



## **Getting Clean Air in Cities**

*Institution of Civil Engineers – 5 June 2017*

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# Getting 'Clean Air in Cities'

- 'One Atmosphere': greenhouse gases and local air
- Governance, mission and principles
- Media coverage. Building public understanding
- Jargon, history and pitfalls
- Health – what is healthy air?
- Sources
- Legal
- Solutions
- Opportunity




# Campaigners, Mayors and Governments

- Campaigning locally. Entity and governance
- Mission. Objectives: health, London-wide. Highly political but non-party. 'Wholesale' not 'retail'
- Principles: London Matrix, Principle and Circles
- Strategy? Focus on air quality in London and 'up'
- How? Content and communications
- It's fun! Engage others. Share knowledge. Sustainable

# Mission

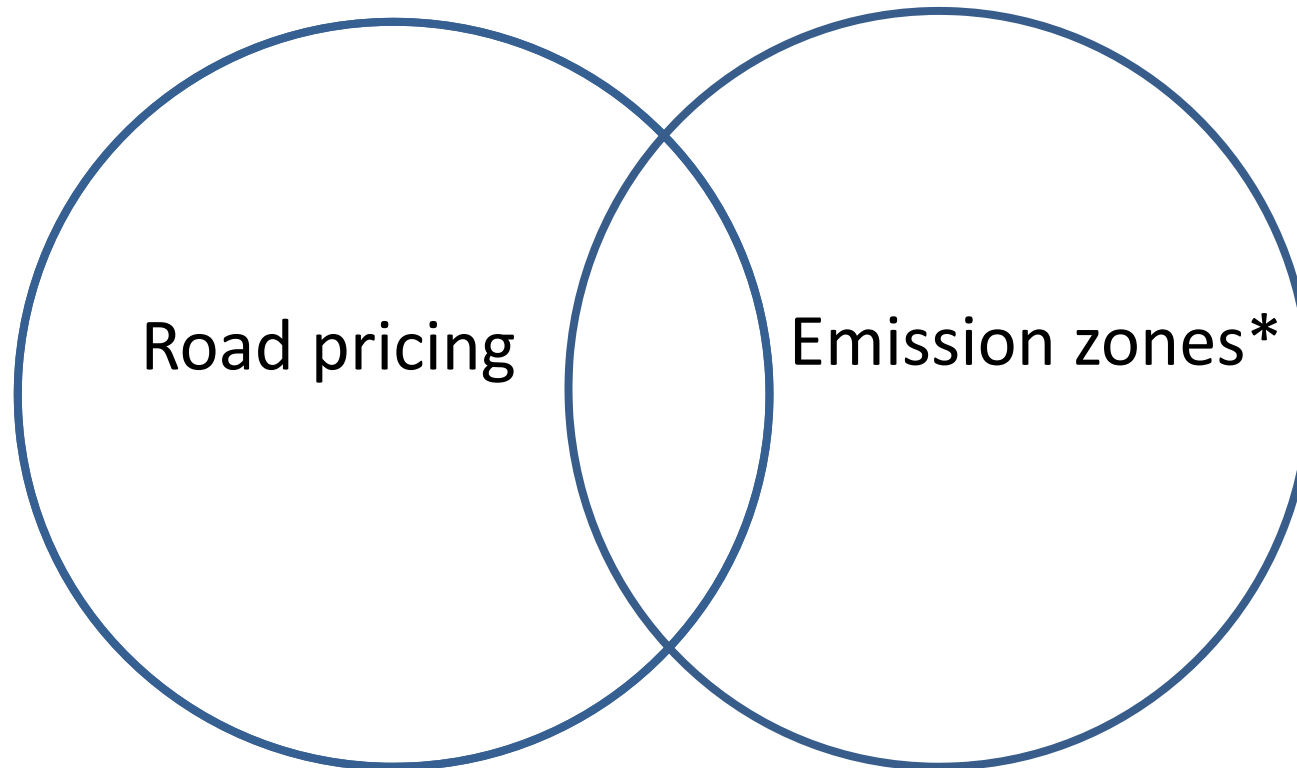
*“To achieve urgently and sustainably full compliance with World Health Organisation guidelines for air quality throughout London and elsewhere”*

# The London Matrix – ‘One Atmosphere’

	Air pollution	Climate change
London	Success	
Rest of world		

# The London Circles

Transport measures address congestion and/or emissions



\* 'Clean Air Zones'

# The London Principle – ‘One Atmosphere’

*We must think in terms of ‘One Atmosphere’. All obligations to reduce air pollution must be met. Any trade-offs between climate change and air quality should be made in an explicit and transparent way e.g. through the application of the ‘London Principle’. This states that a 1% disbenefit in climate change terms (e.g. increased CO<sub>2</sub> emissions) should be accepted when there is an associated benefit of 10% in air quality terms (e.g. reduced emissions of particulate matter or oxides of nitrogen) (and vice versa) provided that legal breaches are not worsened*

# Media coverage: Oxford Street





# Examples of media coverage

ABC Al Jazeera Ars Technica BBC Bloomberg Boston  
Globe Business Green CBS Channel 4 China Central  
Television China Radio International CNN DW Eco dalle  
Citta El Pais ENDS Euronews Evening Standard Express  
Financial Times France 24 Gibraltar Chronicle Guardian  
The Hill Independent ITV LBC London Live Mail Metro  
Mirror New York Times Observer Oriental Morning Post  
Radio France International Reuters RT Saturday Paper  
Le Soir Sky Southern Weekly Sun Svenska Dagbladet  
Sydney Morning Herald Telegraph Time Time Out Times  
Washington Post Vice Voice of Russia Yellow Advertiser  
ZDF

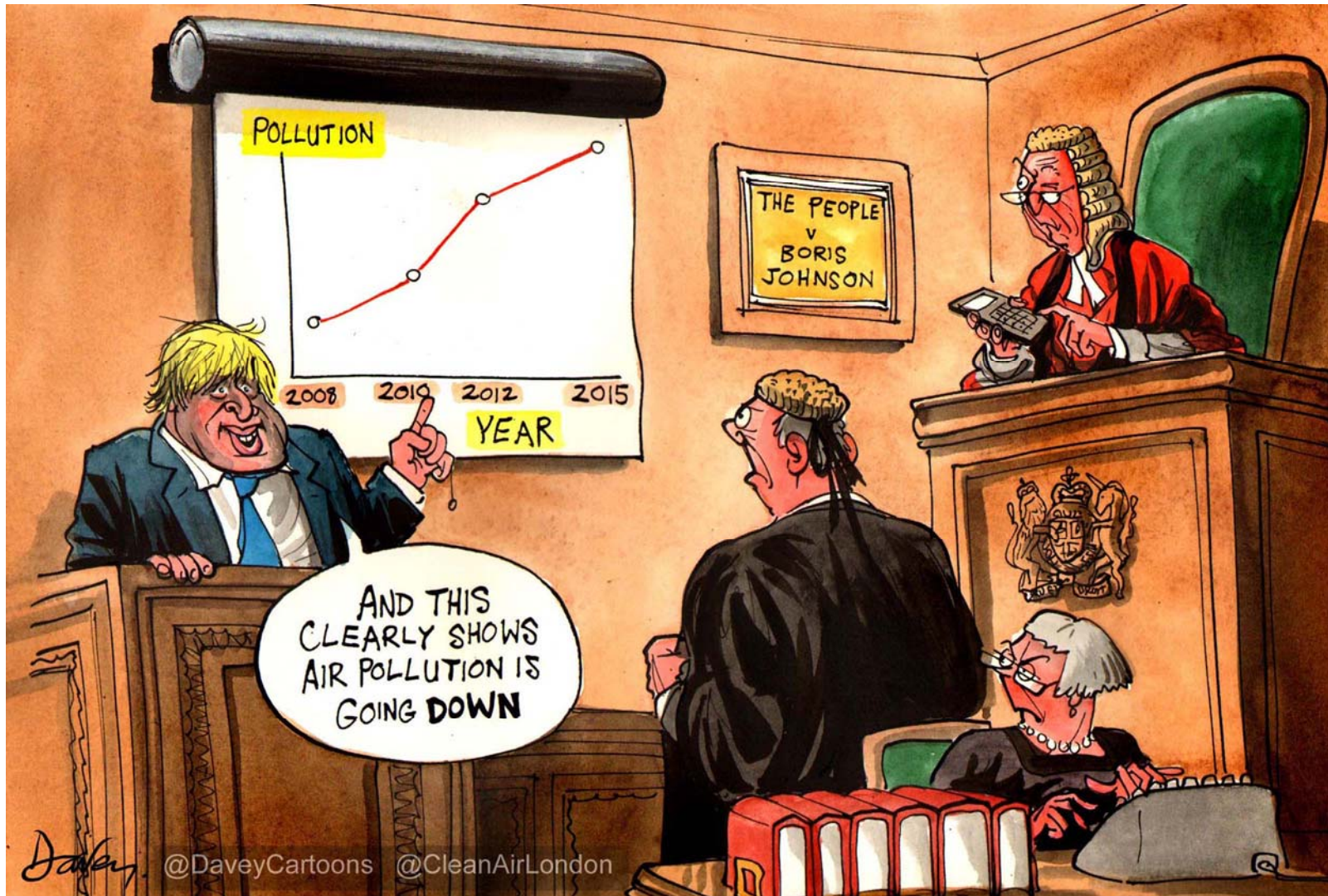
# Building public understanding

Easier to warn the general public than politicians



# Milestones and successes

- **2006-2008** Getting started. Media coverage. New Air Quality Directive for Europe
- **2008-2010** Health investigations. Solutions proposed
- **2010-2012** Olympics and legal pressure. European Commission infraction twice on PM<sub>10</sub>. Many others begin campaigning. Parliamentary inquiries
- **2012-2015** Breakout. European Commission's 'Clean Air Policy Package' in December 2013 and keeping it in early 2015. Role of social media, cartoons etc. NO<sub>2</sub> infraction
- Three sponsors: Camfil (indoor air quality), New West End Company (Oxford Street businesses) and Licensed Taxi Drivers Association (distributing taxi receipts)
- **2015-2020** 'One Atmosphere'. Neighbourhood Forums



# Jargon

- Particles (PM<sub>1</sub>, PM<sub>2.5</sub> and PM<sub>10</sub>) and gases (NO<sub>2</sub>)
- Short (e.g. PM<sub>10</sub>) and long-term (e.g. PM<sub>2.5</sub>) health effects. Mortality and morbidity. Overlapping effects
- Emissions and concentrations. Health exposures, impacts and outcomes. Visible and invisible
- All affected. Many outcomes. Deaths mainly cardiovascular. 4,300 PM<sub>2.5</sub>. 5,900 NO<sub>2</sub> in London versus 8,500 from smoking. Second biggest public health risk
- Local (NO<sub>2</sub>), regional (PM<sub>2.5</sub>) and transboundary pollution e.g. tropospheric ozone (O<sub>3</sub>)

# Historical perspective

- Great Smog 1952 and Clean Air Act 1956
- Scientific focus on short-term respiratory effects despite evidence of cardiovascular deaths in 'time series' studies
- 'Cohort studies' identified long-term effects of PM<sub>2.5</sub>
- Myopic focus in UK since 1990 on CO<sub>2</sub> and fuel efficiency
- Many roads in Central London tend (today) to have the highest NO<sub>2</sub> concentrations in the world. Blame diesel
- Europe Union's 'Clean Air Policy Package' in 2013
- 68<sup>th</sup> World Health Assembly. First debate on air pollution!
- Back where we thought we were 60 years ago

# Myopic focus on CO<sub>2</sub>

*A very senior civil servant, now retired, who worked in the [Department of Environment in the late 1990s] and has asked not to be named, said that cost-benefit studies of a switch to diesel were done, but climate change was “the new kid on the block” and long-term projections of comparative technologies were not perfect. “I recall all the discussions had the health issue as a significant factor,” he says. “We did not sleepwalk into this. **To be totally reductionist, you are talking about killing people today rather than saving lives tomorrow.** Occasionally, we had to say we were living in a different political world and everyone had to swallow hard.”*

John Vidal, Environment Editor, in The Guardian, 20 June 2015

# London: 15 March 2012





# Pollution Suppressor – 26 March 2012



# London: 19 February 2013



# Lessons

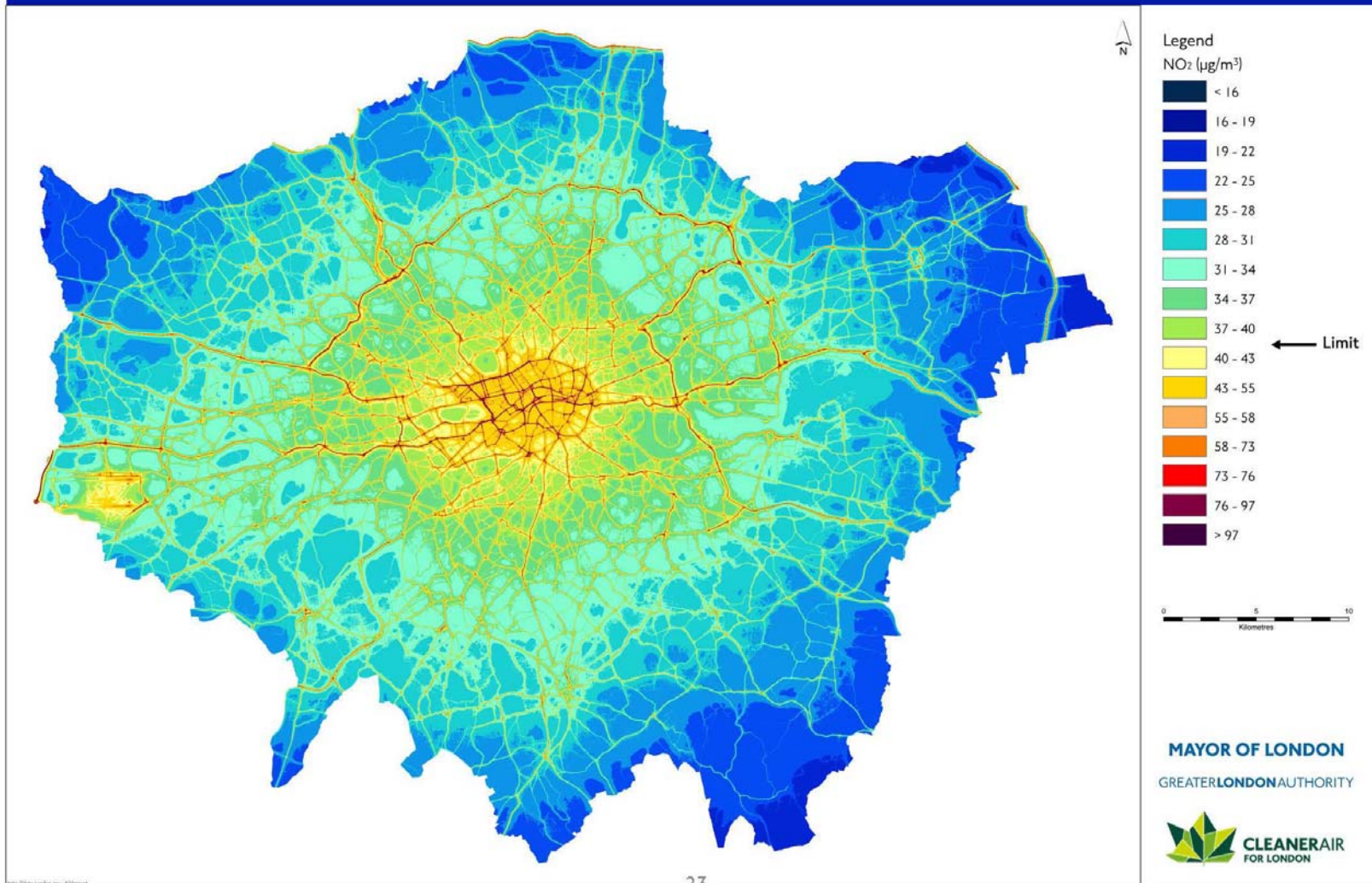
- ‘One Atmosphere’: air pollution and greenhouse gases. Policy disasters promoting diesel and biomass burning
- Government departments are not/never ‘joined-up’. Must maintain and build scientific and official expertise
- Short and long-term effects e.g. offsetting. NO<sub>x</sub>/O<sub>3</sub>. SO<sub>x</sub> cooling effects from shipping. Black carbon. CH<sub>4</sub>. Hg. NH<sub>3</sub>
- Solutions: Governance. Political leadership, lifestyle changes and technology. Not just ‘Best available technical solutions’. Offsetting is never the answer. **Green walls cost 40x exhaust abatement per kg of pollutant removed**
- Indoor air quality: ventilation, air conditioning and filtration
- Communicate health impacts. Warn, protect and reduce
- Expect new health and natural environment impacts

# World Health Organisation declares...



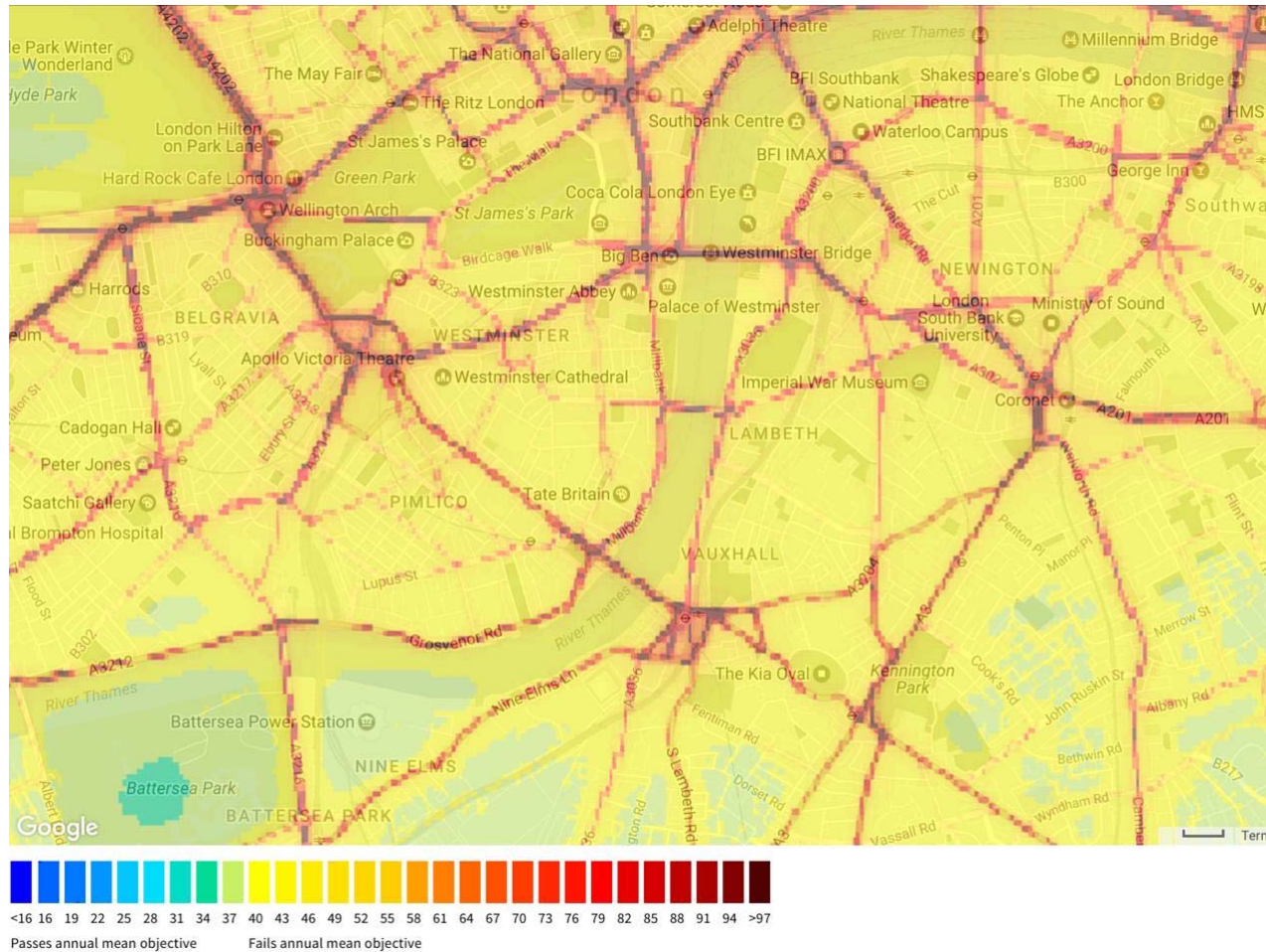
# Health

- Excellent REVIHAAP and HRAPIE reports by WHO
- Statistical versus actual impacts
- PM<sub>2.5</sub> health effects below 10 µg/m<sup>3</sup>. PM<sub>1</sub> penetrates
- NO<sub>2</sub> – London study based on WHO's HRAPIE
- Traffic-related air pollution (TRAP)
- Cognitive effects on children. Jordi Sunyer et al
- Inequalities
- Emerging problems: PM<sub>2.5</sub> and PM<sub>1</sub>! NO<sub>2</sub>, TRAP, ozone and nanoparticles. More pollutants/outcomes



# Annual mean NO<sub>2</sub> in 2013

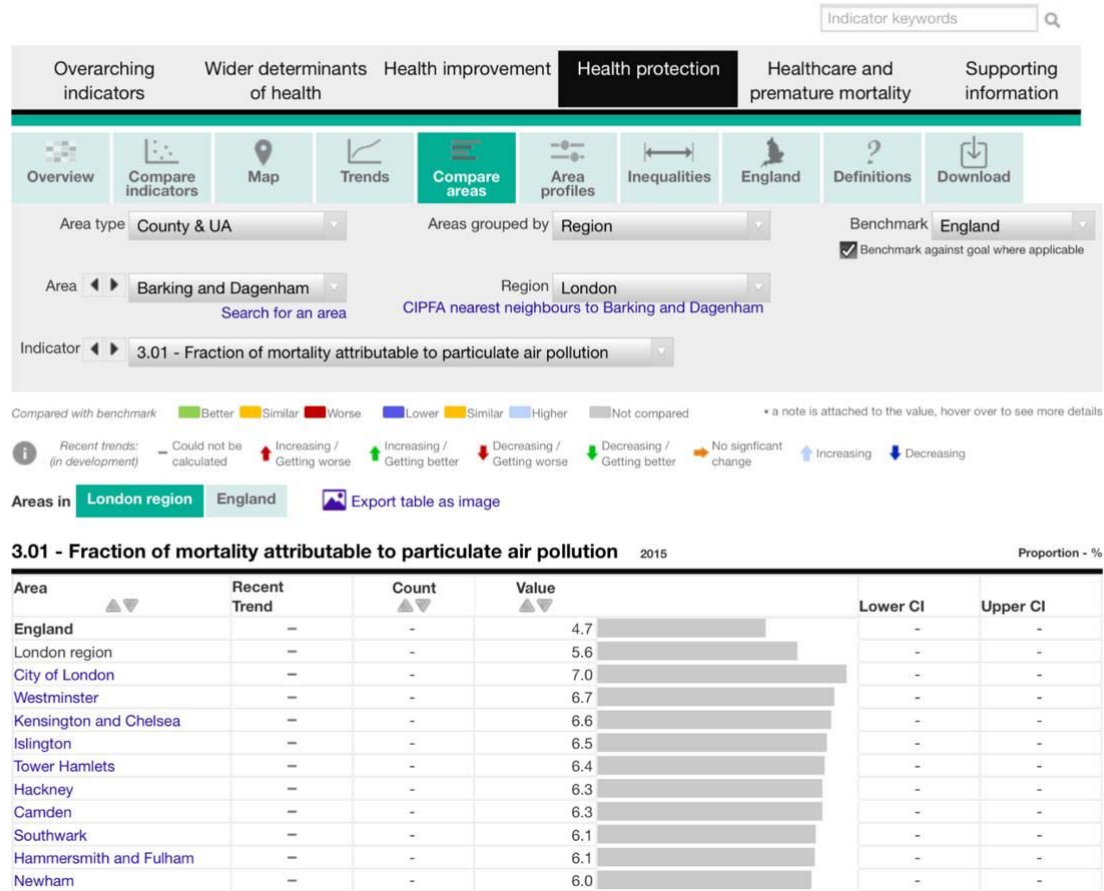
*Credit: London Air Quality Network and TfL*



# % deaths attributable to air pollution

*Credit: Public Health England (2015)*

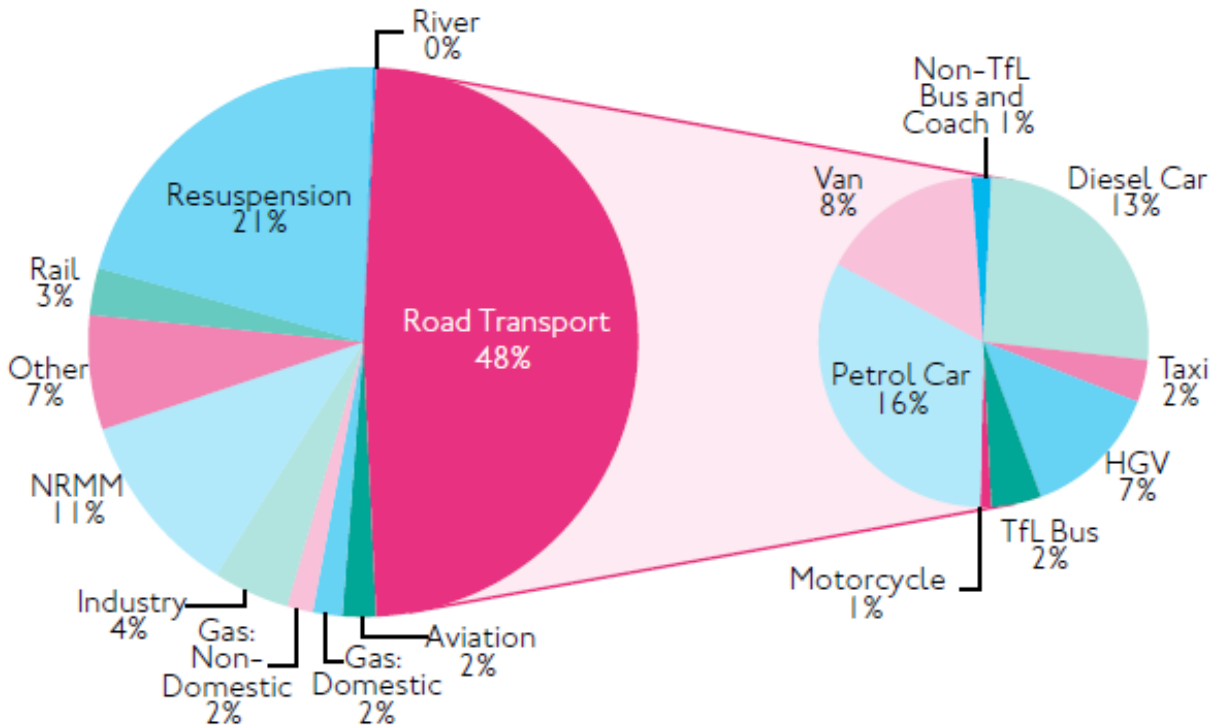
## Public Health Outcomes Framework





# Pollution sources

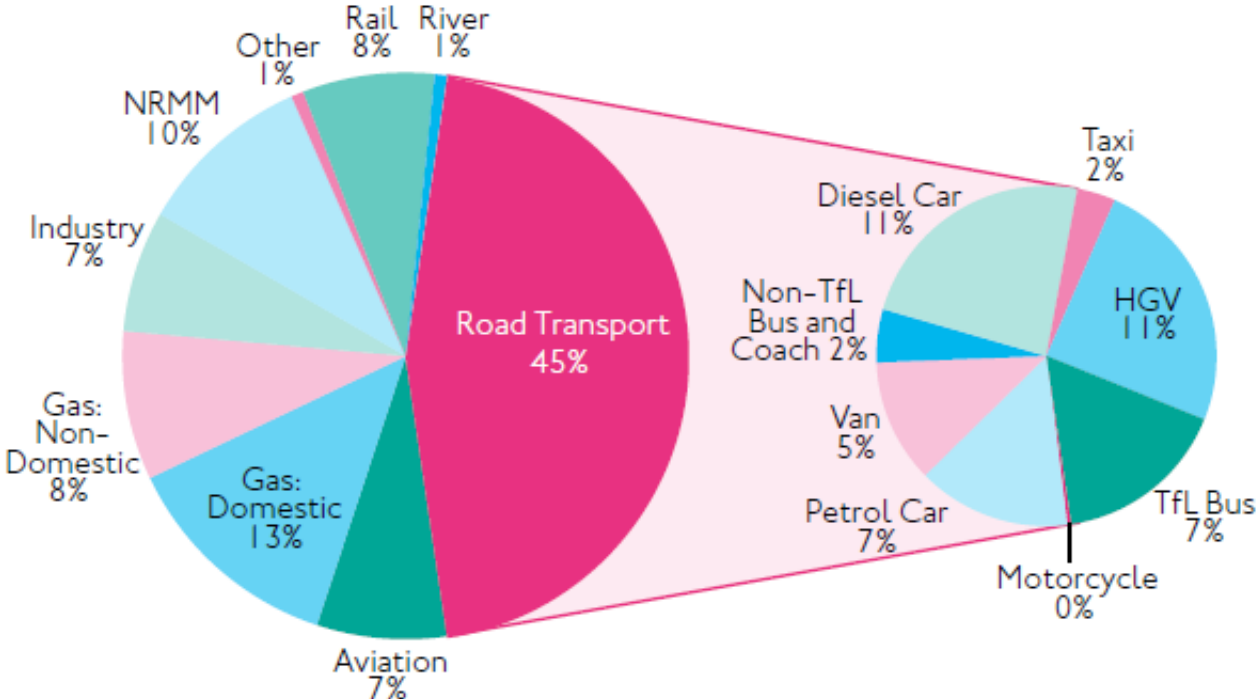
Figure 2.9: Breakdown of PM<sub>10</sub> Emissions in Greater London in 2010, by Source<sup>87</sup>



**Source:** Policy Exchange, Up in the Air Report, 2015

# Pollution sources

Figure 2.7: Breakdown of NO<sub>x</sub> Emissions in Greater London in 2010, by Source<sup>84</sup>



**Source:** Policy Exchange, Up in the Air Report, 2015

# Legal – London and Europe

- Governance e.g. Freedom of Information
- Tiers
  - European infraction escalated to ‘Reasoned Opinion’ for NO<sub>2</sub>
  - National courts. ClientEarth’s wins have implications across Europe. Government must produce new NO<sub>2</sub> plans by July
  - Planning decisions. Authoritative QC opinion
- Need new Clean Air Act to address modern fuels and technologies
- New laws in Europe e.g. National Emissions Ceilings Directive to target sources. NRMM
- Brexit? Heathrow expansion? Gatwick?

# ClientEarth wins

Supreme Court in 2015. High Court in 2016 and 2017



# City solutions

- Build public understanding of air pollution. Smog warnings. Public health agencies must protect people
- Act on illegal wood burning: 5-10% annual mean PM<sub>10</sub>
- Think 'One Atmosphere' on local energy generation e.g. stop standby diesel generators feeding into the 'grid'
- Energy: Efficiency. Zero air emissions. Renewables. Onsite
- Ban diesel, diesel, diesel as we banned coal
- Bus and taxi emissions (scrapping 25ft turning circle)
- Use 'geo-fencing' with care. Restrict road building
- Promote positive measures e.g. active travel and car-free centres. Restrict polluting activities e.g. ultra low emission zones and/or emissions based road charging

# Let's not have an air quality problem!

## Short-term actions (one to two years):

- Vision, leadership and governance
- Build public understanding
- Mitigation and adaptation plan
- Encourage good. Discourage bad
- Consolidation centres for construction, deliveries and waste
- Increase energy/waste efficiency
- Protect indoor quality
- Zero tailpipe emission replacements
- Compressed natural gas if necessary
- **Retrofit everything else!**

## Medium and long-term solutions:

- Technology and lifestyle changes
- Education, incentives, charges and bans
- Emissions Based Road Charging
- Fewer and cleaner vehicles
- Transport
  - active travel
  - public transport
  - electric vehicles
- Construction vehicles and sites
- Zero air emission buildings and cooking
- Healthy indoor air
- Renewable energy (non-nuclear)

**It works for new and existing cities.**

**Outside cities: aviation, farming and shipping. Tyre and break wear...?**

# Neighbourhood Planning

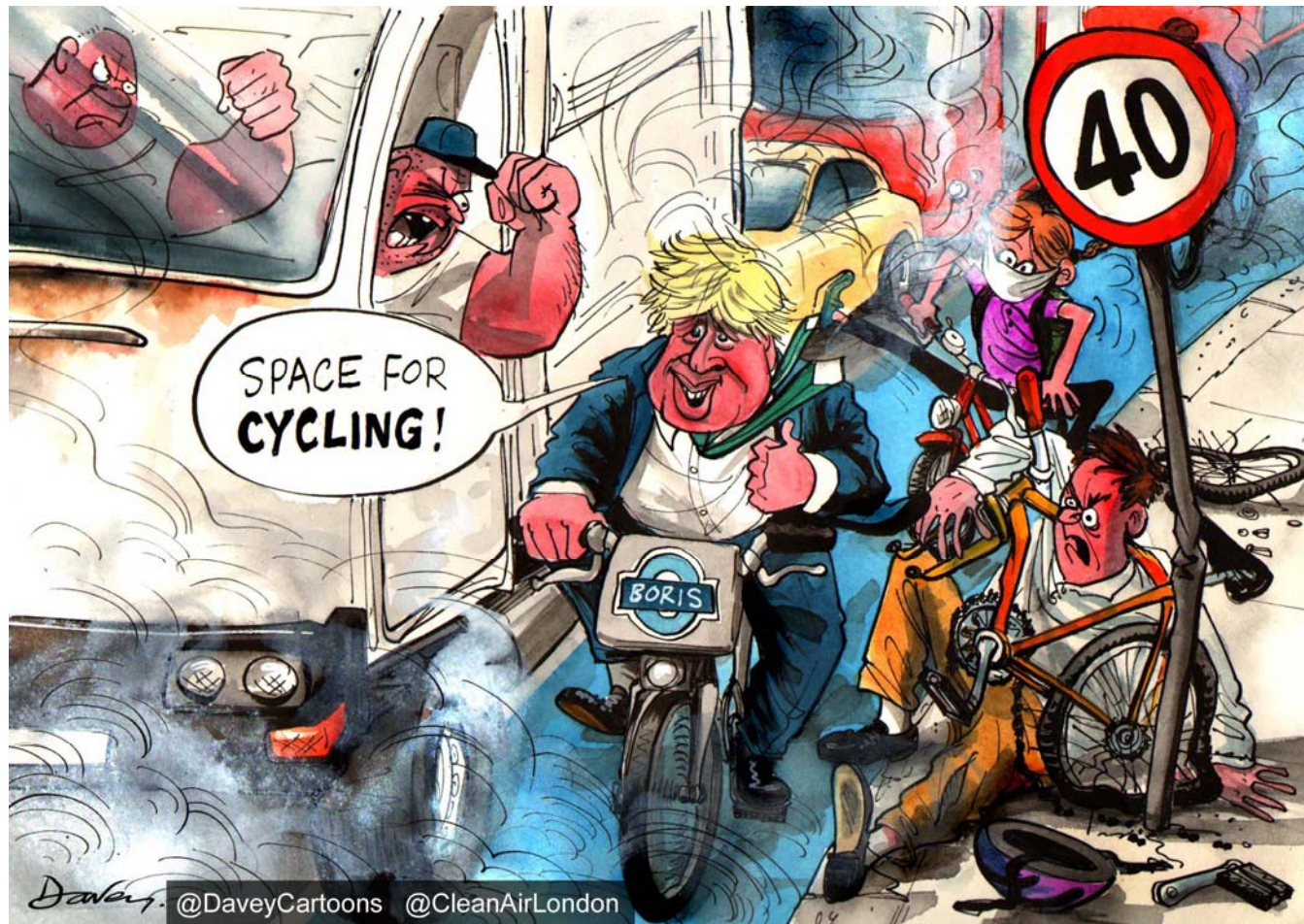
- Real powers
- Policies, 'neighbourhood management' and CIL
- Examples of policies include:
  - Healthy air (including indoor air quality)
  - Renewable energy
  - Knightsbridge Construction Practices
  - Healthy people
- [knightsbridgeforum.org/planning/consultation](http://knightsbridgeforum.org/planning/consultation)

# What would such a city look like?

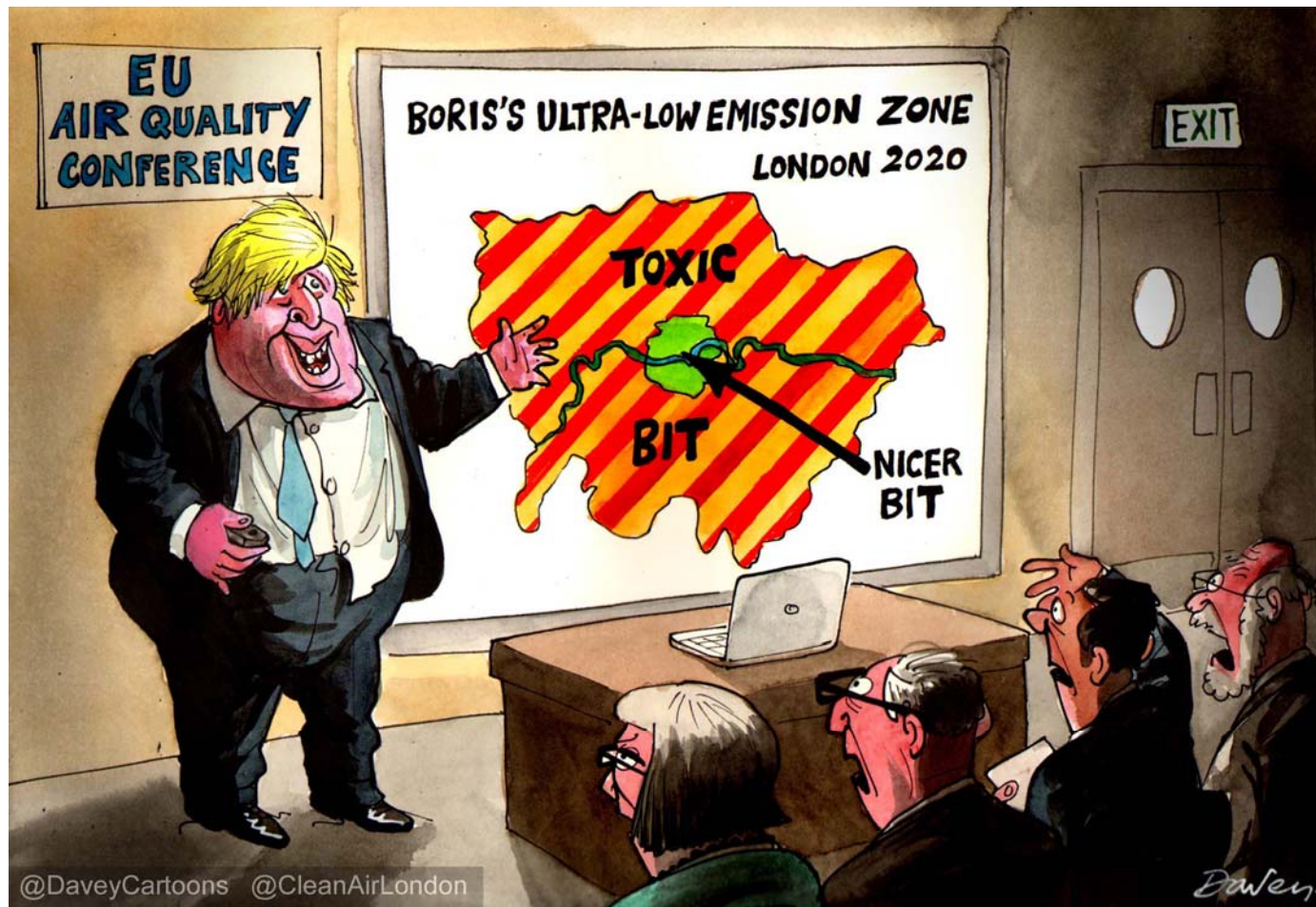
- World leading
- Attractive
- Clean
- Healthy parents and cleverer children
- Quiet
- Successful
- Happy!



# Encourage active travel



# Ultra-low emission zone in 2020



# Indoor air quality matters (a lot!)

## *New standard ISO 16890*

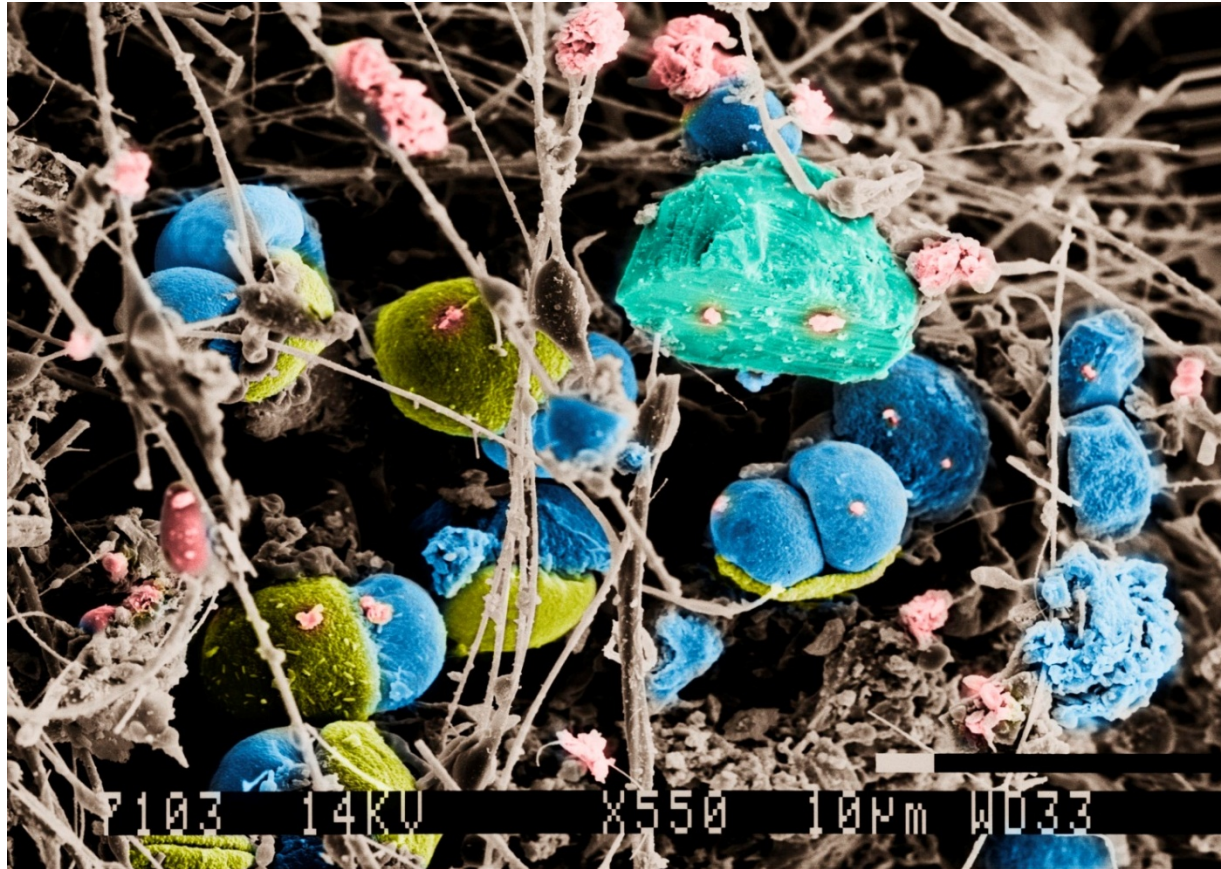
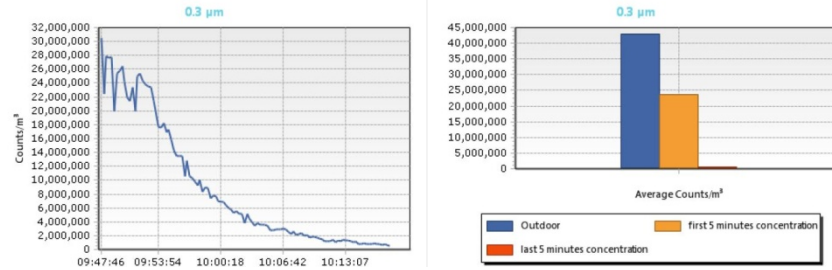


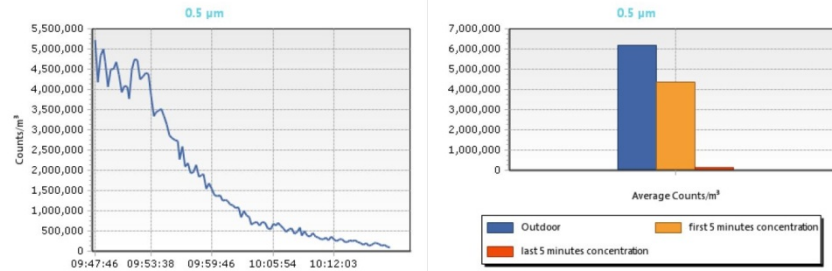
Photo: Lennart Nilsson

Proof Of Concept Measurement

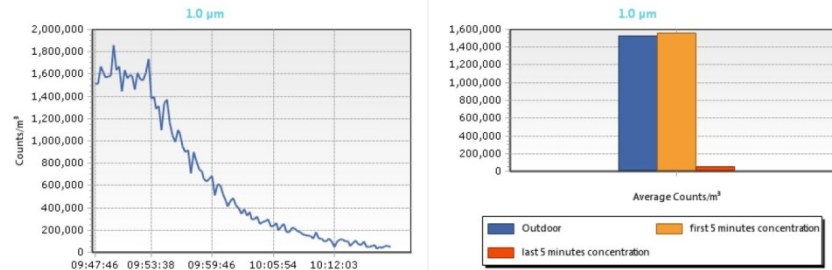
0.3  $\mu\text{m}$ : 97% Improvement



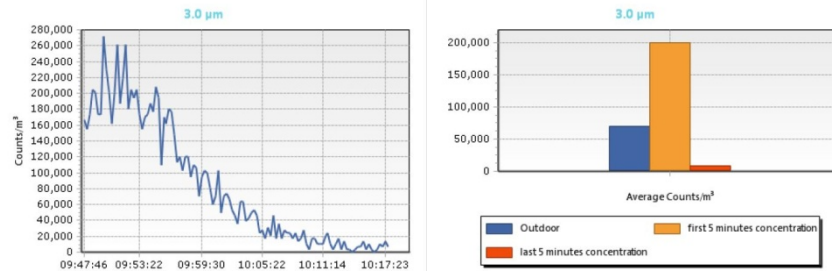
0.5  $\mu\text{m}$ : 97% Improvement



1.0  $\mu\text{m}$ : 97% Improvement



3.0  $\mu\text{m}$ : 96% Improvement

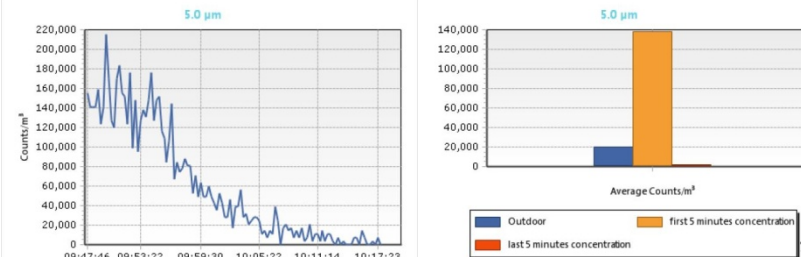


Home office test – City S unit  
Over 25 minutes  
Range 0.3 to 5 microns

97% - 98%  
Particle number  
reduction



5.0  $\mu\text{m}$ : 98% Improvement



# The alternative!



# Next steps for 'Clean Air in London'

- New Mayor in London. Top two issue with housing. Mayor's risk is on the 'upside' not 'downside'
- New Clean Air revolution 60 years after the last
- Eliminate all fossil fuel burning by 2030. Diesel bans
- **Update Clean Air Act for modern fuels and technologies. Address indoor air quality**
- Role of EU law after Soft or Hard Brexit?
- Vision: save London, save the world. Break the cycle of air pollution by eliminating emissions at source

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