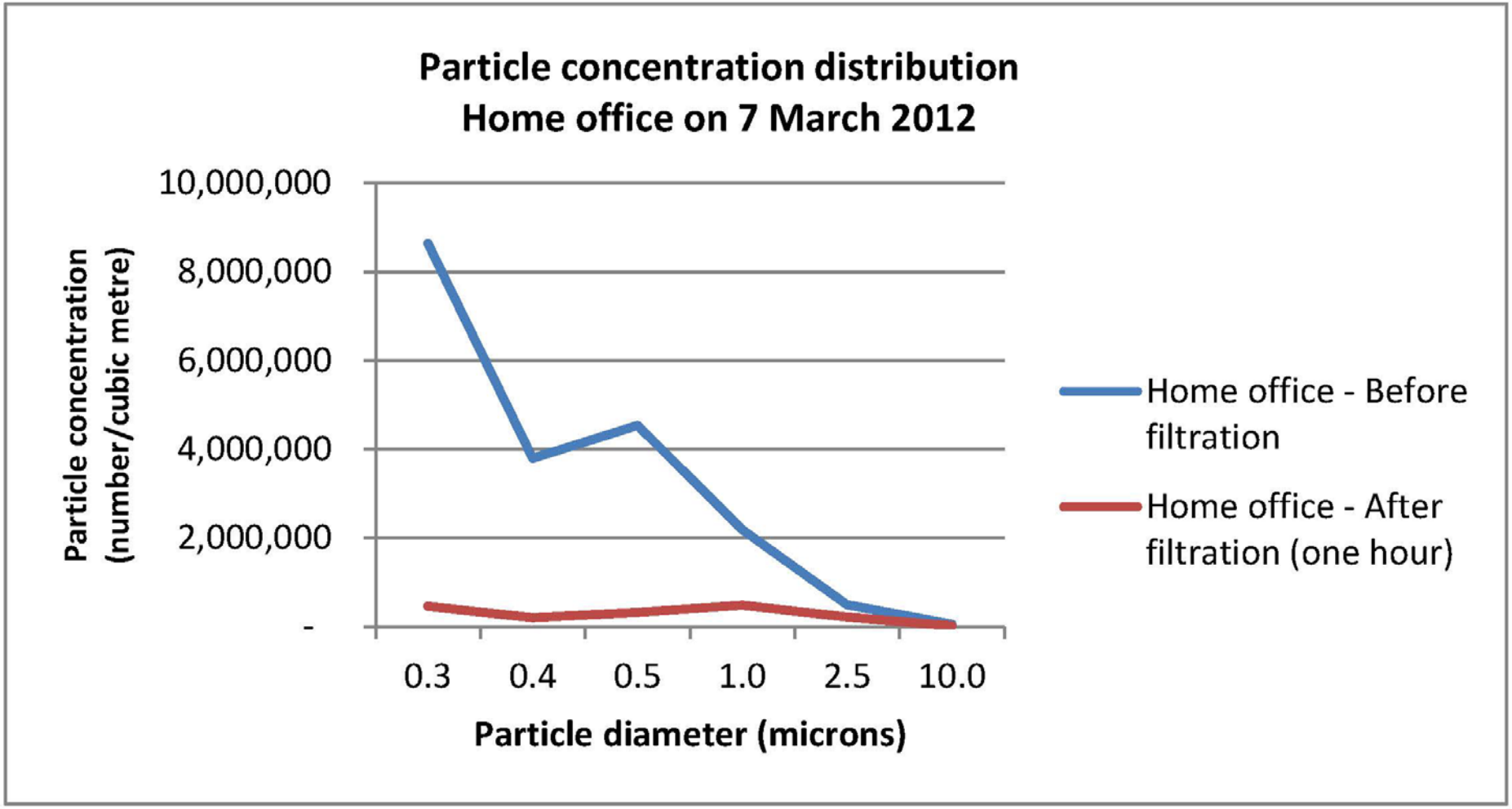
Barbican: Particle number per cubic metre with diameter over 0.3 microns



Test time: 1 minute
Temperature: 14-18°C
Relative humidity: 39-50%

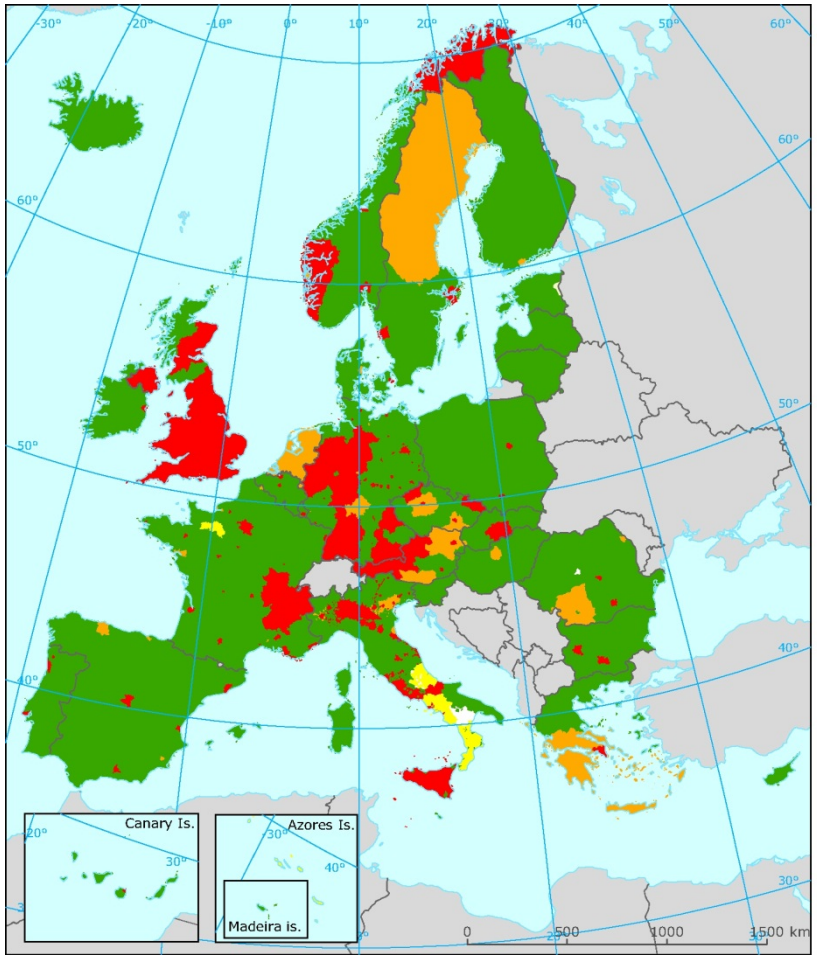
- City of London School for Girls entrance_Total 325,748,408 particles/m3
- Barbican Underground exit_Total 376,735,335 particles/m3
- Beech Street_Westbound queue_Total 337,670,672 particles/m3
- Beech Street_Garchey Bay_Total 340,451,590 particles/m3
- Lauderdale_32_Lift lobby_Total 234,706,006 particles/m3
- Lauderdale_32_Sitting room_Total 278,117,315 particles/m3
- Lauderdale_32_Balcony south facing_Total 107,254,770 particles/m3

AirTEXT
http://www.airtext.info/
Defra
http://uk-air.defra.gov.uk/latest/?zone_id=15&Submit=View&type=forecast
London Air Quality Network
http://www.londonair.org.uk/LondonAir/Default.aspx
London Air Quality Network episodes
http://www.londonair.org.uk/london/asp/publicepisodes.asp?region=0
BBC 5 day forecast
http://www.bbc.co.uk/weather/2643743
Met Office surface pressure forecast
http://www.metoffice.gov.uk/weather/uk/surface_pressure.html
Two week weather forecast
http://www.timeanddate.com/weather/uk/london/ext



Key issues: Year of Air in 2013

UK has highest % age of zones exceeding LV+MOT



Nitrogen dioxide 2009

Annual limit value for the protection of human health

- ≤ limit value
- Limit value - margin of tolerance
- > margin of tolerance
- Zone designated, data missing
- Area not designated
- Geospatial information missing
- Outside data coverage

Key issues: Manifesto for 'clean air in London'

Mayoral candidates must promise to:

- Lead the fight to improve London's air
- Clean up London's transport
- Build a low emission city
- Protect the most vulnerable
- Ensure a legacy from the Olympic Games

Clean Air in London intends to rank the candidates before the Mayoral election

The vision: Clean air urgently and sustainably in all large cities

	Air quality	Climate change
London (or any city)	2012	
Rest of world		

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‘Epidemiology 101’ – Protecting public health

- *“Since 1900, the average lifespan of persons in the United States has lengthened by over 30 years; 25 years of this gain are attributable to advances in public health”*, Journal of the American Medical Association, 1999

- *“Public health experts agree that environmental risks constitute 25% of the burden of disease”.* WHO, 2011

Is air quality still a problem? Yes!

- Great Smog: 4,075 early deaths attributable to short-term exposure to 'visible' air pollution. No understanding of health impacts of long-term exposure to air pollution until mid-1990s and later. Only smoking causes more early deaths

- March 2010: Mayor Johnson estimates 4,267 premature deaths in London in 2008 attributable to long-term exposure to 'invisible' $PM_{2.5.}$

- Traffic related air pollution may be responsible for 15-30% of all new cases of asthma in children. Note: the most vulnerable may be exposed to up to 50% more air pollution than the least vulnerable

- Air pollution concentrations have been broadly unchanged since the late 1990s. Using the same language' used for alcoholism, obesity and smoking, the average loss of life is 11.5 years. We live in the '1%'....

- *"We now need Mayor Johnson and the Government to play their part in tackling an invisible public health crisis with as many early deaths attributable to air pollution in London in 2008 as we thought occurred during the Great Smog of 1952."* Simon Birkett, TIME.com, April 2011

‘Epidemiology 101’ – An introduction to ‘air quality’

- Several ambient air pollutants
  - Nitrogen dioxide (NO_2)
  - Tropospheric ozone (O_3)
  - Particulate matter: ultrafine ($PM_{0.1}$); fine ($PM_{2.5}$); coarse ($PM_{2.5-10}$) and PM_{10}
  - Sulphur dioxide (SO_2)
  - Others e.g. benzene
- Mortality (death) and morbidity (sickness). Acute (short time) and chronic (long time)
- Size matters. Smaller particles penetrate deeper into lungs and bloodstream
- Toxicity matters. So don’t just worry about $PM_{2.5}$
- Time scale matters. ‘Time series’ studies to assess short-term. ‘Cohort’ for long-term
- Unknown degree of overlap between pollutants and time scales
- Anthropogenic (man-made) vs non-anthropogenic air pollution
- Population weighted exposures have been based on residency not personal exposure
- Concentration response function is not linear. Impact on those aged 30+. Children
- Relative risk (hazards rates); year (of life) lost; average years lost per victim; and average nationally

Key messages

- As many early deaths in London in 2008 attributable to long-term exposure to 'invisible' air pollution as we thought occurred in the Great Smog of 1952 due to short-term 'visible' air pollution
- Scientists didn't know about long-term impacts until mid-1990s and later
- Health impacts: cardiovascular, respiratory, cancer and asthma
- Only smoking causes more early deaths than air pollution
- Traffic related air pollution may be responsible for 15-30% of all new cases of asthma in children
- We are in a communications 'battle' with those seeking delay (including some in Government)
  - "We agree with your objective but not with the timescale to get there"
- We must use metrics that relate to those well established for alcoholism, obesity and smoking etc. We must speak the same 'language'
- People want and deserve to understand the risks they face. Children and the elderly are particularly vulnerable. Inequalities are a particular concern
- There is a tremendous opportunity for London to lead the world again

Links between urban ambient particulate matter and health – time series analysis of particle metrics

R Atkinson[1], Ross Anderson[1], Gary Fuller[2], Ben Armstrong[3], Roy Harrison[4]

1. St George's University of London, 2. King's College London,
3. London School of Hygiene & Tropical Medicine, 4. University of Birmingham,

Introduction

• Many epidemiological studies have reported associations between outdoor particulate matter and adverse health effects

•Particulate matter is a mixture of particles of varying size, number and composition and the nature of this mixture varies according to emission sources, secondary chemical reactions in the atmosphere, weather conditions and other factors

•For the protection of public health it would be desirable to know which component of the particulate mixture to target with regulation

• The purpose of this study was to analyse, using time series methods, the health effects of various particle metrics within London and to identify which of the particle metrics are most important for health impact considerations

Method

•Daily measurements for carbon, nitrate, sulphate, chloride and particle number concentrations made at North Kensington (NK) were obtained for the period 1st January 2000 to 31st December 2005. Mass measurements of PM_{10} (particles with a median diameter of 10 microns or less) and $PM_{2.5}$ made using different measurement techniques were also obtained

•Daily counts of deaths and emergency hospital admissions for respiratory and cardiovascular disease were also compiled

•Time series regression methods accounting for seasonal patterns in deaths/admissions, temperature, and other potential confounders were used to evaluate the associations between each particle metric and the health endpoints

•The analysis focused on days when data were available for all pollutants (695 days)

•Results are presented as percentage increase in the average number of daily deaths per interquartile range increase in particle metric

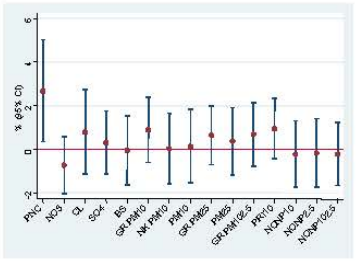


Figure 1 Associations between cardiovascular mortality and the previous day particle concentrations

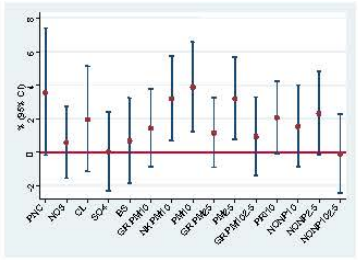


Figure 2 Associations between respiratory mortality and particle concentrations two days before

Key to figures: PNC – particle number concentration measured at North Kensington (NK); NO3, CL, SO4 – nitrate, chloride and sulphate concentrations measured at NK; BS – London-wide average Black Smoke; GR PM10, GR PM2.5 & GR PM10-2.5 – gravimetric PM10, PM2.5 and coarse concentrations measured at NK; NK PM10 & PM10 - TEOM corrected measured at NK and London-wide; PM2.5 - TEOM corrected measured London-wide; PRI PM10, NONP10, NONP2.5 & NONP PM10-2.5 – modelled primary PM10 and non-primary PM10, PM2.5 and coarse particles

Results

•Results for deaths due to cardiovascular and respiratory mortality are shown in Figures 1 and 2

•A specific association between particle number concentrations and deaths due to cardiovascular diseases was observed. This association was independent of other metrics and was also observed for admissions for cardiovascular diseases (not shown)

•Respiratory mortality was associated with a range of metrics most notably the mass based measurements (PM_{10} and $PM_{2.5}$) . A similar pattern of associations for respiratory admissions was also observed

Conclusions

•Preliminary conclusions from these analyses suggest that particle numbers (predominantly very fine particles) are the most relevant particle metric in terms of cardiovascular disease

•Deaths and admissions from respiratory disease were associated with a range of particle metrics and it is less clear which metric(s) are the most relevant. Further work is underway to investigate this issue

Acknowledgements

This project was funded by DEFRA under contract number AQ05515/CPEA 30.

Relationship between central site measurements and personal exposure

•A further component of this study was to examine the relationship between central site measurements and personal exposure to various PM metrics using published work and results from the RUPIOH study
•This analysis helps inform the evidence from ecological time series studies based upon pollution data collected at a single location within a city
•The key finding relevant to this ecological time series study was that there were substantial longitudinal correlations between outdoor measurements (central or home) and personal exposure ($PM_{2.5}$ & PM_{10})

Don’t forget indoor air quality:
We can protect ourselves from up to 90% of air pollutants

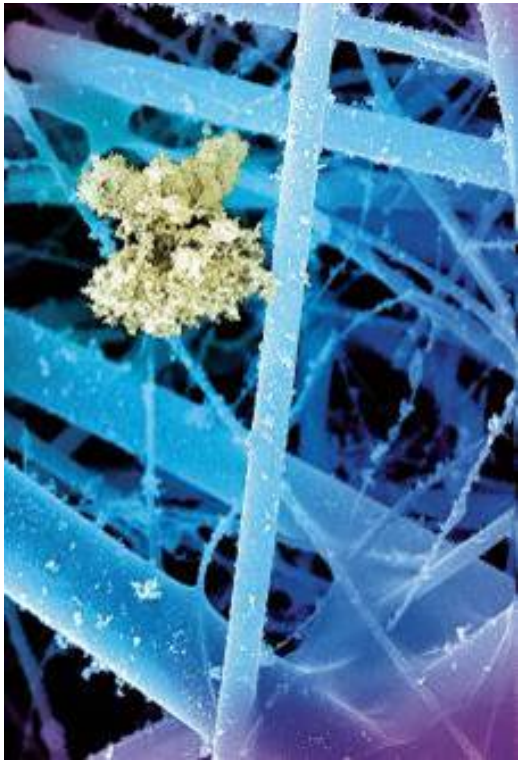


Photo of soot particles in air filter

Photo: Lennart Nilsson

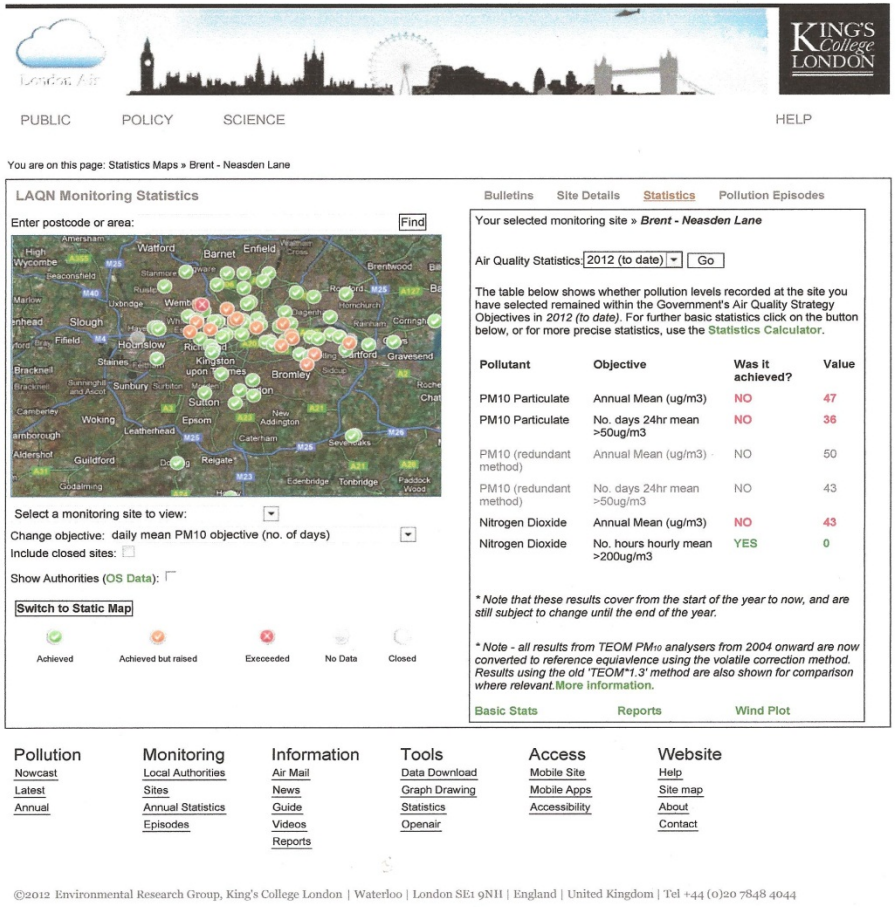
If your hospital or workplace has a mechanical ventilation system or air conditioning (i.e. it is likely to contain the necessary ducting) please ask:

“Does our ventilation system include regularly maintained air filters that comply with European standard EN 13779 and, if not, why not?”

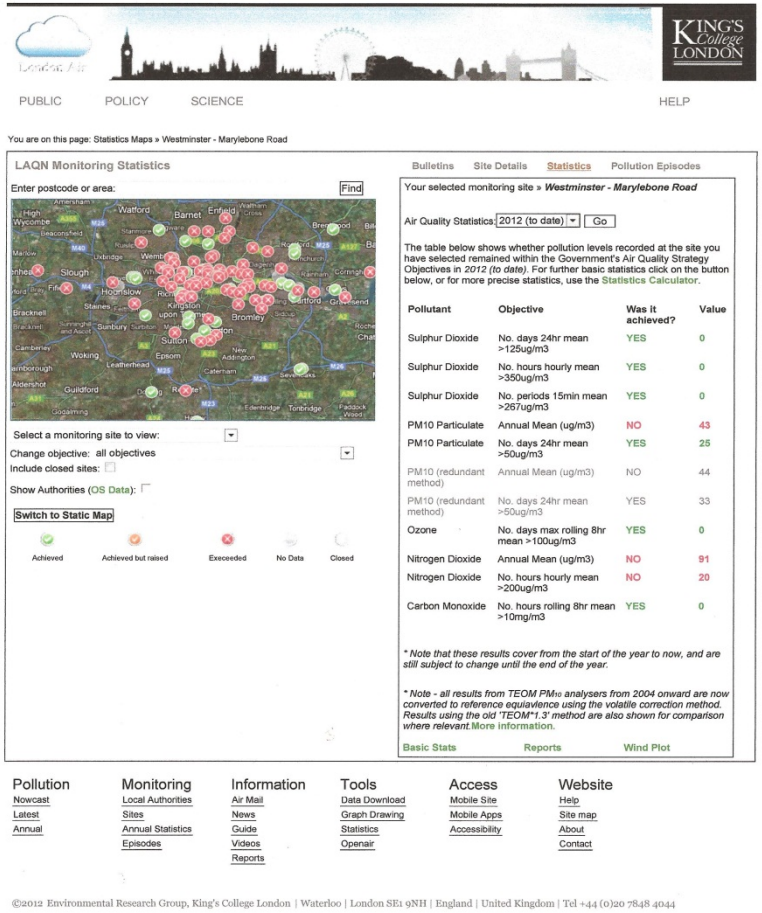
Any questions: visit www.camfilfarr.co.uk a sponsor of Clean Air in London or call 01706 238 000

Note: a building may have air conditioning but not ventilation or air filters (and/or vice versa)

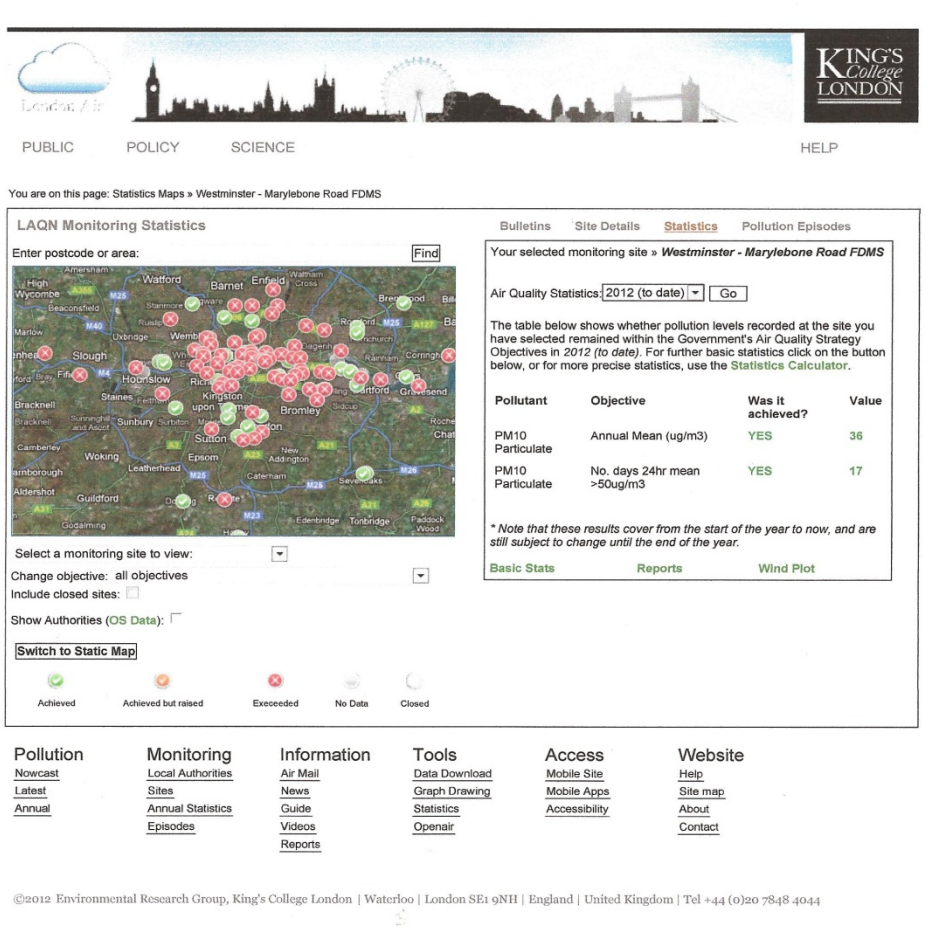
Air pollution – How bad is it?
London Air Quality Network: Neasden Lane



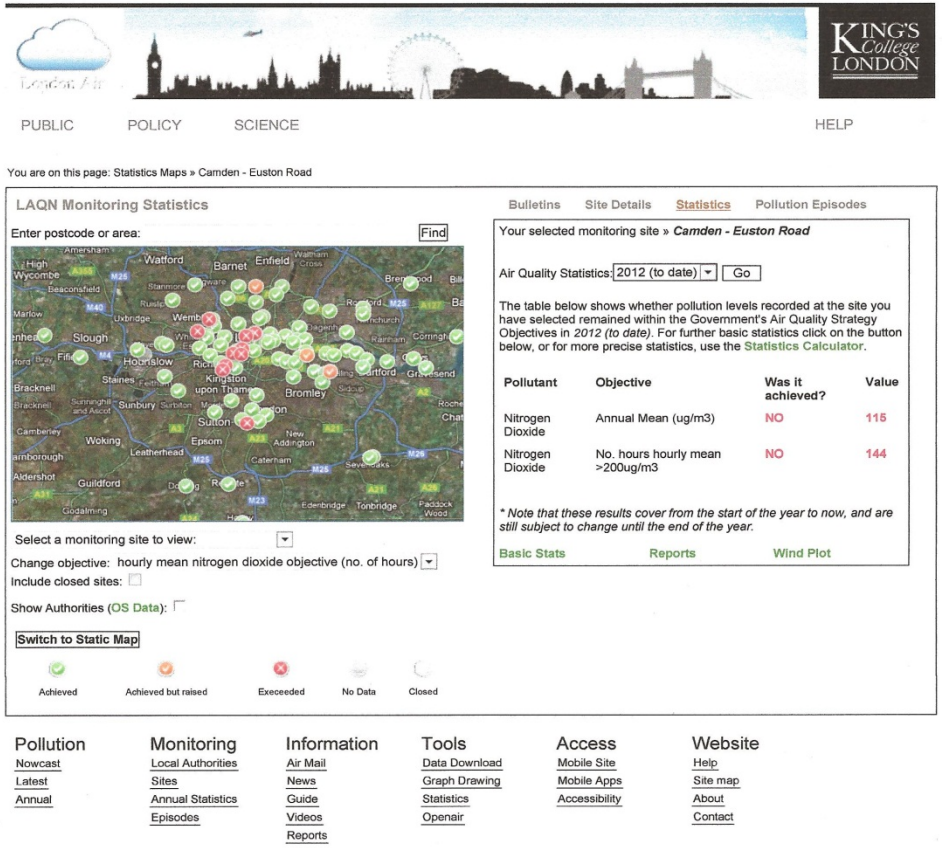
Air pollution – How bad is it?
London Air Quality Network: Marylebone Road



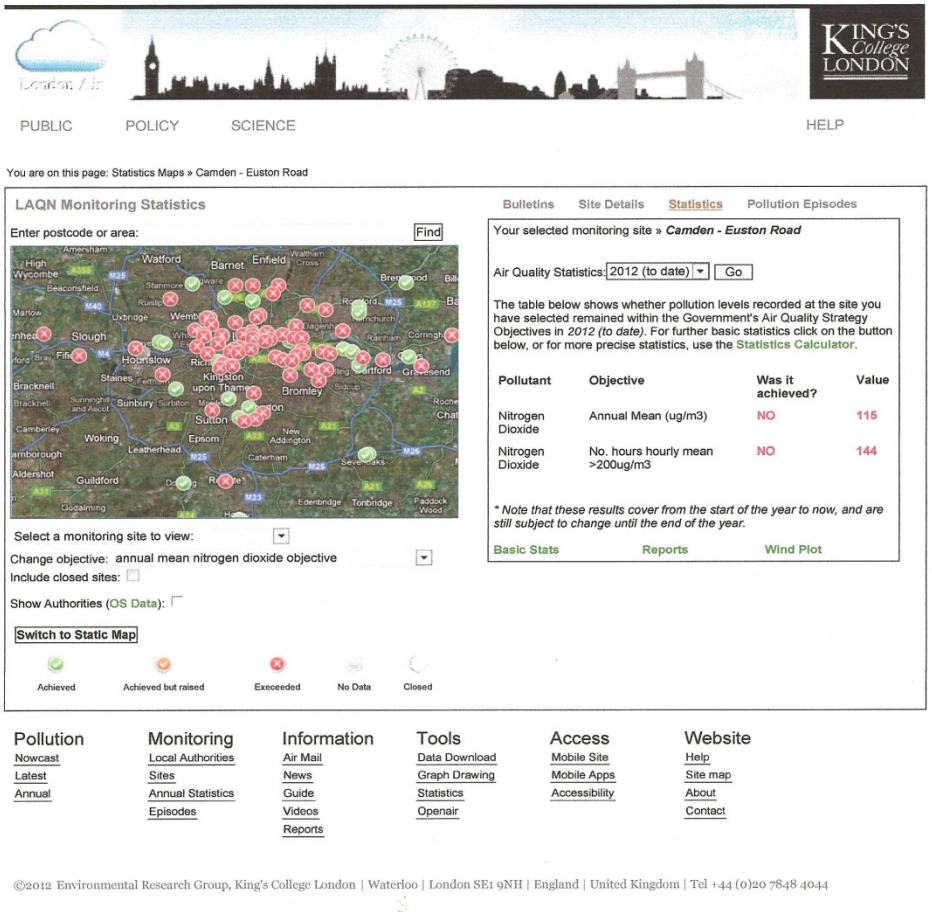
Air pollution – How bad is it?
London Air Quality Network: Marylebone Road



Air pollution – How bad is it?
London Air Quality Network: Euston Road



Air pollution – How bad is it?
London Air Quality Network: Euston Road



UK Plans and Programmes for NO_2: page 1

Table 1: Summary of exceedence of NO_2 limit values and date of expected compliance by zone.

Zone/Agglomeration	Annual mean limit value exceedence				Hourly Limit value exceedence	Postponement of the compliance date required? (Yes/No)	Compliance with NO_2 limits projected by	Current and planned baseline measures will achieve compliance by 2015?	LEZ scenario measure projected to achieve compliance in 2015?
	2008 baseline	Km of road exceeding annual limit value	2010 projection	Projected Km of road exceeding annual limit value in 2010	2008 baseline				
Greater London Urban Area	Yes	1287	Yes	947	Yes	Yes	<2025	×	×
West Midlands Urban Area	Yes	265	Yes	161	No	Yes	2020	×	×
Greater Manchester Urban Area	Yes	261	Yes	114	No	Yes	2020	×	×
West Yorkshire Urban Area	Yes	110	Yes	54	No	Yes	2020	×	×
Tyneside	Yes	56	Yes	30	No	Yes	2015	×	✓
Liverpool Urban Area	Yes	72	Yes	37	No	Yes	2015	×	✓
Sheffield Urban Area	Yes	58	Yes	39	No	Yes	2015	×	✓
Nottingham Urban Area	Yes	45	Yes	18	No	Yes	2015	✓	n/a
Bristol Urban Area	Yes	32	Yes	16	No	Yes	2015	×	✓
Brighton/Worthing/Littlehampton	Yes	3	Yes*	0-3	No	Yes	≤2015	✓	n/a
Leicester Urban Area	Yes	24	Yes	8	No	Yes	2015	✓	n/a

9

UK Plans and Programmes for NO_2: page 2

Portsmouth Urban Area	Yes	14	Yes	10	No	Yes	2015	✓	n/a
Teesside Urban Area	Yes	16	Yes	14	No	Yes	2020	×	×
The Potteries	Yes	23	Yes	18	No	Yes	2020	×	×
Bournemouth Urban Area	Yes	12	Yes	5	No	Yes	≤2015	✓	n/a
Reading/Wokingham Urban Area	Yes	9	Yes	1	No	Yes	≤2015	✓	n/a
Coventry/Bedworth	Yes	11	Yes	2	No	Yes	≤2015	✓	n/a
Kingston upon Hull	Yes	32	Yes	23	No	Yes	2020	×	×
Southampton Urban Area	Yes	21	Yes	15	No	Yes	2020	×	×
Birkenhead Urban Area	Yes	13	Yes*	0-13	No	Yes	≤2015	✓	n/a
Southend Urban Area	Yes	9	Yes	3	No	Yes	≤2015	✓	n/a
Blackpool Urban Area	No	0	No	0	No	No		-	-
Preston Urban Area	Yes	3	Yes	1	No	Yes	≤2015	✓	n/a
Glasgow Urban Area	Yes	76	Yes	46	Yes	Yes	2020	×	×
Edinburgh Urban Area	Yes	14	Yes	9	No	Yes	2015	✓	n/a
Cardiff Urban Area	Yes	18	Yes	10	No	Yes	2015	✓	n/a
Swansea Urban Area	Yes	3	Yes*	0-3	No	Yes	≤2015	✓	n/a
Belfast Metropolitan Urban Area	Yes	36	Yes	25	No	Yes	2015	✓	n/a
Eastern	Yes	111	Yes	80	No	Yes	2020	×	×
South West	Yes	62	Yes	29	No	Yes	2015	✓	n/a
South East	Yes	163	Yes	106	No	Yes	2020	×	×
East Midlands	Yes	82	Yes	36	No	Yes	2020	×	×

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UK Plans and Programmes for NO_2: page 3

North West & Merseyside	Yes	210	Yes	136	No	Yes	2020	×	×
Yorkshire & Humberside	Yes	230	Yes	182	No	Yes	2020	×	×
West Midlands	Yes	76	Yes	49	No	Yes	2020	×	×
North East	Yes	53	Yes	30	No	Yes	2020	×	×
Central Scotland	Yes	24	Yes	10	No	Yes	2015	✓	n/a
North East Scotland	Yes	18	Yes	7	Yes	Yes	≤2015	✓	n/a
Highland	No	0	No	0	No	No		-	-
Scottish Borders	No	0	No	0	No	No		-	-
South Wales	Yes	32	Yes	19	No	Yes	2020	×	×
North Wales	Yes	11	Yes	10	No	Yes	2015	✓	n/a
Northern Ireland	Yes	27	Yes	3	No	Yes	≤2015	✓	n/a
TOTAL	40	3600	40	2303	3	40	-	19	4

n/a refers to the fact that the LEZ scenario has not been applied in the zone.

***Projections show a chance of compliance by 2010 but projection uncertainties mean the confidence is low. Early indication from the 2010 assessment of air quality for the UK supports this judgement for all these zones.**

≤2015 means by 2015 or possibly before

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Record smog episode: looking to Canary Wharf

Record smog episode: looking to City Hall

Key issues: The Pollution Suppressor

http://youtu.be/WUkvGkDOyYA

Key issues: The Pollution Suppressor

CMA Routes and PM10 Monitors

A map showing routes where Transport for London is applying calcium magnesium acetate to the road surface (pollution suppressant).

Air quality monitoring stations measuring PM10 concentrations are shown where they are located on the application routes. Yellow markers show stations from the London Air Quality Network, red markers are also part of the UK Automatic Urban and Rural network.

Routes and monitor locations are approximate.

Unlisted · 522 views
Created on Mar 21 · By · Updated Apr 4

Key issues: Lack of smog alerts in 2012
Defra air pollution announcement (3 April 2012)

"Each year, as the weather gets warmer, there is a possibility of some air pollutants reaching higher levels for short periods of time, especially if there is still, sunny weather. Whilst most people will not be affected by short term peaks in air pollution, some people, particularly vulnerable groups such as those with existing heart or lung conditions, may experience increased symptoms.

"Defra encourages people to take sensible precautions based on the levels of air pollution in their region and their health, such as reducing or avoiding strenuous activity and ensuring they have access to their usual medication, such as asthma inhalers.

"Find out what the air quality is like in your region via the following link: http://uk-air.defra.gov.uk or by calling Defra's freephone helpline on 0800 556677. These sources also offer health advice based on current air pollution levels to the general public and those who may be particularly sensitive to air pollution. You can subscribe through the website to email bulletins for pollution forecasts and latest pollution information."

Key issues: Legal compliance for PM_{10} and NO_2

- Clean Air in London's complaint to European Commission
  - PM_{10} time extension until 2011 was unlawful
  - Even if sustained, it was breached in Neasden Lane in 2011
  - NO_2 limit values breached in 40 of 43 UK zones in 2010
  - No time extension sought for 17 zones. London by 2025!
- Clean Air in London's Environmental Information case
- Infraction action in five stages
  - First and second written warning. CJEU. Second written warning. Unlimited lump sum and daily CJEU fines
  - Infraction against UK for PM_{10} is currently frozen between stages 2 and 3. Note: Localism Act allows transfer of fines
- ClientEarth legal case against Defra

Key issues: Olympics and Paralympic Games

- Olympic Route Network
  - Admit it will cause local, temporary and unmitigated breaches of NO_2 air quality laws (and PM_{10}?)
  - Marylebone Road on 25/35 Bad Air Days
  - Marylebone Road FDMS station on 17/35 Bad Air Days
  - Upper Thames Street on 29/35 Bad Air Days. Loss of power
  - Plan to use Pollution Suppressor to mitigate PM_{10}
- Possible impact a smog episode like 2003 or 2006

Key issues: Health and Wellbeing Boards
Public health outcomes framework 2013-2016

- Metrics for Health and Wellbeing Boards from 2013 include Domain 3: Health protection; 3.1 Air pollution:

  "The mortality effect of anthropogenic particulate air pollution (measured as fine particulate matter, $PM_{2.5}$) per 100,000 population"

- Mortality Burden: To be expressed as attributable deaths and associated years of life lost

Attributable deaths by London borough in 2008

Inner London has highest pollution. Outer London shows more early deaths as borough size is bigger (incl. non-anthropogenic)

Note: Provisional calculations prepared by Campaign for Clean Air in London (30 June 2010 as at 12 noon)

Boroughs ranked by average concentration of PM2.5

	Tot pop	PM2.5	6%
City of London	9,155	**17.590**	4
Westminster	214,750	**16.561**	96
Camden	207,198	**16.188**	107
Kensington and Chelsea	169,015	**16.169**	75
Tower Hamlets	231,664	**16.024**	102
Islington	195,114	**15.921**	100
Waltham Forest	226,706	**15.920**	129
Southwark	276,838	**15.804**	136
Hammersmith and Fulham	178,656	**15.794**	86
Hackney	223,357	**15.702**	96
Lambeth	291,783	**15.696**	139
Wandsworth	289,091	**15.564**	148
Newham	261,691	**15.423**	121
Enfield	291,256	**15.410**	178
Ealing	317,721	**15.405**	167
Brent	277,863	**15.402**	133
Haringey	235,055	**15.321**	99
Lewisham	269,020	**15.300**	153
Hounslow	229,905	**15.258**	121
Greenwich	236,450	**15.244**	150
Merton	198,068	**15.192**	107
Redbridge	252,553	**15.114**	153
Barnet	328,752	**15.112**	201
Richmond upon Thames	184,519	**15.048**	97
Barking and Dagenham	172,357	**15.036**	120
Kingston upon Thames	154,205	**15.015**	91
Croydon	341,021	**14.953**	205
Sutton	185,180	**14.940**	124
Hillingdon	253,432	**14.898**	154
Bexley	218,945	**14.842**	161
Harrow	218,956	**14.819**	119
Bromley	302,464	**14.725**	217
Havering	230,479	**14.621**	182
Greater London (per CCAL)	7,673,219		4,271
Greater London (per Mayor)	7,673,217		4,267

Boroughs ranked by total estimated premature deaths

	Tot pop	PM2.5	6%
Bromley	302,464	14.725	**217**
Croydon	341,021	14.953	**205**
Barnet	328,752	15.112	**201**
Havering	230,479	14.621	**182**
Enfield	291,256	15.410	**178**
Ealing	317,721	15.405	**167**
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Westminster	214,750	16.561	**96**
Hackney	223,357	15.702	**96**
Kingston upon Thames	154,205	15.015	**91**
Hammersmith and Fulham	178,656	15.794	**86**
Kensington and Chelsea	169,015	16.169	**75**
City of London	9,155	17.590	**4**
	7,673,219		4,271
	7,673,217		4,267

Key issues: Year of Air in 2013

We need continuity and the tightening of health and legal protections

Working in partnership with other Member States, we will also use the European Commission review of air quality legislation, expected in 2013, to seek:

- Amendments to the Air Quality Directive which reduce the infraction risk faced by most Member States, especially in relation to nitrogen dioxide provisions.
- Simplifications to the legal framework (e.g. through reducing requirements for Member States) to reduce costs and administrative burdens to local authorities and businesses whilst maintaining or improving health and ecosystem protection.
- Requirements that are strictly proportional to evidence on costs and benefits.

Defra, Red Tape Challenge, Environment Theme proposals (19 March 2012)