

POLICY NEEDS FOR AIR QUALITY MODELLING

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Modelling is an essential part of the policy process

- Regulation of sources
- Source apportionment of current concentrations
- Future projections against targets
- Assessment of policy options
- Evaluation of past policies
- The basis of Cost-Benefit Analysis

But models must satisfy criteria

- Policies must be based on sound science
- But need it always be the most sophisticated model?
- Use just one model with CAUTION!
- Unless it has been subjected to peer review, intercomparisons with measurements and other models

- It is not enough to test a model by comparison with observation
- Policy questions require models to predict changes
- So models must be able to estimate $\partial C_i / \partial Q_i$ to acceptable accuracy for different sources I
- This is still not easy for some basic systems – oxidation of SO_2 and NO_x to form SIA
- Correct source apportionment is key for non-reactive pollutants

Input Data

- The use of advanced models in practical applications can be constrained by the availability and quality of input data
- Emissions – time and space resolution
 - chemical speciation
- Meteorology

Uncertainty

- For policy purposes it is not enough to quantify the scatter around an 'Observed vs Modelled' plot
- The confidence with which **changes** are modelled is important too
- There are uncertainties in
 - future emissions
 - future meteorology (and climate change)
 - inherent uncertainties in models

Some current policy problems:

Airports/aircraft

- The emission characteristics of jet engines have not been incorporated into models to any significant extent to date
- Momentum, buoyancy effects important for local air quality
- UK Dept for Transport PSDH work has done important work here

Particles

- Europe's biggest air quality/health problem
- No comprehensive model to treat all components
- Emissions?
- Secondary aerosols – inorganic and organic
- Coarse component – can't ignore, metals?

Buncefield

- Large fuel tank farm fire
- Shallow ground-based inversion, large wind shear
- Showed limitations of simple plume models

Multiple spatial scales

- European transboundary problems – PM, Ozone
- Hemispheric and Global scales are now recognised as important for air quality
- Health impacts are at the urban scale
- Modelling accurately the spectrum of scales down to the urban scales is a problem

Climate Change and Air Quality

- AQ and CC policies sometimes conflict
- Need to quantify the trade-offs
- Difficult because of the differences in lifetimes-climate metrics? GTP rather than GWP?
- Boucher et al at the Hadley Centre have recently made some advances for Black Carbon