

# Traffic, air pollution and the biggest public health crisis for decades

Royal College of Nursing  
London: 17 February 2012

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# Summary

- Great Smog of 1952
- Is air quality still a problem?
- 'Epidemiology 101'
- Health impact in London and nationally
- Schools near our busiest roads
- Legal framework
- Sources of air pollution in London
- Manifesto for 'clean air in London'
- Health and Wellbeing Boards: Public health outcomes
- Key messages

# 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?



- 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

# 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<sub>2.5</sub>.
- 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' – 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*

# '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<sub>2.5</sub> at an average loss of life of 11.5 years

# 'Epidemiology 101' – What is air quality?

- Several ambient air pollutants
  - Nitrogen dioxide (NO<sub>2</sub>)
  - Tropospheric ozone (O<sub>3</sub>)
  - Particulate matter: ultrafine (PM<sub>0.1</sub>); fine (PM<sub>2.5</sub>); coarse (PM<sub>2.5-10</sub>) and PM<sub>10</sub>
  - Sulphur dioxide (SO<sub>2</sub>)
  - 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<sub>2.5</sub>
- 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

# 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<sub>10</sub> (using +0.75% per 10 µg/m<sup>3</sup>, 24 hour mean)
  - **3,500** GB urban 'deaths brought forward' annually due to SO<sub>2</sub> (using +0.6% per 10 µg/m<sup>3</sup>, 24 hour mean)
  - **700 to 12,500** urban and rural GB 'deaths brought forward' during summer only due to O<sub>3</sub> (+3.0% per 50µg/m<sup>3</sup>, 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<sub>2.5</sub> (6% per 10 µg/m<sup>3</sup> increase in [annual mean] PM<sub>2.5</sub>)
  - 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

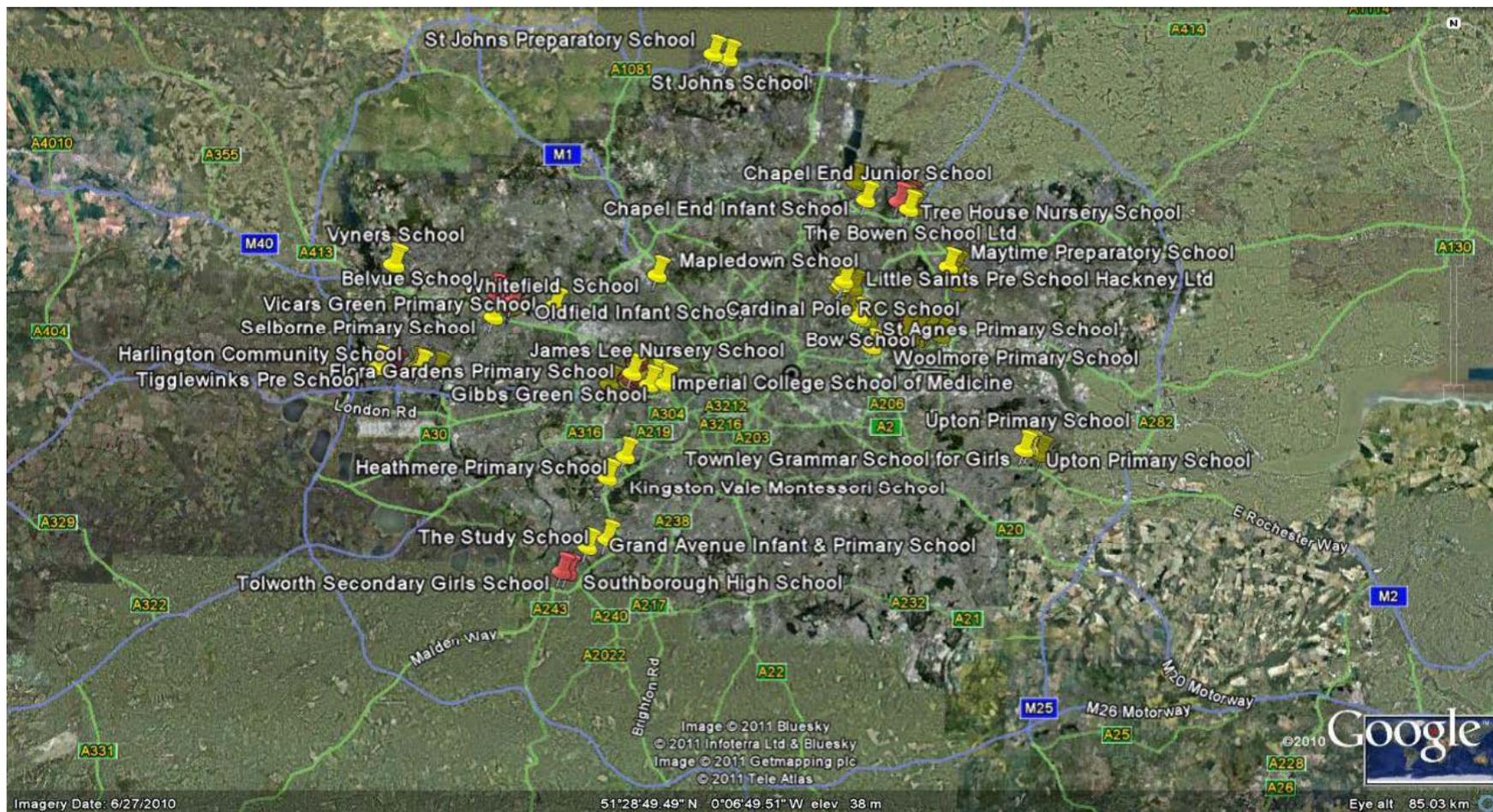
- **29,000 to 53,100** premature deaths attributable to air pollution

## London

- **4,267** premature deaths in 2008 attributable to long-term exposure to PM<sub>2.5</sub>. Ave 11.5 yrs
- Range 756 (1%) to 7,965 (12%). Assumes population weighted exposure of 15.34 µg/m<sup>3</sup>
- 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*



# 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?”***

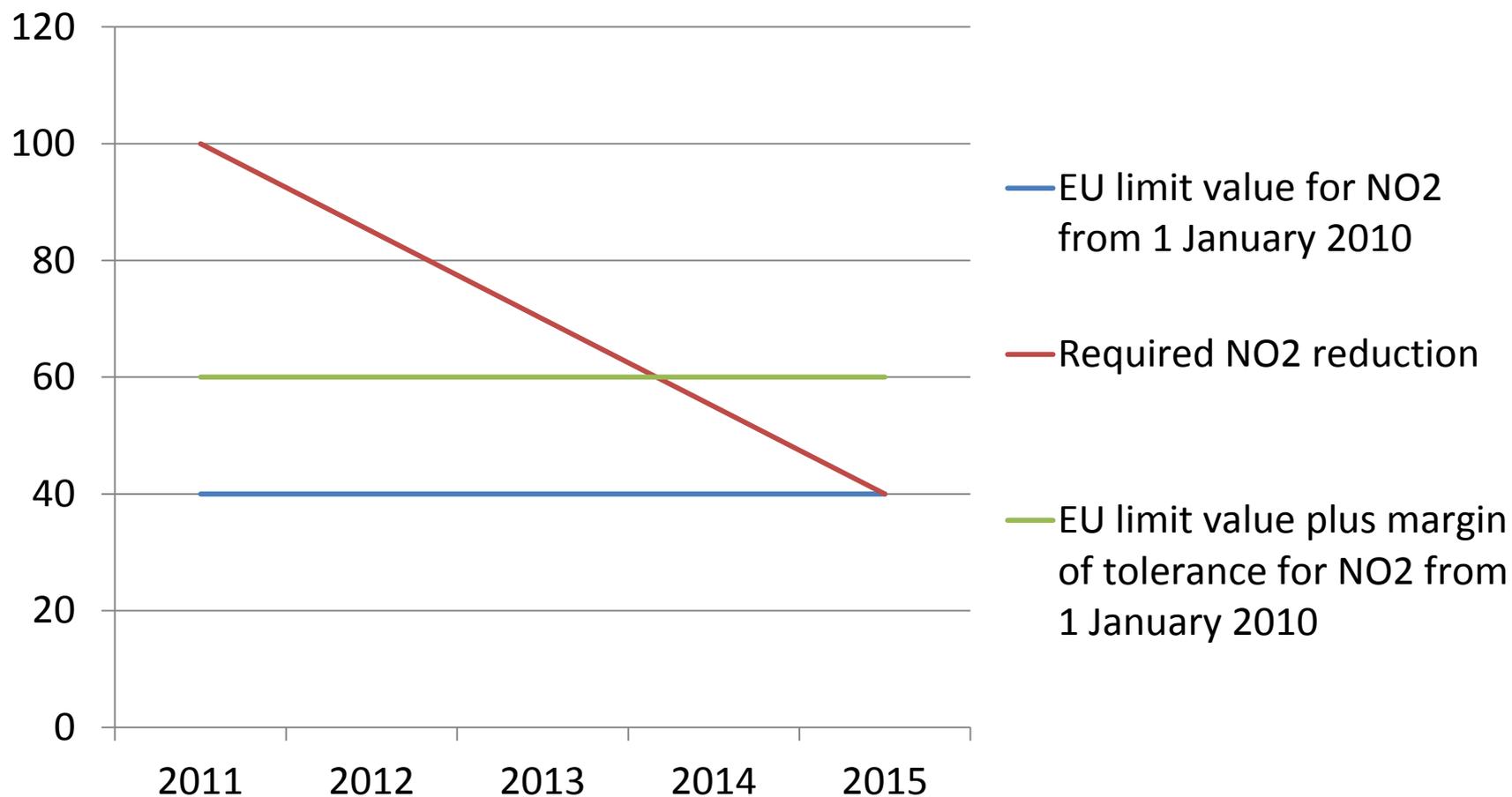
Any questions: visit [www.camfilfarr.co.uk](http://www.camfilfarr.co.uk)  
a sponsor of Clean Air in London or call 01706 238 000

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

# EU legal standards compared to WHO guidelines

Pollutant	Legal standard		WHO guideline	
	Short term	Annual mean	Short term	Annual mean
Fine particulate matter (PM <sub>2.5</sub> )	<ol style="list-style-type: none"> <li>25 µg/m<sup>3</sup> annual mean to become limit value in 2015</li> <li>20 µg/m<sup>3</sup> exposure concentration obligation based on 3-year average</li> <li>Exposure reduction target in percentage by 2020</li> </ol>		25 µg/m <sup>3</sup> 24-hour mean	10 µg/m <sup>3</sup>
Particulate matter (PM <sub>10</sub> )	35 days over 50 µg/m <sup>3</sup>	40 µg/m <sup>3</sup>	50 µg/m <sup>3</sup> 24-hour mean	20 µg/m <sup>3</sup>
Nitrogen dioxide (NO <sub>2</sub> )	18 hours over 200 µg/m <sup>3</sup>	40 µg/m <sup>3</sup>	200 µg/m <sup>3</sup>	40 µg/m <sup>3</sup>

# Concentrations of nitrogen dioxide (NO<sub>2</sub>) in micrograms per cubic metre (µg/m<sup>3</sup>)



# Air pollution – How bad is it?

## London Air Quality Network: Euston Road



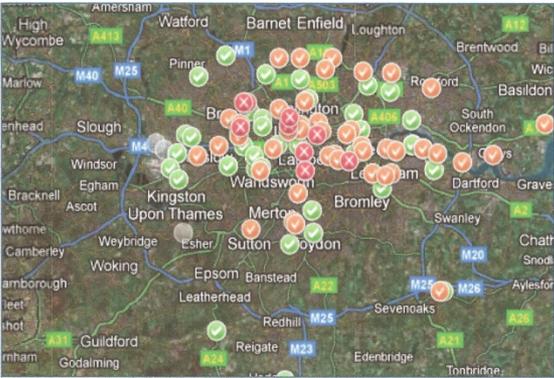


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Your selected monitoring site ◆ **Camden - Euston Road**

Air Quality Statistics:

The table below shows whether pollution levels recorded at the site you have selected remained within the Government's Air Quality Strategy Objectives in 2011 (to date). For further basic statistics click on the button below, or for more precise statistics, use the [Statistics Calculator](#).

Pollutant	Objective	Was it achieved?	Value
Nitrogen Dioxide	Annual Mean (ug/m3)	NO	119
Nitrogen Dioxide	No. hours hourly mean >200ug/m3	NO	487

\* Note that these results cover from the start of the year to now, and are still subject to change until the end of the year.

Basic Stats
Reports
Wind Plot

# Air pollution – How bad is it?

## London Air Quality Network: Marylebone Road





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### LAQN Monitoring Statistics

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Your selected monitoring site **Westminster - Marylebone Road FDMS**

Air Quality Statistics:

The table below shows whether pollution levels recorded at the site you have selected remained within the Government's Air Quality Strategy Objectives in 2011 (to date). For further basic statistics click on the button below, or for more precise statistics, use the [Statistics Calculator](#).

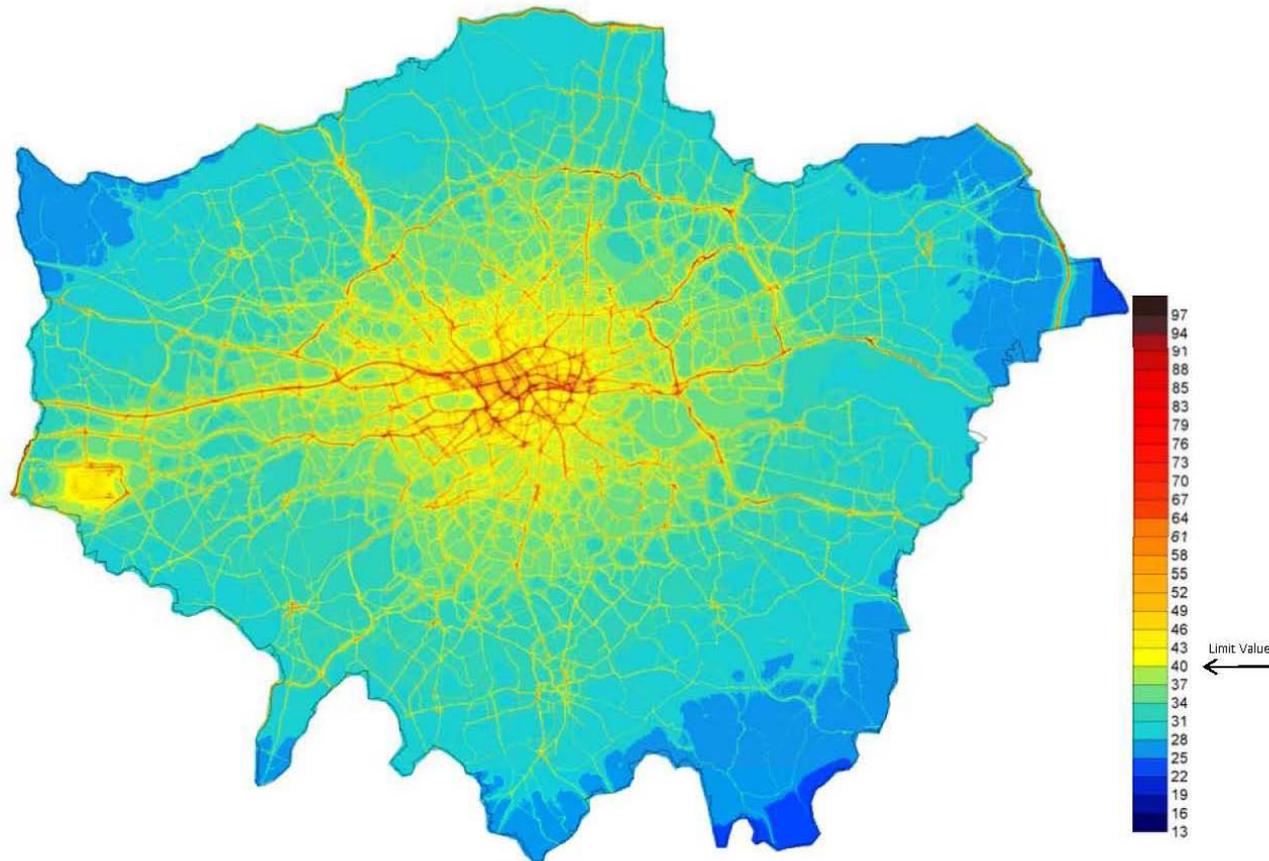
Pollutant	Objective	Was it achieved?	Value
PM10 Particulate	Annual Mean (ug/m3)	YES	39
PM10 Particulate	No. days 24hr mean >50ug/m3	NO	53

\* Note that these results cover from the start of the year to now, and are still subject to change until the end of the year.

[Basic Stats](#)
[Reports](#)
[Wind Plot](#)

# Concentration and trends – Mayor's Air Quality Strategy

## NO<sub>2</sub> annual mean concentrations for 2008



# Sources of air pollution in London

## *Mayor's Air Quality Strategy 2010*

- Emissions (not concentrations). Based on 2008 estimates
- PM<sub>10</sub> (Central London)
  - Road transport 79%. Cars 23%; taxis 20%; LGVs 10%. Buses <10%
  - Tyre and brake wear 35%
- PM<sub>2.5</sub> (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<sub>10</sub>; 2.1x NOx

# 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*

# Public health outcomes framework for 2013-2016

## *Health and Wellbeing Boards*

- 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<sub>2.5</sub>) per 100,000 population”**
- Mortality Burden: To be expressed as attributable deaths and associated years of life lost

# 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

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