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

Working Group on Effects
(Twenty-first session, Geneva, 28-30 August 2002)
Item 5 (b) of the provisional agenda

DRAFT ANNOTATED OUTLINE OF THE REPORT ON THE REVIEW AND ASSESSMENT
OF PRESENT AIR POLLUTION EFFECTS AND THEIR RECORDED TRENDS

Note by the Bureau of the Working Group on Effects
in collaboration with the secretariat and with the assistance of a consultant

Introduction

1. At its twentieth session, the Working Group on Effects approved in principle the draft outline of its 2004 substantive report on the review and assessment of present air pollution effects and their recorded trends (EB.AIR/WG.1/2003, annex VIII, as amended) and agreed to submit it to the Executive Body for information, on the understanding that future action would depend on available resources (EB.AIR/WG.1/2001/2, para. 56).
2. The Working Group also requested its Bureau to summarize and assess the possible contributions of individual programmes and to prepare detailed alternative proposals for the preparation of the substantive report for the next session of the Working Group.

Documents prepared under the auspices or at the request of the Executive Body for the Convention on Long-range Transboundary Air Pollution for GENERAL circulation should be considered provisional unless APPROVED by the Executive Body.

3. The Extended Bureau of the Working Group on Effects at its meeting in February 2002 reviewed possible contributions to the 2004 substantive report proposed by the International Cooperative Programmes (ICPs) and the Task Force on the Health Aspects of Air Pollution in line with the approved draft outline for the report. It agreed that the main purpose of the 2004 substantive report should be to present to the Executive Body summarized long-term results of the effect-oriented activities, including monitoring, modelling and mapping as well as their critical assessment, taking into account new available scientific knowledge on the related topics. The Extended Bureau stressed that for meeting the expectations of the Executive Body, e.g. for providing the necessary background information for effect-based reviewing/updating of the existing Protocols, the report has to present a comprehensive and well-balanced overall assessment of the present status of air pollution effects and their recorded trends. It should define areas, populations and stocks at risk, and address/highlight the environmental, health and economic consequences of recorded adverse effects. There should be emphasis on possible needs for future changes in the objectives and structure of the effect-oriented activities and/or for the development of new control measures for air pollution and its effects.

4. To facilitate the preparation of the annotated outline of the report, the Bureau of the Working Group on Effects requested the secretariat to enlist the assistance of an external consultant. Consequently, the present note was prepared by the Bureau of the Working Group in collaboration with the secretariat and with the assistance of Mr. Thomas G. Brydges (Canada).

5. The first part of the note sets out a proposal for the contents of the 2004 substantive report. The estimated length of the individual main sections is indicated by the percentage of their share in the main report (without annexes). The second part contains explanatory notes to individual sections, indicating possible topics to be addressed. It is however obvious that the preparation of the most important summarizing parts (in particular the overall conclusions and recommendations) will require a major collaborative effort between the Programme Centres, and most probably, some form of additional external assistance.

6. It should also be stressed that the International Cooperative Programmes and the Task Force will not be able to continue to provide such important information on the effects of air pollution and their recorded trends without the continuing active participation of all Parties in the monitoring activities, in exchanging data and information and in comprehensively assessing the results. It will, therefore, be crucial to ensure adequate support for this important work, including sufficient and stable funding, both on the national and on the international level.

CONTENTS OF THE 2004 SUBSTANTIVE REPORT

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IV. Assessment, modelling and mapping of areas, stocks and populations at risk (22%)

- A. Derivation of critical loads/levels and mapping of their exceedances (8%)
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- C. Assessment of populations at risk (2%)
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- A. Atmospheric corrosion of materials
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- A. Overall assessment of the present status and trends in air pollution effects (main pollutants)
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Annexes

Tables, charts, maps

Appendixes

Brief description of general national reports

EXPLANATORY NOTES
TO THE DRAFT CONTENTS OF THE 2004 SUBSTANTIVE REPORT
(Indication of possible topics to be addressed)

Executive summary

Foreword

International character/dimension of environmental problems, examples of successful approaches:

Transboundary character of environmental problems, in particular as related to air and water pollution and/or to industrial accidents; need for effective international cooperation. Existing international environmental legislation/agreements/conventions not only set targets for pollution control, but also include provisions for their efficient implementation, thus promoting monitoring, further research and development, and exchange of data and information. Examples of successful international pollution controlling instruments may include UNECE Conventions (Convention on Long-range Transboundary Air Pollution, Convention on the Protection and Use of Transboundary Watercourses and International Lakes) and/or Canada/United States Boundary Waters Treaty (entered into force in 1910!); Canada/United States Accord on Acid Rain.

Preface

Convention on Long-range Transboundary Air Pollution and its development: Flat-rate emission control in the first protocols. Development of the effect-based approach, introduction of critical level/critical load concept. Starting with acidifying substances (sulphur and nitrogen compounds) further protocols addressed volatile organic compounds, heavy metals, persistent organic pollutants, and the latest multi-effect, multi-pollutant protocol also includes control of nutrient nitrogen, ground-level ozone and (indirectly) particulate matter.

Monitoring of (transboundary) air pollution and its effects, exchange of knowledge/information:

Importance of international cooperation in monitoring transboundary air pollution; objectives, activities and results of EMEP. Development of cooperation in scientific, research and monitoring activities, intensified international exchange of knowledge, information and data. Development of international cooperation in studying effects of air pollution; establishment of the International Cooperative Programmes.

Six International Cooperative Programmes and the Task Force on the Health Aspects of Air Pollution:

Objectives of ICPs and the Task Force, their cooperation, their important role in implementing the Convention and its Protocols.

I. Introduction

Development in pollution situation and influencing factors: Impact of profound political and economic changes in Europe during past twenty years on pollution situation. Changes in economic output, energy mix and fuel mix, introduction of stronger national emission control.

Changes in priorities of air pollution control: (From controlling acid rain to control of nitrogen oxides, VOCs, POPs and heavy metals, up to more comprehensive control of acidification, eutrophication and ground-level ozone). Following the 1972 Stockholm Conference, substantial public attention was given to acid rain and to various possible adverse effects of the long-range transport and deposition of air pollutants. Much of the attention was focused on the effects of sulphur dioxide, because it was documented to be a major cause of ecological damage. Over the years, more attention has been given to nitrogen oxides, which contribute to acidification but also to the formation of ozone. More recently, the effects of heavy metals and their interactions with acidifying pollutants have been given more importance. The evolving science has been reflected in the design of environmental monitoring and research and in the content of emission control agreements.

New challenges and new partners in controlling air pollution: Recently more attention has been devoted to ground-level ozone and to the possible impact of higher-level episodes, in particular on vegetation, human health and some technical materials. There is also a growing concern about the health effects of particulate matter. Climate change and loss of biodiversity have now entered the scene as important ecological factors influencing the status of the biosphere. There are also new possibilities for joining forces in dealing with these demanding environmental problems as new strong partners are emerging within as well as outside the ECE region (Clean Air for Europe (CAFE) programme of the European Commission, but also the Intergovernmental Panel on Climate Change (IPCC), the Acid Deposition Monitoring Network in East Asia (EANET), etc.).

Review process under the Convention: For more than two decades the Convention and its protocols have substantially contributed to the decreased emission, transport and deposition of major air pollutants in the region. However, the implementation of agreed control measures requires substantial resources. The purpose of the review process is to assess the effectiveness of the existing protocols, the status of their implementation and their impact on the state of the environment and human health. It should also identify needs for amendments and/or for developing new measures or for modifying some provisions of existing protocols (e.g. list of controlled substances, strength of control, mechanism of implementation and its control). The Working Group in Effects is expected to provide a substantial contribution to this process.

II. Driving forces

Trends in emissions and depositions; EMEP results: Making use of published EMEP data and available data from North America, review the present status and trends in emissions and depositions of: sulphur dioxide; nitrogen oxides; ammonia; VOCs; ozone; heavy metals; persistent organic pollutants; particulate matter.

Air quality guidelines/criteria; environmental effects: Review of relevant air quality guidelines/criteria and environmental and health effects of major pollutants (in particular those from the long-range transport of air pollution).

III. Environmental and health effects of major air pollutants; current status and recorded trends

Forest ecosystems: Assessment of forest ecosystems condition and trends based on: (i) large-scale level I monitoring; and (ii) intensive level II monitoring. Impact of air pollutants (including sulphur, nitrogen, ozone and heavy metals). Expected changes in conditions of forest ecosystems under various deposition scenarios.

Surface waters: Assessment of chemistry and biology of surface waters and their recorded trends. Recovery due to reductions in deposition (in particular of sulphur compounds). Results of detailed studies of nitrogen and heavy metals in surface waters. Application of dynamic modelling, expected future changes in chemistry and biology of surface waters.

Materials, including historic and cultural monuments: Dose-response functions for a range of materials (including materials for metal construction, building materials, cultural structures, etc.), derived for multi-pollutant conditions. Assessment of trends in corrosion of various materials.

Crops and natural vegetation: Assessment of effects of ozone (and other pollutants, including nitrogen and heavy metals) and their recorded trends on agricultural crops and (semi-) natural vegetation. Derivation of critical limits of ozone for vegetation (levels I and II). European survey of heavy metals in mosses. Preliminary assessment of possible impact of nutrient nitrogen on changes in natural plant communities.

Integrated monitoring: Review of cause-effect relationships for observed changes in ecosystems, based on results of the long-term monitoring of physical, chemical and biological parameters in selected locations (watersheds). Results of calculations of S and N input-output budgets and proton budgets, assessment of N leaching under different conditions, study of heavy metal fluxes. Site-specific dynamic modelling of chemical and biological processes.

Human health: Results of the assessment of health risk of particulate matter, heavy metals and persistent organic pollutants from long-range transboundary air pollution. Review of available information on health hazards of ozone and nitrogen dioxide.

IV. Assessment, modelling and mapping of areas, stocks and populations at risk

Derivation of critical loads/levels and mapping of their exceedances: Updated critical loads of acidity, nutrient N, heavy metals and critical levels of ozone, maps of their exceedances under various deposition scenarios. Progress in deriving critical limits for POPs and particulate matter.

Dynamic modelling on local and regional levels: Assessment of the impact of various deposition scenarios on trends in environmental effects, estimations of time of recovery.

Assessment of populations at risk: Review of preliminary estimations of populations at risk from major air pollutants under various deposition scenarios.

Assessment and mapping of stocks at risk: Results of estimating and mapping stocks at risk, in particular vegetation (agricultural crops) and materials, under various deposition scenarios.

V. Estimation of economic damage due to air pollution

Atmospheric corrosion of materials: Results of economic evaluation of air pollution damage to materials.

Agricultural crops: Results of evaluation of the economic impact of ozone pollution on agricultural crop production in Europe.

Forest ecosystems: Preliminary economic estimation of impact of air pollution on forests and their functions (including non-productive forest functions, e.g. tourism).

Human health: Preliminary economic estimation of impact of air pollution on human health.

VI. Conclusions and recommendations

Overall assessment of the present status and trends in air pollution effects: In particular, possible important effects (including synergetic effects) of pollutants not yet covered by existing Protocols.

Assessment of the impact of implementing the existing Protocols: Summarized illustration of the positive impacts of implementing Protocols (maps, tables, charts).

Experienced and/or expected exceedances, areas at risk: Based on the results of long-term monitoring and using dynamic modelling for various future deposition scenarios, identification of areas where critical loads/levels of major pollutants are still exceeded and/or which might be at risk under possible future deposition scenarios.

Need for strengthening air pollution control measures: Taking into account results already achieved (in particular in identifying areas at risk), as well as all available knowledge and information, formulation of suggestions for strengthening existing, and/or preparing new air pollution control measures (including protocols).

Required data, information, need for further development of activities: Identification of data and information which would allow a more comprehensive evaluation of the present environmental situation and the most important related problems and, thus, substantially contribute to rational decision-making. Proposals for amending/modifying existing and/or developing new cooperative activities in studying effects of air pollution.

Links of the work under the Convention to other environmental issues: Review of the existing links/interrelations of the present activities carried out under the Convention to other activities/bodies addressing environmental problems. Special mention should be made of existing possibilities for sharing data/information with bodies/organizations dealing, for instance, with climate change and biodiversity, and/or with impact of air pollution in other regions of the world.

Annexes

Tables, charts, maps (as required)

Appendixes

Brief description of relevant general national reports, for example: (i) Findings of the United States National Acid Precipitation Assessment Program (NAPAP); (ii) Findings of the Canadian Acid Rain Assessment; (iii) the United Kingdom's National Expert Group on Transboundary Air Pollution (NEGTAP); etc.