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**ECONOMIC COMMISSION FOR EUROPE**

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

Working Group on Strategies and Review

Thirty-eighth session  
Geneva, 19–22 September 2006  
Item 5 of the provisional agenda

**PARTICULATE MATTER**

Report of the second and third meetings of the Expert Group on Particulate Matter by the  
Co-Chairs in collaboration with the secretariat

**INTRODUCTION**

1. The second meeting of the Expert Group was held in London on 7–8 November 2005, and the third meeting was held on 13–14 March 2006 in Dessau (Germany).
2. The second meeting focused on discussing the relevant sources contributing to the transboundary transport of particulate matter (PM); assessing future changes in PM emissions and concentrations, as related to existing protocols to the Convention and other instruments; identifying technical and non-technical measures available for further reduction of PM levels; and initiating a discussion on an adequate strategy to address PM under the Convention. The third meeting discussed a first outline of the report to be presented to the Working Group on Strategies and Review in 2007.

3. Experts from Austria, Belgium, Bulgaria, Canada, the Czech Republic, Estonia, the European Community, Finland, France, Germany, Hungary, Italy, Latvia, the Netherlands, Norway, Poland, the Russian Federation, Serbia and Montenegro, Spain, Sweden, Switzerland, the United Kingdom and the United States attended at least one of the meetings. Experts from the EMEP Meteorological Synthesizing Centre – West (MSC-W) and the Meteorological Synthesizing Centre – East (MSC-E) participated in the second meeting, and experts from the Centre for Integrated Assessment Modelling (CIAM) participated in both meetings. The Working Group on Strategies and Review, the Steering Body to EMEP, the Task Force on Integrated Assessment Modelling, the Task Force on Heavy Metals, the Task Force on the Health Effects of Air Pollution and the Expert Group on Techno-economic Issues were represented at the second meeting. Representatives of the World Health Organization (WHO), the European Environment Agency and the Union of the Electricity Industry (EURELECTRIC) attended the second meeting, and a representative of the Oil Companies' European Organization for Environment, Health and Safety (CONCAWE) attended both meetings. The UNECE secretariat was also represented at both meetings.

4. The meetings were chaired by Ms. M. Wichmann-Fiebig (Germany) and Mr. M. Meadows (United Kingdom). Presentations made at the meeting and links to the background documentation are available on the Internet at <http://www.unece.org/env/pm/meetings.htm>.

## I. SUMMARY OF MAJOR DISCUSSION POINTS

5. The Expert Group defined the objectives and discussed the elements and structure of a report to be presented to the Working Group on Strategies and Review (WGSR) at its fortieth session in September 2007, including the transboundary nature of PM, the health impacts of PM, the state of emission inventories, the key sectors of PM emissions and the current degree of emission control applied to them, as well as potential options for further addressing PM under the Convention. A draft annotated outline of the report is appears in annex I.

6. The Expert Group agreed that the report would have five main objectives: (a) to provide information on the transboundary characteristics of PM and its precursors and on the contribution of key economic sectors to ambient concentrations of primary and secondary PM; (b) to summarize the available evidence on health impacts from PM; (c) to assess the degree of control of anthropogenic emissions of PM and its precursors by existing protocols, current national and international legislation and forthcoming strategies; (d) to identify key sectors contributing to PM concentrations for distinct economic regions of the Convention area and assess their abatement potential; and (e) to explore, from a technical point of view, the requirements for potential options to address PM within the Convention.

**A. The transboundary character of PM**

7. The Expert Group agreed that, based on model results from MSC-W, there was clear evidence of the long-range transboundary character of the transport of primary and secondary PM<sub>2.5</sub> and PM<sub>10</sub>. Calculations from the validated EMEP model showed that the regional background concentrations of anthropogenic PM<sub>2.5</sub> had a considerable transboundary contribution of about 60% on average across Europe, ranging from about 30% in large European countries to 90% in smaller ones. For primary coarse PM concentrations, the transboundary contribution was calculated to be smaller though still significant, ranging from 20% to 30% in Central Europe.

8. The Expert Group took note of the latest report of the Task Force on Hemispheric Transport of Air Pollution, according to which hemispheric transport of PM was small but significant on an annual average basis. Natural events, such as sandstorms, could contribute to short-term (hours to days) ambient PM concentrations by hemispheric transport.

**B. Health impacts of PM**

9. The Expert Group took note of the conclusions of the Task Force on Health that current exposure to PM from anthropogenic sources leads to an average loss of 8.6 months of life expectancy in Europe, varying from around 3 months in Finland to more than 13 months in Belgium. Current legislation (CLE) on the emission of pollutants was expected to reduce the impacts by about one third. Further reduction of impacts could be achieved by implementation of all maximum currently technically feasible reductions (MTFR).

10. It was brought to the attention of the Expert Group that, in particular, the effects of long-term PM exposure on mortality (life expectancy) seemed to be attributable to PM<sub>2.5</sub> rather than to coarser particles. The latter, with a diameter of 2.5–10 µm (PM<sub>2.5</sub>–PM<sub>10</sub>), may have more visible impacts on respiratory morbidity. The Expert Group recognized the difficulty of distinguishing between the effects of PM<sub>10</sub>, PM<sub>2.5</sub>, primary PM and secondary organic aerosols.

11. The Expert Group considered the conclusion of WHO that no threshold could be identified below which no adverse effects on human health are to be expected from either fraction. It took note of the WHO Air Quality Guidelines for Europe recommending limits of an annual average concentration of 10 µg/m<sup>3</sup> PM<sub>2.5</sub> and a daily average concentration of 25 µg/m<sup>3</sup> PM<sub>2.5</sub>. The Expert Group noted that WHO had also issued air quality guidelines for PM<sub>10</sub> but that the numerical guideline value was based on studies using PM<sub>2.5</sub> as an indicator. It agreed that the variability of the PM<sub>2.5</sub> / PM<sub>10</sub> ratio had to be taken into account.

12. The Expert Group agreed that, considering the evidence on health effects, it would consider both PM<sub>10</sub> and PM<sub>2.5</sub> in its report to the Working Group on Strategies and Review.

### **C. The state of emission inventories**

13. The Expert Group noted that estimates of emissions of primary PM and PM precursors provided important information about the relative contribution of different emitting sectors to total emissions, changes in emissions over time and the potential to reduce emissions. This information was vital for atmospheric modelling, policy development and assessment of PM mitigation options.

14. The Expert Group noted with concern the conclusions of the Task Force on Emission Inventories and Projections regarding the completeness and comparability of the estimates of primary PM emissions. Only a few countries had provided complete time series and sector data. In many cases, reported national emissions had failed to include important sources. Common methodologies were not available for all sources, in particular for fugitive emissions.

15. The Expert Group agreed that, in spite of the improvements in reporting over the past few years, PM emission inventories needed urgent improvement for completeness as well as for consistency and comparability. It welcomed the current work by the European Commission to update the *EMEP/CORINAIR Emission Inventory Guidebook* with respect to PM emission factors and methodologies. It recommended that the *Guidebook* include a definition of “PM emissions” considering both the filterable and condensable fractions.

### **D. The current degree of emission control and potential for further abatement**

16. Mr. M. Amann (CIAM) reported on the preliminary results of work to study the impacts of the Convention’s protocols on primary PM emissions in Europe, financed by the United Kingdom (tasks (a) and (b) of the workplan). The study looked at future development of primary PM emissions in Europe, given the obligations laid down in the Protocol on Heavy Metals, the Gothenburg Protocol and other instruments, and the potential for further PM emission reductions through extensions of the existing protocols. It was recognized that the Protocol on Heavy Metals was the only instrument covering primary PM emissions under the Convention. Preliminary conclusions showed that tightening the existing emission limit values (ELVs) would have a relatively small effect on total PM emissions in 2020 for European Union (EU) countries, while there was a much larger potential in non-EU countries. For all countries there was substantial potential for reductions from sectors not covered in current protocols.

17. The Expert Group agreed that CIAM would carry out additional analysis to identify key measures that could contribute to reductions of primary PM emissions in the countries of Eastern Europe, Caucasus and Central Asian (EECCA) and further reductions in EU countries.

18. The Expert Group proposed that an analysis of the future development of PM precursor emissions and the potential for further reductions of those be conducted in conjunction with the analysis planned for the review of the Gothenburg Protocol. It noted that such results would be available most likely in late 2006 or early 2007. The Expert Group sought the agreement of the Working Group to this proposal.

#### **E. Potential options for addressing PM under the Convention**

19. The Expert Group proposed to explore the following non-exclusive options for addressing primary and precursor PM emissions not already covered under the Convention: (a) technological options such as setting ELVs or specifying best available techniques (BAT) for primary PM and PM precursors; (b) specification of non-technical measures to reduce PM; (c) national emission ceilings (NECs) for primary PM and PM precursors; (d) a percentage reduction of the emissions of primary PM and PM precursors relating to a base year; (e) specification of an ambient air standard for PM; and (f) specification of a percentage reduction of current PM levels.

20. It was recognized that the different options for addressing PM under the Convention would relate to different technical requirements, such as the quality of emission data. The Expert Group sought the concurrence of the Working Group with regard to the proposed work to explore the named options and their key pros and cons.

## **II. FURTHER WORK**

21. The Expert Group agreed on its workplan for 2006–2007, which appears in annex II. It also concluded that for its further work the following information was needed from the centres and Task Forces under EMEP:

(a) Calculated ambient concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> for the whole EMEP area for a base year and for 2020 for CLE and MTFR scenarios, and in particular (i) the contribution of primary PM to ambient concentrations; (ii) the contribution of secondary PM to ambient concentrations; (iii) key source sector contributions to primary PM ambient concentrations; and (iv) key source sector contributions to secondary PM ambient concentrations. The Expert Group recognized the importance of including information about the composition of ambient PM in the outputs to the model;

(b) Analysis of the future development of PM precursor emissions and the potential for further reductions of those (in conjunction with the analysis planned for the review of the Gothenburg Protocol);

(c) Assessment of the uncertainty of emission data, in particular for the key source sectors and model results.

## Annex I

### **Annotated outline of the report on particulate matter to be submitted to the thirty-ninth session of the Working Group on Strategies and Review**

#### **I. Introduction**

At its twenty-second session the Executive Body established by decision 2004/3 an Expert Group on Particulate Matter (PM) to (i) assess the degree of control of pollutants that contribute to the formation of PM already provided by existing protocols to the Convention and other instruments; (ii) review current work on PM under the Convention, also taking into account the latest results of the forthcoming Thematic Strategy on Air Pollution of the European Community and similar strategies of other Parties; (iii) consider the work of CIAM, MSC-W and CCC on scientific evidence and technical requirements to reduce exposure to primary and secondary PM; (iv) develop, where possible, further technical and non-technical measures to help Parties to reduce PM emissions and exposure; and (v) give technical support also to other abatement strategies of Parties to the Convention, including the Thematic Strategy on Air Pollution of the European Community.

The Expert Group, led by Germany and the United Kingdom was asked to report on its work to the Working Group on Strategies and Review.

#### **II. Objectives**

The report has the following objectives:

- (a) To provide information on the transboundary characteristics of PM and its precursors and on the contribution of key economic sectors to ambient concentrations of primary and secondary PM;
- (b) To summarize the available evidence on health impacts from PM;
- (c) To assess the degree of control of anthropogenic emissions of PM and its precursors by existing protocols, current national and international legislation and forthcoming strategies;
- (d) To identify key sectors contributing to PM concentrations for distinct economic regions of the Convention area and assess their abatement potential; and

(e) To explore, from a technical point of view, the requirements for potential options to address PM within the Convention.

### **III. Characterization of current and future PM concentrations**

This chapter will address the general characteristics of PM (e.g. how primary PM emissions and precursor gas emissions contribute to ambient PM). The hemispheric and long-range transboundary character of primary and secondary PM<sub>2.5</sub> and PM<sub>10</sub> will be described based on the findings of MSC-W. Current and future concentrations will be given by considering also the differences between urban and rural areas relating to current legislation and maximum feasible reduction scenarios as considered by the Task Force on Integrated Assessment Modelling. Uncertainties in model results and monitoring data will be discussed.

### **IV. Health impacts of PM**

The health effects related to PM will be summarized based on the findings of the Task Force on Health and of WHO. Air quality standards and guidelines currently in force in different parts of the Convention area will be presented.

### **V. State of emission inventories**

The importance of emission inventories for primary PM and PM precursors for atmospheric modelling, policy development and assessment of PM mitigation options will be emphasized. The quality of these inventories will be assessed based on the work of the Task Force on Emission Inventories and Projections and other key European projects, and ongoing work to improve those data will be mentioned. The need for further improvement will be stressed.

### **VI. Current degree of emission control and potential for further abatement**

Relating to the CIAM database, this chapter will assess the current degree of emission control of primary PM from existing protocols and other national and international legislation. The potential for further abatement of primary PM emissions by tightening emission standards or further ratifications of existing protocols will be examined. The abatement potential of sectors not yet addressed under the protocols will be explored.

Similar results for PM precursors will be assessed in conjunction with the review of the Gothenburg Protocol.

## **VII. Potential options for addressing PM under the Convention**

The chapter will explore, from a technical point of view, potential options to address primary and precursor PM emissions under the Convention. Advantages and disadvantages of the following non-exclusive options will be compiled:

- (a) Technological options such as setting ELVs or specifying BAT for primary PM and PM precursors;
- (b) Specification of non-technical measures to reduce PM;
- (c) National emission ceilings (NECs) for primary PM and PM precursors;
- (d) Percentage reduction of the emissions of primary PM and PM precursors relating to a base year;
- (e) Specification of an ambient air standard for PM; and
- (f) Specification of a percentage reduction of current PM levels.

Technical requirements, such as the quality of emission data, related to the feasibility of these options will be discussed.

## **VIII. Conclusions**

Based on the findings in the previous chapters, conclusions will be drawn regarding the robustness of the current understanding of PM concentrations and their health impacts and the extent of further abatement potentials. From a technical point of view, the consequences of potential options for addressing PM under the Convention will be explored and presented.

Annex II

**Workplan for 2006–2007**

**PARTICULATE MATTER**

Objectives: Improved technical understanding of the abatement options and the technical possibilities to reduce concentrations of particulate matter under the Convention.

Main activities and time schedule: The Expert Group on Particulate Matter, with Germany and the United Kingdom as lead countries, will:

- (a) Assess the degree of control of precursor pollutants contributing to the formation of PM already provided for by existing protocols to the Convention (the Co-Chair will liaise with the Task Force on Integrated Assessment Modelling);
- (b) Review current work under the Convention on PM precursors, also taking into account the latest results of the Thematic Strategy on Air Pollution of the European Community and similar strategies of other Parties (the Co-Chair will liaise with the Task Force on Integrated Assessment Modelling);
- (c) Use, *inter alia*, the results of the EMEP model to review the current and future contributions to ambient concentrations of primary and secondary PM, particularly from the key source sectors, and consider the implications of choosing different particle size fractions at the fourth meeting of the Expert Group (the Co-Chairs will liaise with MSC-W);
- (d) Consider, *inter alia*, the work of CIAM on the scientific and technical requirements, as well as technical and non-technical measures, needed to assist Parties in developing further measures to reduce PM in order to prepare supporting information for the fourth meeting of the Expert Group (Co-Chairs to liaise with CIAM);
- (e) Give technical input to other abatement strategies of Parties to the Convention;
- (f) Contribute to reports for the review of the Gothenburg Protocol as prepared by the Task Force on Integrated Assessment Modelling;
- (g) Hold its fourth meeting in London in autumn 2006 to discuss further the draft report of the Expert Group, particularly the current degree of emission control, the potential for

further abatement and potential options to address PM under the Convention, from a technical point of view, and bearing in mind the uncertainties in emissions inventories and model results;

(h) Hold its fifth meeting in Germany in early 2007 to finalize the report of the Expert Group;

(i) Submit its final report to the Working Group on Strategies and Review for its fortieth session in 2007.