Anthropogenic European emission data

for the base year 2005
and projection years 2020, 2025 and 2030

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In support of "UBA Luftqualität 2020/2030: Weiterentwicklung von Prognosen für Luftschadstoffe unter Berücksichtigung von Klimastrategien"


Introduction

- To quantify the contribution of non-German emission sources to expected future concentrations of air pollutants over Germany, the project “Luftqualität 2020/2030”needed projected gridded emission data for Europe, for the years 2020, 2025 and 2030.

- Why also do 2005 again? The year 2005 is needed because the relative change from 2005 to the projected year will be used to scale the gridded base year emissions to these future years.
- Why the scaling? Because projections don’t start from the “as good as we know them now” present day emissions. Directly combining 2005 emission with direct future projection can lead to strange jumps in the data; artefacts that should be removed – not studied.

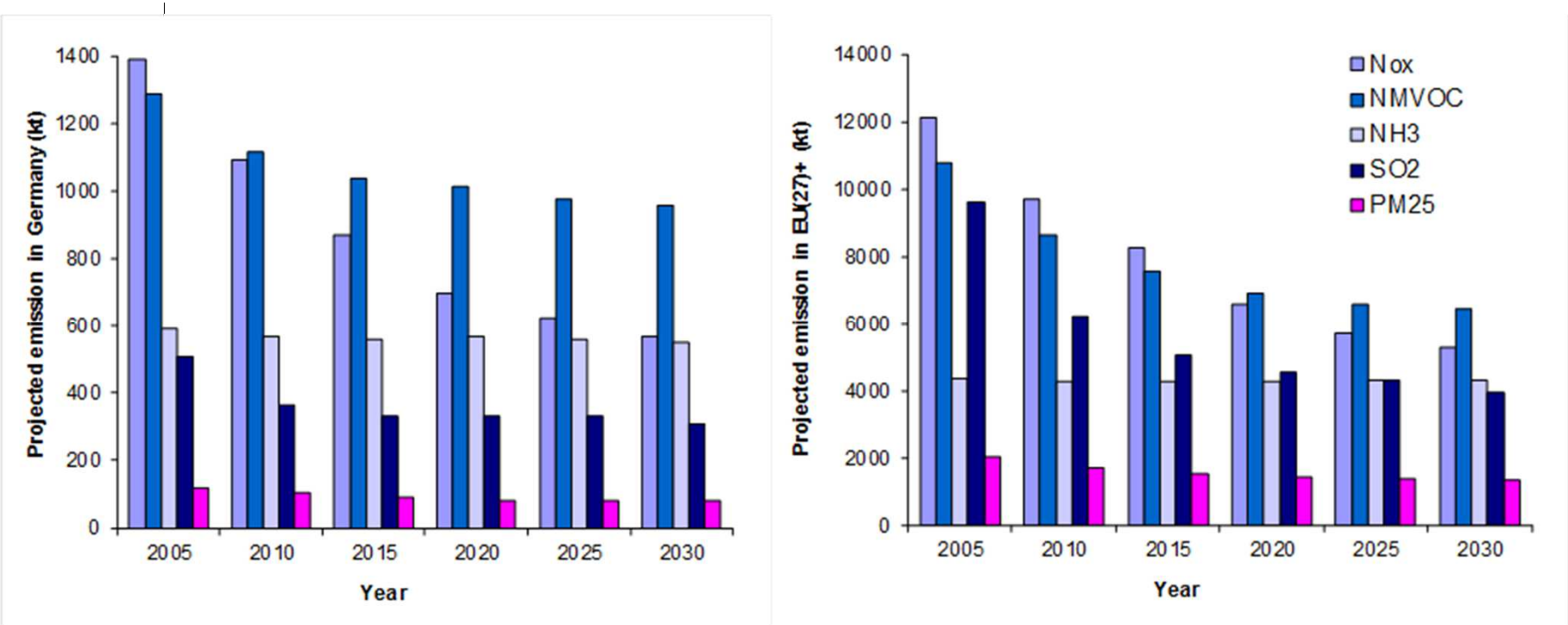
Some details

- 2005 data where possible based on official reported emissions
- Substances: SO_2, NO_x, NH_3, CO, NMVOC, CH_4, PM_{10} and $PM_{2.5}$
- Emissions delivered at aggregated source sector Level SNAP1 (e.g. power plants, agriculture, road transport, etc.)
- Scaling to future years at the level of country / sector / pollutant / year combination (not one scaling factor per country)
- Domain encompasses 42 countries
- Resolution gridded emission data is 1/8 º x 1/16 º longitude-latitude (~ 7 x ~7 km)


Choice of the scenario for future years

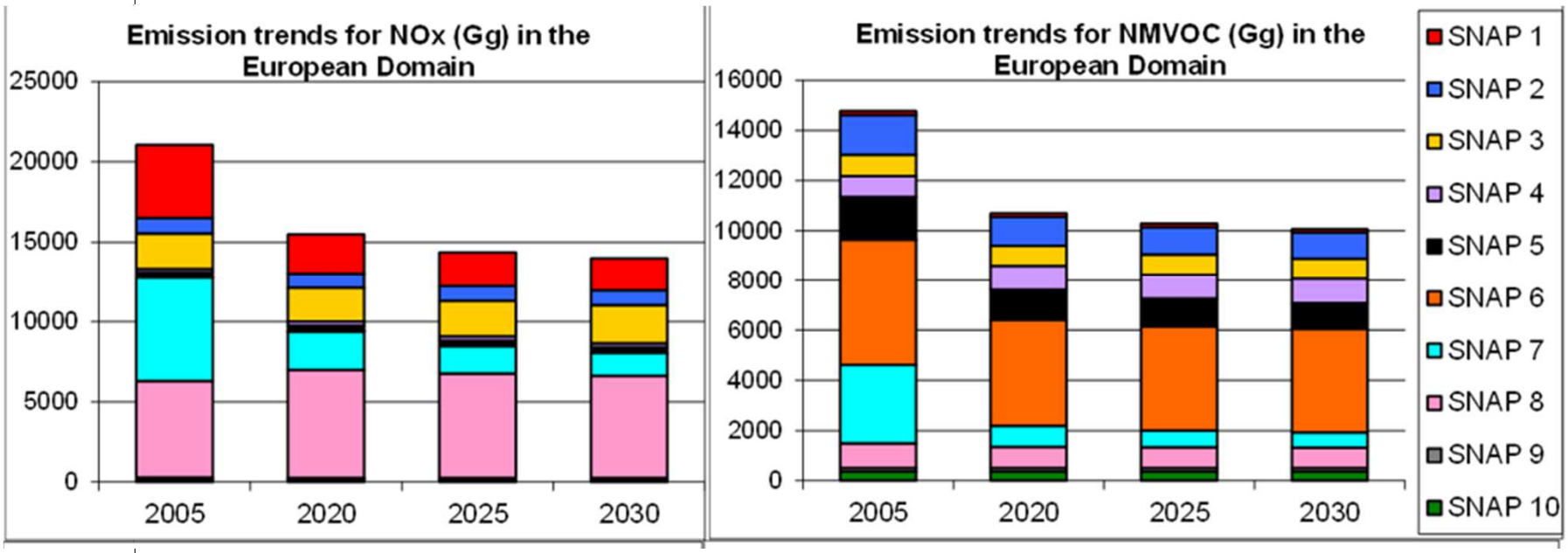
- An emission scenario aims to approximate the impact of current and/or foreseen legislation on emissions. It may try to translate rather abstract “goals” (e.g. limit global warming to 2 ^{o}C) into concrete emission changes over time.
- In UBA luft 2030 project various scenarios were considered (a note was written for comparison). In consultation with UBA, the scenario of choice was based on the IIASA GAINS model (Amann et al.).
- Final choice: PRIMES 2009 baseline scenario, CIAM Report 2 (Amann et al., 2011) ; **“GOTH_PRIMESBL2009_July2011”**

Emission totals for Germany (left) and EU27+ (right) according to the PRIMES2009_july2011 scenario *(note the factor 10 difference in the Y-axis legend).*



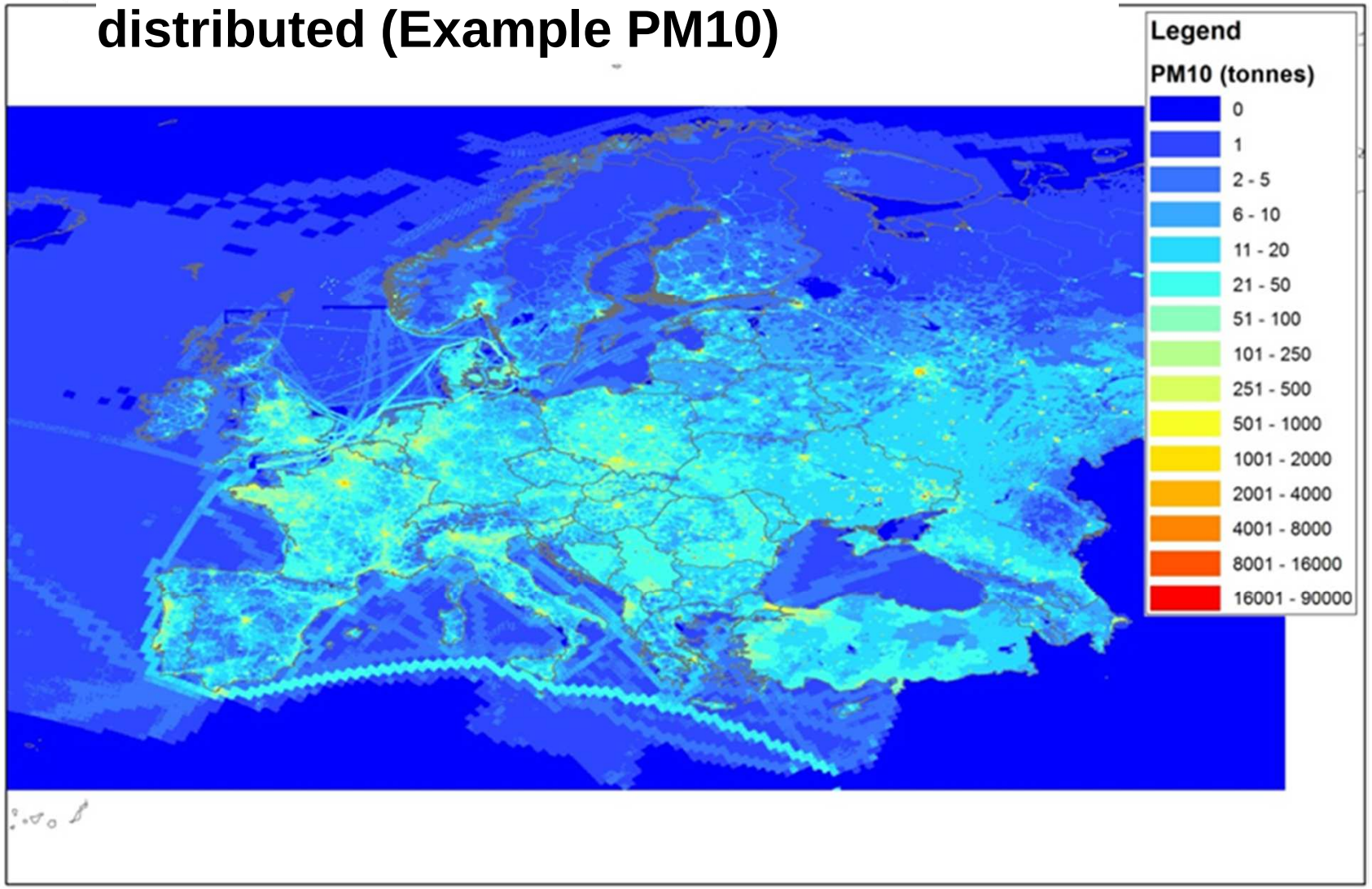
- NOx, SO2 and NMVOC emissions are expected to decrease over time.
- For PM2.5 limited, NH3 almost no emission reduction is foreseen.
- Implication: current legislation & climate goals are not effective for these pollutants
- *Note: we do not review or make the scenario, only use with a clear reference to the source.*

- Emissions not scaled using national totals but first broken down by 10 source categories (SNAP level 1) since changes in emissions over time are not uniform but differ by source sector.

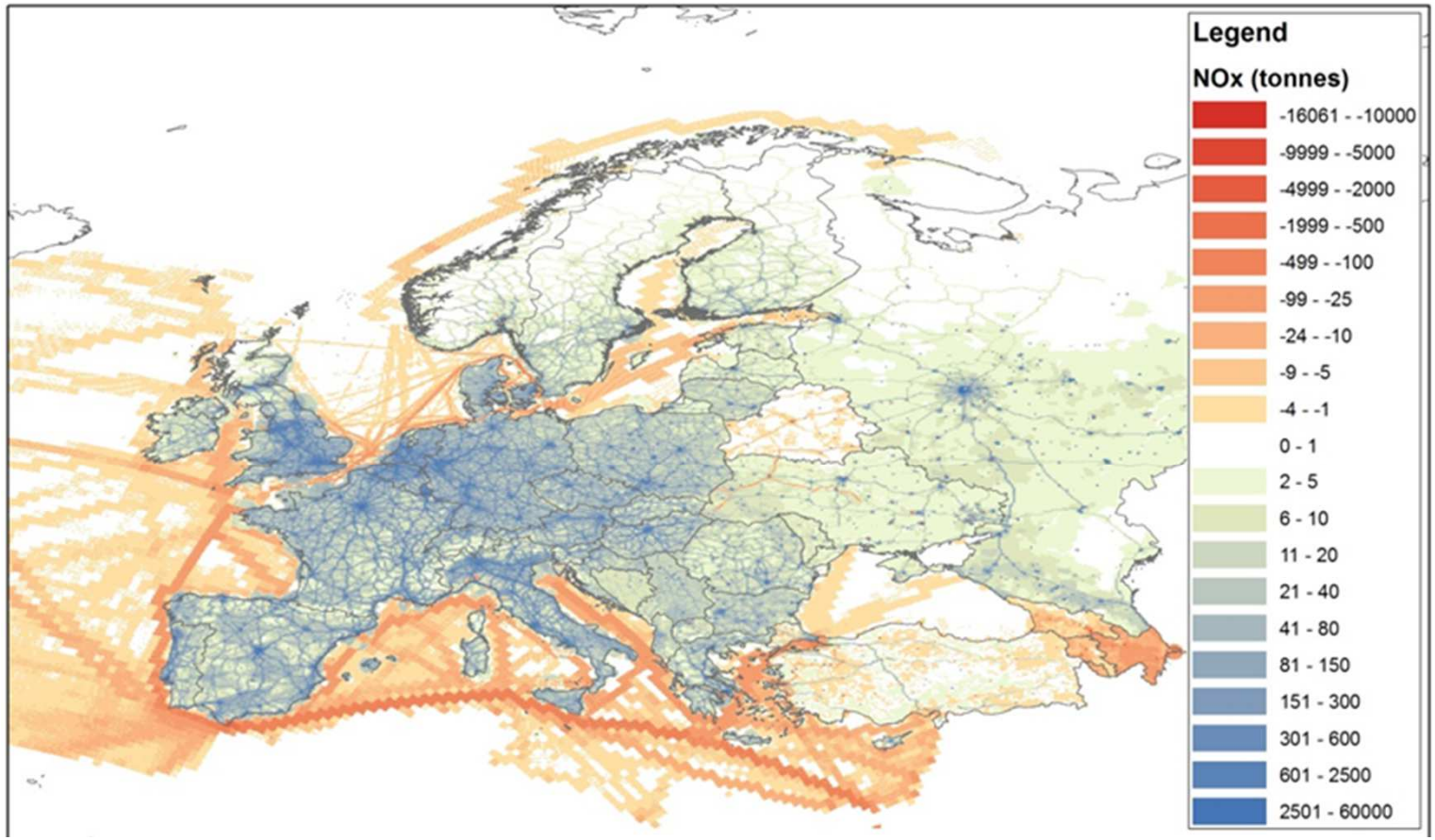


- Example: NOx (left) and NMVOC (right) ; Foreseen changes occur in the sector road transport (SNAP 7) due to emission control legislation.

For modelling the emissions are spatially distributed (Example PM10)



Source sector trends have a spatial component: increase in NOx from shipping, decrease in road transport



Difference in NOx emissions between 2005 and 2020
(red = increase; blue is decrease in 2020 compared to 2005)


Some “evaluating” & scientific remarks

- “Lean and Mean” roughly 1 person month of work. Only possible due to previous UBA PAREST and EU FP7 MACC project
- Interaction was more limited this time (compared to PAREST) but it was a pleasure to collaborate with the various teams.

- We have good reasons to expect that some sources are underestimated (wood combustion, NMVOC from industry and ports), some may be overestimated (NOx from shipping)
- Credibility of established IIASA report is important (good choice) but…none of the above insights went into the UBAluft scenarios or baseline 2005 (no time / budget) – so some sensitivity studies would be good!
- Harrison R. M., B. Brunekreef, M. Keuken, H. Denier van der Gon, X. Querol, **New Directions: Cleaning the air: Will the European Commission’s clean air policy package of December 2013 deliver?** Atmospheric Environment 91, 172-174,(2014)


Conclusions

- TNO made gridded emission data available for the UBA Luft 2030 project based on a well-documented IIASA scenario
- Documented incl. emissions per country per source sector in report TNO-060-UT-2012-01013 and annex (September, 2012)

Thank you for your attention and trust

Thanks to Wolfram for the "voice over"

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