

# Improving London's Air Quality

London's Air Pollution and Emissions Story

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**MAYOR OF LONDON**

# Air quality in history





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# Why is air quality so important?



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## Public Health

- In 2015 the GLA published its assessment of the combined health impacts of particulate matter (PM<sub>2.5</sub>) and nitrogen dioxide (NO<sub>2</sub>). This estimated that the equivalent of 9,500 deaths were caused by long-term exposure to air pollution.
- A baby born in London in 2010 who was exposed to 2010's air quality for its entire life would lose 2.2 years (if male) and 2 years (if female) of life expectancy.

## Fairness

- The health impacts associated with air pollution fall disproportionately on our most vulnerable communities, affecting the poorest and those from minority ethnic groups more acutely. Tackling air pollution is about social justice and there is an urgent need to do more to tackle public health inequalities.

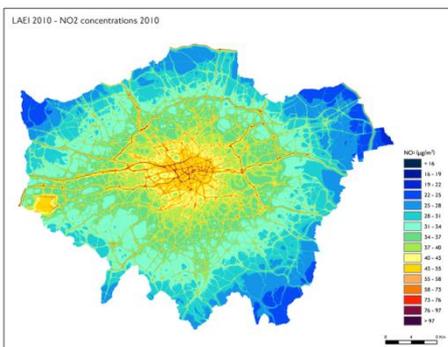
## Legal compliance

- Like most major European cities, London does not meet the legal requirements for some pollutants (mainly Nitrogen Dioxide (NO<sub>2</sub>) but issues remain with Particulate Matter).

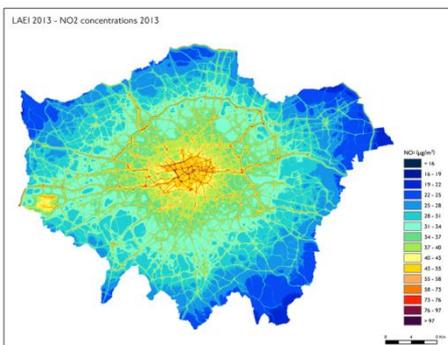
# Recent trends in London's air quality



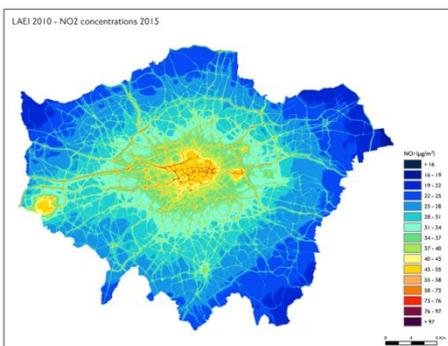
**CLEANER AIR**  
FOR LONDON



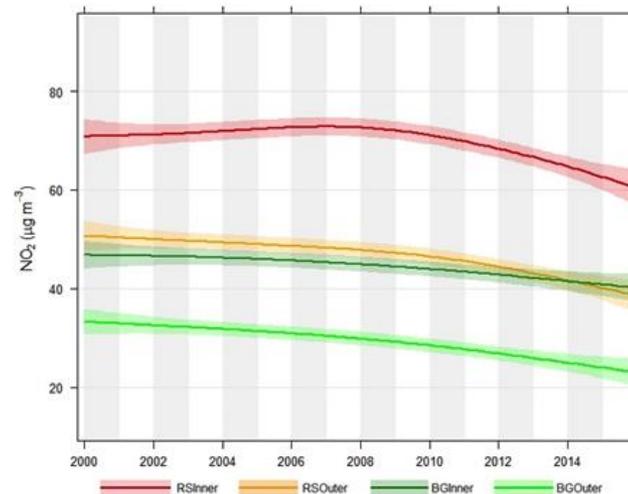
NO<sub>2</sub> 2010



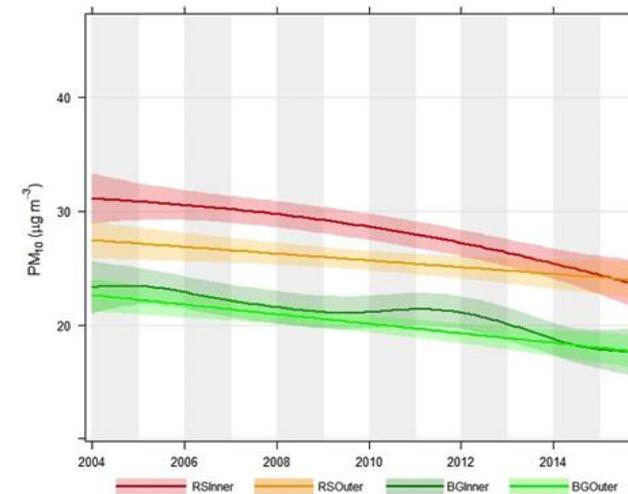
NO<sub>2</sub> 2013



NO<sub>2</sub> 2015

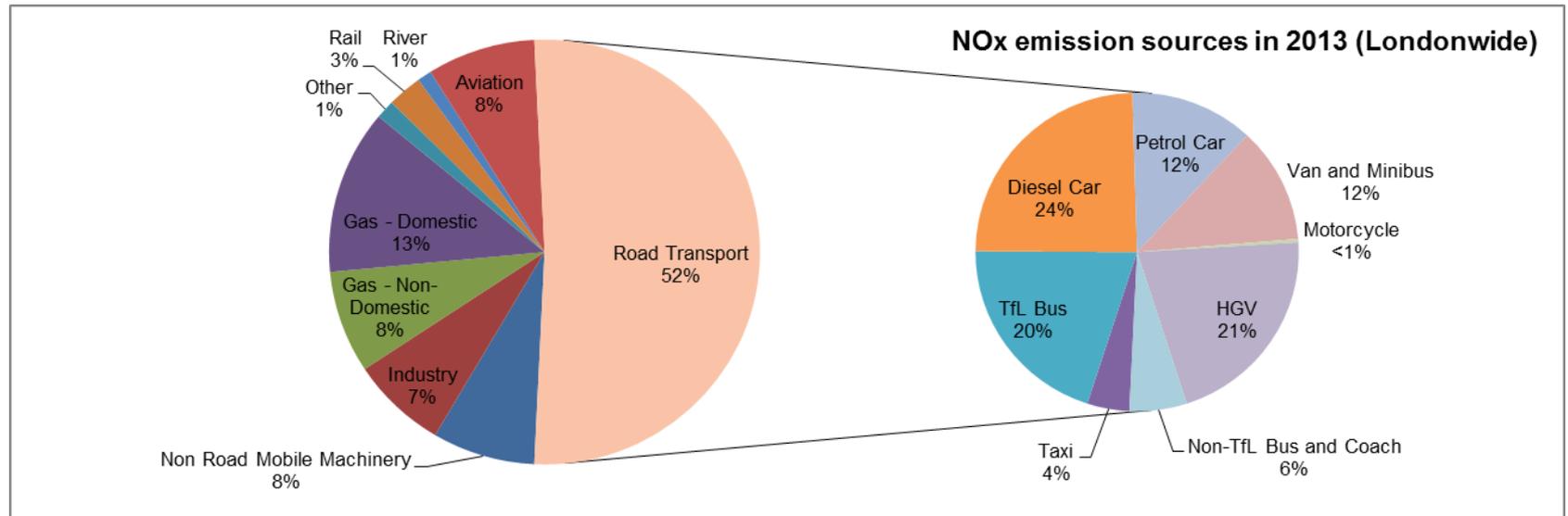


NO<sub>2</sub> trend  
2000-  
2015

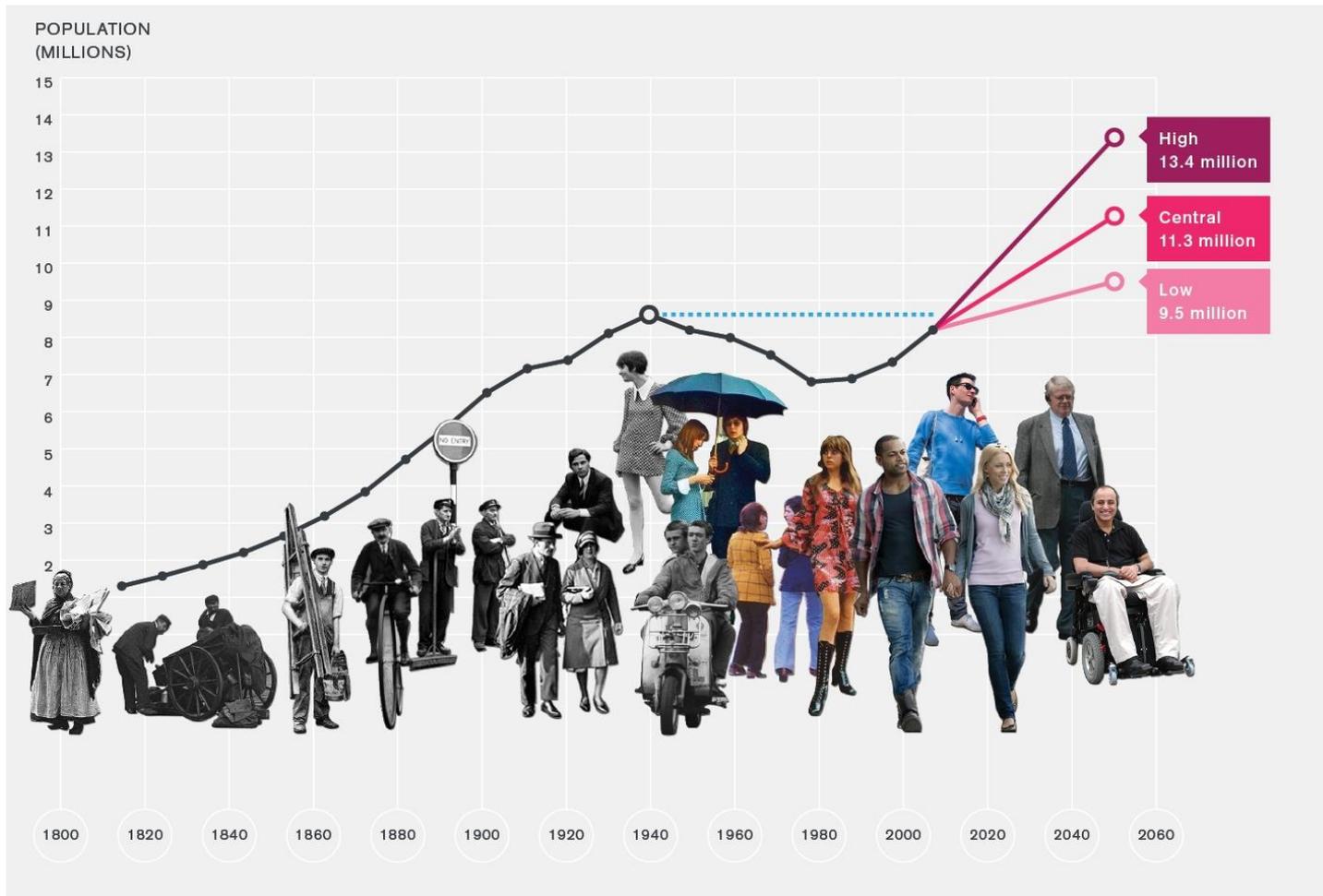


PM<sub>10</sub>  
trend  
2004-  
2015

# Major NOx emissions sources



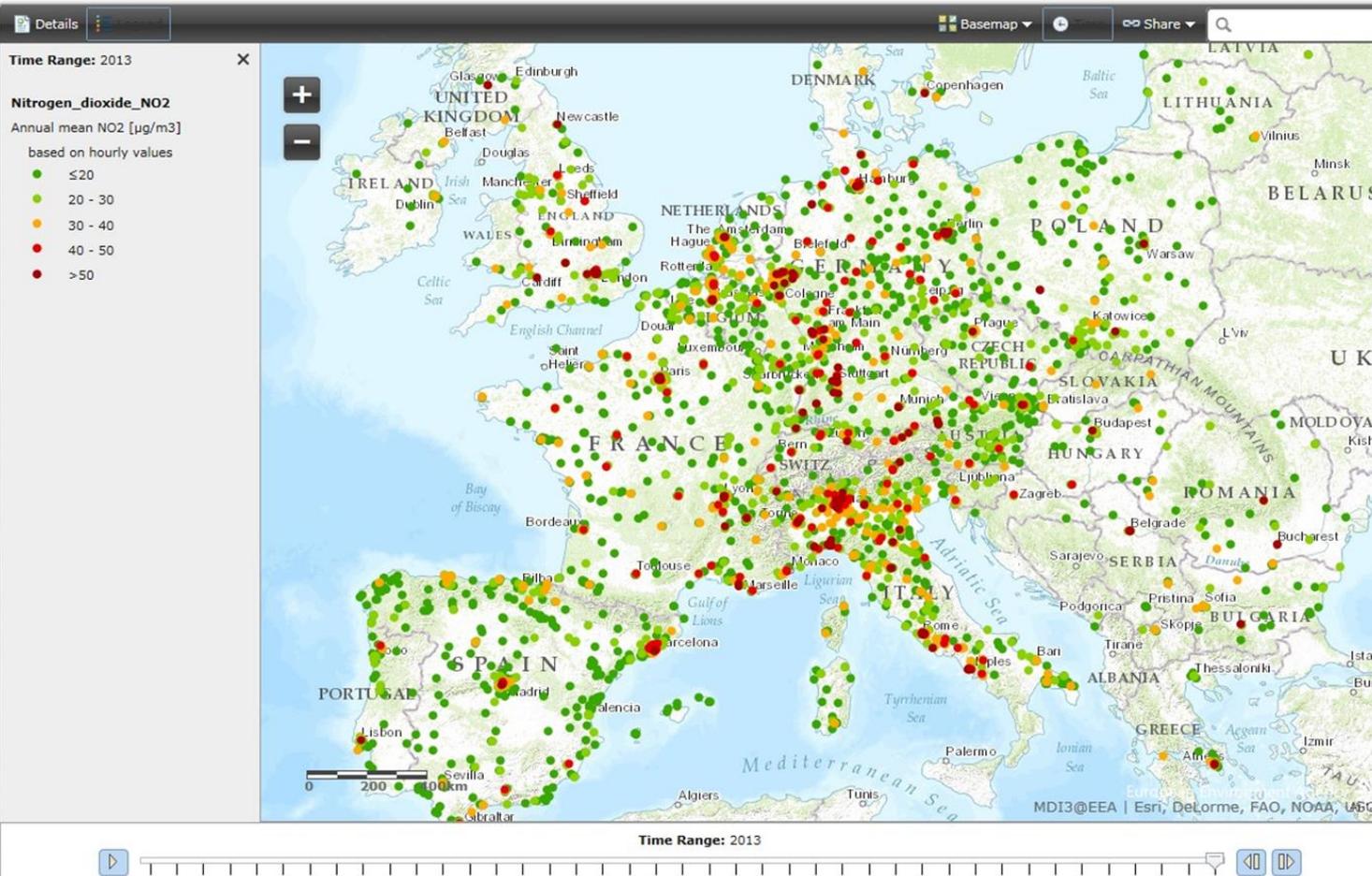
# Population growth



# NO<sub>2</sub> – A EUROPE WIDE CHALLENGE

## Nitrogen Dioxide (NO<sub>2</sub>) in Europe

European Environment Agency   



# Approach

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- **Sort out our own house first:** Buses and taxis are the individually most polluting vehicles
- **Harness technology:** zero emission capable vehicles, geofencing
- **Biggest bang for buck:** heavy diesel vehicles
- **Carrots before sticks:** Incentives and support before disincentives such as charging
- **Local targeted action:** proportionate and uses available funding more effectively

# ULTRA LOW EMISSION ZONE



**Euro VI (<6yrs old in 2020)  
...or £100 a day**

**Euro 4 petrol (<13-14yrs old in 2020)  
Euro 6 diesel (<4-5yrs old in 2020)  
...or £12.50 a day**

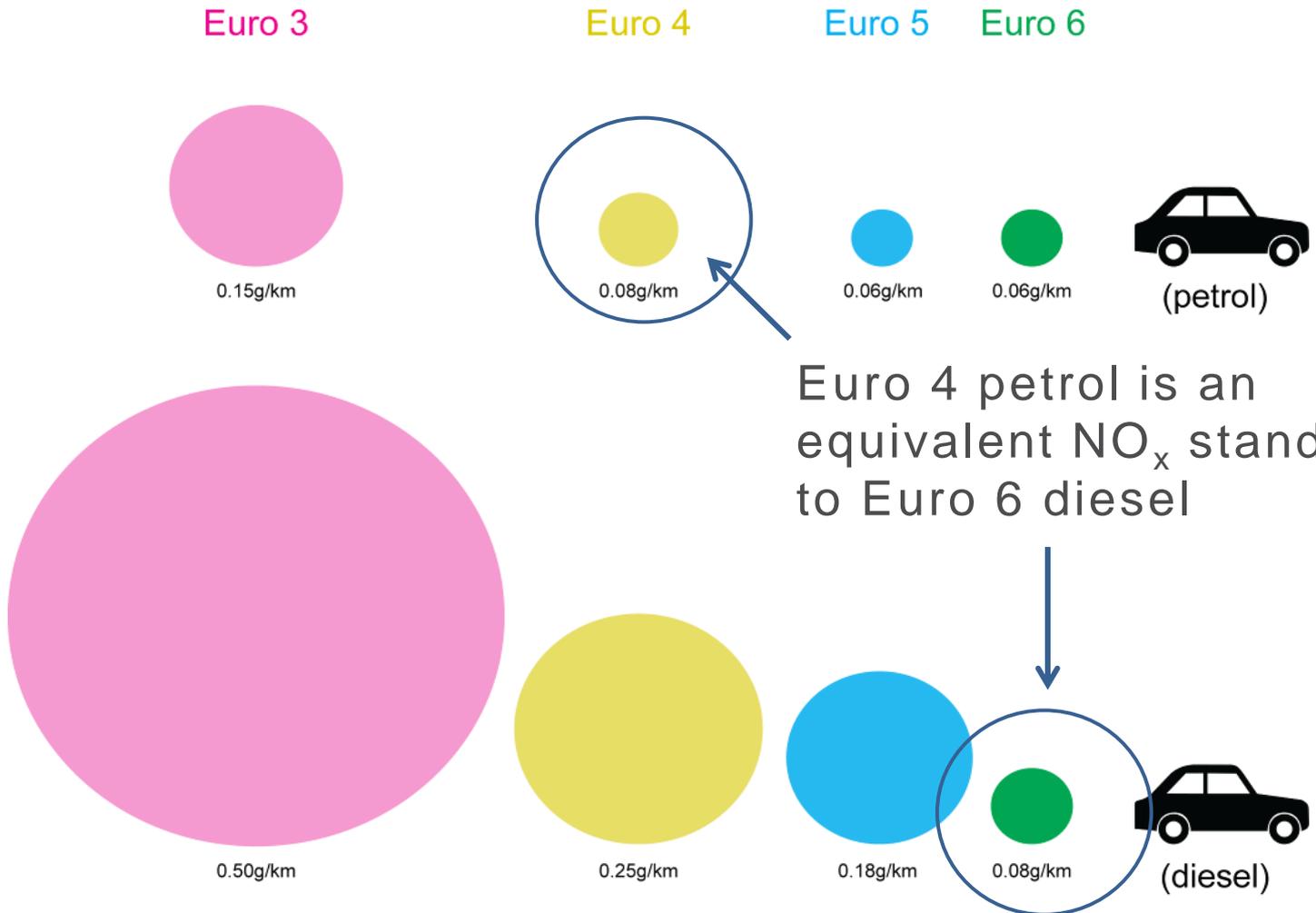


**Euro 3 (<13yrs old in 2020)  
...or £12.50 a day**



**Exempt but new  
licensing  
requirements**

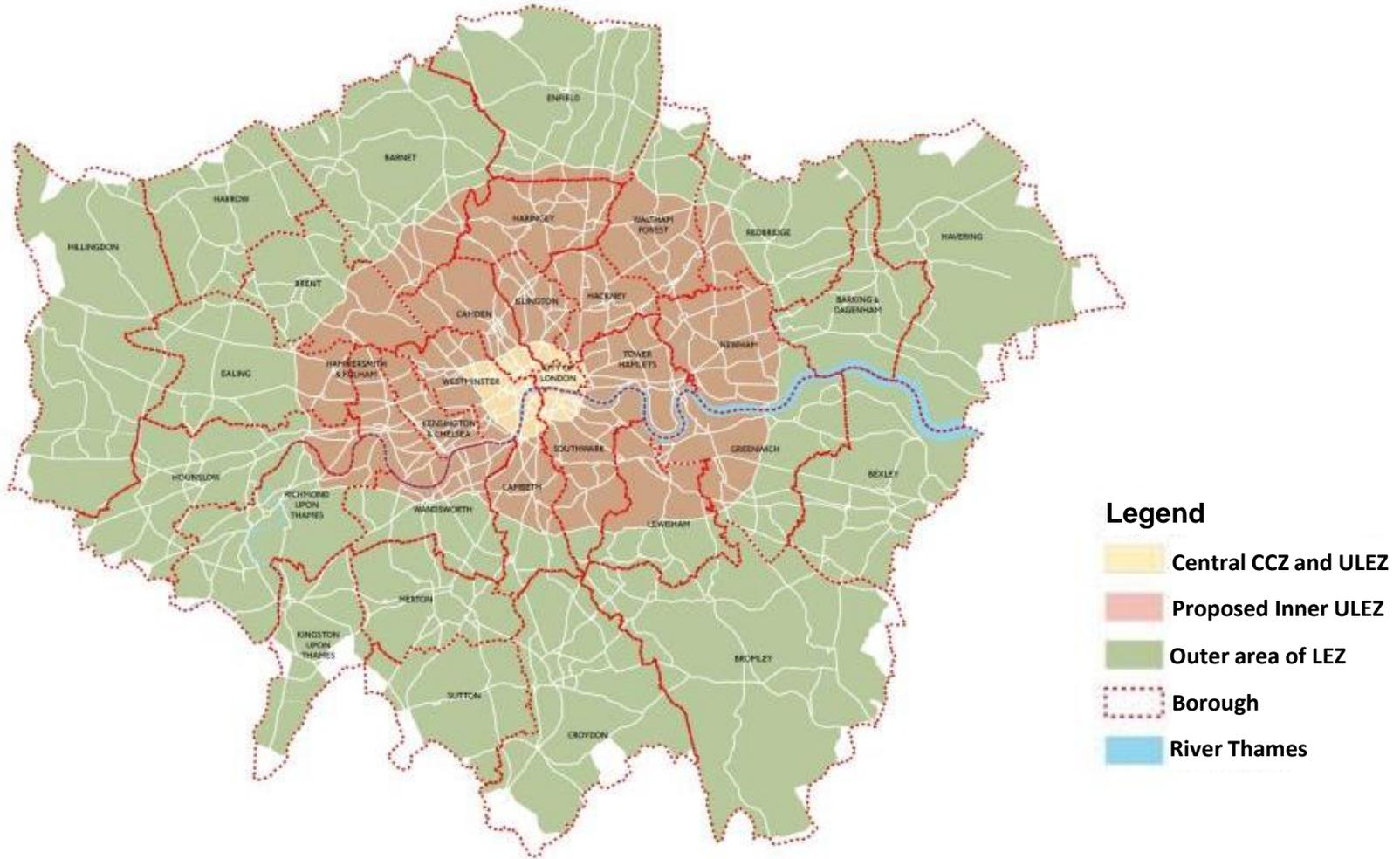
# EURO 6 DIESEL AND EURO 4 PETROL



# ULTRA LOW EMISSION ZONE

- Bringing forward the ULEZ in central London by 2019;
- Extending the ULEZ beyond central London in, or around, 2020:
  - For motorcycles, cars and vans, to the North and South Circular roads
  - For lorries, buses and coaches, London-wide
- TfL have started work on a diesel scrappage scheme as part of a wider national scheme to be delivered by Government and lobbying for a reformed Vehicle Excise Duty.

# ULTRA LOW EMISSION ZONE



# Zero emission capable vehicles (buses and taxis)



TfL is spending more than £300m transforming London's bus fleet by phasing out of pure diesel buses and a commitment to purchase only hybrid or zero-emission double decker buses from 2018



We will no longer licence new diesel taxis from 2018 and supporting the trade to upgrade to much cleaner, 'zero emission capable' vehicles;

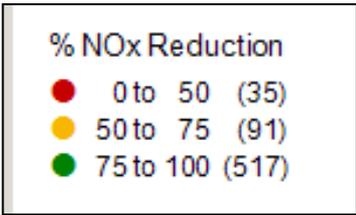
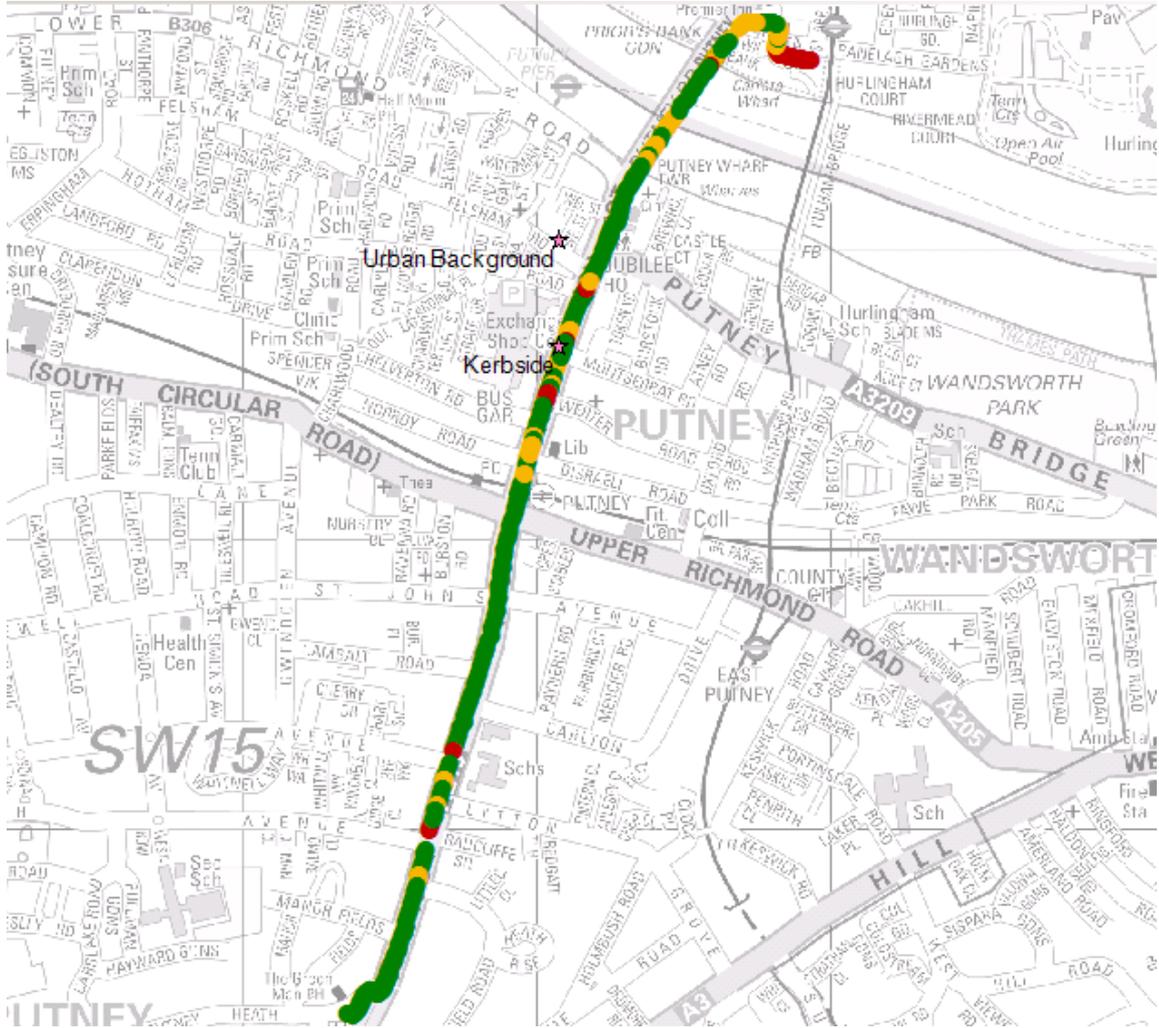


# NOx Abatement Retrofit

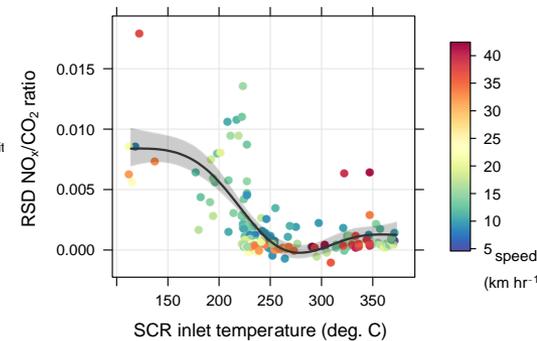
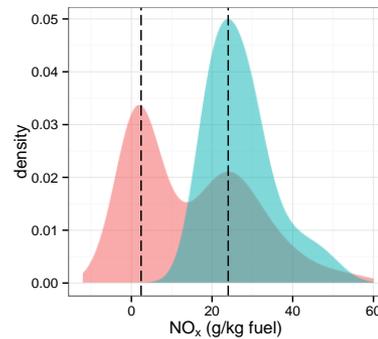
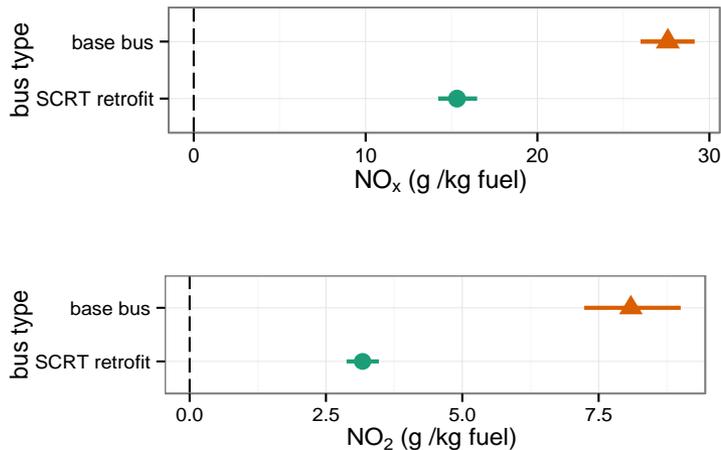
- 2,100 SCR systems now fitted to 3 types of Euro III bus
- 95 out of 220 buses that use Putney High Street were retrofitted with SCR
- This made Putney the ideal location for monitoring the effectiveness of SCR programme.
- Expanding the ULEZ retrofit programme up to 3,000 buses, including some Euro IV buses outside the central zone



# NOx Reduction operating on Putney High Street



# Remote Sensing on Putney Hill



On average we see a **61%** reduction in emissions of NO<sub>2</sub>

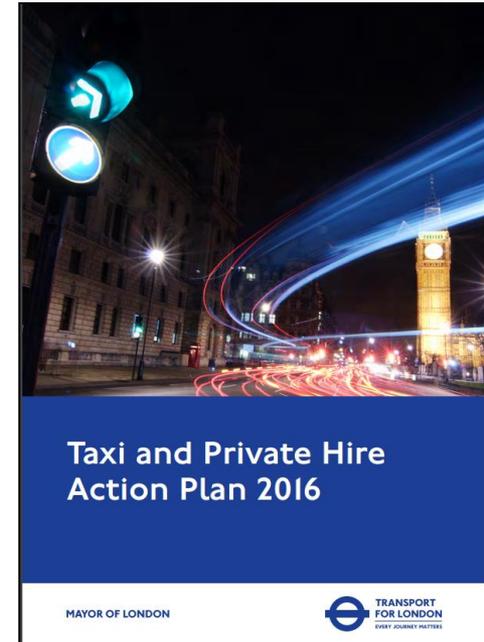
**45%** reduction in emissions of NO<sub>x</sub>

These reductions are substantial compared with the average performance of the bus fleet in London including OEM SCR systems

- Emissions distribution
  - SCRT buses sometimes behave like base buses
  - Other times there is ~90% reduction in NO<sub>x</sub>
- Test track results
  - Importance of SCR inlet temperature
  - >200°C gives 90% reduction in NO<sub>x</sub>
- Expect greater reduction in NO<sub>x</sub> where engine runs hotter

# GREENER TAXIS

- The Mayor wants to deliver the greenest taxi fleet in the world by:
  - No more new diesel taxis and only ‘zero emission capable’ from 2018;
  - Providing a £3,000 grant towards the first 9,000 ZEC taxis;
  - Delivering a rapid charging network from 2017;
  - Introducing a scrappage scheme for the oldest taxis from 2017;
  - Exploring options to convert to a cleaner fuel;
  - Rewarding drivers who pioneer green technology.



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# London NRMM LEZ

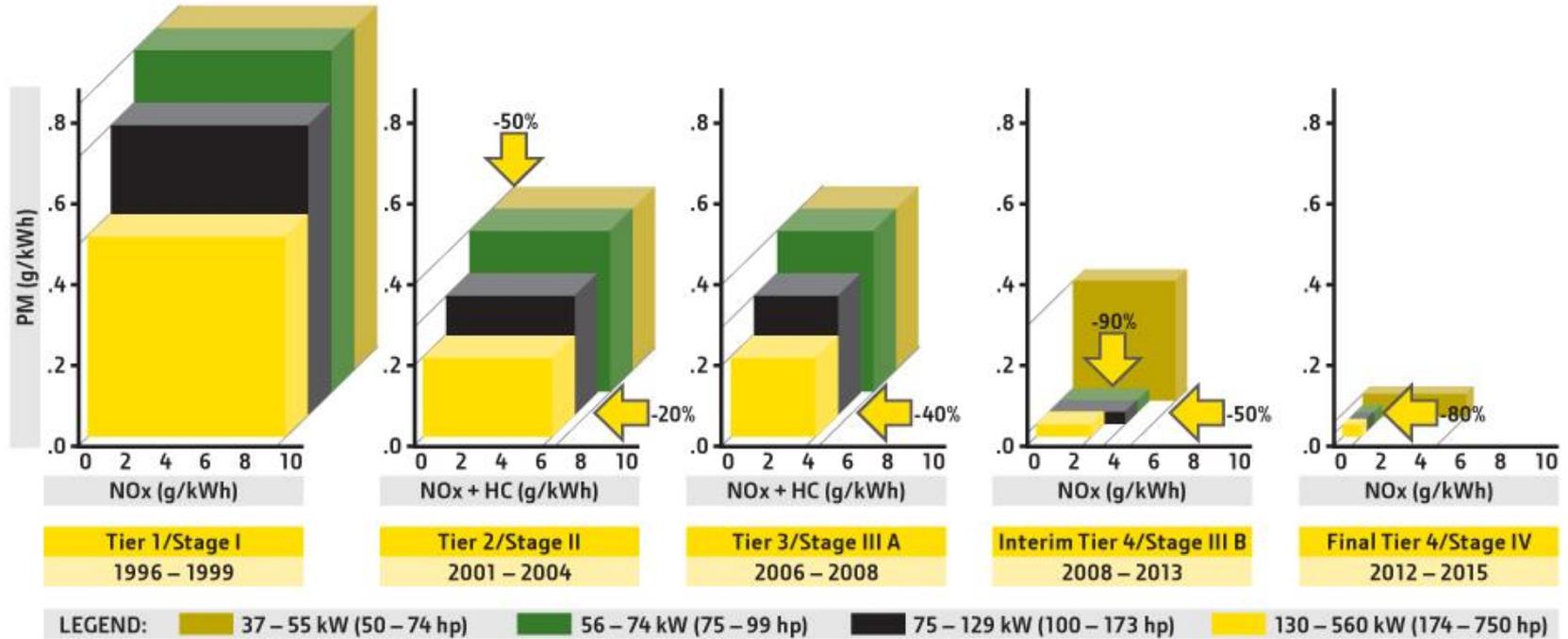
- Covers NRMM on construction sites between 37 and 560 kW
- In the two yellow zones NRMM must meet stage IIIB
- In the rest of London NRMM on major construction sites must meet stage IIIA
- This will be updated to stage IIIB and Stage IV in 2020



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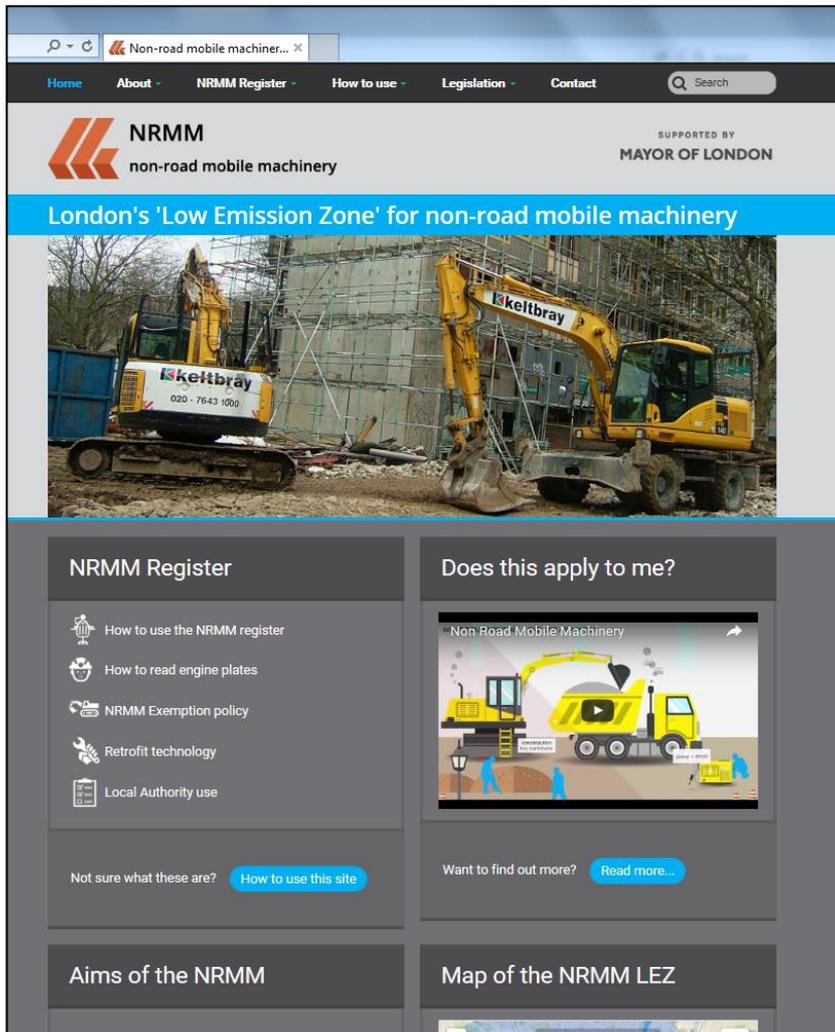
## NRMM emissions Stages

EPA and EU nonroad emissions regulations: 37 – 560 kW (50 – 750 hp)



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## How is it Enforced?



The screenshot shows the website for the Mayor of London's NRMM (Non-Road Mobile Machinery) register. The page features a navigation menu with links for Home, About, NRMM Register, How to use, Legislation, and Contact. The main header includes the NRMM logo and the text 'SUPPORTED BY MAYOR OF LONDON'. A prominent blue banner reads 'London's 'Low Emission Zone' for non-road mobile machinery'. Below this is a photograph of two yellow Keltbray excavators at a construction site. The page is divided into several sections: 'NRMM Register' with links for 'How to use the NRMM register', 'How to read engine plates', 'NRMM Exemption policy', 'Retrofit technology', and 'Local Authority use'; 'Does this apply to me?' featuring a video thumbnail and a 'Read more...' button; 'Aims of the NRMM'; and 'Map of the NRMM LEZ'.

- We use the planning process to require new developments to use the online register for their plant.
- This is monitored and enforced through spot checks
- The register also helps provide a more reliable dataset for NRMM use in London

## Exemptions and retro-fitting

- Exemptions can be applied for through the website for equipment used in emergencies or where compliant equipment isn't available.
- Wherever possible non-compliant equipment should be retro-fitted with approved emissions controls



- Generators and road moving cranes are exempt from the stage IIIB requirements until 2018 due to the lack of available equipment or appropriate retro-fit

- For specialist equipment or where it is not viable for the company to retro-fit or replace a 1 year exemption can be granted for either or both of the zones.

- Exemptions of 30 days can be granted in emergencies or where retro-fit is in the process of being fitted

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## What does the future hold in London?

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- Stage V emissions standards:
  - These will be introduced for new engines from 2019 onwards
  - Ultimately we would like to see any diesel powered machinery in London meeting these standards
- Support for less polluting machines:
  - Hybrid generators are a rapidly maturing technology
  - Hybrid excavators are also available but not yet common in Europe
  - Hydrogen as a fuel is also rapidly maturing, particularly in generators. This is quiet as well as non-polluting
- Better tools for audit and enforcement are being developed



# REDUCING THE IMPACT OF NEW BUILDINGS: AQ NEUTRAL

- A minimum standard for all new major developments
- “Benchmarks” are used to ensure that the buildings are no worse than existing buildings of the same type
- Technology neutral –however you heat the building you have to meet the same standard
- The benchmarks are currently not challenging. We intend to tighten them in the future but the methodology will remain the same

Land Use Class	NOx (g/m <sup>2</sup> )
Class A1	22.6
Class A3 - A5	75.2
Class A2 and Class B1	30.8
Class B2 - B7	36.6
Class B8	23.6
Class C1	70.9
Class C2 <sup>1</sup>	68.5
Class C3 <sup>1</sup>	26.2
D1 (a)	43.0
D1 (b)	75.0
Class D1 (c -h)	31.0
Class D2 (a-d)	90.3
Class D2 (e)	284



# BEYOND AIR QUALITY NEUTRAL.....

- An “Air Quality Positive” development should do more than just hit minimum standards.
- Developments on the master planning scale provide significant opportunities to do more to reduce not only their own emission but improve surrounding areas as well by:
  - Ensuring that new public spaces are separated from sources of pollution, reducing exposure
  - Designing out new emissions sources
  - Making sure new cycling and walking infrastructure serves existing as well as new residents
  - Providing access to new district heat networks so that old boilers can be replaced. Ideally these would use low or zero emission heat sources
  - Supporting infrastructure such as freight consolidation centers and transport hubs that can help reduce the need for more vehicles on the road.



- We want to encourage holistic thinking, not just new hoops to jump through.
- By doing all of this new developments can contribute to making London’s air cleaner

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