Task Force on Integrated Assessment Modelling
38th meeting, 17-19 May 2010

Report by the Chair

I. INTRODUCTION

1. This report describes the results of the thirty-eight 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 work plan 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. The presentations made during the meeting and the reports presented are available at: http://gains.iiasa.ac.at/index.php/tfiam/past-tfiam-meetings.

2. The meeting was hampered by the volcanic ash cloud. Thirty three experts attended, representing the following Parties to the Convention: Austria, Czech Republic, Croatia, Finland, France, Ireland, Italy, Netherlands, Norway, Spain, Sweden and The United Kingdom of Great Britain and Northern Ireland. Also the Expert Group on Techno-Economic Issues (EGTEI), the Co-operative Programme for monitoring and evaluation of the long-range transmissions of air pollutants in Europe (EMEP), the Coordination Centre for Effects (CCE), the European Environment Agency (EEA), the European Environmental Bureau (EEB), and the Union of the European Electricity Industry (EURELECTRIC) were represented. Three other experts participated via a computer connection, among which the head of the Centre for Integrated Assessment Modelling (CIAM).

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

II. OBJECTIVES

4. The chairman introduced the purposes of the 38th meeting. The main focus was the development of target setting options based on the PRIMES2009 scenario and the national baseline scenario. Furthermore progress of the 2010/2011 work plan was 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

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 in 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 is possible. For ozone related mortality a reduction between 30% (BL) and 40% (MTFR) was estimated. For forest acidification reduction targets could lie between 70% (BL) and 90% (MTFR), while for the area of ecosystems with exceedance of the critical load of nitrogen ambitions would be possible between 30% (BL) and 70% (MTFR). For Europe as a whole the differences between the PRIMES2009 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 these approaches the possibilities to improve environmental quality in Europe will 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 are technically feasible and would give a more equal distribution of costs. A 25% gap-closure would cost about 1-2 bn €, and a 50% gap-closure 2-4 bn €. A 75% gap closure would cost 6-10 bn €, while MTFR would cost up to 20 bn €.

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 entail equity criteria, such as the approaches 1, 2 and 3. This least cost approach would lead to lower costs for almost all countries, but in relative terms shift efforts to countries with less stringent emission control measures in their baseline (e.g., non-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 make these data available before the September meeting of the Working Group on Strategies. This should facilitate a discussion about a fair distribution of additional costs and environmental improvements over 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 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 IMO-agreement for ships emissions and that impact calculations included ecosystem dependent deposition rates. Costs were expressed in 2005-euros and are 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 to use the national 2009 scenarios for Switzerland and Norway as part of the PRIMES2009 baseline scenario, instead of the PRIMES 2008 data for these countries.

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 this informative annex for the Baseline and the MTFR scenario. CIAM agreed to make data available at the end of May. Later the analysis of scenarios between the baseline and MTFR would follow.

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 to proceed with the further implementation of this methodology.

IV. ECONOMIC ASPECTS OF ABATEMENT STRATEGIES

Developments in the methodology for Cost-Benefit Analysis

14. TFIAM took note of the methodology for benefit assessments in EU and non-EU countries presented by *EMRC*. The assessment of health impacts had been co-ordinated with the Task Force on Health. Health risks include mortality rates for young infants (1 month to 1 year). The valuation of mortality ranges from 52.000€ to 120.000€ for a life year lost. A sensitivity run with a value of 40.000€ was proposed.

15. Both the implementation of the European Commissions Thematic Strategy for Air Pollution and the higher ambitions for environmental improvement proposed by the European Parliament will have net benefits for all EU-countries. The MTFR scenario shows net costs for countries at the fringes of the EU. The Task Force took

note of the need for sensitivity analyses and the further efforts to include ecosystem damage in the calculations. It appreciated 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.

Possibilities of emission trading

16. The Task Force took note of a study for the European Commission presented by *ENTEC* on possible ways to implement SO_2 and NO_x emission trading between large point sources (i.e. sources that are covered by the 2009 European Council agreement on the draft Industrial Emissions Directive - IED). The study shows that if individual installations would be able to trade emission credits within a country instead of individually complying with the emission limit values set in the IED, this could lead to significant cost savings, without violating the national emission ceiling.

17. Average abatement costs could decrease from 2000 € ton of NO_x in the original situation where installations have to comply with emission limit values to 700 € per ton, while the total national emission from the sectors concerned remains constant. This trading within countries would probably not significantly change the distribution of transboundary impacts over Europe. Average abatement costs of SO_2 would decrease from 1700 € to 1100 € 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 SO_2, 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 ENTEC changes in the distribution of impacts would be relatively small at the European level, because the installations that trade emissions generally have 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 result 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 rationale for the pre-trading allocation. Thus, after trading the ultimate distribution of these criteria would be different from the distribution that was considered as fair in the original allocation.

20. The Task Force noted that the political acceptability of SO_2 and NO_x emission trading will depend on whether decision makers put more emphasis on European-wide cost effectiveness than on maintaining the ‘fairness’ in the initial distribution of emission ceilings. It noted that the flexibility in target deposition patterns implied in SO_2 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 this case the additional cost savings from an emission trading scheme are 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 are lower), and less emission reductions at the low-level emission sources that cause 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 recommends to look further into the potential interactions with the CO_2-emission trading scheme.

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 macro-economic feedbacks and is looking forward to see the results of the model runs at its next meeting.

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 to acknowledge 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 years average; and splitting the ceilings into a fixed value and a flexible range. The flexible range has 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 entail significant uncertainties and where better information is expected to become available in the coming years. These relative targets could be translated into absolute emission ceilings some years before the end of the target period, when uncertainties would have become less. Such an approach would not discourage parties to improve emission estimates, because improved emission estimates would not cause immediate compliance problems.

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

Guiding document on economic instruments

27. On behalf of the United Kingdom, the lead country of the Network of Experts on Benefits and Economic Instruments, the chairman 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 the July 19th 2010. See:
http://www.unece.org/env/documents/2010/eb/wg5/Informal%20documents/EB.AIR.1999.2.e.Gothenburg_ch.VI%20Updated%202010.pdf

V. LINKAGES BETWEEN AIR AND CLIMATE CHANGE

Progress in including short lived climate forcers in GAINS

27. The Task Force took note of progress at the Centre on Integrated Assessment Modelling 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, Russia, 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 these substances by 2030. The impacts on regional (European and Asian) climate forcing and carbon deposition to the Arctic and Alpine glaciers will be included in the GAINS model in the coming months. Future analyses would also include ships emissions and forest fires.

28. First modelling results will be presented at the meeting of the ad-hoc expert group on Black Carbon that will first meet on 17-18 June in Brussels. It will also be input to the 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 is on methods for uncertainty management and on the development of long term scenarios (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 give a different perspective on the investments needed in the next decades than scenarios that are only focussed on 2020. From a longer term perspective it is not sufficient to introduce emission limits for the year 2020, since large scale power plants have a much longer life span, and choices of actors will depend on what they expect 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 are significantly more substantial at the longer run than in 2020.

32. The Task Force noted the progress made in integrated assessment modelling in EECCA countries, based on a presentation by Sweden on behalf of Russia and the Ukraine. In cooperation with Sweden, Finland and CIAM GAINS model versions have been developed for Russia, Belarus and the Ukraine. The Task Force took note of the regional explicit modelling performed in the Russian Federation, and the experiences drawn in the Ukraine and Belarus.

33. TFIAM welcomes the work performed in the co-operation projects and urges the project group to continue. Other Task Force experts are also encouraged to report on their co-operation with EECCA countries.

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 is under construction: www.policymeasures.com. This website will be available from the end of July 2010. The value of national capacity building and international collaboration was emphasised.

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 that were 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. 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 is to translate such key uncertainties into a robust policy strategy.

36. Depending on the requests by the Working Group on Strategies the 39th meeting of the Task Force is tentatively planned in January 2011. The venue will be decided later. The meeting will focus on scenario calculations based on ambition levels yet to be defined by the WGSR.

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

38. The 40th meeting of the Task Force will be held mid May 2011 in Oslo.