Update on benefits assessments

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Updates

- NO_2 and health
- Analysis of healthcare costs
- Impacts on productivity
- Wider CBA / BCA activities

NO_2 and health

- HRAPIE study (WHO, for DG ENV, 2013)
  - http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/publications/2013/health-risks-of-air-pollution-in-europe-hrapie-project.-recommendations-for-concentrationresponse-functions-for-costbenefit-analysis-of-particulate-matter,-ozone-and-nitrogen-dioxide
- DG ENV funded study (2017)
  - http://ec.europa.eu/environment/air/publications/models.htm
- COMEAP (UK Committee on the Medical Effects of Air Pollutants)
  - https://www.gov.uk/government/publications/nitrogen-dioxide-interim-view-on-long-term-average-concentrations-and-mortality
  - Final statement due shortly
- concawe
  - New report? 2014 report at https://www.concawe.eu/publication/report-no-914/
- Others?

VITO/KCL for DG ENV

- Methodological requirements
  - Methods should allow for different response functions, irrespective of cut-off
  - Focus on long-term health effects
  - Based on static population map
  - Spatial scale – needs to capture strong gradients and spatial variability

Main uncertainty

- Concentration response functions tested
  - HRAPIE: 5.5% change in mortality per 10 ug/m^3 with a 20 ug/m^3 cutoff, with 33% reduction
  - COMEAP 2015: 2.5% change in mortality per 10 ug/m^3 with no cutoff, with 33% reduction
    - Note: final position of COMEAP will be different
- Factor 2-3 difference in impacts for regions with 'moderate' NO_2 exposures (COMEAP generally gives higher estimates).
- Other uncertainties (e.g. mortality rate, population age) have less effect
- Suggested to go to a spatial scale of 100m

HRAPIE and Interim COMEAP functions

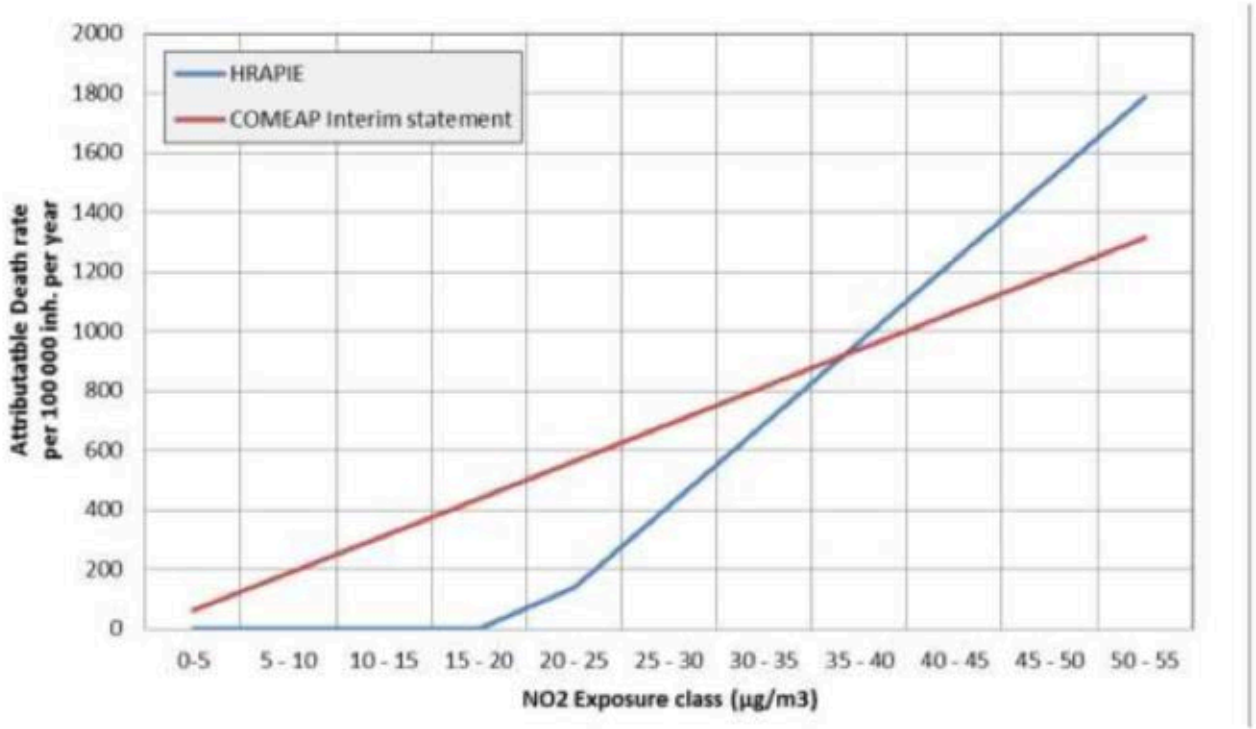

Figure 12 : Illustration of the difference between both CRFs showing the attributable deaths per 100 000 inhabitants per year for HRAPIE and COMEAP as a function of NO_2 exposure class, where the bin center is used as the population weighted averaged concentration in each interval. A baseline mortality rate of 1000 / 100000 inhabitants is used here.

Areas with NO_2 > 20 ug/m^3

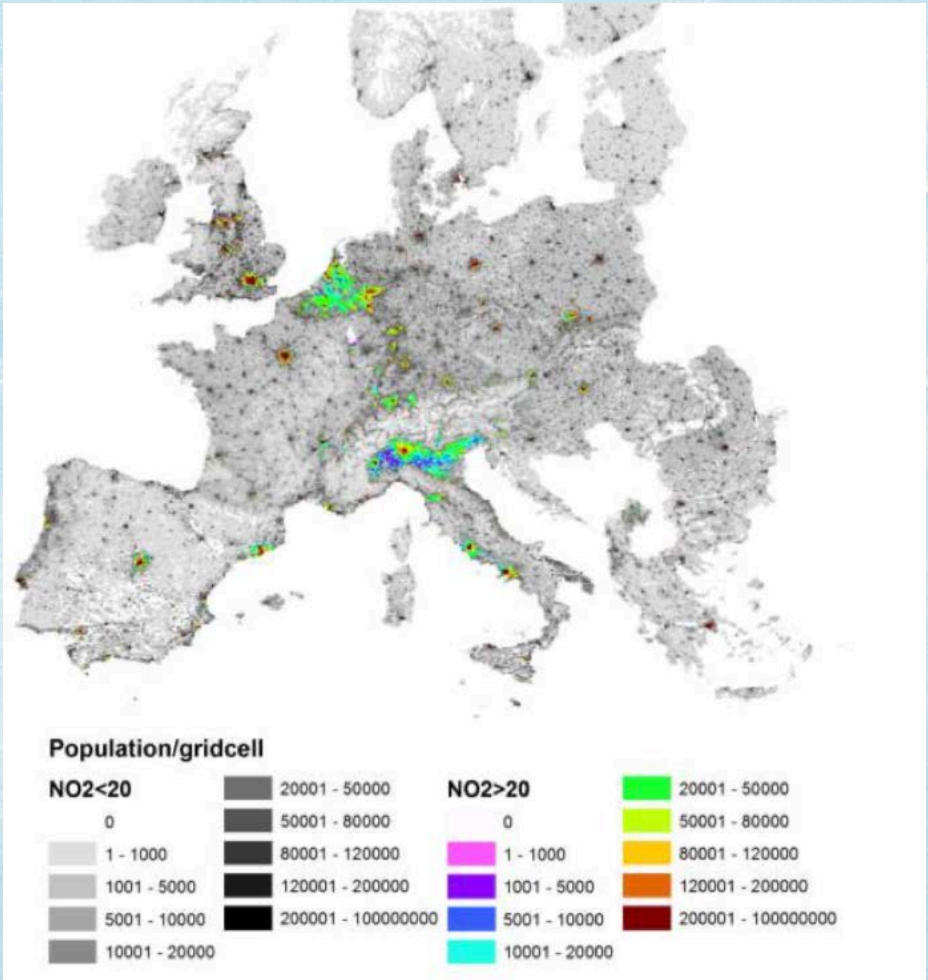

Figure 18 : GEOSTAT population map using the CHIMERE 7x7 km NO_2 map to show the 20 µg/m^3 threshold. The area's shown in color indicate regions in excess of 20 µg/m^3 annually (according to CHIMERE). The CHIMERE data was contributed by JRC, E. Pisoni for the base year 2010 (as taken for the SHERPA tool : EC4MACS proxies applied on GAINS total emissions (2010) using ECMWF IFS meteo).

Exposure model developed by VITO/KCL

- Available at the website (see above)
- Starts from 7x7 km, scales down to 1 km
- Geared to annual concentrations
  - Fine for long term effects, not for short term
- "*The preliminary results from the GAINS-kernel coupling obtained within this project require further analysis and discussion, nevertheless we have successfully demonstrated the coupling of the methodology with an integrated assessment model*."
- Most suited to analysis of traffic emissions
- Bias correction required, depending on response function (?)

Analysis of healthcare costs

- Estimation of costs to the NHS and social care due to the health impacts of air pollution
- For Public Health England, carried out by UK Health Forum and Imperial College
- To be published (?)
- Includes range of ‘new’ morbidity impacts
- Validation of some required

Effects considered

- Asthma
- Chronic obstructive pulmonary disease
- Coronary Heart Disease
- Stroke
- Diabetes
- Lung cancer
- Low birth weight
- Dementia

Impacts on productivity

- Significant morbidity impact linked to $PM_{2.5}$ and ozone
- But based on limited evidence base
- Not reviewed under HRAPIE in detail
- More extensive literature review now undertaken
- Additional study by IOM/Ricardo for UK government
  - https://uk-air.defra.gov.uk/assets/documents/reports/cat19/1511251135_140610_Valuing_the_impacts_of_air_quality_on_productivity_Final_Report_3_0.pdf

Literature review

- Identified a substantial number of papers (<50) relevant to the impact
- Many on school loss days rather than work loss (ease of measurement issue)
- Concluded that available evidence did not contradict continued use of agreed functions

IOM Ricardo study on productivity

- Analysis for UK government
- Included same function as recommended under HRAPIE
- But included additional endpoints linked to:
  - Mortality
  - Value of volunteering and other non-paid work
  - Etc.
- Significant increase in impact relative to HRAPIE recommendation

Wider CBA / BCA activities

- BCA guidelines
  - https://sites.sph.harvard.edu/bcaguidelines/methods-and-cases/
    - Valuing Mortality Risk Reductions in Global Benefit-Cost Analysis
    - Valuing Nonfatal Health Risk Reductions in Global Benefit-Cost Analysis
    - Accounting for the Timing of Costs and Benefits in the Evaluation of Health Projects Relevant to LMICs
    - Valuing Changes in Time Use in Low- and Middle-Income Countries
    - Assessing the Economy-wide Effects of Health and Environmental Interventions in Support of Benefit-Cost Analysis
    - Assessing the Distribution of Impacts in Global Benefit-Cost Analysis
    - Valuing Protection against Health-Related Financial Risks
- ISO 14001

WHO Air Quality Guidelines

- *In addition to health-protective guideline values, the final guideline document will propose interim targets to assist Member States in monitoring progress towards WHO AQGs as well as in setting national air quality standards.*
- *Interim targets will be based on the concentration-response functions of each pollutant derived from the abovementioned systematic reviews, but will also take into consideration the variability of contextual factors across settings.*
- *Contextual evidence includes*
  - *the balance of desirable and undesirable effects,*
  - *priority of the problem,*
  - *cost and resource implications,*
  - *population values and preferences,*
  - *acceptability,*
  - *feasibility, and*
  - *equity and human rights considerations.*