

London Atmospheric Emissions Inventory 2010

Functionality and method improvements



MAYOR OF LONDON

What is the LAEI

What it is...

- A full inventory of emissions in London, by source and by location, for 2010. Future year emissions estimated for 2012, 2015 and 2020
- Presented as excel spreadsheets, summary tables and maps

Essential analytical evidence base for...

- Strategic emissions and concentration modelling to inform policy, plans and proposals e.g.
- Producing air quality maps and identifying hotspots, e.g.
- Understanding the main sources of pollution and air quality across London to inform targeted action

Key users...

- Boroughs (statutory requirements to GLA / Defra)
- GLA and TfL (policy making and tracking progress)
- GLA / Defra
- Consultancies and developers (Environmental Impact Assessments, planning assessments)
- Academic institutions (research)
- Public information systems, e.g.
 - Kings College's 'Nowcast'
 - Cleaner air for London 'Personalised view'

LAEI functionality

Dashboards for London-wide and borough emissions statistics

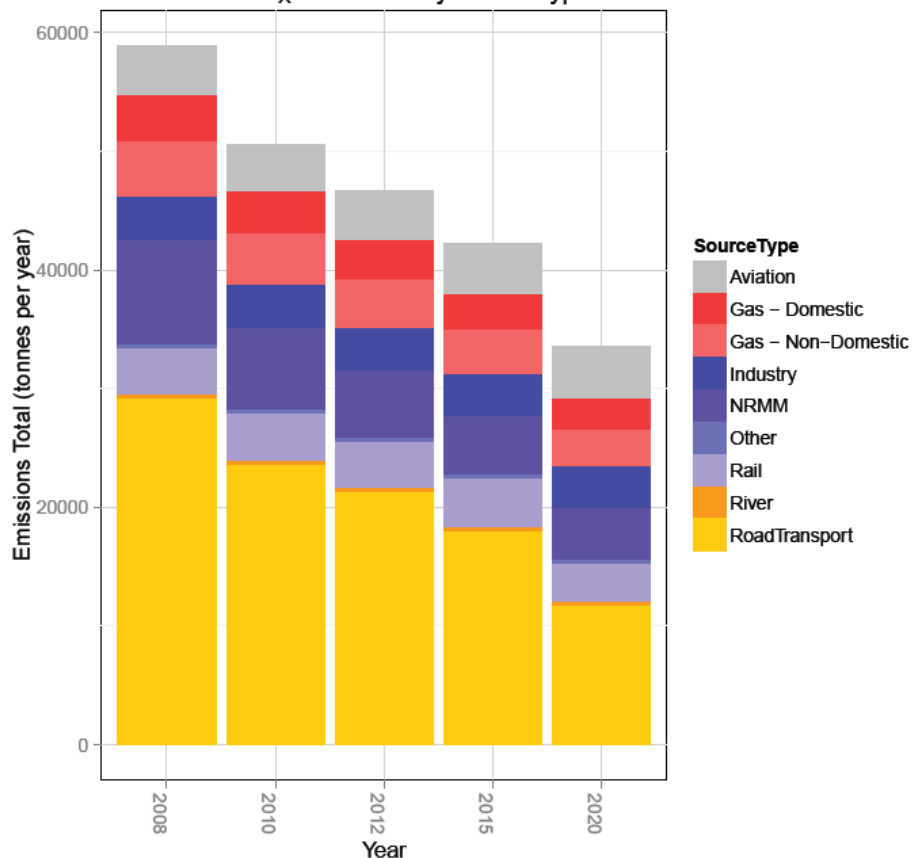
* dashboard from the forthcoming Cleaner Air for London website

London Atmospheric Emissions Inventory

Emissions for Greater London



Total NO_x emissions by source type



Emissions T/y	2008	2010	2012	2015	2020
Aviation	4,163	3,871	4,029	4,300	4,416
Gas – Domestic	3,808	3,507	3,286	2,980	2,531
Gas – Non-Domestic	4,730	4,419	4,115	3,698	3,094
Industry	3,604	3,604	3,604	3,604	3,604
NRMM	8,783	6,865	5,702	4,826	4,283
Other	388	367	367	369	374
Rail	3,825	3,920	3,794	4,078	3,168
River	363	368	368	368	368
Road Transport	29,236	23,657	21,370	18,048	11,751
Total	58,900	50,577	46,634	42,269	33,588

Notes:

The summary graph represents emissions from each source stacked on top of one another, with the total stack height equalling the total emissions from all sources.

The numbers in the table are those used to plot the graph and represent the tonnes of pollution emitted into the atmosphere in that year (T/y).

The emissions are combined into reasonably self explanatory "Source Types".

However, the categories: "Industrial", "NRMM" and "Other" require further explanation:

Industrial: is the total emission from Part A and Part B industrial processes, combined.

Non-road mobile machinery (NRMM): is the total emission from construction and industrial off road machines, combined.

Other: is the total emission from a number of small sources including: agriculture, coal and oil burning, construction/demolition, outdoor fires, garden emissions, forests, waste and waste transfer sites, combined.

NA: Where "NA" appears in the table of results no emissions have been calculated for this source.

Q: What are the main sources of NO_x emissions in London

Q: How are emissions forecast to change over time?

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Download data at – <http://www.cleanerairforlondon.org.uk/london-air/air-quality-data/london-emissions-laei/gla-emissions-summary/>

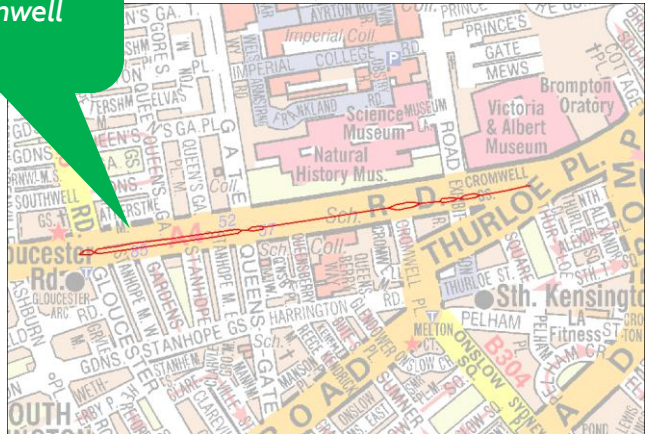
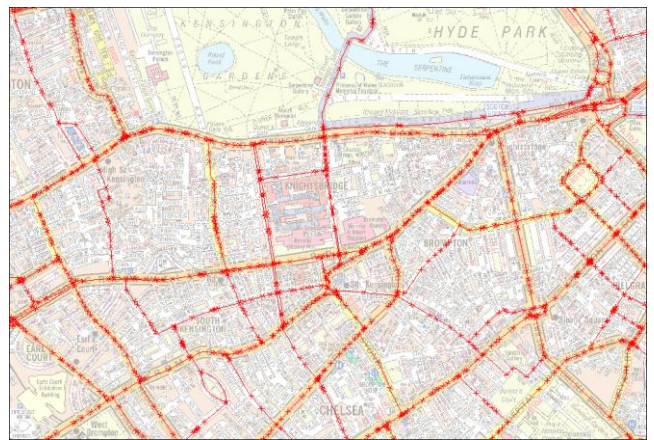
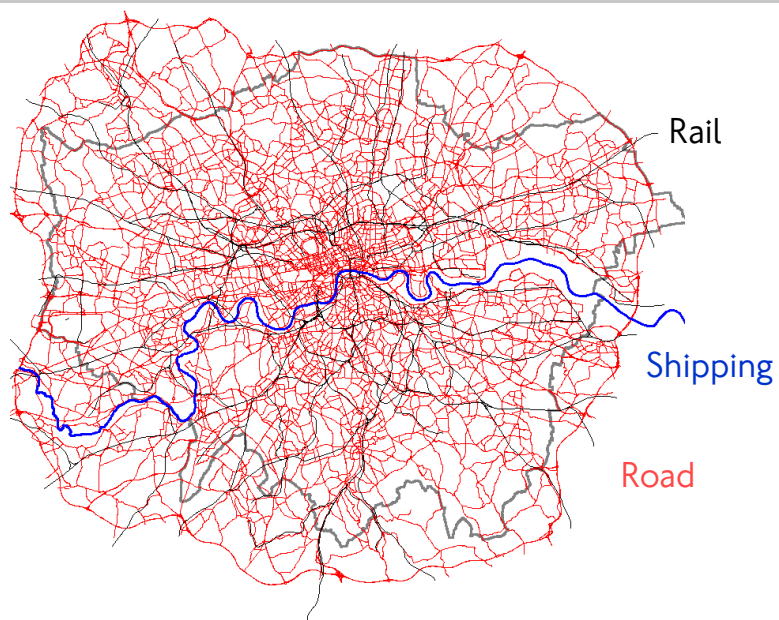


Link level emissions and flows

* Available at <http://data.london.gov.uk/> and from the forthcoming Cleaner Air for London website

The inventory consists of river and rail links and thousands of road links.

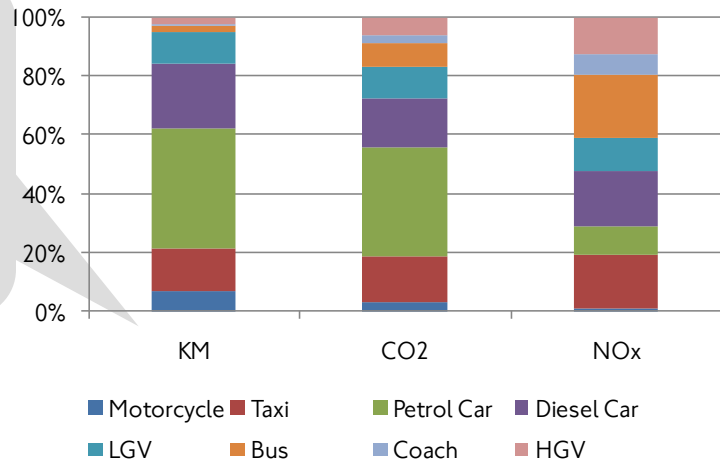
Users can extract vehicle flows / kilometres and emissions breakdowns at link level*



Q: Which vehicles emit the most along Cromwell Road?



On Cromwell Road diesel cars emit more NO_x than petrol cars even though they drive fewer kilometres



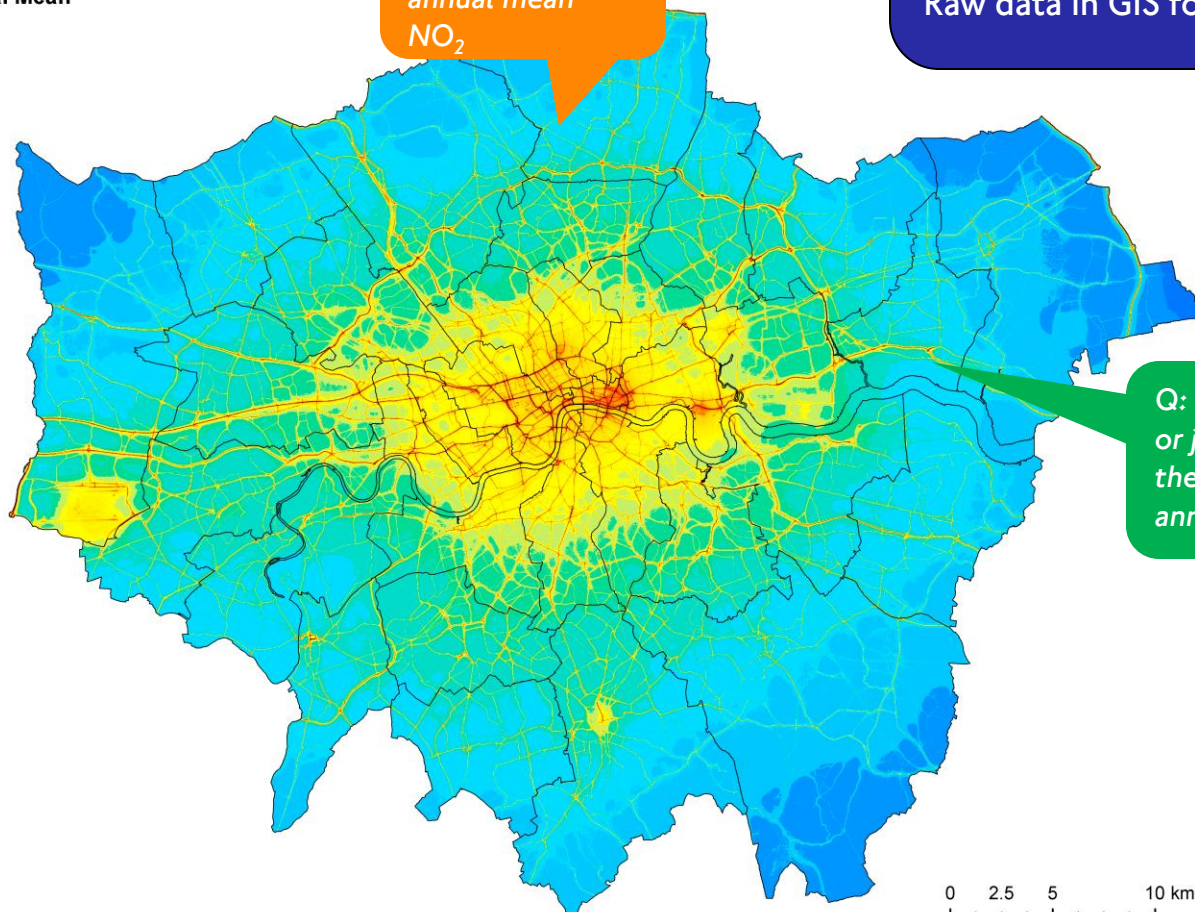
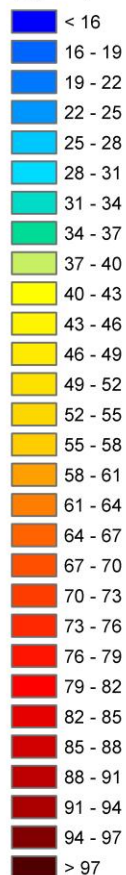
Air quality modelling

- NO₂ Annual Mean 2010

Images of the air quality modelling will be available on the London datastore* and on www.cleanerairforlondon.org.uk

Raw data in GIS format is also online

2010 NO₂ Annual Mean
($\mu\text{g m}^{-3}$)



Q: Which areas have the lowest annual mean NO₂

Q: Which roads or junctions have the highest annual mean NO₂

* <http://data.london.gov.uk/>

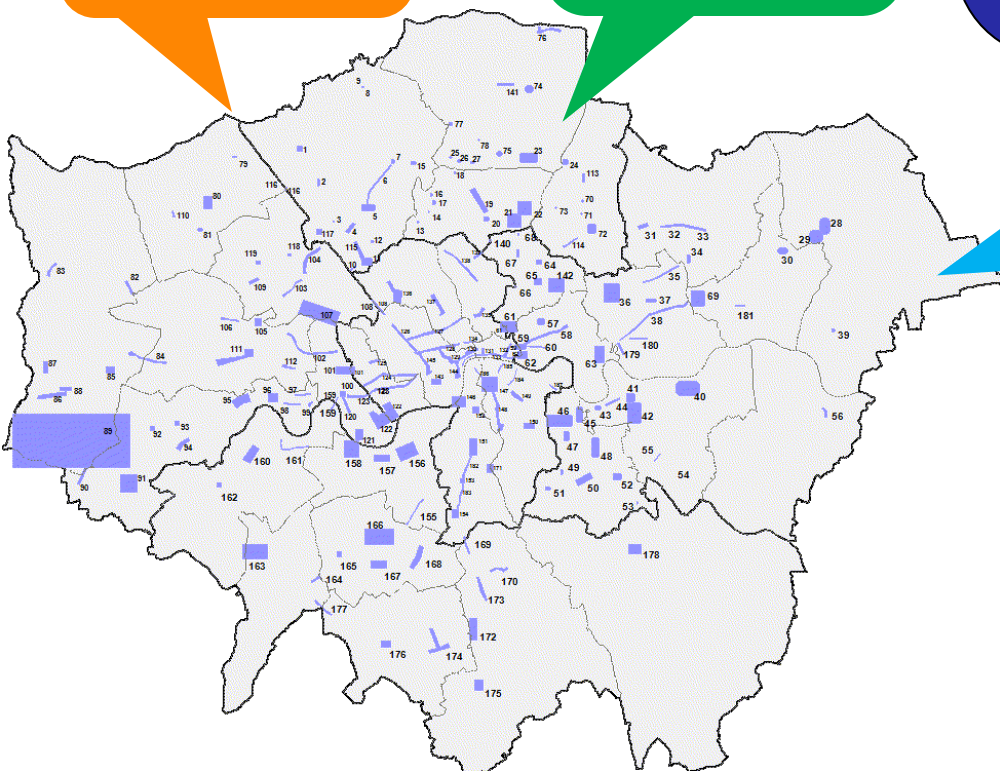
Hotspot identification

Q: Which areas have the worst air quality and high human exposure

Q: Where could boroughs implement their local air quality measures and Mayor's Air Quality Fund schemes?

- The NO₂ problem in London is expansive
- Identifying hotspots using road emissions data alone doesn't take into account human exposure or air quality concentrations
- TfL has identified 187 'Focus Areas'.
- These are areas with high NO₂ concentrations and high human exposure (town centres, residential areas, areas of high pedestrian footfall)
- It is not intended to be an exhaustive list of areas with high pollution levels but are where, in the first instance, local measures could be targeted.

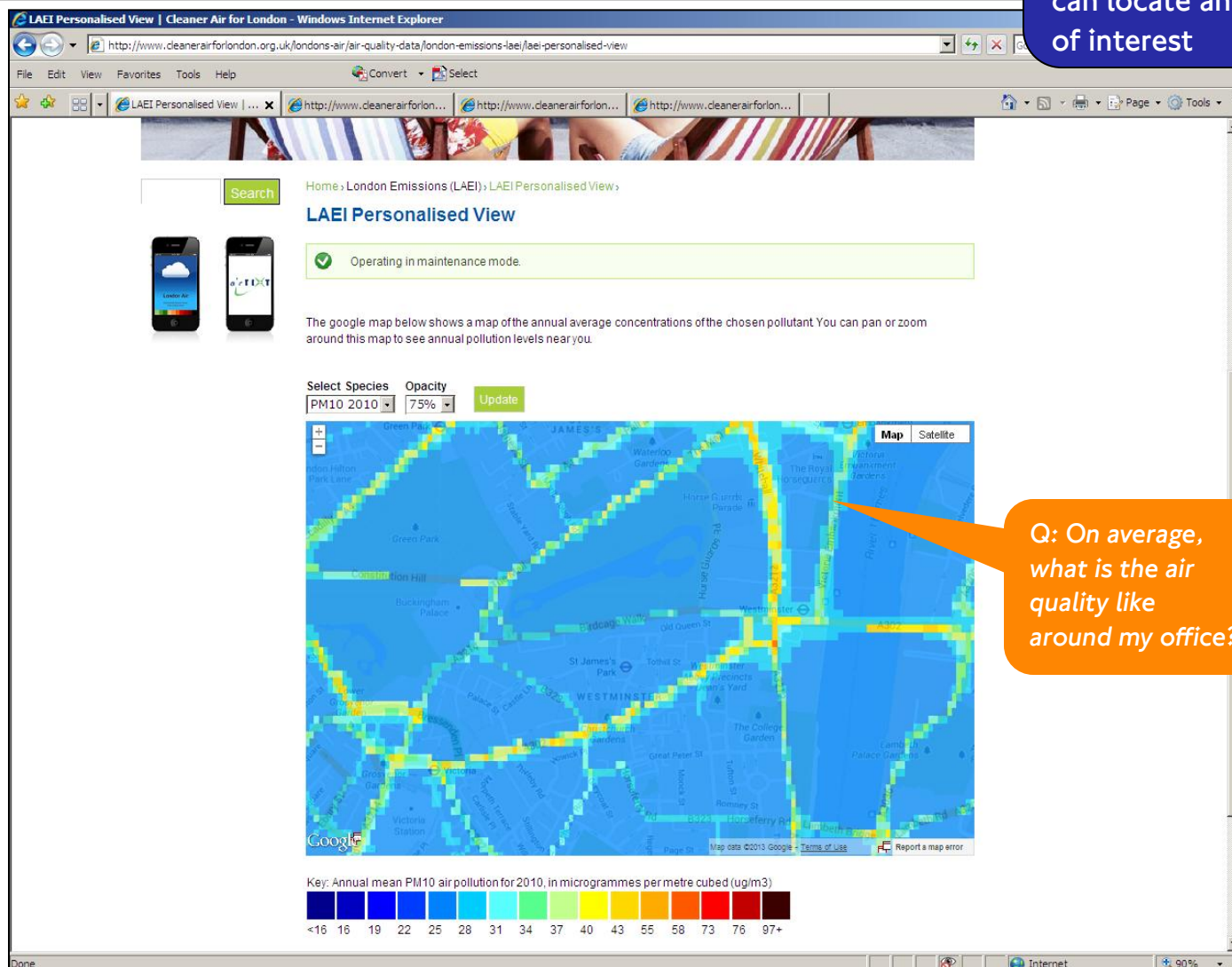
Q: Where should TfL locate their cleanest buses



Personalised view of air quality

- from the forthcoming Cleaner Air for London website

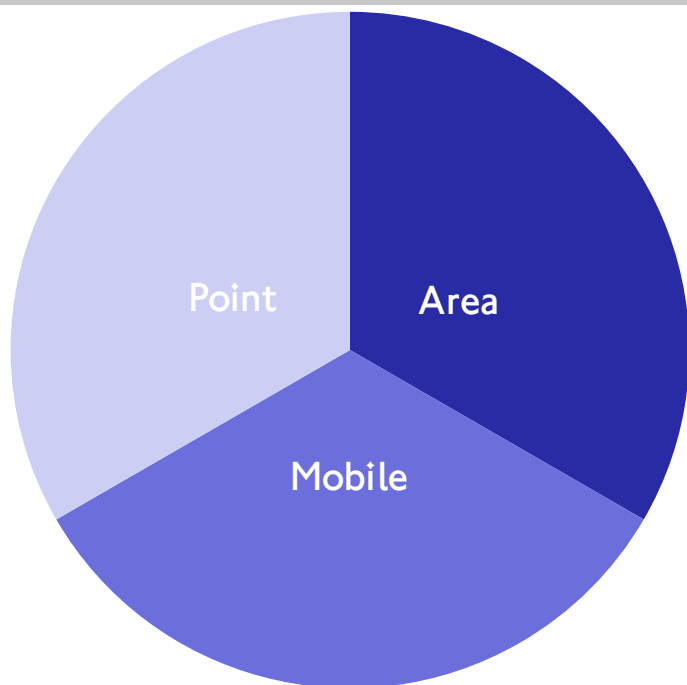
Air quality modelling results have been overlaid onto a Google map of London so users can locate and zoom in on areas of interest



Q: On average, what is the air quality like around my office?

Key methodological improvements

LAEI 2010 key improvements



Domestic and Commercial Gas

Emissions factor updates based on the UK's National Atmospheric Emissions Inventory (NAEI) 2010



Natural / Other

Complete review of sources and methodology by Aether and the inclusion of Non-Road Mobile Machinery (NRMM)



Road Transport

Adoption of new Defra emissions functions and petrol / diesel splits



Updated TfL London fleet compositions



Tyre and brake methodology improved



Inclusion of resuspension



A number of improvements to the methodology were made.

Some were to bring the LAEI in line with updates to the NAEI.

Others were to incorporate findings from London specific studies.



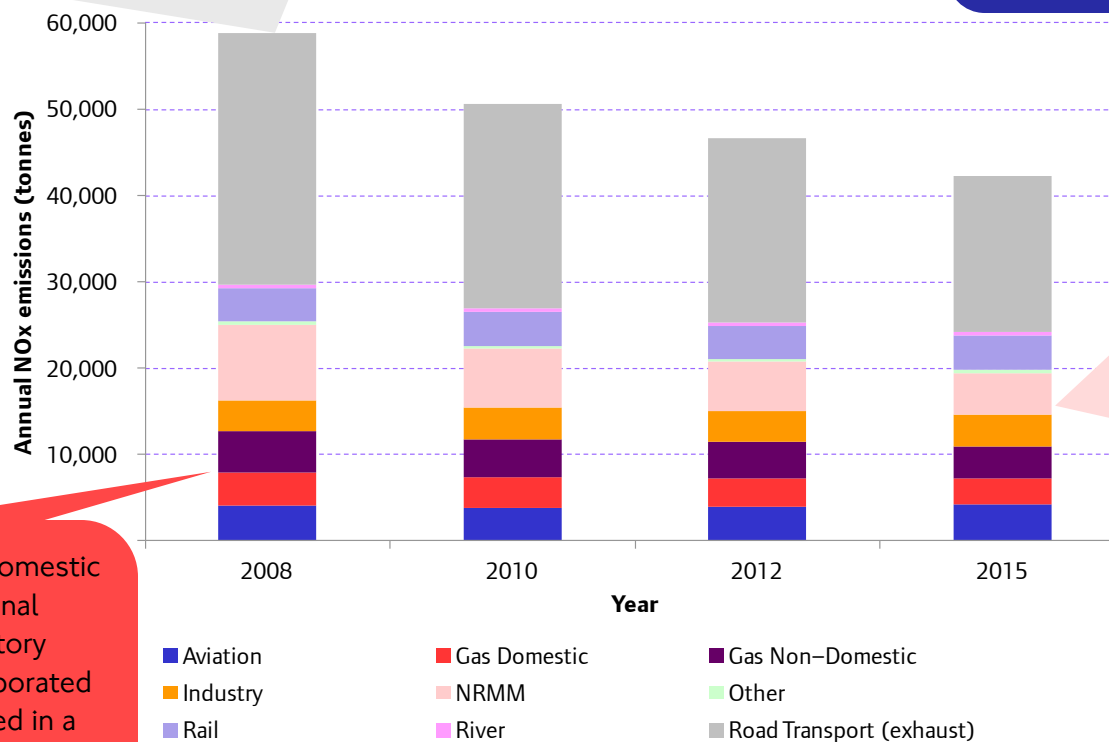
Change in sector emissions compared to the LAEI 2008

NO_x – method improvements

LAEI 2010 emissions 2008 - 2015

COPERT IV emissions functions were adopted along with an update to the Euro standard breakdown of the London fleet to incorporate policies such as the taxi age limit

This chart shows the total tonnes of NO_x emitted in London by source

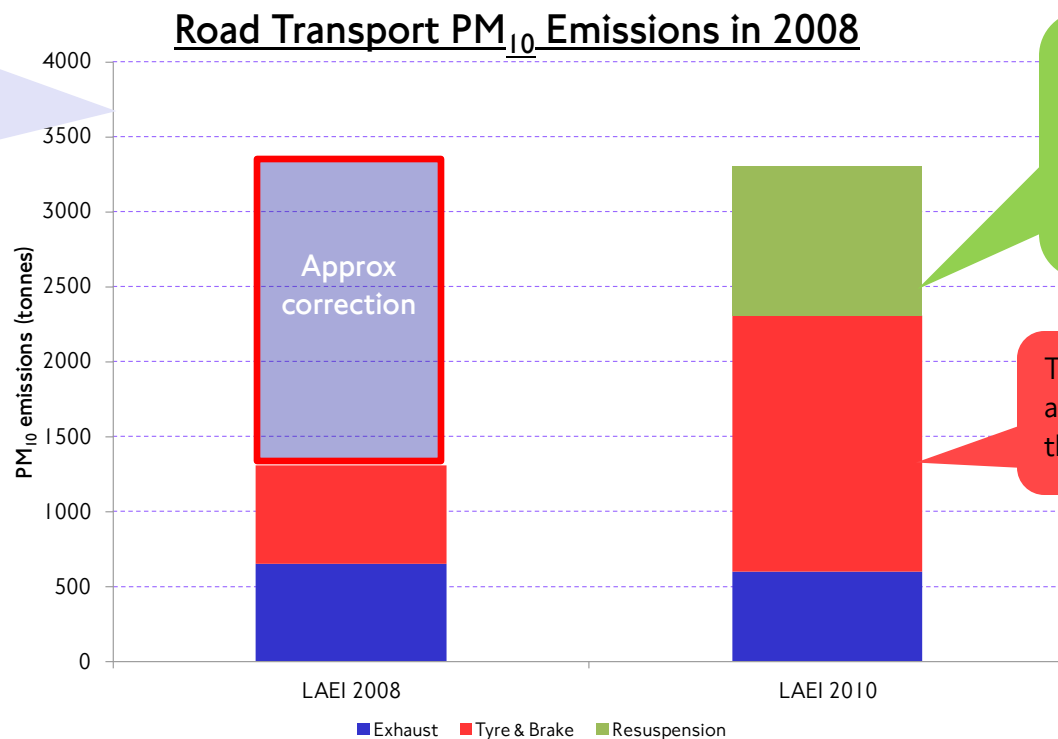


The emissions functions for domestic gas were updated in the National Atmospheric Emissions Inventory (NAEI). This change was incorporated into the LAEI 2010 and resulted in a 70% decrease in emissions from domestic gas compared to the LAEI 2008

NRMM is included for the first time. This is an emerging area in inventory development and will be kept under review for future iterations.

Road transport PM₁₀ emissions

- There has been a growing disparity between modelled and monitored PM₁₀ concentrations
- Air quality modelling has had to rely on unsatisfactorily large 'calibration factors' to correct for the disparity
- Research on this issue has concluded that non-exhaust road transport sources of PM₁₀ are of much greater importance to road transport emissions than previously accounted for.
- Using evidence derived from speciation studies (the chemical composition of particulate) the contribution of road vehicle tyre and brake wear has been recalculated for London.
- In addition, the inclusion in the 2010 inventory of re-suspended PM₁₀ (roadside dust that is re-entrained by passing vehicles or wind) has helped to close the gap between the modelled and monitored concentrations.



Models no longer need to be corrected to match the real-world monitored concentrations

Approx correction

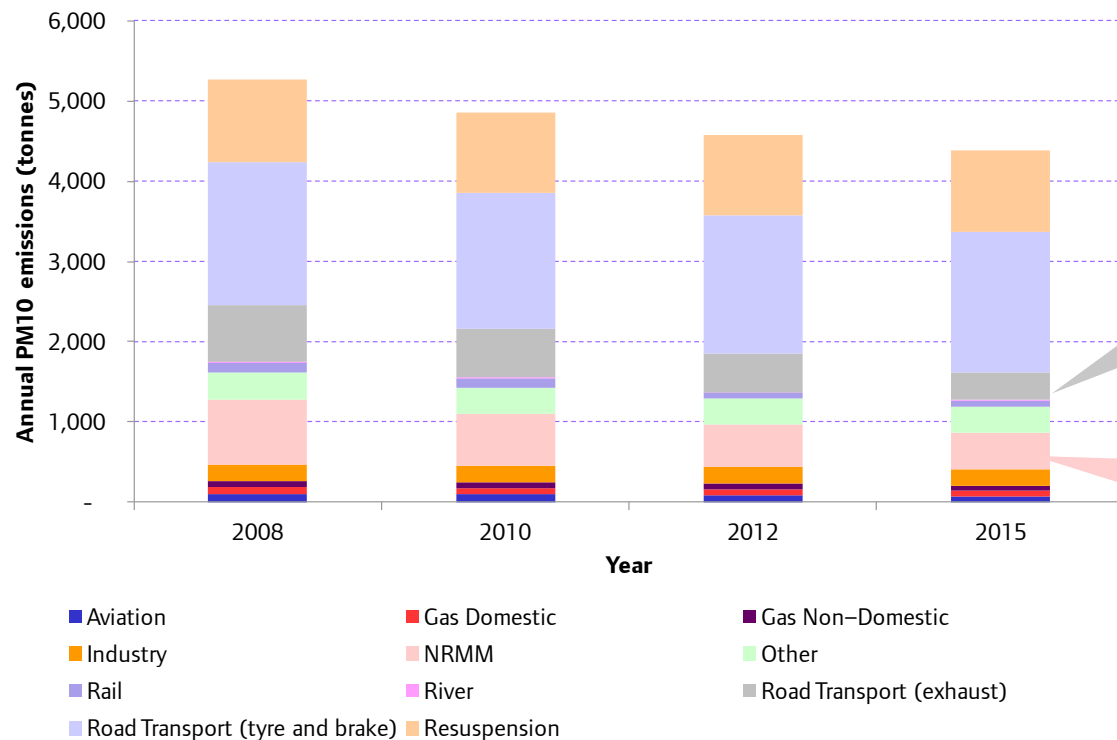
The new methodology takes account of the additional impact of emissions on days where there is a lack of dispersion.

Tyre and brake emissions in 2008 are about 150% higher in the LAEI 2010 than in the LAEI 2008

PM₁₀ – method improvements

LAEI 2010 emissions 2008 - 2015

This chart shows the total tonnes of PM₁₀ emitted in London by source



Road transport now around 1:3 exhaust vs tyre and brake. Previously about 1:1

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