



**Economic and Social
Council**

Distr.
GENERAL

ECE/EB.AIR/WG.5/2010/11
ECE/EB.AIR/GE.1/2010/4
11 June 2010

Original: ENGLISH

ECONOMIC COMMISSION FOR EUROPE

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

Working Group on Strategies and Review

Forty-seventh session
Geneva, 30 August–3 September 2010
Item 3 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 6 (b) of the provisional agenda

INTEGRATED ASSESSMENT MODELLING

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

I. INTRODUCTION

1. This report describes the results of the thirty-eighth meeting of the Task Force on Integrated Assessment Modelling, held from 17 to 19 May 2010 in Dublin, Ireland, in accordance with item 2.3 of the workplan approved by the Executive Body at its twenty-seventh session (ECE/EB.AIR/99/Add.2). It describes progress in scenario analysis with integrated assessment models. Prior to that meeting, the Task Force held its thirty-sixth and thirty-seventh meetings, on 6 and 7 October 2009 in Laxenburg, Austria, and from 22 to 24 February 2010 in Geneva, respectively. The presentations made during all three meetings and informal reports of

GE.10-22653

the first two meetings are available at:

<http://www.unece.org/env/lrtap/TaskForce/tfiam/meetings.htm>.

A. Attendance

2. The meeting was hampered by travel restrictions due to the volcanic ash cloud emanating from Iceland. Thirty-three experts attended, representing the following Parties to the Convention: Austria, the Czech Republic, Croatia, Finland, France, Ireland, Italy, the Netherlands, Norway, Spain, Sweden and the United Kingdom of Great Britain and Northern Ireland. Also, the Expert Group on Techno-Economic Issues, the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP), the Coordination Centre for Effects (CCE), the European Environment Agency, the European Environmental Bureau, and the Union of the European Electricity Industry (EURELECTRIC) were represented. Three other experts participated via a computer connection, including the head of the Centre for Integrated Assessment Modelling (CIAM).

B. Organization of work

3. Mr. R. Maas (Netherlands) chaired the meeting.

II. OBJECTIVES

4. The Chair introduced the purposes of the thirty-eighth meeting. The main focus was the development of target-setting options based on the PRIMES 2009 scenario and the national baseline scenario. Furthermore, progress on the 2010 and 2011 workplans were to be discussed, including the ex-post impact analysis with the Working Group on Effects; the analysis of impacts of the draft technical annexes; modelling of short-lived climate forcers; analysing possible 2050 aspirations; uncertainty management and flexible mechanisms; and the exchange of national experiences with the Network of Integrated Assessment Modellers.

III. OPTIONS FOR TARGETS IN A REVISED GOTHENBURG PROTOCOL

A. Target-setting approaches

5. The head of CIAM presented the possible range of environmental improvement options between the 2020 baseline scenarios (BL) and the maximum technically feasible reduction (MTFR) in the Greenhouse Gas and Air Pollution Interactions and Synergies model (GAINS) for 2020 (MTFR, excluding early scrapping, behavioural change, and additional climate and energy measures). For the loss in life expectancy (years of life lost) due to exposure to particulate matter, a European-wide reduction between 40% (BL) and 70% (MTFR) relative to 2000 was possible. For ozone-related mortality, a reduction between 30% (BL) and 40% (MTFR) was estimated. For forest acidification, reduction targets could be between 70% (BL) and 90% (MTFR), while for the area of ecosystems with exceedance of the critical load of nitrogen

ambitions, between 30% (BL) and 70% (MTFR) would be possible. For Europe as a whole, the differences between the PRIMES 2009 baseline scenario and the national baseline scenario appeared to be small.

6. CIAM developed four different approaches for target setting. Targets could be based on equal environmental quality caps throughout Europe (approach 1) or an equal relative improvement in environmental quality compared to a base year (approach 2). With those approaches the possibilities for improving environmental quality in Europe would be limited by the technical feasibility of emission reductions in a small number of countries. For most countries there would be no incentive for environmental improvement.

7. Targets could also be based on an equal effort to close the gap between the baseline and the MTFR scenario (approach 3). By definition, such reductions were technically feasible and would give a more equal distribution of costs. A 25% gap closure would cost about €1 to 2 billion, and a 50% gap closure €2 to 4 billion. A 75% gap closure would cost €6 to 10 billion, while MTFR would cost up to €20 billion.

8. A fourth approach would be to optimize environmental improvements for Europe as a whole, e.g., minimizing the total loss of life years for Europe. Such an approach would offer a more cost-effective result than target-setting approaches that entailed equity criteria, such as in approaches 1, 2 and 3. That least-cost approach would lead to lower costs for almost all countries, but in relative terms would shift efforts to countries with less stringent emission control measures in their baseline (e.g., non-European Union (EU) countries).

9. The Task Force requested CIAM to present the results of target-setting approach 3 (with 25, 50 and 75% gap closure for all countries) and approach 4 (European-wide optimization with comparable ambitions as the 25, 50 and 75% gap closure) in the form of tables with costs, emission figures and environmental improvements, and to make those data available before the September meeting of the Working Group on Strategies. That should facilitate a discussion about a fair distribution of additional costs and environmental improvements among countries and of the flexibility in the spatial distribution of environmental improvements that would be allowed in order to decrease total costs. A hybrid combination of approaches 3 and 4 could also be considered.

10. The Task Force noted that the baseline had been adapted to comments given by the Parties; that it included the “light” version of the International Maritime Organization (IMO) Regulations for the Prevention of Air Pollution from Ships; and that impact calculations included ecosystem dependent deposition rates. Costs were expressed in 2005 euros and were not completely comparable with earlier scenarios in 2000 euros. The City-delta corrections and the ozone flux approach were not yet included in the model. The Task Force requested that the national 2009 scenarios for Switzerland and Norway be used as part of the PRIMES 2009 baseline scenario, instead of the PRIMES 2008 data for those countries.

B. Ex-post analysis by the Working Group on Effects

11. The representative of the CCE presented the methodology for the ex-post analysis of effects. Results of the ex-post analysis should eventually form the basis for an informative annex to the revised Gothenburg Protocol, showing the impacts of the agreed policy obligations.

12. The Task Force requested the CCE and other bodies under the Working Group on Effects to produce results of an ex-post analysis in the envisaged format of that informative annex for the baseline and the MTFR scenario. CIAM agreed to make data available at the end of May. The analysis of scenarios between the baseline and MTFR would follow later.

C. Analysis of the technical annexes

13. The Task Force took note of the methodology suggested by Italy for translating the three ambition levels for the emission limit values in the draft technical annexes to the revised protocol into GAINS-scenario runs in order to assess the emission reductions, costs and environmental improvements that would result from implementing equal technological ambition levels for each of the parties. The Task Force requested Italy and CIAM to proceed with the further implementation of that methodology.

IV. ECONOMIC ASPECTS OF ABATEMENT STRATEGIES

A. Developments in the methodology for cost-benefit analysis

14. The Task Force took note of the methodology for benefit assessments in EU and non-EU countries presented by a consultant for the European Commission in the context of the European Consortium for Modelling of Air Pollution and Climate Strategies (EC4MACS) project (see: <http://www.ec4macs.eu/home/index.html>). The assessment of health impacts had been coordinated with the Task Force on Health. Health risks included mortality rates for young infants (aged 1 month to 1 year). The valuation of mortality ranged from €52,000 to €20,000 for a life year lost. A sensitivity run with a value of €40,000 was proposed.

15. Both the implementation of the European Commission's Thematic Strategy on Air Pollution and the higher ambitions for environmental improvement proposed by the European Parliament would have net benefits for all EU countries. The MTFR scenario showed net costs for countries at the fringes of the EU. The Task Force took note of the need for sensitivity analyses and further efforts to include ecosystem damage in the calculations. It asked if an ex-post cost-benefit analysis of relevant GAINS scenarios, in the context of the EC4MACS project, could be made available in the coming months.

B. Possibilities for emission trading

16. The Task Force took note of a study for the European Commission presented by a consultant on possible ways to implement SO₂ and NO_x emission trading between large point sources (i.e., sources that were covered by the 2009 European Council agreement on the draft Industrial Emissions Directive (IED)). The study showed that if individual installations could trade emission credits within a country, instead of individually complying with the emission limit values set in the IED, that could lead to significant cost savings without violating the national emission ceiling.

17. Average abatement costs could decrease from €2000 per ton of NO_x in the original situation where installations had to comply with emission limit values to €700 per ton, while the total national emission from the sectors concerned remained constant. That trading within countries would probably not significantly change the distribution of transboundary impacts over Europe. Average abatement costs of SO₂ would decrease from €1,700 to €1,100 per ton.

18. Allowing for trading at the EU-wide scale would further decrease costs to €400 per ton of NO_x or €800 per ton of SO₂, without leading to higher emissions for the EU as a whole. But such trades would change the distribution of emission reductions over countries and the resulting spatial distribution of transboundary impacts. According to the consultant, changes in the distribution of impacts would be relatively small at the European level, because the installations that trade emissions generally had high stacks.

19. The Task Force focused its discussion on the aspects of international emission trading between countries and concluded that quantitative results should be interpreted cautiously, inter alia, because of the uncertainties in the data. It noted that cost savings from trading resulted from relaxations of the equity criteria (e.g., equal distribution of efforts, of environmental benefits, or equal emission limit values) that have been employed as the rationale for the pre-trading allocation. Thus, after trading, the ultimate distribution of those criteria would be different from the distribution considered as fair in the original allocation.

20. The Task Force noted that the political acceptability of SO₂ and NO_x emission trading would depend on whether decision makers put more emphasis on European-wide cost effectiveness than on maintaining “fairness” in the initial distribution of emission ceilings. It noted that the flexibility in target deposition patterns implied in SO₂ and NO_x emission trading could also be taken into account in optimizing emission ceilings with GAINS, if such flexibility would be politically accepted. In that case, the additional cost savings from an emission trading scheme were likely to be small.

21. The Task Force noted that trading could lead to more emission reductions by the largest high stack emission sources (because unit abatement costs were lower), and less emission reductions at the low-level emission sources that caused higher population exposure. It should be

guaranteed that trading would not lead to exceedances of local air quality limit levels and larger population exposure.

22. In the design of a trading system, incentives for innovation should be considered, as well as ways to avoid the risk of trading emission reductions that would have been made anyway. The Task Force recommended that the potential interactions with the CO₂ emission trading scheme be looked into further.

23. The Task Force took note of the work planned by the Netherlands Environmental Assessment Agency on the possible cost savings of a multi-gas impact-based trading scheme, including macroeconomic feedbacks, and was looking forward to seeing the results of the model runs at its next meeting.

C. Uncertainty management and possible flexible instruments in a new protocol

24. The Task Force took note of a systematic overview presented by Ireland of the possibilities for acknowledging uncertainties in modelling in flexible compliance mechanisms for national emission ceilings. Suggestions included: the possibility for countries to offset “overcompliance” with one pollutant against a failure to comply with another; to base compliance not on a single year, but on a three-year average; and splitting the ceilings into a fixed value and a flexible range. The flexible range had the possibility of increasing or decreasing as uncertainties become understood better during the process.

25. The Task Force discussed advantages of absolute and relative reduction targets. Relative reduction targets could be set for substances where emission factors and sources entailed significant uncertainties and where better information was expected to become available in the coming years. Those relative targets could be translated into absolute emission ceilings some years before the end of the target period, when uncertainties were reduced. Such an approach would not discourage parties from improving emission estimates, because improved emission estimates would not cause immediate compliance problems.

26. The Task Force noted that decision makers might benefit from constructive input and suggested an informal discussion paper on the ideas mentioned above should be forwarded to the European Commission and the Working Group on Strategies and Review.

D. Guidance document on economic instruments

27. On behalf of the United Kingdom of Great Britain and Northern Ireland, the lead country of the Network of Experts on Benefits and Economic Instruments, the Chair introduced a draft guidance document on economic instruments. Several economists within the Task Force were prepared to review and give input to the draft document before 19 July 2010 (see http://www.unece.org/env/documents/2010/eb/wg5/Informal%20documents/EB.AIR.1999.2.e.Gotherburg_ch.VI%20Updated%202010.pdf).

V. LINKAGES BETWEEN AIR POLLUTION AND CLIMATE CHANGE

A. Progress in including short-lived climate forcers in GAINS

28. The Task Force took note of progress at CIAM in including near-term climate forcing with GAINS. A global assessment showed the contribution of short-lived climate forcers and the possibilities for a “climate neutral” air pollution policy. Technical and non-technical measures to reduce emissions of black carbon in Brazil, the Russian Federation, India, China and South Africa and in developing countries dominated a package of abatement measures that could lead to a 75% reduction of the global radiative forcing from those substances by 2030. The impacts on regional (European and Asian) climate forcing and carbon deposition to the Arctic and Alpine glaciers would be included in the GAINS model in the coming months. Future analyses would also include ship emissions and forest fires.

29. First modelling results would be presented at the first meeting of the ad hoc expert group on Black Carbon to be held on 17 and 18 June in Brussels. It would also be input to the United Nations Environment Programme (UNEP) Black Carbon Assessment and the fifth Assessment Report of the International Panel on Climate Change.

VI. EXCHANGE OF OTHER EXPERIENCES IN INTEGRATED ASSESSMENT MODELLING

30. The Task Force took note of work by the Network of National Integrated Assessment Modellers and the use of its website to exchange documents and experiences among modellers. The current focus of information exchange was on methods for uncertainty management and on the development of long-term scenarios (to 2050).

31. The Task Force took note of the European-wide energy scenarios until 2050 generated with the TIMES model that were presented by the University of Stuttgart. Long-term scenarios gave a different perspective on the investments needed in the next decades than scenarios that were only focused on 2020. From a longer-term perspective it was not sufficient to introduce emission limits for the year 2020, since large-scale power plants had a much longer life span and choices of actors would depend on what they expected the environmental policy to be in the longer term. From a longer-term perspective it would be more cost effective to stimulate the use of natural gas, wind energy, and the development of carbon capture and storage technologies, than to focus on more effective air pollution abatement technologies for coal-fired power plants. Potential environmental improvements were significantly more substantial over the longer run than by 2020.

32. The Task Force noted the progress made in integrated assessment modelling in countries in Eastern Europe, the Caucasus and Central Asia, based on a presentation by Sweden on behalf of the Russian Federation and Ukraine. In cooperation with Sweden, Finland and CIAM, GAINS

model versions had been developed for the Russian Federation, Belarus and Ukraine. The Task Force also took note of the modelling for different regions within the Russian Federation, and the modelling experiences in Ukraine and Belarus.

33. The Task Force welcomed the work performed in the cooperation projects and urged the project group to continue. Other Task Force experts were also encouraged to report on their cooperation with countries in Eastern Europe, the Caucasus and Central Asia.

34. The Task Force took note of the latest developments in the Irish integrated assessment modelling and the future plans. A website with information on the effectiveness of policy measures was under construction: www.policymeasures.com. That website would be available from the end of July 2010. The value of national capacity-building and international collaboration was emphasized.

VII. FURTHER WORK

35. Based on some initial thoughts by the representative of EURELECTRIC, the Task Force exchanged ideas for uncertainty analysis to be addressed at the workshop to be held in November. Priorities identified included uncertainties in scenarios (growth assumptions, energy and carbon prices, etc); alternative hypotheses on the toxicity of particulate matter; and the systematic overestimation of the implementation and efficiency of abatement measures. The Meteorological Synthesizing Centre-West (MSC-W) would be asked for information on the sensitivity of the source-receptor matrices for assumptions on the meteorology used in scenarios. The Task Force concluded that the challenge was to translate such key uncertainties into a robust policy strategy.

36. Depending on the requests by the Working Group on Strategies, the thirty-ninth meeting of the Task Force was tentatively planned for January 2011. The venue would be decided later. The meeting would focus on scenario calculations based on ambition levels yet to be defined by the Working Group on Strategies and Review.

37. The workshop on sensitivity analysis and robustness of results would be held in Laxenburg, Austria, on 3 and 4 November 2010.

38. The fortieth meeting of the Task Force would be held in mid-May 2011 in Oslo.
