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Updated cost-effectiveness analyses for the EU Clean Air Policy Package

Task Force on Integrated Assessment Modelling
44th Session, Edinburgh, May 6-8, 2015

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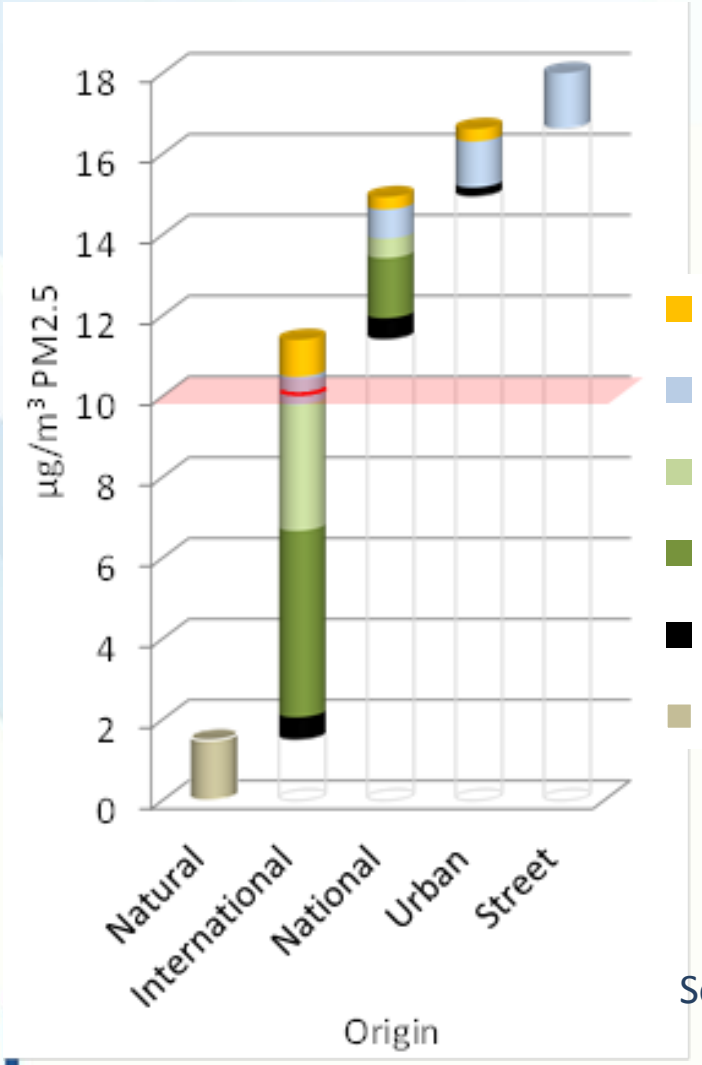
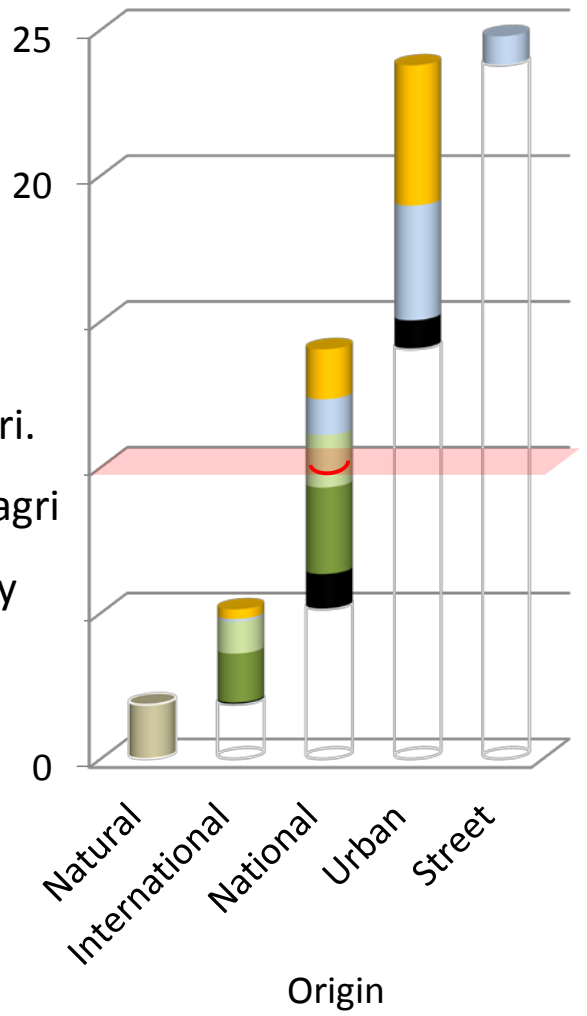
Origin of PM2.5 - 2009

Netherlands
average of the urban AIRBASE stations



Households
Primary PM: Traffic
Sec. PM: Traffic + agri.
Sec. PM: Industry + agri
Primary PM: Industry
Natural

Lyon, Centre Ville



Source: IIASA GAINS

TSAP work in 2014/15

- New analyses for Working Party on Environment (WPE) of the European Council:
  - Incorporation of new statistical information
  - Updated NEC proposal

- For the European Parliament:
  - Interactions with recent climate policy decisions

Objectives of bilateral consultations with MS conducted under the auspices of the WPE

1. Eliminate potential misunderstandings
   (e.g., in model results, input data, or national statistics)
2. Spot and correct obvious mistakes in input data
3. Identify differences in perspectives on future development, and assess their relevance on overall outcomes
   (i.e., national emission ceilings or relative changes in emissions over time)
4. Summarize and report to Commission and Member States

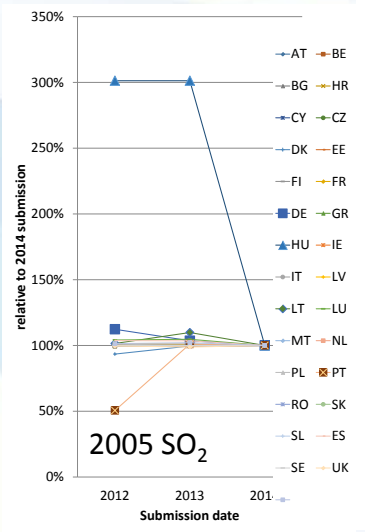
Bilateral consultations with all 28 MS

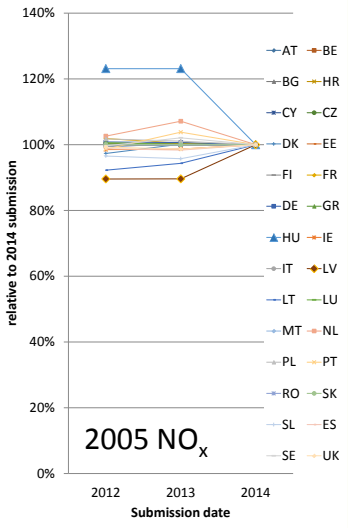
- Bilateral contacts with all 28 Member States
  - 24 meetings at IIASA, 1 video-conference, 3 MS via e-mail exchange
- More than 110 experts involved
- Completed in July 2014

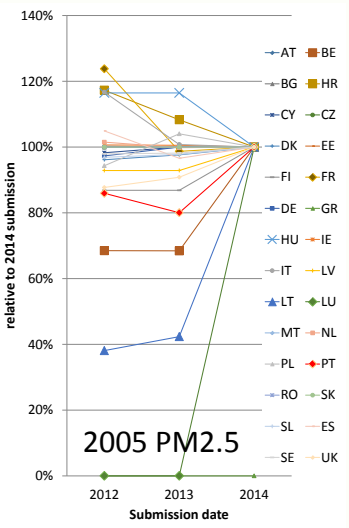
- Results were incorporated into GAINS thereafter
- Minutes of meetings in provided in updated TSAP 13 Report
- Implementation in GAINS documented in TSAP 14 + TSAP 16

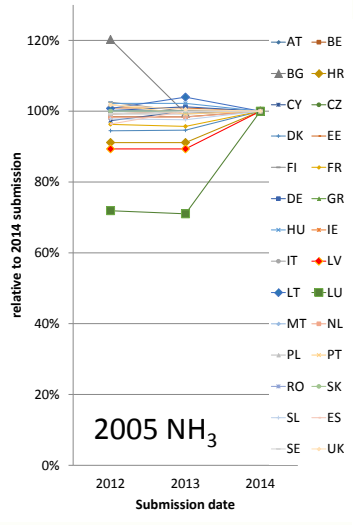
Recurring issues (1): Discrepancies in 2005 emission inventories between GAINS/TSAP and national 2014 submissions

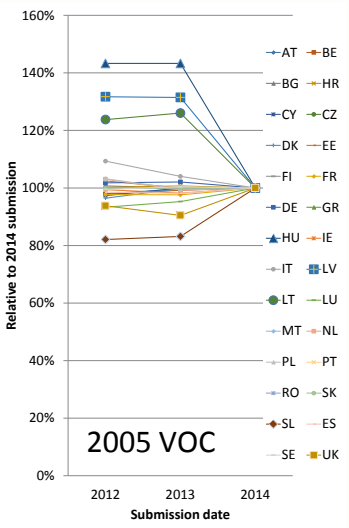
Changes in emission inventories for 2005 between 2012 and 2014 submissions











Frequent reasons for discrepancies of 2005 emission inventories

- Differences in source coverage (e.g., agricultural soils, burning of agricultural waste, etc.).
- Different inventory methods for some sources (PM2.5, NH_3)
  (GAINS uses Tier 2 to reflect national circumstances,
  but many MS still employ Tier 1 that ignores local conditions)
- Discrepancies between national energy statistics used for emission inventories and what has been submitted to EUROSTAT
- Variations in emission factors due to national circumstances;
  not always well documented, taken into account within plausible limits
- Ongoing further improvements in national inventories;
  GAINS has been adjusted to forthcoming 2015 submissions

Overall, good match of updated GAINS 2005 inventories with national 2014 submissions – with exceptions

	Difference EU-28	# of countries with difference <5%	# of countries with difference >5%
SO_2	-0.4%	27	1
NO_x	-0.4%	22	6
PM2.5	+13%	16	12
NH_3	+2%	19	9
VOC	+3%	17	11

Recurring issues (2): (Baseline) emission projections for 2030

- Different activity projections
- Already agreed legislation (e.g., Stage IV for non—road machinery) not always taken into account in national projections
- Different assumptions on the effectiveness of Euro 6, the timing of introduction, and the turnover rate of the vehicle stock
- Many countries assume no change in average emission factors from the ongoing renewal of installations (e.g., for residential combustion and the solvents sector)
- Some countries assume fixed relation between GDP and (the quantity of) personal products containing solvents (hairsprays etc), GAINS assumes saturation at high income levels.

Recurring issues (3): Future mitigation potentials

- Activity projections (higher activity levels than assumed in PRIMES/CAPRI)
- Enforcement of the (already existing) ban of agricultural waste burning is considered as unrealistic in some MS
- Different expectations for the Ecodesign directive – new standards as of 2022

Recurring issues (4): Projections of future activities

- Many MS have different perspectives on the future evolution of economic activities, energy use, transport demand and agricultural activities.
- 19 Member States provided (partial) national projections; Original NECs are feasible with one exception
- International consistency of national projections should be assessed.

The updated proposal for National Emission Ceilings in 2030
(EU-28, emissions relative to 2005)

	2012	Original Commission proposal for 2030		WPE update	
		Baseline	Proposal	Baseline	Proposal
SO_2	-48%	*-73%*	-81%	*-74%*	**-81%**
NO_x	-27%	*-65%*	-69%	*-63%*	**-65%**
PM2.5	-12%	*-27%*	-51%	*-32%*	**-54%**
NH_3	-5%	*-7%*	-27%	*-8%*	**-25%**
VOC	-24%	*-41%*	-50%	*-40%*	**-46%**

Costs and benefits of the additional measures

Costs:

Air pollution control measures:

€ 2.2 bn/yr
(0.008% of GDP)

Methane measures:

Cost savings € 2.4 - 4.0 bn/yr

Net costs:

Likely to be negative

Benefits:

Gains in statistical life expectancy from lower PM2.5:

4.4 months (-50% of 2005)

Monetized *health* benefits

€ 35 - 135 bn/yr

Additional Natura2000 areas protected against eutrophication:

150,000 km^2

Towards the revised ceilings

- About **half of the PM equivalent emission** reductions for 2030 have **already been achieved in 2012**, and about 60% should be attained when the 2020 targets (Gothenburg Protocol) targets are met.
- **CLE** and projected activity changes **deliver almost 90% of the required SO_2** reductions by 2030, and more than **95% of the NO_x reductions**. Implementation of new EU-wide legislation (i.e., new BAT conclusions, MCP and NRMM directives) would largely fill the remaining gap.
- For **PM2.5, CLE** will **achieve 60%** of the emission reduction, and the IED, MCP, NRMM and Ecodesign directives would further deliver a large part of the additional reduction required.
- CLE and projected activity changes would deliver about **30%** of the reduction for **NH_3 and 85% for VOC**.

Conclusions (1)

- Overwhelming participation of all MS in the bilateral consultations, very constructive attitude.
- The emission reduction requirements proposed by the Commission remain technically feasible for the PRIMES 2013 REFERENCE scenario (with one exception).
- Updated NECs have been produced for WPE; costs decline by one third. The new ceilings are feasible also for the national projections (with one exception)
- Quality and international consistency of emission inventories is critical for cost-effectiveness approach.
  Are current quality control procedures sufficient?

Supplementary analysis for the European Parliament Context

- The European Parliament recognizes that climate policies determine, i.a.,
  - costs for additional air pollution control measures,
  - the economically optimal ambition level for further measures (marginal costs = marginal benefits).

- The 2013 Commission proposal for the NEC Directive is based on the PRIMES 2013 REFERENCE energy projection (with energy and climate policies as of spring 2012).

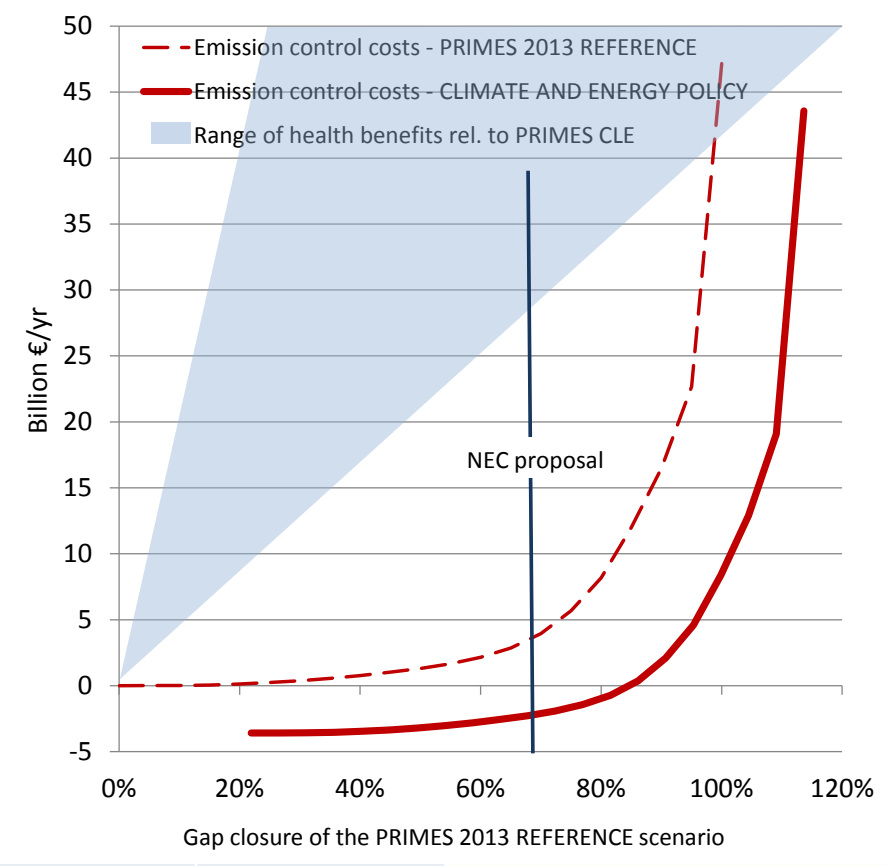
- The 2014 Commission proposal and Council conclusions on climate and energy policy suggest more ambitious targets.

How would these new targets affect the proposed Clean Air Policy Package?

- Re-analysis with ‘GHG40/EE’ scenario of the Commission Impact Assessment supporting the Communication on the ‘Policy Framework to 2030’
- -40% GHG, 26.4% renewables, +29.3% energy efficiency in 2030
- -10% energy use compared to PRIMES 2013 REFERENCE

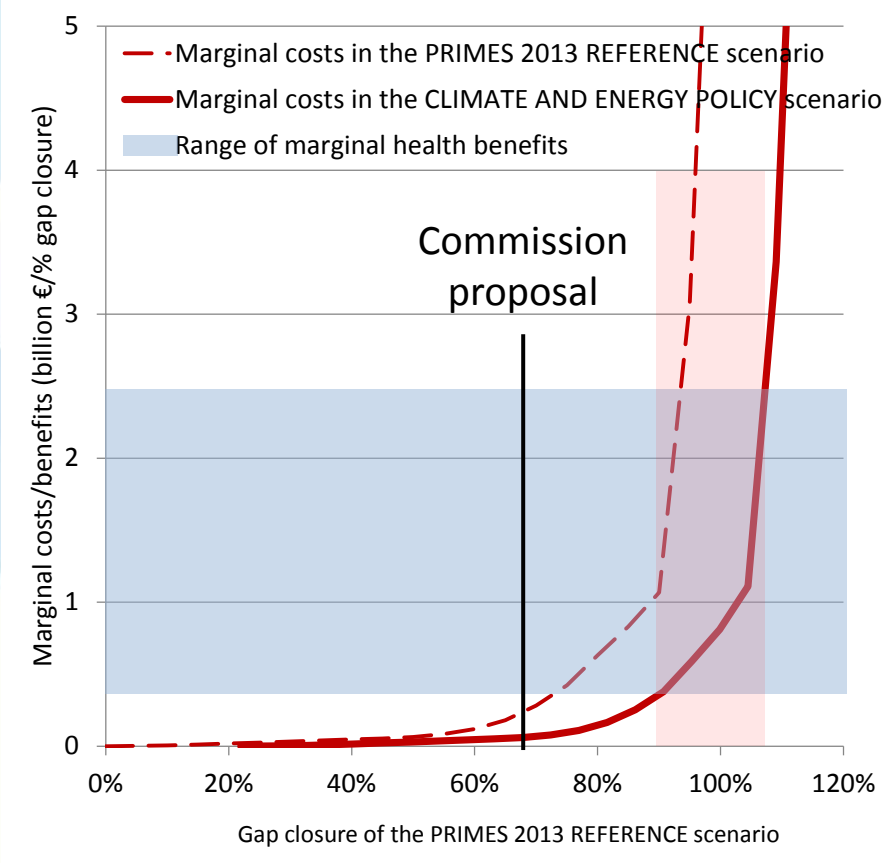
Commission NEC proposal for 2030: Costs and health benefits

Implementation of current legislation in 2030		
Additional costs to reach proposed Commission target		
Total	88.0	93.5



'Gap closure' in terms of health effects between current legislation (0%) and maximum technically feasible reductions (100%)

The economically optimal ambition level: Marginal benefits equal marginal costs



For the PRIMES 2013 REFERENCE scenario:

- Optimal level between 75% and 92% gap closure in 2030
- Commission proposed 67% for 2030 - (5% below the optimum in 2025, plus 5 more years for implementation)

For the CLIMATE AND ENERGY scenario:

- Optimal ambition level found between 75-92% gap closure of the CLIMATE AND ENERGY scenario, corresponding to 92-106% of the original scenario.

Conclusions (2)

The economically optimal ambition level (for the most conservative monetization of health benefits (75% gap closure)):

- Would save annually additional 16,200 cases of premature deaths/yr (+7%) - or 140,000 life years compared to the Commission proposal
- Total air pollution control costs € 2.2 bn/yr lower (€91.3 bn/yr instead of €93.5 bn/yr)
- Monetized health benefits €8.4-50.8 bn/yr higher than in Commission proposal

Conclusions (3)

- In 2020, an economically optimal strategy would save annually 680,000 – 870,000 life years compared to the revised Gothenburg Protocol, with benefits ranging between €40 bn/yr and €300 bn/yr.