INTEGRATED ASSESSMENT MODELLING: CLRTAP EXPERIENCE

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CHAIR OF THE EMEP STEERING BODY

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

- IAM is one of the activities borne by the EMEP programme which provides scientific background to the CLRTAP and its protocols

- CLRTAP: Adopted in 1979, CLRTAP is a UNECE convention (Europe, USA, Canada) ratified by 51 Parties

- 8 protocols among which the 1999 Gothenburg Protocol to abate Acidification, Eutrophication and ground level ozone that entered into force in 2005 and has been amended in 2012 with new objectives (2020) and to include PM issues

- IAM drove the objective set by the “multi-pollutants / multi-effects” Gothenburg protocol
DATA FLOWS WITHIN THE CLRTAP

TF hemispheric transports
TF measurement & modelling
TF inventories
TF TEI
TF IAM
TF RN
ICP materials
ICP modelling and mapping
ICP Forests
ICP waters
ICP Integrated monitoring
ICP vegetation
JEG dyn mod
WGSR

Co-operative programme for monitoring and evaluation of the long-range transmissions of air pollutants in Europe
I AM ADDED VALUE:

• Defining emission control strategies by accounting for their costs, feasibility, and their impacts and benefits

• Maximizing benefits, optimizing costs and burden sharing

• The GAINS model (former RAINS) developed by IIASA provides “a framework for assessing strategies that reduce emissions of multiple air pollutants and greenhouse gases at least costs, and minimize their negative effects on human health, ecosystems and climate change”.

• It allows to test various emission reduction scenarios regarding as objective a number of metrics (end points) that are representative of health and environment impacts

• The Convention approach (and EU legislation) is based on national emission ceilings
## GAINS APPROACH: INTEGRATED APPROACH FOR THE POLLUTANTS AND THE EFFECTS

<table>
<thead>
<tr>
<th>Health impacts:</th>
<th>PM (BC, OC)</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>VOC</th>
<th>NH₃</th>
<th>CO</th>
<th>CO₂</th>
<th>CH₄</th>
<th>N₂O</th>
<th>HFCs</th>
<th>PFCs</th>
<th>SF₆</th>
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</thead>
<tbody>
<tr>
<td>PM (Loss in life expectancy)</td>
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<td>✓</td>
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<tr>
<td>O₃ (Premature mortality)</td>
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<td>✓</td>
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<tr>
<th>Vegetation damage:</th>
<th>PM (BC, OC)</th>
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<th>VOC</th>
<th>NH₃</th>
<th>CO</th>
<th>CO₂</th>
<th>CH₄</th>
<th>N₂O</th>
<th>HFCs</th>
<th>PFCs</th>
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<tbody>
<tr>
<td>O₃ (AOT40/fluxes)</td>
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<tr>
<th>Acidification (Excess of critical loads)</th>
<th>PM (BC, OC)</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>VOC</th>
<th>NH₃</th>
<th>CO</th>
<th>CO₂</th>
<th>CH₄</th>
<th>N₂O</th>
<th>HFCs</th>
<th>PFCs</th>
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<tr>
<td>Eutrophication (Excess of critical loads)</td>
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<th>Climate impacts:</th>
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<th>NH₃</th>
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<th>CO₂</th>
<th>CH₄</th>
<th>N₂O</th>
<th>HFCs</th>
<th>PFCs</th>
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<tr>
<th>Near-term forcing (in Europe and global mean forcing)</th>
<th>PM (BC, OC)</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>VOC</th>
<th>NH₃</th>
<th>CO</th>
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<th>PFCs</th>
<th>SF₆</th>
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<tr>
<td>Black carbon deposition to the arctic</td>
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Source: IIASA – GAINS website
Looking for the best compromise.
EMISSIONS, PROJECTIONS, SCENARIOS

- Regulatory framework (Protocols, EU Directives) allows to gather emission and projection databases
- Task Force on Techno-economic Issues (TF TEI) helps for projections
- But potential drastic changes in data reported year by year

Source: CIAM
LOOKING FOR POTENTIAL OPTIONS TO REDUCE EMISSIONS

- There is still some potential to reduce emissions from power plants and industries in EECCA countries.
EMEP MODELLING AND MONITORING TOOLS TO SIMULATE THE IMPACTS

- Airborne concentrations and deposition
- Impact indicators in the present situation and in the future

Loss of life expectancy (months)
Plant species loss (% protected)
Mercury accumulation in soil (CL-exceedance)
QUALIFYING THE BENEFITS

- Comparing with scenarios corresponding to « no management strategy »

Acidification (excess dep.)

- Actual/Legislation
- No control
- Max. Tech. Reductions
- TSAP target

Population exposure PM2.5

- Actual/Legislation
- No control
- Max. Tech. Reductions
- TSAP target

Source: IIASA

12 months life expectancy
~600,000 premature deaths per year

Source: IIASA
APPLICATION OF IAM IN FRANCE

- Pollutant & Greenhouse gases Emissions
  - Cost Benefit Analysis
  - Global Chemistry-Climate
  - Regional Climate
  - Regional Chemistry (CHIMERE)
  - Health Impact Assessment
  - Economical Valuation

- Policy Scenarios
- Geophysical models
- Impact Evaluation
PM2.5 IN 2050 SIMULATED BY INERIS CLIMATE/CTM CHAIN

Business as usual

Mitigation
The cost of climate mitigation is largely compensated by (i) Savings in quality mitigation, (ii) Reduced health damage.
INTERNATIONAL COOPERATION

• GAINS-ASIA is running, and there are some examples of national applications (GAINS-Korea)
• Other IAM initiatives develop in Asia

• Common policy-oriented framework could help to feed the IAM tools and to set shared objectives driving the scenarios
• Permanent dialogue with the countries should be maintained (CIAM’s duty) to develop a robust and transparent approach and control uncertainties. Reference centers are very useful in that perspective
• CLRTAP gets experience in implementing good practices (emissions and projections, cost-benefits analyses) and develop its own tools.
• Cooperation could develop through:
  • exchange of views and tools,
  • review initiatives,
  • common objectives on hemispheric issues (ozone, SLCP)
THANK YOU FOR YOUR ATTENTION

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