Convention on Long-range Transboundary Air Pollution
Executive Body, 27th session,
14 – 18 December 2009
Informal document No. 18
Agenda item No. 9

UNITED NATIONS

E

Economic and Social Council

Distr.
GENERAL

ECE/EB.AIR/WG.5/2010/xx
ECE/EB.AIR/GE.1/2010/x
14 December 2009

Original: ENGLISH

ECONOMIC COMMISSION FOR EUROPE

EXECUTIVE BODY FOR THE CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION

Working Group on Strategies and Review

Forty-sixth session
Geneva, 12–16 April 2010
Item 9 of the provisional agenda*

Steering Body to the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP)

Thirty-fourth session
Geneva, 13–15 September 2010
Item xx (xx) of the provisional agenda**

INTEGRATED ASSESSMENT MODELLING

DRAFT Report by the Chair of the Task Force on Integrated Assessment Modelling

* ECE/EB.AIR/WG.5/xx.
** ECE/EB.AIR/GE.1/2010/1.

I. INTRODUCTION

1. This report describes the results of the thirty-sixth meeting of the Task Force on Integrated Assessment Modelling, held on 6 and 7 October 2009 in Laxenburg, Austria, in accordance with item 2.3 of the workplan approved by the Executive Body at its twenty-sixth session (ECE/EB.AIR/96/Add.2). It describes progress in integrated assessment modelling, in particular with regard to the development of the baseline scenario and target setting. The presentations made during the meeting and the reports presented are available at: http://gains.iiasa.ac.at/index.php/meetings/pastmeetings.

A. Attendance

2. Forty-six experts from the following Parties to the Convention attended the meeting of the Task Force: Austria, Belarus, Belgium, Czech Republic, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Serbia, Spain, Sweden, Switzerland, and the United Kingdom of Great Britain and Northern Ireland. Also present were representatives from the Working Group on Effects, the Steering Body to Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP), the Expert Group on Techno-economic Issues, the Centre for Integrated Assessment Modelling (CIAM), the Meteorological Synthesizing Centre - West (MSC-W), and the Coordination Centre for Effects (CCE). The European Environmental Bureau (EEB), the Oil Companies' European Organization for Environment, Health and Safety (CONCAWE), European Petroleum Association (EUROPIA), Worldsteel Association, and the Union of the Electricity Industry (EURELECTRIC) were represented. A member of the Convention secretariat also attended.

B. Organization of work

3. Mr. R. Maas (Netherlands) chaired the meeting, which was hosted by the International Institute for Applied Systems Analysis (IIASA).

C. Welcome addresses

4. The Director of IIASA welcomed participants.

II. OBJECTIVES AND INTRODUCTORY REMARKS

5. The Chair noted that the meeting's purposes were: (a) to formulate baseline scenarios for further work on to the revision of the 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol); (b) to discuss targets for the environment and health; and (c) to assess of the progress achieved in other areas of integrated modelling.

6. The representative of the Convention secretariat outlined the conclusions from the meetings of the main subsidiary bodies in September. The Task Force welcomed the increasing collaboration between effects-oriented bodies, integrated assessment modellers and the Task Force on Reactive Nitrogen. It noted that baseline scenarios outside the EMEP modelling domain could best be reviewed by the Task Force on Hemispheric Transport of Air Pollution.

III. DEVELOPMENT OF THE BASELINE SCENARIO

A. Model evaluation

7. The Head of CIAM reported on a European Consortium for Modelling of Air Pollution and Climate Strategies (EC4MACS) project comprising a methodology to address air quality, extended to urban areas. The review of all models in the EC4MACS project, including the GAINS (Greenhouse Gas and Air Pollution Interactions and Synergies) model, was discussed on 5 October 2009 in Laxenburg, Austria. The Task Force took note of the main conclusions, inter alia that the technical possibility existed to use the GAINS model in full mode; that the GAINS model did not include economic feedback mechanisms, options for lifestyle changes and premature scrapping; that its long-term technology options were conservative, although the potential implementation rates were optimistic; and that effects estimates depended on the spatial resolution, leading to possible underestimation of receptor areas. It also concluded that cooperation should be enhanced between different ministries and experts delivering data on energy and activity levels to various international processes and that improved transparency and communication were deemed crucial for acceptance of model results and use in policy processes. It also encouraged to present results for air pollution and climate change jointly; distinguishing between different components of PM; and the network of National Integrated Assessment Modelling (NIAM) to take an active coordinating role in reviewing the quality of data used in the models. Benefits estimates should be made more robust using sensitivity analysis;

B. Energy and activity scenarios

8. The Head of CIAM presented two data sets that could be used as baseline scenarios in the GAINS model scenarios for countries within and outside the European Union (EU). The basic assumptions for the scenarios are summarized in table 1.

9. The first data set, hereinafter the national scenario, comprised 2009 updates of national energy and activity scenarios from 13 countries, including Norway, Switzerland and 11 EU Member States. For the rest of the EU Members States data from the 2008 PRIMES energy baseline were used. Those data reflected the EU climate and energy package. They also included agricultural emissions based on the 2005 national data. The Task Force noted that no updates were received from non-EU countries. As far as those countries were not covered by PRIMES data from the 2008 World Energy Outlook of the International Energy Agency (IEA) were used.

10. The second data set, hereinafter the coherent scenario, was mainly based on the 2009 update of the PRIMES energy baseline for the 27 European Union (EU) Member States and selected candidate countries (Croatia, the Former Yugoslav Republic of Macedonia and Turkey). The data included the effects of the economic crisis. For Norway and Switzerland scenarios including the effects of the economic crisis were not available; therefore 2008 PRIMES baseline scenario was used. The data held measures currently in place, but no future commitments. Therefore, these data did not describe the full attainment of the climate and energy package. The key assumptions included the EU Emission Trading Directive[1], carbon dioxide (CO_2) and passenger car regulation, the economic recovery package, national and EU legislation on emissions from sectors not in the emission trading system, and national renewable energy policies. The latter, however, were not always sufficient to meet the target of a 20 per cent share of total energy use. Some delegates noted that emissions of the 2009 PRIMES scenario, based on data from Eurostat, were not correct because some recent investment plans were not included and the Eurostat database classification was not specifying some crucial aspects of biomass fuel use such as non-commercial wood burning in households and the use of black liquor from the pulp and paper industry. The Task Force noted that for countries not covered by PRIMES a new IEA 2009 World Energy Outlook would become available in November 2009, which would include the effects of the economic crisis.

11. The agricultural activities in the coherent scenario were based on the draft 2009 CAPRI (Common Agricultural Policy Regionalized Impact) model. For countries not included in CAPRI activity data from the Food and Agricultural Organization (FAO) was used. The activities were used to calculate emissions in the GAINS model.

Table 1. Current status and sources for basic energy and activity assumptions for the two proposed baseline scenarios.

	National scenario	**Coherent scenario**
27 EU Member States	National data updated in 2009 (11 EU Member States) 2008 PRIMES with EU climate and energy package (16 EU Member States)	2009 PRIMES; CAPRI
Norway and Switzerland	National data updated in 2009	2008 PRIMES
Croatia, the Former Yugoslav Republic of Macedonia and Turkey	IEA 2008 World Energy Outlook	2009 PRIMES; CAPRI
The rest of non-EU countries	IEA 2008 World Energy Outlook	IEA 2009 World Energy Outlook; FAO

[1] 2003/87/EC.

12. The Task Force took note that the information on the actual implementation status of control measures was important. If all measures would be implemented, this would lead to significant further reductions in sulphur and nitrogen oxides and fine particulate matter ($PM_{2.5}$). . The Task Force noted that for non-EU countries assumptions about the implementation of current legislation were more important than economic assumptions. It also took note that both baseline scenarios assumed the measures recently agreed by the International Maritime Organization (IMO), but not the worldwide decrease in the sulphur content of shipping fuels.

C. Proposed baseline scenario

13. The Task Force welcomed the preparation of the scenarios by CIAM and decided to consolidate the baseline scenario assumptions to be used in further analyses. It noted that the 2009 PRIMES data seemed to be a realistic starting point for negotiations, as they included the effects of the economic crisis. However, it recommended using the available national baseline projections in parallel with this coherent scenario to analyse the robustness of results.

14. The Task Force invited CIAM to send out in November 2009 a request to 13 Parties, which had delivered the energy and activity data for the national scenarios, to check their data in the GAINS model format and to clarify remaining questions. It urged these countries to check energy balances and other relevant details, and to respond by the end of January 2010. It further asked CIAM to inform the relevant countries on the finalized 2009 PRIMES data by January 2010. It invited CIAM to present the consolidated national scenario and the coherent scenario if available, at the thirty-seventh meeting of the Task Force in February 2010, in preparation of the formal acceptance of the baseline scenario by the Working Group on Strategies and Review in April 2010. It agreed to present both national and coherent baseline scenarios to the Working Group on Strategies and Review in April 2010. It also noted that when countries would comment on the scenarios they should facilitate the discussion by preparing justifications with national data and models to support their remarks.

D. Environmental impacts

15. The Head of CIAM presented the tentative results on environmental impacts using different emission scenarios and illustrated the importance of the (conservative) assumptions on the enforcement of current legislation in non-EU countries, the IMO agreement and the consequences of the economic crisis.

16. The tentative baseline results suggest that without additional policy the loss of statistical life expectancy due to $PM_{2.5}$ exposure in EU-countries would in 2020 be 45–50 per cent lower than in 2005. In non-EU-countries a reduction by 20-25 per cent would be achieved. Premature deaths due to ozone would be 30 per cent lower. The exceedance of critical loads for acidification of forest soils and surface waters would become 50–75 per cent lower. The area with exceedance of critical loads for eutrophication of terrestrial ecosystems would be 20 per

cent lower in EU Member States and 45 per cent in non-EU countries. The exceedance of critical loads was calculated using EMEP modelled ecosystem-specific deposition, which resulted in higher exceedance that the earlier used grid cell average deposition.

17. The Task Force welcomed the offer from the Working Group on Effects to assess both these and other effects in the planned ex-post analysis in collaboration with CIAM. Some experts noted that it was not easy to communicate some indicators, e.g. the amount of exceedance of critical loads, to policy makers and the public. The Task Force also took note of the long-term aim to achieve non-exceedance of critical loads.

18. The representative of the CCE introduced the ex-post analysis, which denotes an evaluation on effects carried out after the GAINS model optimisation. The Task Force welcomed this initiative and suggested to first analyse extreme scenarios; to compare results in different spatial resolutions (10×10 km^2 and 50×50 km^2); and to make use of the harmonized land use maps. The Task Force invited the Working Group on Effects to coordinate the work and harmonize the communication of the results from the ex-post analysis to both integrated modellers and policymakers.

19. The Co-Chair of International Cooperative Programme on Effects of Air Pollution on Materials, including Historic and Cultural Monuments (ICP Materials) from Italy presented preparations for the ex-post analysis of the effects on materials. He presented the proposed short and long-term targets and tolerable levels for corrosion of carbon steel, zinc and limestone, and general soiling. He emphasized that the tentative results in the 50×50 km^2 grid could underestimate effects in urban areas. The Task Force welcomed the preparations for material damage as an indicator. It also proposed to create ways to communicate the meaning of the differences of corrosion rates, and to consider calculating and showing benefits of avoided monetary damage.

E. Flexibility mechanisms

20. The Task Force welcomed a presentation on a qualitative review of potential flexible mechanisms, which could be adapted for use under an emission ceiling agreement. The review incorporated mechanisms on compliance flexibility and mechanisms related to emissions trading. The flexibilities could be combined in various ways to reflect uncertainties that would persist in target setting. In the ensuing discussion some delegates noted that there was a tension between potential cost savings and the potential loss of environmental ambition levels. The Task Force decided to amend the written report and include the Network of Experts on Benefits and Economic Instruments in its further analysis.

IV. OPTIONS FOR TARGET SETTING

21. The Chair of the Working Group on Effects presented tentative proposals by effects-oriented activities on defining and choosing policy relevant indicators, making distinction between data available on chemistry, biology and dose-response functions. He noted that long-term aims were healthy ecosystems and people via non-exceeded critical loads and levels. In the ensuing discussion several experts noted the needs and difficulties to have biological endpoints included in the work. These could include, inter alia, the absence, presence and abundance of species, and robust ecosystem services, especially in relation to the stability of biogeochemical cycles of carbon, nutrients and water. The Task Force noted the need to proactively present alternatives to policymakers with related required action and environmental consequences of various targets. It expressed the need to have understandable indicators acceptable for scientists, policymakers and the public.

22. The Task Force took note of the progress and supported planned ex-post analysis, which could include a full range of various indicators on major receptors. It encouraged the further development of more popular indicators to be added in ex-post analysis. It further noted that on the basis of ex-post analysis policymakers might wish to add additional environmental and health targets to be included in the GAINS model.

V. SPECIFIC TECHNICAL REDUCTION OPTIONS

23. The Co-Chair of the Expert Group on Techno-economic Issues from Italy presented the progress in updating the technical annexes of the Gothenburg Protocol, including the proposed three ambition levels for technical control options. Some experts noted the necessary linking with the work on reference documents for best available technologies (BREFs) in the Joint Research Centre (JRC) in Sevilla, Spain. Currently available control scenarios in the GAINS model were current legislation, current policy proposals (i.e. the proposal adopted by the European Commission to revise the Integrated Pollution Prevention and Control (IPPC)[2] Directive of the European Union) and maximum technically feasible reductions. The Task Force noted the comparison with the options proposed in the technical annexes was not straightforward as the GAINS model operated at a higher level of data aggregation.

24. A representative of CIAM informed that the Task Force on Reactive Nitrogen was also preparing three ambition levels on ammonia for annex IX of the Gothenburg Protocol. He noted that work was different from the other technical annexes as it addressed percentage reductions from defined reference technologies and not specific emission limit values (ELVs).

25. The Task Force suggested that CIAM explored the three control scenarios in the GAINS model as appropriate and made a comparison with relevant options in the technical annexes

prepared by the Expert Group on Techno-economic Issues. The Task Force invited CIAM to present the results to the Working Group on Strategies and Review in 2010 after the baseline has been agreed upon.

26. The Task Force also discussed the emissions from shipping. It decided to explore the effects of further emission reductions in shipping on the control requirements of land-based sources together with other planned sensitivity analyses.

VI. ASPIRATIONAL SCENARIOS FOR 2050

27. The Chair presented possibilities for national aspirational targets. Due to the fact that for 2050 technology options and cost curves cannot be known, other criteria had to be applied such as a convergence towards equal emission densities or equal emissions per capita. Both options would focus additional efforts on countries with high densities of fossil fuel use, traffic and cattle.

28. The representative of the CCE presented preliminary modelling results based on the abovementioned criteria. A convergence towards maximum emissions per capita or per km^2 could significantly reduce exceedance of critical loads and without large emission reductions for the EMEP region as a whole. The Task Force considered it useful to have various types of indicators available and suggested also to explore the possibility of equal emission factors per energy unit for sulphur and nitrogen oxides, and equal ammonia emissions per cattle unit or per agricultural area.

VII. PROGRESS IN RELATED AREAS

29. The representative of the NIAM network presented its recent developments. Currently, the network comprised 23 countries and the JRC (see www.niam.scarp.se). The Task Force welcomed the initiatives taken by the network to contribute to the review of the EC4MACS project and to the dialogue with national experts on the PRIMES data; to attract more funding from other than currently national sources; to strengthen the collaboration with countries in Eastern Europe, the Caucasus and Central Asia; and to reach out towards the experts in the climate change community.

30. The Task Force welcomed a presentation on the indirect co-benefits of an EU-wide policy on carbon dioxide. It took note of the results obtained with a macroeconomic model and 2007 PRIMES data, indicating that implementation of the climate and energy package within the EU might lead to reduced productions levels, which in turn would lead to lower air pollutant emissions.

[2] 1996/61/EC, codified as 2008/1/EC.

31. The Head of CIAM presented its recent study on direct co-benefits on reduced air pollutant emissions from the current pledges of Annex 1 countries of the Kyoto Protocol on reducing greenhouse gases made in view of the meeting of the United Nations Framework Convention on Climate Change in December 2009 in Copenhagen, Denmark. Air pollution in Annex 1 countries the Kyoto Protocol would be 7–9 per cent lower in 2020 when greenhouse gases were reduced by 6–17 per cent compared to 1990. Additional use of the clean development mechanism (CDM) would results in fewer benefits. The Task Force took note of the potential of significant co-benefits achieved with low costs.

32. The representative of EURELECTRIC presented potential systematic biases in the treatment of large combustion plants, arising, in particular if the role of emission height and the toxicity of PM from various sources were not accounted for in integrated assessment modelling. The Task Force noted the need to carry out sensitivity analyses based on contributions of the Task Force on the Health Aspects of Air Pollution. It also noted that the current practice is to assume all $PM_{2.5}$ mass equally harmful.

VIII. FURTHER WORK

33. The thirty-seventh meeting of the Task Force will be held from 23 to25 February 2010 in Geneva and focus on the development of the baseline scenario. Its thirty-eighth meeting will be held from 17 to 19 May 2010 in Dublin and with the focus on options for target setting. In late 2010a workshop on sensitivity analysis and robustness of results will be held in Laxenburg, Austria

---