Review of Kelly et al.,
An Assessment of the Impact of the Congestion Charging Scheme on Air Quality in London

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Review Committee Thoughts

- Team took on a tough task
  - Quantify a relatively small signal in a noisy background with the potential of other factors masking the response to the congestion charging scheme (CCS)
  - New and innovative approaches used
    - CUSUM application in the air quality arena
    - Ethane normalization
    - Oxidative activity of London PM_{10}

Strengths

- A variety of techniques employed to help identify the air quality signal
  - Dispersion modeling
  - Ethane normalization
  - Cumulative Sum (CUSUM) assessment
  - Polar plot analysis
  - Analysis of changes in mean concentrations
- Toxicological assessment of oxidative activity of filter samples

Oxidative Activity

- Increased oxidative potential near roadways linked to Cu, Ba and bioavailable Fe
  - Species increased during the 6 year period
  - Particularly interesting in light of yesterday's comments on the importance of non-exhaust components.
  - Further importance when increases in PM10 at a roadside monitor are linked to non-exhaust components

However…

- Less sure that one can say that a reduction in various pollutants has been demonstrated
  - Nice exchange with the investigators as to the weight of evidence
- Many other processes leading to short and long term changes
  - Weather*, controls, bus and taxi programs, growth…
- Relatively few monitors in the CCZ
  - One impacted by building*
  - Being dealt with in Low Emission Zone study

*Bad things happen

Dispersion modeling

- Dependent upon many assumptions, some unevaluated (nor could all of them be evaluated), and very small change simulated
  - CCS expected to decrease NO_x by 1.7 ppb (-2.5%), overall a 3.6 ppb decrease was simulated (observations decreased 2%, though comparison is not exact)
    - NO_2 expected to increase 0.1% (observations increased 32%)
  - CCS expected to decrease PM_{10} by 0.8 µg/m^3 inside zone, though an increase of 0.4% was simulated for the monitor site (observations in geometric mean increased about 5.7%)
- Modeled interannual variability was about 20% for NO_x, suggesting the size of the change simulated would be difficult, at best, to be seen

Ethane Analysis

- Unique approach
- Results
  - PM_{10} increased, Decrease in ratio driven largely by increase in ethane
  - Shaftesbury similar

Parameter	Before implementation	After implementation
Marylebone		
14 day mean PM_{10}	37.1 $\mu g\ m^{-3}$	53.3 $\mu g\ m^{-3}$
Mean London excess	21.3 $\mu g\ m^{-3}$	27.2 $\mu g\ m^{-3}$
London excess/ethane	1.66	1.44

Summary

- Results may be suggestive, but the impact on air quality, if any, is small
  - Very difficult to detect such small signals without adequate monitoring and long observational period
    - So…

- Oxidative potential results contribute to an increasing concern over non-exhaust PM components

Possible Additional Analyses

- May consider meteorological detrending (e.g., Rao, Zurbenko and co-workers)
  - Use long records of how pollutant concentrations vary with meteorological (and day of year variables) to help identify changes due to emissions