

Markus Amann, Zig Klimont

International Institute for Applied Systems Analysis (IIASA)

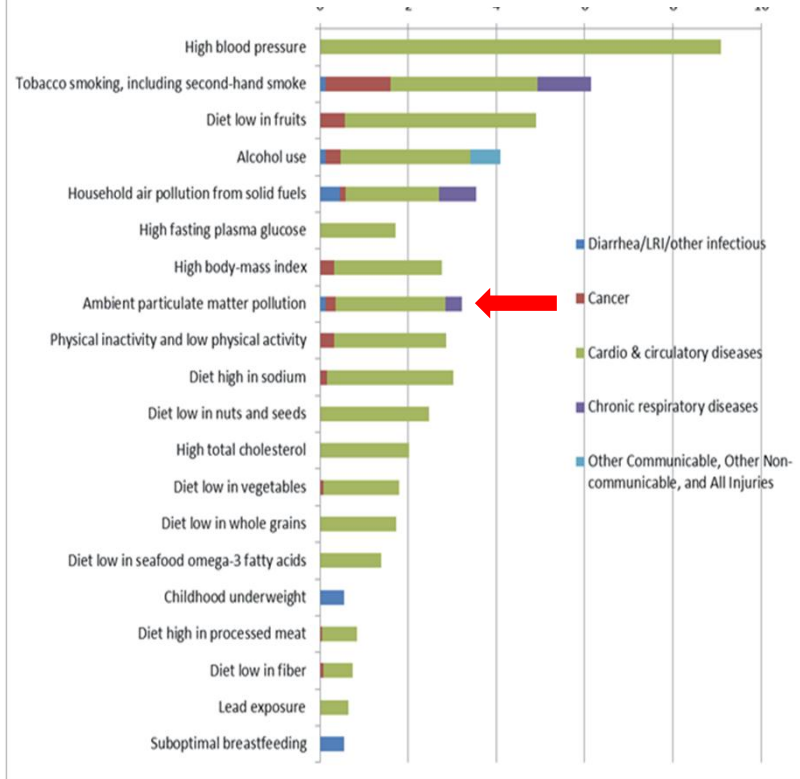


Challenges for reducing fine particulate matter in Europe

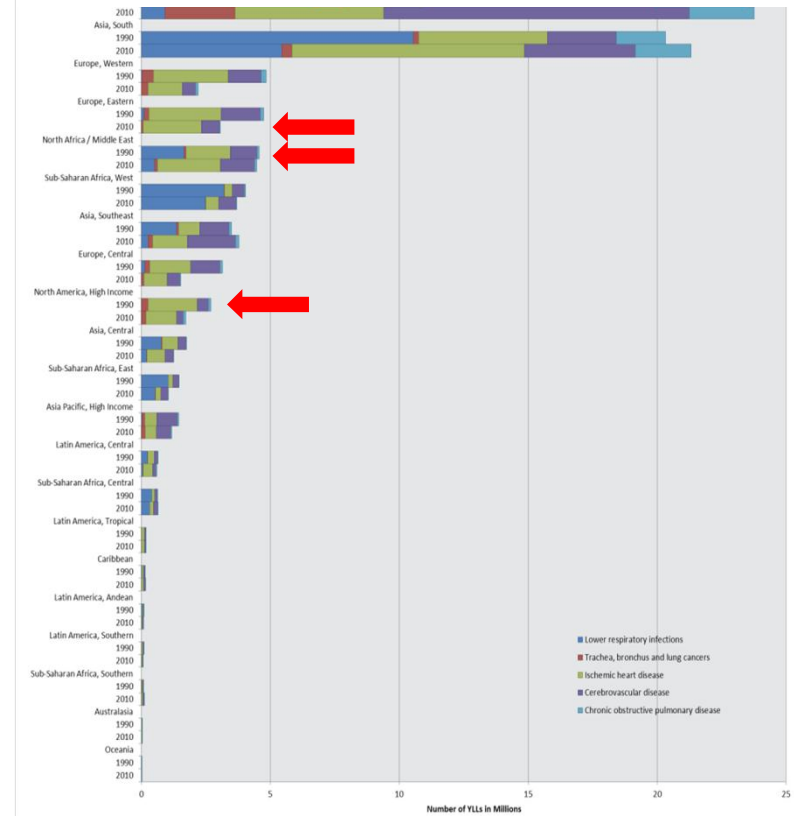
Outdoor air pollution (from PM) is risk factor #8 in the Global Burden of Disease (Lim et al., 2013)



Top 20 Global Mortality Risk Factors in 2010 (Lim et al., 2012)



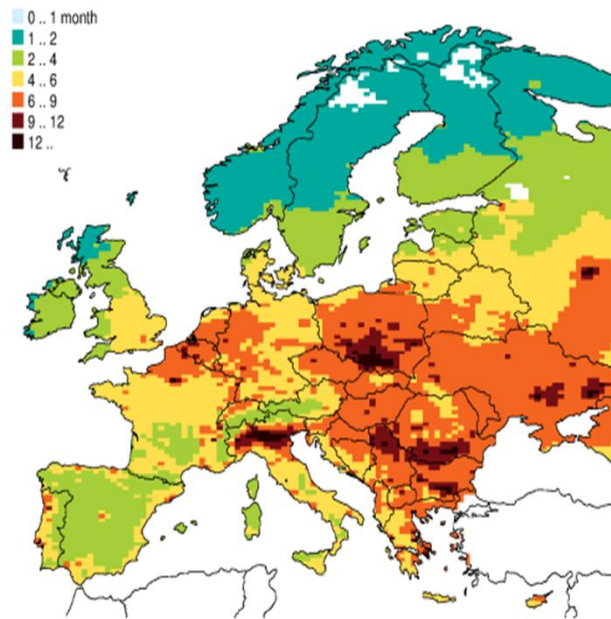
Years of life lost from outdoor air pollution by world region



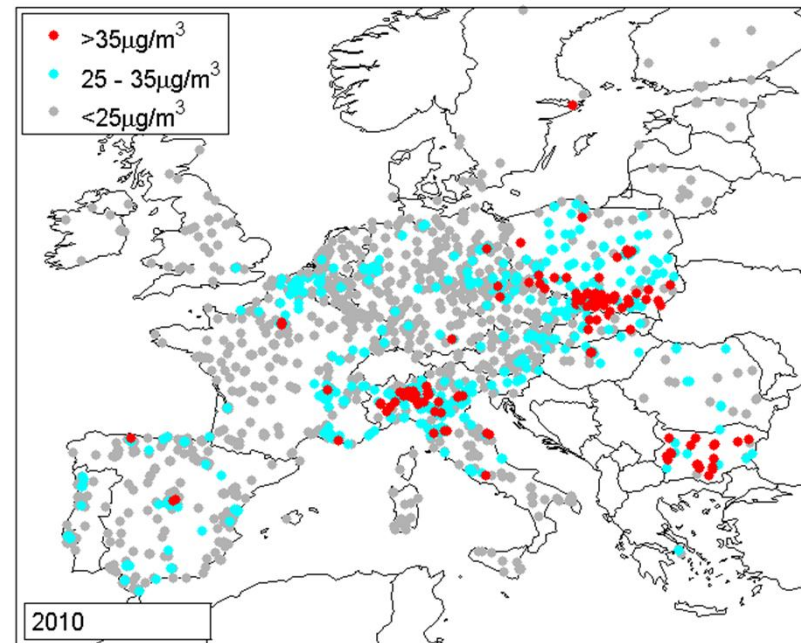
Also in Europe, PM causes significant health impacts, and PM10 AQ limit values are widely exceeded



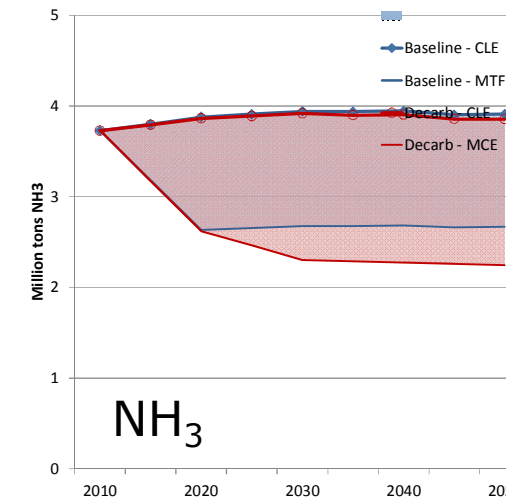
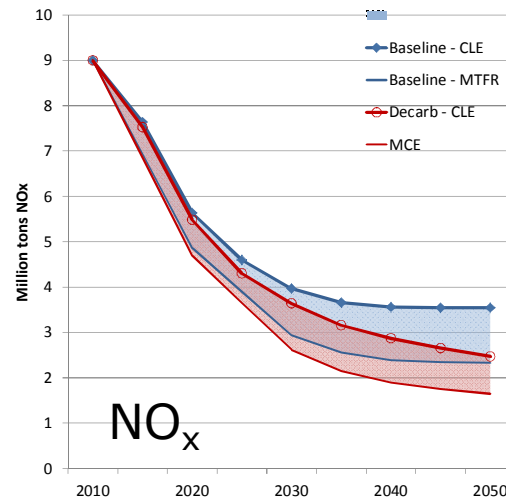
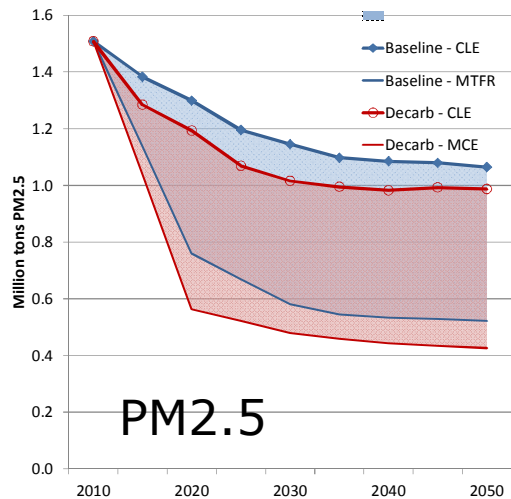
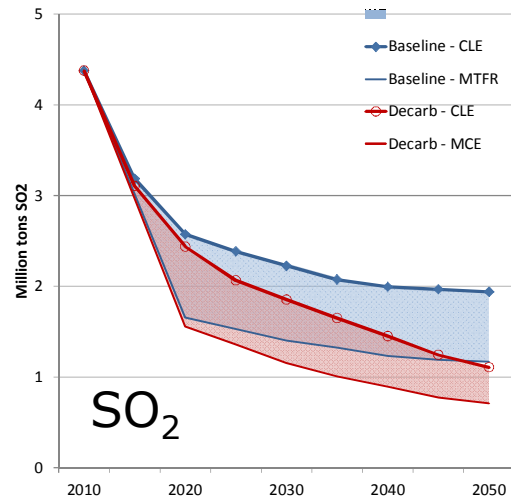
Loss of statistical life expectancy from PM2.5 (GAINS estimate for 2010)



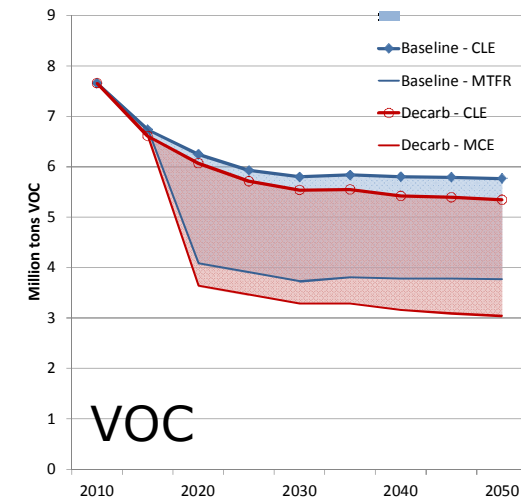
Exceedances of PM10 limit values in 2010



PM precursor emissions will change in future due to existing legislation and climate policies



- Blue ranges: TSAP-2012 CLE-MTRF
- Red ranges: Decarb CLE-MCE
- After 2025/30 progress only from decarbonisation

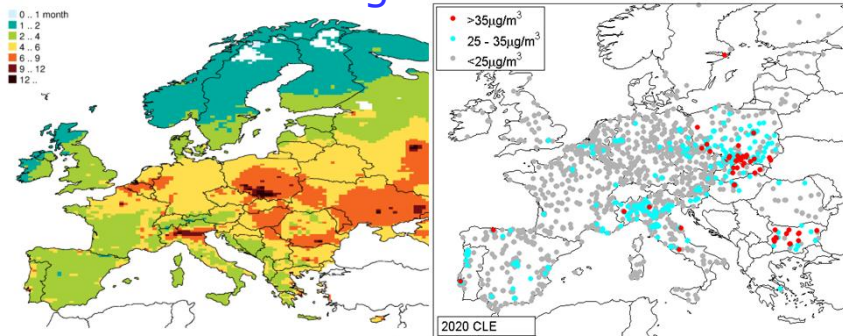


However, these changes will not be sufficient to resolve the PM problems in Europe



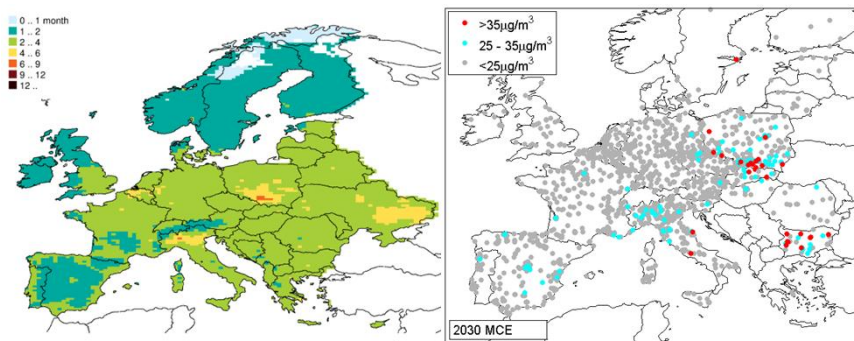
Life expectancy Compliance PM10

Current legislation in 2020



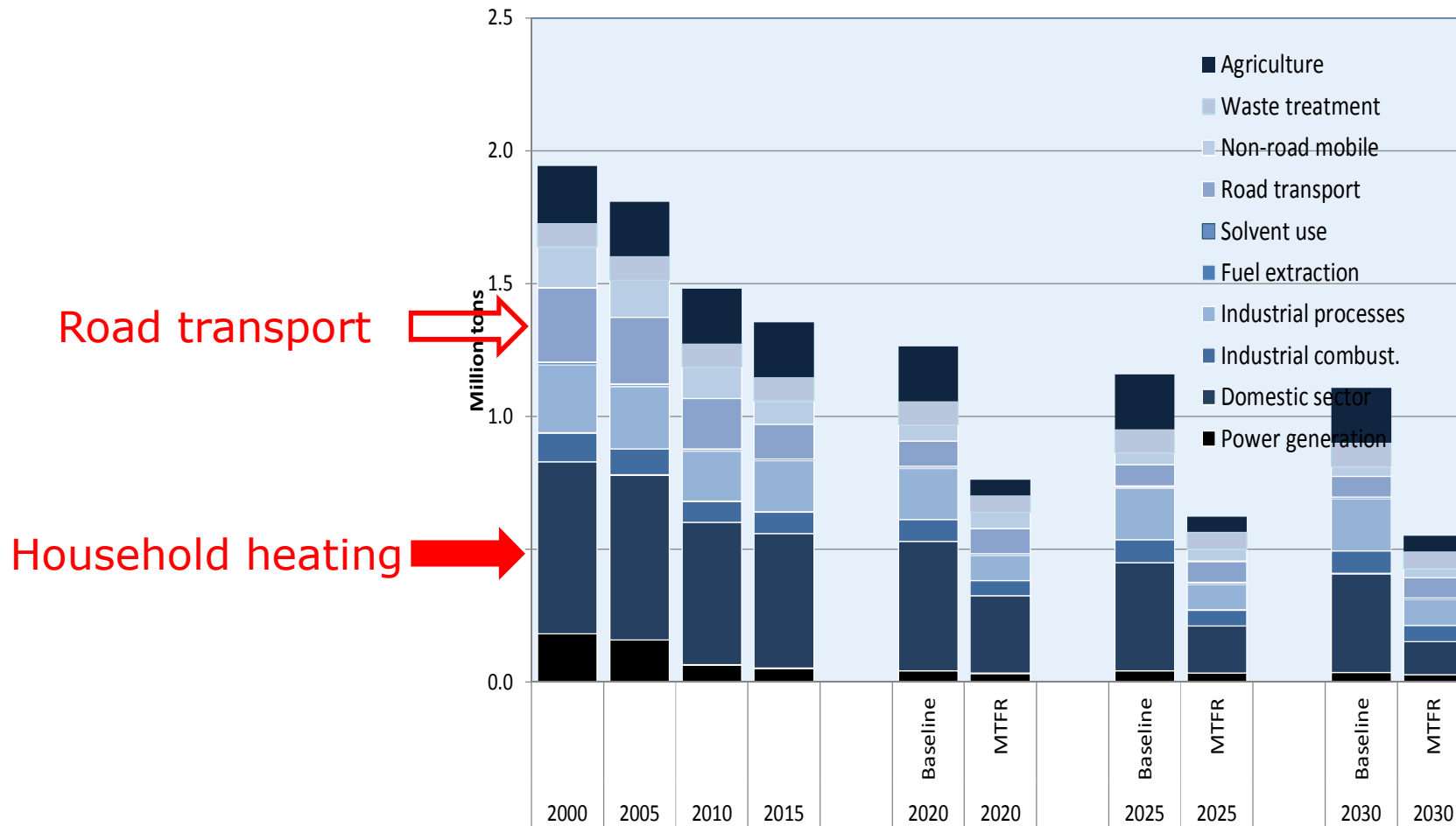
- Baseline implies ~5 months shortening of statistical life expectancy after 2020
- Additional MTRF measures could save ~55 million years of life of European population

With further measures in 2030



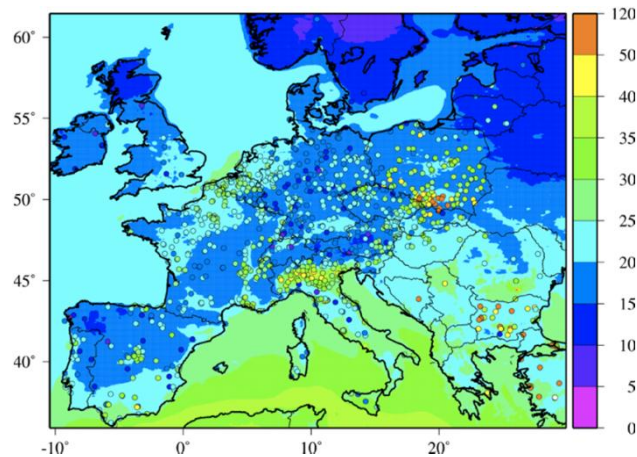
- Compliance problems with PM10 will remain in some New Member States due to space heating with solid fuels (coal, wood). Restructuring of household heating would be required.

Solid fuel combustion in the domestic sector is the largest source of primary PM2.5 emissions in the EU



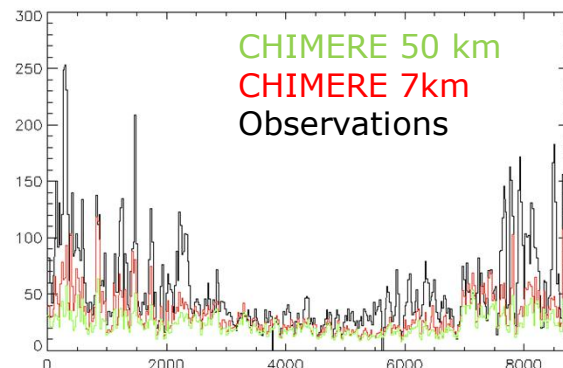
There are strong indications that PM emissions from solid fuels in households have been seriously underestimated in central Europe

Annual mean PM2.5 in 2009 ($\mu\text{g}/\text{m}^3$)



- With official emission inventories, all models underpredict observed PM10 levels by up to a factor of 10 in central and eastern Europe, especially in winter

Modelled PM10 for Krakow (2009)

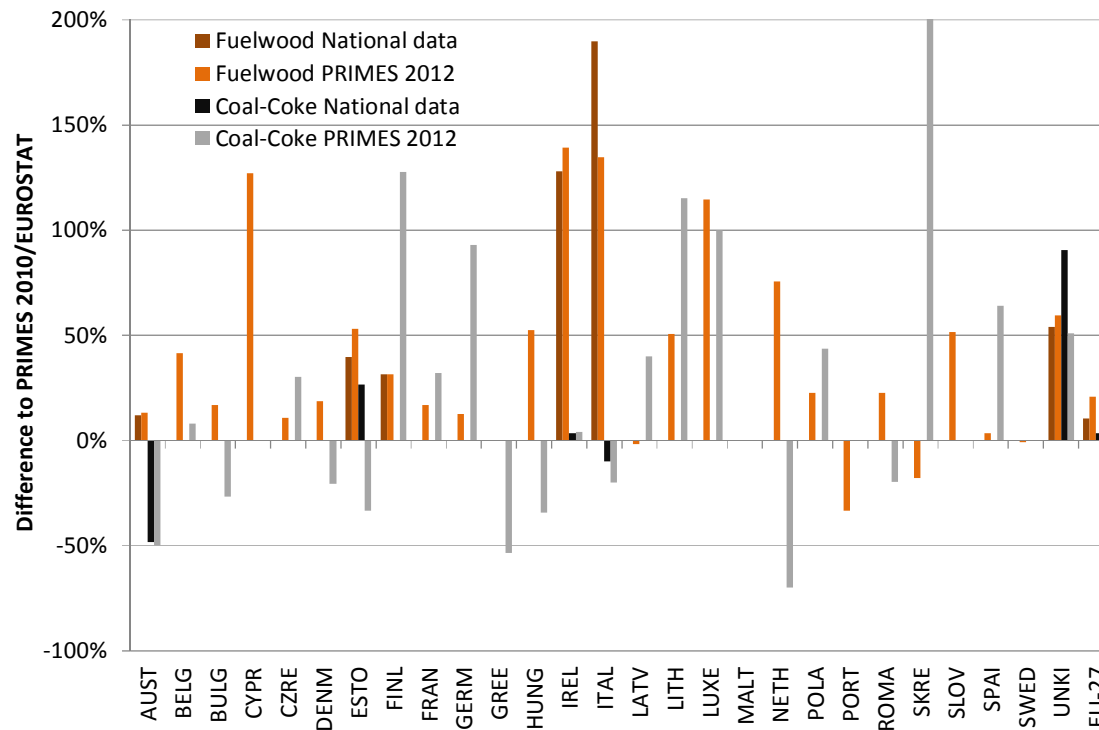


- However, the same models perform well for other parts of Europe, and for the summer in central and eastern Europe

Countries have recently updated statistics for non-commercial solid fuels



Differences in energy use statistics for solid fuels in households



- Overall, +20 mio tons wood and 6 mio tons coal in 2010
- Increase in, e.g., HU, SL, IT are consistent with recent emission reporting to EMEP
- SK reported higher emissions, but lower fuel consumption to EUROSTAT (ratio off by factor 10-15)
- New estimates will be incorporated into TSAP analyses

Conclusions



- Solid fuels in the domestic sector remain a key target for clean air in central Europe
- Data have been improved recently and confirm earlier suspicions about underestimated emissions; however, there remain questions for some countries
- For the future:
 - Important that the eco-design directive includes more stringent standards for solid fuel installations
 - Enforcement?
 - How to accelerate replacement of old boilers and stoves
 - Structural funds of EU?