

A map of London showing the River Thames in light blue and a dense network of transport routes in various colors (red, orange, yellow, green, blue, purple, black). The routes are concentrated in the central urban area and radiate outwards. The background is a light beige color representing the land area.

# London Atmospheric Emissions Inventory 2013

LAEI Workshop 14<sup>th</sup> April 2016



**What is the LAEI?**

**Datasets**

**Emissions Summary**

**What's Changed?**

**Next Steps**

**What is the LAEI**

# LAEI 2013

## What it is...

- A full inventory of London's emissions, by source and locations for 2013.
- Future year emissions estimated for 2020, 2025 and 2030.
- 2008 and 2010 emissions recalculated with method updates.
- Provided inputs for London Toolkit Air Quality Model

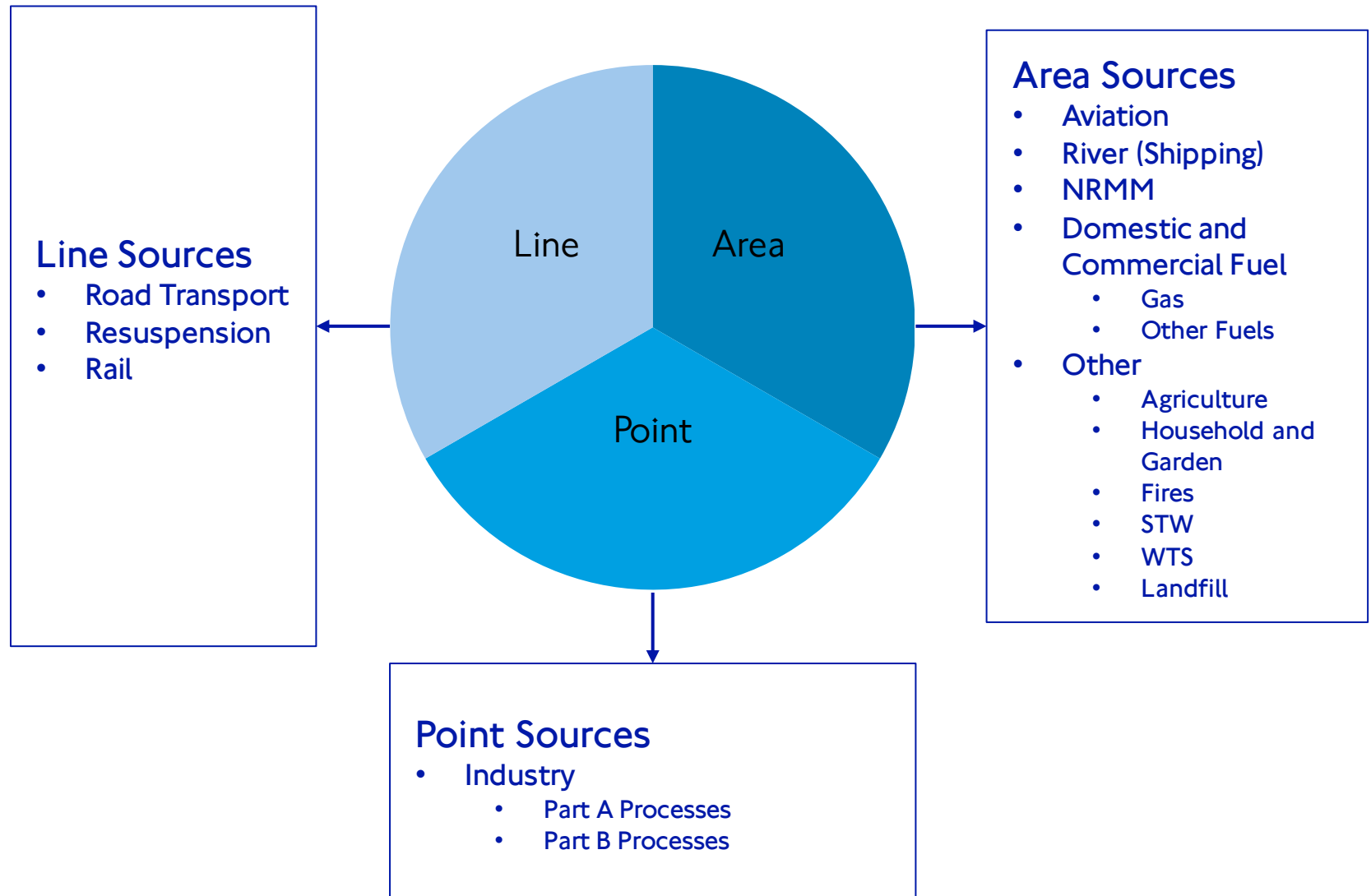
Analytical evidence base essential for policy development and planning:

- Strategic emissions modelling
- Concentrations modelling & air quality mapping
- Hotspot identification
- Source contributions
- Vehicle Fleet Compositions
- Traffic flows and vkm
- LEGGI

## Key users:

- Boroughs (LLAQM, Planning and Health)
- GLA and TfL policy and strategy development
- GLA/Defra – reporting to EC
- Consultancies, Developers (EIA & planning)
- Public Information systems (Kings – Nowcast, Cleaner Air For London)

# Sources



# Datasets and Emissions

# Datasets

- Emissions
  - Pre-calculated summaries by LAEI, GLA, Central, Inner, Outer, and by Borough
  - Detailed source breakdown across London
  - Gridded and Link Level
  - Dashboards for easy summaries

# Key Improvements

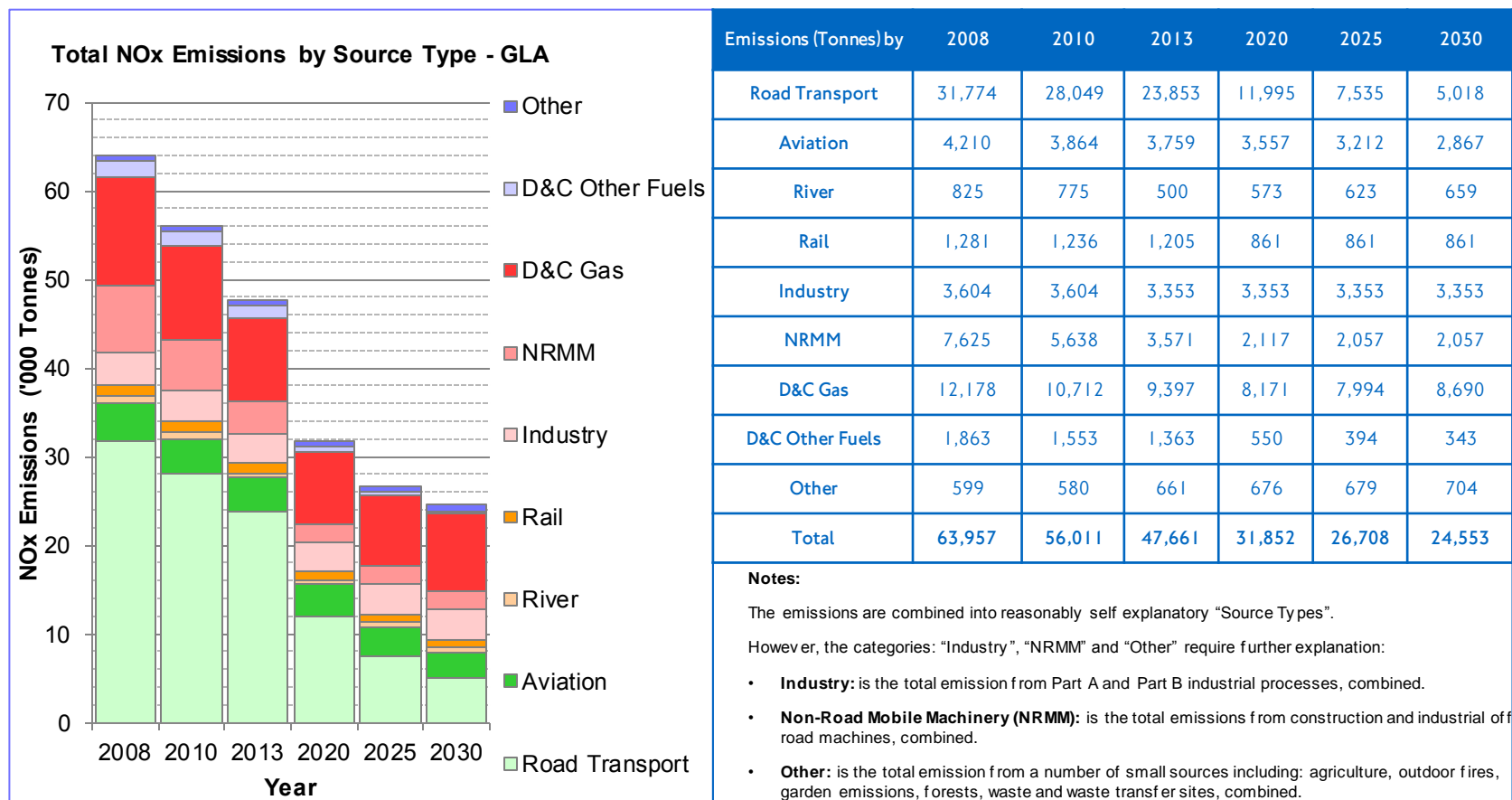
- Road Traffic Fleet Compositions updated
  - Aimed to represent baseline projections
  - LVAT data incorporated – ANPR derived unique and capture data
  - London specific relationship between stock and vkm by mode
  - London based Petrol/Diesel splits assumed (vs national)
  - Defra projections for BEV, HEV and PHEV incorporated
  - Bus fleet compositions are route based using iBus records
- Zonal Fleet Compositions developed
  - ULEZ fully incorporated into fleet compositions
  - Different fleet compositions for ULEZ, IRR, INNER and OUTER London.
  - ULEZ area consistent with ULEZ consultation.
- Road traffic emissions factors based on COPERT 4v11 (revised 2015)
  - NOx : changes only to Euro 5 and 6
  - PM : changed from DfT EFs to COPERT.
- Road Traffic Growth
  - Borough and M25 Motorway based growth



# Key Improvements

- Shipping
  - Passenger in-port emissions included
  - Lloyds shipping registered used to update fleet and movements
  - Revised emissions factors accounting for MARPOL convention
- Rail
  - NAEI emissions factors used
  - ORR model and forecasts (Delta rail no longer available)
  - Crossrail included
- Domestic and Commercial Gas
  - Emissions factors based on UK NAEI (2013)
  - GLA Boilers work providing Borough based boiler age adjusted EFs
  - Revised population growth accounted
- NRMM improved further
  - Spatial distribution based on GLA planning database and London plan
  - NRMM SPG incorporated (80% compliance in CAZ, 50% elsewhere)
  - Revised assumptions between proportion of construction emissions in London and UK

# Dashboards – NO<sub>x</sub> Emissions (GLA)

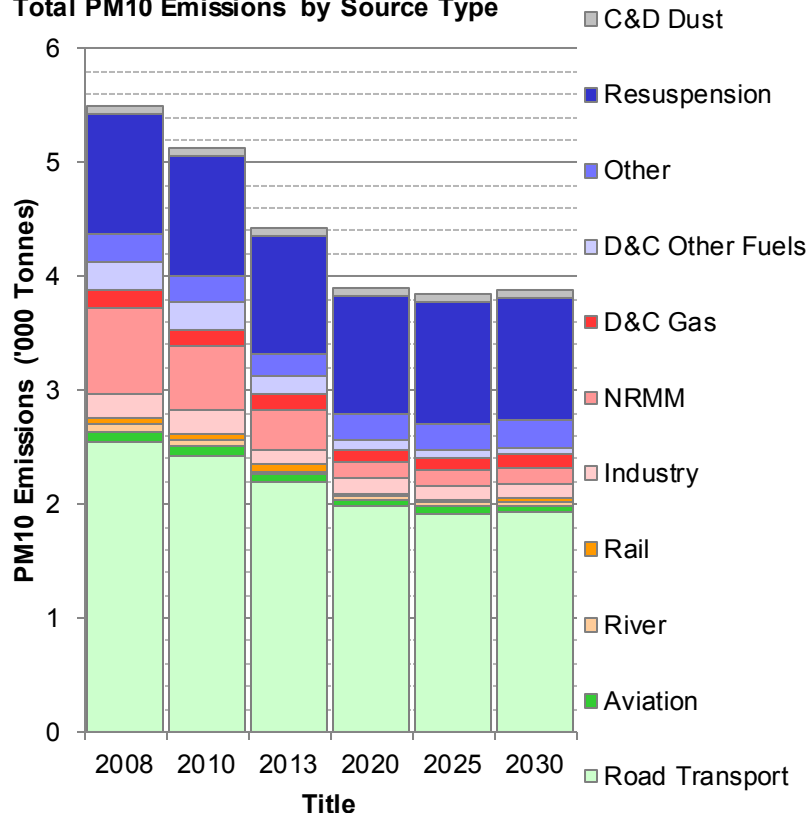


NO<sub>x</sub> - GLA      % Change in Emissions

Year	Road Transport	Aviation	River	Rail	Industry	NRMM	D&C Gas	D&C Other Fuels	Other	Grand Total
2008										
2010	-12%	-8%	-6%	-3%	0%	-26%	-12%	-17%	-3%	-12%
2013	-25%	-11%	-39%	-6%	-7%	-53%	-23%	-27%	10%	-25%
2020	-62%	-16%	-31%	-33%	-7%	-72%	-33%	-70%	13%	-50%
2025	-76%	-24%	-24%	-33%	-7%	-73%	-34%	-79%	13%	-58%
2030	-84%	-32%	-20%	-33%	-7%	-73%	-29%	-82%	18%	-62%

# Dashboards – PM<sub>10</sub> Emissions (GLA)

Total PM10 Emissions by Source Type



Emissions (tonnes) by	2008	2010	2013	2020	2025	2030
Road Transport	2,552	2,424	2,198	1,978	1,919	1,936
Aviation	88	84	66	63	58	53
River	66	50	28	31	35	37
Rail	58	58	57	22	22	22
Industry	207	210	132	132	132	132
NRMM	755	567	354	139	139	139
D&C Gas	154	143	128	110	107	115
D&C Other Fuels	254	249	164	82	62	52
Other	241	225	197	227	240	250
Resuspension	1,057	1,051	1,031	1,048	1,062	1,078
C&D Dust	66	61	65	65	65	65
<b>Total</b>	<b>5,499</b>	<b>5,122</b>	<b>4,420</b>	<b>3,897</b>	<b>3,840</b>	<b>3,880</b>

## Notes:

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

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

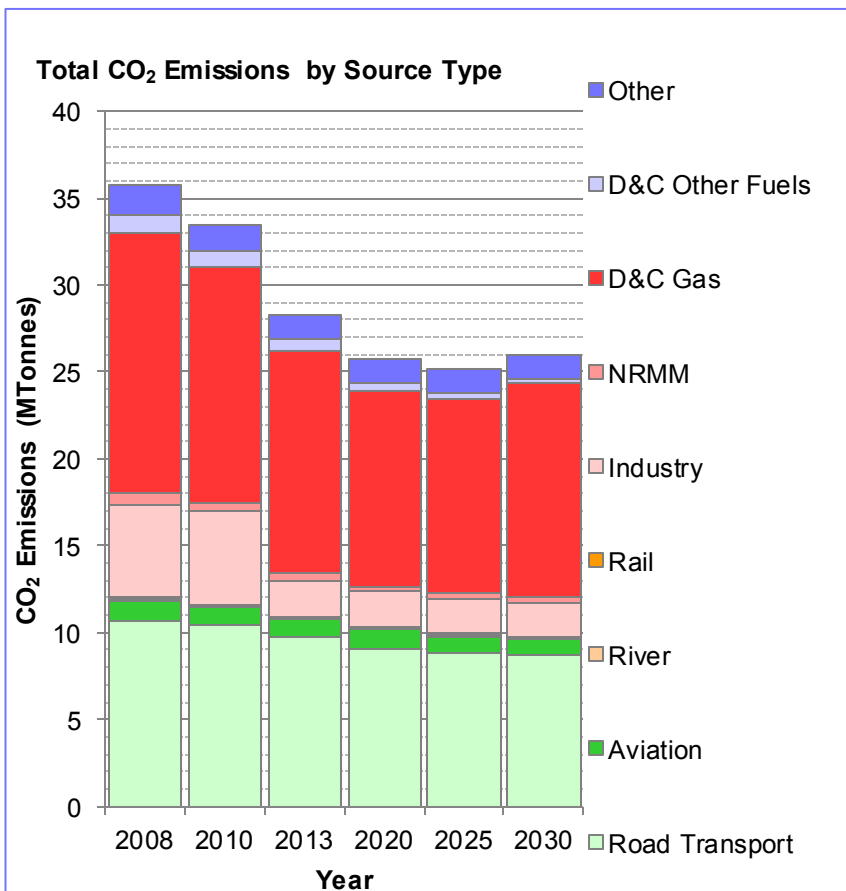
- Industry:** is the total emission from Part A and Part B industrial processes, combined.
- Non-Road Mobile Machinery (NRMM):** is the total emissions from construction and industrial off road machines, combined.
- Other:** is the total emission from a number of small sources including: agriculture, outdoor fires, garden emissions, forests, waste and waste transfer sites, combined.

PM10 - GLA % Change in Emissions

Year	Road Transport	Aviation	River	Rail	Industry	NRMM	D&C Gas	D&C Other Fuels	Other	Resuspension	C&D Dust	Grand Total
2008												
2010		-5%	-5%	-24%	-1%	-1%	-25%	-7%	-2%	-7%	-1%	-7%
2013	-14%	-26%	-57%	-2%	-36%	-53%	-17%	-35%	-18%	-2%	-1%	-20%
2020	-23%	-29%	-53%	-62%	-36%	-82%	-29%	-68%	-6%	-1%	-1%	-29%
2025	-25%	-34%	-47%	-62%	-36%	-82%	-31%	-76%	-1%	-1%	-1%	-30%
2030	-24%	-40%	-43%	-62%	-36%	-82%	-25%	-80%	-4%	-2%	-1%	-29%

# Dashboards – CO<sub>2</sub> Emissions (GLA)

Excludes Electric Rail and Electricity Generation



Emissions (tonnes) by	2008	2010	2013	2020	2025	2030
Road Transport	7,337,105	7,146,030	6,651,511	6,106,822	5,854,313	5,728,930
Aviation	1,150,455	1,054,417	969,357	1,034,119	952,887	871,654
River	46,867	49,843	30,630	35,270	38,282	40,485
Rail	958,455	937,052	876,001	598,833	433,666	293,405
Industry	5,127,617	5,127,617	1,935,825	1,935,825	1,935,825	1,935,825
NRMM	700,869	550,077	521,681	309,204	300,432	300,432
D&C Gas	12,959,735	11,956,119	11,186,471	9,941,950	9,854,826	10,777,333
D&C Other Fuels	878,019	738,171	657,321	281,622	207,274	184,927
Other	1,005,118	819,657	758,308	764,539	767,830	770,637
<b>Total</b>	<b>30,164,241</b>	<b>28,378,985</b>	<b>23,587,104</b>	<b>21,008,184</b>	<b>20,345,335</b>	<b>20,903,628</b>

## Notes:

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

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

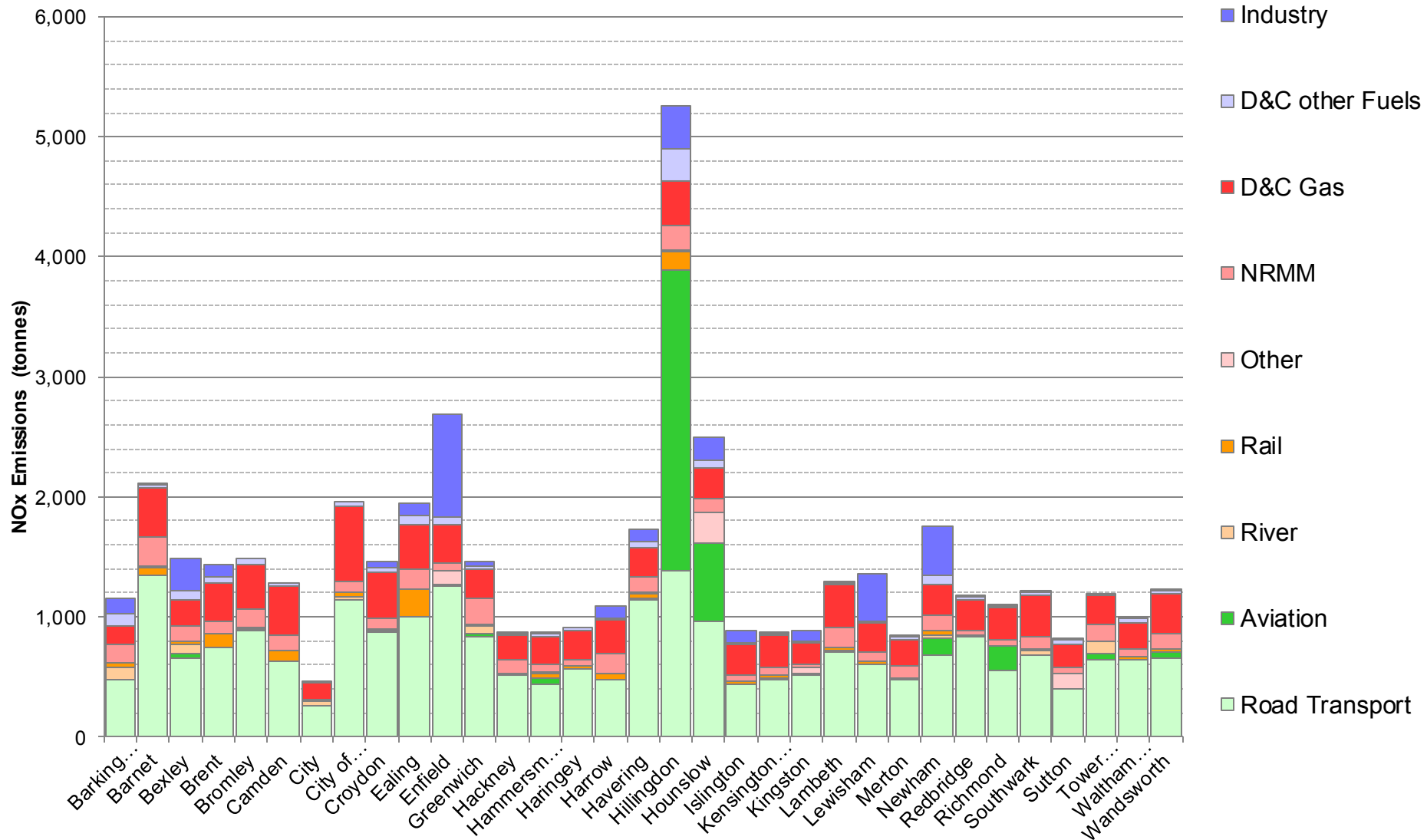
- Industry:** is the total emission from Part A and Part B industrial processes, combined.
- Non-Road Mobile Machinery (NRMM):** is the total emissions from construction and industrial off road machines, combined.
- Other:** is the total emission from a number of small sources including: agriculture, outdoor fires, garden emissions, forests, waste and waste transfer sites, combined.

## CO<sub>2</sub> - GLA % Change in Emissions

Year	Road Transport	Aviation	River	Rail	Industry	NRMM	D&C Gas	D&C Other Fuels	Other	Grand Total
2008										
2010	-2%	-8%	-5%	-3%	0%		-22%	-9%	-14%	-18%
2013	-9%	-15%	-8%	-2%	-62%		-26%	-15%	-24%	-23%
2020	-15%	-10%	0%	-18%	-62%	-56%	-24%	-66%	-22%	-28%
2025	-17%	-17%	-6%	-18%	-62%	-57%	-25%	-74%	-22%	-30%
2030	-19%	-24%	-10%	-18%	-62%	-57%	-18%	-77%	-21%	-27%

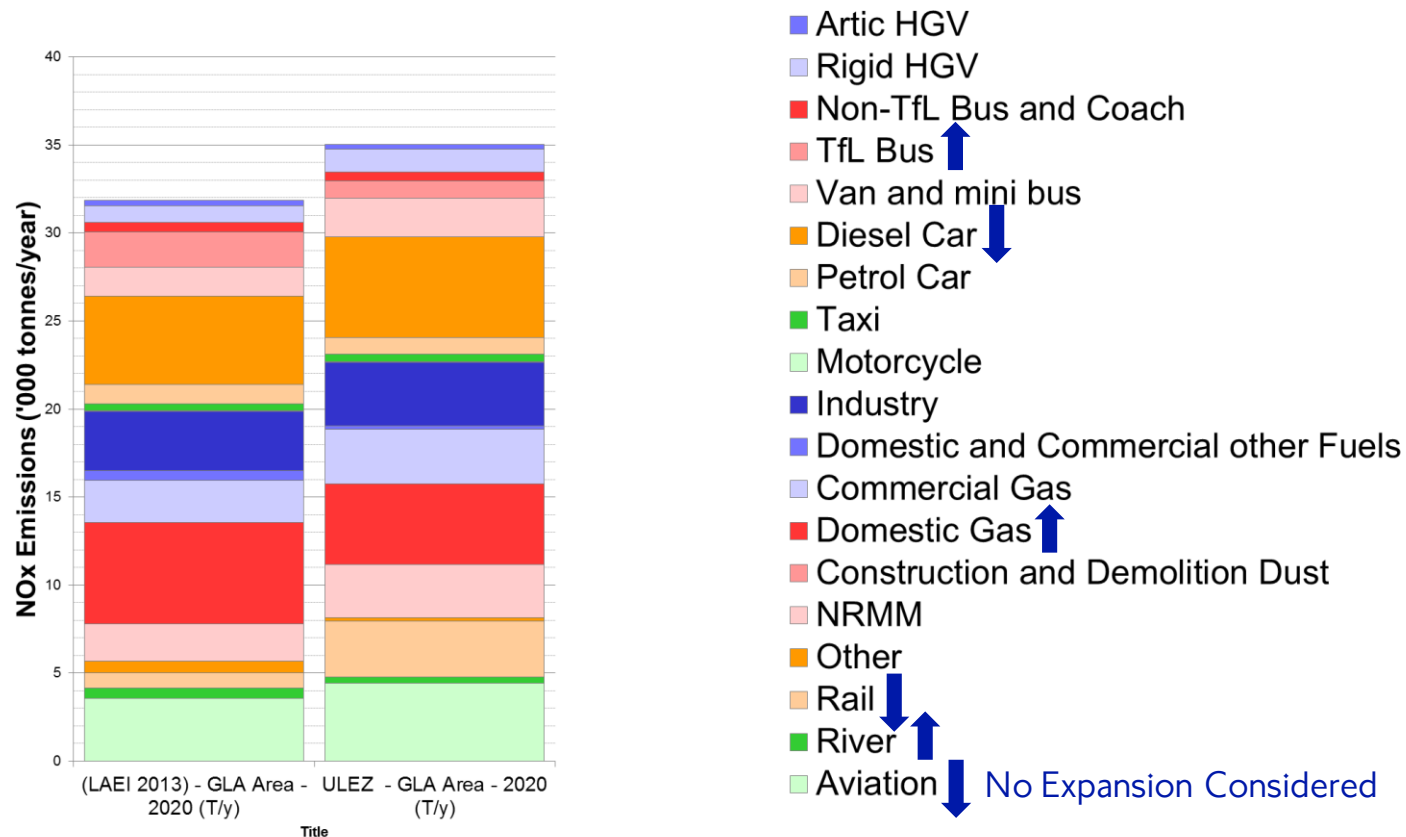
# Borough Overview – NO<sub>x</sub>

NO<sub>x</sub> Emissions by Borough - 2013

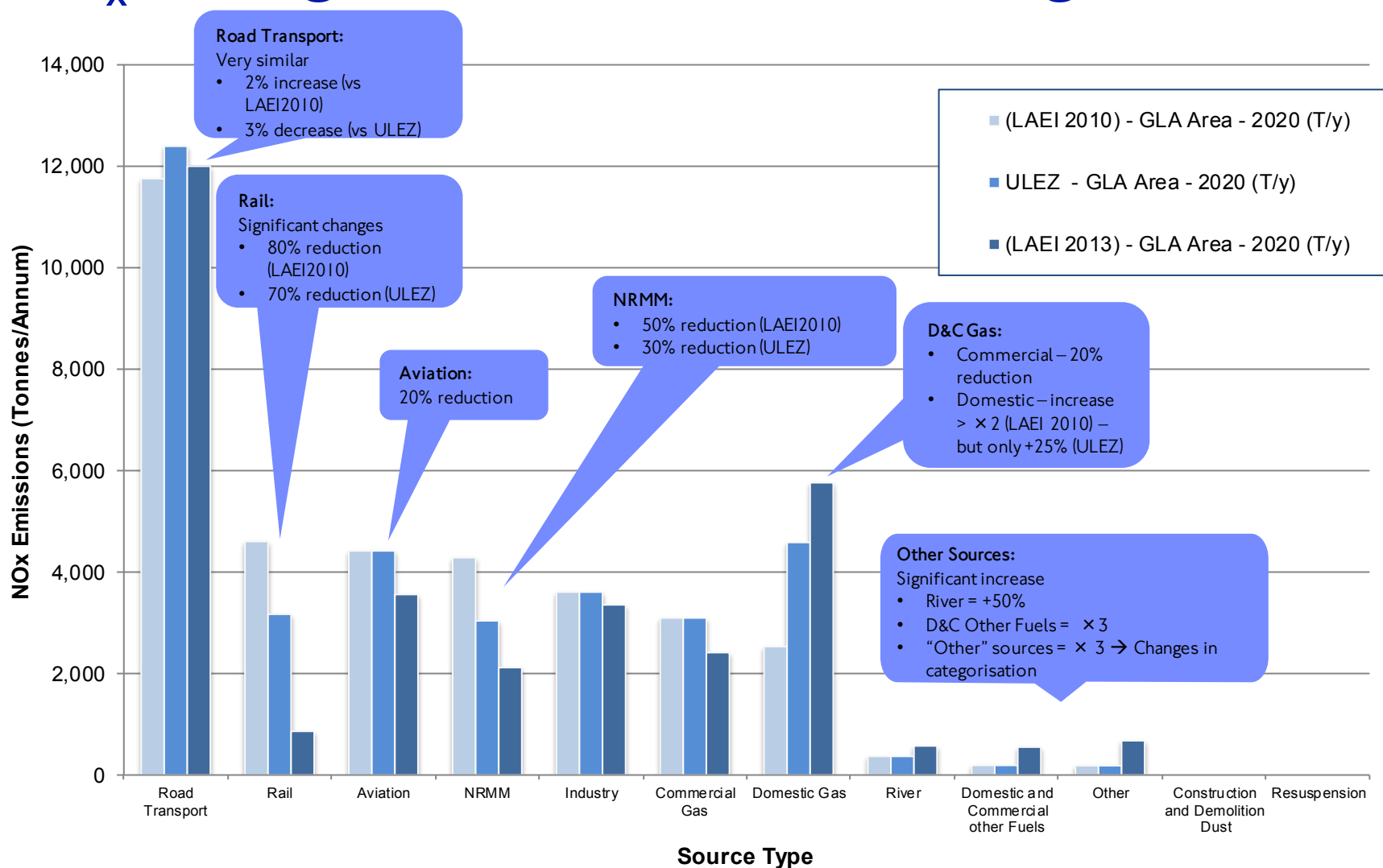


# What has changed? (Compared to ULEZ)

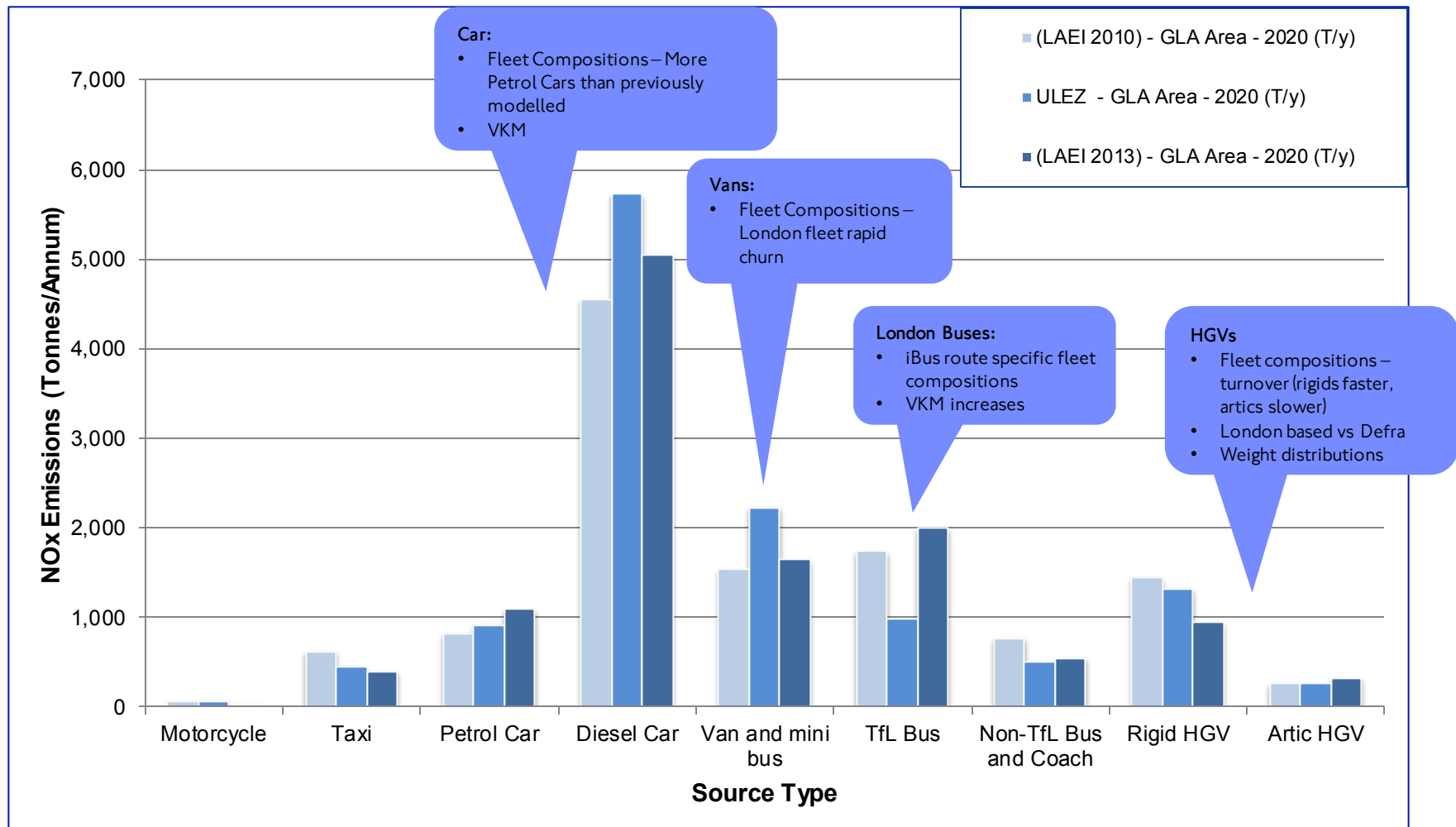
- Total NOx emissions 9% lower in 2020 than ULEZ



# NO<sub>x</sub> Changes – GLA (Method Changes)

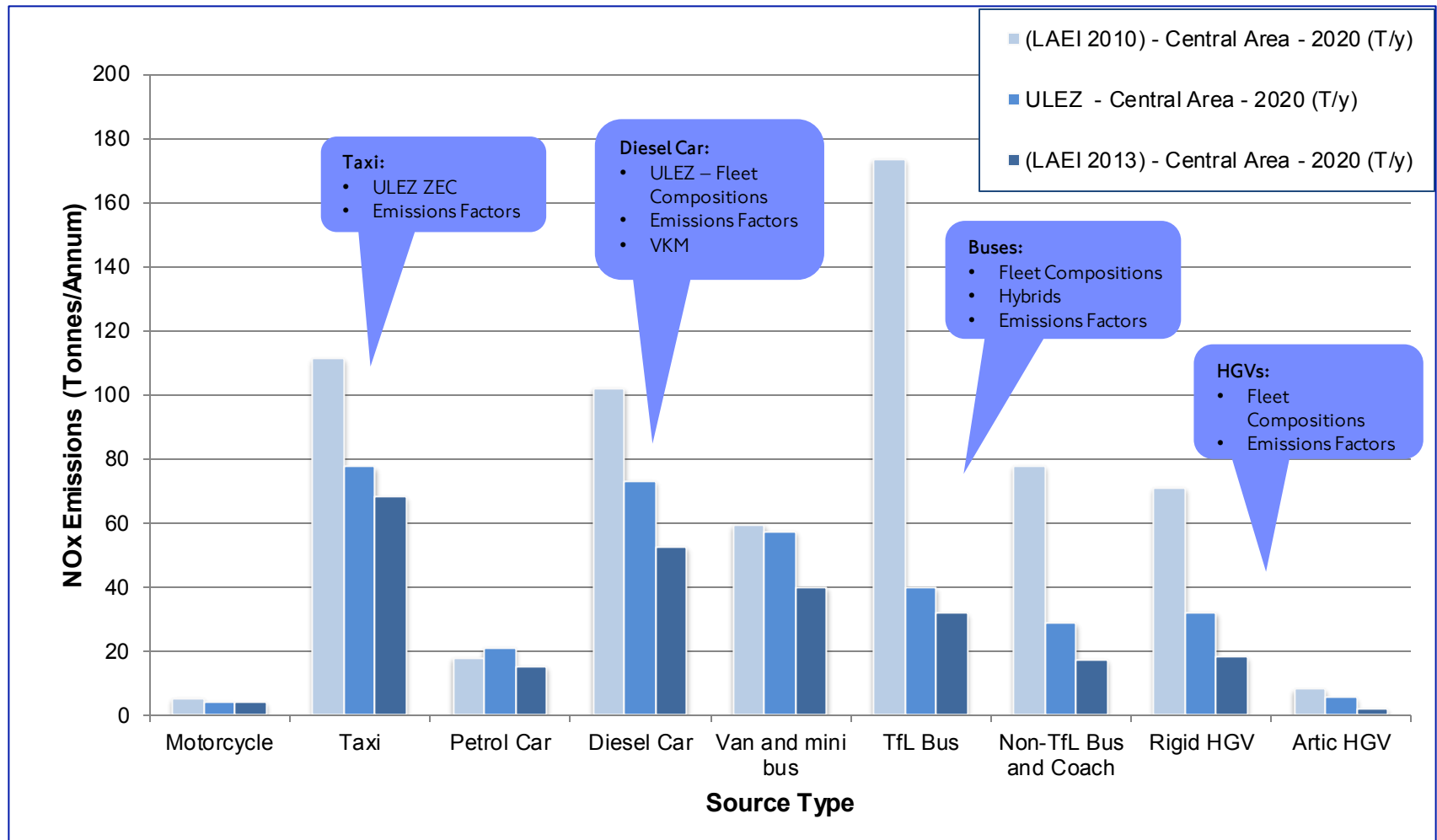


# NO<sub>x</sub> Changes – Road Transport (GLA) – Method Changes



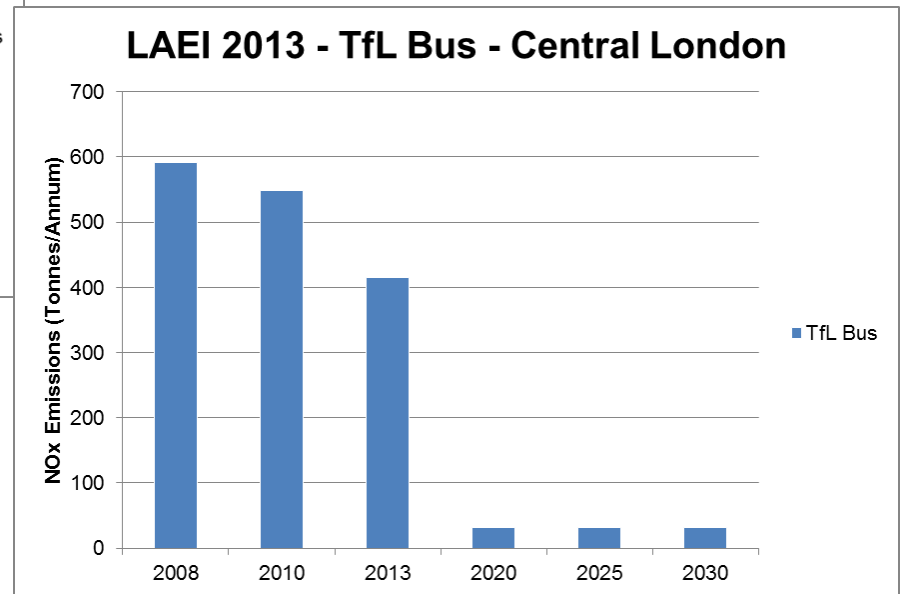
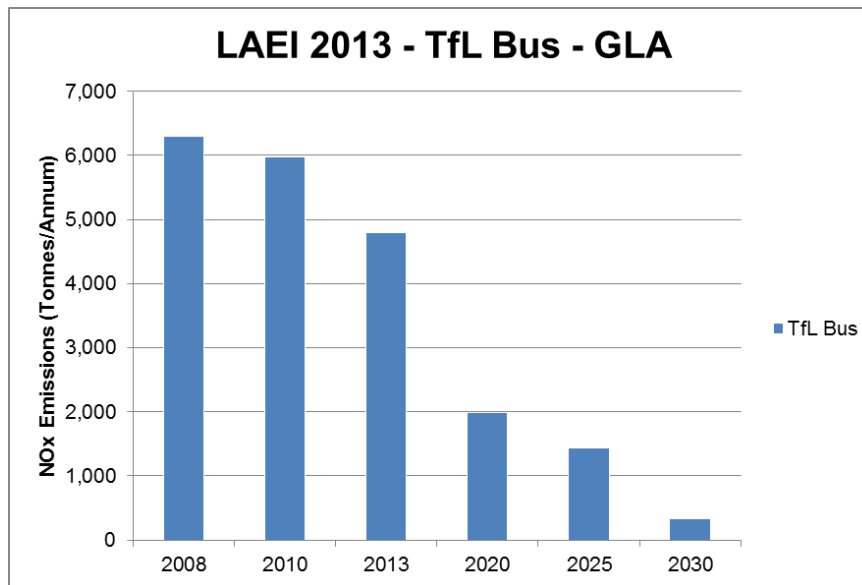


# NO<sub>x</sub> Changes – Road Transport (Central) (Method Changes)

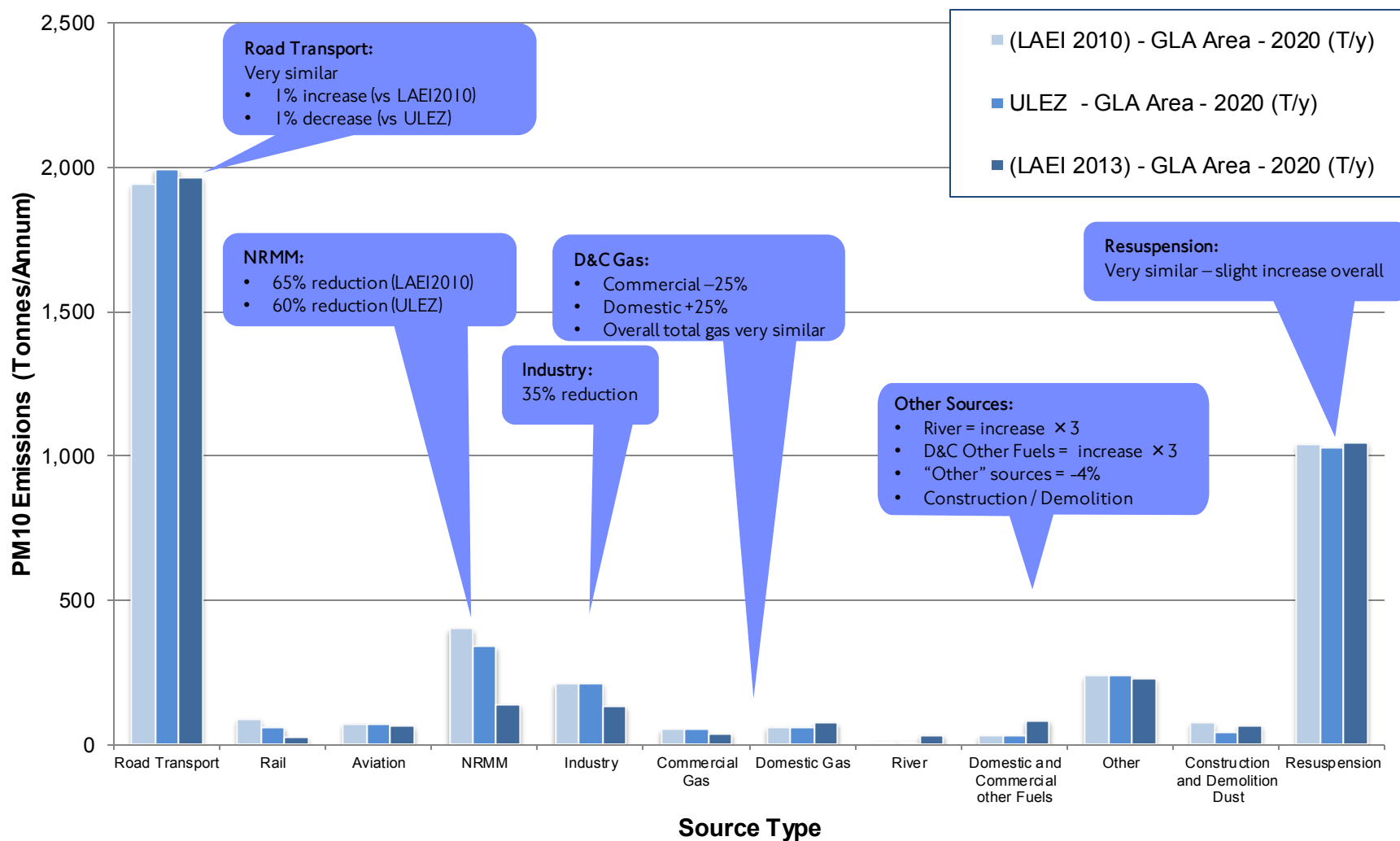


# TfL Bus NOx Emissions Trends

- Significant reductions reflecting ongoing bus emissions improvement programme



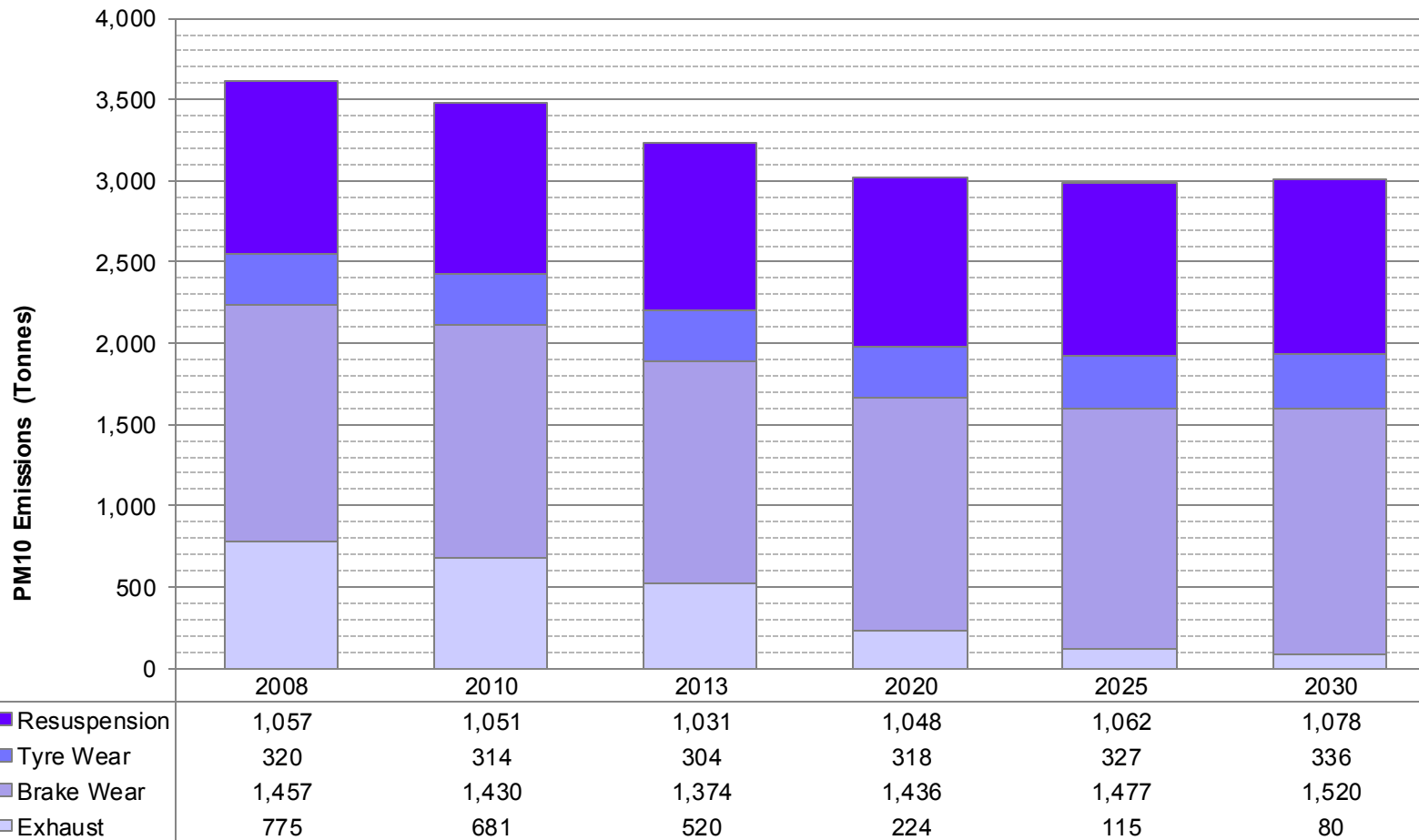
# PM<sub>10</sub> Changes (Method Changes)



# PM<sub>10</sub> Emissions – Road Transport

LAEI2013

Road Transport PM10 Emissions - Area = GLA

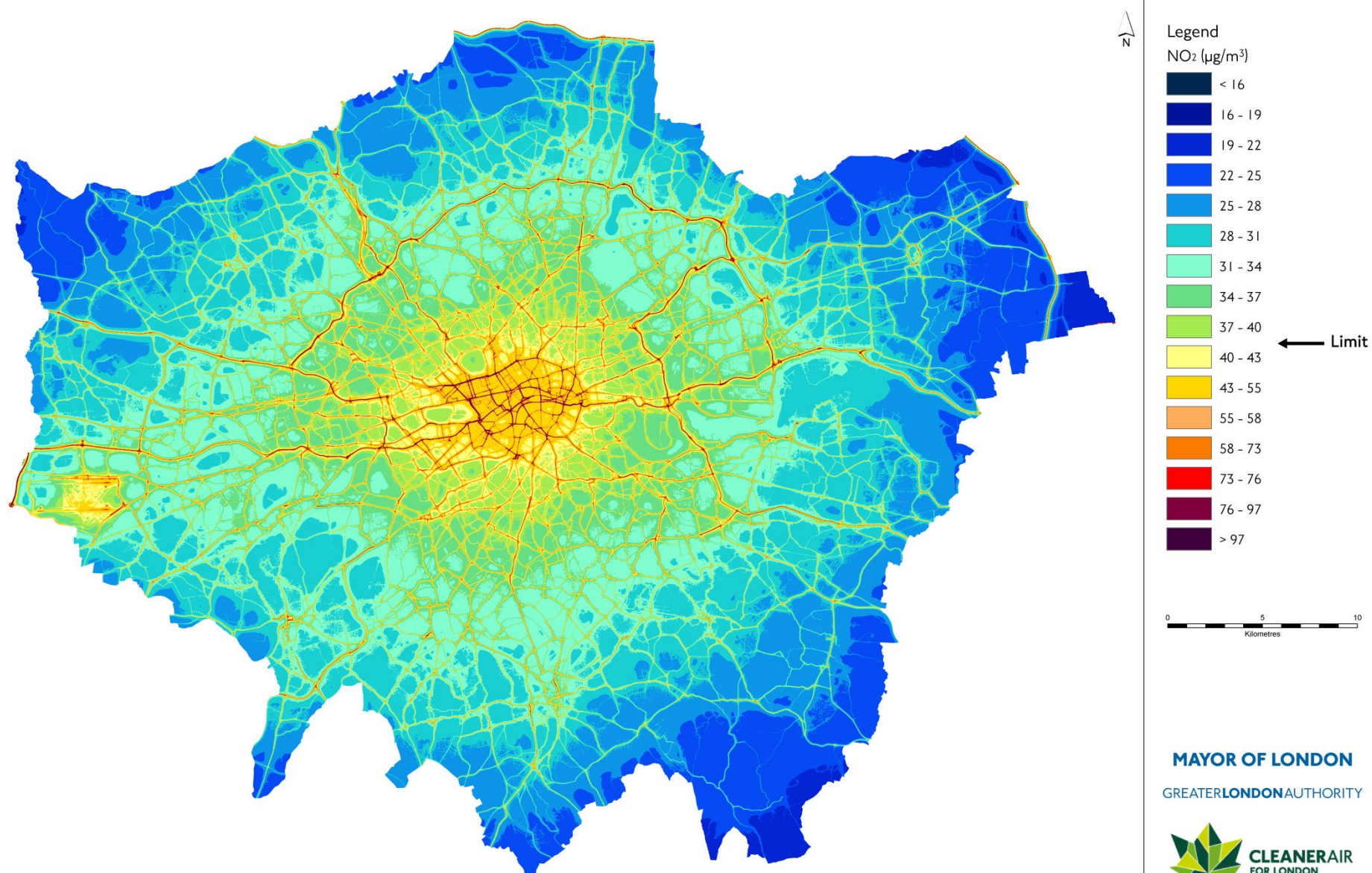


# Datasets

- Emissions
  - Pre-calculated summaries by LAEI, GLA, Central, Inner, Outer, and by Borough
  - Detailed source breakdown across London
  - Dashboards
- Link level traffic flows and emissions
  - Excel
  - GIS
  - VKM Summaries

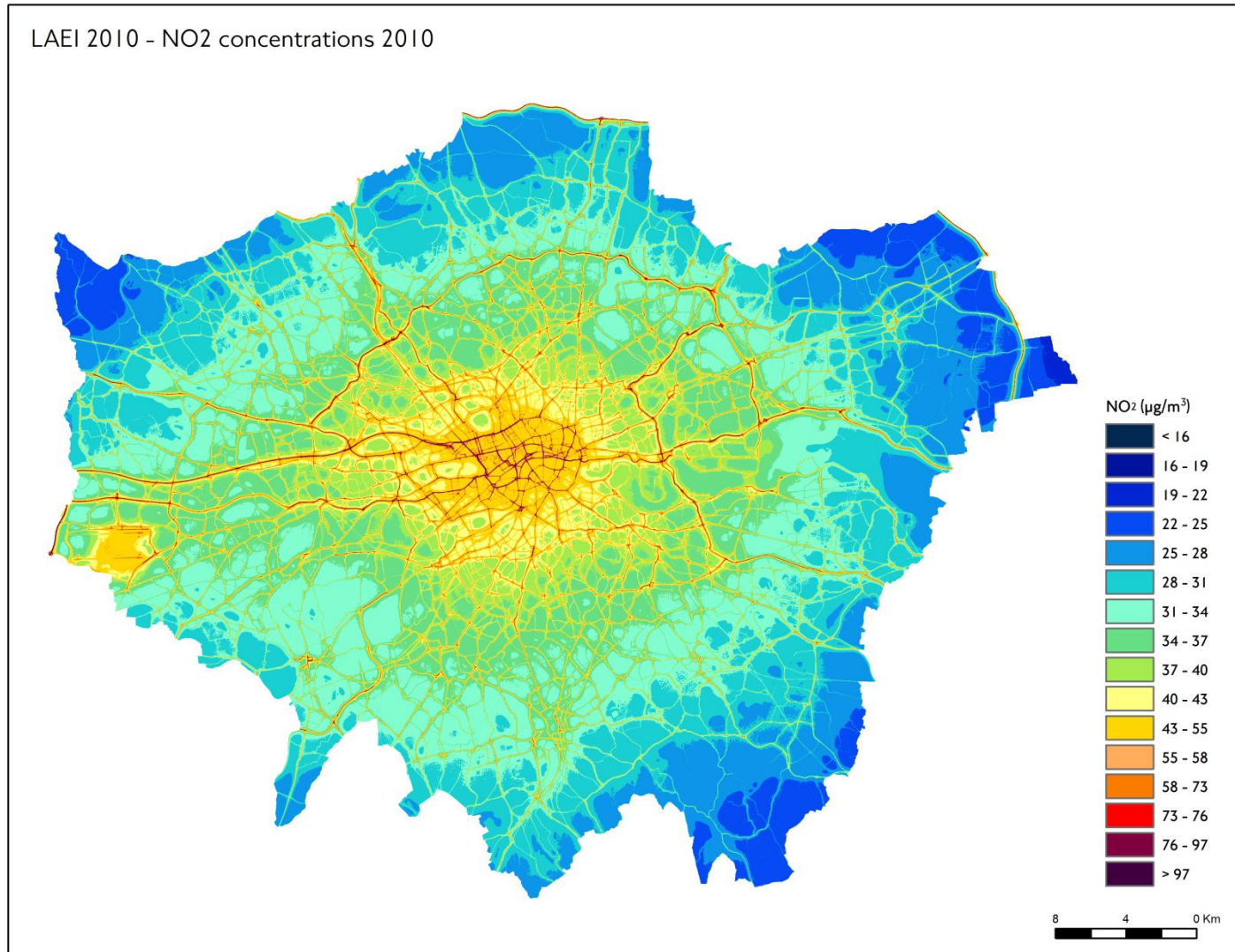
# Datasets

- Emissions
  - Pre-calculated summaries by LAEI, GLA, Central, Inner, Outer, and by Borough
  - Detailed source breakdown across London
  - Dashboards
- Link level traffic flows and emissions
  - Excel
  - GIS
  - VKM Summaries
- Concentration maps
  - Images (easy to paste)
  - GIS files
  - Raw data files



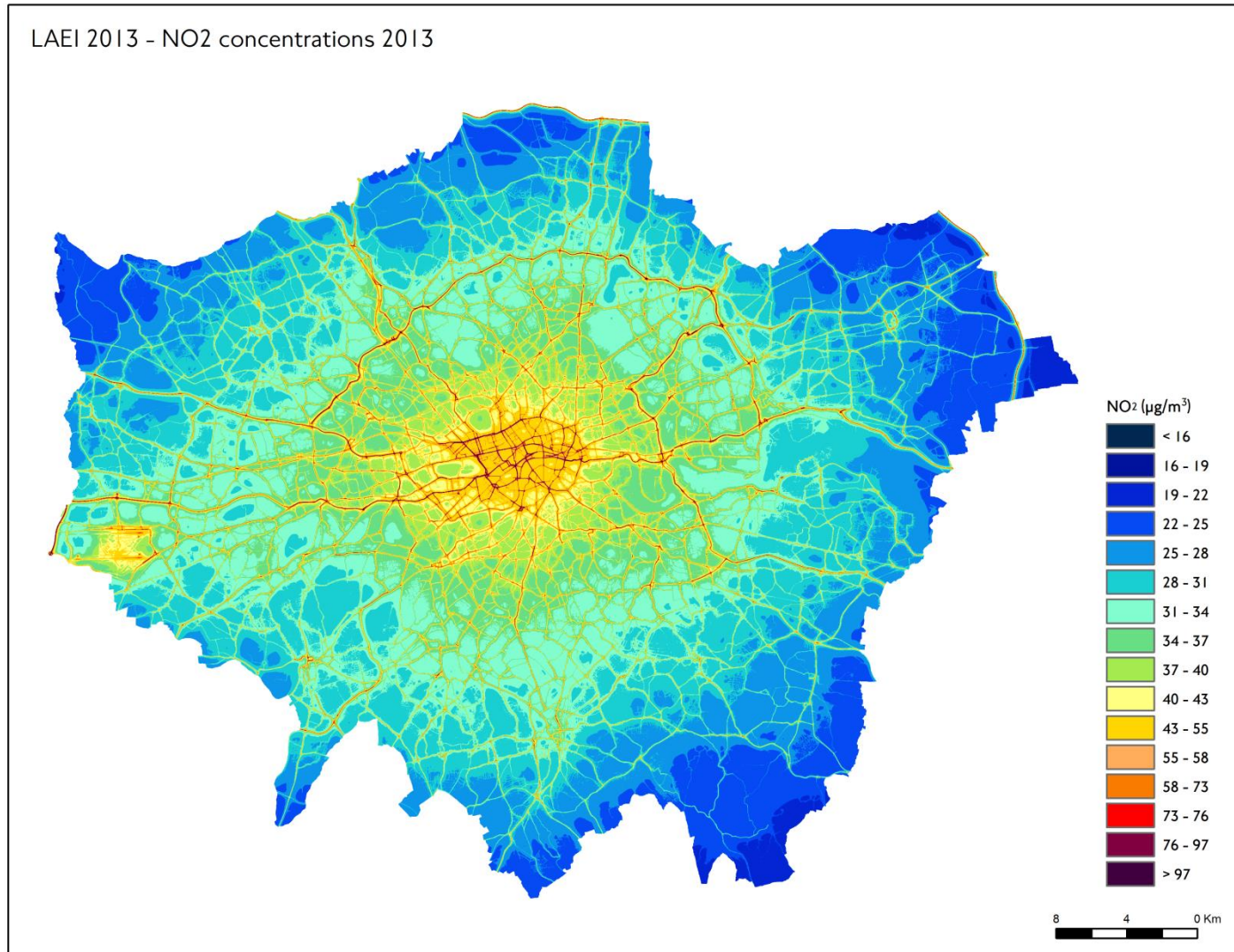


# How have concentration maps changed?

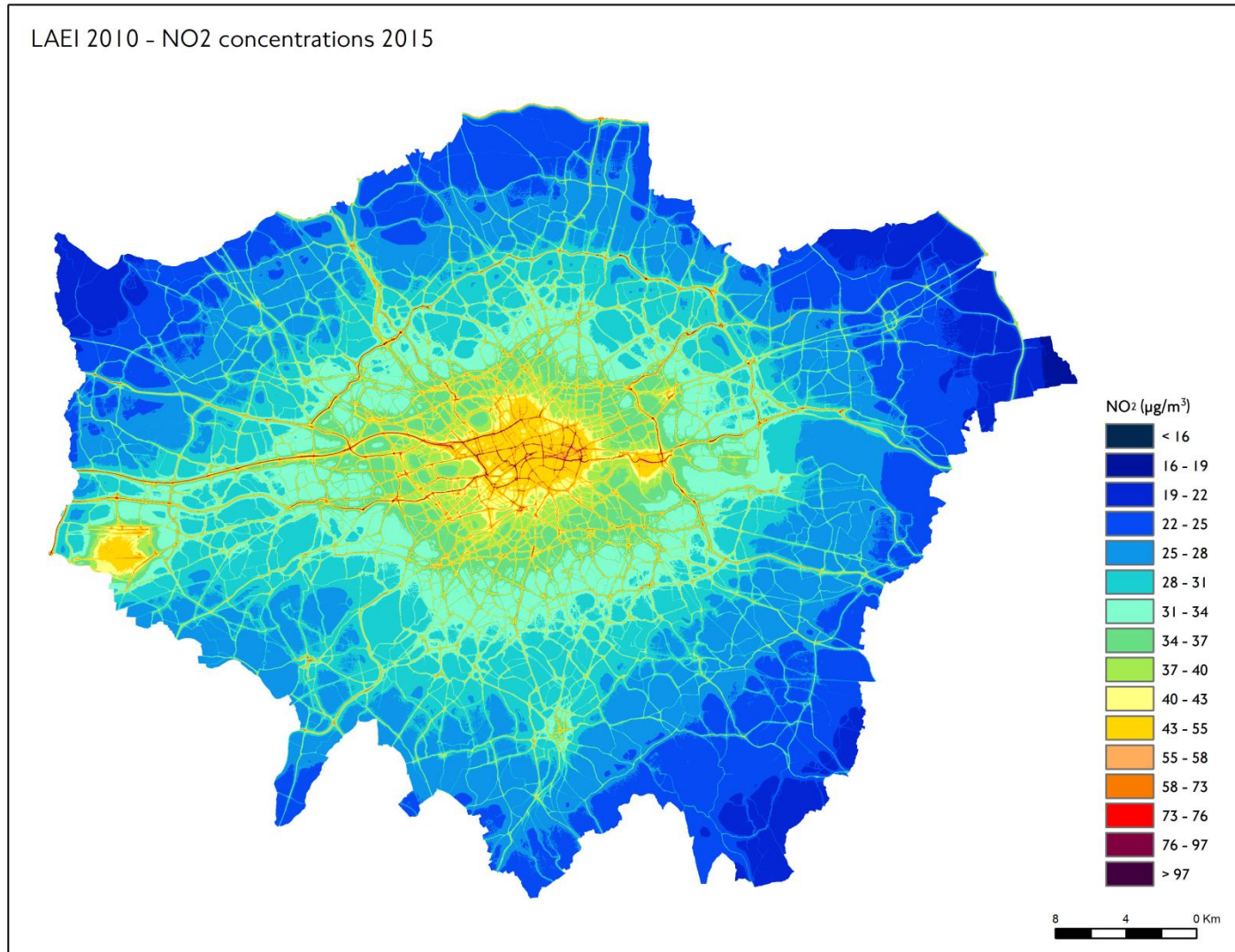




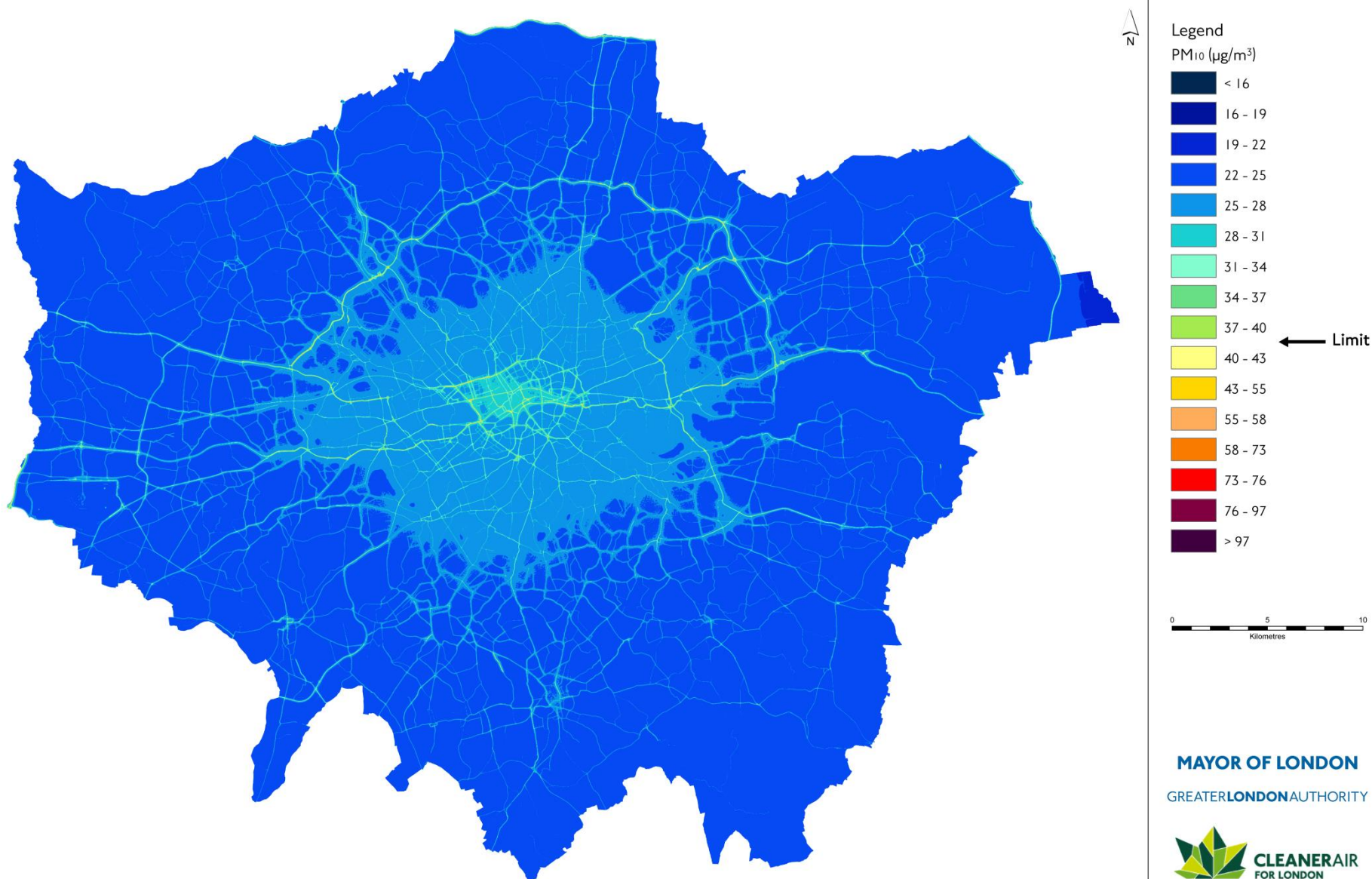
# How have concentration maps changed?



# How have concentration maps changed?

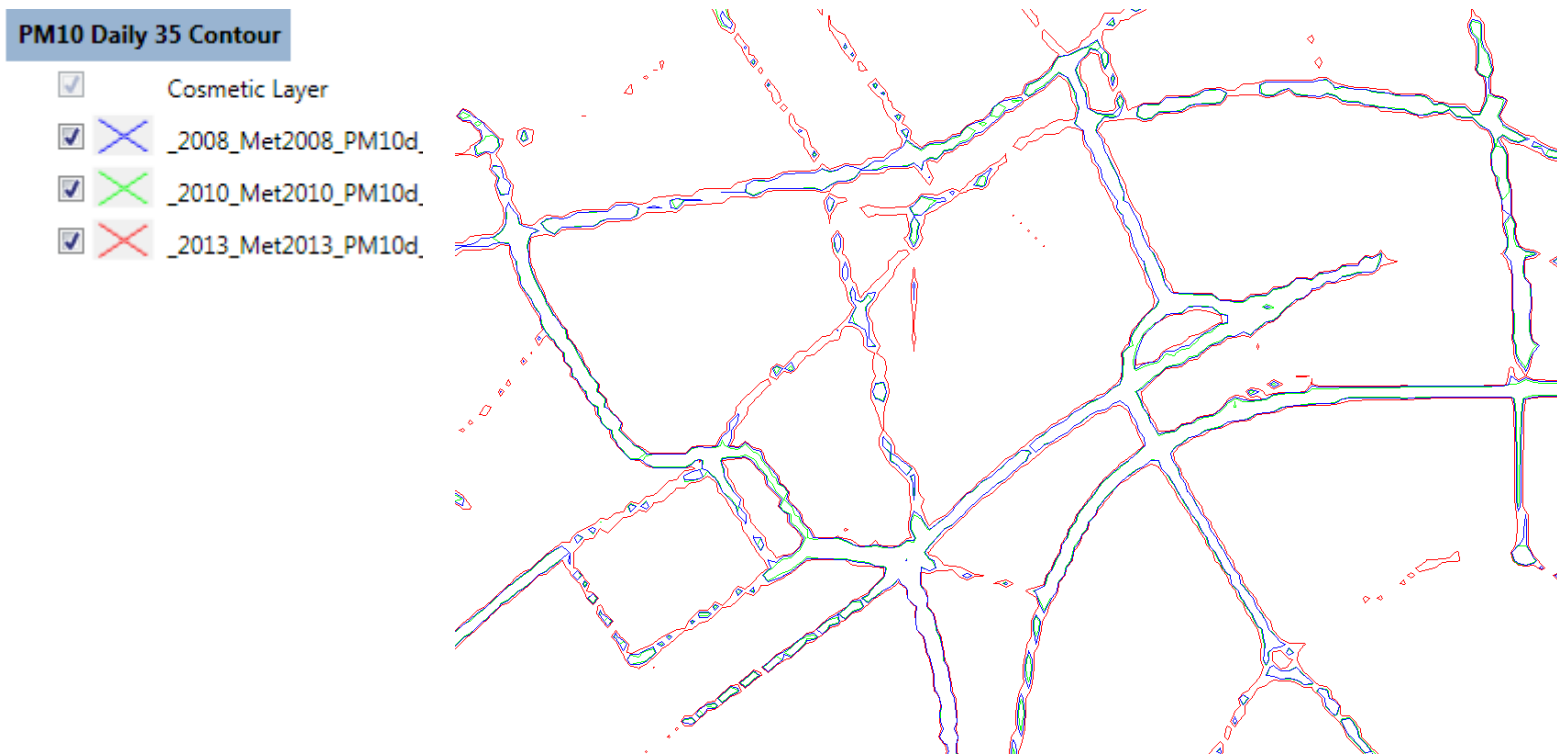






# PM10 Compliance

- Defra report UK compliance for  $PM_{10}$
- London modelling still shows local issues due to detailed level of modelling for London



# Datasets

- Emissions
  - Pre-calculated summaries by LAEI, GLA, Central, Inner, Outer, and by Borough
  - Detailed source breakdown across London
  - Dashboards
- Link level traffic flows and emissions
  - Excel
  - GIS
  - VKM Summaries
- Concentration maps
  - Images (easy to paste)
  - GIS files
  - Raw data files
- LLAQM Packages
  - Borough maps
  - Exceedence maps and population exceeding
  - Source Apportionment tools



# Thank you

Yvonne Brown – 0207 027 9792  
[yvonnebrown@tfl.gov.uk](mailto:yvonnebrown@tfl.gov.uk)



**TRANSPORT  
FOR LONDON**  
EVERY JOURNEY MATTERS