



Economic and Social Council

Distr.: General
5 October 2010

Original: English

Economic Commission for Europe

Executive Body for the Convention on Long-range Transboundary Air Pollution

Twenty-eighth session

Geneva, 13–17 December 2010

Agenda item 12 of the provisional agenda

Review of strategies and policies of Parties and Signatories to the Convention for the abatement of air pollution

Draft 2010 review of strategy and policies for air pollution abatement*

Note by the secretariat

Overview and trends

Contents

	<i>Paragraphs</i>	<i>Page</i>
I. Introduction.....	1–8	3
A. Mandate and general objectives.....	1–6	3
B. Main contents	7–8	4
II. Executive summary.....	9–23	4
A. The Convention	9–14	4
B. Implementation of the protocols and progress on national strategies and policies	15–21	5
C. General trends and priorities in combating air pollution	22–23	6
III. Overview of the Convention	24–61	7
A. Status of ratification of the Convention and its protocols.....	24–25	7
B. Activities in the framework of the Convention.....	26–45	7
C. Compliance mechanism.....	46–51	11
D. Capacity-building activities	52–55	12
E. Future priorities under the Convention	56–61	13

* This document was submitted late owing to resource constraints.

IV.	Trends in air pollution emissions and effects	62–81	14
A.	Emission levels and trends.....	62–71	14
B.	Trends in effects	72–81	16

I. Introduction

A. Mandate and general objectives

1. This document presents the first part of the draft 2010 Review of strategies and policies for air pollution abatement (the 2010 Review) prepared by the secretariat with the assistance of a consultant, as mandated by the Executive Body at its twenty-seventh session in December 2009 (ECE/EB.AIR/99, para. 85 (e)). The second and third parts of the review are contained in ECE/EB.AIR/2010/8/Add.1 and 2. The Executive Body may wish to provide advice on the finalization of the review and approve the subsequent publication of the review, or parts of it, in 2011. The annex to document ECE/EB.AIR/2010/8/Add.2 proposes figures for inclusion in the final version of the 2010 Review upon its publication.

2. The 2010 Review provides an overview of the activities undertaken in the framework of the 1979 Convention on Long-range Transboundary Air Pollution (the Convention) and presents progress to date in implementing the Convention and its protocols. It also summarizes the replies to the 2010 questionnaire on strategies and policies (ECE/EB.AIR/2009/12 and ECE/EB.AIR/2009/13) received from 28¹ of the 51 Parties to the Convention by 22 May 2010.

3. In 2009, the Executive Body approved the protocol-related and general policy questions of the 2010 questionnaire, invited the secretariat to make the questionnaire available online and requested the Parties to reply to it by the deadline of 31 March 2010.

4. The questionnaire on strategies and policies, circulated every two years, is intended to assist Parties in providing information as required under the seven substantive protocols to the Convention. In 2009, the Executive Body decided that the 2010 questionnaire would represent the uniform reporting framework referred to in article 8, paragraph 2, of the Nitrogen Oxides (NO_x) Protocol;² article 8, paragraph 4, of the Protocol on Volatile Organic Compounds (VOCs);³ article 5, paragraph 1, of the 1994 Sulphur Protocol;⁴ article 9, paragraph 2, of the Protocol on Persistent Organic Pollutants (POPs);⁵ article 7, paragraph 2, of the Protocol on Heavy Metals;⁶ and article 7, paragraph 2, of the 1998 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (the Gothenburg Protocol).

5. Since 2000, the information reported by Parties via the questionnaire has been summarized and published every four years.⁷

¹ Austria, Belarus, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Italy, Liechtenstein, Netherlands, Norway, Poland, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom of Great Britain and Northern Ireland, Ukraine, United States of America and European Union.

² 1988 Sofia Protocol concerning the Control of Emissions of Nitrogen Oxides or Their Transboundary Fluxes.

³ 1991 Geneva Protocol on Volatile Organic Compounds or Their Transboundary Fluxes.

⁴ 1994 Oslo Protocol on Further Reduction of Sulphur Emissions.

⁵ 1998 Aarhus Protocol on Persistent Organic Pollutants.

⁶ 1998 Aarhus Protocol on Heavy Metals.

⁷ The 2000, 2002 and 2006 Reviews are available at <http://www.unece.org/env/lrtap/conv/conclusi.htm>. Parties' responses to the 2010 and the earlier on-line questionnaires are available at: <http://apps.unece.org/ehlm/WebApt/Questionnaire/login.aspx>. (Username: "guest", no password required).

6. The overall aim of the reviews is:

(a) To assess the progress made by Parties and the region as a whole in implementing the Convention and its protocols;

(b) To facilitate the exchange of information between Parties on the activities for air pollution abatement, as required by the Convention and its protocols; and

(c) To raise awareness of the problems of air pollution, as well as to make the Convention's contribution to successful abatement of pollution more visible, in particular with a view to promoting the ratification of the protocols by the countries in Eastern Europe, the Caucasus and Central Asia.

B. Main contents

7. The 2010 Review includes an executive summary (in chapter II) and the following main chapters:

(a) Chapter III presents an overview of the Convention and its recent activities, including in particular the revision of the three most recent protocols and the capacity-building activities in Eastern Europe, the Caucasus and Central Asia. Future priorities under the Convention are also presented;

(b) Chapter IV outlines trends in air pollution emissions and effects in the region in recent years. It is based on information provided by the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) Centre on Emission Inventories and Projections (CEIP), using data submitted by Parties in 2010 and data submitted to the International Cooperative Programmes under the Convention's Working Group on Effects;

(c) Chapter V of the review (presented in chapter I of documents ECE/EB.AIR/2010/8/Add.1 and Add.2.) highlights progress made by responding Parties in meeting their obligations under the protocols, with a focus on the three most recent protocols;

(d) Chapter VI (presented in chapter II of ECE/EB.AIR/2010/8/Add.2) presents an overview of the national institutional and regulatory frameworks for air pollution abatement, as well as of policy measures and economic instruments for addressing the emissions from the main economic sectors.

8. To avoid overlaps in the information reported and to emphasize implementation of the Gothenburg Protocol, the strategies and policies to reduce emissions of sulphur dioxide (SO₂), NO_x, ammonia (NH₃) and VOCs reported by the Parties to the Gothenburg Protocol are summarized in the section dedicated to that Protocol. The sections on the 1985 and 1994 Sulphur Protocols, the Protocol on NO_x and the Protocol on VOCs only refer to the replies by those countries that are not yet Parties to the Gothenburg Protocol.

II. Executive Summary

A. The Convention

9. The Convention has been a major contributor to international policy on reducing transboundary air pollution and an essential framework for controlling and reducing the damage to human health and the environment caused by such pollution through research, monitoring, policy and legislative action. In the 30 years of its existence, the Convention

has been extended by eight protocols, seven of which address specific pollutants and environmental problems such as acidification and eutrophication.

10. The 2010 Review presents progress to date in implementing the Convention and its seven substantive protocols, with a focus on the three most recent protocols. It is based on replies to the 2010 questionnaire on strategies and policies for air pollution abatement received from 28 of the 51 Parties to the Convention.

11. Concentrations of SO₂ in Europe continued to decrease, falling 70% from 1990 to 2008. Over the same period, other pollutants have also decreased: NO_x by 32%; VOCs by 45%; and NH₃ by 29%.

12. Effects, particularly acidification, have fallen in line with the decrease in emissions. This was especially notable in freshwaters in some regions. However, there remain concerns about nitrogen depositions, ozone concentrations and the effects of particulate matter (PM) on human health.

13. The Executive Body continues to place increased emphasis on the implementation of the Convention and its protocols, in particular in Parties with economies in transition. This objective is promoted through a dedicated action plan and several donor-funded projects coordinated by the secretariat. Furthermore, the obligations of the three most recent protocols are being revised including to build in more flexibility, e.g., with respect to implementation timescales and to facilitate their ratification.

14. The Convention is about to adopt a long-term strategy for 2010–2020, which takes stock of important scientific and policy developments regionally and globally relating to air pollution issues such as climate change and biodiversity and defines its future priorities, work programme and organizational structure accordingly. The vision for the next 10 years will be based on the Convention's strong link between science and policy and its ability to negotiate strong regional agreements to improve the environment and protect human health.

B. Implementation of the protocols and progress on national strategies and policies

15. **The Gothenburg Protocol** aims to simultaneously address the three effects it describes through controlling and reducing the emissions of SO₂, NO_x, NH₃ and VOCs. Negotiations to revise its obligations are under way, including with a view to addressing PM. Emissions from mobile sources were well controlled in the majority of responding countries. For existing stationary sources the level of emissions continued to vary significantly between countries. All Parties reported on their efforts with respect to introducing and implementing best available techniques (BAT). Specific non-technical measures reported by Parties included promoting renewable sources of energy, fuel switching and increased energy efficiency. The linkage with climate change was noted, with Parties reporting that efforts to reduce greenhouse gases also contributed to reducing air pollutants under this Protocol and vice versa. The majority of responding Parties had specific strategies in the agricultural sector to limit emissions from slurry and manure application and storage, including rules on the time of day and means of application and guidelines on livestock housing and management.

16. **The Protocol on POPs** sets out to eliminate any discharges, emissions and losses of POPs by banning or restricting their production and use. Originally the Protocol recognized a list of 16 POPs. After the entry into force of the 2009 amendments to the Protocol, it regulates altogether 23 hazardous substances. In addition, in 2010 further five substances were being considered for inclusion into the Protocol. All responding Parties reported a ban on import, production and use of the substances originally included in the annex I to the

Protocol. Progress was reported on the environmentally responsible elimination of remaining substances under annex I, including their safe transport. Countries that did not have the facilities to eliminate these substances safely exported them to appropriate facilities abroad. Responses from Parties indicated varying degrees of removal of substances originally listed in annex II for which uses were restricted under the 1998 Protocol.

17. The main objective of **the Protocol on Heavy Metals** is to control the human-induced emissions of cadmium, lead and mercury. Negotiations to revise its obligations are under way, including with a view to adding mercury-containing products in its annex. Significant reductions in lead were achieved by most Parties through the phasing out of leaded petrol. BAT was promoted in most responding countries and was integrated into permits for new stationary sources emitting heavy metals. The majority of responding Parties reported limit values for most stationary sources as being within those set in annex V to the Protocol.

18. **The 1994 Sulphur Protocol** provides for the control of the sulphur content of fuel, energy-efficiency measures, the promotion of renewable energy and the application of BAT. Most Parties to the Protocol indicated that they promoted energy efficiency mainly through subsidies, grants and tax breaks, e.g., in the transport and building sectors. The reported measures to promote renewable energy simultaneously targeted reductions in greenhouse gas emissions. Many Parties had set specific targets for their desired share of energy from renewable sources.

19. Although the 1994 Protocol superseded **the 1985 Sulphur Protocol**,⁸ a few Parties did not accede to it and remain bound by the obligations of the latter. The most frequently cited measures to reduce SO₂ emissions related to limits and caps, including in relation to power generation and mobile sources, and economic measures such as taxes and fiscal incentives. All Parties had achieved at least the 30% reductions in SO₂ emissions required by this Protocol, with many having exceeded this amount.

20. **The Protocol on VOCs** requires Parties to control and reduce their emissions of VOCs in order to reduce their transboundary fluxes and the fluxes of the resulting secondary photochemical oxidant products so as to protect human health and the environment. Parties reported on a range of techniques and limits to reduce their emissions emitted from a diversity of sources. The European Union (EU) member States referred to their implementation of the relevant EU legislation.

21. **The NO_x Protocol** requires Parties to take effective measures to control and/or reduce their annual emissions of NO_x, to apply national emissions standards to sources and to introduce pollution control measures for major sources. The majority of Parties had reached their targets under this Protocol, while others reported significant reductions. Some of the reported measures to control NO_x emissions from major stationary sources included retrofitting low NO_x burners, retrofitting selective catalytic reduction units, using combined cycle or cogeneration configurations, modernizing fusion aggregates and introducing Emission Optimized Sintering (EOS) systems.

C. General trends and priorities in combating air pollution

22. In most Parties the ministry of the environment was the lead authority in combating air pollution and air quality issues were integrated within broader environmental protection

⁸ 1985 Helsinki Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent.

plans. A number of Parties reported on regular collaboration between the ministry of the environment and other ministries, while others felt that inter-ministerial collaboration needed further improvement. Several Parties reported that they applied a multi-pollutant management approach, and applied measures to simultaneously address air pollution and climate change. Parties reported on the use of economic measures such as taxes, grants, licensing and voluntary schemes to reduce emissions from industrial sources. In the transport sector, significant efforts were being made by Parties to promote cycling, to improve public transportation and to improve fuel quality. Parties indicated a clear trend towards increased use of renewable sources of energy and improved energy efficiency in buildings. In the agriculture sector, many Parties reported on measures such as alternative livestock feeding strategies, improved practices for manure storage and spreading, low-emission animal housing systems and the use of mineral fertilizers.

23. A number of Parties mentioned that their research activities were linked to those of EMEP and its task forces, while others emphasized research relating to both climate change and air pollution. Technology exchange, both at the national and the international levels, was reported by a number of countries. The active role of the public in defining policies related to air pollution was also reported by various Parties.

III. Overview of the Convention

A. Status of ratification of the Convention and its protocols

24. With 51 out of the 56 United Nations Economic Commission for Europe (UNECE) member countries being Parties to the Convention, the Convention covers virtually the entire area of the UNECE region in Europe and North America.⁹ While only two countries from Central Asia are currently Parties (Kazakhstan and Kyrgyzstan), the remaining three (Tajikistan, Turkmenistan, and Uzbekistan) are involved in work that can lead to accession. Capacity-building in Eastern Europe, the Caucasus and Central Asia and in South-Eastern Europe is increasingly important in the Convention's work, and some of that work is described in section D below.

25. The Convention successfully negotiated and adopted eight legally binding protocols to control specific pollutants, all of which have entered into force. Negotiations to update and revise the obligations of the three most recent protocols are under way. Continued efforts by Parties to ratify or accede to the more recent protocols will further strengthen endeavours to meet the targets set by the protocols.¹⁰ Overall targets for the region for most pollutants covered by the protocols are being met, though the successes of individual Parties vary.

B. Activities in the framework of the Convention

26. The Executive Body (the meeting of the Parties) is the governing and decision-making body of the Convention. At its meetings, its three main subsidiary bodies and the Convention's Implementation Committee provide reports on their work. The Executive Body is responsible for adopting decisions, reports (such as this review) and agreeing its annual workplans, as well as developing strategies for its future work. The sessions of the Executive Body provide a forum for Parties to adopt protocols and amendments to them.

⁹ Insert figure: The UNECE region and the Parties to the Convention.

¹⁰ Insert figure: Status of ratification of protocols in 2010.

27. Reflecting the Convention's science-based approach to emission control strategies, the Executive Body has two scientific subsidiary bodies, the Working Group on Effects and the EMEP Steering Body. The Working Group on Strategies and Review is the main negotiating body for the Convention and is responsible for reviewing protocols, identifying any need for amendment or revision and making recommendations for such changes.

28. The Implementation Committee consists of nine elected members covering a cross-section of the geographical spread and expertise of the Convention. It draws the attention of the Executive Body to cases of non-compliance by Parties with their obligations under the Convention's protocols and recommends action for encouraging compliance.

29. The work of the three main subsidiary bodies and the Implementation Committee is described below with reference to recent achievements.¹¹

1. Working Group on Strategies and Review

30. Having first focused on negotiating protocols for consideration by the Executive Body, in 1999, the Working Group on Strategies was renamed the Working Group on Strategies and Review to recognize that much of its future work would be to prepare reviews of existing protocols and present the results to the Parties for their consideration and possible action. The Working Group continues to deal with other policy-related questions and recommends decisions on these to the Executive Body.

31. The three most recent Protocols (the Protocols on POPs and Heavy Metals and the Gothenburg Protocol) require Parties to keep under review the sufficiency and effectiveness of their obligations. The reviews provide the basis for possible revisions and updates of these Protocols. Furthermore, to facilitate ratification by countries with economies in transition of the UNECE region, the Working Group explores options for building in more flexibility into the obligations of these three Protocols, for instance with respect to timescales for their implementation.

32. For the scientific and technical preparatory work, background documents and recommendations considered in the formal review and revision of the protocols, the Working Group relies on inputs from all the Convention bodies and programme centres. The Executive Body has established four technical groups (Task Forces on Heavy Metals, POPs and Reactive Nitrogen and the Expert Group on Techno-economic Issues) that assist the Working Group in the review and revision of the protocols, their technical annexes and the related guidance documents, as needed.

33. The Expert Group on Techno-economic Issues has been instrumental in informing the negotiations for updating the technical annexes to the Gothenburg Protocol and the guidance documents connected to it, including on cost-effective abatement techniques and technologies and the impact of emerging technologies on air pollution abatement. The Task Force on Reactive Nitrogen was established in 2007 to address the need for a more integrated approach to understand and control the emissions of nitrogen, taking into consideration the full cycle of reactive nitrogen. Furthermore, the Task Force carries out work for the revision of the measures for the control of ammonia in the Gothenburg Protocol and has taken on the work of the former Expert Group on Ammonia Abatement to regularly update the Guidance document on control techniques and the Framework advisory code on good agricultural practice. The Task Forces on Heavy Metals and on POPs are also charged with reviewing any new substances proposed by Parties for addition to the protocols.

¹¹ Insert figure: Organizational structure of the Convention.

34. The EMEP Task Force on Integrated Assessment Modelling and the Centre for Integrated Assessment Modelling (CIAM), in collaboration with the Working Group on Effects, have been charged with most of the preparatory work for the revision of the emission ceilings in the Gothenburg Protocol and proposing of new environmental and health targets. In addition, ad hoc expert groups have been set up for a limited period of time to accomplish specific tasks in connection with the Gothenburg Protocol review and revision, notably on PM and on black carbon. For the numerous questions of legal nature in relation to the legal instruments and their revision, the Working Group refers to an ad hoc group of legal experts.

35. To date, the Working Group had completed the first reviews of the Protocols on POPs and Heavy Metals and the Gothenburg Protocol and on that basis had made recommendations for possible revisions. In December 2009, based on the options for revision negotiated by the Working Group, the Parties to the Protocol on POPs represented at the twenty-seventh session of the Executive Body adopted amendments to that Protocol. The negotiations on options for revising the two other Protocols have yet to be completed.

2. Cooperative Programme on Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP)

36. EMEP was established before the adoption of the Convention as a consequence of rising awareness in Europe, the United States and Canada of the environmental damage caused by deposition of acidifying pollutants. Its implementation and development is described in article 9 of the Convention. The main objective of the programme is to provide sound scientific support for the Convention mainly in atmospheric monitoring and modelling; emissions inventories and projections, and integrated assessment.

37. Five programme centres (the Chemical Coordinating Centre, the Meteorological Synthesizing Centre-West, the Meteorological Synthesizing Centre-East, CIAM and the Centre on Emission Inventories and Projections) and four task forces coordinate the work of EMEP. The EMEP centres and task forces report to the EMEP Steering Body, which reviews their activities at its annual sessions.¹²

38. There are now 43 Parties to the 1984 Protocol on Long-term Financing of EMEP which provides funding for the work. The work of EMEP continues to expand as increasing numbers of Parties report data and establish monitoring stations. Parties to protocols are required to report emissions of the associated pollutants in accordance with the Convention's Guidelines for reporting emission data¹³ and to submit their emission inventories to regular in-depth reviews, with a view to minimizing uncertainties related to data collection and reporting. Parties to the Convention that have not yet ratified protocols with reporting obligations are nevertheless encouraged to report on their emissions in line with the Guidelines and many of them do so.

39. The emissions database is available at <http://www.ceip.at/>. Emission data are used to model the transport of pollution across Europe and to quantify overall deposition of pollutants and country-to-country deposition matrices. The modelling results form the basis for developing and implementing abatement measures to protect human health and threatened ecosystems and are therefore key to the development of air pollution strategies and policies.

¹² Details on the work of EMEP are available at <http://www.emep.int/>. For documents of the EMEP Steering Body see: <http://www.unece.org/env/lrtap/emep/documents.htm>.

¹³ Guidelines for reporting emission data under the Convention on Long-range Transboundary Air Pollution (ECE/EB.AIR/97) and other reporting instructions are available at: <http://www.ceip.at/reporting-instructions/>.

40. Integrated assessment models use emissions data, atmospheric air pollution transport models and effects in combination with available control techniques to develop cost-optimized strategies, which maximize benefits for the environment and human health. The effects of acidification, eutrophication, PM and ozone exposure are described with exceedances of critical loads for different ecosystems and human health indicators.

41. In 2009, EMEP developed a monitoring strategy for 2010–2019 to ensure sufficient ongoing long-term monitoring of concentrations and deposition fluxes in a way that is affordable for all Parties and that reflects the scientific development and emerging capabilities at the national levels.

42. An overall EMEP strategy for 2010–2019 was adopted in 2009. The strategy addresses acidification, the reactive nitrogen cycle, ozone formation, PM, heavy metals and POPs. The strategy takes into account relevant policy developments under the Convention and elsewhere, including in the EU. For example, one of the objectives of the ongoing negotiations to revise the Gothenburg Protocol is to address PM, which has been the subject of scientific investigations and a driving force of relevance to the work of EMEP for several years. In addition, climate variability and change have consequences for atmospheric composition which EMEP takes into account in its work with the aim of supporting development of policies that recognize the co-benefits of harmonized air pollution and climate change emission reduction strategies. Processes related to regionalization and globalization, an increasing emphasis on the intercontinental transport of air pollution and its contribution to pollution in various regions, as well as the extension of the EMEP domain to areas in the eastern part of the UNECE region, are included in the strategy. EMEP also cooperates with other Conventions and initiatives which offer opportunities to further extend its work in support of policy developments.

3. Working Group on Effects

43. The Working Group on Effects was established to develop international cooperation in research and monitoring to provide information on the degree, geographic extent and trends of pollutant impacts. Since the early 1980s, the Working Group has provided a unique framework for comprehensive air pollution effects monitoring and research that is science-based and policy relevant. This research, based largely on observational evidence, has documented widespread causal effects of air pollution of a variety of receptors in Europe and North America.

44. The Working Group manages six international cooperative programmes (ICPs) that study aquatic and terrestrial ecosystems and materials.¹⁴ Effects of pollution on buildings, materials and cultural heritage sites have been studied by ICP Materials. ICP Modelling and Mapping has been responsible for developing maps of critical loads that show the effects of acidification, eutrophication and heavy metals. Monitoring by ICP Vegetation has shown the widespread effects of ozone on crops and other vegetation across Europe. The extensive defoliation and intensive forest sites of ICP Forests have shown the continued damage to forests from air pollution. The lakes and streams monitored by ICP Waters have shown trends in both damage and recovery of aquatic systems in many parts of the region. ICP Integrated Monitoring has determined and predicted the state of ecosystems and their changes from a long-term perspective with respect to the impact of air pollutants, especially nitrogen, sulphur and metals. A joint Task Force on Health with the World Health Organization (WHO) considers the health effects of air pollution using, for example, the analysis of data from epidemiological studies.

¹⁴ Additional information, including details on each of the ICPs, can be found at <http://www.unece.org/env/lrtap/WorkingGroups/wge/welcome.html>.

45. The Working Group prepares an annual review of the activities and results of the ICPs, the Task Force on the Health and the Joint Expert Group on Dynamic Modelling. In addition, in 2008, it prepared a consolidated report on air pollution effects which summarizes current information.

C. Compliance mechanism

46. An effective compliance mechanism is an important component of the success of the Convention. Parties must demonstrate that they have complied with their obligations under the Convention. This includes both their obligations to reduce emissions under protocols they are Party to and their obligation to report this information. Reporting on strategies and policies, emission reporting and emission reduction are all monitored by an Implementation Committee, which oversees compliance by Parties with their respective obligations.

47. The Implementation Committee was established by a decision of the Executive Body in 1997 (decision 1997/2) and operates under decision 2006/2 which lays out its primary tasks:

- (a) To consider submissions or referrals on individual Parties' compliance;
- (b) To periodically review compliance by the Parties with the reporting requirements of the protocols; and
- (c) To carry out in-depth reviews of compliance with or implementation of specified obligations in an individual protocol.

48. Based on submissions and referrals, the Committee examines whether an individual Party is in non-compliance with a specific obligation under a given protocol as alleged in the submission or referral. In conducting its examination, the Committee is authorized to request information from relevant technical bodies under the Convention on the quality of the data reported. If the Committee finds, based on information received from the Party concerned or through the secretariat, that there is a case of non-compliance, it submits to the Executive Body, together with its report, recommendations on measures that could be taken to bring about full compliance.

49. Unlike this consideration of individual cases, the other two tasks do not include examination of individual Parties' compliance, but are mainly an overall review of the implementation status of the protocols. Even if, while carrying out these tasks, the Committee identifies possible non-compliance by an individual Party with some obligations, this does not trigger a more thorough examination, since the Committee cannot examine an individual Party's compliance without a specific submission or referral by a Party or the Secretariat.

50. Each year the Committee submits a detailed report about its work and findings to the Executive Body. Together with the Committee's recommendations, this allows the Executive Body to take the decisions it considers necessary to promote overall and individual compliance with the Convention and the protocols.

51. The Committee also reviews compliance by Parties with their obligations to report on strategies and policies for air pollution abatement, based on their replies to questionnaire on strategies and policies. The Committee's findings and recommendations for 2010 are contained in its reports to the twenty-eighth session of the Executive Body.¹⁵

¹⁵ ECE/EB.AIR/2010/2 and ECE/EB.AIR/2010/6.

D. Capacity-building activities

52. The Convention actively supports the increased participation of the countries in Eastern Europe, the Caucasus and Central Asia and South-Eastern Europe in the Convention's activities and promotes their accession to the protocols to tackle air pollution and its environmental and health impacts in these countries. It promotes as a priority the implementation and ratification of the three most recent protocols to the Convention and the EMEP Protocol. In 2005, the Executive Body adopted a dedicated action plan to promote efforts to this end. The action plan was revised in 2007 and its implementation is regularly reviewed by the Working Group on Strategies and Review.¹⁶ Parties to the Convention have also been urged to contribute to a trust fund administered by the Convention secretariat for assisting the countries with economies in transition to implement the action plan.

53. The secretariat's initiatives to better understand and effectively target the needs of the countries in the subregion in question have indicated that the capacity-building activities should focus on establishing and improving the policy and legislative frameworks and technical capacities in these countries. To date, the secretariat has already coordinated a number of donor-funded projects aimed at the development of national action plans for the implementation of the protocols, taking into account specific legislative and environmental challenges. The module for the project implementation developed by the secretariat includes three phases: (a) a design phase, including a launching event and the development of a project proposal for potential donors and stakeholders; (b) an elaboration phase, involving the development of a national action plan; and (c) an implementation phase, focusing on enforcement of actions specified in the national action plan with the assistance of the secretariat and partner countries.

54. In April 2010, the secretariat organized a special session on the Convention's activities to facilitate the implementation and ratification of the three most recent protocols by countries in Eastern Europe, the Caucasus and Central Asia and South-Eastern Europe. The projects that are ongoing at the time of writing are presented below. In addition, discussions are under way with Azerbaijan and Uzbekistan on developing similar assistance programmes.

(a) **The project to support to the implementation of the Gothenburg Protocol in the Republic of Moldova** is funded by the Czech Republic. It focuses on the establishment of a high-quality national emission inventory and the improvement of the country's capacity for integrated assessment modelling. As part of the project implementation, a gap analysis of national air quality legislation was completed and the costs of the technical and economic measures related to the implementation of the Gothenburg Protocol were assessed. The Government is now in the process of completing its national action plan for the implementation and ratification of the Gothenburg Protocol and for submitting data to CIAM and the Chemical Coordinating Centre (CCE);

(b) **The Western Balkans Project**, financed by the Netherlands, aims at assisting Albania, Bosnia and Herzegovina, Montenegro, Serbia and the former Yugoslav Republic of Macedonia in implementing and ratifying the Heavy Metals, POPs and Gothenburg Protocols. At the time of writing, Montenegro, Serbia and Macedonia had completed their national action plans and entered into the implementation phase of the project. Albania has signed a memorandum of understanding to initiate the first phase of the project. The project is expected to be finalized in June 2011;

¹⁶ ECE/EB.AIR.WG.5/2009/13.

(c) **The Joint Project of the Russian Federation, Belarus and Kazakhstan** aims at assisting the countries in Eastern Europe, the Caucasus and Central Asia to ratify and implement the three most recent protocols to the Convention. Following the presentation of the project's design phase in April 2010, the financial contributions from Switzerland and the Russian Federation have allowed the project to proceed to the next phase involving the development of national implementation and ratification strategies.

55. At the twenty-seventh session of the Executive Body in 2009, the Republic of Belarus proposed to establish a coordinating group to coordinate joint projects and other efforts towards accession by countries in Eastern Europe, the Caucasus and Central Asia to the latest protocols to the Convention, to facilitate discussion of strategic issues relevant to these countries and to enhance the exchange of information and the application of bilateral and multilateral projects results by all interested Parties in the subregion. The Executive Body agreed with the proposal, welcomed the offer of the Russian Federation to act as a lead country for the Coordinating Group and invited it to prepare draft terms of reference for the Group. At its twenty-eighth session in 2010, the Executive Body is expected to formally establish the Group. In line with its terms of reference, the Coordinating Group will review the current work on implementation of the Convention in countries of Eastern Europe, the Caucasus and Central Asia and assess the lessons learned; promote the implementation of the Convention and its mechanism on air quality management in these countries through information exchange and capacity-building; jointly assess with other relevant bodies of the Convention the costs and benefits of prospective accession to the latest protocols by the countries of this subregion; develop and maintain the information databases on scientific, technical and policy documentation related to the Convention in the Russian language; develop and implement joint projects aiming at accession to the latest protocols to the Convention; and elaborate joint recommendations on strategic issues of the Convention.

E. Future priorities under the Convention

56. The Executive Body of the Convention is developing a long-term strategy for the Convention for 2010–2020. In view of the important scientific and policy developments regionally and globally over the past 10 years relating to air pollution issues, such as climate change and biodiversity, the Convention is assessing its priorities in relation to these wider issues and will be deciding on its future work programme and organizational structure accordingly. Moreover, the vision for the next 10 years will be based on the Convention's strong link between science and policy and its ability to negotiate strong regional agreements to improve the environment and protect human health, which has led the way for a wider global approach for POPs and heavy metals.

57. A major strength of the Convention is its geographical coverage of most of the Northern Hemisphere. Increased ratification, implementation and compliance with existing protocols will continue to be a high priority in the Convention. In particular, the Executive Body reaffirmed that a more active participation of countries in Eastern Europe, the Caucasus and Central Asia and South-Eastern Europe was one of the key priorities, stressing the need for support directed to assist these countries in ratifying and implementing the three most recent protocols to the Convention.

58. PM, the linkages between air pollution and climate change, hemispheric transport of air pollution and reactive nitrogen in the environment are the newer challenges facing the Convention. The reduction of black carbon, as part of PM, is important due to its toxicological effects and contribution to climate change. In 2009, the Executive Body established the Ad Hoc Expert Group on Black Carbon to review the current state of black carbon research and explore future strategies for reducing the pollutant's emissions. The

Group's work will contribute to improved coordination of black and organic carbon-related activities, with the aim of improving public health in the UNECE region while achieving reductions that will also benefit the climate in the near term.

59. The Convention's work on hemispheric transport may provide information on a broader scale, but political involvement of countries outside the region is likely to be a long-term challenge. The Convention looks forward to the 2010 Hemispheric Transboundary Air Pollution Report. In addition, the threat of eutrophication of sensitive ecosystems continues in large areas of the UNECE region despite the reductions in emissions in nitrogen-containing air pollutants. Links could be established between eutrophication, including the acidifying effects of nitrogen deposition, and changes in biodiversity in sensitive ecosystems dependent on nutrient-poor conditions.

60. Cooperation on air pollution can extend beyond the UNECE region. Other organizations such as WHO, the World Meteorological Organization, the United Nations Environment Programme (UNEP), the United Nations Framework Convention on Climate Change, the Stockholm Convention on Persistent Organic Pollutants and the Convention on Biological Diversity are now addressing issues of importance to air pollution and it will be important for the Convention to formulate additional ways of working with these bodies.

61. Science will remain an essential component of the Convention and the content and balance of the scientific programme will need to reflect its overall policy priorities. While the scientific links between the Convention and other regions of the world are growing, the challenge remains how to link policy development in one part of the world with that in another. This will only be achieved through keen understanding of the needs in other regions. The goal is for the Convention to be a leading regional framework, working with other bodies, in addressing the remaining and emerging transboundary air pollution challenges in the twenty-first century.

IV. Trends in air pollution emissions and effects

A. Emission levels and trends

62. Reporting of high-quality emission data is essential for assessing the state of air pollution within the UNECE region and for establishing the compliance of Parties with their protocol commitments. Parties submit data each year in accordance with the Guidelines for reporting emission data and the EMEP/EEA Air Pollutant Emission Inventory Guidebook (the Guidebook).¹⁷ The data summarized in this report correspond to the latest available annual emissions submitted by Parties until 2010.¹⁸ Emission totals for the major air pollutants were reported by approximately 84% of the Parties to the Convention.

63. Emissions of SO₂ in Europe continued to show a clear downward trend. The total emissions for all Convention Parties within the geographical scope of EMEP¹⁹ was estimated to be 12,220 Gg (SO₂) in 2008, representing a decrease of 70% since 1990. SO₂ emissions reported by Parties with targets under the Gothenburg Protocol decreased by

¹⁷ The Guidebook developed by EMEP and the European Environment Agency (EEA) is available at <http://www.eea.europa.eu/publications/emep-eea-emission-inventory-guidebook-2009>.

¹⁸ For Parties where no data were submitted the emissions were estimated.

¹⁹ Emissions reported by the United States and Canada and estimated emissions for North Africa, the sea areas and the extended EMEP area are not included.

77%.²⁰ This implies that, over the whole EMEP area, the emission target for SO₂ for the Gothenburg Protocol for 2010 had already been reached in 2008. However, there are significant differences in the achievements of individual Parties.

64. For emissions of NO_x, the situation is not as satisfactory. Total emissions of all Parties within the EMEP area have fallen to 17,062 Gg (NO_x) in 2008, a 32% reduction from 1990 levels. NO_x emissions reported by Parties with targets under the Gothenburg Protocol decreased by 41%.²¹ These figures imply that 52% of Parties to the Gothenburg Protocol have reached their targets for 2010. A further 6% decrease in total emissions from the EMEP region is needed to reach the overall 2010 target.

65. Estimated ammonia emissions in the EMEP region decreased by 29% from 1990 levels, in 2008 they totalled 6,070 Gg. NH₃ emissions reported by Parties with targets under the Gothenburg Protocol decreased by 29% as well. This implies that 76% of all Parties to this Protocol have met their 2010 targets and that total ammonia emissions in the EMEP area are close to the overall 2010 target.²²

66. For non-methane volatile organic compounds (NMVOCs), emissions in 2008 were 13,775 Gg, a decrease of 45% from 1990 levels. NMVOC emissions reported by Parties with targets under the Gothenburg Protocol decreased by 53%. In the EMEP area as a whole, the Protocol emission target for NMVOCs for 2010 had been reached in 2008.²³

67. For POPs, emissions of polychlorinated dibenzo-(p)dioxins and dibenzofurans (PCDD/PCDF) within the EMEP domain were estimated to be 5,913 g I-TEQ in 2008. This represents a decrease in PCDD/PCDF emissions by 63% since 1990. In 2008, polycyclic aromatic hydrocarbon (PAH) emissions were estimated at 1,519 Mg (PAH), a fall of 59% from 1990 levels, and hexachlorbenzol (HCB) emissions were estimated at 14,356 Mg, a decrease of 31% from 1990 levels.²⁴

68. Regarding emissions of lead, cadmium and mercury, between 1990 and 2008, total anthropogenic emissions in the EMEP region decreased for all three heavy metals, for lead by about 82% (from 34.9 Gg/year to 6.4 Gg/year), for cadmium by about 43% (from 0.484 Gg/year to 0.278 Gg/year) and for mercury by about 47% (from 0.331 Gg/year to 0.177 Gg/year).

69. Officially reported estimates for acidifying pollutants NO_x, SO_x and NMVOCs for the United States and Canada indicate a decrease between 1990 and 2008 of their emissions of SO_x (50%), NO_x (35%) and NMVOCs (33%). NH₃ emissions in North America decreased only by 5% overall, with an increase of 12% for Canada and a 7% decrease for the United States.²⁵

70. In 2008 the EMEP grid was extended eastwards to include further parts of the Russian Federation and Kazakhstan, as well as Uzbekistan, Turkmenistan and Tajikistan. Due to the insufficiency of the officially reported data, emissions from the extended areas were only estimated and imply significant uncertainties. For 2008, SO₂ emissions in the extended areas were estimated at 6,552 Gg; NO_x emissions at 2,063 Gg; NH₃ emissions at 1,413 Gg; and emissions of NMVOCs at 1,439 Gg.

²⁰ Insert figure: Emission trends of sulphur in the EMEP area 1990–2008 and 2010.

²¹ Insert figure: Emission trends of NO_x in the EMEP area 1990–2008 and 2010.

²² Insert figure: Emission trends of ammonia in the EMEP area 1990–2008 and 2010.

²³ Insert figure: Emission trends of NMVOCs in the EMEP area, 1990–2008 and 2010.

²⁴ Insert figure: Emission trends of POPs in the EMEP area, 1990–2008 and 2010.

²⁵ Insert figures: Emission trends in North America.

71. Subject to the approval for its publication by the Executive Body, the final 2010 review will include for SO₂, NO_x, ammonia, NMVOCs and PM, gridded maps on emissions in 2008; figures presenting sources of emissions by sector in the EMEP area; and emission reductions per country (1990–2008).

B. Trends in effects

72. There are a number of health and environmental effects from air pollution. The Working Group on Effect's six ICPs and the Task Force on Health identify the most endangered areas, ecosystems and other receptors by considering damage to human health, terrestrial and aquatic ecosystems and materials. They also track the status and trends of the effects still being observed. The effects-oriented work has initiated and supported the development of air pollutant emission reduction protocols under the Convention. In addition, the effects-oriented activities have considered aspirational targets to describe the potential status of the environment and human health. Aspirational targets were set up for the year 2050. These help with setting targets for 2020, which should be in the pathway for the aspirational targets.²⁶

73. For human health effects, the current levels in the WHO Air Quality Guidelines²⁷ should be considered as the health-related targets for air quality. The most recent data available for analysis relate to 2008 and cover 32 European countries. A small decrease of coarse PM (PM₁₀) levels has been observed in 2007–2008 compared with the period 2000–2006. However, about 90% of the urban population of Europe continues to live in cities where the WHO levels for annual mean PM₁₀ are exceeded. Monitoring of fine PM (PM_{2.5}) is expanding and is conducted in about 500 locations. In Eastern Europe, the Caucasus and Central Asia monitoring of PM is still very limited. Research continues to demonstrate the effects of PM on mortality and cardiopulmonary disease in children, adults and the elderly.

74. The Task Force on Health has concluded that ozone was one of the air pollutants with the most important negative health impacts in Europe. It was associated with 21,000 annual premature deaths in 25 EU member States. New areas of research include the impacts on neurological effects (migraines and cognitive performance). Recent observations in both North America and Europe have shown that as concentrations of ozone increase (due to human activities or episodes of very hot weather), health effects become increasingly numerous and severe. Current policies would not be sufficient to reduce impacts significantly during the next decade.

75. Harmful exposures were defined for several selected POPs. The Task Force on Health is currently preparing a hazard assessment of the five new substances considered for inclusion in the Protocol on POPs, namely endosulfan, dicofol and hexabromocyclododecane, pentachlorophenol and trifluralin. For Heavy Metals, the Task Force assessed the health effects and concluded that further emissions of cadmium into the atmosphere or soil should be avoided, concentrations of mercury in fish should be reduced and emissions of lead into the atmosphere should be kept as low as possible.

76. Trends in the effects on materials identified by ICP Materials over the period 1987–1997 showed decreasing trends in corrosion of all trend materials (carbon steel, zinc and limestone). During 1997–2003 the corrosion rate of carbon steel continued to decrease, but the corrosion rate of zinc and limestone increased slightly. Additional actions are needed in

²⁶ Insert figure: Effects of pollutants covered by the Convention's protocols.

²⁷ WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide — Global update 2005: Summary of risk assessment.

order to meet the 2020 and 2050 targets for protecting infrastructure and cultural heritage, as there were no substantial changes in corrosion compared with the exposures in 2005–2006 and 2008–2009.

77. Effects on forests have been assessed through crown condition observations at 6,000 ICP Forests “extensive monitoring sites”. Today, as a result of air pollution control measures implemented under the Convention, acidic deposition has decreased. Despite this success, critical loads for sulphur are still exceeded on a quarter of the monitoring plots studied and critical loads for nitrogen are exceeded on over 65% of the plots studied, particularly those in Central Europe. For 2010, ICP Forests calculated 10 years of deposition time trends for the mean of 150 forest monitoring plots. The decrease in sulphate inputs was confirmed, and 50% of the plots showed a decrease, but no trends could be detected on the rest of the plots. Soil acidification remained a possible threat to forest vegetation in parts of Europe. There were hardly any visible trends for nitrogen compounds.

78. Freshwaters in Europe and North America are responding positively to decreasing emissions of sulphur and nitrogen. However, the trend assessment on acidification in aquatic ecosystems up to 2004 by ICP Waters showed that acidification remained a problem in some parts of Europe, although its effects were decreasing in Western Europe. The biological recovery is slow and not widespread.

79. The work of ICP Waters has recently focused on mercury in aquatic ecosystems and the effects of nitrogen deposition on nutrient-poor aquatic ecosystems. It has shown considerable evidence that nitrogen enrichment through nitrogen deposition affected primary production in nutrient-poor boreal and Arctic lakes. The finding challenged the reigning paradigm of freshwater primary productivity being limited by phosphorus, suggesting that additional nitrogen did not affect the growth of algae and other organisms. Assessment of mercury in water, lake sediments and fish, has shown that mercury concentrations in fish were increasing in northern boreal lakes. Levels in fish in Europe and North America were frequently above thresholds advised for human consumption. The high and increasing mercury concentrations in fish were in contrast to the low concentrations in water and in lake sediment data, indicating reduced mercury deposition since the 1990s.

80. ICP Integrated Monitoring has calculated site-specific critical loads for acidification, showing evidence of decreasing lead concentrations in organic layers of soil and of decreasing cadmium. Mercury showed no sign of decrease. On the basis of the critical loads of acidification of aquatic ecosystems calculated at 16 Integrated Monitoring sites, only 4 sites (25%) can be considered protected from surface water acidification in 2010. Seven sites will be protected from surface water acidification in 2020 if sulphur deposition decreases as expected. ICP sites in Northern Europe also indicate recovery from acidification. The situation regarding nitrogen is quite different, with few decreasing trends in deposition and both decreasing and increasing trends in run-off/soil water.

81. ICP Vegetation recently reviewed evidence of widespread ozone damage to vegetation in Europe. At the local scale, there was evidence of higher ozone damage in years with higher ozone concentrations in regions where climatic conditions were conducive to high ozone fluxes. Current ambient ozone concentrations in the Mediterranean area induced negative impacts on the production and quality of many agricultural and horticultural crop species of economic importance. Despite the high ozone concentrations frequently experienced in Mediterranean areas, observed ozone impacts were often less severe than expected due to interactions with other environmental stresses such as drought. ICP Vegetation concluded that air pollution abatement strategies based on protecting only human health would not protect vegetation from adverse effects of ozone in Northern Europe.