

London's Air 2016

LAQN Seminar - 13th July 2017

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MRC-PHE
Centre for Environment & Health

Contents

- The London Air Quality Network
- Annual air quality results 2016
- Air quality trends over time
- LAQN latest and planned developments

London Air Quality Network

- The London Air Quality Network (LAQN) was formed in 1993 to coordinate and improve air quality monitoring in London
- A collaboration between King's College London and local authorities in London and the surrounding areas
- The LAQN is now Europe's most advanced urban monitoring network
- Sites in the majority of London's 33 boroughs - over 100 monitoring sites in a variety of location types
- King's provides scientific and technical expertise to assist with local authority monitoring
- Emphasis on high quality QA/QC of automatic measurements
- More than just monitoring – public information and research

London Air FORECAST TODAY MODERATE TOMORROW LOW **KING'S College LONDON**

Air Pollution - Information - Monitoring - Tools - Quick Links (Policy) -

Readings for Wed 5th Jul

Map data ©2017 Google 10 km Terms of Use

London Air FORECAST TODAY MODERATE TOMORROW LOW **KING'S College LONDON**

Air Pollution - Information - Monitoring - Tools - Quick Links (Public) -

You are on this page: Nowcast

Nowcast - Pollution Maps Find postcode View Full Screen

What is a Nowcast?

This map shows a pollution "nowcast", which is a service to show current pollution levels in detail across London in comparison with the Government's Air Pollution Index.

It is created by combining readings taken within the last hour and air pollution modelling in London. As you zoom into the map you will see which areas are currently experiencing higher pollution levels than others, usually those areas close to busy roads. More information about the Air Pollution Index and health advice associated with each index level can be seen here.

More Information

- Why nowcast?
- Why do you use only four pollutants?
- Why does pollution appear to be low everywhere?
- How accurate is it?

* Calculated PM10 air pollution index levels, based on measurements taken up to 15:00 on Thursday 6th July 2017

London Air FORECAST TODAY MODERATE TOMORROW LOW **KING'S College LONDON**

Air Pollution - Information - Monitoring - Tools - Quick Links (Public) -

You are on this page >> Home >> Forecast

Forecast

Today

Issued By: Environmental Research Group King's College London
 Issued On: 05/07/2017 11:48:00
 Pollution Band: Moderate

Outlook

Issued By: Environmental Research Group King's College London
 Issued On: 06/07/2017 11:57:00
 Start: Friday 7 July
 Finish: end of Friday 7 July

Pollution Band: Low

Details

A mixture of cloud and sunshine for Thursday. Rain and some thundery downpours are forecast for the morning. Once the rain passes, temperatures should increase into the high twenties, in good sunshine.

A gentle east or south-easterly breeze is forecast to change to south-westerly later in the evening.

Earlier in the day, we expect to import air which had previously been over the North Sea, the Channel and the midlands. Later, with an air feed from the the North Sea, the Channel and near continent, it's possible we'll import ozone precursor chemicals, required for ozone formation.

Friday will be another hot day with temperatures set to rise into the mid-twenties. After a bright start, cloud cover is expected to increase through the day.

From the early hours of Friday, the wind direction will move round from a predominantly southerly direction to a westerly direction and remain at that through the day.

The shift to cleaner Atlantic air combined with increased cloud cover will hamper ground-level ozone production. However there is an outside chance Moderate ozone may be reached in outer-London later in the day as

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Air Pollution - Information - Monitoring - Tools - Quick Links (Public) -

You are on this page: Statistics Maps

LAQN Monitoring Statistics Find postcode

Bulletins Site Details Statistics

Pollution Episodes

This page gives statistical results for each of the continuous monitoring sites in the region you have selected.

You can find out more information about each location (monitoring site) by clicking on the map icons or selecting from the drop down list.

Year shown on map: 2016 Go

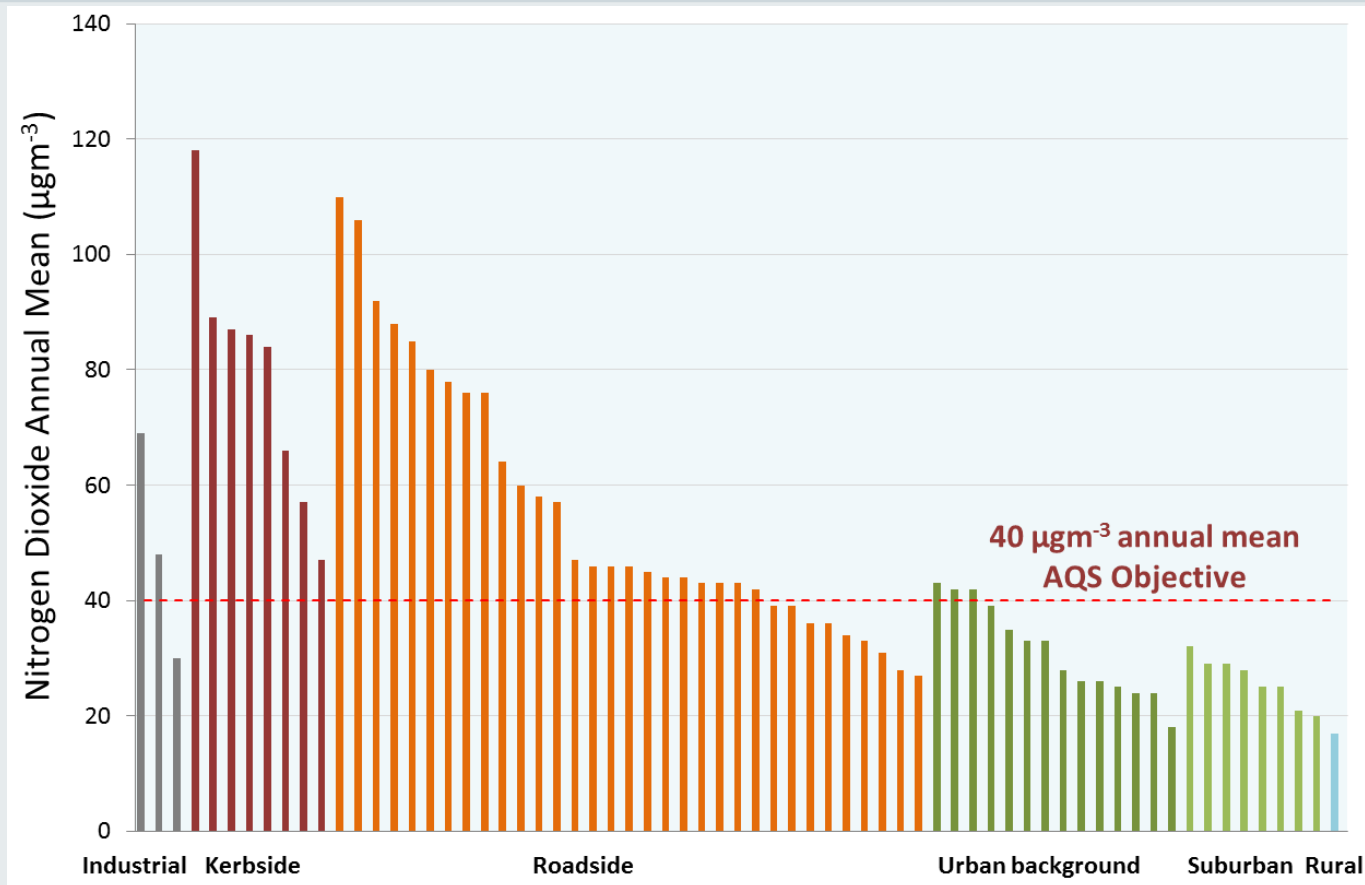
View reports

Select a monitoring site to view:
 Change objective: all objectives
 Include closed sites:
 Show Authorities (OS Data):

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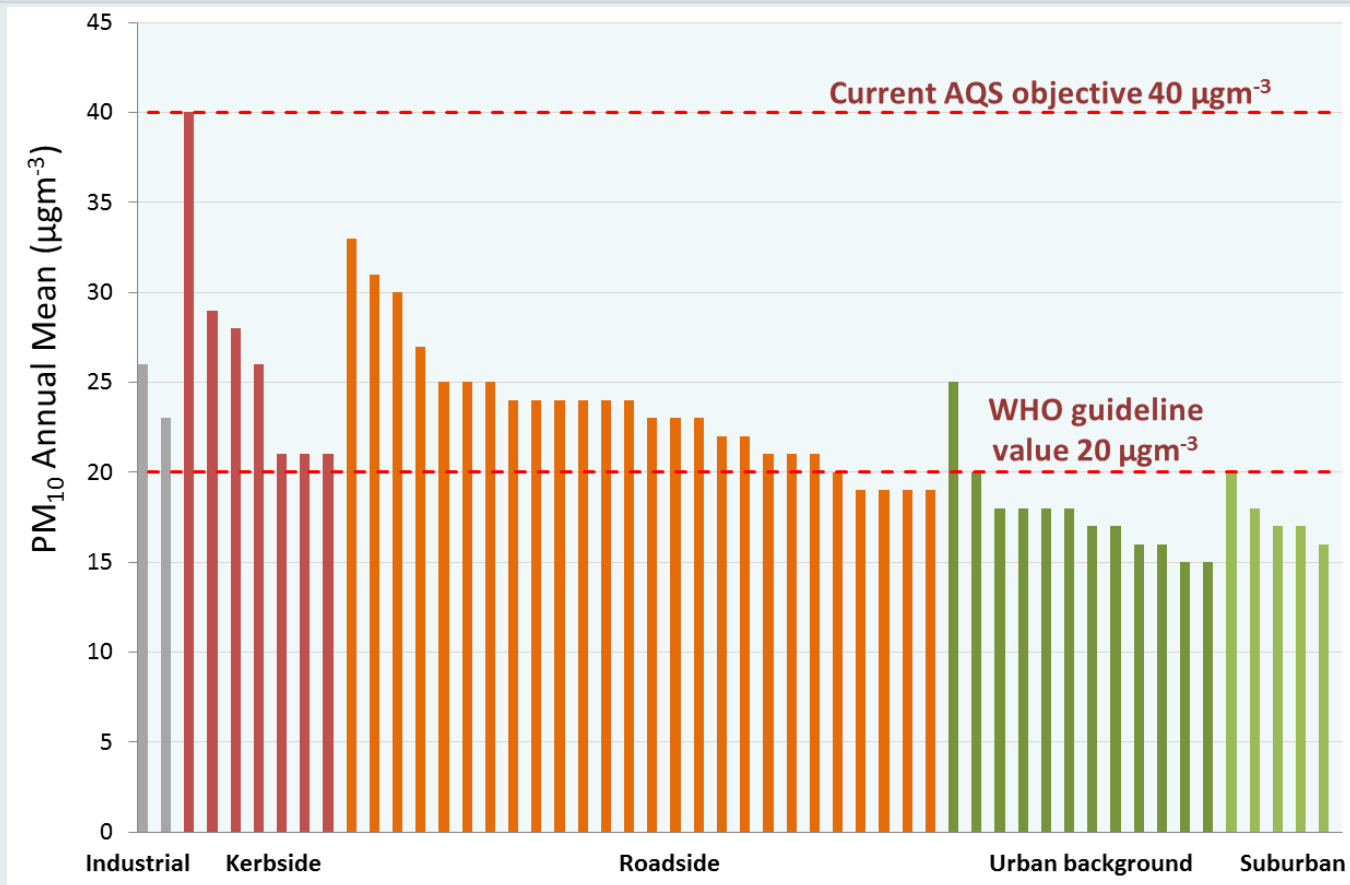
Public Health England **MRC** Medical Research Council **Imperial College London** **KING'S College LONDON**

NO₂ Annual Mean Objective 2016



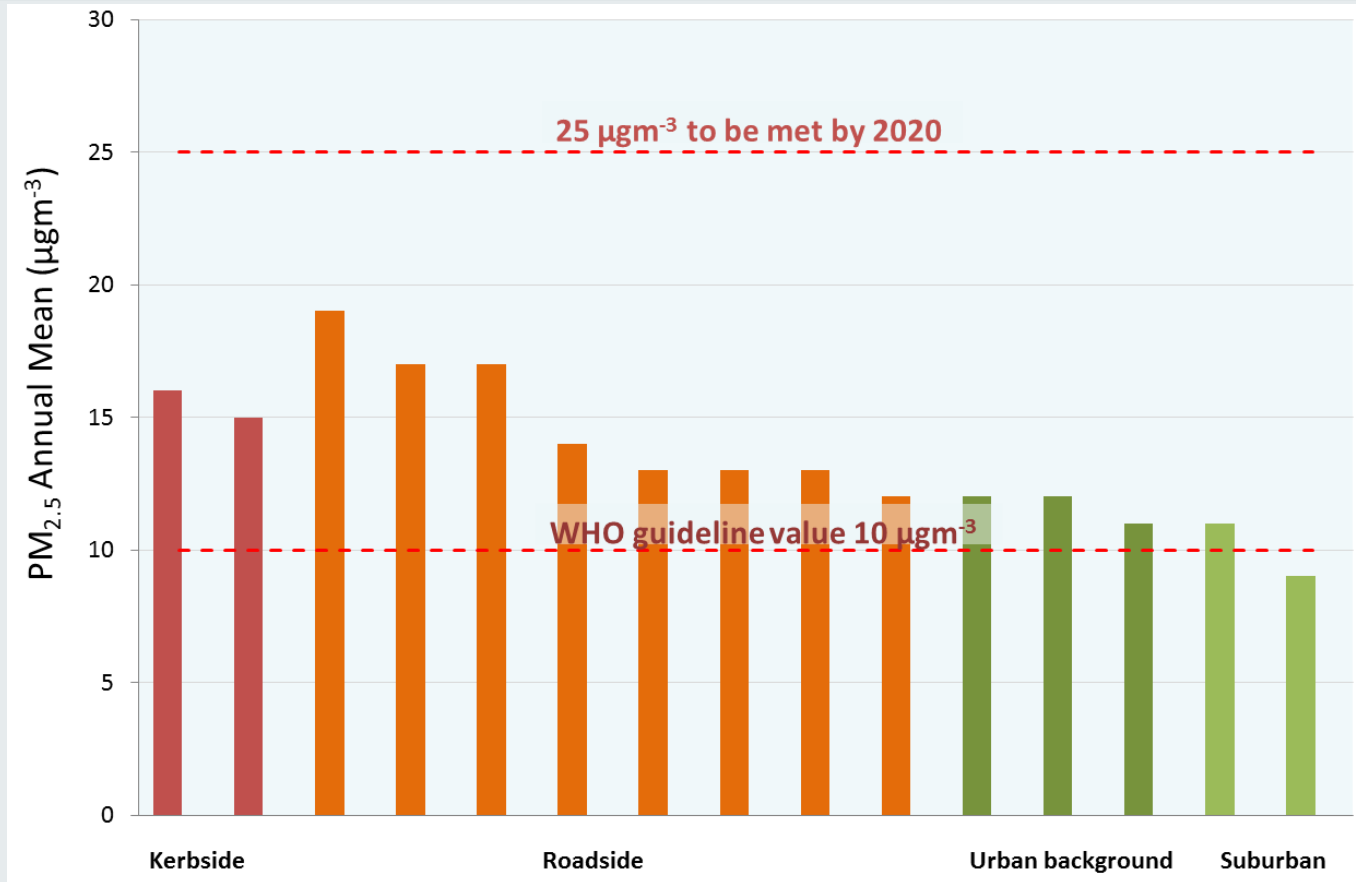
- Less than half the sites achieved the annual mean objective
- 11 sites recorded an annual mean of twice the legal limit or above
- 24 sites exceeded the hourly mean objective for NO₂
- Main source of NO₂ is vehicles – especially diesel

PM₁₀ Annual Mean Objective 2016



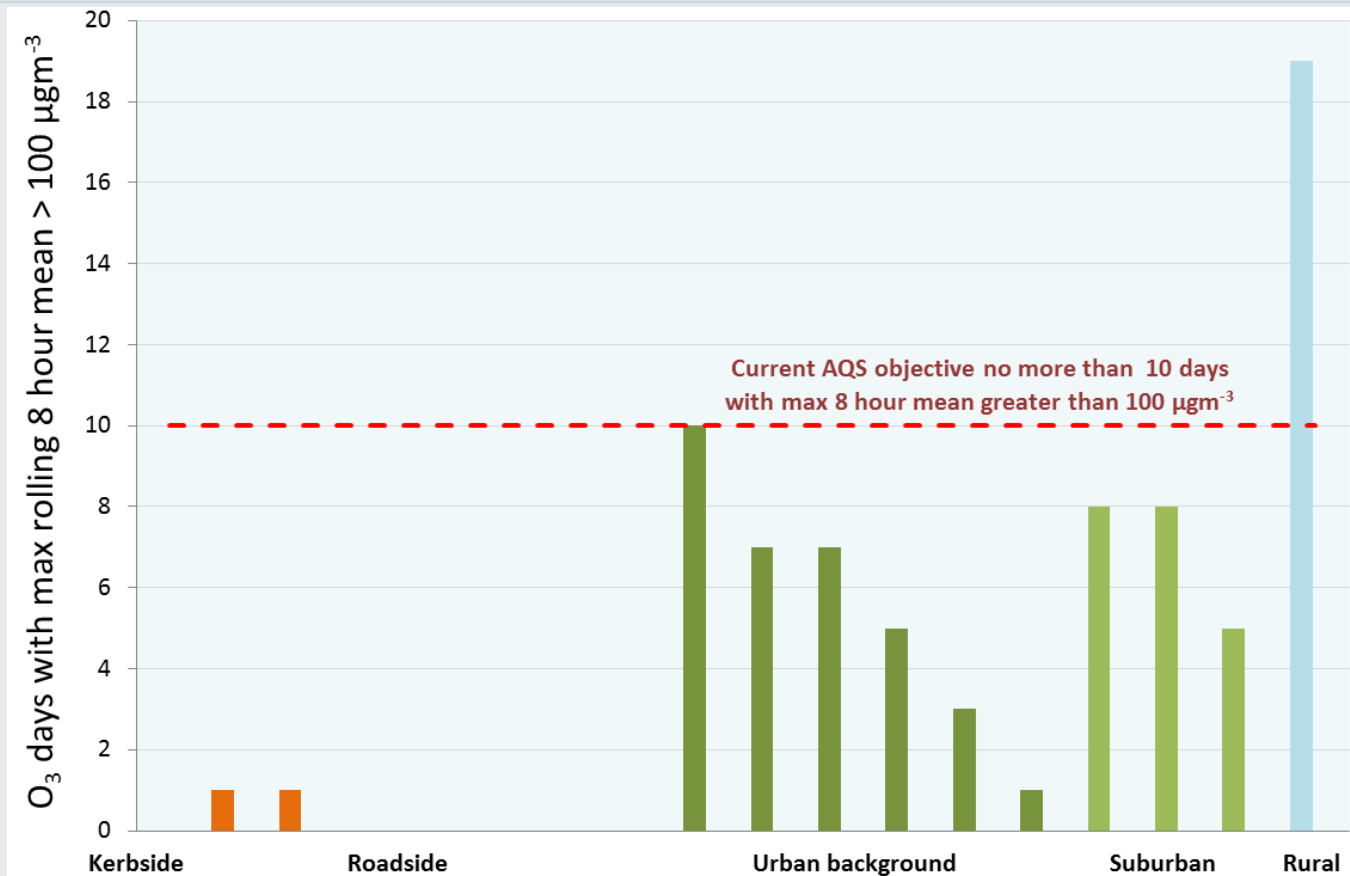
- All sites met the annual mean AQS objective
- Most sites still above WHO guideline value

PM_{2.5} Annual Mean 2016



- All sites that used a reference equivalent measurement method achieved the EU target value. This target value should be met by 2020
- Only one site using a reference equivalent measurement method achieved the WHO guideline value (WHO, 2006)

O₃ 8-Hourly Mean Objective 2016

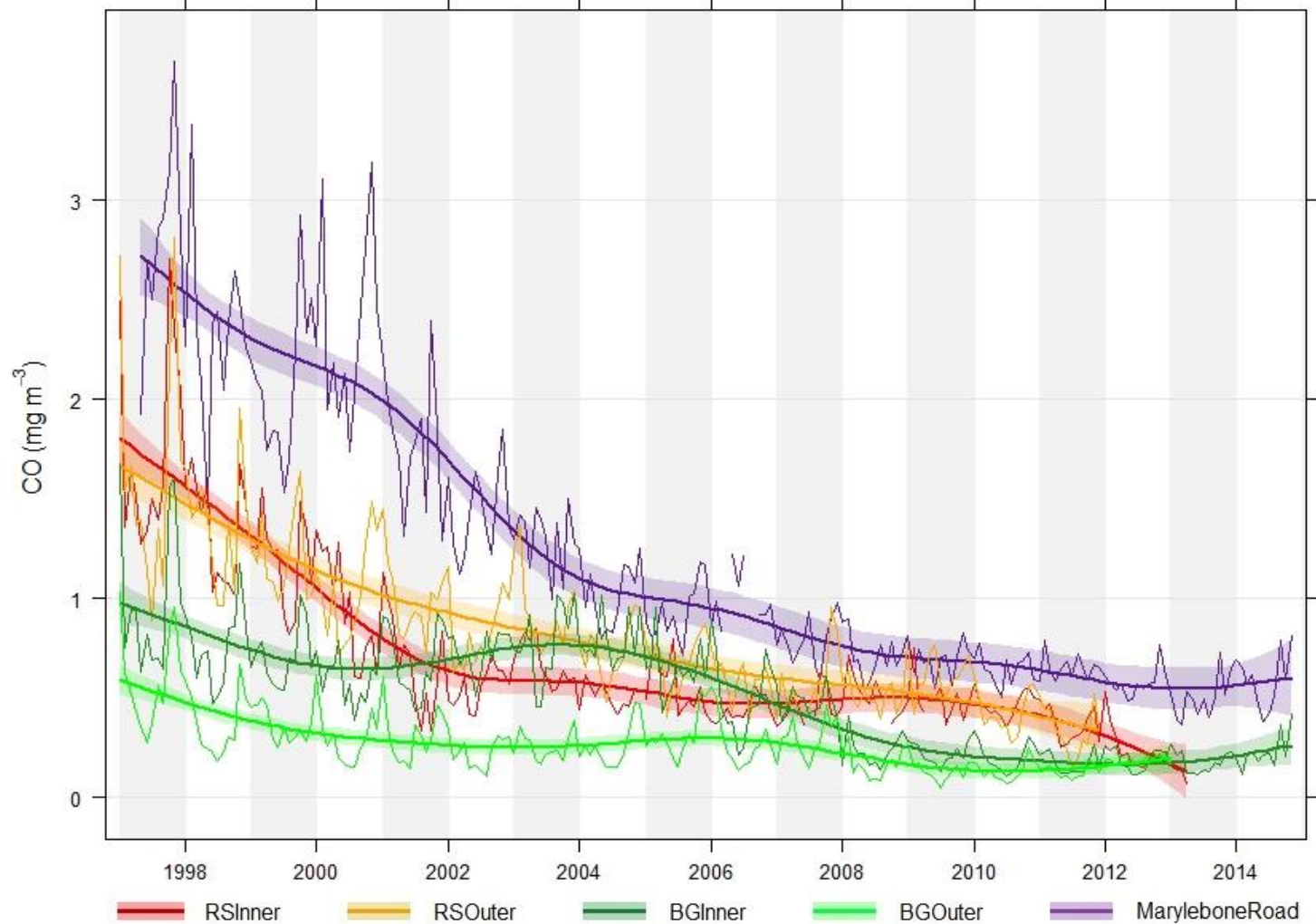


- One rural site did not achieve the objective
- O₃ is a regional pollutant. It is greater away from busy roads as it is scavenged by NO_x from traffic

CO and SO₂ Objectives

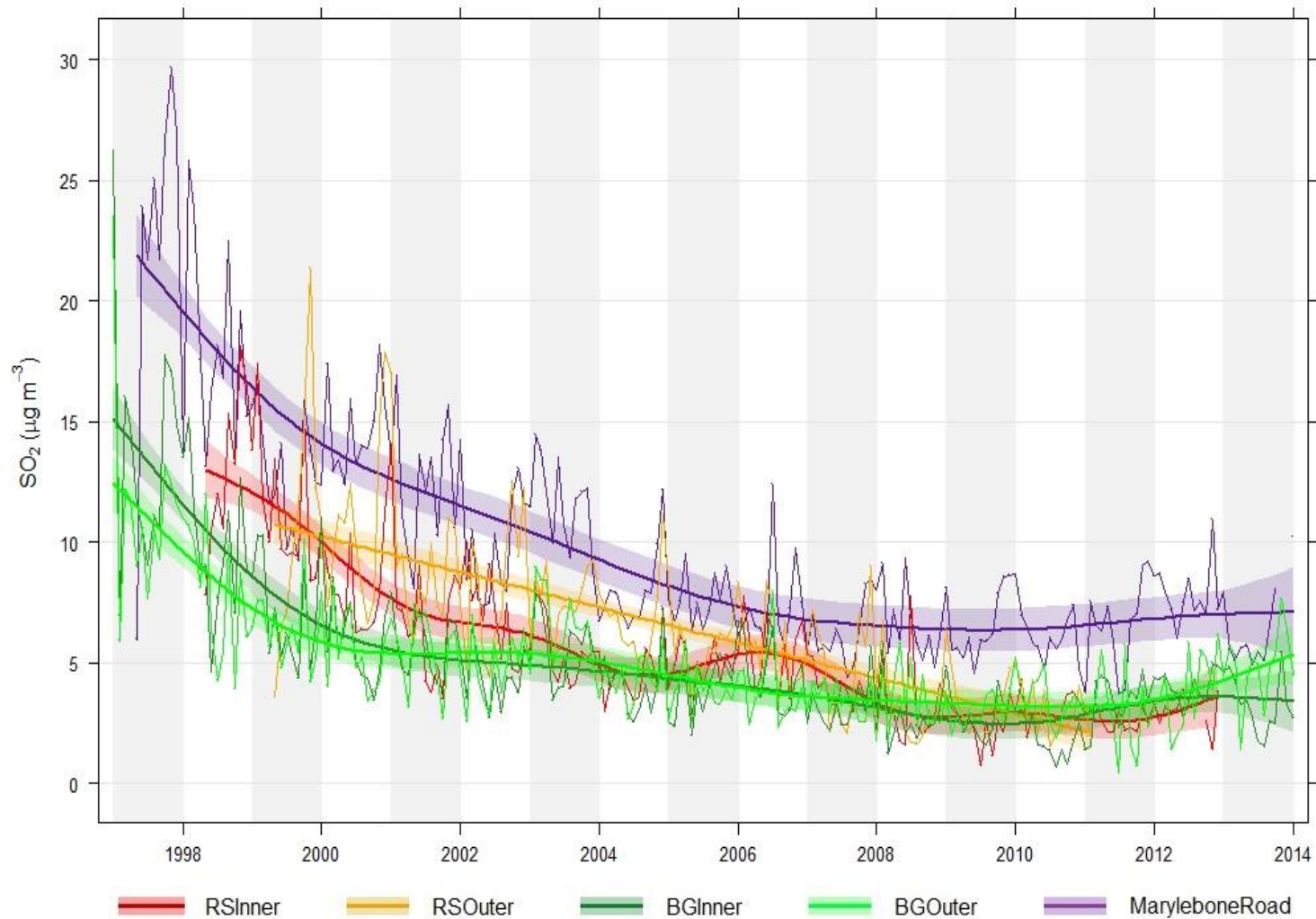
- Historically CO and SO₂ were measured at many sites across the network
- Large improvements in recent years due to introduction of catalytic converters (CO) and industry moving away from cities, removal of sulphur from vehicle fuel (SO₂)
- All LAQN sites met all objectives for these pollutants in 2016
- Reduction in monitoring

CO Trends since start of LAQN



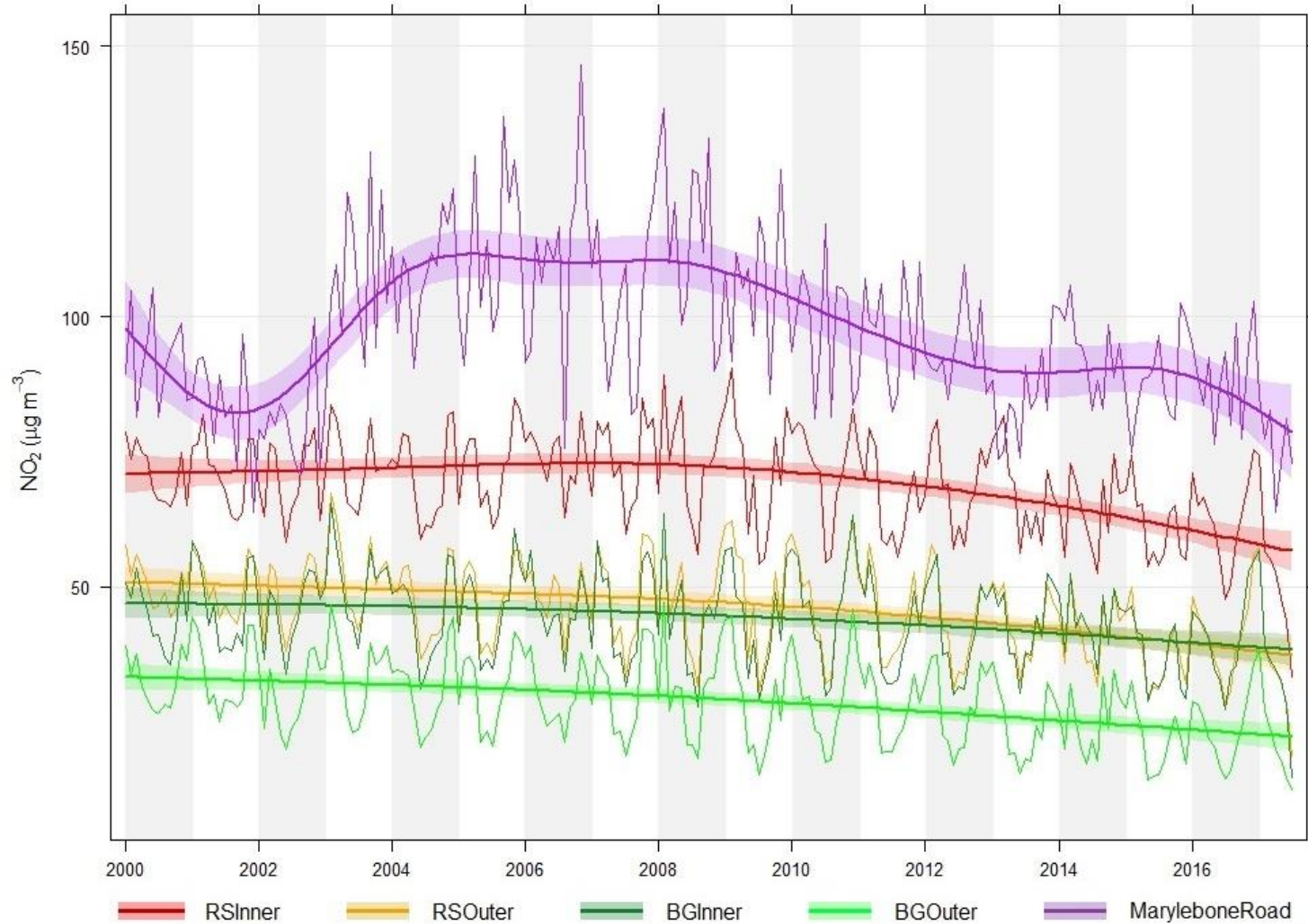
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SO₂ Trends since start of LAQN



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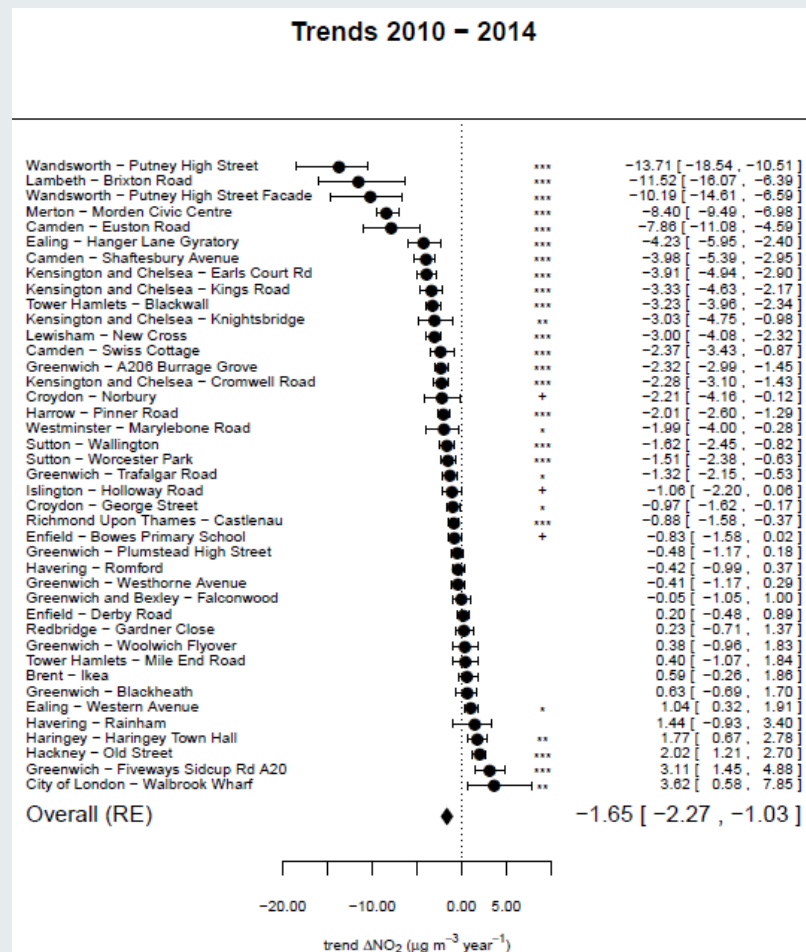
NO₂ Trends from 2000 to present



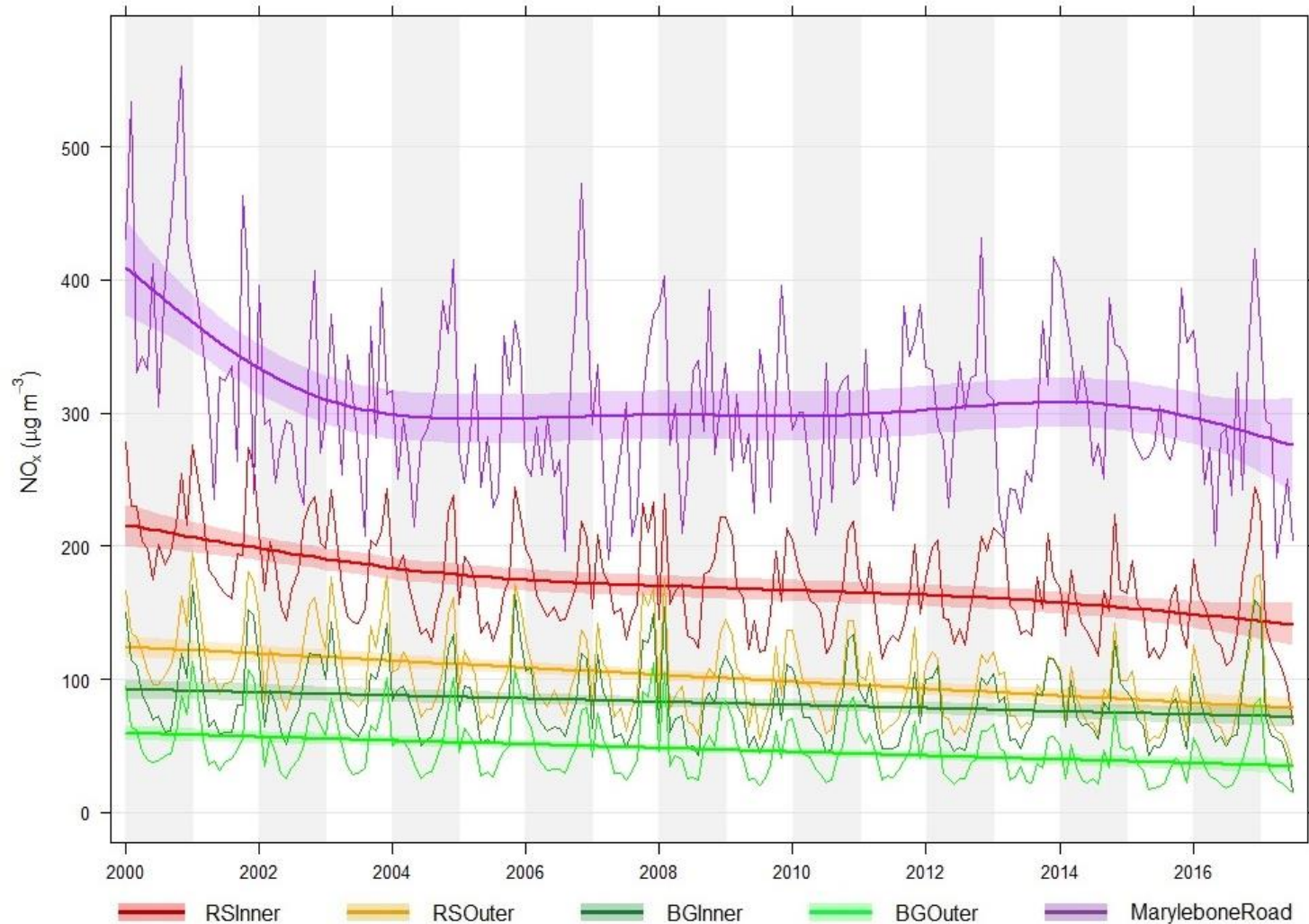
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NO₂ Trends split by site

- Trends in roadside increment (i.e. background removed) for sites in London
- Shows heterogeneity in the trends which are not seen with the grouped sites
- Overall downward trend from 2010 to 2014 but not seen everywhere and some sites improving quicker than others
- Some sites show effect of specific local interventions, e.g. Putney High Street change to buses (SCR fitted)

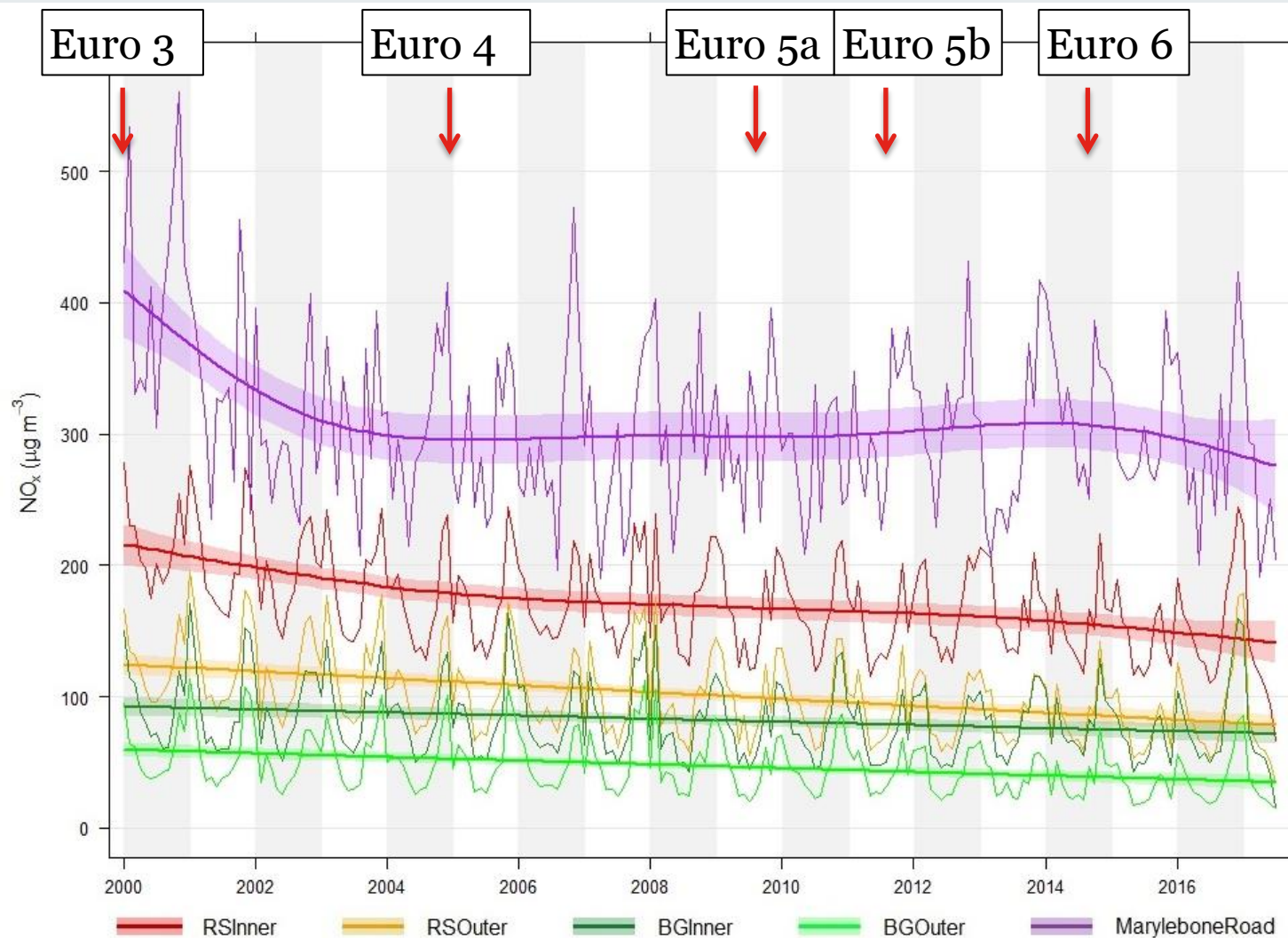


NO_x Trends from 2000 to present

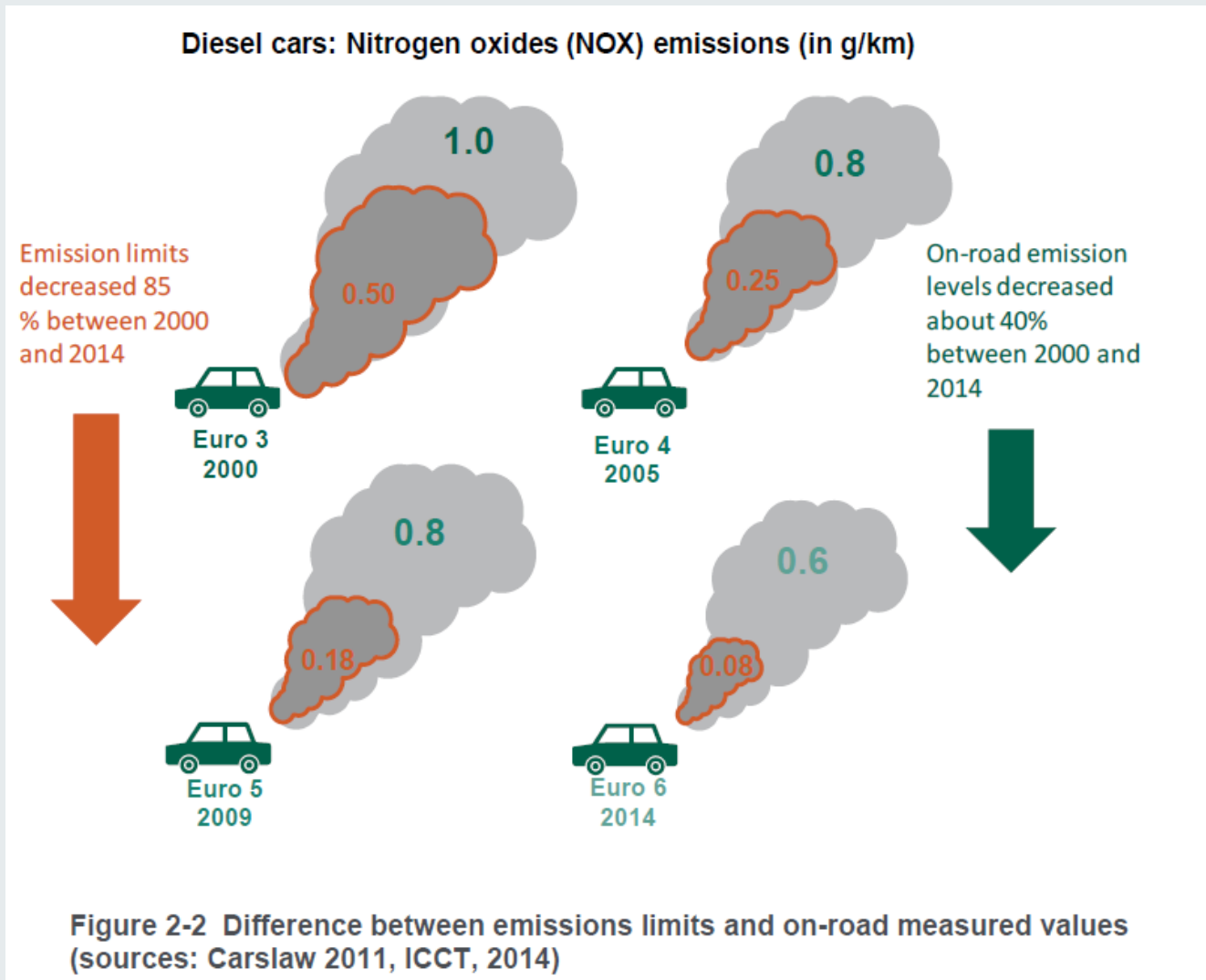


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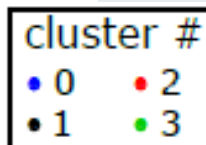
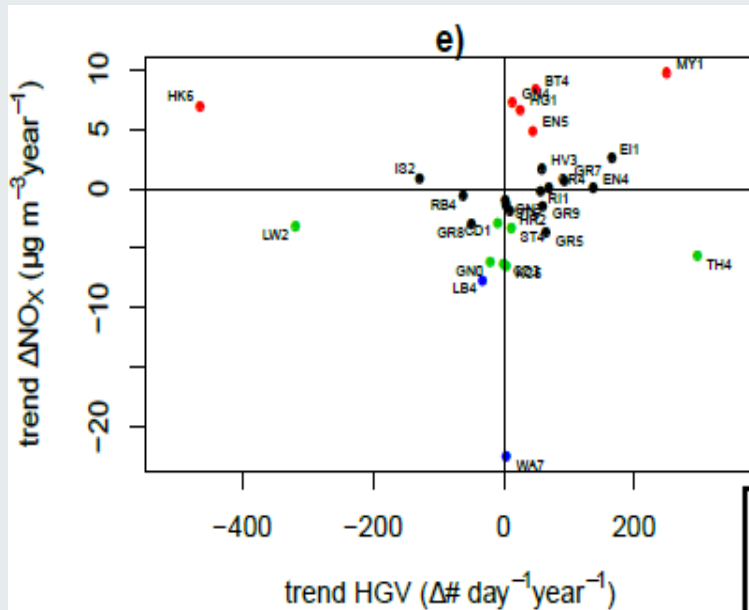
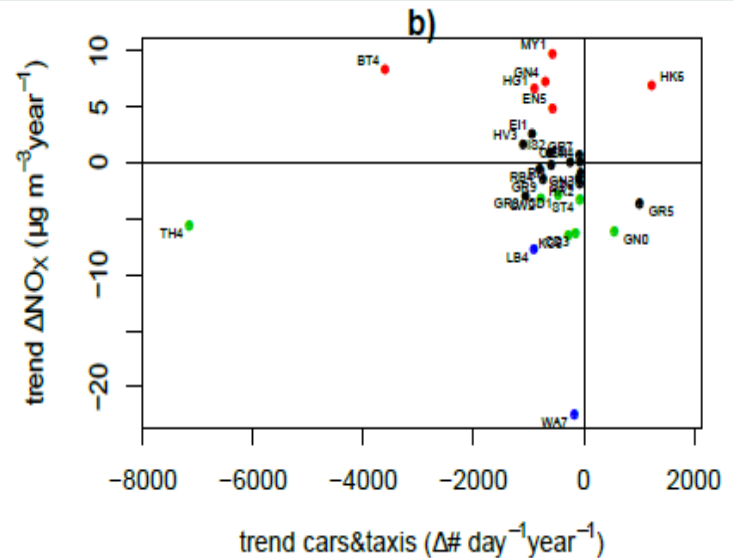
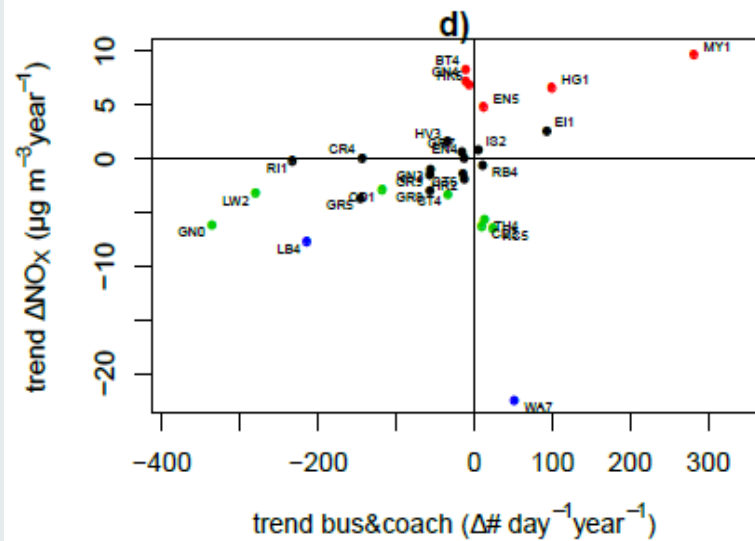
NO_x Trends from 2000 to present



NO_x Trends from 2000 to present



Comparison to changes in traffic - NO_x



Environmental Pollution
Volume 218, November 2016, Pages 463-474

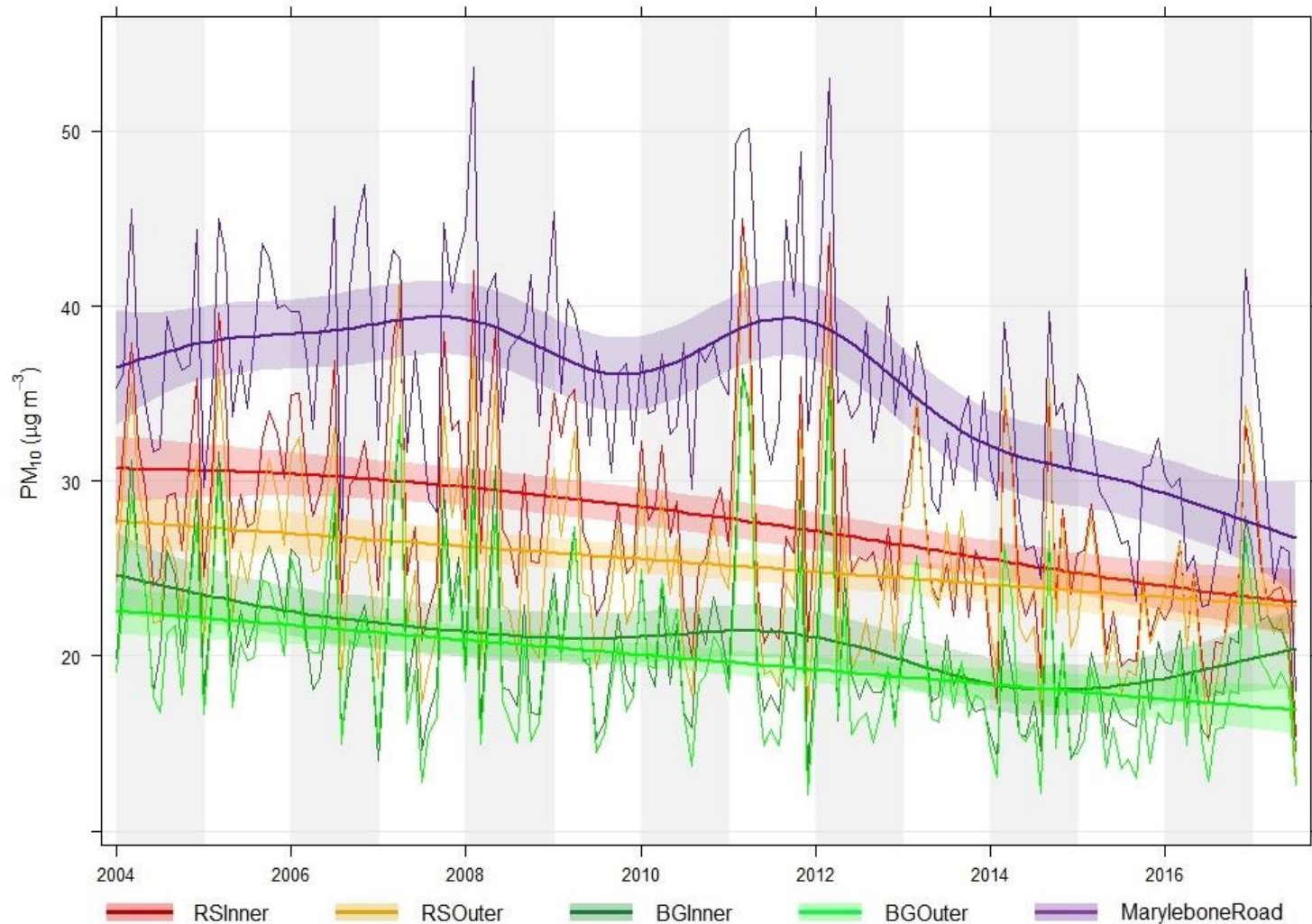
Did policies to abate atmospheric emissions from traffic have a positive effect in London? ☆
Anna Font ^{A, B}, Gary W. Fuller

Show more
<https://doi.org/10.1016/j.envpol.2016.07.026> Get rights and content
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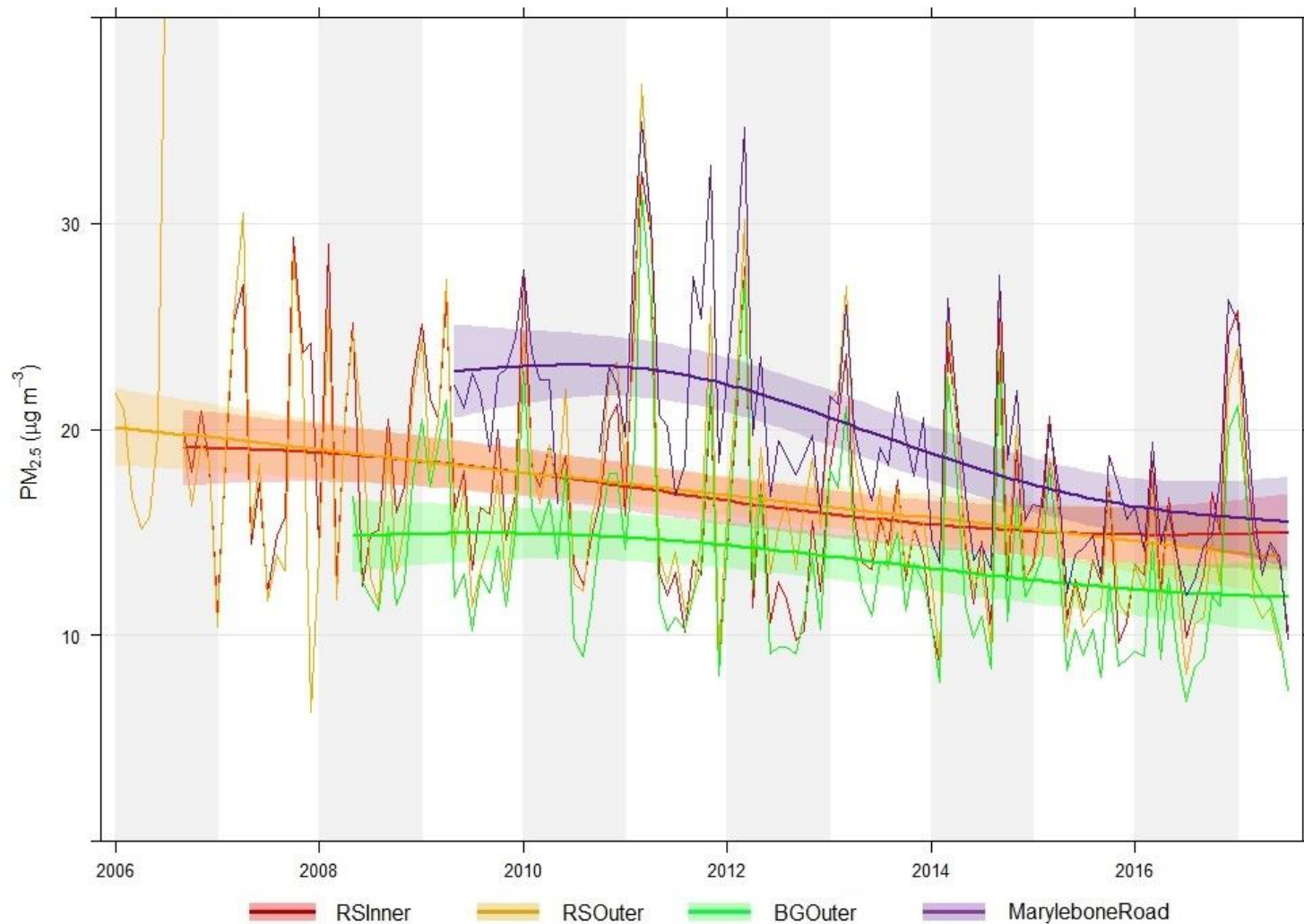
Highlights

- Short-term trends in roadside increments of air pollutants along 65 roads in London.
- Great variability of response to abatement policies across London's roads.
- General decrease of NO_x and NO₂ concentrations in 2010–2014.
- Roads with increased NO_x observed more buses and heavy good vehicles.
- PM_{2.5} concentrations decreased along with black carbon; PM₁₀ coarse increased.

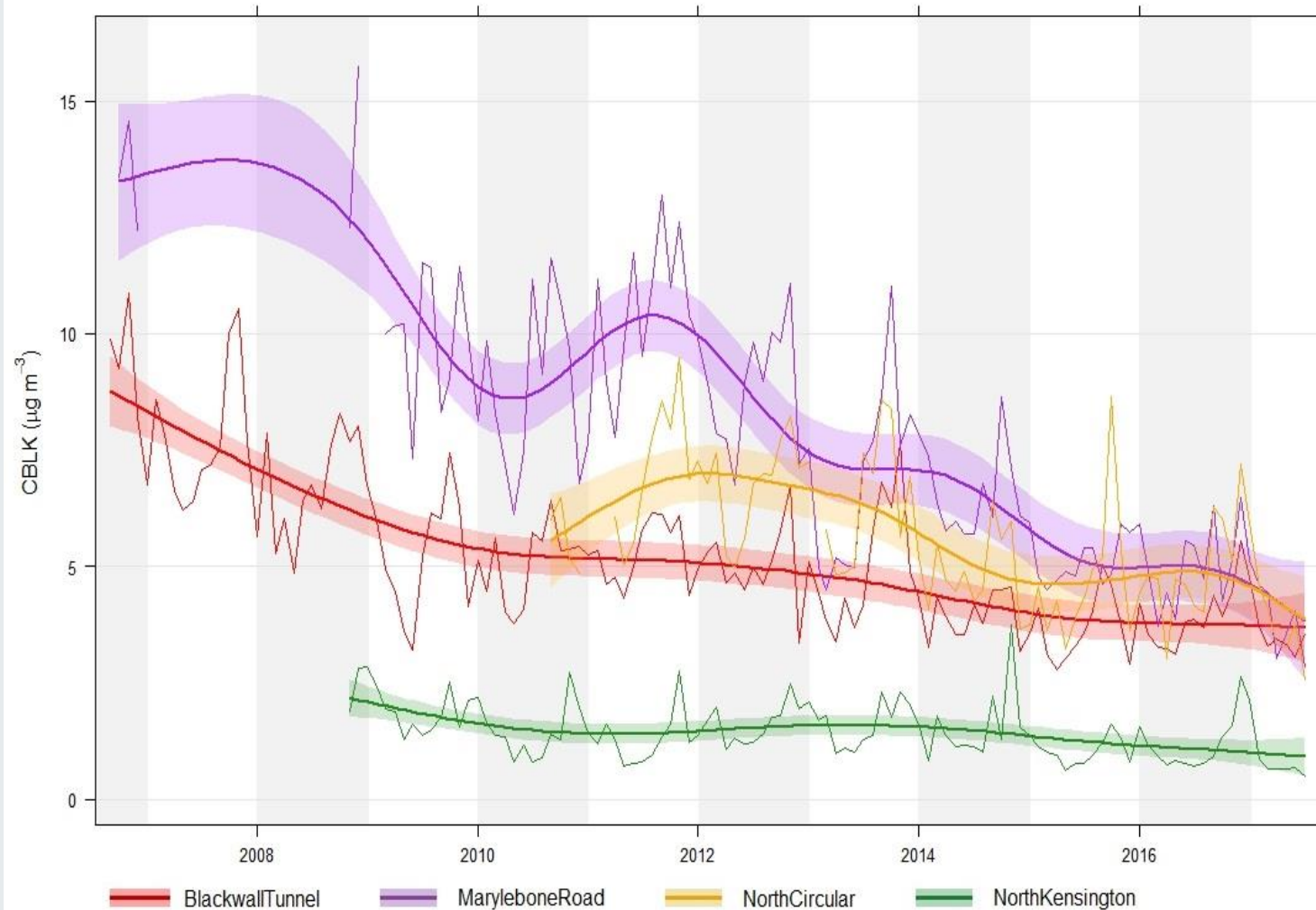
PM₁₀ Trends from 2004 to present



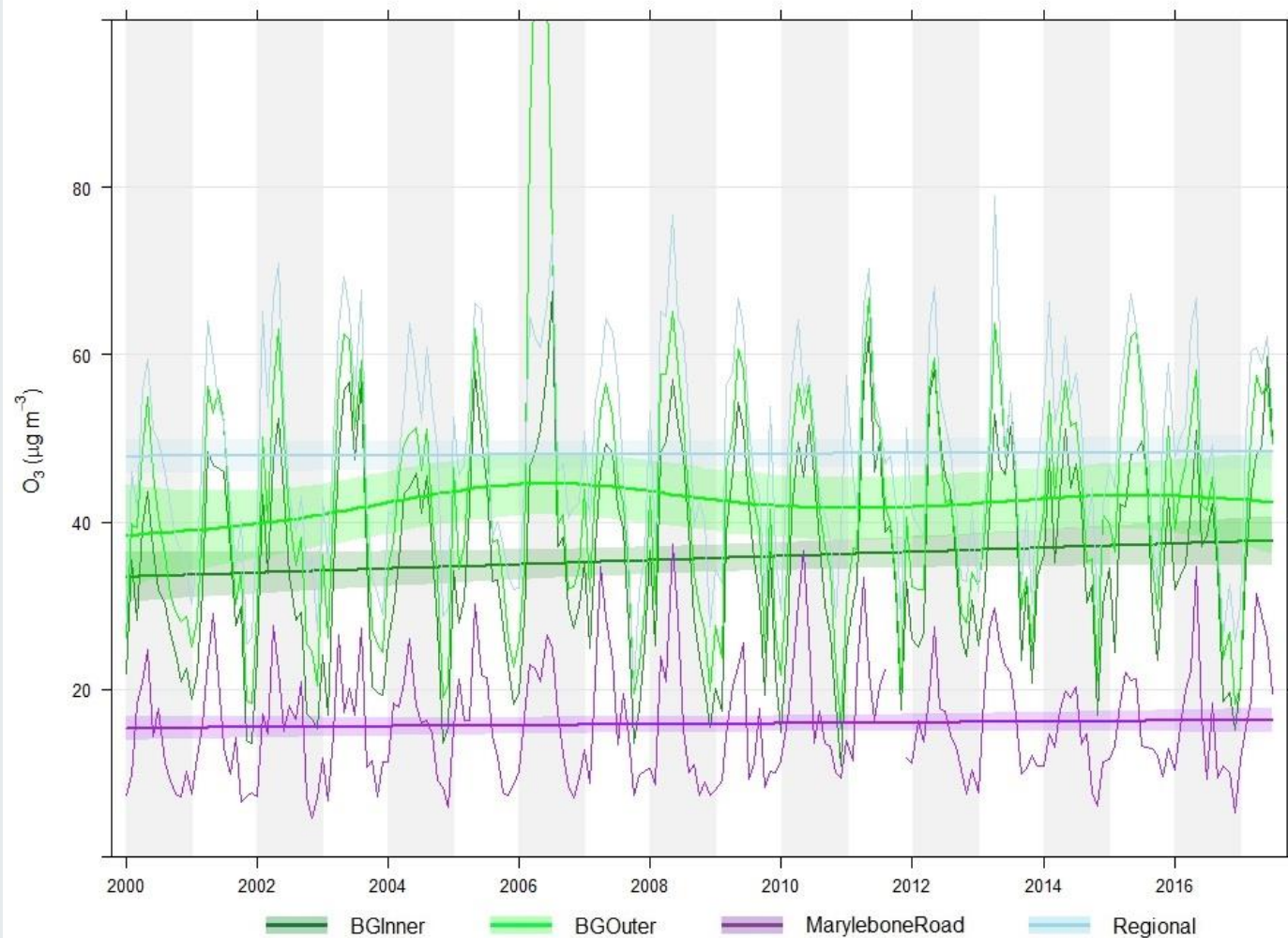
PM_{2.5} Trends from 2006 to present



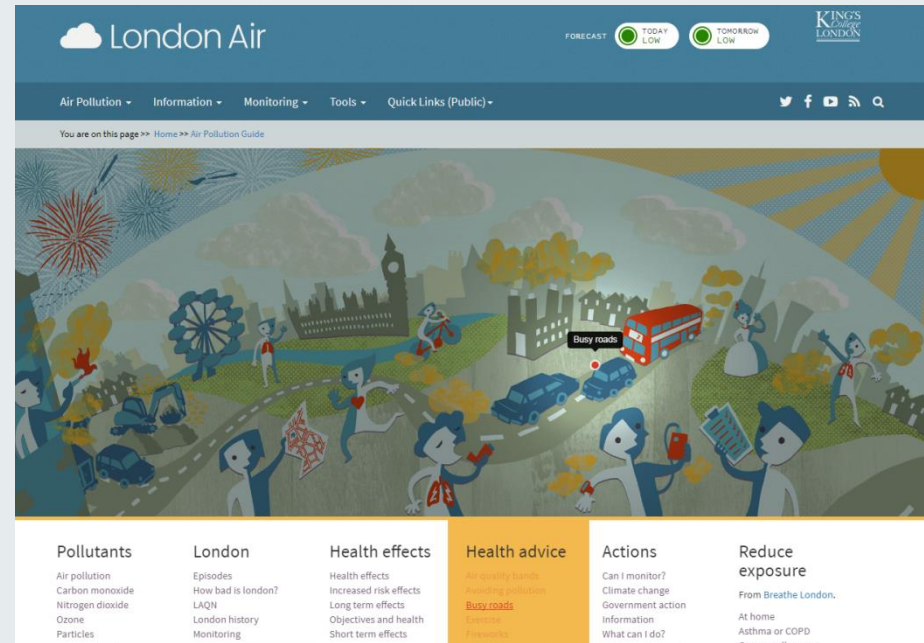
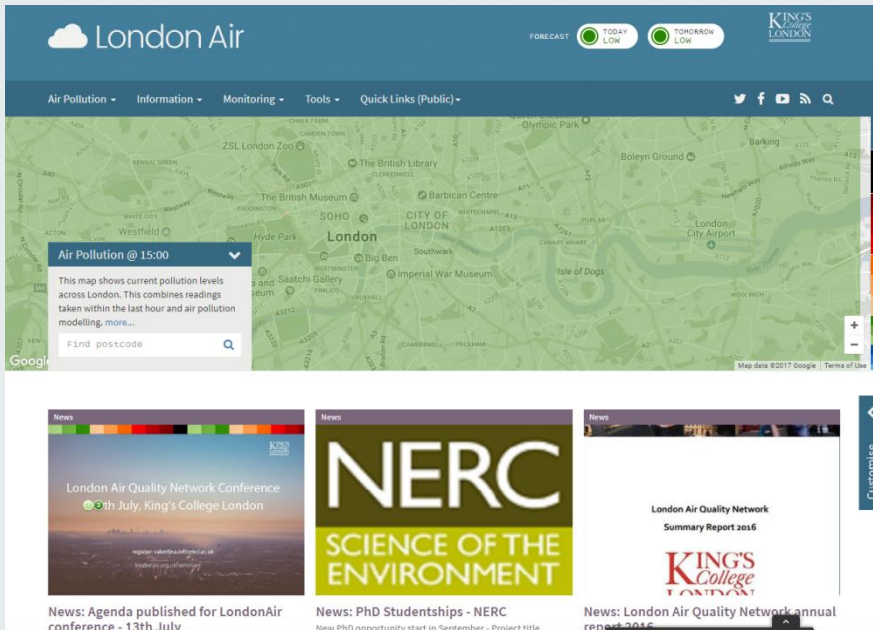
Black Carbon Trends from 2006 to present



O₃ Trends from 2000 to present



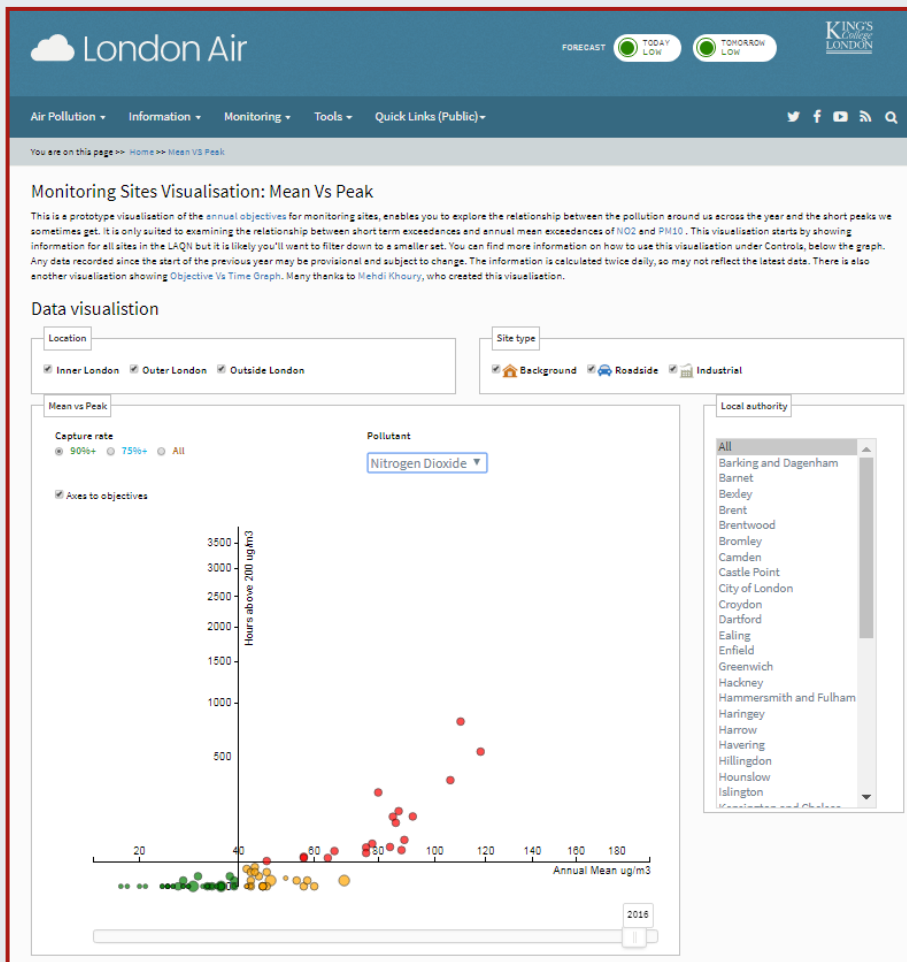
Latest Developments on the LAQN



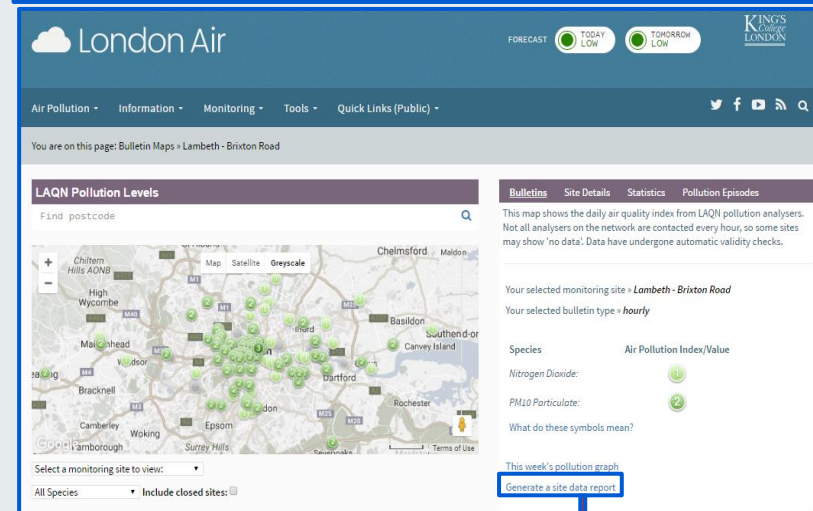
- New look LondonAir website
- Cleaner design, optimised for smart phones, allowing access to air pollution information on the move
- New customisable home page according to your interests
- New graphical home page for our updated pollution guide
- Rollout of further updates is ongoing – including improved statistical tools

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- Links on LondonAir website to data and statistical reports that can be used for LAQM submissions
- Previously been emailed to local authorities - can now be accessed from the site bulletin pages



- New data visualisation tools
- Compare annual and short term objectives
- Objectives v time graphs
- Link on LondonAir home page – please try them out!

Lambeth Kings College London

Quarterly Air Quality Report for Lambeth - Brixton Road (Quarter 2, 2016)

	April 2016	May 2016	June 2016	Quarter
Nitrogen Dioxide				
Data capture rate (%):	99	99	99	99
Hourly max (ug/m3):	311.3	346.3	256.7	346.3
Low days:	8	25	22	55
Moderate days:	22	6	8	36
High days:	0	0	0	0
Very high days:	0	0	0	0
Mean: (AQ5 Objective < 40ug/m3)				n/a (2016 full year)
Annual data capture rate (%):				91 (2016 full year)
Occurrences of hourly mean >200ug/m3: (AQ5 Objective <= 18)				n/a (2016 full year)
PM10 Particulates				
Data capture rate (%):	100	95	100	98
Daily mean max (ug/m3):	51.2	50	45	51.2
Low days:	29	28	30	87
Moderate days:	1	1	0	2
High days:	0	0	0	0
Very high days:	0	0	0	0
Mean: (AQ5 Objective < 40ug/m3)				n/a (2016 full year)
Days where daily mean >50ug/m3: (AQ5 Objective <= 35)				n/a (2016 full year)
Annual data capture rate (%):				92 (2016 full year)

LondonAir Widget

Citizen Sense

London Air Widget from London Air Quality Network

We are trialling the London Air Widget, developed by the Environmental Research Group at King's College. It's a little widget which contains hourly and annual pollution maps, alerts, the forecast, videos, news and a brief guide, based on the [London Air](#) site. We have included the widget here in a blog post so that it can be viewed at a larger size, but the widget can also be included in the side bar of a website.

ABOUT PROJECTS PEOPLE

WRITING WALKS KITS

POLLUTION SENSING WILD SENSING URBAN SENSING

EVENTS RESOURCES ADVISORY



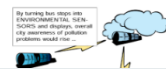
What "Matters" in Sensing Air Quality?

Even if it seems as though air quality might be a single entity "out there" to be sensed and measured, its enactment through ...



Indeterminate Data and Monitoring Practices at Extraction Sites

As part of the first phase of research into environmental monitoring, the Citizen Sense project has undertaken fieldwork to ...



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LondonAir Widget

The screenshot shows the London Air website interface. At the top, there's a navigation bar with 'London Air' logo, 'FORECAST' status (TODAY LOW, TOMORROW LOW), and 'KING'S COLLEGE LONDON' logo. Below the navigation bar, there are tabs for 'Air Pollution', 'Information', 'Monitoring', 'Tools', and 'Quick Links (Public)'. The 'Tools' menu is open, showing options like 'Apps & Widgets', 'Data Download', 'Graph Plotting', 'Data Feeds', 'Statistics', and 'Openair'. The 'London Air Widget Builder' option is highlighted with a red box. Below the menu, there are sections for 'Mobile Apps' (London Air on iPhone, London Air on Android) and 'London Air on Chrome'. At the bottom, there are sections for 'Follow Us' (Tweets by @LondonAir), 'Our newsletter', and 'Guide'.

The screenshot shows the 'London Air Widget Builder' interface. It has a header with the title and a color-coded bar. Below the header, there are configuration options for 'Option' and 'Description'. The 'Option' column lists settings like 'Width x Height', 'Start Authority', 'Start Tab', 'Hide Left Menu', and 'Hide Tabs'. The 'Description' column provides details for each option. A red arrow points from the 'London Air Widget Builder' option in the previous screenshot to this interface. Below the configuration options, there is a list of local authorities with their respective air quality levels (LOW, MODERATE, HIGH, vHIGH). At the bottom, there is an 'iframe snippet' for embedding the widget.

Option	Description
Width x Height	Width and height in pixels.
Start Authority	Will automatically expand the local authority section of the specified local authority id (LAIid).
Start Tab	Determines which tab of the left menu is selected at start. Note: if showAlertsOnNew is true and there are alerts then this setting will be overridden.
Hide Left Menu	If selected then the left menu will be hidden from the user.
Hide Tabs	Can be used to hide items on the left menu. Check the box for each item you wish to hide.

```

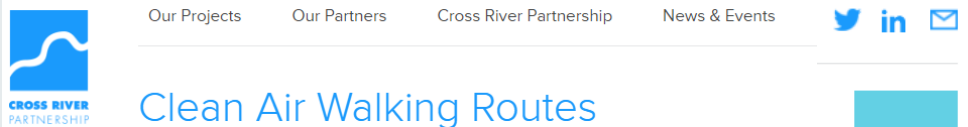
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src="https://www.londonair.org.uk/widget/main.html?
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```

Modem upgrades

- Investment in site hardware
- Existing modems and communications old and less well supported
- Future-proofing data collection
- Saving money for local authorities on line/SIM rental
- Now offering reduced call costs
- Over 100 modems sent out
- Continuing to offer modems for remaining suitable sites



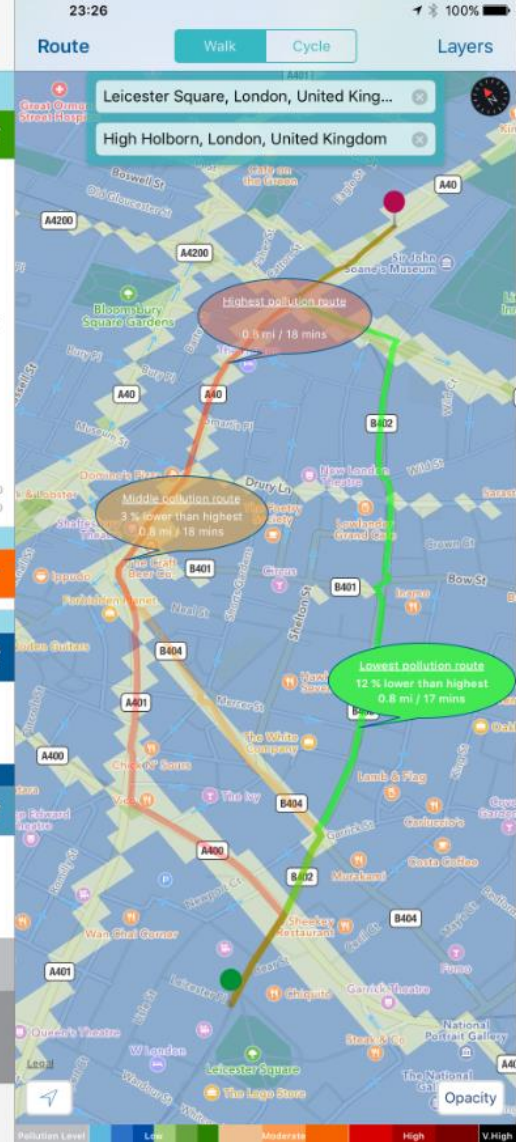
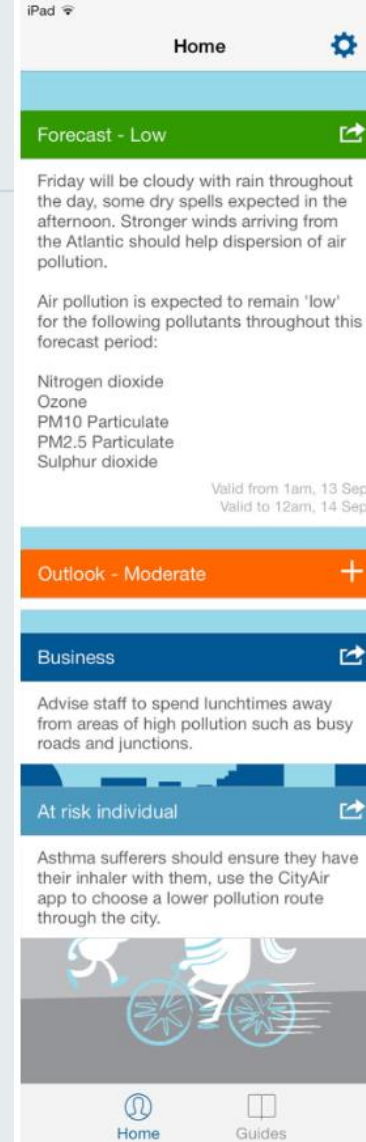
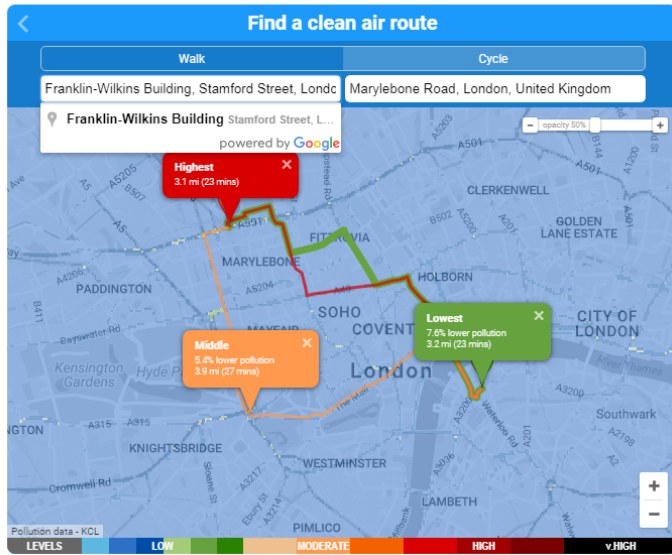
Low Pollution Routing



Clean Air Walking Routes

Exposure to air pollution can seriously affect our health. Luckily, simple changes to the way we commute and explore the city can lower exposure quite dramatically.

Use our clean air route finder to choose the cleanest route to your destination.



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Air Pollution Research

- Combined outputs help us learn more about air quality
 - Air quality trends – study commissioned for Paris, similar to work done in London
 - Wood burning
 - Particle composition – studies in Wales and Sheffield as well as ongoing measurements at Marylebone Road and North Kensington
 - Health effects

Marylebone Road supersite



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Summary and Conclusions

- London still struggling with meeting objectives – particularly NO_2 despite changes to vehicles
- Some promising signs in pollution trends but still a long way to go
- Black carbon reductions driving decrease in $\text{PM}_{2.5}$ – reduction in exhaust emissions
- O_3 virtually flat for the entire period – combined action needed on a larger scale
- However, at King's, we are continuing to make improvements to the LAQN! Feedback welcome

Thank You

Thank you to all of our LAQN partners who support the Network - Local Authorities, BIDs, the Environment Agency and TfL

Thank you to my colleagues in the Measurement Team who ensure the high quality of the data

References

www.londonair.org.uk

[http://www.londonair.org.uk/london/reports/2016 LAQN Summary Report.pdf](http://www.londonair.org.uk/london/reports/2016_LAQN_Summary_Report.pdf)

<http://www.sciencedirect.com/science/article/pii/S0269749116305966>

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/548148/vehicle-emissions-testing-programme-web.pdf