**NIAM activity on PM2.5**

As one of our first activities in NIAM we would like to look at how countries are addressing PM2.5 pollution, including how they model it, how they assess the health impacts, and how this feeds into policy. As a first step we are gathering information on current work in this area towards organisation of a virtual meeting in November.

If you are interested in participating please register your interest with an e.mail to [h.apsimon@imperial.ac.uk](mailto:h.apsimon@imperial.ac.uk). And if you are already working in this area we shall be grateful if you can also send a response to the questions below which will help us in planning a focus on this topic.

1. **Modelling PM2.5 UK**

If you model PM2.5 concentrations in your country:-

1. Do you use GAINS, or independent modelling- in which case please give brief details.

*We use the UK integrated assessment model, UKIAM. This embeds national projections and modelling of abatement scenarios in the UK plus shipping in the surrounding seas, in EMEP modelling of imported contributions to concentrations and deposition*

1. What distance scales do you cover- e.g. European, national, city: and with what spatial and temporal resolution?

*UKIAM can be broken down into regions (London, rest of England, Wales, Scotland and N Ireland) with a 1x1 km grid for annual average concentrations and 5x5 km grid for deposition.*

1. What components of PM2.5 do you include- e.g. primary PM2.5, secondary inorganic aerosol, secondary organic aerosol, natural dust etc?

*Primary PM2.5, SIA components. Other components, SOA, natural dust etc are included for comparison with measurements, but kept constant over time in future projections*

1. What emissions data do you use e.g. a national inventory. Are there particular sources you think are uncertain, missing, or would like to discuss?

*We use the UK NAEI national inventory and projections for baseline emissions, and the MPMD database of abatement measures, and superimpose sensitivity studies to uncertainties in emissions. UKIAM includes the detailed BRUTAL sub-model of road transport emissions built up across the UK road network.*

*Sources with large uncertainties include non-exhaust emissions, non-road mobile machinery, domestic wood burning, and cooking (which is a source not covered in the national inventory). Also issues of the definition of PM2.5 re condensable fractions.*

1. Have you undertaken validation of your model against measurements, and if so what measurements do you have available to use

*Yes. We compare with the national AURN monitoring network of PM2.5 stations, and also the AGANET network for concentrations of SIA components.*

1. What do you think are the most important uncertainties or aspects of PM2.5 modelling that you would like to discuss

*Emissions of primary PM2.5, and also issues of non-linearity for SIA when using source-receptor matrices in integrated assessment*

1. **Assessing health impacts**

The health impacts of PM2.5 are a major driver to reduce air pollution.

1. We are interested in how you use data on concentrations of PM2.5, either modelled or measured or both, to assess human exposure and health impacts?

*We combine concentrations with population data to estimate population weighted mean concentrations PWMC for different regions and agglomerations, and also population weighted mean exceedance of the WHO guideline (or alternative threshold). The PWMC calculations are used to assess monetised health impacts with assistance from Mike Holland.*

1. If you undertake such assessments of health impacts of PM2.5, do you follow WHO guidance and base this on total mass of PM2.5, or do you focus on particular components and/or differentiate relative toxicity?

*We use total mass of PM2.5, but we also have detailed source apportionment so can resolve components such as black carbon or toxic species from individual sources.*

1. What health impacts do you consider e.g. mortality, asthma etc; and what risk coefficients do you use?

*We use the risk coefficients provided by our UK Committee on the Medical Effects of Air Pollution, COMEAP including their advice on combining PM2.5 and NO2*

1. Do you assess the economic costs of health impacts, and if so what do you include e.g. life years lost, hospital/medical costs, loss in productivity/working days lost etc.?

*Yes. We use economic costs provided by Mike Holland, which are consistent with the intergovernmental panel guidance in the UK on effects to include- mortality, asthma etc*

1. **Policy applications**

We are also interested in the application of your work, particularly as input to development of policy.

1. How do you relate your work to environmental goals e.g. compliance with regulations, or comparison with WHO guidelines?

*We use UKIAM to model scenarios to achieve compliance with national emissions ceilings; and also to explore convergence towards attainment of the WHO guideline for PM2.5. This analysis includes human exposure and health impacts, and also ecosystem protection.*

1. **Publications**

Have you published your work, in which case please give references is available?

*A report by ApSimon, Oxley, Woodward and Mehlig in 2019 on modelling of PM2.5 is on the Defra web-site: www.gov.uk/government/publications/air-quality-assessing-progress-towards-who-guideline-levels-of-pm25-in-the-uk*

1. **Questions**

Are there particular aspects of questions that you would like NIAM to address on PM2.5, including at the virtual meetings proposed for November.

*Primary PM2.5 emissions, health impacts and possibly uncertainties/ model differences in modelling SIA*

Please e.mail your response to Helen ApSimon: h.apsimon@imperial.ac.uk