

# Gothenburg Protocol Review

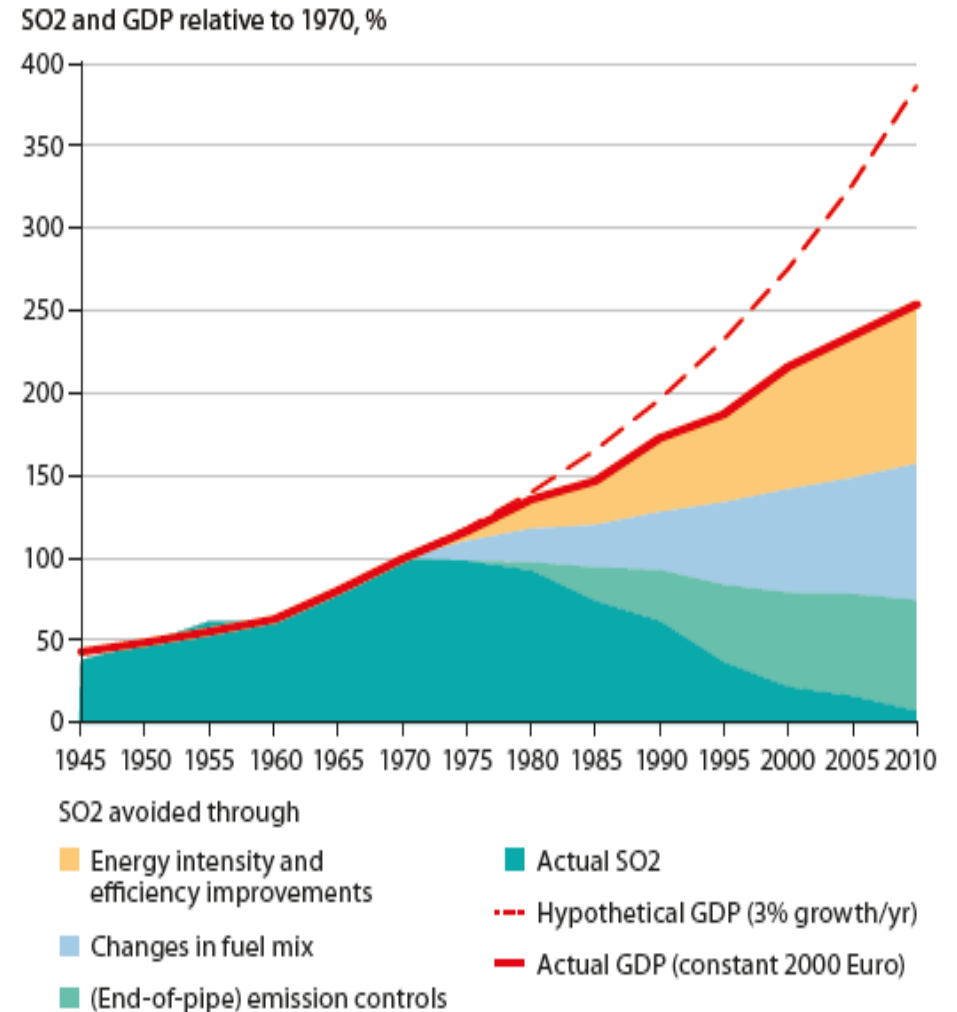
Questions for TFIAM/CIAM

TFIAM50 - 21-23 Apr 2021

# 1.4b What are the main causes of emission reduction?

(Spring 2022)

- See Rafaj et al 2014:
  - Combination of abatement measures (FGD, SCR) and structural changes
  - Energy efficiency improvements
  - Fuel mix changes (coal-gas-renewables)
  - For NH3: introduction of EU- milkquota (1984)



## 1.4d Where are large additional reduction potentials?

(Spring 2022)

- Outcome strongly depends on policy and its effectiveness assumptions; For EECCA/SEE challenging data/scenario status (major activity developing updated data ongoing);
  - In EU: ammonia, residential solid fuel burning, agricultural waste burning
  - In EECCA/SEE: coal burning, residential fuelwood burning, industrial processes, transport emissions

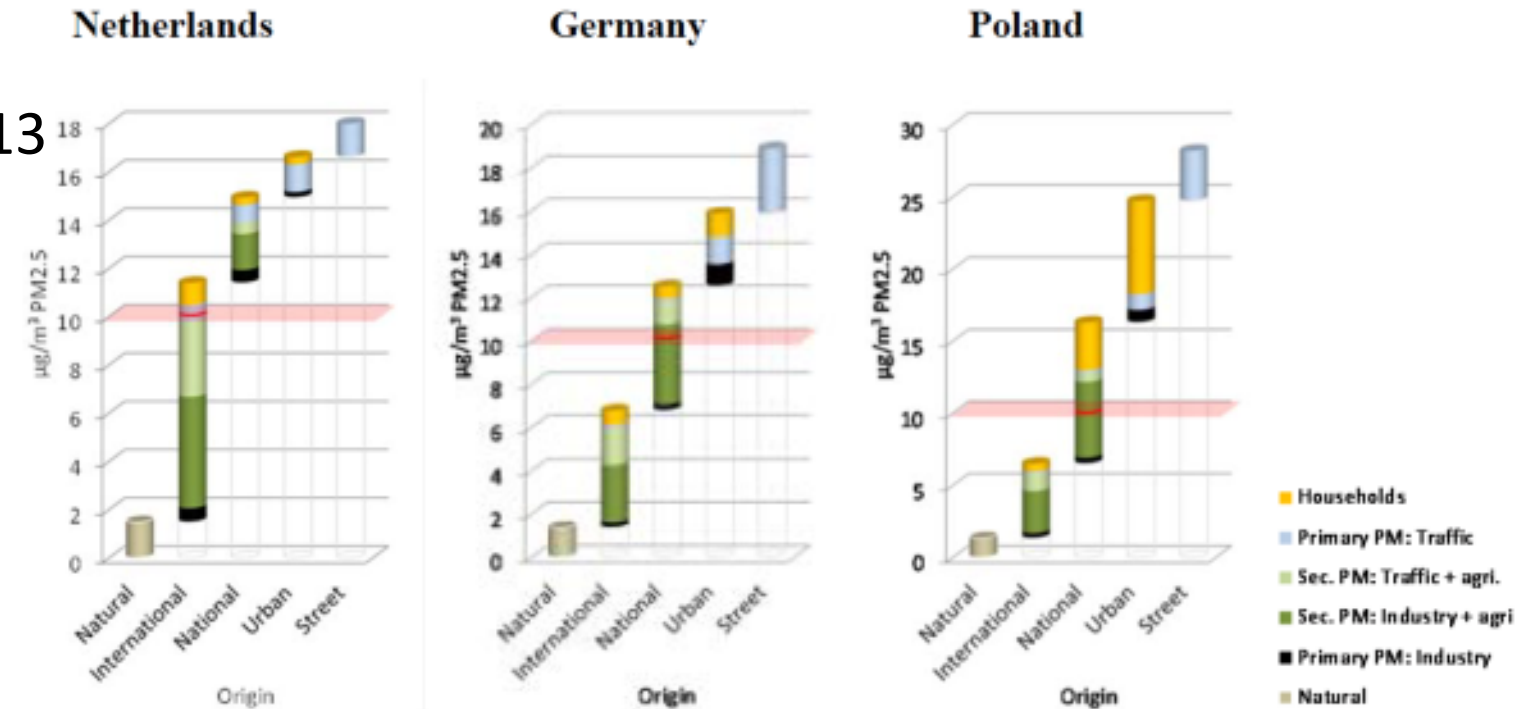
# 2.1c What is the contribution of long-range transport to exceedance of WHO-guideline concentrations in cities?

**International cooperation is needed to reduce secondary particulate matter**

(Spring 2021)

See: ao. Kieseewetter et al, 2013

Could a local air quality approach be a driver for additional air quality policy in countries that did not sign the protocol?



**Local measures alone will often be insufficient to meet WHO guideline levels**

## 2.4a,b What is projected trend in life years lost and morbidity due to ozone, PM2.5 and NO2?

(Fall 2022) Answer to be coordinated with TF Health

- Latest RR-factors and counterfactual values
- Advice on how to avoid double counting of impacts?
- Advice on how to estimate morbidity impacts (and associated economic costs) - see also Mike Holland, 2020

# 4.4 What will be the impact of including condensables in reporting of particulate matter?

(Spring 2022)

- More complete source apportionment of population exposure
- Shift in optimal policy strategy to tackling residential solid fuel burning
- Adjustment of historical PM-emission data (and revision of national PPM-reduction obligations?)
- Need for better national data on residential wood burning

Convention on Long-range Transboundary Air Pollution

**emep** Co-operative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe

emep  
emep

Technical Report  
MSC-W 4/2020

## How should condensables be included in PM emission inventories reported to EMEP/CLRTAP?

Report of the expert workshop on condensable organics organised by MSC-W, Gothenburg 17-19th March 2020

David Simpson, Hilde Fagerli, Augustin Colette, Hugo Denier van der Gon, Chris Dore, Mattias Hallquist, Hans Christen Hansson, Rob Maas, Laurence Rouil, Nadine Allemand, Robert Bergström, Bertrand Bessagnet, Florian Couvidat, Imad El Haddad, Johan Genberg Safont, Franziska Goile, Andrew Grieshop, Isaline Fraboulet, Åsa Hallquist, Jacqui Hamilton, Kristina Juhlich, Zbigniew Klimont, Zlatko Kregar, Ingrid Mawdsely, Athanasios Megaritis, Leonidas Ntziachristos, Spyros Pandis, André S.H. Prévôt, Sabine Schindlbacher, Morten Seljeskog, Natalia Sirina-Leboine, Jacob Sommers, Stefan Åström

msc-w

Nordic Council of Ministers

## 4.2 Impact of PM-emissions reductions to black carbon and polycyclic aromatic hydrocarbons emissions

(Spring 2022)

- See: [ECE/EB.AIR/WG.5/2021/8 \(unece.org\)](https://www.unece.org/ece/eb/air/wg.5/2021/8)
- For modelling: BC = EC and PAH = OC

### **Priorities:**

- Reduce emissions from solid fuel burning in residential sector
- Substitute old fleet of diesel vehicles
- Enforcement ban on open burning of waste, including agricultural residues
- Synergies with climate policy (eg. zero-emission vehicles, reduced coal use in residential sector)

## 3.5c What are available non-technical measures and what policy instruments to trigger them?

(Fall 2021)

- Multiple benefits for environment and individual health from shifting car mobility to active mobility (walking, cycling and public transport use) and changing diets (less meat, more vegetables)
- Effective in several cities: pricing, regulation and infrastructural measures (remove parking places and car lanes, improve facilities for cycling and fast public transport)

See: [Note on non-technical and structural measures -201120.pdf \(unece.org\)](#)

*WGSR will probably request a guidance document on non-technical measures (and/or economic instruments)*



3.1g What are the latest improvements of the GAINS model with respect to scenario development and cost updates? What is the state of play for countries in Eastern, South-Eastern Europe and Turkey, the Caucasus and Central Asia?

(Fall 2021)

- Including condensables; installation structure in residential sector (ongoing)
- Waste management sector
- High emitter vehicles
- Downscaling 10x10 km – improved source attribution in cities
- New projections data for selected EECCA, West Balkan, Turkey

## 6.3a,b,c What is the projected future trend in methane emissions and related health and ecosystems impacts?

(Spring 2021) Answer to be coordinated with TF HTAP and WGE

- CLE and MFR projections to be based on ECLIPSE-scenarios
- CLE focus on emission from waste and gas exploration, gas recovery from landfills and reduced use of fossil fuels
- Additional measures focus on emissions from cattle (changes in cattle feed, and reduced livestock) +reduced meat consumption

Höglund-Isaksson et al. (2020). Technical potentials and costs for reducing global anthropogenic methane emissions in the 2050 timeframe –results from the GAINS model. Environ. Res. Commun. (2020) 025004 <https://doi.org/10.1088/2515-7620/ab7457>

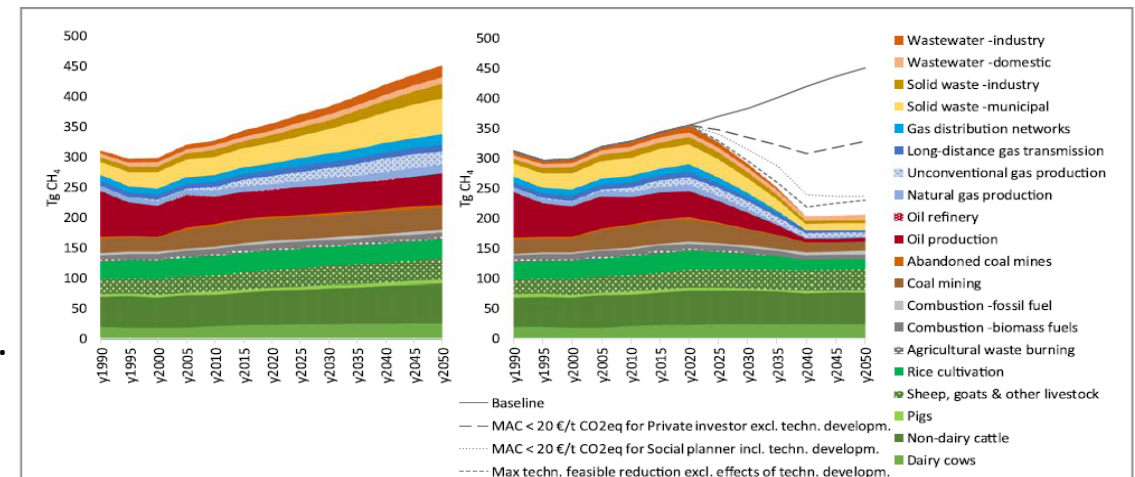


Figure 8. Global anthropogenic CH<sub>4</sub> emissions 1990–2050 in the Baseline scenario (left panel) and with Maximum technically feasible reduction (MFR) including effects of technological development (right panel).

# 3.1f What would be the impact of emission reductions on climate and vice versa

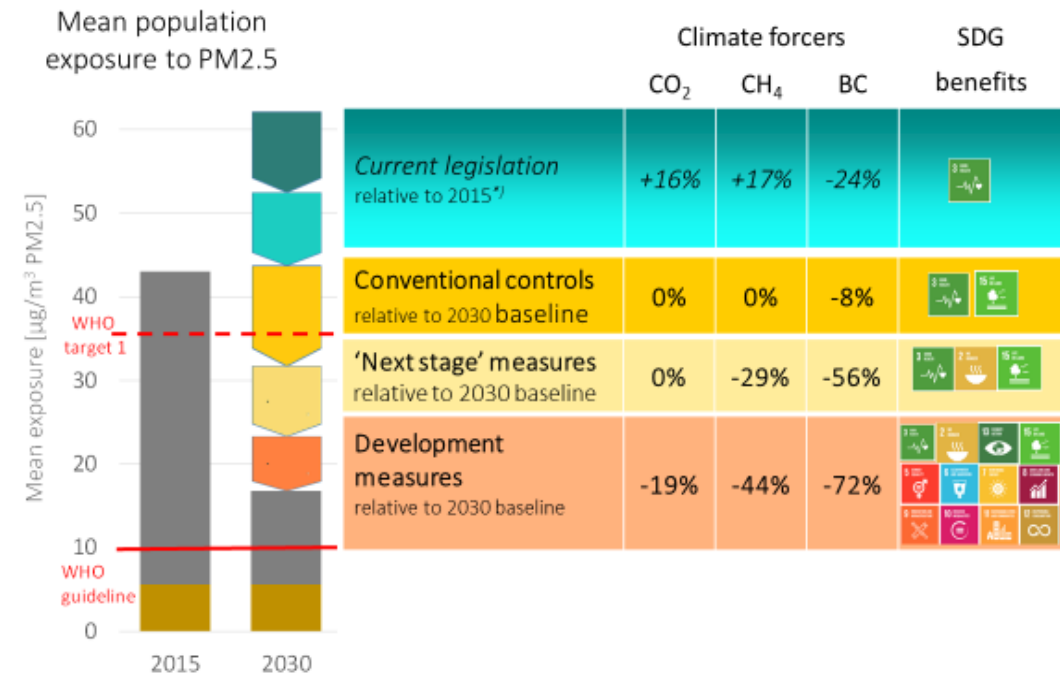
(spring 2021)

- See: Amann et al. 2020:
  - [Reducing global air pollution: the scope for further policy interventions | Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences \(royalsocietypublishing.org\)](#)
  - [2<sup>nd</sup> Clean Air Outlook study for the EU](#)

TFIAM 48: Remaining nitrogen problems would require additional action.

Moving towards the WHO air quality guideline requires a mix of policies. An integrated design of climate and air quality policy is needed to deal with policy trade-offs: fuel switch for climate reasons should not worsen (local or regional) air quality, and air pollution strategies should aim to be at least climate-neutral

THE NEW POLICY MEASURES WOULD HAVE IMPORTANT CO-BENEFITS ON SDGs



## 3.1a Will the Protocol obligations be met based on latest emission projections?

(Fall 2021)

TFIAM49:

- Model calculations for EU-countries show that full implementation of emission limit value regulations would enable parties to meet national emission reduction obligations for SO<sub>2</sub>, NO<sub>x</sub>, NMVOC and PPM<sub>2.5</sub>, assuming an average lifetime of existing installations and vehicles
- Many parties have difficulties to meet the ammonia reduction obligation, even with implementation of emission limit values for new large stables
- See: <https://ec.europa.eu/environment/air/pdf/CAO2-MAIN-final-21Dec20.pdf>.

3.1a3 What would be the optimized emission reduction obligations, given the updated emission inventories and projections and the same gap-closure ambitions as used in the preparation of the amended Gothenburg Protocol?

(Spring 2022)

- Including sensitivity analysis for condensables and deposition reduction targets for marine ecosystems (to be formulated by Gudrun Schütze et al. WGE)

## 3.1b Are emission reduction obligations adequate for meeting long term environmental and health protection targets?

(Fall 2021) Based on updated RRs from TFH and updated CL from CCE/ICP Veg

Scenario's:

- 1) full implementation of the 2020 emission reduction obligations
- 2) emission projections for 2030 based on national air pollution control programmes
- 3) tentative emission projections for 2050 assuming implementation of climate policies

Current difficulties and slow progress in reduction of ammonia emission suggest that exceedance of nitrogen critical loads will remain; impact of secondary aerosols on population exposure to PM<sub>2.5</sub> as well as ozone damage to be analysed

### 3.1c What are the estimated reductions based on the best available emission projections for non-Parties to the revised protocol (EECCA/SEE)?

(Fall 2021)

Several alternative sources will be used and implemented in GAINS; these include the EU-project on West Balkan and EECCA and IEA/FAO projections. CEIP and TFTEI will be involved to get a most up-to-date picture of current legislation and actual current implementation of abatement technologies

Bilateral communication with the Parties involved will depend on available co-funding and time (and will probably be postponed to the revision phase of the protocol)

Uncertainties about the actual implementation of measures will probably remain significant

### 3.1d,e Will implementation of best available techniques and emission limit values be adequate for meeting long term environmental and health protection targets of the protocol beyond 2020?

(Fall 2021)

- CIAM/IIASA: MTRF scenario considering BAT and ambitious ELVs as defined in the technical annexes (with support of TFTEI)
- CIAM update of (best available) emission projections for several EECCA- and west-Balkan countries, including Turkey, for both current legislation and with maximum feasible technical measures
- IIASA and MSC-W concentration and deposition calculations and evaluating health and environmental impacts



## 3.5a What will be the costs of additional measures in the ECE region that would not exceed the external costs of inaction

(Fall 2022)

- A TFIAM/TFTEI-report on the Costs of Inaction will be available in the coming months. See informal document: [Cost of inaction TFIAM two pager.pdf \(unece.org\)](#)
- For ammonia: see Ammonia Assessment report [ECE EB.AIR WG.5 2021 7-2102624E.pdf \(unece.org\)](#)

- Updates from TFRN, see:

Options for Ammonia Mitigation: Guidance from the UNECE Task Force on Reactive Nitrogen [http://www.clrtap-tfrn.org/sites/clrtap-tfrn.org/files/documents/AGD\\_final\\_file.pdf](http://www.clrtap-tfrn.org/sites/clrtap-tfrn.org/files/documents/AGD_final_file.pdf) and: Framework (advisory) code of good agricultural practice for reducing ammonia emissions <https://www.unece.org/fileadmin/DAM/env/lrtap/Publications/>

### 3.6 Are additional local air quality measures sufficient and cost-effective to reduce health risks or strive towards WHO air quality guideline values?

(Fall 2022)

Local traffic measures are effective to reduce the health burden for people living along busy roads that are exposed to high pollution levels. Cities can stimulate early replacement of old installations, wood stoves and non-road mobile machinery in favour of newer ones, that comply with stricter emission limit values

Even in large cities like Berlin and London, there is a large regional and transboundary contribution to the concentration of particulate matter at traffic stations

Meeting WHO guideline values requires that also long range pollution source are addressed (need for a multiscale governance approach)

Any additions?