KING'S College LONDON

Contribution of construction dust to London's air quality

Ben Barratt, King's College London

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Contribution of construction dust to London's air quality

- How important are fugitive emissions from construction activities to air quality in London in terms of:

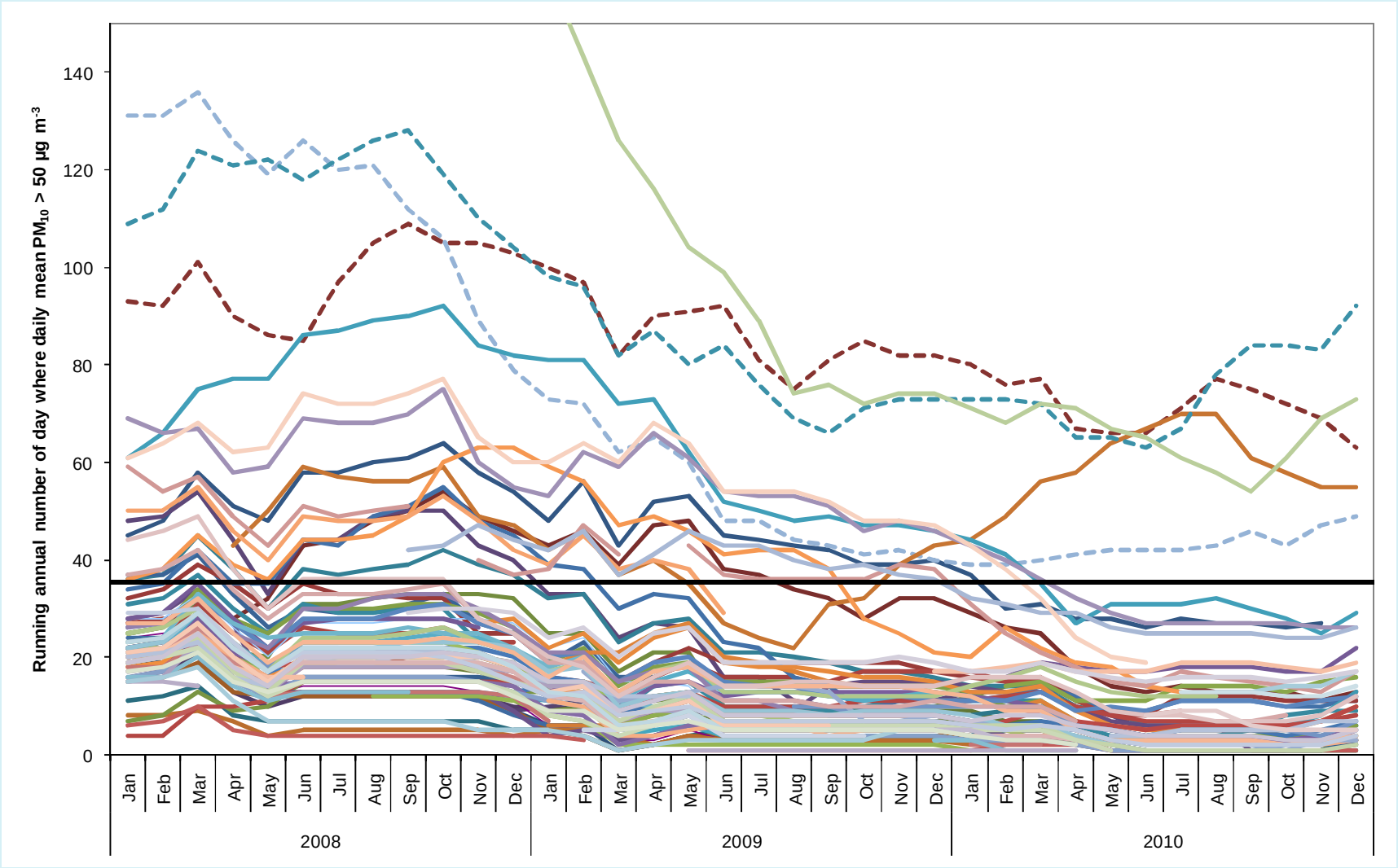
  A – Legislative compliance and

  B – Health impacts
- Evidence gathered from sample studies within London
- Finish with some more geographically general comments

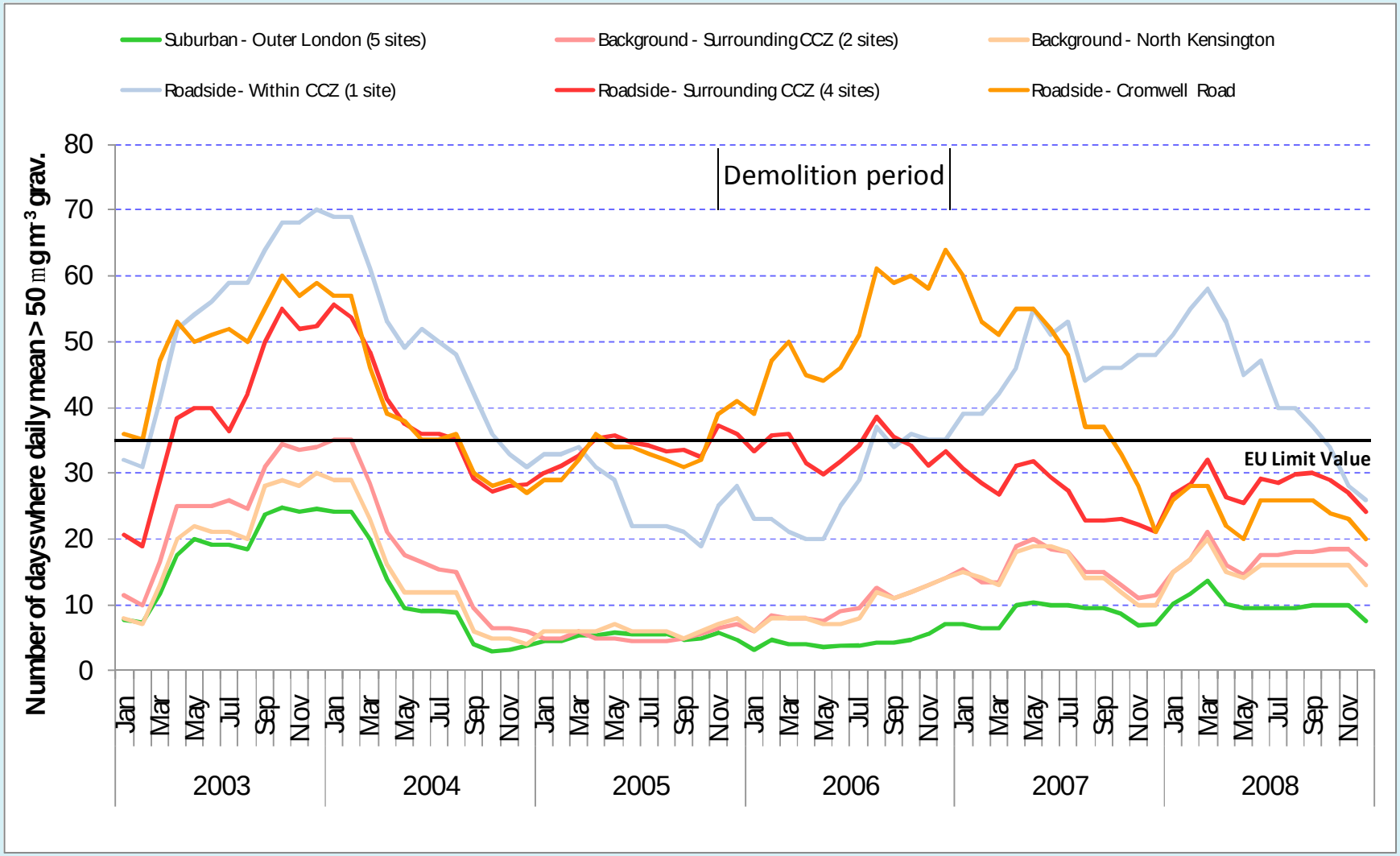
Construction dust and legislative compliance

- PM_{10} concentrations in 2010 lower than previous years, allowing 35 'exceedence' days limit to be met (just)
- PM_{10} compliance across London in 2011 will be extremely closely watched
- Compliance in 2012 will also be under international scrutiny due to the Olympics
- Especially important close to borderline sites
- No simple 'get out' clause for short to medium term emissions sources.

PM_{10} exceedence days, all LAQN sites



Impact of construction – WEZ



Construction of the Darwin Wing

How widespread are these impacts?

ELSEVIER

AE International – Europe

Atmospheric Environment 38 (2004) 4993–5002

ATMOSPHERIC ENVIRONMENT

www.elsevier.com/locate/atmosenv

The impact of local fugitive PM_{10} from building works and road works on the assessment of the European Union Limit Value

Gary W. Fuller*, David Green

Environmental Research Group, School of Health and Life Sciences, King's College London, Franklin Wilkins Building, 150 Stanford Street, London SE1 9NN, UK

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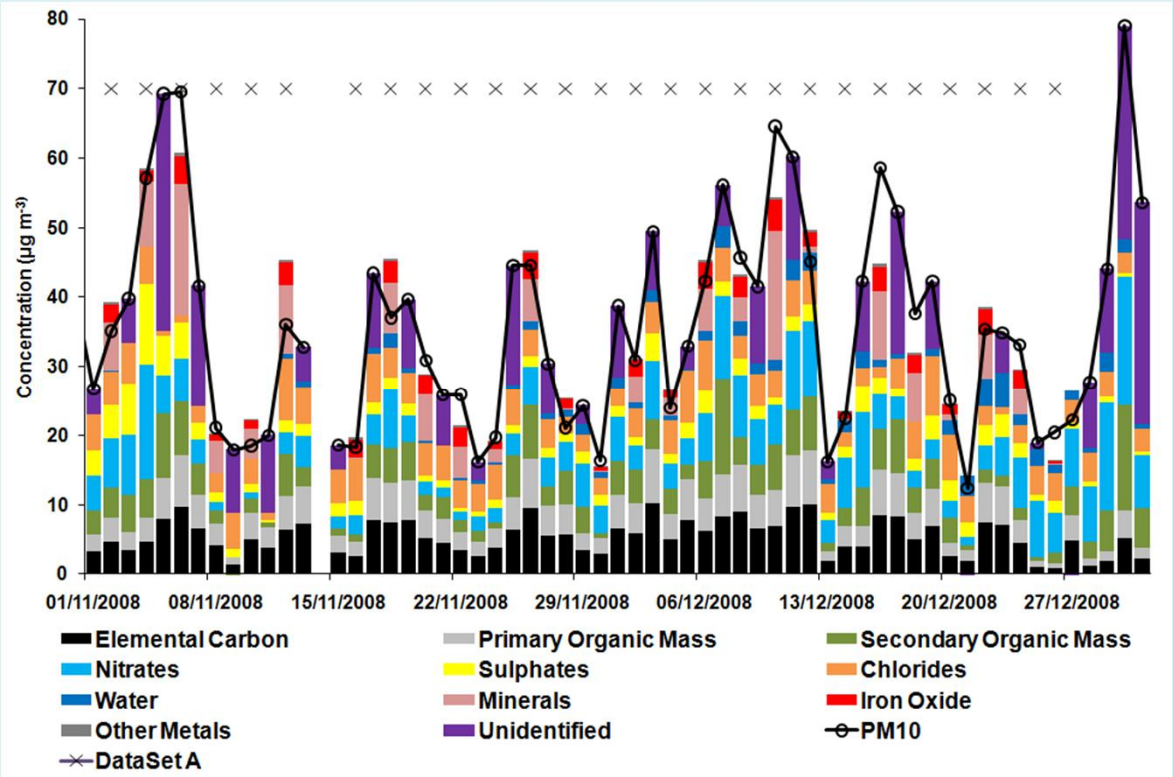
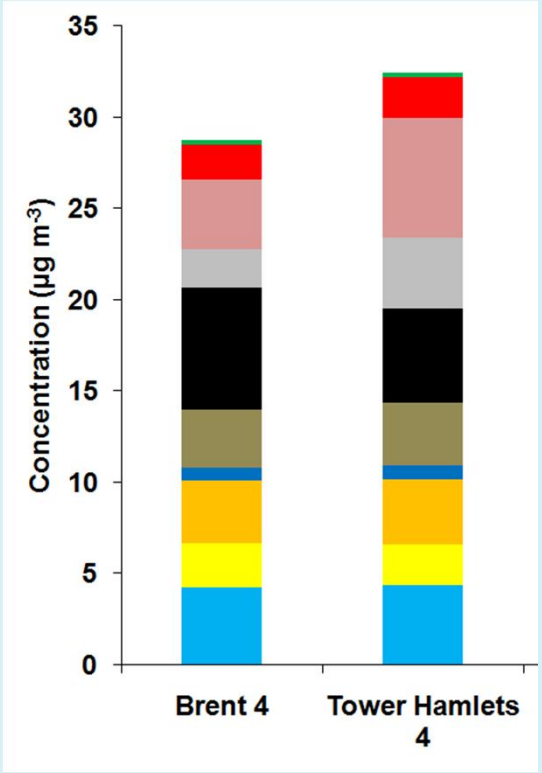
Table 1
Results of screening method showing the frequency of daily mean PM_{10} above $50\,\mu g\,m^{-3}$ that might be due to fugitive sources during each year

Days identified by screening method	No. of sites
1999 (57 sites screened)	
0	43
1	8
2–4	3
5–7	1
>7	2
2000 (68 sites screened)	
0	51
1	12
2–4	3
5–7	2
>7	1
2001 (75 sites screened)	
0	58
1	10
2–4	7
5–7	0
>7	1

Chemical composition of PM_{10}

- Mass closure chemical speciation at two roadside sites in 2008
- Even at roadside, mineral contribution ≈ exhaust contribution

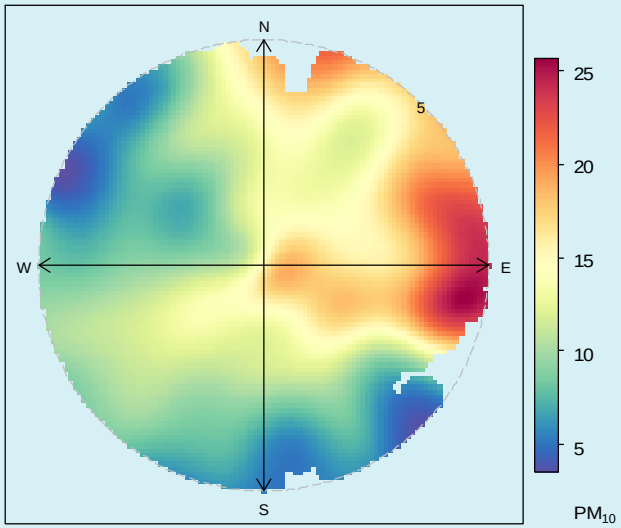


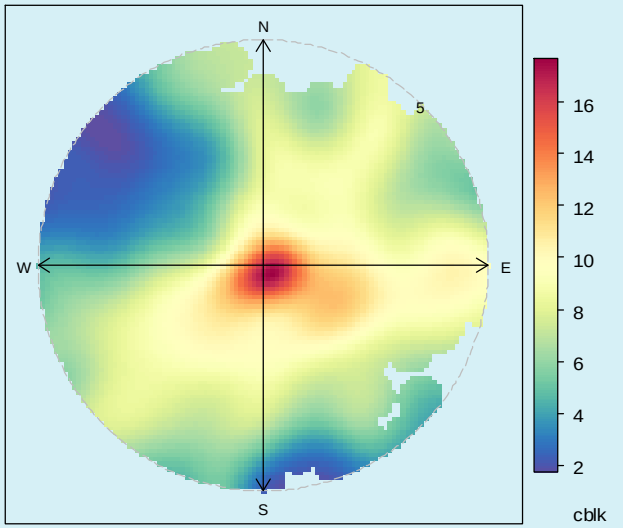


Health impacts

- Aside from nuisance issues, the ultimate aim of air quality remediation/mitigation is improvement of public health.
- Is it sensible to lump PM from construction activities in with all other sources of PM_{10} in mass terms?
- Should $PM_{2.5}$ be given higher priority?
- Should non-road machinery exhaust emissions control (black carbon) be a priority?

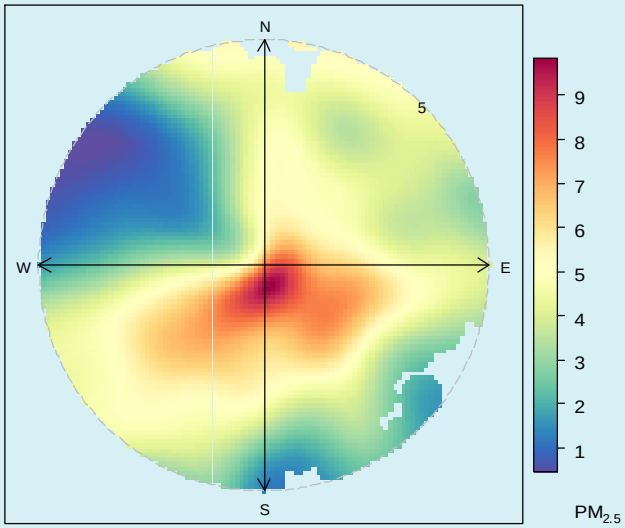
Transport of PM_{10} and $PM_{2.5}$ (N Circ.)





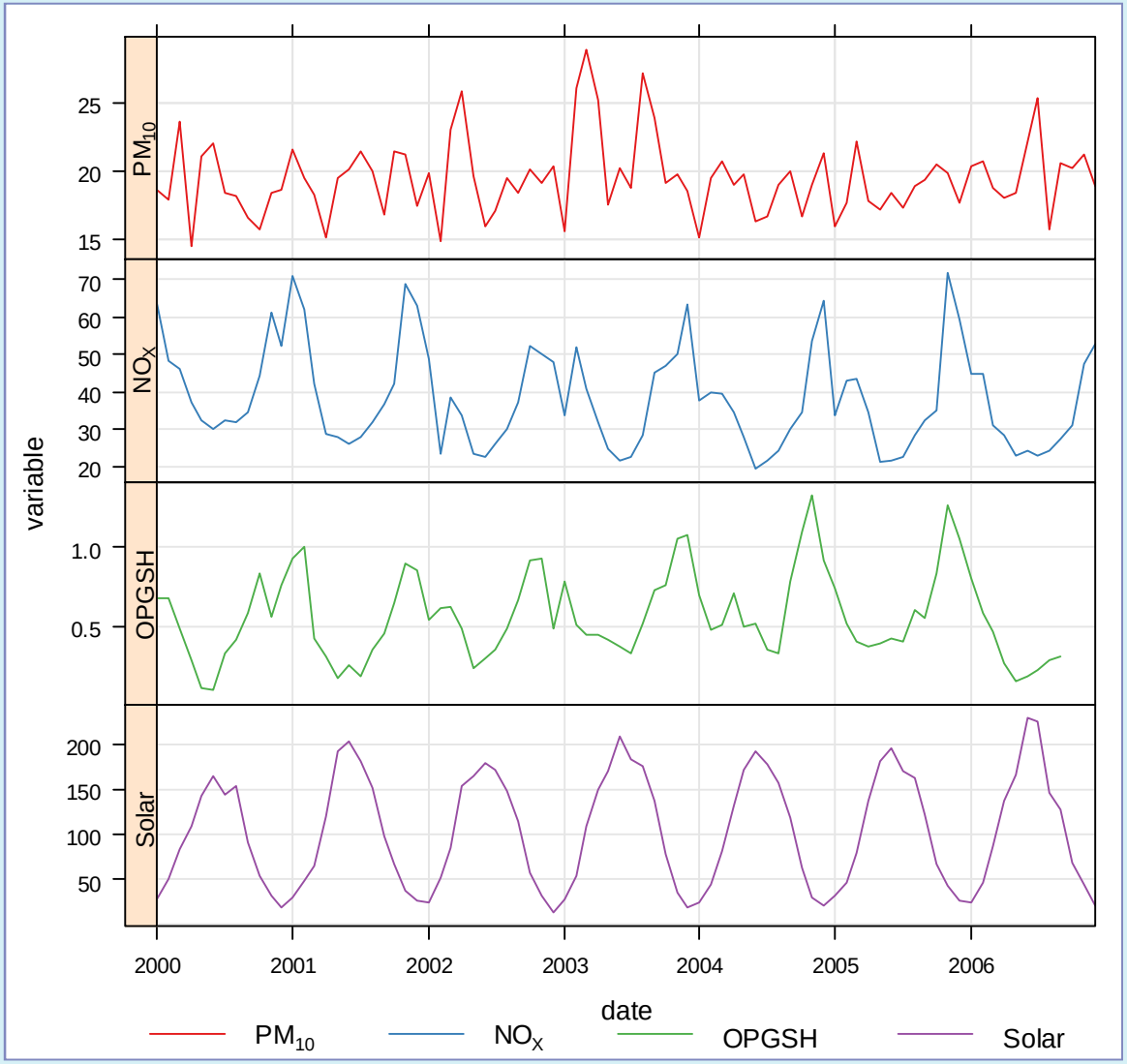
PM_{10}

BC



$PM_{2.5}$

Oxidative activity of London's PM

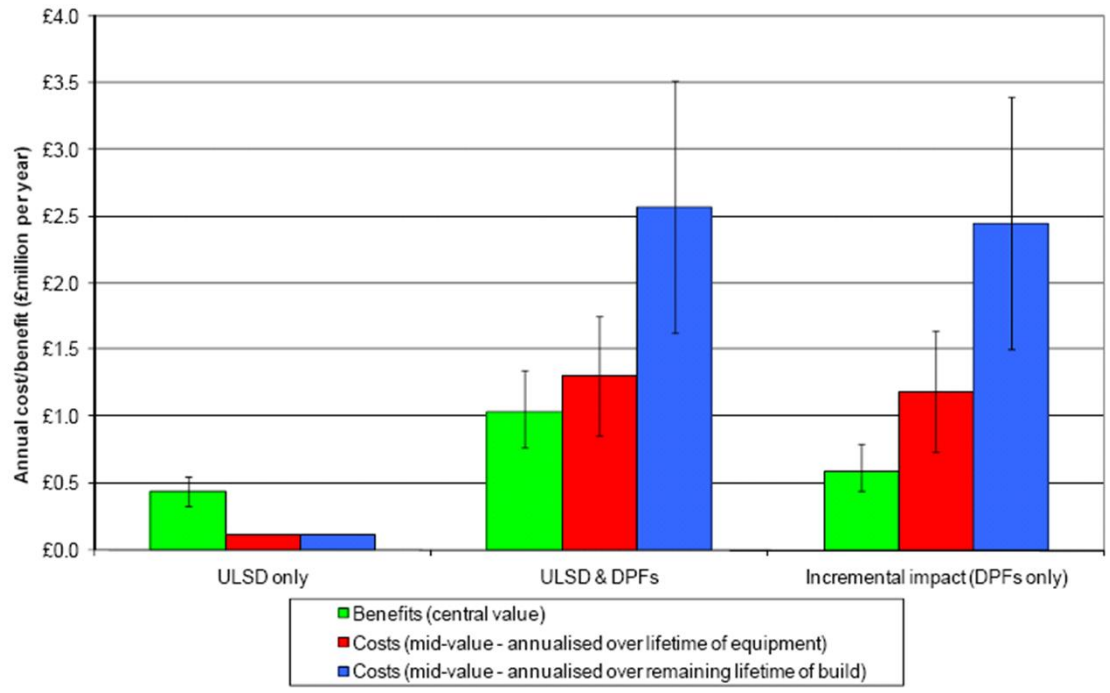


NRMM – exhaust emissions control

- *'All NRMM to use ULSD where available and be fitted with appropriate exhaust after-treatment from the approved list'.*
- Resistance from industry:
  - The impact of filters on engine efficiency, fuel efficiency, noise
  - Warranties, training, service requirements, health and safety
  - Cost effectiveness of the filters
  - A lack of consultation in respect of this element of the Guidance
- Precedents exist in US – Boston and New York City:
  - www.northeastdiesel.org/construction.html
- Olympic Park development an ideal first test case.

Cost benefit analysis for Olympic Park

Figure 6.1 Summary of costs and benefits of each scenario



Local nuisance issues

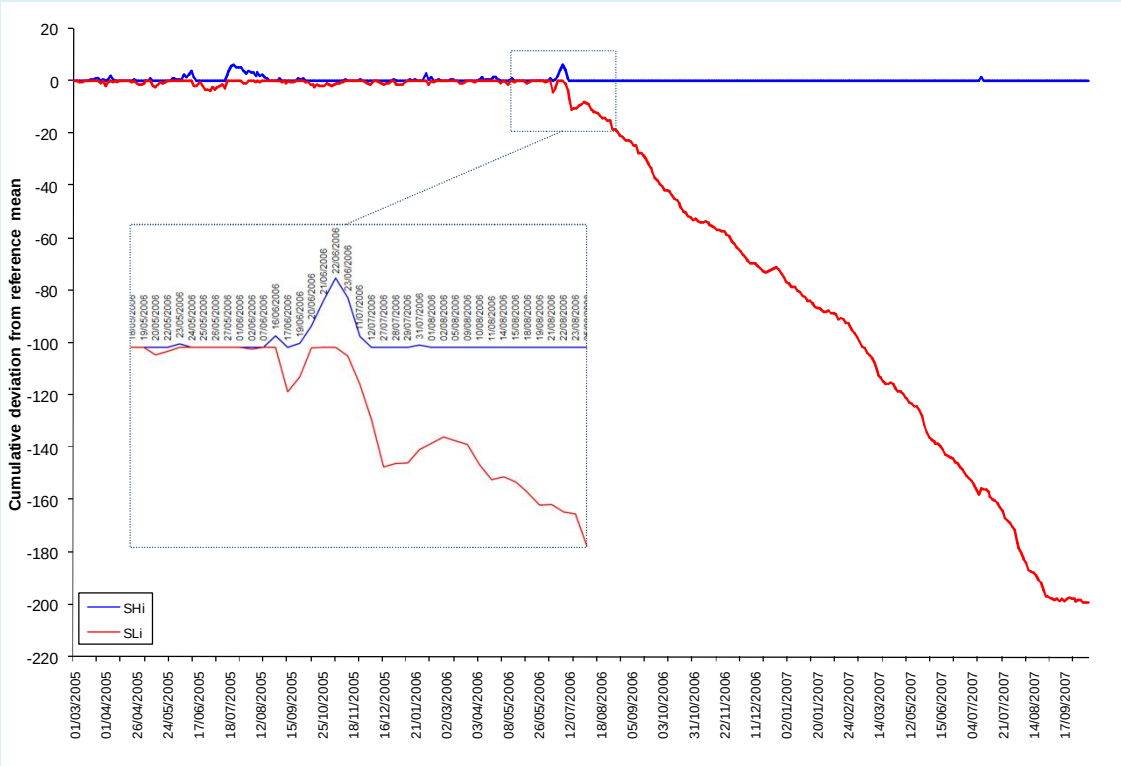
- What drives ‘significance’ - nuisance limits (e.g., 250 µg m^{-3} 15min mean), legislative limits (e.g., 50 µg m^{-3} daily mean reference equivalent) or health limits (no threshold)?
- Once the monitoring requirement is met, who polices the outcomes (alert response, mitigation, monitoring maintenance)?
- How do you assign blame in a dense urban environment?
- Do we have sufficient robust evidence to be able to:
  - Estimate the likely area of impact?
  - Estimate PM_{10} (and $PM_{2.5}$?) emissions?
  - Know what to advise if a problem is identified?

Mitigation and source identification

- 'Blind' study of PM_{10} emissions from a waste transfer site.
- Evidence to assist establishment of BP guidelines for similar sites – which mitigation measures had an impact?

Do on-site mitigation measures work?

- Cumulative deviation from forecast mean concentrations
- Based on the model: $PM10_{lf} = 387 + 3.86T_a - 4RH_a$ ($R^2 = 0.62$)

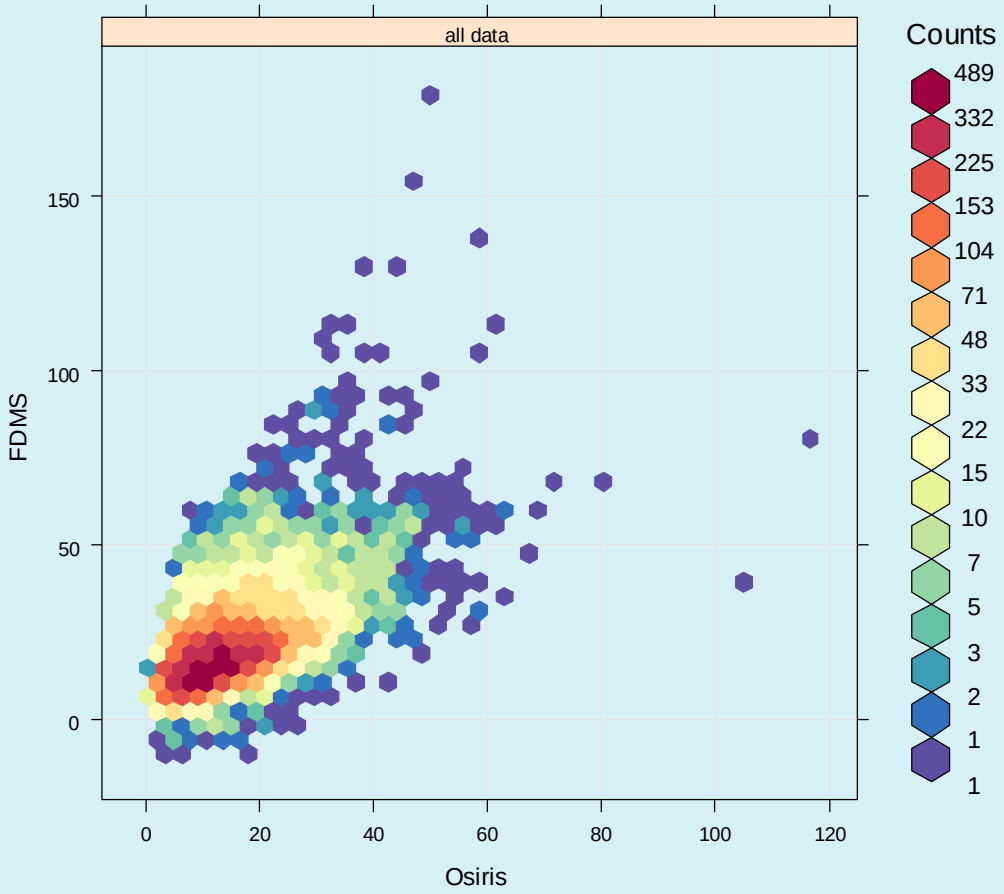


- Change point co-incidental with wheel wash installation.
- Effect of damping down yard, not cleaner road.
- XC Days dropped from c. 250 to c. 170

‘Non-reference’ monitoring data

- Light-scattering instruments most commonly used in construction scenarios for good practical reasons.
- Are results from these instruments useful for health-based limit compliance monitoring?
- Co-location studies are inconsistent, varying from a large over read through to a large under read.
- FDMS co-locations now available for assessment.

King's Cross development co-location



$[PM_{10}] = 0.81[osir] + 9.2$

$R^2 = 0.34$

Summary (A)

- Construction dust has an identifiable affect on PM_{10} concentrations across London.
- Major projects are likely to cause PM_{10} exceedence days at roadside locations due to incremental effect
- In marginal compliance areas this could have very large implications this year and 2012.
- Impacts in terms of nuisance, health and legislative compliance should be considered.
- $PM_{2.5}$ will become of increasing importance, but unlikely to pose as big a problem as PM_{10}.

Summary (B)

- More evidence appears to be required for:
  - Feasibility of retrofitting of particle traps on non-road mobile machinery
  - Area of impact of construction activities
  - Road entrainment vs. Fugitive sources
- Advise great caution when using non-reference methods for EU Limit Value compliance monitoring.
- Significant local officer time is required to police BPG requirements.

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Thank you

benjamin.barratt@kcl.ac.uk

daniel.marsh@kcl.ac.uk