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Technical and policy approaches to black carbon and other short-lived climates forcers within UNECE CLRTAP

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- LRTAP approaches to BC and SLCFs – policy decisions and actions
- Scientific/technical approaches examples from the EMEP Programme and effects oriented activities under the Working Group on Effects
- LRTAP outreach activities

28th session of the Executive Body of LRTAP adopted:

- Long-term Strategy of the Convention
- Inclusion of BC as a component of PM in the process of the revision of the Gothenburg Protocol
- Revised mandate of the Task Force on Hemispheric Transport of Air Pollution (takes over from EG on Black Carbon the work on BC); latest HTAP 2010 report
- Decison 2/2011 on black carbon and other short-lived climate forcers (SLCFs): tropospheric ozone and its precursors including methane and carbon monoxide; for all bodies and groups in the Convention
- 2011 workplan

See new LRTAP website:
http://live.unece.org/env/lrtap/welcome.html

Long-term Strategy (LTS) of the Convention

- gives high importance to increased ratification and implementation of the latest three protocols; flexible and consensual process; implementation plan for the LTS
- remaining challenges: PM, O3, eutrophication, (reactive) N, …
- **outreach and inter-regional collaboration (EANET, UN ESCAP, NEASPEC, UNEP, UN FCCC, CBD, GAPF, …**
- maintaining close links between science and policy
- coupling of air pollution, climate change and biodiversity; considers geographical and pollutant wise extension, SLCFs, CH4 and CO as ozone precursors

Revision of the Gothenburg Protocol (GP) to abate acidification, eutrophication and ground-level ozone

- updated: emission ceilings for 2020 + new for PM2.5, limit values; new scenarios; level of ambition; to be finalized in 2012
- BC as a component of PM; prioritized measures to abate PM; work on BC national mission inventories, atmospheric transport, effects and abatement measures
- another revision with a focus on BC and other SLCF? - unofficial observation from ongoing negotiations

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

Five EMEP Centres on emissions/measurements and modelling are listed below in *italics:*

EMEP Emissions – Task Force on Emission Inventories and Projections (TF EIP, UK) - *CEIP* (AT)

EMEP Measurements - TF on Measurements &Modelling (TF MM, UK ,WMO) – *Chemical Coordinating Centre* (*CCC*, NO)

EMEP Models – Unified EMEP Model (*MSC-W*, NO), HMs and POPs Models (*MSC-E*, RU), GAINS (*CIAM*, IIASA, AT)

TF on Integrated Assessment Modelling (TFIAM, NL/SE)

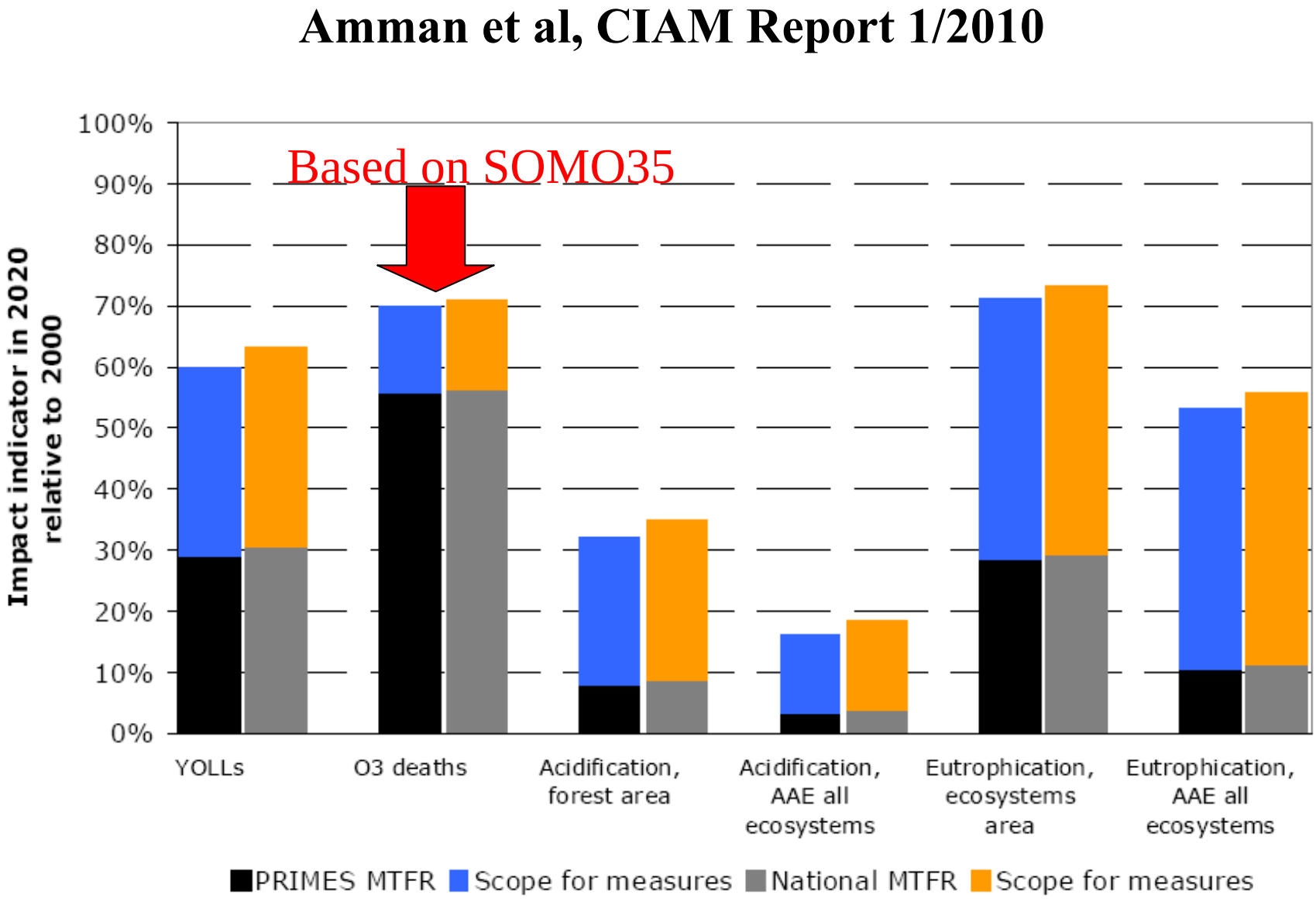
TF on Hemispheric Transport of Air Pollution (TFHTAP, US, EU)

More details at:http://www.emep.int

Extension of the GAINS multi-pollutant/multi-effect framework to include near-term climate impacts

	PM (BC, OC)	SO_2	NO_x	VOC	NH_3	CO	CO_2	CH_4	N_2O	HFCs PFCs SF_6
Health impacts: PM (Loss in life expectancy)	√	√	√	√	√					
O_3 (Premature mortality)			√	√		√		√		
Vegetation damage: O_3 (AOT40/fluxes)			√	√		√		√		
Acidification (Excess of critical loads)		√	√		√					
Eutrophication (Excess of critical loads)			√		√					
Climate impacts: Long-term (GWP100)							√	√	√	√
Near-term forcing (in Europe and global mean forcing)	√	√	√	√	√	√				
Black Carbon deposition to the Arctic	√									

Impact indicators in 2020 vs. levels in 2000, for the baseline cases and the maximum technical feasible reductions (MTFR)



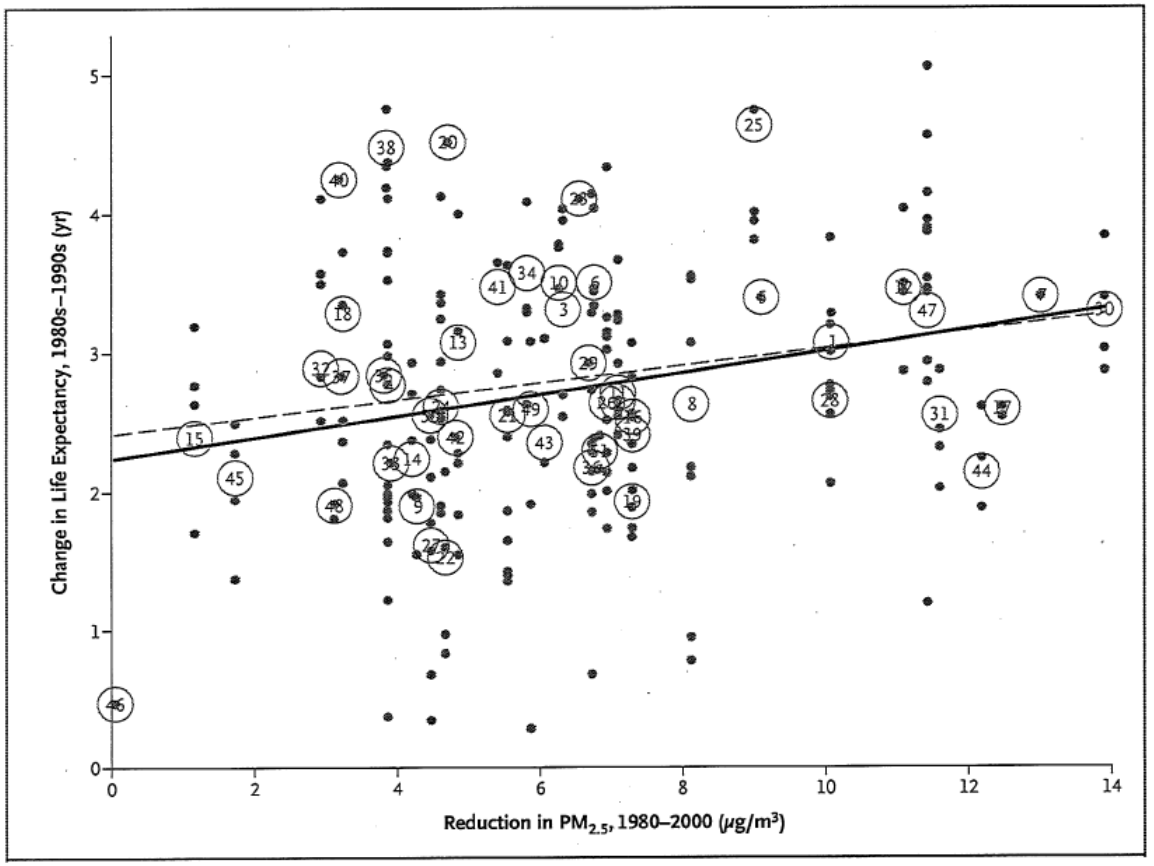
In 2020 baseline:

- SO_2 emissions in the EMEP modelling domain are expected to be approximately 35% lower than in 2000;
- NOx and VOC emissions would be 40% and
- $PM_{2.5}$ emissions 20% lower
- no significant changes for NH_3 emissions

Despite these cuts in emissions, negative impacts of air pollution remain considerable: In 2020, air pollution would

- still shorten statistical life expectancy by 4.7 months,
- there will be more than 24,000 cases of premature deaths every year caused by ground-level ozone,
- bio-diversity of 1.4 million km^2 of European ecosystems will be threatened by high levels of nitrogen deposition, and
- more than 110,000 km^2 of forests will continue to receive unsustainable levels of acid deposition.

Reduction of PM exposure and increase of life expectancy in the US



Pope AC et al, NEJM 2009

A decrease of 10 µg/m3 of PM2.5 associated with increase of life expectancy by 7.3 months between 1980 and 2000

Reduction in PM accounts for 15% of overall increase in life expectancy

Health impact indicators related to exposure to PM2.5, for the PRIMES scenarios, for the baseline (BL) and the maximum technically feasible reduction cases (MTFR). Urban increments included.

	Loss in average life expectancy due to PM2.5 (months)		
	2000	2020	
		PRIMES	
		BL	MTFR
Belgium	13.7	6.6	4.9
Finland	3.2	1.9	1.0
EU-27	8.6	4.1	2.7
Non-EU	7.7	6.0	2.2
Total	**8.3**	**4.7**	**2.6**

Health impact indicators related to exposure to ozone human health, for the PRIMES scenarios, for the baseline (BL) and the maximum feasible reduction cases (MTFR).

	Premature deaths (cases per year)		
	2000	2020	
		PRIMES	
		BL	MTFR
Estonia	25	18	16
Italy	5 084	3 331	2 939
EU-27	26 103	17 135	14 924
Non-EU	9 583	7 282	6 072
Total	**35 686**	**24 417**	**20 996**

Main messages from the work of the Task Force on Hemispheric Transport of Air Pollution (HTAP) and the Expert Group on Black Carbon (BCEG) in the context of: revision of the Gothenburg Protocol, outreach activities and LTS of the Convention

- Message on the importance of the intercontinental transport of air pollution

- Message on methane and other tropospheric ozone precursors

- Message on Black Carbon and on other short lived climate forcers (SLCFs)

Reports on black carbon and HTAP available at LRTAP website:

- Report of the Expert Group on Black Carbon

http://www.unece.org/env/documents/2010/eb/eb/ece.eb.air.2010.7.e.pdf

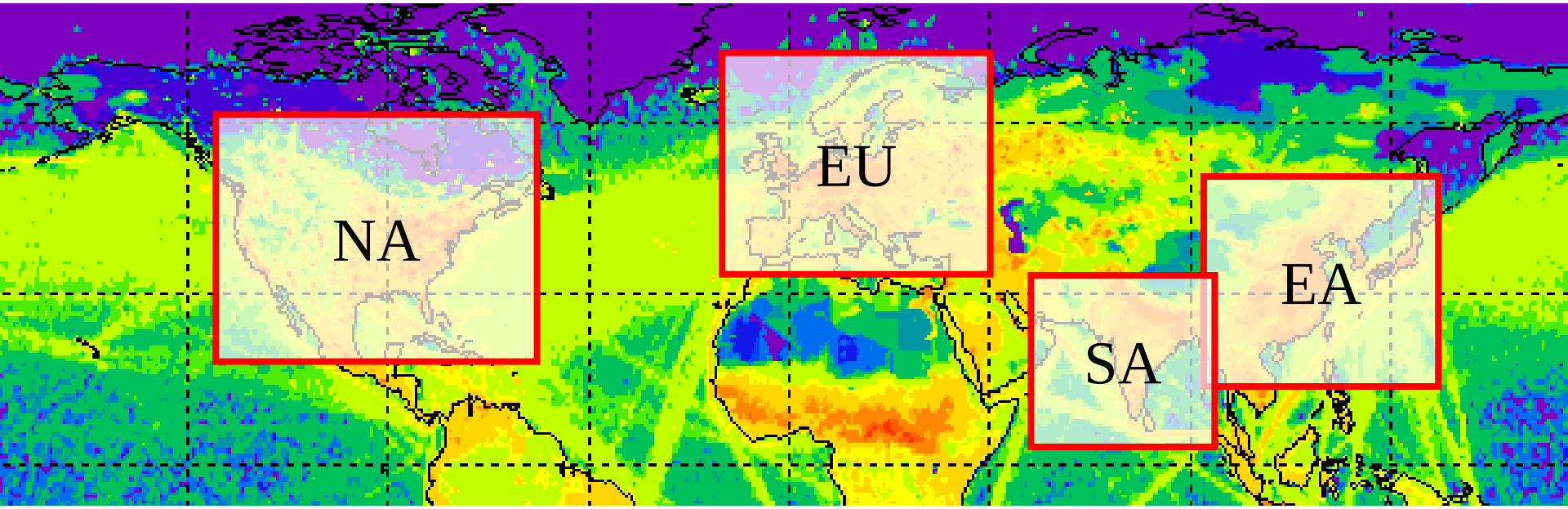
- Executive summary of the HTAP report

http://www.unece.org/env/documents/2010/eb/eb/ece.eb.air.2010.10.e.pdf

- Policy implications of the HTAP 2010 Assessment

http://www.unece.org/env/documents/2010/eb/eb/Informal%20documents/Inf.doc%203_Policy%20Messages%20from%20the%20Co-Chairs%20i%20clean.pdf

Design of Multi-Model Experiments



If A,B,C,D represent the change due to 20% emission reductions in each source region:

$$\textbf{Import Sensitivity} = \frac{A + B + C}{D}$$

$$\textbf{Relative Intercontinental Response} = \frac{A + B + C}{A+B+C+D}$$

Methane Message

- methane is an important precursor for tropospheric ozone
- the ozone benefits of methane reductions are global, do not depend on location of emissions, and take a decade to be fully realized.
- globally, many methane emission reductions are available at a low cost or net savings
- global methane trends can offset reductions of other ozone precursors at the regional scale
- recognizing that methane is being addressed under the UNFCCC, the LRTAP Convention should consider means of addressing methane as an ozone precursor within the context of the Convention

Black Carbon Message

- mitigation of BC will lead to positive regional impacts by reducing BC deposition in areas with snow and ice

- EB should consider the advantages of integrated air quality and climate policies. Climate and air quality are inextricably linked, and strategies devised for one will likely impact the other

- while it is clear that BC emission reductions would be expected to provide important health and climate benefits, there is substantial room for improving the knowledge base with respect to emissions and impacts

- combined, the regional climate impacts and the known health benefits that would accrue to UNECE region by reducing particulate matter (PM) justify the EB considering options to mitigate BC as a component of PM when making revisions to the Convention's 1999 Gothenburg

Black Carbon Message - continued

-recommendations for implementation in LRTAP 2011 workplan (EMEP, WGE, HTAP)

- BC emission from shipping in the Arctic may increase by a factor of two to three by 2050. This may have a significant impact on the Arctic environment. This issue is presently under consideration in the International Maritime Organization. Although emissions from international shipping are not included in the work under the Convention, EB could consider informing the IMO about its concern about the effects of BC on the Arctic

- Also suggested are possible outreach activities (e.g., capacity-building and cooperation on monitoring, developing emission inventories, and mitigation measures) to **non-UNECE countries**, countries with economies in transition, and countries preparing to ratify the Gothenburg Protocol.

Black Carbon Message – related to GAINS

- Near-term forcing and carbon deposition to the Arctic could be included as an additional effect of air pollutants into the existing GAINS multi-pollutant/multi-effect framework
- Suggested metrics:
  - Instantaneous radiative forcing at the regional/global scale
  - Carbon deposition to the Arctic
- A prototype version of GAINS is currently being developed
- In a first step, such information could be used to prioritize reductions of precursor emissions to reduce PM2.5 levels

Working Group on Effects – examples of outreach activities

ICP Forests - EANET

ICP Waters – chemical inter-comparison, five laboratories from Asia, China, Indonesia (2) and Thailand (2)

ICP Materials - RAPIDC (Regional Air Pollution in developing Countries, MALÉ Declaration (Small Island Developing States)

ICP M&M – China (application of critical loads SO2, NOx)

ICP Vegetation – APINA (Air Pollution Information Network in Africa), MALÉ Declaration through APCEN (Air Pollution Crops Effect Network lead by SEI in York

TF Health – MALÉ Declaration, global outreach

Thank you very much!

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http://live.unece.org/env/lrtap/welcome.html