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## ECONOMIC COMMISSION FOR EUROPE

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

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

(Twenty-seventh session, Geneva, 8-10 September 2003)

### **Working Group on Strategies and Review**

(Thirty-fifth session, Geneva, 17-19 September 2003)

## INTEGRATED ASSESSMENT MODELLING

Progress report prepared by the Chairman of  
the Task Force on Integrated Assessment Modelling in collaboration with the secretariat

### **Introduction**

1. This report presents progress in integrated assessment modelling and the preparation of model inputs, with a focus on the preparation of the baseline scenarios to be assessed for the review of the Gothenburg Protocol. It includes the results of the twenty-eighth meeting of the Task Force on Integrated Assessment Modelling, held in Haarlem (Netherlands) on 7-9 May 2003. Presentations made during the meeting and reports presented can be accessed on the Internet at [www.unece.org/env/tfiam](http://www.unece.org/env/tfiam).

2. Experts from the Belgium, Czech Republic, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Slovenia, Sweden, Switzerland, the United Kingdom and the European Community participated in the meeting. Representatives from the EMEP Centre for Integrated Assessment Modelling (CIAM), Chemical Coordinating Centre of EMEP (CCC), the Meteorological Synthesizing Centre-West of EMEP (MSC-W), the Coordination Center for Effects (CCE), the World Health Organization (WHO), the UNECE secretariat, the European Topic Centre on Air and Climate Change (ETC-ACC),

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as well as from the Oil Companies' European Organization for Environment, Health and Safety (CONCAWE), the Union of the Electricity Industry (EURELECTRIC) and the World Conservation Union (IUCN), were also present.

3. Mr. Rob MAAS (Netherlands) chaired the meeting.

## **I. LINKAGES BETWEEN REGIONAL AND GLOBAL EMISSION CONTROL**

4. The Task Force discussed the outcome of the workshop on linkages between regional and global emission control held at the International Institute for Applied Systems Analysis (IIASA) in Laxenburg (Austria), 27-29 January 2003. It adopted the conclusions of the workshop with some amendments and decided to present them as an addendum to its report (EB.AIR/GE.1/2003/4/Add.1 - EB.AIR/WG.5/2003/5/Add.1) to EMEP Steering Body and the Working Group on Strategies and Review.

5. The Task Force was informed that Italy might organize a side-event on the linkages between air pollution and climate change during ninth session of the Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC) to be held in Milan (Italy) on 1-12 December 2003. The Task Force welcomed steps to enhance cooperation between the experts working in the two fields.

## **II. EMISSION AND BASELINE SCENARIOS**

6. At its twenty-seventh meeting, the Task Force had noted that several countries were reviewing NO<sub>x</sub> emission data from heavy-duty vehicles (HDVs). The findings seemed to suggest that NO<sub>x</sub> emissions from HDVs following the EURO 2 and 3 specifications were in reality higher than assumed in previous estimates.

7. Mr. Bernd Schärer (Germany) informed the Task Force about the results of a joint study conducted by Austria, Germany and Switzerland. It was found that HDV engines complying with EURO 2 standards were optimised so that they would show low NO<sub>x</sub> emissions at the prescribed measurement points in the engine test cycle, while emissions at other points were much higher. This would lead to overall emissions for a vehicle that were on average 35% higher than previously expected. For Germany, the overall emissions were more than 10% of what had originally been estimated. The projected emissions for 2010 might be some 150 kt higher than anticipated. For EURO 3, the situation might be similar, but there were not yet sufficient measurements and it might be possible to adjust the standard to avoid this effect.

8. The increase in projected NO<sub>x</sub> emissions will make it more difficult for some Parties to comply with their emission ceilings under the Gothenburg Protocol. It also affects emission inventories for the last few years.

9. The Task Force agreed that it was important to correct emission inventories and to ensure consistency for all countries. The new emission reporting guidelines require Parties to recalculate past emission estimates in light of new methodologies and this would also apply to the revised emission factors for EURO2 HDVs. CIAM should check that its database was consistent for all countries. Further work was necessary to determine the correct emission factors for EURO3 HDVs.

10. Mr. Markus Amann of CIAM presented an overview of the work on the baseline scenario. The work was following the timetable of the European Commission's CAFE programme: The RAINS model databases were presently under development. Bilateral consultations with national experts were scheduled for autumn 2003. Draft baseline scenarios were expected to be presented in January 2004 and final scenarios might become available in March 2004. 2004 will be used to develop the main policy alternatives so that the main scenarios could be decided upon in 2005.

11. The baseline scenario would consist of the following elements:

(a) Energy projections: three scenarios were planned: A scenario based on EC DG TREN data with measures required under the Kyoto Protocol; the same scenario without Kyoto; and national projections (data for which was due by 30 June 2003). There were some significant differences between the scenarios used for the preparation of the Gothenburg Protocol for 2010 and the new EC scenarios, especially for the EU accession countries. The projected energy consumption and the coal use were much lower than previously assumed.

(b) Transport: The EC scenario would be based on the same energy model as the energy projections, but refined by specific transport models. National projections were also due by 30 June. Issues to be addressed included the EURO2/3 emission factors, the projection of the increasing number of sports utility vehicles (SUVs) that replace many passenger cars, but for which the higher emission limit values of light duty vehicles apply; and the determination of the emission factor for gasoline direct injection engines.

(c) Agriculture: There was an EC scenario up to 2010. Beyond that, CIAM would use FAO projections. Due to lack of data, no assumptions were included about any reform of the EU Common Agricultural Policy.

(d) Emission inventories: One of the main problems was that only a few Parties had so far reported activity data. These data were crucial to IAM. There were also important gaps in the reported PM inventories, especially concerning the data for PM<sub>2.5</sub> emissions.

(e) National plans for abatement measures: The data would be based on the Parties' reports to the UNECE secretariat on their national strategies and policies and on national reports to the European Commission under the National Emission Ceilings (NEC) directive.

(f) Emission control options and costs: Data will come from the work by the Expert Group on Techno-Economic Issues (EGTEI - see below). Data gaps remain for new, emerging technologies.

(g) Critical loads and levels: The Coordination Center for Effects (CCE) was updating the critical load maps and developing a database for dynamic modelling. For ozone, it was expected to continue use of the critical levels based on AOT<sub>40</sub> for crops other than potatoes and winter wheat, for which a flux approach would be developed. For forests also an AOT<sub>40</sub> or and AOT<sub>30</sub> approach might be used.

(h) Quantification of the health impacts: This was based on the work by WHO. The new WHO results supported the use of the methodology to estimate changes in life expectancy in order to capture impacts on mortality. A problem remained the lack of an adequate methodology to incorporate impacts on morbidity.

(i) Atmospheric dispersion calculations: Uncertainty ranges could be developed based on the evaluation of the Eulerian model, including the model intercomparison. Urban concentrations would be modelled on the basis of the work resulting from the City-delta project (see below).

(j) Uncertainty information: Data for various model input parameters were forthcoming and could be evaluated according to the adopted methodology.

12. The Task Force noted that the timetable adopted by the Executive Body for the review of the Gothenburg Protocol also foresaw the review to commence in 2004, although this was contingent on the entry into force of the Gothenburg Protocol in 2003. The processes for the Gothenburg Protocol review and the CAFE programme should be advanced in parallel as far as possible.

13. The Task Force recognized that the timetable for the development of the baseline scenarios could only be met if all Parties provided the data to CIAM as required. A

particular point of concern was that little data was available for the Parties within EMEP not covered by the CAFE programme (Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Georgia, Kazakhstan, Kyrgyzstan, Monaco, Republic of Moldova, Romania, Russian Federation, Serbia and Montenegro, The former Yugoslav Republic of Macedonia, Turkey, and Ukraine). There was an urgent need for data to be able to incorporate the Parties and also to attempt to link the work to new Parties in Central Asia. The available funding for CIAM work through the financial contributions by Parties to the core activities not covered by EMEP should be devoted as a matter of priority to assist these Parties. CIAM offered to cooperate with national experts to develop the necessary data.

14. Mr. Hans Eerens of the European Topic Centre on Air and Climate Change (ETCACC) informed the Task Force about plans for the development of scenarios for the state of the environment report. The European Environment Agency (EEA) would prepare this report for publication in 2005. It intended to assess the progress in the sixth Environmental Action Programme. The scenarios would look at a short (2020-2030), medium (2030-2050) and long (2100) time horizon. Much of the work would focus on the links between air pollution and climate change and indicators to cover these links were being developed.

### **III. THE REVIEW OF THE RAINS MODEL**

15. Mr. Matti Vainio of the European Commission informed the Task Force about the planned review of the RAINS model to be funded by the CAFE programme. The European Commission would issue a call for tender for external reviewers in the summer 2003. The review would be conducted in the second half of 2003 with a close link to the Task Force on Integrated Assessment Modelling.

16. The purpose of the review was to assess adequacy of model from scientific and economic point of view, provide guidance for possible improvement of RAINS and Ensure transparency, scientific credibility and fitness for purpose. The review would cover the scientific quality of the model itself, but not its input parameters. Country-specific data on activity projections, abatement options and their costs would be reviewed by national experts. The EMEP model and the effects-data would be reviewed separately.

17. The model design would be reviewed in order to determine: Whether the RAINS modules provided a scientifically credible representation of reality; What the main limitations were; and what implications these limitations had for policy for the purposes of the CAFE programme and the Gothenburg Protocol review? The review should look

closely at the treatment of uncertainties to determine whether: the main uncertainties have been adequately addressed; an alternative formulation would be better; and there was any systematic bias (under- or over-estimate of measures required). In particular, it was considered interesting to find out whether RAINS model's emphasis on end-of-pipe measures biased the results. Finally, the review should examine a number of issues related to communication, in particular: the control of input data, the involvement of users and stakeholders, the presentation of results, and the transparency of the model structure.

18. The Task Force welcomed the outline of the review. While the Task Force had accompanied the development of the RAINS model over many years, the review would provide a useful outside examination of the model and help to present the modelling results to a wider audience. The Task Force participants provided a number of specific suggestions concerning the review.

19. The Task Force agreed that, once a draft review report had been completed, a workshop on the review could be organized in the framework of the Task Force to present and discuss the results.

#### **IV. PROGRESS ON TECHNO-ECONOMIC ISSUES**

20. Mr. Michael Ball of the French-German Institute for Environmental Research (IFARE) informed the Task Force about progress in the work of the Expert Group on Techno-economic Issues. The Centre Interprofessionnel Technique d'Etudes de la Pollution Atmosphérique (CITEPA) and IFARE had developed a software tool to provide a link between national data and integrated assessment models.

21. National experts were invited to provide data by the end of July 2003. For this purpose they should use the EGTEI database tool, which would be released by mid-June and would be pre-filled by expert estimates based on the EGTEI database and the present RAINS model data. The updated databases provided by countries would then be used by CIAM to construct the baseline scenario in the autumn 2003. Ultimately, all data used in the RAINS model would be subject to the bilateral discussions between national experts and CIAM carried out in the autumn 2003. The final set of the national EGTEI databases used for the baseline scenario would be documented by EGTEI by the end of 2003.

22. Further information on the work of the expert group is presented in its report to the Working Group on Strategies and Review (EB.AIR/WG.5/2003/6) and on the Internet at [http://citepa.org/forums/egtei/egtei\\_index.htm](http://citepa.org/forums/egtei/egtei_index.htm).

23. The Task Force noted that the work of the Expert Group on Techno-economic Issues would only cover state-of-the-art technologies presently available. In the coming 10-20 years new technologies would become available. These should be assessed in order to correctly represent the future emission reduction potentials and their costs.

24. The Task Force agreed on the need for a targeted activity to examine the potential of new technologies. This work should involve all stakeholders, including industry, in order to make sure that the information reflected the ambition of bringing emissions down to levels to ensure that critical loads were not exceeded and that cost estimates were realistic. It was important to take into account that the initial costs would decline as new technologies were developed for widespread application. It might be useful to split the work for different sectors, especially for mobile and stationary sources and agriculture. The European Commission announced that it had funding available to perform this work.

25. Mr. Matti Vainio of the European Commission informed the Task Force about plans for a cost-benefit analysis under the CAFE programme. EC was obliged to assess the costs and benefits of policy it processes. In addition it had to carry out an impact assessment in qualitative and quantitative terms, for instance using multi-criteria analysis. A call for tender had been issued for a project to carry out the cost-benefit analysis. The objective was to get a team cooperating closely with IIASA to take the results from RAINS, complement them with unquantified impact estimates (in a multi-criteria framework), and assess all monetary and non-monetary benefits. As an outcome the costs (from the RAINS model) and benefits (from this contract) would be analysed and presented in a transparent manner. The work should be finalized by the end of 2004.

26. The contract foresaw the work to be conducted in close cooperation with the Network of Experts on Benefits and Economic Instruments (NEBEI), including one or several joint workshops. The work should take results of previous NEBEI workshops as a basis, including those of the most recent workshop on ecosystem valuation held in Scheveningen (Netherlands) on 3-5 October 2002. The report of this workshop is presented to the Working Group on Strategies and Review (EB.AIR/WG.5/2003/1). Papers and presentation can be found on the website [www.unece.org/env/nebei](http://www.unece.org/env/nebei). The next NEBEI workshop was intended to cover air pollution damage to materials, focusing on cultural heritage.

27. The Task Force noted that data on critical loads and levels were only prepared for the mapping of exceedances as part of the development of abatement strategies using integrated assessment modelling. The original data should be re-evaluated prior to their use in cost-benefit analysis.

## V. MODELLING URBAN AIR POLLUTION

28. Mr. Markus Amann of CIAM provided an overview of the progress in the City Delta project. The objective of the project was to provide input for integrated assessment on the impact of urban air pollution on human health and ecosystems. 8 European cities were covered and 7 emission scenarios plus 1999 as the evaluation scenario were analysed. The EC Joint Research Centre (JRC), acting as a coordinator of the project, has developed a software tool to assist the graphical interpretation of the results. Mr. Amann presented some of the initial findings. The results would still be subject to final review of the data. Final conclusions would be discussed at a workshop at the end of October. Further information can be found at <http://rea.ei.jrc.it/netshare/thunis/citydelta>.

29. Mr. Frank de Leeuw of the ETC/ACC presented plans for an analysis of urban measurement data showing the trends in the 1990s for SO<sub>2</sub>, NO<sub>2</sub> and ozone and the exceedances of health guideline values. The objective would be to quantify the influence of local/urban emissions and measures on local exceedances.

## VI. PROGRESS ON ATMOSPHERIC MODELLING

30. Mr. David Simpson of MSC-W reported on the state of development of the EMEP Eulerian model and the plans for review. The model development phase had now come to an end and preliminary results would be prepared for integrated assessment modelling. Test runs would cover 4-6 countries and different emission levels. This work would especially aim at determining the linearity of the source receptor relationship. The emphasis of further work is placed on model evaluation. The overall performance seems to be satisfactory, comparable to other models of a similar scale.

31. The Task Force on Measurements and Modelling reviewed the state of model development at its fourth meeting held in Valencia (Spain) on 9-11 April 2003. The results are reported to the EMEP Steering Body (EB.AIR/GE.1/2003/3). The Task Force on Measurements and Modelling would oversee the process of the Eulerian model evaluation. It had agreed that MSC-W could proceed with the calculation of preliminary source-receptor relationships for presentation to the EMEP Steering Body at its twenty-seventh session. They should be considered preliminary until further examination at the Task Force workshop on the review of the Unified model in November 2003.

32. Mr. Simpson also informed the Task Force on Integrated Assessment Modelling on the progress in the work on critical levels for ozone and on the development of land-use maps. MSC-W was cooperating with CCE and CIAM on this matter.

33. The Task Force on Integrated Assessment Modelling expressed its support for



work to ensure that the same land-use data was used for all work under the Convention. It noted that it was preferable to use maps that were prepared on the basis of officially submitted data.

## VII. PROGRESS ON EFFECTS MODELLING

34. Mr. Heinz Gregor (Germany), Chairman of the Working Group on Effects provided to the Task Force an overview of the work under the Working Group on Effects, included work by the International Cooperative Programmes (ICPs) and the participation of Parties in this work.

35. Mr. Jean-Paul Hettelingh of CCE briefed the Task Force on progress in the work on mapping and modelling of critical loads and levels. CCE has issued a manual on dynamic modelling, which was and is available on the Internet at [www.rivm.nl/cce](http://www.rivm.nl/cce). This manual aimed at assisting Parties in applying dynamic models. The 2002 call for data to national focal centres included dynamic modelling data. 19 of the 24 centres reported new critical load data and 10 of these provided dynamic modelling data. The 2003 call for data would be aimed at developing data for possible use for integrated assessment modelling.

36. The Task Force recognized the potential usefulness of the work on dynamic modelling results. It agreed that data collection should continue in order to open up the possibility of using the target load functions to incorporate the results of dynamic modelling into the RAINS model.

37. CCE also reported on the work on critical loads for heavy metals. Preliminary results covering cadmium and lead had been presented in 2002 in a joint report with MSC-E. The methodology was being finalized in 2003 and it is planned to issue a call for data in 2004.

38. The Task Force recognizes that once this work had sufficiently advanced, integrated assessment modelling could be extended to also cover heavy metals. This work will have resource implications and clear guidance was therefore needed to be able to plan for the appropriate time to initiate the work.

39. Mr. Jürgen Schneider (WHO) presented the recent findings of the WHO European Centre for Environment and Health in Bonn (Germany). A report on the systematic review of health aspects of air pollution in Europe prepared for the CAFE programme was finalized. The work had focused on twelve questions received from the CAFE Steering Group using state-of-the-art knowledge on epidemiology and toxicology to provide short answers, supported by more extensive justifications. The results were

extensively reviewed and presented to a meeting of stakeholders. The report was available on Internet at: <http://www.euro.who.int/document/e79097.pdf>

40. The second phase of the CAFE project would develop responses to additional questions posed by the CAFE Steering Group. This would also include an uncertainty assessment. The work was also followed up by a meta-analysis to develop concentration-response functions that could eventually be used for health impact assessments. This would cover mortality and morbidity effects of PM and ozone pollution. Based on the results of the work, the WHO Air Quality Guidelines would be updated. The updated Guidelines would be global and this should be finalized in 2004.

41. The upcoming sixth meeting of the Joint WHO/UNECE Task Force on Health Impacts of Air Pollution would discuss approaches to risk assessment and modelling and assessment of health impacts of particulate matter and ozone from long-range transboundary air pollution. This discussion would address the relevance of secondary inorganic aerosols for PM-related health effects. It would examine whether the AOT60 approach was still appropriate and identify possible approaches to include effects on morbidity into integrated assessment models. The results of this meeting will be presented to the Working Group on Effects (EB.AIR/WG.1/2003/11).

42. The Task Force noted that the new WHO results supported the use of the methodology presented by CIAM at the 27<sup>th</sup> meeting of the Task Force (EB.AIR/GE.1/2002/5 – EB.AIR/WG.5/1, paras. 23-27) to estimate changes in life expectancy in order to capture impacts on mortality. Besides the use of life expectancy as the target value in integrated assessment modelling, it may also be useful to use exposure indicators in order to be able to assess the progress.

## **VIII. OTHER INTEGRATED ASSESSMENT MODELLING ACTIVITIES**

43. Mr. Tim Oxley of the National Centre for Integrated Assessment of the United Kingdom at Imperial College, London, reported on further development of the integrated assessment model developed for the United Kingdom (UKIAM). Initially the model focused on the reduction of acidification, eutrophication, and exposure to particulate PM<sub>10</sub>, with reference to deposition of sulphur and nitrogen (oxidised and reduced), and concentrations of secondary SO<sub>4</sub>, NO<sub>3</sub> and NH<sub>4</sub> particles and primary particles. UKIAM combined sector specific emissions, atmospheric transport and deposition, ecosystem specific critical load exceedances, and pollution abatement costs to determine optimised abatement strategies using benefit and, where applicable, recovery functions. The model was developed in a way to make it possible to nest it within the European scale model ASAM of Imperial College.

44. Ms. Helen ApSimon of Imperial College reported on work to develop target load functions to reflect dynamic critical loads for freshwater ecosystems. Modelling done for the United Kingdom explored the use of the methodology in integrated assessment modelling. Preliminary results showed that there would need to be a continued reduction of depositions in certain areas where critical loads have already been achieved. The approach also would place more emphasis on sulphur reduction than on nitrogen reduction due to the capacity of soils to retain nitrogen for substantial periods of time.

45. For the United Kingdom, Imperial College also examined strategies to reduce depositions of nitrogen from agricultural sources on sensitive ecosystems. The analysis suggested that avoiding emissions close to sensitive ecosystems along a narrow band along the perimeter could improve the protection of ecosystems and help to reduce exceedances and associated effects. The study suggests that a good balance of additional local and regional measures would be most effective. In order to further examine this issue, it would be useful to have more data on the local depositions of local scale ammonia emissions.

46. Mr. Stefan Reis of the University of Stuttgart (Germany) informed the Task Force about progress in the MERLIN project. The collaborative project conducted by six institutes in different European countries and funded by the European Commission's Directorate-General for Research, aims at developing an integrated assessment model for European air pollution. Work has been completed on developing the database on stock, activity and measures for different sectors. Some further work is necessary on some industrial sectors, but this should be completed before the end of the summer. All data would be made available over the Internet. Comparison between Merlin and EMEP emission databases suggest that there are some differences, for instance for the transport sector. Work has been initiated to examine the effects of applying non-technical measures. An optimisation tool using an evolutionary (or genetic) algorithm is being tested. More information can be found at <http://www.merlin-project.info>.

47. Mr. Peringe Grennfelt (Sweden) presented an overview of integrated assessment modelling work under the International and National Abatement Strategies for Transboundary Air Pollution (ASTA) project. The objective of the project was to produce scientific material of importance for international abatement strategies of transboundary air pollution in order to support the revisions of the Gothenburg Protocol and the NEC directive. With that objective, ASTA has developed tools for national strategies within the sectors where transboundary air pollution is of importance. The ASTA Synthesis Report covering the first phase of the project is available at <http://asta.ivl.se>.

48. The second phase of ASTA will cover four themes to support integrated assessment modelling activities. The four themes are: Source-effect relationships, indicators and target setting; Realisation, costs and benefits; Uncertainties, transparency and communication; and Support to national strategies.

49. Mr. Grennfelt also informed the Task Force about a EU-funded research project to set up a Network for the support of European Policies on Air Pollution (NEPAP). The objective is to provide the European Commission, in particular the CAFE programme, with scientific analyses and assessments and a forum to discuss related issues. The project will run until November 2004.

50. Mr. Tiziano Pignatelli (Italy) reported on progress in the work of the Italian national focal point for integrated assessment. The work included the collection and validation of techno-economic data on emission sources and related abatement technologies. APAT, the Italian Agency for Protection of the Environment, also co-operate in the analyses, providing data on the energy scenarios and abatement technologies. A special project conducted in cooperation with IIASA focuses on the development of a version of the RAINS model for Italy. The project started in December 2002 and is scheduled to be completed in 2004. RAINS Italy will have the same features of the RAINS Europe model, but it will allow analyses at a smaller scale, namely at the scale of the Italian Administrative Regions and Metropolitan Areas. A model on the atmospheric transfer, chemistry and deposition of air pollutants will be used to create atmospheric transfer matrix to be integrated into RAINS Italy.

51. Mr. Pignatelli also reported on results of a study to estimate the co-benefits of climate change measures on air pollution abatement in Italy. The study compared Kyoto-Protocol implementation scenarios performed with RAINS and with an energy model (MARKAL). The study concluded, that the adoption of an energy scenario, which included measures to reduce the GHG emissions according to the provisions of the Kyoto Protocol, would lead to significant reductions in the emissions of SO<sub>2</sub>, NO<sub>x</sub> and VOC from energy sources. There were cost savings due to the avoided need to implement additional abatement technological measures to achieve the air quality targets. In particular for SO<sub>2</sub> such emission reduction were found to be the crucial factor for the achievement of the Gothenburg Protocol emission ceilings.

52. The Task Force welcomed the presentations on national integrated assessment modelling and encouraged the experts to continue to inform the Task Force about further progress in their work. It encouraged all national focal points to come forward with their results at its future meetings.

## **IX. PLANNING FURTHER WORK**

53. The Task Force discussed its work-plan for 2004 based on the work plan adopted by the Executive Body for 2003 (ECE/EB.AIR/77/Add.1, annex XIII, item 2.7).

54. Work to address hemispheric air pollution has started. CIAM has prepared a set of emission projections for methane, NO<sub>x</sub> and CO for the northern hemisphere. This data can be used to examine the effect of the hemispheric background on source-receptor relationship in Europe. This work should be pursued and extended in 2004.

55. It is not expected that integrated assessment modelling would be a core of the preparations of the review of the Protocols on POPs and Heavy Metals. The work on heavy metals would cover the whole northern hemisphere and some contribution could be made using integrated assessment modelling.

56. In addition, the Task Force agreed that the activities that needed to be carried out in 2004 also included:

- (a) Work to assess uncertainty in general;
- (b) Work to incorporate new and emerging technologies and structural measures into the model; and
- (c) The work on measures to address urban pollution.

57. The Task Force discussed the budget requirements of CIAM. It recognized that in 2003, CIAM would receive funding worth US\$ 66 000 through the EMEP Protocol via MSC-W, for temporary external assistance to MSC-W and this amount would increase to US\$ 100,000 in 2004, subject to approval by the EMEP Steering Body. The Executive Body had budgeted for 2003, 2004 and 2005 an additional US\$ 240 000 for CIAM in its decision 2002/1. Decision 2002/1 included a call on Parties to contribute to the cost of core activities. However, by May 2003, not many Parties had followed that call and it was uncertain whether the resources would be forthcoming as budgeted. The Task Force recognized that in this situation, the funding provided to IIASA for integrated assessment modelling work by a number of Parties was essential.

58. In view of the possible short-fall in funding, the Task Force agreed that priority should be given to complement the work at CIAM, which is funded under the EC CAFE programme, for the Parties to the Convention within EMEP that are not participating in CAFE (see para 13 above).

59. The Task Force adopted the following budget for CIAM for 2004 and tentatively for 2005:

**Table. Budgeted resource requirements of CIAM covered by the Convention, 2004 and 2005 (thousands of US\$)**

<b>Tasks</b>	<b>2004</b>	<b>2005</b>
1. Dynamic modelling:		
Acid models	-	-
Cost curves	-	-
Optimization	-	-
2. Particulate matter cost curves	-	-
2020 projections and baseline emissions	60	-
Update of cost curves for other pollutants	60	60
Urban scale cost curves	-	-
3. Health impacts		
- Methodology	-	-
- Data	-	-
- Urban scale	30	-
4. Source-receptor relationships	-	-
5. Optimizations for PM and urban pollution	-	60
6. Uncertainty management	100	80
7. Scenarios	60	110
8. Public access (Internet)	-	-
Cooperation with National Focal Points	30	30
<b>Proposed funding through EMEP and decision 2002/1</b>	<b>100+240</b>	<b>100+240</b>

60. The next meeting of the Task Force on Integrated Assessment Modelling is tentatively scheduled for May 2004. The venue has not yet been chosen. In December 2003 a workshop on the RAINS model review will be held at CIAM at IIASA in Laxenburg (Austria). Other issues that could also be covered by a specific workshop include urban modelling and the new, emerging technologies and structural measures.