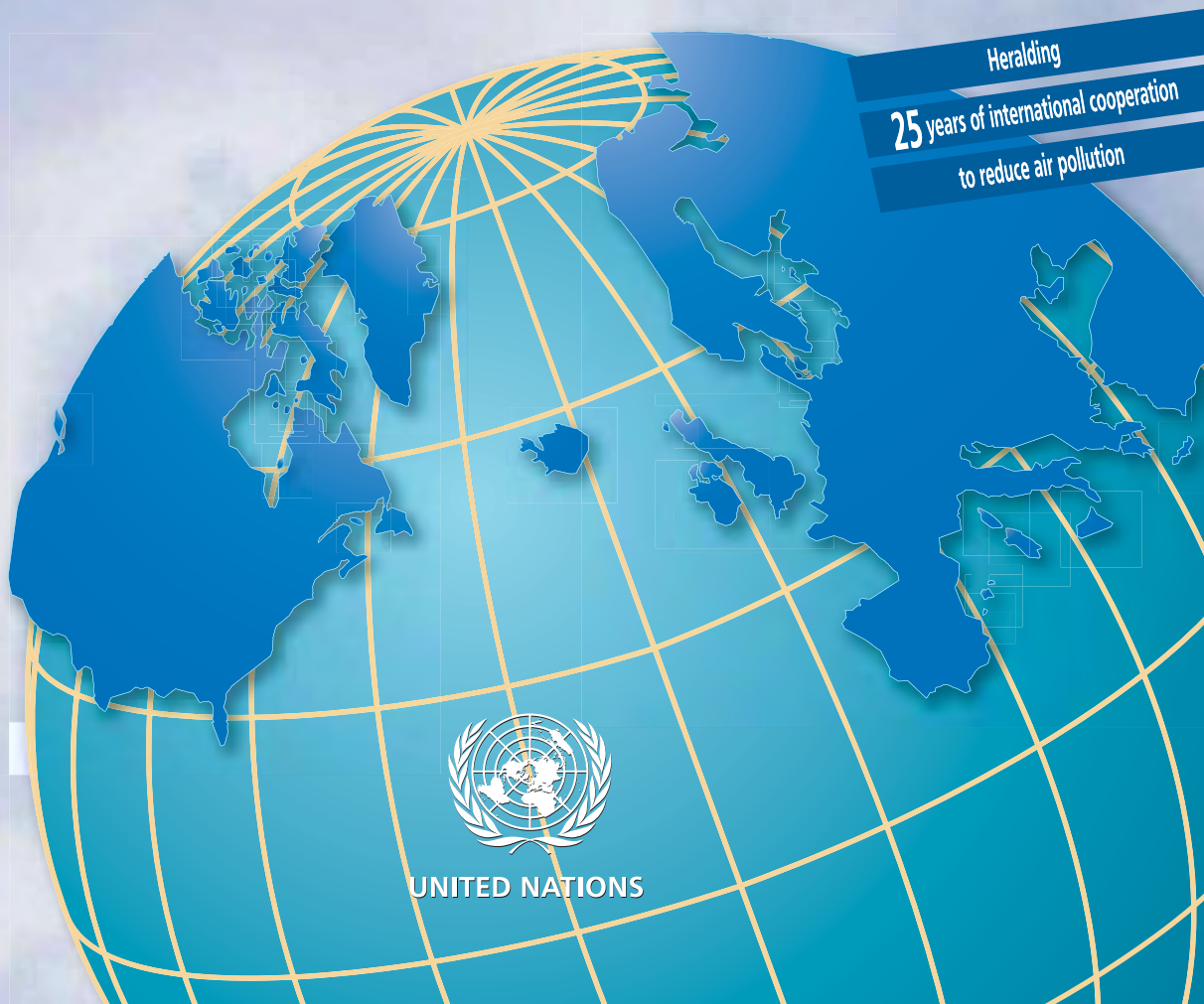
ECONOMIC COMMISSION FOR EUROPE

CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION

Strategies and Policies for Air Pollution Abatement



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ECONOMIC COMMISSION FOR EUROPE

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STRATEGIES AND POLICIES FOR AIR POLLUTION ABATEMENT

2002 Review prepared under
The Convention on Long-range Transboundary Air Pollution

United Nations
New York and Geneva, 2004

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In United Nations texts, the term "ton" refers to metric tons (1,000 kg or 2,204.6 lbs).

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Preface

The Convention on Long-range Transboundary Air Pollution, signed at Geneva in 1979, is a landmark international agreement. For the past 25 years it has been instrumental in reducing emissions of transboundary air pollution in the ECE region through coordinated efforts on research, monitoring and the development of emission reduction strategies on regional air pollution and its effects. This publication demonstrates successful implementation of the Convention in summarizing the policies, strategies and measures used by Governments to tackle the problems of air pollution and to minimize the effects on human health and ecosystems.

The 2002 Review of Strategies and Policies for Air Pollution Abatement is based on replies by Parties to the Convention to the 2002 questionnaire on strategies and policies. The questionnaire asked Parties for information on protocols in force and those not yet in force, as well as general policy information related to the integration of environmental policies with economic, transport, energy, waste management, spatial planning and other policy frameworks. Each of the seven protocols to the Convention now in force includes reporting obligations by Parties. Providing information to the secretariat by means of the questionnaire is one method Parties use to convey the information in accordance with their reporting obligations under the Convention.

The overall aim of the reviews of strategies and policies is:

- To assess the progress made by Parties and the region as a whole in implementing obligations under the Convention and its protocols and to further their implementation;
- To facilitate the exchange of information between Parties, which is foreseen in the Convention and its protocols; and
- To raise awareness about the problems of air pollution, as well as to make the contribution of the Convention to its successful abatement more visible.

As of 13 April 2004, 48 member countries of ECE and the European Community were Party to the Convention. The Review reflects the continued efforts made by Parties to comply with their obligations under international environmental agreements, and to contribute to a cleaner environment in the region.

Executive Summary

The 2002 Review was prepared on the basis of replies to a questionnaire on strategies and policies for air pollution abatement received from 35 of the 49 Parties to the **Convention on Long-range Transboundary Air Pollution**. The questionnaire, circulated every two years, is used as a tool for determining compliance by Parties to the Convention and its protocols, as well as for the collection and dissemination of more general information on air pollution abatement technologies and trends. The Review shows that Parties are pursuing creative and innovative approaches to reducing air pollution, as well as drawing on the successes of those methods and measures that have proved effective over the years.

National strategies, policies and programmes used by Governments to abate or reduce sulphur emissions under both the **Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent** (Helsinki, 1985) and the **Protocol on Further Reduction of Sulphur Emissions** (Oslo, 1994) include the converting of industrial, utility and domestic thermal and electric power sources from coal and fuel oil to natural gas, reducing consumption of high-sulphur fuel oil and making use of local fuels (peat, associated petroleum gas, wood and wood residues), and the promotion of clean technologies. To reduce emissions from mobile sources, Parties are promoting the use of compressed natural gas and liquified petroleum as motor fuels and encouraging sustainable mobility.

The **Protocol concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes** (Sofia, 1988) calls on Parties to apply national emission standards to all major source categories and new stationary and mobile sources using economically feasible Best Available Technologies (BAT), while developing pollution control measures for existing stationary sources. Parties must also make unleaded fuel sufficiently available to encourage the use of vehicles with catalytic converters. For stationary sources, a combination of flue-gas recycling and multi-stage combustion helped to reduce NOx emissions. For mobile sources, most Parties have national emission standards in place and are using a policy mix including the use of economic instruments (e.g. excise duties on petrol and diesel) and making unleaded petrol sufficiently available, particularly along main international transit routes. Twenty-seven countries reported that they had phased out the use of leaded petrol for on-road vehicles.

The **Protocol concerning the Control of Emissions of Volatile Organic Compounds (VOCs) or their Transboundary Fluxes** (Geneva, 1991) requires Parties to reduce their VOC emissions by 30% by 1999, from those with base years from 1984 to 1990, and to maintain them below those levels. By

1999, 13 of the 21 Parties to the Protocol had achieved the required emission levels and remained below these levels in 2000. National strategies, policies and programmes used to achieve this include command and control measures and economic instruments such as licensing and permits that enforce emission standards, and taxes and charges on the polluters in industry, refineries, services and transport. Some countries have succeeded in reducing VOC emissions in the transport sector by providing subsidies for the purchase of electric vehicles, promoting public transport, encouraging car pooling and supporting pedestrians.

The **Protocol on Persistent Organic Pollutants (POPs)** (Aarhus, 1998) and the **Protocol on Heavy Metals** (Aarhus, 1998) had not yet entered into force when the questionnaire was circulated, but many Parties provided information voluntarily on policies and practices in place to reduce or abate the substances covered by the two Protocols which entered into force in 2003. The POPs Protocol covers 16 substances, 11 pesticides, 2 industrial chemicals and 3 by-products or contaminants. The Protocol aims to control, reduce or eliminate discharges, emissions and losses of POPs into the environment by either banning the production and use of some products, or severely restricting their use. Specific techniques to reduce the levels of POPs include: setting targets, standards and emission limit values, instituting BAT, requiring licences and permits, encouraging responsible energy and transport consumption, installing industrial filters and treatment devices, and prohibiting/restricting the production and consumption of POPs. The Heavy Metals Protocol aims to control the emission of three priority metals: cadmium, lead and mercury. The most common strategies to tackle pollution from heavy metals are: economic instruments; voluntary agreements; conservation; clean energy sources; clean transport systems; phasing out of processes that emit heavy metals and product control measures.

The **Protocol to Abate Acidification, Eutrophication and Ground-level Ozone** (1999, Gothenburg) aims to simultaneously address these three effects by controlling the pollutants that cause them, namely sulphur, NOx, VOCs and ammonia. Though the Protocol had not yet entered into force when the questionnaire was circulated, Parties provided, on a voluntary basis, information on limits set for specific emission sources and examples of BAT and control measures to abate these pollutants. As the only Protocol to specifically address ammonia emissions, the Gothenburg Protocol has given an impetus to Parties in developing national codes of recommendations for good agricultural practices to reduce ammonia emissions, as most ammonia emissions originate from this sector.

Parties were asked about the degree to which their environmental policies were integrated with other policies, such as transport, energy, industry, agriculture, waste management, finance, climate, spatial planning and nature conservation. In the transport sector, for example, the use of economic instruments to meet environmental goals was considered important for many countries; these included taxes on emissions ("polluter pays"), fuel taxes and taxes imposed on motor vehicles. Subsidies in support of electric vehicles, public transport and extra-low sulphur fuel are used in some countries, as well as tax incentives for ethanol-blended fuel.

With a quarter of a century of achievements behind it, the Convention is focussing now on the review and possible revision of existing Protocols, including new issues not currently covered, such as particulate matter, as well as placing increased emphasis on the effects of air pollution on human health and linkages with climate change. The success of the Convention and its protocols will go a long way towards cleaner air in Europe and North America, and is a useful model for developing effective strategies and policies for other regions.

Introduction

To help Parties report on their obligations and to provide a basis for review, the Executive Body, at its nineteenth session, approved the 2002 draft questionnaire on strategies and policies for air pollution abatement (EB.AIR/2001/2). The questionnaire was made available to Parties on the Internet between 15 February and 31 May 2002. Information supplied by other means was collected up to 15 July 2002. Emission data used were those up to 31 March 2002, although late submissions from Germany, Greece and the European Community were also taken into consideration where possible. As requested by the Executive Body, the replies provided by Parties are available on the Convention's web site: http://www.unece.org/env/eb/2002questionnaire.htm. A review based on the replies and other information is presented below in accordance with the work-plan of the Executive Body (ECE/EB.AIR/75, annex VI, item 1.3).

This review was prepared from Parties' replies to the strategies and policies questionnaire, their reported emission data and other available information. It was submitted to the Executive Body for approval to enable the secretariat to arrange for its publication, in three languages, in a form suitable for delegates, governments, the public, the press, international research and scientific communities and other stakeholders.

I. THE CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION

The Convention on Long-range Transboundary Air Pollution was adopted in 1979, establishing a broad framework throughout European and North American regions covered by the United Nations Economic Commission for Europe (UNECE) for cooperative action on air pollution. The Convention is a landmark international agreement that coordinates efforts on research, monitoring, and the development of emission reduction strategies on regional air pollution and its effects. It was the first international agreement to recognize both the environmental and human health problems caused by the flow of air pollution across political borders and the need for regional solutions. Forty-eight countries and the European Community are party to the Convention. (See figure 1: Parties to the Convention.)

The Convention has set up a process for negotiating concrete measures to control specific pollutants through legally binding protocols. Since 1984, eight protocols have been adopted, five of which had entered into force when the 2002 questionnaire was circulated.[1] Those in force call for the reduction of emissions and transboundary fluxes of sulphur (SO_2), nitrogen oxides (NOx) and volatile organic compounds (VOCs). The two protocols that recently entered into force target emissions of heavy metals and persistent organic pollutants (POPs); the one protocol not yet in force calls for the abatement of SO_2, NOx, ammonia and VOCs, which cause acidification, eutrophication and ground-level ozone. The web site for the Convention provides more details http://www.unece.org/env/lrtap.

II. ACTIVITIES WITHIN THE FRAMEWORK OF THE CONVENTION

As a result of Convention activities, more than one thousand scientists and other experts are linked in an information network, greatly increasing information sharing. The Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) and the Convention's Working Group on Effects provide governments and the Convention's Executive Body with qualified scientific information to support the evaluat ion and further development of the protocols negotiated

[1] The 1998 Protocol on POPs entered into force on 23 August 2003; the 1998 Protocol on Heavy Metals entered into force on 29 December 2003.

under the Convention. The Working Group on Strategies and Review is the primary negotiating body, while the Executive Body leads the Convention and has overall authority. (See figure 2: The organizational structure of the Convention).

EMEP is comprised of four main elements: (a) collection of emission data; (b) measurements of air and precipitation quality; (c) modelling of atmospheric transport and deposition of air pollution; and (d) integrated assessment modelling. EMEP prepares reports on data related to emissions, air quality and deposition, and develops the science necessary to do its work in these areas. For more detailed information on the work of EMEP, see http://www.emep.int.

To develop the necessary international cooperation in the research on and the monitoring of pollutant effects, the Working Group on Effects was established under the Convention. The Working Group on Effects provides information on the degree and geographic extent of the impacts on human health and the environment of major air pollutants, such as sulphur and nitrogen oxides, ozone, and heavy metals. The Working Group on Effects manages six international cooperative programmes (ICPs) that study the effects of air pollution, and their trends, for forests, waters, materials including cultural heritage, vegetation including crops, ecosystem monitoring and the mapping of critical loads and levels (see figures 3 and 4: Critical load maps for sulphur and nutrient nitrogen). There is also a joint task force, with the World Health Organization (WHO), that considers the health effects of air pollution http://www.unece.org/env/wge.

An Implementation Committee reviews compliance of Parties with their obligations under the Convention and its protocols. In addition, a number of expert groups, reporting to the Working Group on Strategies and Review, provide information on economic benefits and technical measures related to air pollution abatement and other issues related to the current priorities.

III. 2002 REVIEW OF STRATEGIES AND POLICIES FOR AIR POLLUTION ABATEMENT

The information in this Review is derived in large part from replies from Parties to the 2002 questionnaire on strategies and policies for air pollution abatement. The purpose of the questionnaire was to assist Parties with their reporting obligations under the Convention and its protocols and to provide an overview of air pollution abatement in the ECE region.

Parties were required to answer questions relating to their specific obligations to each protocol in force for them. The following 35 Parties to the Convention responded to all or some of the questionnaire, although replies to individual questions on protocols were often dependent on whether countries were Party to that protocol: Armenia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Kazakhstan, Latvia, Liechtenstein, Monaco, Netherlands, Norway, Poland, Portugal, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and the United States. The following 12 Parties to the Convention did not respond at all to the questionnaire: Bosnia and Herzegovina, Georgia, Iceland, Kyrgyzstan, Lithuania, Luxembourg, Malta, Republic of Moldova, Romania, the former Yugoslav Republic of Macedonia, Serbia and Montenegro and the European Community. The reply from Ukraine was received too late to be reflected in the present publication. Azerbaijan was not a Party to the Convention when the questionnaire was made available. Detailed tables on response rates for each question are available on the Convention's web site.

IV. EMISSION LEVELS AND TRENDS

Under the Convention, the reporting of high-quality emission data is essential both in assessing the state of air pollution within the UNECE region and in establishing the compliance of the Parties with protocol commitments. By 31 January 2002, Parties were expected to submit to the UNECE secretariat their official emission data for sulphur dioxide (SO_2), nitrogen oxides (NOx), ammonia (NH_3), non-methane volatile organic compounds (NMVOC), carbon monoxide (CO), particulate matter (total suspended particulates (TSP); particulate matter <10 mm and <2.5 mm), heavy metals and selected persistent organic pollutants (POPs) for 1980-2000 and projections for 2010 and 2020. More detailed information and the revised Emission Reporting Guidelines can be accessed at http://webdab.emep.int/.

For this Review, emission data are those submitted by Parties in 2002 for their 2000 emissions. Emission totals for the major air pollutants were reported by approximately 77% of the Parties to the Convention.[2] The trends in SO_2, NOx, and NMVOC presented here show pollutants covered by the protocols in force.

European SO_2 emissions showed a clear downward trend. The total emissions of SO_2 in 2000 were 60% lower than in 1980 (see figure 5: Emission trends of sulphur in the EMEP area, 1980-2001, 2010). The emissions of NOx were relatively constant in the early 1980s, then slightly increased in the late 1980s and steadily decreased throughout the 1990s. The NOx reduction was 25% between 1990 and 2000 (See figure 6: Emission trends of nitrogen oxides in the EMEP area 1980-2001, 2010). NMVOC emissions refer to anthropogenic releases only. There was a downward trend in the 1990s, leading to a drop of 30% between 1990 and 2000. (See figure 7: Emission trends of volatile organic compounds in the EMEP area, 1980-2001, 2010).

Emission trends estimates for SO_2, NOx and VOCs for both the United States and Canada are shown in figures 8-10. Overall, a 38% reduction in SO_2 emissions is projected in Canada and the United States from 1980 to 2010. VOC emissions in Canada and the United States are expected to decline by 40% between 1980 and 2010 (see figures 8-10: Canada/United States total emissions for SO_2, 1980-2010; NOx, 1990-2010; and NMVOCs, 1980-2010).

In addition to the joint emission trends data, 1999 data on sources of emissions by sector are presented in figures 11-16 (see figures 11 and 14: Sectoral emission of SO_2 in United States and Canada, 1999; figures 12 and 15: Sectoral emission of NOx in United States and Canada, 1999; figures 13 and 16: Sectoral emission of VOCs in United States and Canada, 1999.[3])

Gridded maps showing European emissions in 2001 for SO_2, NOx, ammonia, NMVOCs, and carbon monoxide are shown in figures 17-21 in the annex. Sources of emissions by sector for the EMEP area are shown in figures 22-24.

V. EXTENT OF IMPLEMENTATION AND PROGRESS OF NATIONAL POLICIES AND STRATEGIES FOR THE PROTOCOLS IN FORCE

This section summarizes the extent of implementation and the progress of national policies and strategies for the four substantive protocols that were in force when the questionnaire was circulated in 2002, based on officially submitted emission data and the 2002 questionnaire replies.

Parties to the Convention have generally developed action plans or long-term programmes to implement their national strategies. These programmes can be made up of a host of regulations, decrees or directives. Some Parties have constitutional laws in place

[2] When official information is not available, emissions are estimated based on information from available sources and often in collaboration with the Centre for Integrated Assessment Modelling (CIAM). Wherever possible, figures reported under the CORINAIR Programme (1985, 1990 and 1994) substitute missing values. Projections for 2010 shown in figures 5-7 are based on the emission ceilings from the Gothenburg Protocol for Signatories to the Protocol, on reported projections, and CIAM's current legislation scenario. When none of the above sources is available, the latest reported value is used. "Present State of Emission Data" (EB.AIR/GE.1/2002/8).

[3] Source: United States-Canada Air Quality Agreement, 2002 Progress Report.

and many (in particular European Community (EC) Member States and applicant countries) refer to EC directives. EC directives are a set of provisions set out by the Economic Council of the European Union. Parties meeting these provisions often drew attention to this rather than provide detailed information. Some Parties set emission reduction targets based on Protocol obligations or domestic policy, whilst others set goals and requirements for achieving national air quality standards. Air quality standards or target levels are regulatory measures that frequently serve as a reference for other standards (e.g. fuel quality, control technology) designed to achieve a desired level of air quality. Target loads or deposition standards, often established after consideration of critical loads, play a similar role by providing a basis for other policy measures. A mix of instruments is used in most cases, though the different types of measures should be complementary. Parties' responses generally referred to their framework for regulation and cited the appropriate directives, policies and/or regulations.

There is a series of requirements to apply the best available techniques, which are economically feasible, through national emission standards to new mobile and certain stationary sources, and to apply pollution control measures to certain existing sources. The best available techniques, and the extent to which they are economically feasible, are a matter of judgement. In some countries, these concepts are explicitly stated in environmental legislation, whereas others stipulate their use in the permits and licences for undertaking potentially polluting activities. Emission standards for the control of air pollutants either set maximum permissible quantities for specific sources and for specified pollutants, or require specific technological controls to be applied. Emission standards can be set industry by industry, plant by plant or on the basis of national emission standards for specific pollutants. These requirements are discussed below. More detailed definitions are provided in the protocols to the Convention and their annexes.

There are several general issues that the protocols address which, for purposes of this summary, are summarized together in chapter VII, general information from protocol-related questions. These issues are exchange of technologies, public participation, and research and development.

A. 1985 Sulphur Protocol

22 Parties (as of 13 April 2004):
Austria, Belarus, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Russian Federation, Slovakia, Sweden, Switzerland and Ukraine.

The 1985 Helsinki Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent, which entered into force in 1987, contains two requirements of Parties that remain of particular relevance. The first is to make a 30 per cent cut in emissions (or their transboundary fluxes) by 1993 from the levels recorded for 1980 and to maintain these reductions. For this, Parties develop national policies, strategies and programmes, and report progress to the Executive Body. The second is to report sulphur emissions annually to the Executive Body.

According to the emission reporting programme approved as part of the EMEP workplan, and in line with the revised Emission Reporting Guidelines, the deadline for submitting 2000 data and updating data from previous years and projected data was 31 January 2002. Based on official submissions in 2001, 21 of the 22 Parties to the Protocol (Austria, Belarus, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Liechtenstein, Luxembourg, Netherlands, Norway, Russian Federation, Slovakia, Sweden, Switzerland and Ukraine) made the required reductions by 1993 and were below these levels in 2000.

Data for 2000 were received too late from Germany and Italy to be reflected here. However, Germany and Italy had maintained the required reductions up to 1999.

The Convention's Implementation Committee in considering this Protocol and the 1994 Sulphur Protocol has concluded (EB.AIR/1999/4, paras. 30-32) that, after the year 2000, compliance with the 1994 Sulphur Protocol also constituted compliance with the 1985 Sulphur Protocol for all Parties that were Parties to both protocols. However, reporting under the 1985 Sulphur Protocol will still be required for those Parties that are only Party to the 1985 Sulphur Protocol. The information on national strategies, policies and programmes for countries that are Party to both the 1985 Sulphur Protocol and the 1994 Protocol on Further Reduction of Sulphur Emissions is summarized under section D.

National strategies, policies and programmes

Belarus, Bulgaria, Estonia, the Russian Federation and Ukraine are the countries that are Party to the 1985 Sulphur Protocol but not to the 1994 Sulphur Protocol. Priority measures to reduce sulphur emissions in Belarus entail converting industrial, utility and domestic thermal and electric power sources from coal and fuel oil to natural gas, reducing consumption of high-sulphur fuel oil and making use of local fuels (peat, associated petroleum gas, wood and wood residues). In 2000, the share of natural gas relative to all other fuels was about 80%, but as much as 93% at large power-generating facilities (thermal power stations). Emissions of sulphur compounds from mobile sources are being reduced, with more than 70% of diesel fuel being low-sulphur. Belarus is also taking steps to convert mobile sources to the use of compressed natural gas and liquefied petroleum as motor fuels. Belgium (Brussels capital region) has developed a system of permits, impact evaluations, monitoring and controls, and promotion of clean technologies. In the Walloon region the reduction of sulphur comes under the rubric of EU Directive 84/360; in the Flemish region concrete actions include emission reduction programmes for SO_2 in industry, strengthening of emission limit values for combustion processes and efficient replacement and maintenance of central heating systems. Bulgaria continues sulphur emission reduction policies and has developed a National Strategy for Energy Development. Estonia is implementing legislation regarding emission limit values for large combustion plants and has a programme to reduce emissions from existing large combustion plants. The Russian Federation has adopted a federal law on atmospheric air protection and an ecological programme for heat and hydraulic power plants for the period until 2005. The Russian Federation's emissions of SO_2 have decreased and these are meeting the ceilings established by the 1994 Sulphur Protocol. Belgium, in the Flemish region, developed a web site to inform consumers about how environmentally friendly new cars are. In both the Walloon region and the Brussels capital region, information and public awareness campaigns were developed to promote clean technologies and sustainable mobility.

Ukraine, a Party to the 1985 Sulphur Protocol, did not provide a response in time to be reflected in the present document. Luxembourg is a Party to both the 1985 Sulphur Protocol and the 1994 Sulphur Protocol, but did not respond to questions for either Protocol.

B. 1988 Protocol on Nitrogen Oxides

28 Parties (as of 13 April 2004):
Austria, Belarus, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Russian Federation, Slovakia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, United States and European Community.

The 1988 Sofia Protocol concerning the Control of Emissions of Nitrogen Oxides (NOx) or their Transboundary Fluxes entered into force in 1991. It requires Parties to take effective measures to ensure NOx emissions at the end of 1994 and the following years are no higher than those in 1987 (except for the United States, whose base year for NOx is 1978). In addition, six months after the Protocol's entry into force, its Parties must cooperate to establish critical loads and related emission reduction objectives with a timetable for action. Parties negotiate on further reductions, taking these into account. They should also facilitate the exchange of technology through direct industrial contacts, joint ventures, technical assistance and commercial exchange.

By 1993, Parties must apply national emission standards to all major source categories and new stationary and mobile sources using economically feasible best available techniques (BAT), while developing pollution control measures for existing stationary sources. Parties must also make unleaded fuel sufficiently available to encourage the use of vehicles with catalytic converters. Emission reporting requirements mirror those for the 1985 Sulphur Protocol.

Based on official submissions due 31 January 2002 (2000 data), including updates for previous years, for 24 of the 28 Parties to the Protocol (Austria, Belarus, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Russian Federation, Slovakia, Sweden, Switzerland, Ukraine, United Kingdom and the European Community), NOx emissions at the end of 1994 and subsequently were no higher than those in 1987, as required by the Protocol. Four Parties (Ireland, Greece, Spain and the United States) showed increases in NO_2 emissions during this period (Greece: from 285 Gg/ NO_2 in 1987 to 320 Gg/NO_2 in 2000; Ireland: from 115 Gg/NO_2 in 1987 to 125.1 Gg/NO_2 in 2000; Spain: from 1121 Gg/NO_2 in 1987 to 1419 Gg/NO_2 in 2000; United States: from 20654 Gg/NO_2 in 1987 to 21713 in 2000). The compliance of Greece, Ireland and Spain has been subject to review by the Implementation Committee. The United States continued to reassess its base year (1978) emission estimates for NOx. Italy did not report its annual emissions in 2002 (2000 data), although previous submissions indicated it had met its NOx requirements under the Protocol. (See figure 23: Anthropogenic emissions per sector of NOx in 2001 within the EMEP area and figure 25: Reductions in emissions of NOx in the ECE region, 1990-2000).

National strategies, policies and programmes

Twenty-five Parties to the Protocol and Croatia and Poland provided information on national strategies, policies and programmes that specifically address the control and reduction of NOx emissions or their transboundary fluxes. Some Parties referred to programme, policy or strategy documents that were written specifically to implement this Protocol or all protocols of the Convention to which they are Party. In other cases, Parties referred to EU directives or national plans and programmes. The tenor of responses made it clear that all responding Parties had such programmes, policies and strategies in place to address the requirements of the Protocol.

For example, the Czech Republic approved a new Clean Air Act, which came into force on 1 June 2002. This will create the legal framework for fulfilling the regulations and requirements of all Protocols to the Convention. France had specific regulations in place that targeted certain geographical zones characterized by significant air pollution, namely Paris, Lyons, Marseilles, Rouen and Strasbourg. Austria was working on new strategies to further reduce NOx in view of the Gothenburg Protocol. The Netherlands, Slovakia and the United Kingdom had national policies that set long-term strategic

objectives for reducing NOx and other major air pollutants. Spain was drawing up the 2001 to 2011 Infrastructure Plan, which would include gas and renewable energies as the main components of new electricity generation. The European Community did not respond, but its 2000 reply indicated that it was assessing the projected air quality in 2010 and establishing a framework within which different policy options to reduce emissions could be assessed using the principles of cost-effectiveness, sound science and transparency. This assessment will provide the foundation towards longer-term air quality studies covering all emission sources. Although Poland is not a Party to the 1988 NOx Protocol, it reported having a national policy with a gradual emission reduction of NOx which fulfilled all major Protocol obligations.

Estonia reported that existing plants did not meet emission limit values laid down in the Large Combustion Plant Directive. However, on 25 July 2000, the Government of Estonia adopted a programme to reduce emissions of existing large combustion plants to fulfil the obligations of the Convention. Two Parties to the Protocol, the European Community and Luxembourg, did not reply to this or any other part of the questionnaire.

Stationary sources

There is a requirement to apply the best available technologies that are economically feasible through national emission standards to new stationary sources and to apply pollution control measures to certain existing sources in the major stationary source categories. Major source categories and limit values were listed or referred to by the majority of the Parties to the Protocol. Twenty-five Parties to the Protocol, and Poland and Portugal, provided adequate information on national emission standards for new and substantially modified stationary sources and major stationary source categories. The major sources of NOx emissions identified by the Parties included: utility power stations, boilers at thermal electric and district heating plants, commercial boiler plants, industrial combustion plants, process heaters, production of cement, lime, glass, rolled steel, nitric acid production, stationary combustion turbines, blast furnaces, sinter plants, production of coke, production of iron and steel, grey iron foundries, processing of magnesite and production of basic fire-resistant materials, municipal and hazardous waste incineration, fertilizers, and pulp mills. Belgium, Bulgaria, Spain and Sweden mainly referred to the EC Directive for Large Combustion Plants.

Twenty-two Parties to the Protocol and Portugal adequately reported their progress on major stationary source categories and pollution control measures for existing sources. Most Parties had set emission standards and/or limit values for existing stationary sources.

For existing sources, Belarus combined flue-gas recycling and multi-stage combustion, which helped reduce NOx emissions from existing sources on average by 30%. In addition, Belarus reported that by 2010 it expected wider use of steam-gas turbines, wind-power installations and small hydropower plants for electricity and thermal power generation. Austria, Bulgaria, Canada (Ontario), Germany and Switzerland apply the same standards to some existing sources that they apply to new sources. Stationary sources contribute less than 10% of total NOx emissions in France. For existing sources, France had in place low NOx burners in certain thermal power stations. Many Parties used a licensing or permit procedure where the BAT principle is applied to fix the emission limit values for stationary sources.

In addition to other emission limiting regulations to address ozone non-attainment, Canada and the United States also control NOx emissions from stationary sources using the emissions cap concept; they report this to be a cost-effective way to achieve emission reductions. Slovakia also uses economic

incentives and cost-effective air pollution abatement strategies for existing stationary sources.

The Russian Federation did not provide sufficient information to answer all parts of the question; it stated that evaluating progress made in introducing NOx control measures for existing major stationary sources is practically impossible because of the contraction of production since 1990. Four Parties to the Protocol, Estonia, Luxembourg, the United Kingdom and the European Community, did not respond to the question on existing stationary sources.

Mobile sources

Twenty-four Parties to the Protocol and Poland provided sufficient information on national emissions standards applied to new mobile sources. Most Parties reported emission standards for mobile sources. Some Parties listed their standards in the tables of the questionnaire. Many Parties referred to EU directives. Several Parties provided additional information.

For example, the largest mobile source category in Norway is ship and boat traffic, including fishing vessels. Emissions from its road traffic are attributed to diesel- and petrol-driven vehicles. Norway's Road Traffic Act resulted in the introduction of three-way catalytic converters for cars. Austria had additional standards for boats and ships on Lake Constance according to an agreement with Germany and Switzerland. The Netherlands had additional temporary fiscal measures to promote early compliance with EU directives. Ireland had an increased excise duty on petrol and diesel. The United States promulgated new tailpipe emissions and low-sulphur fuel standards for light-duty vehicles in December 1999. These standards included new requirements for sport utility vehicles. In addition, heavy-duty engine regulations were tightened in 2000. The United States had already published, in 1996, a number of rules applying standards to many categories of non-road engines. Canada was developing regulations in 2002 to align Canadian emissions standards for on-road sources with those of the United States.

Some Parties referred to emission standards but failed to specify the new mobile source categories considered to be major source categories. The Russian Federation has developed a federal target programme for reducing the environmental impact of motor transport emissions. While this programme does not mention emission standards, it makes provision for a number of measures to improve national vehicles up to 2010.

Unleaded petrol

There is a requirement to make unleaded fuel sufficiently available to facilitate the circulation of vehicles fitted with catalytic converters, particularly along main international transit routes. Twenty-three Parties to the Protocol and Monaco, Poland, Portugal and Slovenia reported that they had phased out the use of leaded petrol for on-road vehicles.

Bulgaria's deadline for the complete phase-out of leaded petrol is 31 December 2003. Croatia (not a Party to the Protocol) will phase out leaded petrol in 2005. Both Bulgaria and Croatia reported on the availability of unleaded petrol. The consumption of unleaded petrol in Bulgaria in 2000 was 249,140 tons, 38% of the total petrol consumption, compared with 149,000 tons in 1999. The bulk of unleaded petrol produced in Bulgaria is exported. The Russian Federation reported that it planned to end the use of leaded petrol in its territory by 2005, and to increase the share of petrol and diesel fuel with improved ecological characteristics to 20% of the total volume output.

Critical load data

A "critical load" is a quantitative estimate of the exposure to one or more pollutants

below which significant harmful effects on specified sensitive elements of the environment do not occur, according to present knowledge. Nineteen Parties to the Protocol and Croatia and Poland responded that they had provided critical load data to the Working Group on Effects.

Belgium responded that the Walloon region had established critical loads for acidifying pollutants in forests, surface waters and materials, and for ozone in vegetation. For the Flemish region, sensitivity maps for acidification and eutrophication were constructed, showing critical loads for forests, heath and meadow. Estonia responded to the question but did not provide any information, stating that it did not report its data to the Working Group on Effects. Liechtenstein reported that no detailed data for critical loads had been established in Liechtenstein because of the country's small size. The Russian Federation is making changes regarding the establishment of critical loads. Spain merely mentioned that it followed EU legislation.

C. 1991 Protocol on Volatile Organic Compounds (VOCs)

21 Parties (as of 13 April 2004):
Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Liechtenstein, Luxembourg, Monaco, Netherlands, Norway, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

The 1991 Geneva Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes entered into force in 1997. It requires Parties to reduce their VOC emissions by 30% by 1999, from those in a base year from 1984 to 1990, and subsequently maintain them below these levels. They should not exceed 1988 levels in tropospheric ozone management areas (TOMAs). Parties must apply national and international emission standards and measures to new stationary and mobile sources and products by 1999, and to existing sources by 2002. By 1999, Parties should foster public participation in national programmes through public announcement, traffic management and improved transport. By 2002, Parties need to apply economically feasible BAT and vehicle emission reduction techniques to any areas exceeding the standards. While taking the necessary measures to reduce VOCs, it is vital that all Parties ensure that carcinogenic and ozone-depleting VOCs are not substituted for those being replaced. Requirements for reporting progress mirror those for previous protocols.

By 1999, 13 of the 21 Parties to the Protocol had achieved the required emission levels of the Protocol and remained below these levels in 2000: Austria, Bulgaria, Czech Republic, Denmark, Estonia, France, Germany, Hungary, Liechtenstein, Netherlands, Slovakia, Switzerland and United Kingdom. For two more Parties (Belgium and Monaco), the Protocol entered into force only in 2001 and, hence, there were no obligations before 2001. In separate decisions taken in December 2001, the Executive Body expressed its concern about Norway's, Finland's and Italy's non-compliance with their obligations under the VOC Protocol (Executive Body decisions 2001/1, 2 and 3). These decisions were taken after review by and on the recommendation of the Implementation Committee in its fourth report to the Executive Body. The Committee planned to review progress by the three Parties. The Implementation Committee also planned to continue to review the compliance by Luxembourg, Spain and Sweden with the emission reduction obligation of the VOC Protocol. (See figure 26: Reduction in emissions of NMVOCs in the ECE region, 1990-2000).

National strategies, policies and programmes

Twenty Parties to the Protocol and Canada, Croatia, Poland and the United

States provided information on national strategies, policies and programmes that specifically address the control and reduction of VOC emissions or their transboundary fluxes. Some Parties to the Protocol referred to programme, policy or strategy documents that were written specifically to implement this Protocol or all protocols to the Convention to which they are party. In other cases, Parties referred to EU directives or national plans and programmes. The tenor of responses makes it clear that all Parties to the Protocol that responded have such programmes, policies and strategies in place to address the requirements of the Protocol.

The most common policies include command and control measures and economic instruments that address the following sectors: industry/energy, refineries, consumers, services and transport. These include licensing/permitting procedures that enforce the emission standards and limits called for in the policy. Austria, the Czech Republic and Switzerland also apply charges or taxes on the polluter for VOC emissions. Many Parties have also chosen to implement strategies that reward cooperation, such as voluntary agreements and economic incentives. Belgium, in the Flemish region, has implemented an emission reduction programme for VOCs for a number of industrial activities, lowered the VOC content in products or replaced them with non-VOC containing alternatives. Denmark made a voluntary agreement with the Confederation of Danish Industries in 1995 to reduce emissions from important industrial sources by 40%. Italy, Liechtenstein and Monaco have tried to decrease VOC emissions in their transport sectors by providing subsidies for the purchase of electric vehicles, promoting public transport, encouraging carpooling and supporting pedestrians. Although not a Party to the 1991 VOC Protocol, Poland is fulfilling the basic Protocol obligations and has undertaken steps to accede to the VOC Protocol as soon as it has revised its documentation on VOC emissions.

It is important to note that many Parties to the Protocol have not yet reached the 30% emissions reduction called for due, in part, to emissions from mobile sources. These Parties include Finland and Italy.

Stationary sources

Twenty Parties to the Protocol and Canada, Croatia, Greece, Poland and the United States provided information on controlling VOC emissions from new stationary sources. Of these respondents, Denmark, Estonia, Finland, Spain, Sweden and the United Kingdom failed to provide information on major new stationary source categories, as indicated in the questionnaire, or did not provide sufficient information to answer the question. However, they did make reference to relevant EU directives. Monaco and Norway indicated that there were no new stationary sources of VOCs under the Protocol.

Nineteen Parties to the Protocol and Canada, Greece, Poland and the United States provided information on controlling VOC emissions from existing stationary sources. Bulgaria, Denmark, Finland, Liechtenstein, Slovakia, Spain, Sweden, Switzerland and the United Kingdom failed to provide information on major existing stationary source categories, as indicated in the questionnaire, or did not provide sufficient information to answer the question. However, they did make reference to relevant EU directives.

The major sources of VOC emissions identified by the Parties included: solvents, petrol, organic chemicals, combustion, metal production, waste treatment and agriculture. Parties identified standards and emission limits to promote VOC abatement in these industries (national responses on the web site provide lists of major source categories and limit values). Italy expanded its emission limits in 2000 to include new vapour recovery systems in petrol-loading facilities, and new incineration and co-incineration plants. In June 2001, Finland also updated its national limits on

VOC emissions to include the use of organic solvents in certain activities and industrial installations. Common best available techniques and pollution control measures employed included absorption filtration, catalytic combustion (application of coatings), adsorption and regeneration (for the use of solvents in degreasing). The Czech Republic found that VOC emissions were greatly reduced by an increased fraction of production and use of solvent-free, water-based coatings and coatings with low solvent content, and also with the use of powder coatings. Although not a Party to the Protocol, Poland was in the process of identifying sources and defining emission standards.

Control measures on fuelling

There is a requirement in those areas in which national or international tropospheric ozone standards are exceeded or where transboundary fluxes originate, or are expected to originate, to control VOC emissions from petrol distribution, vehicle refuelling and by reducing the volatility of petrol. Eighteen Parties to the Protocol and Canada, Croatia, Greece, Poland and the United States provided sufficient information on progress made in introducing techniques to reduce VOC emissions from petrol.

Responding countries mentioned the application of petrol distribution and vehicle refuelling controls. Belgium, Canada, the Czech Republic, France, Greece, Italy, Liechtenstein, Monaco and the United States reported to have taken measures to reduce the volatility of petrol. These measures included regulating the amount of benzene and other aromatics in unleaded petrol, and limiting the volatility of petrol to a maximum amount of vapour pressure (usually 60Kpa), especially during the summer ozone season. Some countries, e.g. Norway and the United Kingdom, did not apply measures regulating VOC emissions during refuelling operations, although the United Kingdom planned to have a programme in place by October 2002.

Mobile sources

Nineteen Parties to the Protocol, and Canada, Greece and the United States, specifically referred to emission standards for new mobile sources. Most European countries aligned their policies on mobile source emissions with EU directives. The EU is continually revising its standards, and has added emission limits for non-road mobile machinery. Most Parties cited the same information for the VOC and NOx questions regarding mobile sources (see section B above for more information on mobile sources).

Bulgaria provided insufficient information to answer the question in full. It referred to the production of a small number of engines which meet EURO I-III requirements, and implementation of national rules and Directive 97/68/EC, but did not indicate other categories or standards for mobile sources.

Product controls

Sixteen Parties to the Protocol, and Canada, Poland and the United States, had taken measures to promote low-solvent products that went beyond restricting the use of products high in VOC content. These included labelling schemes to increase consumer awareness. For example, in 1994 the Czech Republic adopted the National Programme of Labelling Environmentally Friendly Products. In 2001, this programme was updated by making those categories affecting VOC emissions stricter. In addition to labelling schemes, some Parties to the Protocol were promoting the use of low-solvent products through voluntary agreements with industry. Finland had years of success with voluntary agreements with paint manufacturers, painters and the Confederation of Finnish Construction Industries to use only water-based paints for indoor painting. Four Parties to the Protocol, Estonia, France, Luxembourg and Spain, failed to provide any information on product controls.

Product substitution measures

Sixteen Parties to the Protocol, and Canada and the United States, provided information on the substitution of one VOC for another that is more toxic or carcinogenic. Most Parties had designed legislation pursuant to the requirements of the Montreal Protocol, regulating substances that are harmful for the stratospheric ozone layer. In addition, policies on labour safety address this issue, often requiring risk assessment and monitoring measures that aim to decrease worker exposure to VOC and prevent the onset of Organo-Psycho-Syndrome (OPS). Four Parties to the Protocol, Estonia, France, Luxembourg and Spain, failed to provide information on product substitution measures.

D. 1994 Protocol on Further Reduction of Sulphur Emissions

25 Parties (as of 13 April 2004): **Austria, Belgium, Canada, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Liechtenstein, Luxembourg, Monaco, Netherlands, Norway, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom and European Community.**

The 1994 Oslo Protocol on Further Reduction of Sulphur Emissions entered into force in 1998. It has more stringent requirements than those of the 1985 Sulphur Protocol; however, it does not supersede it since some Parties to the 1985 Protocol are not yet party to the Oslo Protocol. The second Sulphur Protocol was the first to be genuinely effects-based and to allocate emission reductions to specific countries to ensure the overall benefit would be the greatest. Emission ceilings were therefore differentiated between countries.

The Protocol requires Parties to take the most effective measures to reduce emissions. It cites controlling the sulphur content of fuel, energy efficiency measures, the promotion of renewable energy and the application of BAT. This Protocol is the first requiring the mandatory application of emission limits, specified in the Protocol itself. There are mandatory limits on the sulphur content of gas oil. There is also a provision encouraging economic instruments for reducing SO_2 emissions cost-effectively.

There are two provisions for reporting requirements. The first is to report emissions of sulphur annually to the Executive Body as in the first Sulphur Protocol. The second part involves reporting on matters such as the application of emission measures and the implementation of strategies; these were dealt with through the 2002 questionnaire used to compile this summary. Officially submitted emission data suggest that 19 of the 25 Parties to the 1994 Sulphur Protocol met their national emission reduction obligations in 2000. Two Parties (Croatia and Italy) did not submit data for 2000, which did not allow for evaluation. For three Parties (Belgium, Hungary and Monaco) the Protocol was not in force in 2000. The Protocol requires Parties whose territory includes areas listed as sulphur oxides management areas (SOMA) in its annex III to reduce and maintain their annual sulphur emissions in the area. As Canada did not submit any sulphur emission data for its SOMA for 2000, it was not possible to evaluate whether Canada had complied with its obligation. (See figure 22: Anthropogenic emissions per sector of SO_x in 2001 within the EMEP area and figure 27: Reduction in emissions of sulphur in the ECE region, 1990-2000).

National strategies, policies and programmes

Twenty-two Parties to the Protocol, and Bulgaria, Monaco and Poland, provided information on national strategies, policies and programmes that specifically address the control and reduction of sulphur emissions. Some

Parties referred to programme, policy or strategy documents that were written specifically to implement this Protocol or all protocols to the Convention to which they are party. In other cases, Parties referred to EU directives or national plans and programmes. Several Parties referred to emission limit values and BAT, licensing procedures and the precautionary principle. The tenor of the responses made it clear that all responding Parties had such programmes, policies and strategies in place to meet the requirements of the Protocol.

Slovenia adopted its National Environmental Action Programme to reduce emissions from industrial sources, thermal power plants and heating systems in urban areas, and control long-range air pollution, as well as ensure the gradual closure of the Trbovlje-Hrastnik coal mine. Canada has set national and regional emission caps and key policy measures, in which the federal government sets the target and the provinces either regulate or have voluntary agreements with source emitters to achieve reductions. In Ireland, the sectoral ceilings for the newly liberalized electricity supply industry are being reviewed in the context of Ireland's signature of the Gothenburg Protocol.

Several Parties indicated strategies that promote renewable energy. The strategies included: thrifty use of non-renewables and greater use of renewable energy sources, greater use of combined production of heat and electricity and activities directed towards decreasing energy loss in transmission, limit values for the sulphur content in fossil fuels, sulphur taxes, quota systems for large combustion plants, the polluter pays principle, and incentives for public traffic systems. Several Parties recommitted to going beyond the Sulphur Protocol by reducing emissions further to meet the emission ceilings in the Gothenburg Protocol. Three Parties to the Protocol, Croatia, Luxembourg and the European Community, did not respond.

Measures for new and existing sources

Twenty-three Parties to the Protocol, and Bulgaria, Monaco and Poland, provided information on steps taken to implement measures to reduce sulphur emissions from new and existing sources, increase energy efficiency, increase the use of renewable energy, reduce the content of particular fuels and encourage the use of fuel with a low sulphur content. All Parties responding (except Monaco, Spain and Switzerland) cited measures to increase energy efficiency and renewable energy. These measures included: building code regulations, subsidies for the construction/rehabilitation of residential buildings, replacement of old heaters and stoves in the commercial/industrial sector, setting of minimum purchase prices for electricity from renewable sources, limitation of heat losses in the waste gas of small firing installations, financial support for co-generation, tax relief for hydro, solar, wind farms and biomass energy projects, and labelling schemes. Parties have measures to reduce the sulphur content in fuels.

Emission limit values for major new stationary combustion sources

Twenty Parties to the Protocol, and Bulgaria, Monaco and Poland, provided adequate information on progress made in applying emission limit values to major new stationary combustion sources. Most Parties indicated that their emission standards were in accordance with those specified in the Protocol. Austria responded that almost all of its standards were more stringent than the values in the Protocol. In Liechtenstein, there were no major stationary combustion sources (installations with a heat input of 50 MW or more) and special installations as cement kilns, sulphuric acid production, refineries or waste incineration plants. Emission standards apply to new and existing smaller installations. This provision does not apply to Canada.

Emission limit values for existing stationary combustion sources with thermal input above 500 MWth

Twenty-two Parties to the Protocol, and Bulgaria, Monaco and Poland, reported on progress made in applying emission limit values to existing stationary combustion sources with a thermal input above 500 MWth. Most Parties had emission limit values that met the requirements of the Protocol. The Czech Republic was preparing an implementing regulation (legally in force as of 1 June 2002) for all existing stationary combustion sources burning solid or liquid fuels with a thermal input greater than 500 MWth, introducing the emission limit value of 500 mg/m^3. From 1 January 2008, an emission limit value of 400 mg/m^3 will apply to those sources. Spain and Sweden cited EU legislation.

Liechtenstein and Norway had no stationary combustion sources with a thermal input above 500 MWth. This provision does not apply to Canada.

Emission limit values or limitations for major existing stationary combustion sources with thermal input between 50 and 500 MWth

Twenty-two Parties to the Protocol, and Bulgaria, Monaco and Poland, provided information on the application of emission limit values or limitations to the major existing stationary combustion sources whose thermal input is between 50 and 500 MWth. Most Parties indicated that they had implemented regulations to limit sulphur emissions by the amount required in the Protocol. Many Parties listed their standards in their replies. Spain and Sweden cited EU directives.

The Netherlands complies with the emission limit values set in the Protocol. Moreover, the existing refinery installations (those licensed before 1987) will meet the relevant emission limit values of annex V before the end of 2002. Slovenia has plans to reduce sulphur emissions from some of its old units between 50 and 500 MWth and approval of an environmental action plan for the Trbovlje-Hrastnik coal mine is expected in 2002. Liechtenstein and Monaco do not have combustion sources large enough to meet the definitions in the Protocol. Canada, while a Party to the Protocol, is not required to apply these limit values.

National standards for sulphur content of gas oil

Eighteen Parties to the Protocol, and Bulgaria and Poland, provided adequate information. The Protocol requires Parties to apply national standards for the sulphur content of gas oil that are at least as stringent as those specified in its annex V. The limit value for diesel for on-road vehicles is a sulphur content of no more than 0.05%, and for other types of gas oil no more than 0.2%. Most Parties set more stringent standards, applying EU Directive 98/70/EC, which sets a limit on allowable sulphur content in car-diesel at 0.035% from 1 June 2000 and 0.005% from 1 January 2005. EU Directive 1999/32/EC meets the requirements of the Protocol by setting a limit of 0.2% on the sulphur content of gas oils, other than car-diesel. Most Parties plan to meet the standards in annex V. Bulgaria, not a Party to the Protocol, planned to meet the standards set in its annex V by 2003.

Denmark did not provide sufficient information on the standards for diesel for on-road vehicles. France did not provide any information about gas oil standards for stationary sources; however, both Denmark and France, as EU member States, are obliged to translate EC directives 1999/32/EC and 1998/70/EC into national law and apply standards in accordance with annex V. While Canada is a Party to the Protocol, this sulphur limit requirement does not apply.

Economic instruments

Twenty-three Parties to the Protocol and Bulgaria, Monaco and Poland provided information. Sixteen Parties, and Bulgaria and Poland, had national programmes that employed economic instruments to encourage the adoption of cost-effective approaches to the reduction of sulphur emissions. Tax incentives, fees and charges, subsidies, credit guarantees and low-interest loans are the most common forms of economic instruments employed by Parties to the Protocol. Many Parties, including Denmark and Finland, had decreased the tax on low-sulphur diesel fuel to promote its use. France, Hungary, the Netherlands, Poland and Slovenia all provided economic opportunities in the form of subsidies or loans to promote investment into the research and development of technology contributing to the abatement of sulphur emissions. Ireland subsidized social welfare recipients during the heating season from October through April, providing an additional weekly payment to assist lower-income households with the increased cost of purchasing smokeless solid fuel. Canada, Slovakia and the United Kingdom instituted or are considering employing quotas or capping emissions, which may, ultimately, lead to trading programmes that provide economic incentives to control emissions and remain under the cap. Monaco does not apply any economic instruments.

VI. PROGRESS OF NATIONAL POLICIES AND STRATEGIES FOR PROTOCOLS NOT YET IN FORCE IN 2002

Information on the 1998 Protocols on Heavy Metals and POPs and the 1999 Gothenburg Protocol was provided voluntarily by each country, as these protocols were not yet in force when the 2002 questionnaire was distributed.

A. 1998 Protocol on Heavy Metals

The 1998 Aarhus Protocol on Heavy Metals targets three harmful metals, cadmium, lead and mercury, though it makes provision for adding others in the future if necessary. Parties to the Protocol will be required to reduce their emissions of the three metals below 1990 levels (or a chosen year between 1985 and 1995). The Protocol aims to cut emissions from industrial sources (e.g., iron and steel industry, non-ferrous metals industry), combustion processes (e.g., power generation, road transport), and waste incineration. It sets deadlines for applying emission limits to new and existing major stationary sources and suggests BAT measures, such as special filters, scrubbers or mercury-free processes, to achieve these limits. Alternatively, Parties may apply different strategies to achieve equivalent overall emission reductions. The Protocol requires Parties to phase out leaded petrol and introduce measures to lower emissions of mercury from products (such as mercury in batteries). It proposes the introduction of management measures for other mercury-containing products, such as electrical components (thermostats, switches), measuring devices (thermometers, manometers, barometers), fluorescent lamps, dental amalgam, pesticides and paint.

In December 2000, the Executive Body noted the importance of the global-scale transport of mercury and invited the United Nations Environment Programme (UNEP) to initiate an assessment of mercury and consider future action. It indicated that it, together with its subsidiary bodies, and in cooperation with its secretariat, was willing to help with the assessment process and make available its knowledge and expertise. The UNEP Governing Council has initiated the assessment. The Protocol on Heavy Metals will serve as a driving force for future global action in this area.

In December 2002, the Executive Body established an Expert Group on Heavy Metals

under its Working group on Strategies and Review to: (a) collect and evaluate available information (within and outside the framework of the Convention) on the effects of heavy metal pollution; (b) review the information on abatement options and their costs, taking into account the synergies with the abatement of particulate matter; (c) assess the measures scheduled for re-evaluation in the Protocol; and (d) review the information on heavy metals not yet included in the Protocol.

The 1998 Protocol on Heavy Metals controls the emissions of 3 priority metals: cadmium, lead and mercury.

National strategies, policies and programmes

Nineteen Signatories to the Protocol[4] provided information on their national strategies, policies and programmes developed to implement the Protocol and reduce emissions of heavy metals. The most common strategies included those suggested in annex I to the Protocol: application of economic instruments; development of voluntary agreements; encouragement of conservation; use of clean energy sources; introduction of clean transport systems; phase-out of processes that emit heavy metals; and employment of cleaner processes.

Prior to and in preparation for ratification, many countries have begun to redefine national emission inventories within each sector of the economy, identifying heavy metal emission sources and evaluating the effectiveness of various applied technologies and control measures. The most common major stationary source categories of heavy metal emissions are listed in annex II to the Protocol. Signatories to the Protocol have identified the following specific control strategies and technologies to reduce emissions from the major source categories: scrubbers; electrostatic precipitators; textile filters (also known as waste gas filters or fabric filters); adsorption on active carbon; flue-gas treatment (installation of battery cyclones); fuel with smaller ash content; multi-stage fuel switching; flue-gas recirculation; advanced waste gas cleaning systems (in accordance with EU directive); and installation of electric arc furnaces to replace open furnaces.

Some Signatories have already defined emission limit values and implemented best available techniques, as called for in the Protocol, to reduce the emissions of heavy metals (see below). These strategies have been successful for the United Kingdom, which has already met the main requirement of the Protocol to reduce annual emissions to air of cadmium, lead and mercury to below 1990 levels. In addition to the strategies mentioned above, Italy is employing educational tools such as population attention and warning levels for total suspended particulates to increase awareness and action related to the decrease of heavy metal emissions.

Many Signatories have begun to meet the measures called for in the Protocol, including terminating the sale of leaded petrol, in an effort to decrease emissions into the environment. In addition, a number of Signatories, including Canada, Denmark, Germany, Latvia and the Netherlands, have restricted or prohibited the use and marketing of products containing heavy metals, another control measure called for in the Protocol. For example, Denmark has banned the use of cadmium as a surface treatment, as a pigment and as a stabilizer in plastics, and has limited the content of cadmium in phosphorous fertilizers. Canada has banned the use of lead shot for the hunting of most migratory game birds in wetland areas. A ban on mercury in products has been in place in Denmark since 1994 (with some delays and exemptions) and in the Netherlands since 1998.

Emission limit values

Fifteen Signatories have indicated that there were national emission limit values in

[4] Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Finland, Germany, Hungary, Italia, Latvia, Liechtenstein, Netherlands, Norway, Poland, Switzerland, United Kingdom and United States.

place for all major stationary sources of heavy metal emissions. While Finland had limit values for waste incineration, no regulations had been adopted for other existing sources. The United Kingdom had requirements that were in line with the emission limits proposed in the Protocol, however these were not yet legally binding. Canada selected the option of reducing annual atmospheric emissions and, therefore, did not need to provide emission limit values per sector.

Product control measures

Many Signatories had already banned or phased out the use of leaded petrol for on-road vehicles. Some Signatories had also begun to limit the amount of mercury to be used in the manufacture of dry-cell batteries. Other product control measures to limit emissions of heavy metals included thermostat collection programmes, and the banning of bactericides, fungicides and the interior latex paint phenylmercuric acetate, all containing mercury (these programmes have been implemented in the United States). The most common additional product management measures used by most responding Signatories are listed below according to each heavy metal. Prohibitions and/or restrictions on the following products containing cadmium: pigments (for paints and plastics); pesticides; fluorescent and other lamps; batteries and accumulators; PVC stabilizers; metal surface treatment agents; packaging; wastes; and platings. Prohibitions and/or restrictions on the following products containing lead: mineral oils; wastes; fuels; batteries and accumulators; paints; packaging; shots; and lamps. Prohibitions and/or restrictions on the following products containing mercury: antifoulings; pesticides; fluorescent and other lamps; batteries and accumulators; dental amalgam; clinical thermometers and other measuring devices; auto switches; wastes; electrical components; paints; and wood or textile impregnation products. Signatories using voluntary agreements with manufacturers or providing other avenues for the responsible collection and disposal of restricted products include Austria, Germany, Italy and Liechtenstein. The United States was considering using this type of programme. In addition to voluntary agreements with manufacturers, many Signatories, including Denmark, Germany and Italy, were using labelling programmes to encourage the use of product alternatives that had fewer or no heavy metals

B. 1998 Protocol on Persistent Organic Pollutants (POPs)

The 1998 Aarhus Protocol on Persistent Organic Pollutants (POPs) aims to control, reduce or eliminate discharges, emissions and losses of POPs into the environment. There are 16 substances listed in the Protocol, 11 pesticides, 2 industrial chemicals, and 3 by-products or contaminants. The Protocol bans the production and use of some products outright (aldrin, chlordane, chlordecone, dieldrin, endrin, hexabromobiphenyl, mirex and toxaphene). Others are scheduled for elimination at a later stage (DDT, heptachlor, hexaclorobenzene, PCBs). Finally, the Protocol severely restricts the use of DDT, HCH (including lindane) and PCBs. It sets deadlines for applying emission limits to new and existing major stationary sources and suggests BAT, such as special filters, scrubbers or mercury-free processes, to achieve these limits. Parties to the Protocol will be permitted to apply, as an alternative, different strategies that achieve equivalent overall emission reductions.

The Protocol includes provisions for dealing with the wastes of products that will be banned. It also obliges Parties to the Protocol to reduce their emissions of dioxins, furans, PAHs and HCB below their levels in 1990 (or an alternative year between 1985 and 1995). For the incineration of municipal, hazardous and medical waste, it lays down specific limits. It calls on Parties, moreover, to promote the provision of information to the general public, including users of POPs, on labelling, risk

assessment and hazard and risk reduction, as well as information to encourage the elimination of POPs or a reduction in their use. The Protocol allows for substances to be added or current obligations to be modified as new information becomes available. Within six months of the Protocol's entry into force, its Parties must establish national policies, programmes and strategies to encourage the implementation of environmentally and economically efficient management and reduction techniques as well as re-evaluation. This must also take place for products that are contained as contaminants in other substances, chemical products or manufactured articles, as soon as the relevance of the source has been established. Within one year of the Protocol's entry into force, its Parties are required to review the feasibility of alternatives to DDT and promote their commercialization, and within two years, they must re-evaluate all exceptions to restrictions on DDT, PCBs and HCH, including lindane.

The 1998 Protocol on Persistent Organic Pollutants controls emissions of 16 POPs: *aldrin, chlordane, chlordecone, DDT, dieldrin, dioxins and furans, endrin, heptachlor, hexachlorobenzene, hexachlorocyclohexane (HCH), hexabromobiphenyl, mirex, PAHs, PCBs, and toxaphene.*

The Protocol on POPs is seen as a major step towards global controls of these substances. It provided impetus for the negotiations on a global treaty on POPs. These were concluded in 2000 and the 2001 Stockholm Convention on POPs was opened for signature on 22 May 2001 until 22 May 2002. This Convention will require Parties to reduce and/or eliminate the production, use and/or release of 12 POPs, consisting of nine pesticides (aldrin, dieldrin, endrin, DDT, mirex, chlordane, heptachlor, hexachlorobenzene also known as HCB, and toxaphene), two industrial chemicals (PCBs and HCB; HCB has been intentionally produced for both pesticide and industrial chemical uses), and four unintentional by-product pollutants (dioxins, furans, PCBs and HCB; PCBs and HCB are listed as intentionally produced and unintentionally produced). The treaty has provisions for adding other chemicals (http://www.chem.unep.ch/sc/).

The Executive Body established an Expert Group on Persistent Organic Pollutants under its Working Group on Strategies and Review to: (a) prepare a compendium of available information provided by experts relating to the existing obligations for substances listed in annex I, II or III to the Protocol on POPs, together with expert judgment on this material; and (b) prepare a compendium of information provided by national experts on substances not included in the Protocol after technical evaluation of this material (ECE/EB.AIR/75, annex VI, item 1.5).

National strategies, policies and programmes

Seventeen Signatories to the Protocol[5] have already begun to develop national programmes aimed at reducing or eliminating discharges, emissions and losses of POPs. The most common strategies include those measures listed in article 7, paragraph 2, of the Protocol: encourage economically feasible, environmentally sound management techniques; implement other management programmes (including voluntary programmes and economic instruments); reduce the levels of pollutants subject to the Protocol in contaminants, chemical products or manufactured articles; consider evaluating other substances for inclusion into the POPs Protocol.

Specific techniques currently used by various Signatories include setting targets, standards and emission limit values, instituting BAT requirements, requiring licences/permits for sources, encouraging responsible energy and transport consumption, installing industrial filters and treatment devices, and prohibiting/restricting the production and

[5] Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Germany, Italy, Latvia, Liechtenstein, Netherlands, Norway, Poland, Switzerland, United Kingdom and United States.

consumption of POPs. Some Signatories, like Italy and the Netherlands, have taken additional measures to ensure the control of POPs in the environment. Italy has a programme to make agricultural practices less harmful by reducing the use of pesticides. The Netherlands is currently investigating four new substances on the basis of national risk profiles: polychlorinated naphthalenes, dicofol, hexachlorobutadiene and pentachlorobenzene. The use of hexachloroethane is prohibited in the Netherlands. On the other hand, some Signatories are just beginning to develop programmes that address POPs in the environment. Croatia still feels that there is a need for action, specifically to identify emission limits, to set up non-compliance legislation, and to develop environmental awareness among the public.

Status of elimination of POPs

The following Signatories had eliminated the production and use of some or all of the substances listed in annex I to the Protocol: Austria, Belgium, Bulgaria, Canada, Croatia, the Czech Republic, Denmark, Germany, Hungary, Italy, Latvia, Liechtenstein, the Netherlands, Norway, Poland, Switzerland, the United Kingdom and the United States. Most Signatories had prohibited some of the annex I chemicals as plant-protective agents, namely all but hexabromobiphenyl, mirex and PCB. Mirex is still unrestricted in Austria, Germany, Liechtenstein and Switzerland, although it is not licensed or registered for use in any of these countries, and its export market is non-existent. There are other circumstances under which pollutants in annex I are still produced or consumed. For example, Latvia had permitted the use of DDT, heptaclor and toxaphene. The use of the gamma isomer lindane was permitted in seed dressings and pharmaceuticals in Liechtenstein and Switzerland. In addition, while still permitting the use of PCBs in some transformers, Italy and many other Signatories, including Croatia and the Czech Republic, were finding and eliminating older stocks of PCBs.

Waste disposal and destruction

Many Signatories suggested that waste containing PCBs was the only hazardous waste relevant to this Protocol, and had taken steps to ensure its responsible destruction and disposal. Most Signatories required permits for the handling of hazardous wastes, and had policies that controlled the operation of incineration plants and the use of landfills for stabilized residues. The United States specifies the required level of destruction efficiency of the hazardous constituents of wastes, and designates landfills for hazardous wastes as those with, for example, double liners and landfill leachate collection and monitoring. Austria, Belgium, Bulgaria, Canada, Croatia, the Czech Republic, Germany, Hungary, Italy, Latvia, the Netherlands, Norway and Poland had aligned their national policies with the Basel Convention, resulting in strict rules on the import, export and transit of hazardous waste. Most Signatories required documentation, permits and fees for the handling of hazardous waste.

Domestic POPs disposal

While the above policies have ensured responsible management and disposal of hazardous wastes, the restrictions have left some Signatories with stocks of obsolete pesticides and no established facility to manage them. Croatia and Latvia are two good examples. Croatia admitted that its current system of entrusting the handling of hazardous waste to authorized companies has not ensured environmentally sound handling. In fact, only 15-20% of PCBs in use have been disposed of so far. Similarly, in 2001, Latvia collected and stored 1750 tons of pesticides, including 172 tons of DDT-containing products. Currently, there are no means available for the disposal of hazardous waste in Latvia. A landfill for hazardous waste was expected to be ready by 2004 and the Government was planning to install a waste incinerator. Companies generating hazardous waste were storing it until the planned incineration plant was in opera-

tion. Poland also had a national stock of POPs and has not exported its pollutants for processing as it feels hazardous waste should be treated and disposed of near to its source to avoid unnecessary movement of waste. Therefore, Poland had begun to collect and store pesticide waste in concrete containers, or "tombs", and was planning a programme of elimination.

Transboundary movement of POPs

There are Signatories that have chosen to work within the system of licences and fees to export their wastes as long as the handler can demonstrate that environmentally sound treatment abroad is assured. For example, Italy chose to export some of its PCBs in order to achieve sound thermal destruction. Norway and Switzerland also exported PCBs for proper disposal. Measures taken to ensure that the transboundary movement of hazardous waste is conducted in an environmentally sound manner are obligatory under the Basel Convention. Many Signatories, including Canada and Germany, noted the application of some of these measures, including prior informed consent procedures, tracking shipments, the ban on export of waste for final disposal in non-EU and non-EFTA countries, and the ban on export for recovery/recycling to non-OECD countries. Austria and Italy had also developed policies requiring the identification and labelling of hazardous waste with the content, location and amount of waste clearly marked.

C. 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone

The 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone is an innovative multi-effect, multi-pollutant protocol that will simultaneously address the three effects it describes through controlling the pollutants causing them. It promotes action within the UNECE region and sets an example for action worldwide.

The Protocol sets emission ceilings for 2010 for four pollutants: sulphur, NOx, VOCs and ammonia. Ceilings were negotiated on the basis of scientific assessments of pollution effects and abatement options. Parties whose emissions have a more severe environmental or health impact and whose emission reductions are relatively inexpensive will have to make the biggest cuts. Once the Protocol is fully implemented, Europe's emissions should be cut significantly for sulphur (63%), NOx (41%), VOCs (40%) and ammonia (17%), compared to 1990. (See figure 28: Percentage reduction of SO_2, NOx, NH_3 and NMVOC (1990-2000) of 1990 levels).

The Protocol also sets stringent limits for specific emission sources (e.g., combustion plant, electricity production, dry cleaning, cars and lorries) and requires BAT to keep emissions down. VOC emissions from products such as paints or aerosols will have to be cut and farmers will have to take specific measures to control ammonia emissions. Guidance documents adopted with the Protocol describe a wide range of abatement techniques and economic instruments to reduce emissions in the relevant sectors, including transport.

Estimates suggest that, once the Protocol is implemented in 2010, the area in Europe with excessive levels of acid deposition will shrink from 93 million hectares in 1990 to 15 million hectares (See figure 29: Ecosystem area protected from acidification in every EMEP-50 km grid cell for the years 1980, 1990, 2000 and 2010) and excessive levels of eutrophying nitrogen deposition will fall from 165 million to 108 million hectares (See figure 30: Ecosystem area protected from eutrophication in every EMEP-50 km grid cell for the years 1980, 1990, 2000 and 2010). The number of days with excessive ozone levels will be halved. Consequently, it is estimated that life-years lost from the chronic effects of ozone exposure will be about 2,300,000 fewer in 2010 than in 1990, and that each year there will be about 47,500 fewer premature deaths

resulting from ozone and particulate matter in the air. The area of vegetation exposed to excessive ozone levels is expected to be 44% smaller.

The Executive Body for the Convention established an expert group on ammonia abatement. This has developed and is promoting the use of a draft framework code for good agricultural practice for reducing ammonia as a basis for Parties to draw up national codes, and to quantify better the relationships between recommended control options/techniques and resulting ammonia emissions. Furthermore, the expert group is exploring the non-agricultural ammonia emissions possibly under-reported by Parties, developing work to improve the quality of reporting of ammonia emissions and measurements, and assisting Parties, as needed, in developing and drawing up their own national advisory codes of agricultural practice to control emissions (EB.AIR/WG.5/2002/3).

National strategies, policies and programmes

Eleven Signatories to the Protocol (Belgium, Bulgaria, Czech Republic, Denmark, Greece, Hungary, Netherlands, Norway, Switzerland, United Kingdom and United States) had plans in place to implement the Gothenburg Protocol. Austria, Canada, Finland, Latvia and Poland were in the process of developing national action plans that addressed acidification, eutrophication and ground-level ozone. The most common strategies included issuing permits, identifying emissions limit values, promoting BAT (especially for the energy and transport sectors), applying economic incentives and developing emission cap and trade programmes. Many European Union member States rely on the EU National Emission Ceilings Directive (2001/81/EC) and other EU legislation for guidance on limit values for the four pollutants addressed by the Protocol.

Stationary sources

There is a requirement to apply limit values to various stationary sources to achieve the overall emission levels specified in the Protocol. Major source categories and limit values were listed or referred to by twelve Signatories[6] in their responses. Most Signatories' limit values for SO_2 and NOx are equal to or more stringent than the values given in annexes IV and V to the Protocol. Other values are based on EC directives, namely Directive 1999/13/EC, which gives emission limit values for VOCs, and Directive 2001/80/EC on large combustion plants. Existing source categories include industrial processing and combustion for SO_2, petroleum and mineral industries and processes for NOx, and emissions from the transport of crude oil for VOCs.

Mobile sources

The Protocol, through annex VIII, specifies limit values for fuels and new mobile sources. Fifteen Signatories provided information on limit values applied (for details see original responses). Many Signatories refer to EU directives. Please refer to the sections above for the SO_2, NOx and VOC Protocols for additional information on mobile source limits and controls.

Best available techniques

The Protocol calls for the application of BAT, or the most current proven technology, to combat acidification, eutrophication and ground-level ozone. The best available technologies, and the extent to which they are economically feasible, are a matter of judgement. Most Signatories promote the use of BAT through permitting or licensing programmes that require the application of state-of-the-art strategies to certain stationary sources. The European Union legislation that adopts this strategy is Directive 96/61/EC on Integrated Pollution Prevention and Control (IPPC). In the Czech Republic, BAT for mobile sources are often implemented through tax

[6] Austria, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Finland, Latvia, Netherlands, Norway, Switzerland, and United States

relief programmes to promote the use of energy-efficient, low-emission vehicles. Emission standards for mobile sources are usually based on the application of the best, most economically feasible control technology.

VOC product controls

Austria and Canada had limits on the VOC content of various products including paints, lacquers, inks, scented products, household cleaners, fabric protectants, and coatings for vehicles, metals and plastics. Other product controls, such as those used in the Czech Republic, addressed fuel content by offering lower taxes on alternative fuels like bio-diesel fuel, LPG and CNG, whose VOC emissions were low relative to traditional petrol. Switzerland also used tax incentives as a product control, discouraging the use of VOC-rich solvents by imposing a solvent tax. The revenue of the incentive tax on VOC will be redistributed to the population through the mandatory health insurance scheme.

Ammonia control measures

The majority of ammonia emissions originate from agriculture. Many Signatories, including Austria, Belgium, Bulgaria, Czech Republic, Denmark, Netherlands, Norway and Switzerland, have addressed this link by issuing a code of good agricultural practice. These national codes offer recommendations on the management of fertilizer and manure, which are rich in nitrogen. They also promote organic farming (to discourage the use of fertilizers), and recommend the use of catch crops to reduce the concentration of nitrogen in the soil. In the Netherlands, most of the control measures for ammonia, including application of BAT, are obligatory. Furthermore, the Netherlands requires farmers that produce a manure surplus to settle in advance a contract with farmers with a manure shortage or with manure processors. Denmark advises farmers on the handling of manure, and has put bans on surface spreading of manure and ammonia treatment of straw.

VII. GENERAL INFORMATION FROM PROTOCOL-RELATED QUESTIONS

A. Exchange of technologies

The 1988 NOx Protocol, the 1991 VOC Protocol, the 1994 Sulphur Protocol, the 1998 Protocols on Heavy Metals and POPs and the 1999 Gothenburg Protocol all have a requirement to provide information on measures taken to facilitate the exchange of technology related to reduction and control of emissions. Most responding Parties to the Convention were engaged in the exchange of technologies and techniques in one or more of the following ways: on a commercial and consultant basis; through bilateral or multilateral agreements (like the European IPPC Bureau); via professional associations, meeting/conferences and journals; and/or on the Internet. Many European Parties, such as Finland, regularly prepared EU-wide BAT reference documents for each industrial sector under the IPPC Directive. Other bilateral/multilateral forums to exchange information included the Twinning Programme of the EC, in which Germany takes part, and the EURECA Programme, in which Poland participates. Many Parties, including Belgium, Germany, Latvia and the United States, hosted web sites that disseminate information on national projects and the latest technology being deployed to combat air pollution.

Canada has developed Canadian Environmental Technology Advancement Centres. These centres are private sector, not-for-profit corporations that help environmental enterprises demonstrate and deploy their technologies. Three centres foster the growth of the environmental industry in Canada by bringing innovative technical solutions to environmental problems while contributing to economic growth. Poland was planning to develop a similar centre in the near future. Most responding Parties to the Convention noted employing monitoring systems in an

effort to strengthen research and development on the control of toxic emissions (see section C, research and development, below).

B. Public participation

The 1991 VOC Protocol, the 1998 Protocol on POPs and the 1999 Gothenburg Protocol have a requirement to provide information on measures taken to foster public participation and promote the provision of information to the general public. Most of these measures revolve around media campaigns, information centres and economic incentives that increase awareness and promote participation in abatement activities. A popular event in many European countries including Denmark, Hungary and Italy is to sponsor a car-free day once a month. In the Czech Republic, a car-free day is held once a year. Carpooling, mass transit, cycling and walking programmes are also popular ways to promote responsible public transport habits. Other campaigns include daily reports on air pollution levels in newspapers and on local television; economic incentives for fuel-efficient cars; environmental labelling of household and garden products and the development of Internet sites that provide information to the public on air pollution and pollution control measures. For example, Norway had a national centre for documenting and spreading practical examples of achieving sustainable development called the Ideas Bank Foundation. Canada sponsored vehicle emissions inspection clinics in the summer to promote public awareness of vehicle emissions, the effect of emissions on the environment and to emphasize the importance of proper vehicle maintenance in controlling vehicle emissions.

Other public campaigns addressed the risks associated with POPs by reporting on the concentration of these chemicals in rivers, marine biota, drinking water and food. VOC abatement programmes target the identification of VOC-containing products through labelling schemes, the promotion of renewable energy and energy efficiency, management options for wastes, and general information on health and environmental effects associated with these pollutants.

C. Research and development

The 1994 Sulphur Protocol and the 1998 Protocols on Heavy Metals and POPs have a requirement to provide information on activities undertaken to encourage research, development, monitoring and cooperation. Many Parties to the Convention are engaged in research and development to address the effects of sulphur, heavy metals and POPs on the environment and human health. These efforts include evaluating the effects of the introduction of BAT, establishing critical loads, studying alternatives to the use of these pollutants in various products and agricultural settings, and developing programmes and technology to control waste containing these pollutants. Research also focuses on developing energy-efficient technology and using renewable energy sources.

Air pollution monitoring encompasses emissions, air quality, deposition and the environmental effects of air pollution. Monitoring may be designed to provide information for local problems, national issues, or for studies at the regional level. Monitoring sites are dispersed throughout most countries, though the numbers operated and the participation in the different monitoring programmes differ between countries. The data collected are very important in assisting in, for example, calculating emission data and critical loads, estimating deposition levels, validating models and assessing effects and recovery. While many countries have their own monitoring network, 36 Parties to the Convention have monitoring stations that are part of the EMEP network. These monitoring stations measure the quality of the air and precipitation. Many countries also participate in various International Cooperative Programmes (ICPs) that were set up under the Working Group on Effects to look at relevant receptors and

environmental issues. The six different ICPs address issues such as integrated monitoring, forests, waters, vegetation, materials and modelling and mapping. Human health issues are addressed by a joint Convention and World Health Organization Task Force. Many countries, including Germany and the United Kingdom, reported that they participated in all International Cooperative Programmes under the Convention.

VIII. ADDITIONAL GENERAL INFORMATION

A. Integrating policies: activities aimed at increasing the integration of environmental and other policies

Transport

In an effort to reduce emissions, many countries have begun to promote forms of transport that are more efficient and do not rely on the use of sulphur-rich fuels. The Czech Republic and Latvia have developed cycle tracks and other measures to promote cycling as an alternative means of transport. Many countries also promote the use of electric vehicles and vehicles that use cleaner fuels. Many European countries, including Austria, the Netherlands and Switzerland, have begun to shift freight transport from road to rail, while other countries are imposing taxes on heavy-duty vehicle use. For example, Germany is working to reduce its economy relying on heavy goods road transport; the government will impose a road toll on heavy goods transport by trucks. While financial penalties begin to internalize the negative externalities of transport pollution, there is a formal effort by the EU and OECD countries to include all external costs of transport (accidents, noise, climate change and air pollution) in internal transport costs. Financial incentives are an important aspect of policy in the United States to meet air pollution standards; federal funds for transport projects such as highway and mass transit system construction and repair are dependent on compliance with air pollution standards. Another notable policy that links transport and air quality issues is the Estonian programme to develop a network of automatic monitoring in towns for assessing emissions and for operative redirection of traffic flows.

Energy

Energy policies that aim to reduce the emissions of harmful air pollutants ranged from raising fuel quality standards to promoting energy conservation and the development of alternative forms of energy. Norway has a permit programme that requires all energy projects to work out an impact study prior to receiving a permit. Canada and Estonia have programmes aimed at capturing and reusing harmful by-products of energy production. Canada's CO_2 Capture and Storage Initiative aims to capture CO_2 from utility sources, treat it and then transport it for storage underground. Estonia uses oil shale processing waste in road, railroad and dam construction and as construction gravel and filling material. Many countries, like the Netherlands, were also considering emissions trading to control emissions from utility plants. Other strategies focused on increasing the reliance on alternative forms of energy. Cyprus was involved in negotiations to secure the supply of natural gas for use in the energy sector. Austria and Latvia were promoting other forms of alternative energy. Austrian law stipulates that, by 2007, 4% of energy must be provided by wind, biomass, biogas or solar forms of energy. Latvia established a programme on the production and use of biofuels to analyse the possibility of producing petrol-bioethanol mix, rapeseed oil and biogas. Latvia also developed an energy efficiency strategy that identified measures to decrease the primary energy consumption per unit of GDP by 25% by the year 2010. To promote renewable energy sources in Belgium, Flanders introduced a system of green electricity certificates where electricity distributors are forced to

demonstrate that a certain percentage of delivered electricity is produced with renewable energy sources. Other countries were developing policies that promoted conservation and discouraged unsustainable energy consumption.

Industry

The most popular strategy for integrating industrial and environmental policies aims to increase awareness of clean production. Kazakhstan has tried to do this by establishing one national and four regional cleaner production centres that target the oil, mining and metallurgy sectors; they aim to increase awareness of environmental responsibility and build capacity to improve environmental performance. Many countries chose to offer grants or subsidies to industries as an incentive to reduce emissions. Cyprus has this type of grant programme, as does the Czech Republic, which subsidizes up to 50% of the cost of introducing environmental management systems according to ISO 14001 or the Environmental Management and Audit Scheme (EMAS). Many countries (including the Czech Republic and Hungary) had established eco-labelling programmes that promote awareness and put pressure on industry to improve environmental performance and reduce emissions.

Agriculture

While many countries have policies that integrate agricultural and environmental goals, the most notable policy comes from the Czech Republic, where a strategy has been developed to produce crops for energy-production purposes. The main goal of this programme is partly to replace the combustion of fossil fuels and partly to preserve the cultural landscape and the character of rural areas. Many countries, including Austria and Germany, promote organic farming as a means to reduce energy demand and pesticide use. Estonia has developed a plant protection system that aims to educate farmers on agricultural management techniques that increase the efficiency of the land and reduce the reliance on fertilizers and pesticides.

Waste management

Policies that integrate environmental and waste management strategies often address combustion and conservation. For example, Cyprus has decided to erect an incineration plant that would fully comply with the relevant EU directive to control the disposal of hazardous wastes and the control of emissions of heavy metals and POPs arising from their burning. Norwegian policies to address waste management focus on implementing measures to reduce landfilling of organic wastes. Estonia's waste management policies address consumption, by aiming to stabilize municipal waste generation at an annual level of 250-300 kg per person. Many countries' waste management policies are beginning to address waste prevention and recovery. In Belgium, efforts are made first towards waste prevention and, secondly, towards the encouragement of waste treatment for its recycling and reuse, the recovery of raw materials and the production of energy from certain waste.

Finance

Many countries had notable examples of policies that integrated environmental goals with financial incentives. Most focus on "greening" the national system of taxation. For example, Belarus imposed an environmental tax on air pollutant emissions from gas-operated transport. Other policies supported the polluter-pays principle including those in the Czech Republic, Kazakhstan, Latvia and Sweden. The Czech Republic has implemented a "green" tax system that aims to internalize negative externalities by increasing taxes (or introducing new taxes) on energy products, while decreasing labour taxes. Latvia's Law on Natural Resources Tax defines tax rates for emissions into air depending on the pollutant hazard. Sweden's financial incentives include a tax on energy consump-

tion, CO_2 emissions, sulphur emissions, charges on NOx emissions and grants for the development of renewable energy production systems and the sustainable use of energy. Kazakhstan has implemented a system of fees and fines to discourage industrial pollution. However, it has not yet led to the implementation of cleaner technologies because of a lack of funding and because charges do not reflect the real damage caused to the environment. In many cases, special arrangements can be made with the authorities to reduce the amount paid. United States taxpayers receive income tax deductions for their use of low-emissions vehicles. Countries were also attempting to design pricing policies to reflect the environmental cost of products. For example, Estonia considers the environmental implications throughout the lifetime of a product when making pricing decisions. Canada is examining areas where tax and spending programmes may be having an impact on the longer-term goals of sustainable development.

Climate, spatial planning and nature conservation

Integration of environmental goals with other policies should go beyond the key sectors highlighted above to address issues relating to the protection of our climate, urban and rural areas, and natural ecosystems. Canada has begun to address the relationship between air pollution and climate by exploring the ancillary benefits of climate change mitigation measures for air pollution. It is also assessing the extent to which climate mitigation options may have adverse air quality impacts. Austria and Norway have integrated spatial planning policies with those that address air pollution. Austria promotes energy-saving multiple dwellings over houses in regional and local spatial planning programmes. Norway also aims to limit urban sprawl by promoting dense urban development. In this case, Norway hopes that this type of spatial planning will improve the possibilities for developing district heating systems, which will also contribute to more sustainable energy consumption. Many Parties to the Convention are also working to integrate air pollution policies into those that promote nature conservation. The most notable example of a successful policy that integrates these two goals comes from the Netherlands, where programmes that restructure agriculture and nature areas are used to realize and maintain an ecological main structure that will connect major nature areas and stimulate biodiversity.

Extent of integration of national policies with European Union policies

The following Parties to the Convention identified national programmes and policies as being integrated with European Union programmes and policies: Bulgaria, Estonia, Hungary, the Netherlands, Norway, Spain and Sweden.

Energy consumption trends

Energy consumption and trends were analysed for various fuels, including solid, liquid and gaseous fuels, nuclear energy, electricity, hydro- and geothermal energy, steam and hot water energy and other forms of energy. Because responses varied greatly, only those responses that provided data in the recommended format are reviewed here. Armenia, Austria, Belgium, Canada, Cyprus, Denmark, Estonia, Finland, Germany, Hungary, Italy, Latvia, Monaco, Netherlands, Switzerland and Turkey provided data on liquid fuel consumption. Liquid fuel consumption declined between 1990 and 2000 in Armenia, Denmark, Estonia, Finland (oil and oil products), Hungary, Latvia and Switzerland (heating oil), and rose during the same period in Austria, Belgium, Canada, Cyprus, Germany, Monaco, Netherlands, Switzerland (transport fuels) and Turkey. Liquid fuels have been the largest single source of energy in these countries, except in Armenia, Hungary and the Netherlands (where gaseous fuels are predominant), and in Estonia and Latvia (where solid fuels are predominant). For

countries who provided projections for 2010, liquid fuel consumption was expected to rise in Cyprus, Denmark, Hungary, Latvia, Netherlands, Switzerland (transport fuels) and Turkey and decline in Belgium, Finland (oil and oil products), Germany, Italy and Switzerland (heating oil).

Armenia, Austria, Belgium, Canada, Cyprus, Denmark, Estonia, Finland, Germany, Hungary, Italy, Latvia, Monaco, Netherlands, Switzerland and Turkey provided data on solid fuel consumption. Solid fuel consumption declined between 1990 and 2000, in Armenia, Austria, Belgium, Cyprus, Denmark, Estonia, Finland, Germany, Hungary, Italy (between 1990 and 1995), Latvia and the Netherlands, and rose during the same period in Canada, Cyprus, Monaco, Switzerland (except for coal, which declined) and Turkey. Where Parties provided projections for 2010, consumption of solid fuels was expected to decline in Belgium, Denmark, Germany, Finland and Hungary, and to rise in Cyprus, Italy, Latvia, Netherlands, Switzerland and Turkey. Armenia, Austria, Belgium, Canada, Denmark, Estonia, Finland, Germany, Hungary, Italy, Latvia, Monaco, Netherlands, Switzerland and Turkey provided data on gaseous fuel consumption. For countries which provided projections for 2010, gaseous fuel consumption was expected to increase, except in Denmark.

Data on nuclear energy consumption were given only by Belgium, Finland, Germany, Hungary and the Netherlands. In Germany and the Netherlands, nuclear energy consumption gradually decreased between 1990 and 2000, while in Belgium, Finland and Hungary it increased. In all five countries, nuclear energy consumption is expected to remain stable or decrease by 2010.

Austria, Belgium, Canada, Denmark, Finland, Germany, Hungary, Italy, Latvia, Monaco, the Netherlands and Switzerland provided data on electricity consumption. Electricity consumption in these countries increased between 1990 and 2000 (except in Hungary, Latvia and Switzerland, where it decreased). Countries that provided projections expected that electricity consumption would rise again between 2005 and 2010, except for Finland, Italy and Latvia, which expected a decrease in this period, and Hungary, which expected electricity consumption to remain stable. Consumption of hydro- and geothermal, steam and hot water, and other forms of energy is expected to rise between 2005 and 2010 as overall consumption increases and other, more polluting forms of energy are phased out.

B. Legislative and regulatory framework

All responding Parties to the Convention[7] acknowledged that basic principles for air pollution are laid down in their legislation. Some of these basic principles include the polluter pays principle, the precautionary principle and the substitution principle. Other fundamentals of air pollution legislation focus on preservation, improvement and restoration of the state of ambient air, prevention and control of harmful chemical, physical, biological and other impacts on air quality, and the rational use of ambient air. While general principles of air pollution regulation are present in most legislation, there is still a need for review and reform of current rules. For example, Kazakhstan's Law on Air Protection is a vestige of Soviet rule but is still in force. There is a need to incorporate environmental protection provisions into this law. The country's future strategy is to have as few by-laws as possible and to revise the laws to include issues of ecological control and auditing, investment, ozone depletion and biodiversity protection, among others. Most Parties to the Convention have standards and legislation that aim to abate the pollutants targeted in the Convention's Protocols.

In addition to the product regulations resulting in the control or reduction of air pollutants covered by the Protocols and reported in earlier sections, some countries reported

[7] The 18 Parties responding were Austria, Belarus, Belgium, Bulgaria, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Kazakhstan, Monaco, Netherlands, Norway, Switzerland and United States.

additional controls. The Czech Republic, Norway, Switzerland and the United States reported having vehicle speed limits. Bulgaria and Hungary have product regulations relating to the control of PCB, PCT and VOCs. In addition, the United States has prohibitions or limitations on the use of a variety of pesticides and chemicals.

Bulgaria and the United States highlighted additional specific regulatory measures that have recently been applied or are under preparation. Bulgaria developed a decree on requirements for the treatment and transport of waste oil and oil products, which entered into force on 1 January 2001. Regulations on waste incineration, large combustion plants and eco-labelling have also come into effect within the past two years in Bulgaria. In February 2002, the United States introduced the Clear Skies Initiative. This initiative is expected to: set mandatory caps that would significantly reduce emissions of sulphur dioxide, nitrogen oxide and mercury from electric power generation; mitigate the health and environmental effects of fine particles, ozone, regional haze, acid rain, eutrophication and mercury; provide greater regulatory certainty to allow power plants cost-efficient planning and compliance measures; and provide environmental certainty for the American public.

C. Economic instruments

Using charges/taxes to meet environmental goals: 'greening' the taxation system

More than half the responding Parties to the Convention[8] have a system of charges or taxes that are tied to environmental goals. Most of these[9] have charges and/or taxes on emissions that are determined through a variety of methods. Bulgaria takes the following criteria into account when calculating the charge: pollutant type; period of discharge; quantity over the admissible level; and price per kg (specific for each pollutant). The offender must pay monthly until emissions reach admissible levels. The Czech Republic has published fees for individual main pollutants and two classes of other pollutants valid since 1 January 2003. For example (rates given in US$/ton), Class I pollutants: 5257.90; Class II pollutants: 2628.95; freons: 5257.90. Denmark, Norway and Sweden base the rate of the tax on the amount of the pollutant, specifically the quantity of sulphur, CO_2 and NOx emissions.

All responding Parties to the Convention described their country's fuel tax as being differentiated according to fuel type. Most countries base the tax on the fuel quality and emissions hazard, charging higher rates for fuel with high lead and sulphur contents. This differentiation, based on the level of toxicity, is meant to promote environmental protection. However, not all Parties impose fuel taxes for environmental reasons. For example, the Czech Republic imposes taxes on energy products for other reasons and the revenues from the charges are an income for the State budget without specification of use. The Netherlands has a tax on electricity: the 1998 tax plan extended special provisions for electricity from renewables and waste incineration plants, promoting 'green electricity' by rewarding electricity from the biomass fraction.

Almost all responding Parties to the Convention[10] have a system of taxes or charges imposed on motor vehicles. Most use some of the following criteria: engine power (cylinder volume or piston displacement), application of catalytic converter, vehicle weight, vehicle age, vehicle price, vehicle type, fuel consumption and emission level. Many countries also have a charge for the use of roadways. The Czech Republic, Finland, the Netherlands and Norway specified legislation that provides financial incentives for the use of energy-efficient cars, specifically those that run on electricity.

Many Parties responded with examples of legislation imposing charges and/or taxes on products other than fuel or motor vehicles.

[8] The Parties responding "Yes" to this question were Bulgaria, Denmark, Germany, Hungary, Latvia, Netherlands and Norway. Those responding "No" were Austria, Canada, Cyprus, Czech Republic, Monaco and Switzerland, although Switzerland plans to introduce such a "green" taxation system starting in 2006.

[9] The Parties responding "Yes" were Bulgaria, Czech Republic, Denmark, Estonia, Latvia, Norway, Slovenia and Sweden. Those responding "No" were Austria, Cyprus, Finland, Hungary, Monaco, Netherlands and Switzerland.

[10] Belarus was the only responding country that had no specific tax on motor vehicles, only on motor fuels. The countries that responded positively were Austria, Bulgaria, Canada, Cyprus, Czech Republic, Denmark, Finland, Hungary, Latvia, Netherlands, Norway, Spain, Sweden and Switzerland.

Canada, Denmark, Hungary and Latvia have taxes on tyres. Denmark, Hungary and Latvia also have taxes on batteries and Denmark and Latvia have taxes on light bulbs. Denmark and Finland tax disposable beverage containers used for retail. Denmark and Sweden tax transport out of their countries either through passengers on aircraft departing from airports (Denmark) or through vessels' harbour fees (Sweden). Taxes on pesticides, chemicals, packaging materials, paper and waste generation are also common among Parties to the Convention. The Netherlands has a programme of efficiency class labelling for household appliances and rebates on energy bills to promote the efficient use of energy. These programmes are paid for from the income generated by the energy tax.

Some responding Parties provided information on how these charges and/or taxes have affected emissions and/or energy use. Canada found that after the federal tax on leaded petrol was imposed, the demand for leaded fuel fell more rapidly. Recent studies (2000 and 2001) in the Netherlands were carried out on the effects of the regulatory energy tax. These indicate a price elasticity of –0.3 to –0.4%. Researchers also found that the tax stimulates technology innovation towards energy-efficient equipment. Sweden noted that effectiveness comes when the tax or charge is high enough. Most responding Parties[11] acknowledged that a portion of the revenues generated from these charges/taxes was earmarked for environmental purposes while the rest was paid to the general treasury. Hungary uses revenues from charges and taxes for subsidizing emissions control measures and improving public transport. Germany's eco-tax is earmarked for the reduction of social security contributions. Another notable programme that returns revenue from environmental charges to help citizens is in Sweden, where the NOx charge system gives the money back to the payers. Sweden returns more money for less pollution, so some stakeholders are gaining money while others are losing.

[11] Austria, Bulgaria, Czech Republic, Denmark, Latvia, Netherlands, Norway and Switzerland, all responded that part of the revenues was earmarked for environmental purposes and part was paid to the general treasury. Cyprus and Finland pay the total revenues directly to the general treasury.

D. Financial assistance schemes (legislation) that lead to a decrease in the emissions of air pollutants covered by the Convention

Emission reductions

Many responding Parties highlighted programmes that provide financial assistance to emission reduction schemes. For example, Bulgaria writes off fines for companies investing in pollution abatement. Cyprus has a cash grants scheme in which the Government funds up to 30% of the total investment in pollution abatement equipment with a ceiling value of US$ 150,000. The Netherlands provides a deduction on corporate tax for companies that reduce emissions beyond legally required emissions levels or standards. In addition, over a period of four years from 1996 to 2000, the Norwegian Government granted NKr 35 million to support the upgrading of existing ship engines and the installation of new technology in order to reduce NOx emissions from ships. In Belgium, a subsidy is granted to individuals or companies that have their petrol cars fitted with an LPG tank.

Energy saving

Austria provides financial support for energy conservation, promotion of renewable energy, use of alternative fuels (biomass), and district heating projects (as do Denmark, Finland, and Germany). Canada has a new production incentive (of up to $260 million) for electricity produced from qualifying wind energy projects: the Canadian Government will provide an initial incentive payment of 1.2 cents per kilowatt-hour of production, gradually declining to 0.8 cents for the first 10 years of production. This will result in more investment in wind energy projects and will encourage its development. The Latvian Government has agreed to buy electrical energy produced from renewable resources for a higher price than would be paid for energy from non-renewable sources; the difference in the pur-

chase price is financed by increasing the average sales tariff on electricity. The Netherlands stimulates energy efficiency and renewable energy by subsidies for innovation and tax incentives for green investments. The Government of Norway has established 18 regional energy efficiency centres that offer information on the use of different energy carriers and their tariffs, and advise on how to use energy more efficiently.

Technology

Many responding Parties, including Cyprus, Denmark, Finland, Germany, the Netherlands, Norway and Switzerland, have financial assistance schemes in the form of grants, low-interest loans and tax incentives. Bulgaria promotes research and development by writing off fines upon agreement to invest in technology and achieve emission limits.

Compliance by smaller companies

The Czech Republic will pay 5% interest on bank loans given to small and medium-sized companies that have met the ISO 9000 or ISO 14000 environmental management standards. Denmark, Finland, Germany and the Netherlands also provide financial assistance to small and medium-sized companies engaging in pollution abatement practices.

Reduction in the use of pesticides and fertilizers, and promotion of organic farming

Austria, Latvia and Switzerland have financial assistance programmes that promote organic farming. Austria has subsidies for organic and extensive (integrated husbandry and reduced fertilizer use) farming. These farming methods bring about reductions in the use of pesticides, fertilizers and energy and thus contribute to a reduction in emissions covered by the Convention and its Protocols.

Use of electric vehicles, public transport and extra-low sulphur fuel

Austrian provinces and municipalities subsidize the installation of solar collectors and heat pumps and the purchase of electric vehicles. Norway provides tax subsidies to stimulate the use of electric cars including the exemption from the sales tax, value-added tax, exemption from road toll charges and the annual vehicle tax. Many countries also have financial assistance schemes that support public transport, including Finland and Switzerland. Canada provides tax incentives for ethanol-blended fuel to increase its market share; the long-term goal is for the ethanol market to be self-sustaining. While Germany, Hungary and Switzerland all subscribe to the principle that the polluter should pay for environmental damage, they all have financial assistance schemes for special purposes (see above).

E. Subsidy use that has detrimental effects on the environment

Austria, the Czech Republic, Finland, Latvia, the Netherlands and Norway all acknowledge that some forms of financial assistance provided by their governments do have detrimental effects on emission levels and air pollution. The most common programmes aim to support the domestic economy by subsidizing valuable industries, or to improve the flexibility of labour by reducing taxes for commuters. Canada has begun to combat this problem and improve economic efficiency by substantially reducing or eliminating many government subsidies, grants and contributions. For example, the Canadian government has significantly reduced the extent of direct government subsidies to the transport and agricultural sectors, and has ended direct financial support for various energy mega-projects. Canada wants to ensure that these industries are self-financing.

F. Market incentives used to further reduce emissions

Environmental labelling

Eighty-five per cent of responding Parties to the Convention[12] use labelling as a market incentive. Members of the European Union implement the EU energy labelling and EU eco-labelling schemes. Energy efficiency labelling of household products and cars is mandatory according to EU regulations, however the eco-labelling programme is voluntary. The eco-labels promote the production and distribution of environmentally friendly products. Other common labelling schemes include the voluntary international "Green Dot" packaging label, which symbolizes that the producer and/or importer of the product assume responsibility for its disposal. Symbols for recycled materials and organic food products are also popular labelling schemes. Latvia has a labelling system for chemical substances that classifies the hazard level. The label is used for substances and products that are toxic to organisms and/or are capable of negatively influencing the ozone layer or the environment in general. Most countries have developed their own labelling scheme. The Nordic countries have the Nordic Swan label, which assesses the product's environmental impact during its entire life cycle from raw material to waste. Germany has developed an environmental label called the "Blue Angel" awarded to air quality control measures and products such as low-emission oil and gas burners and paints low in or free of solvents. Many of these labelling schemes require regular certification by a third party. Most responding countries also promote certification of environmental management systems through the International Standards Organization (ISO 14001) and/or the European Union's EMAS. In addition to supporting these environmental certification programmes, Norway has developed a national ecological management system called the Eco-Lighthouse Programme, which is tailor-made to address environmental issues of small and medium-sized companies in Norway. In addition to labelling, several[13] have highlighted programmes that classify products based on environmental preferability. Most classify household appliances, fuels, coatings and vehicles on fuel economy and CO_2 emissions. In Belgium, a royal decree requires dealers to display labels on all cars for sale stating the fuel consumption and CO_2 emissions.

Use of financial support to promote the market introduction of environmentally friendly products

Austria, Canada, the Czech Republic, Denmark, the Netherlands and Norway all have fiscal incentives to promote the use of energy-efficient cars (e.g. electric cars) and fuels (e.g. ethanol-blended fuels, bio-diesel fuels). In addition, the Czech Republic decreases the tax rate for consumers of recycled paper, environmentally sound coatings, wood waste for energy use, and for producers of rapeseed oil and the operators of renewable sources.

'Green' procurement

Seventy-eight per cent of responding Parties to the Convention[14] have 'green' procurement policies that take into account the environmental effects of the products prior to purchase by a public agency. Most 'green' procurement policies relate to the purchase of electricity from green energy providers, for example, wind plants. The Netherlands is considering a policy that would require at least 50% of the power procured by the State to come from 'green electricity'. Canada has already implemented a similar policy.

Emissions permit trading

The only responding countries with systems of tradable permits already in force are Canada and the Netherlands, although most countries are planning trading systems in order to achieve emissions targets set forth in the Kyoto Protocol. The Netherlands has a

[12] Austria, Belgium, Canada, Czech Republic, Denmark, Germany, Hungary, Latvia, Netherlands, Norway, Sweden and Switzerland all use labelling as a market incentive; Bulgaria and Cyprus do not.

[13] Austria, Czech Republic, Denmark, Estonia, Netherlands, Norway and Sweden indicated they have product standards of environmental preferability.

[14] Austria, Canada, Czech Republic, Denmark, Germany, Netherlands and Norway, all have 'green' procurement policies; Cyprus and Switzerland do not.

manure trading system that obliges farmers with surplus manure to settle in advance contracts with other farmers who have manure shortages and/or with manure processors. Germany has the possibility of a bubble concept, allowing compensation of emissions between plants and firms if higher emission reductions can be achieved. Unfortunately, Germany has noted little use of this instrument. Canada's provincial government of Ontario implemented a cap, credit and trade system in January 2002. This emissions trading system is a hybrid system that incorporates features of a pure "cap and trade" with those of a "baseline and credit". When fully implemented in 2007, the limits would cut smog and acid-rain-causing emissions from fossil fuel plants: nitrogen oxides by 53%; and sulphur dioxide by 25%.

Canada was the only country to give data on the effects of a tradable permit system. In an attempt to fully eliminate the use of methyl bromide (MBr) by 2005, Canada established a trading programme awarding MBr allowances to each direct user by calculating the average consumption between 1991-1993. Canada allows trading among MBr users or with other companies that have no allowances, enabling those who have access to more affordable alternatives to transfer quotas to those who do not. In 1998, the phase-out schedule called for a 25% reduction in the use of MBr, and allowances acquired a value up to $2 to $3 per kilo (MBr was approximately $5/kg). In 2000, 100 allowance holders engaged in 33 transfers. Half of MBr allowances changed hands in 2000. A higher total price for MBr has led people to reduce use and implement least-cost alternatives.

The Czech Republic, Finland, the Netherlands and Norway all responded that studies have been carried out to examine the cost-saving potential of emissions trading systems. Most data indicate that are cost savings associated with emission reductions when a system of tradable permits is in place. However, many of these studies have found the benefit to vary among the stakeholders, and more studies are being carried out in the Czech Republic, for example, to analyse the potential for trading from the standpoint of the individual sectors and groups of sources.

G. Voluntary agreements

Voluntary agreements and control measures are becoming a valuable way for countries to support air pollution abatement programmes. Many agreements are between government and industry, and focus on ensuring the manufacture of various engines and low-emissions vehicles that are required for the successful implementation of legislation that promotes the use of these types of technologies.[15] Many Parties to the Convention, including Austria, have chosen to enter into voluntary agreements with providers of utilities that rely on renewable sources such as biomass, biogas, wind and solar energy to produce electricity. In addition, voluntary agreements are being made, particularly in Finland and the Netherlands, with various industry leaders to promote conservation and energy-saving operations. The Finnish Ministry of Trade and Industry fosters the implementation of these agreements by granting funds to energy audits and investment aimed at saving energy. Other voluntary agreements being made in Austria, the Czech Republic, Italy and the United States aim to reduce emissions from various chemicals, oil and gas. For example, in the United States, some retailers have agreed to voluntarily sell only low-VOC paints during the summer; companies are volunteering not to paint or use VOC-based cleaning equipment on days when the ozone level in the air is expected to be especially high; and printers are voluntarily switching to low-VOC inks. In addition, the United States has a lawnmower buy-back programme that replaces petrol-powered mowers with electric ones.

[15] Canada, Italy and United States have voluntary agreements with engine and vehicle manufacturers.

H. Bilateral activities

Nearly all responding Parties to the Convention[16] cited bilateral or multilateral agreements between neighbouring countries or the European Union. Many of these partnerships focused on improving financial and technical assistance, increasing environmental education and awareness, fostering joint scientific research and monitoring efforts, and supporting the transfer of information and emission data. The European Union and the United Nations have provided invaluable opportunities for support and development of an intellectual network committed to air pollution abatement. Some of the most common EU programmes that countries participate in include Clean Air for Europe (CAFE), PHARE and IPPC. In addition, many countries are engaged in other multilateral agreements that have links to this Convention and its Protocols, including the United Nations Framework Convention on Climate Change, the International Maritime Organization, the International Convention for the Prevention of Pollution from Ships (MARPOL), the International Civil Aviation Organization, the Convention for the Protection of the Marine Environment of the North-East Atlantic and the Convention on the Protection of the Rhine.

IX. FUTURE REVIEW OF PROTOCOLS AND CURRENT PRIORITIES

A major priority of the Convention at present is the implementation and compliance with existing agreements. The Convention's Working Group on Strategies and Review is developing plans for reviewing the protocols that have recently entered, or are about to enter, into force, which may lead to recommendations for revising Parties' obligations to these protocols. Parties to the protocols, together with the Executive Body, will decide upon the details of the reviews; however, the Protocol on POPs specifies that a review should be completed within three years of its entry into force, while the Gothenburg Protocol indicates a review should begin within 12 months of entry into force. Discussions are already under way on the nature and content of the reviews, and scientific work has begun in the three core scientific areas, atmospheric measurement and modelling, effects, and integrated assessment, including modelling and economic benefit evaluation.

The Convention is increasing its emphasis on new issues not covered directly by existing protocols, such as health impacts and particulate matter. It is also becoming concerned with the potential transport of pollutants beyond the continental scale. Recently, the issue of POPs was addressed at the global scale through the 2001 Stockholm Convention as discussed above in chapter VI, section B. The Executive Body is now expected to consider how to improve the scientific understanding of the movement and impacts of ozone and fine particulates, which may be transported around the northern hemisphere. These pollutants not only cause human health and environmental damage, but are also important greenhouse gases. Three workshops were held dealing with intercontinental air pollution: Palisades, United States, 2001 (http://www.ciesin.columbia.edu/pph/); Seattle, United States, 2000 and Bad Breisig, Germany, 2002.

For a quarter of a century, the Convention on Long-range Transboundary Air Pollution has played a major role in protecting the environment from atmospheric pollution. (See Table 1: Effects of pollutants covered by the Convention's protocols and Table 2: Status of ratification of protocols, (as of 13 April 2004).

Further work will continue with the upcoming reviews of the three most recent protocols, while the effective implementation of these protocols will need to be addressed as they enter into force. Communication between Parties, the sharing of best practices and the exchange of technology will assist Parties, not only in achieving their obligations

[16] Austria, Belgium, Bulgaria, Canada, Cyprus, Czech Republic, Denmark, Germany, Hungary, Latvia, Netherlands, Norway, Sweden, Switzerland and United States. (Monaco said it did not participate in any multilateral or bilateral programmes on reducing air pollution in the ECE region.)

under the Convention, but also in developing effective policies and strategies for air pollution abatement outside of their legal obligations. These efforts will go a long way towards cleaner air in Europe and North America and may serve as a model for other regions of the world.

Annex

49 Parties, *as of 13 April 2004*

Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, Serbia and Montenegro, Slovakia, Slovenia, Spain, Sweden, Switzerland, the former Yugoslav Republic of Macedonia, Turkey, Ukraine, United Kingdom, United States and European Community.

Figure 1: **Parties to the Convention on Long-range Transboundary Air Pollution**

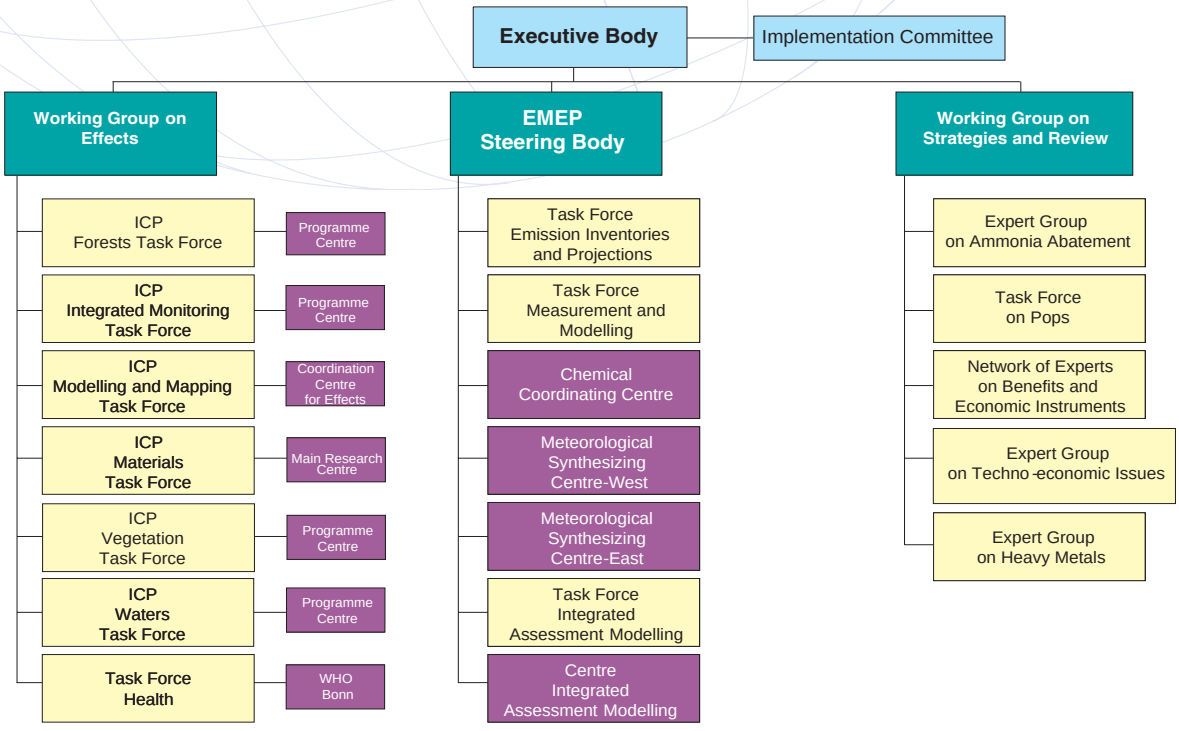

Figure 2: **Organizational structure of the Convention on Long-range Transboundary Air Pollution**

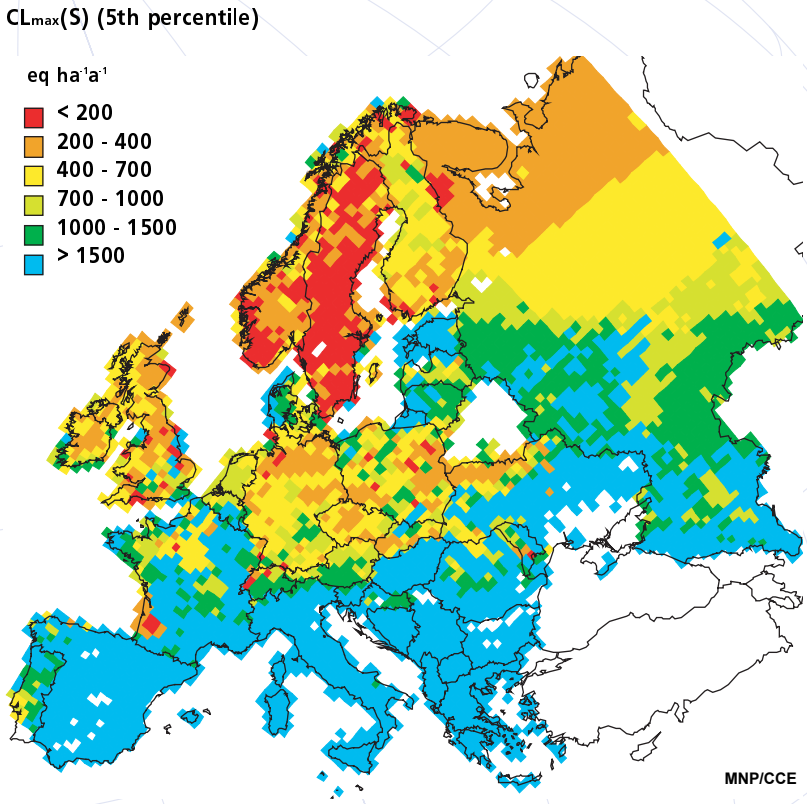

Figure 3: **Fifth percentile of the maximum critical load for sulphur within the EMEP-50 km grid**

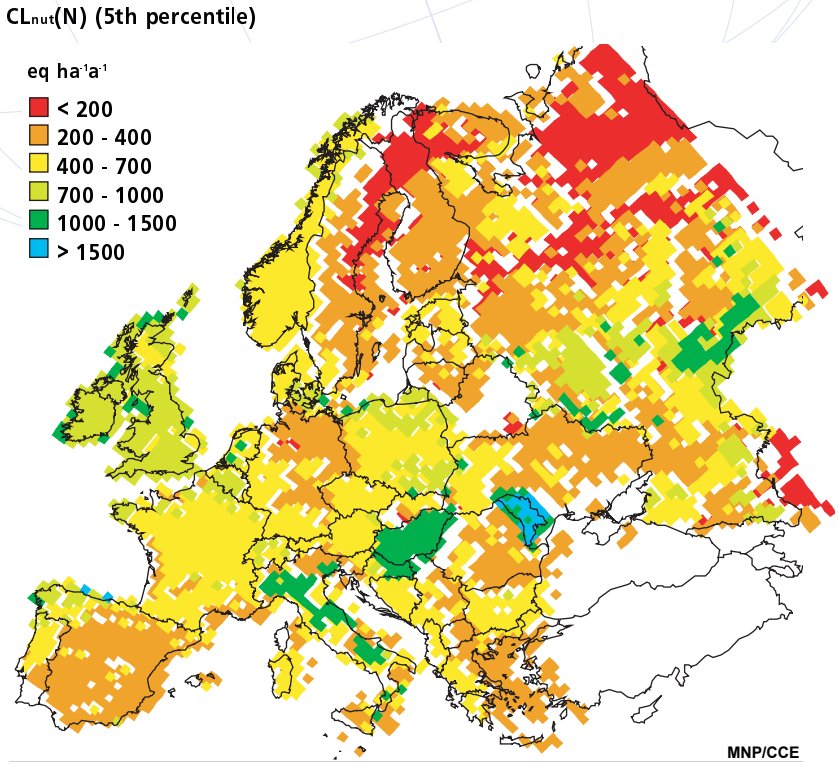

Figure 4: **Fifth percentile of the critical load of nutrient nitrogen within the EMEP-50 km grid**

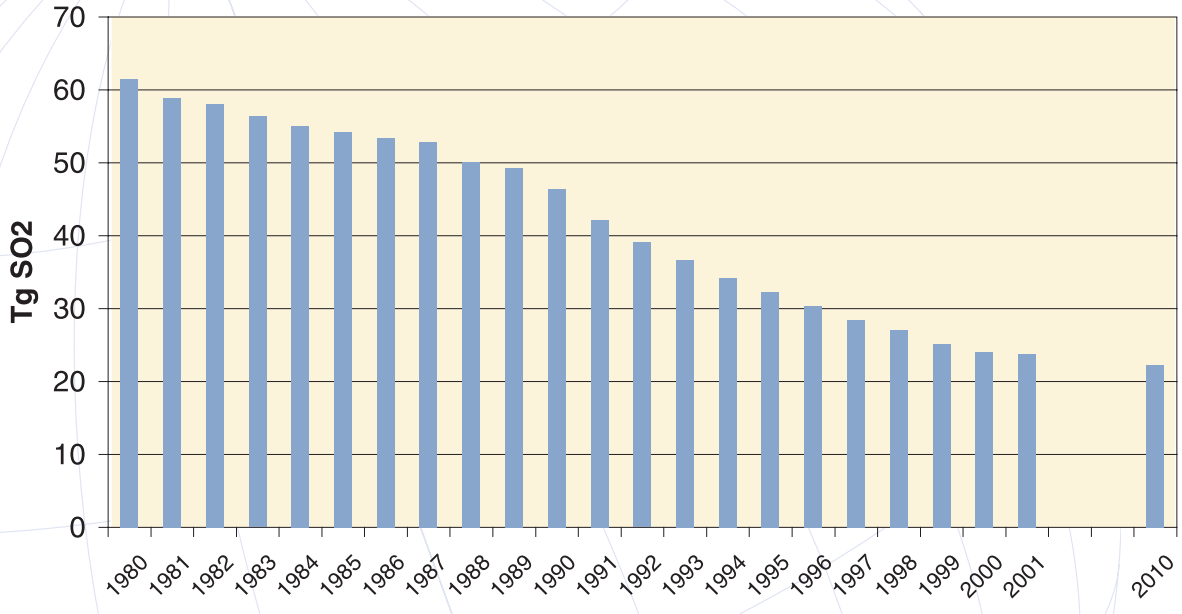

Figure 5: **Emission trends of sulphur in the EMEP area, 1980-2001, 2010**

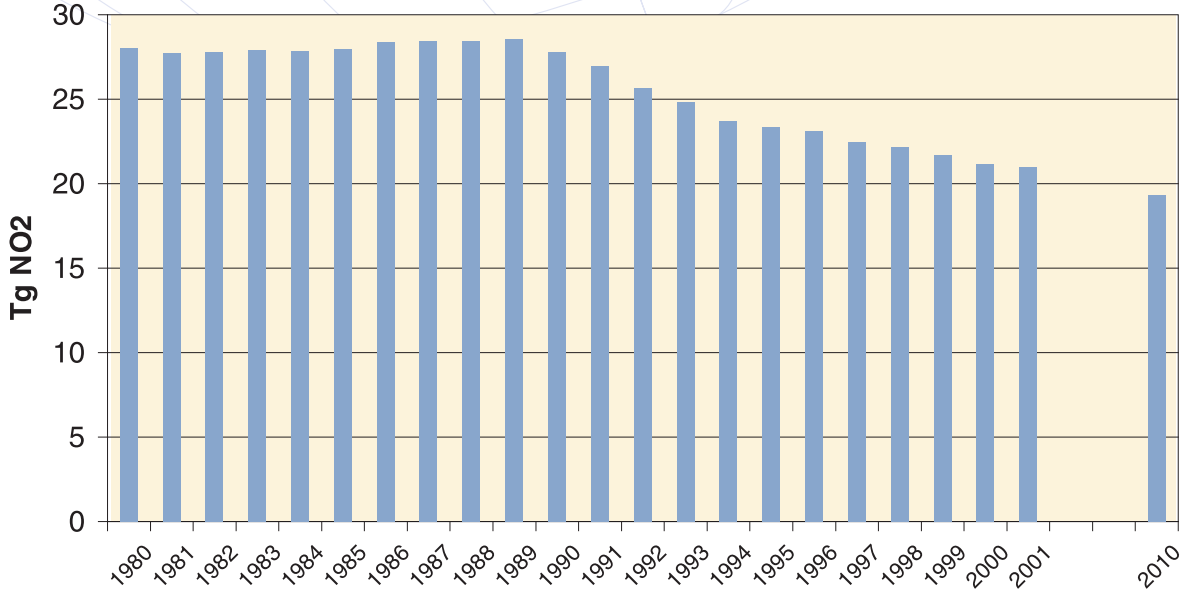

Figure 6: **Emission trends of nitrogen oxides in the EMEP area, 1980-2001, 2010**

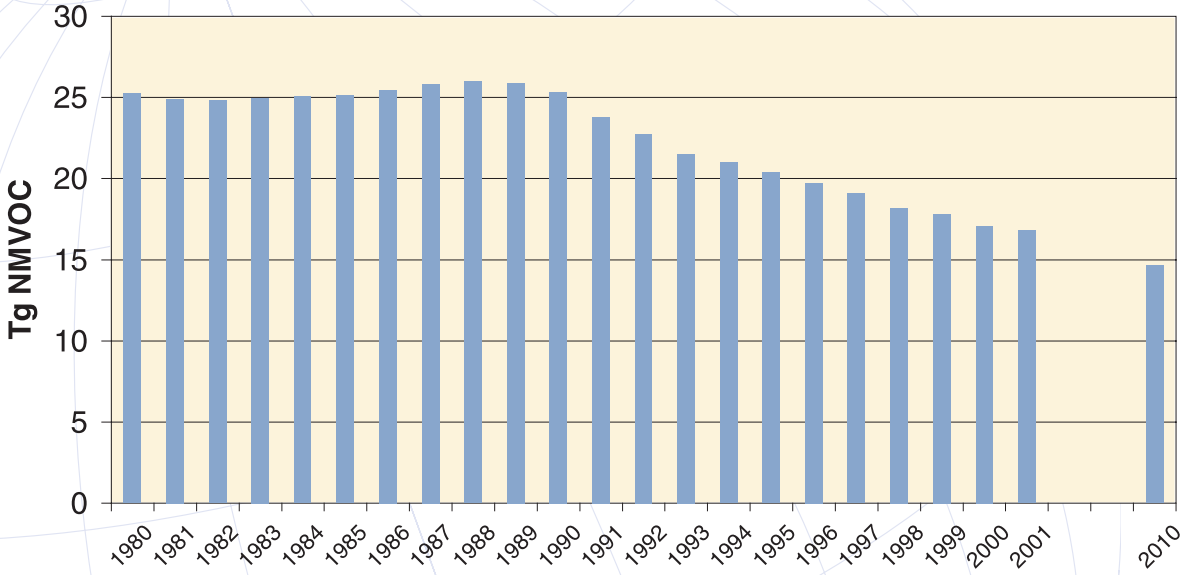

Figure 7: **Emission trends of NMVOCs in the EMEP area, 1980-2001, 2010**

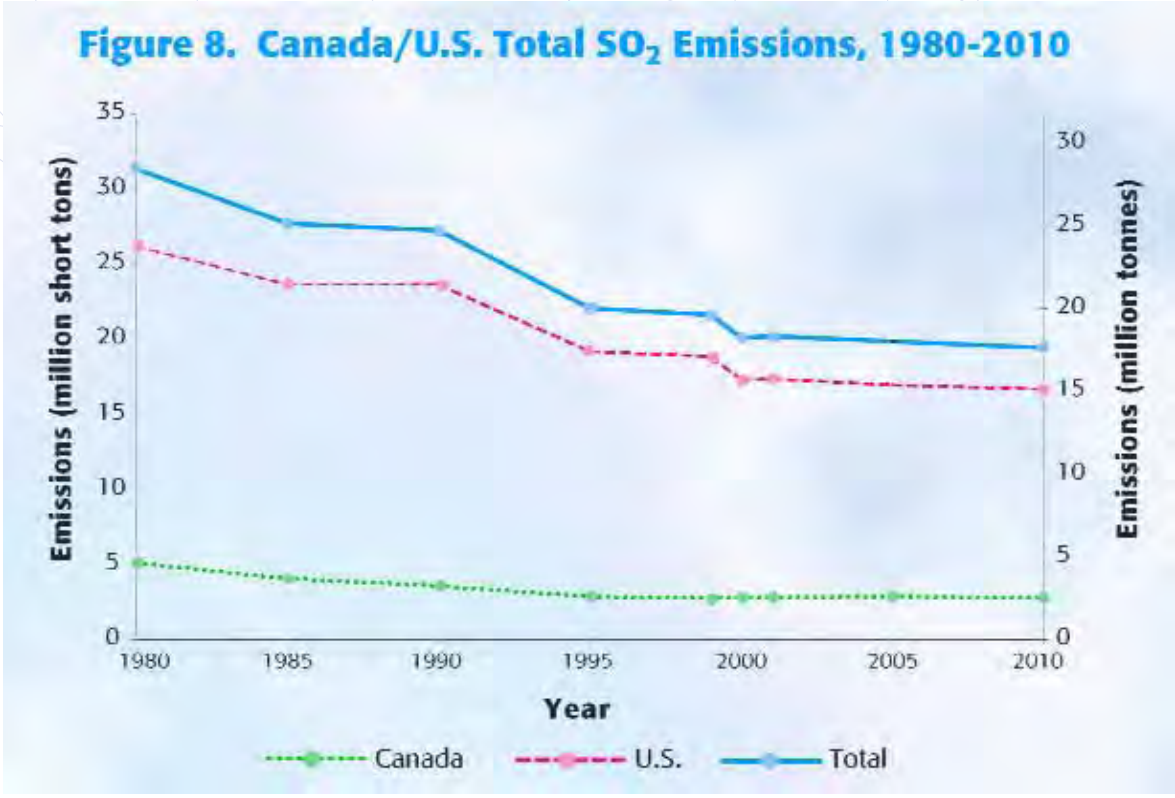

Figure 8: **Trends in North American emissions of SO2 (Canada/US total SO2 emissions, 1980-2010)**

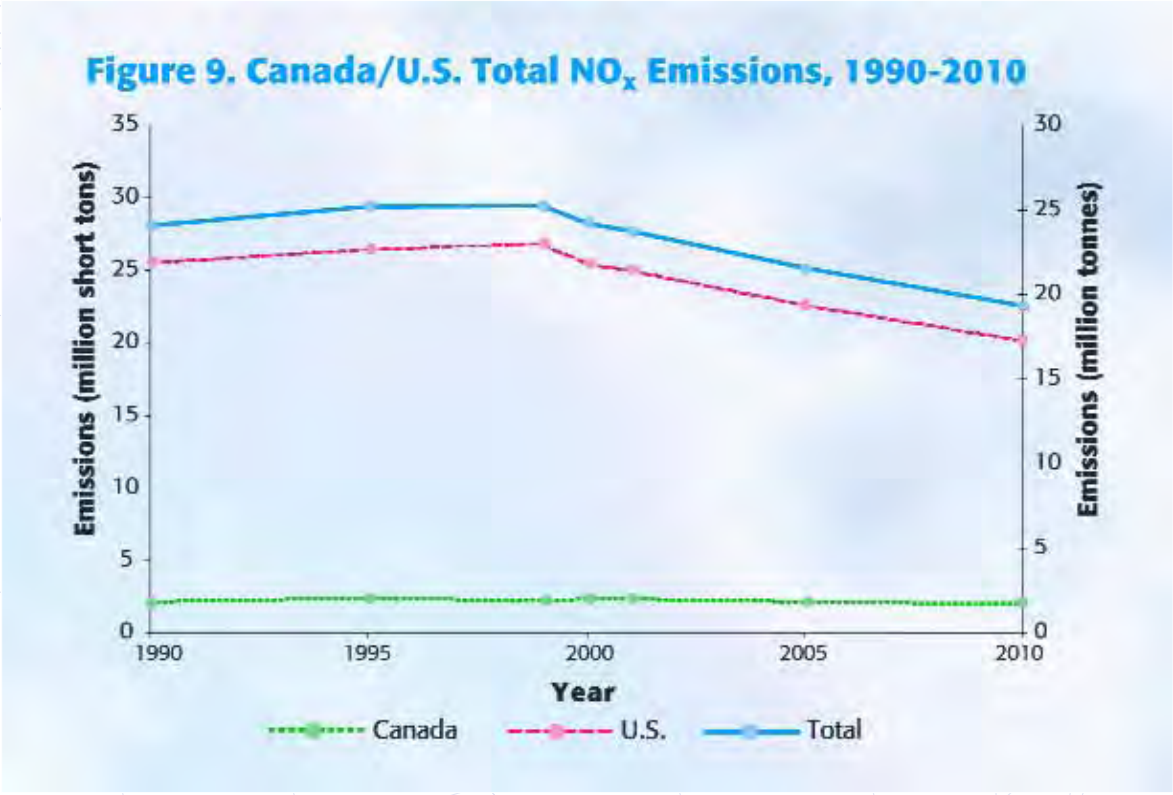

Figure 9: **Trends in North American emissions of NOx (Canada/US total NOx emissions, 1990-2010)**

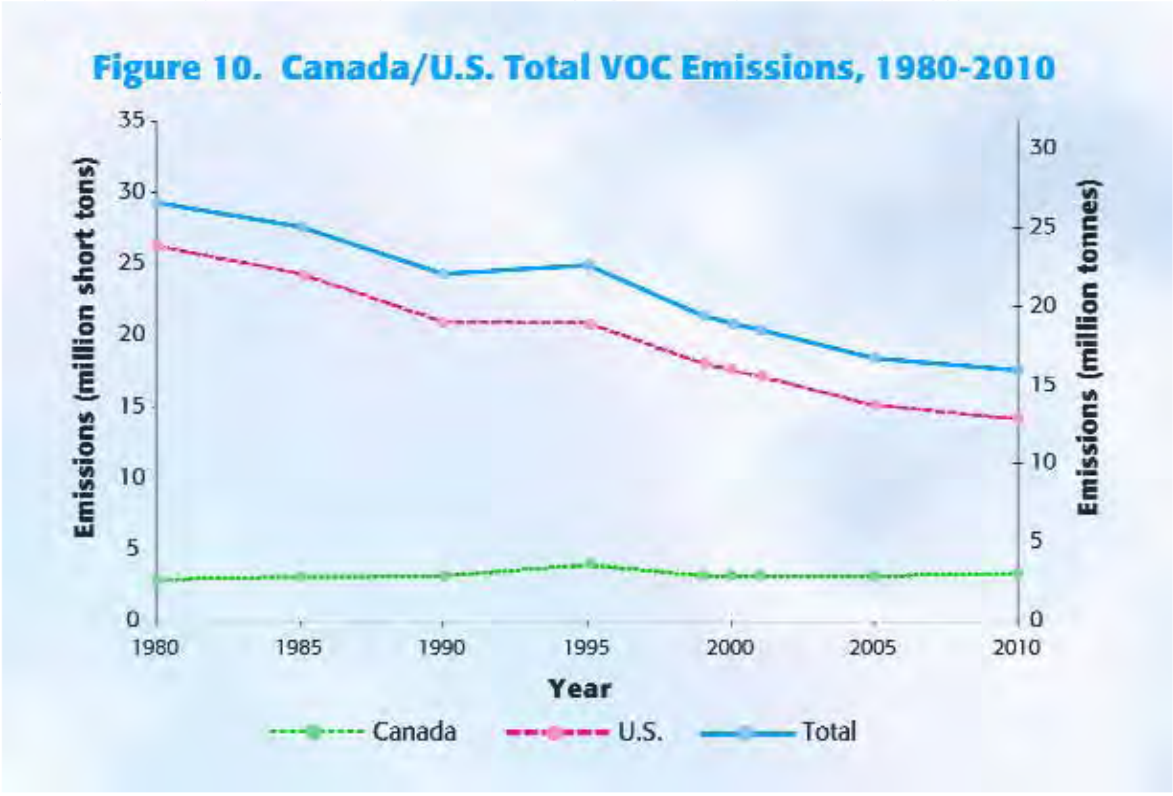

Figure 10: **Trends in North American emissions (Canada/US total VOC emissions, 1980-2010)**

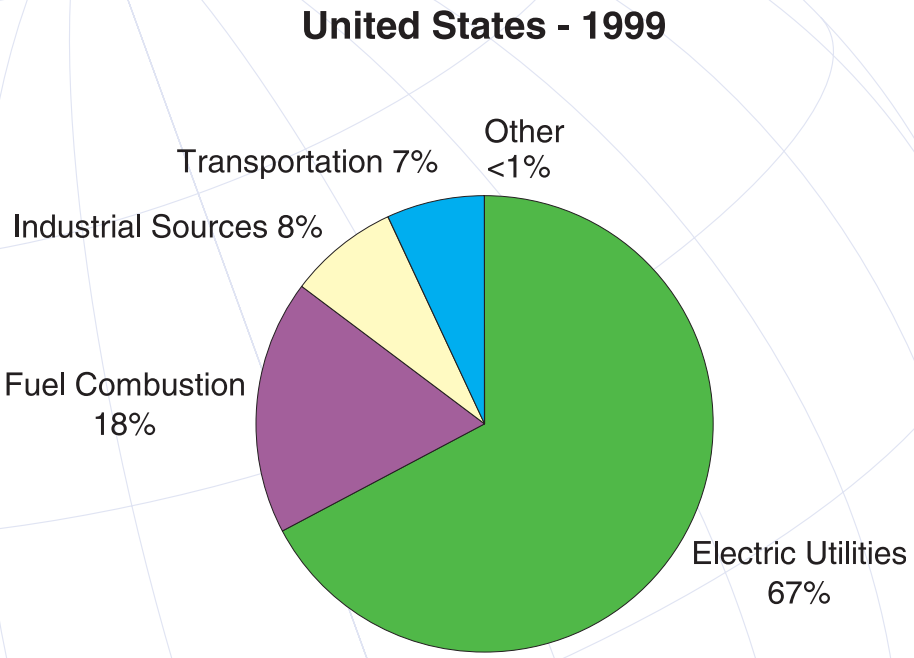

Figure 11: **Sectoral emissions for SO_2 (1999, US)**

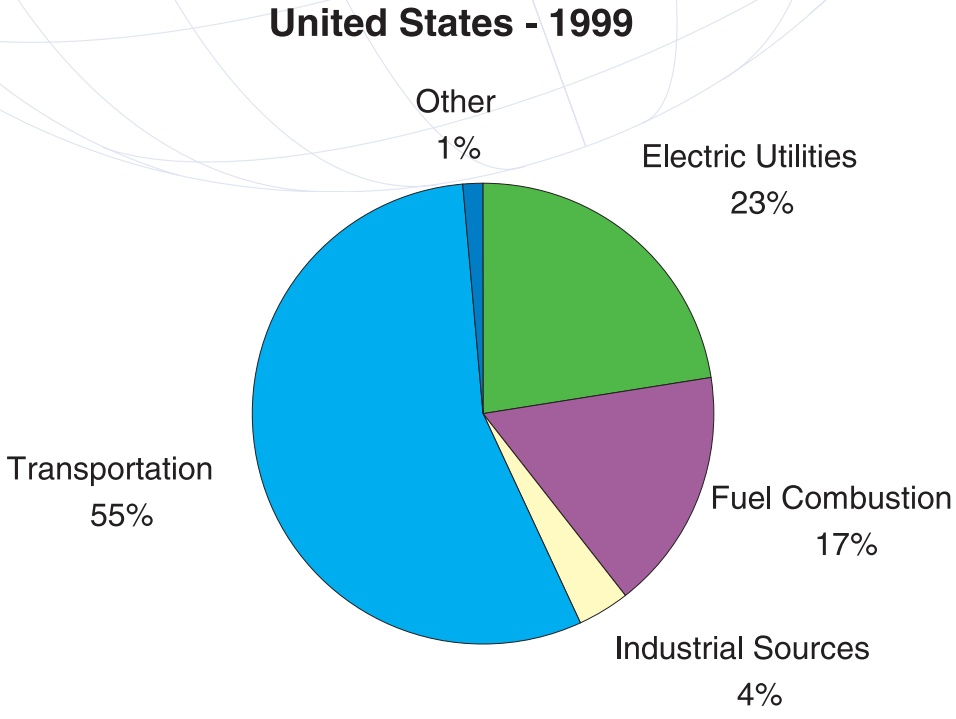

Figure 12: **Sectoral emissions for NO_x (1999, US)**

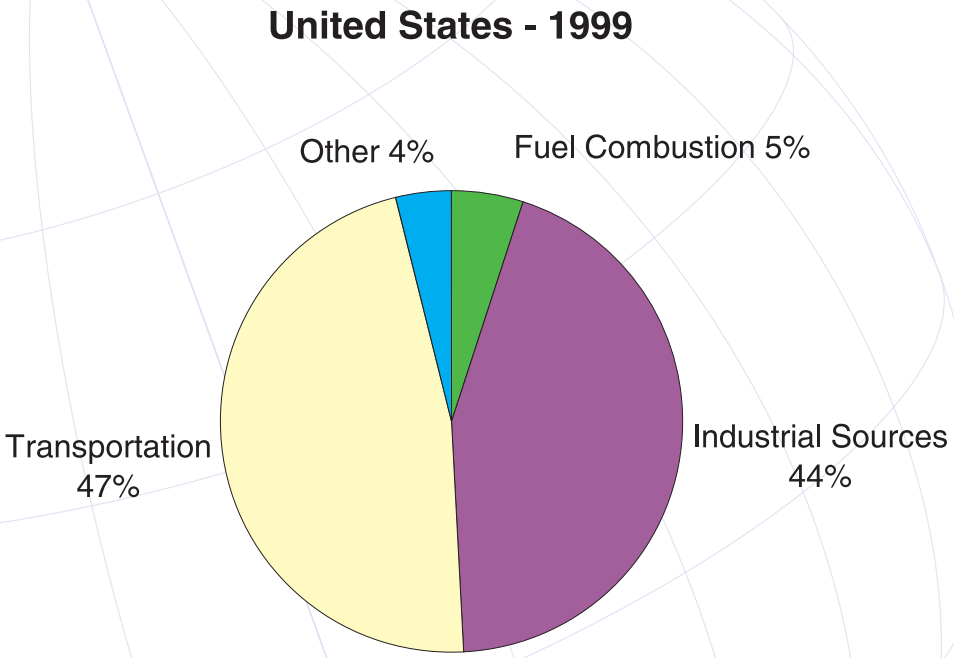

Figure 13: **Sectoral emissions for NMVOCs (1999, US)**

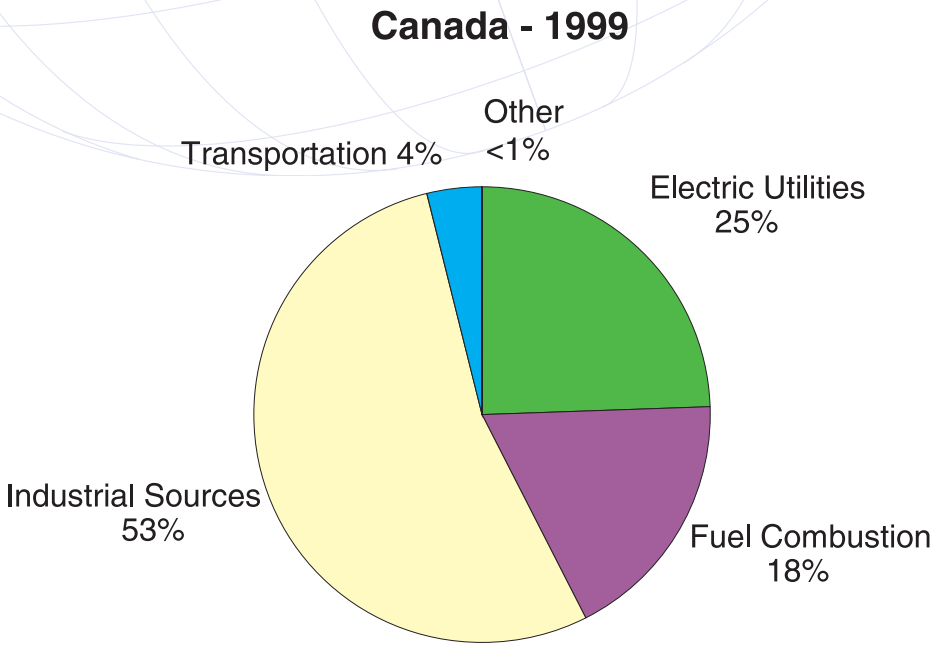

Figure 14: **Sectoral emissions for SO_2 (1999, Canada)**

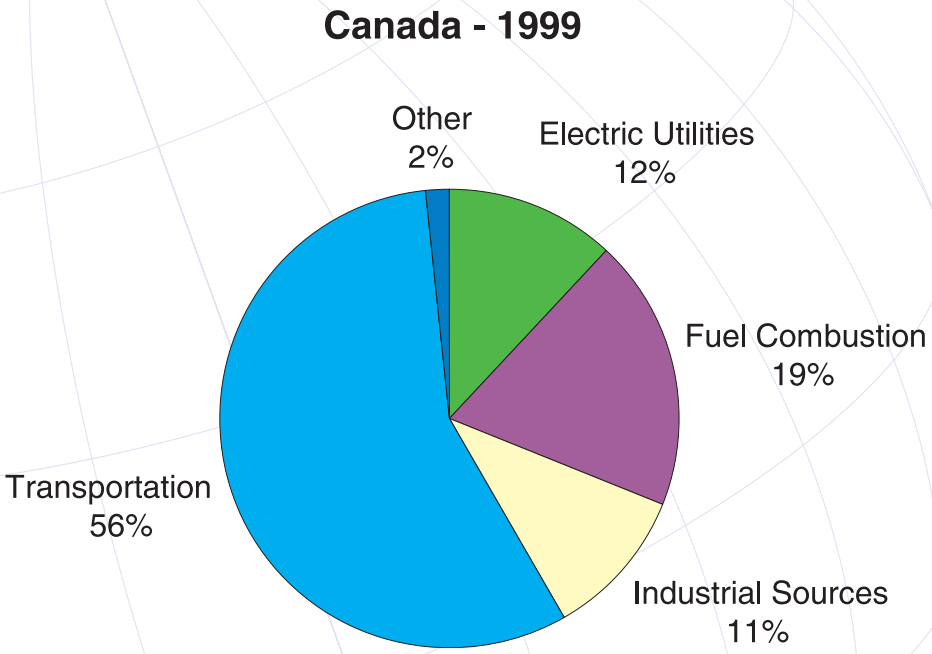

Figure 15: **Sectoral emissions for NO_x (1999, Canada)**

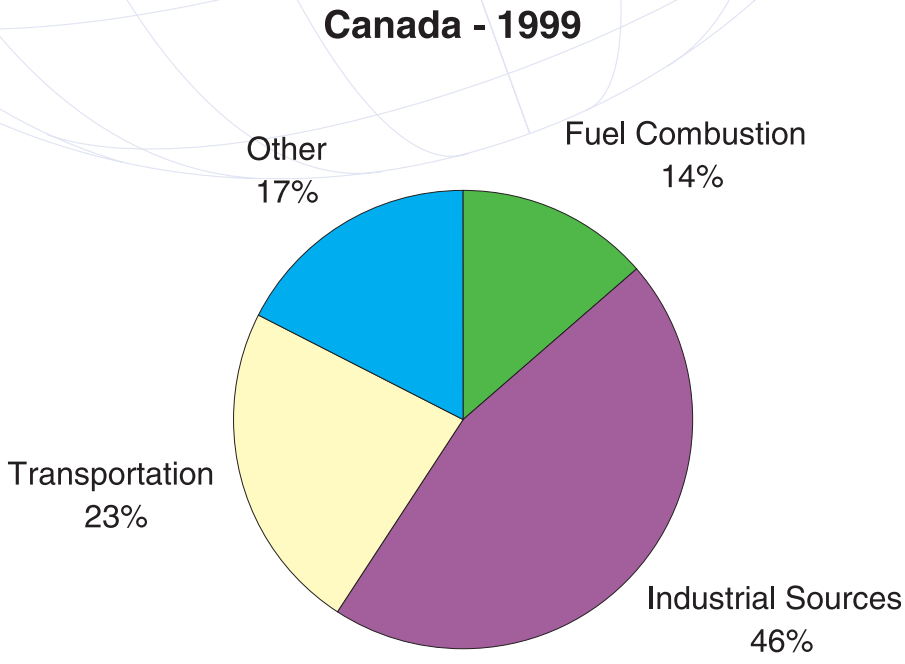

Figure 16: **Sectoral emissions for NMVOCs (1999, Canada)**

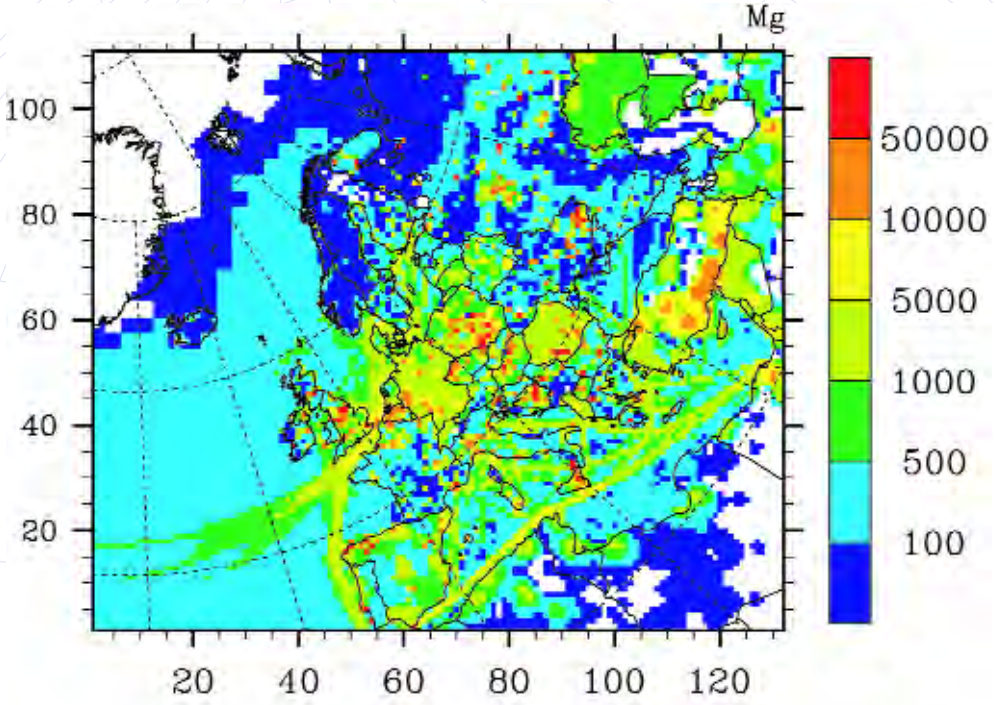

Figure 17: **Emissions of sulphur in 2001 at 50km resolution (Mg as SO_2)**

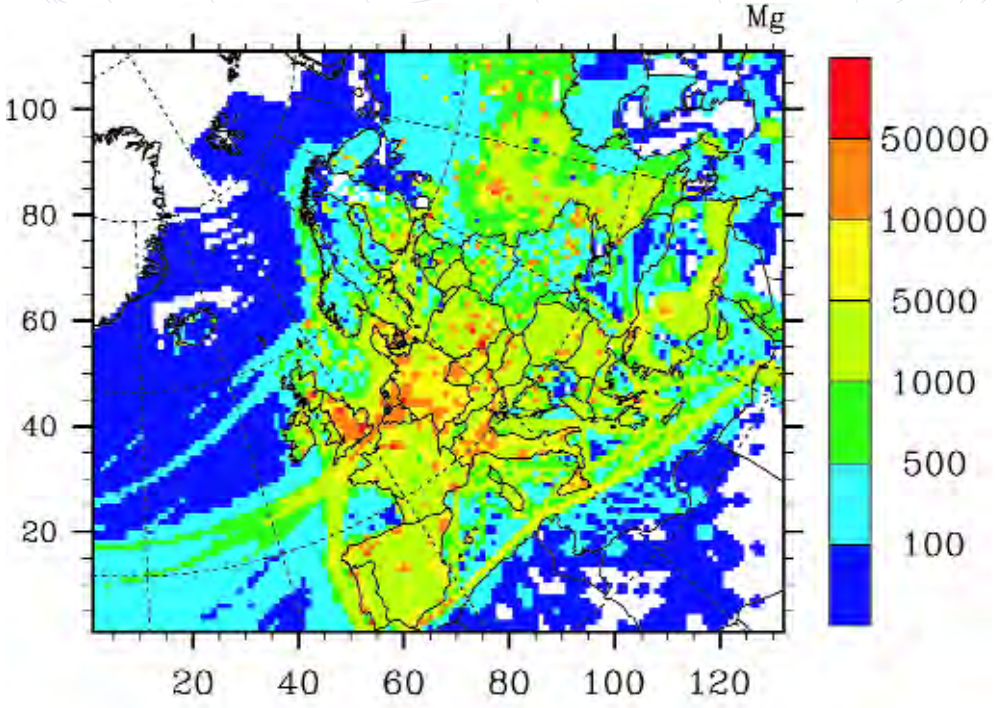

Figure 18: **Emissions of nitrogen oxides in 2001 at 50km resolution (Mg as NO_2)**

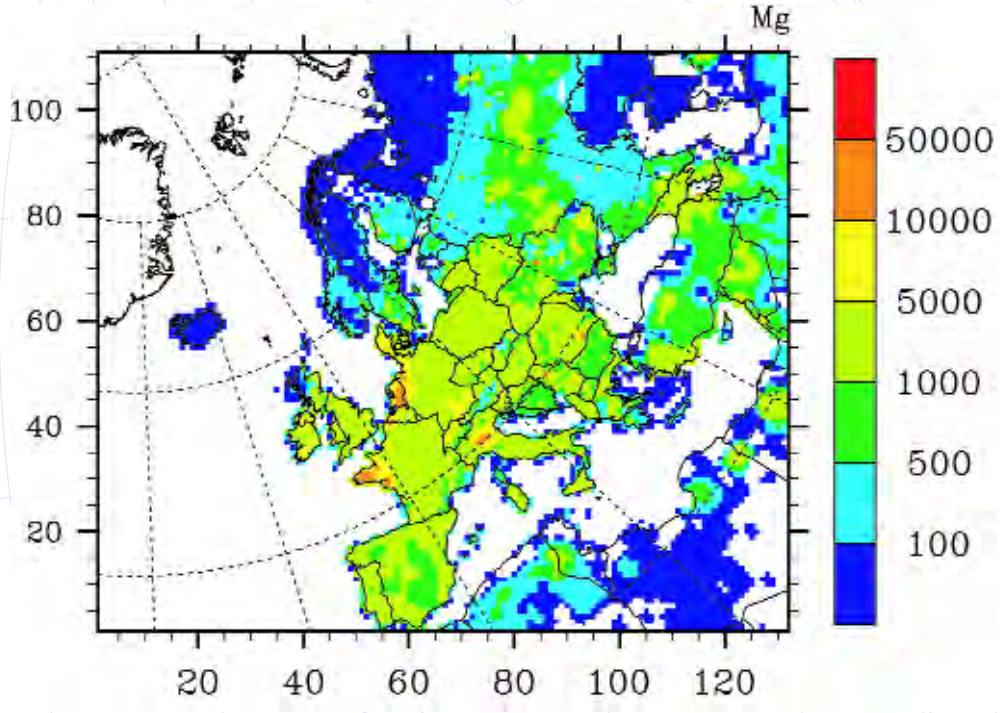

Figure 19: **Emissions of ammonia in 2001 at 50km resolution (Mg as NH_3)**

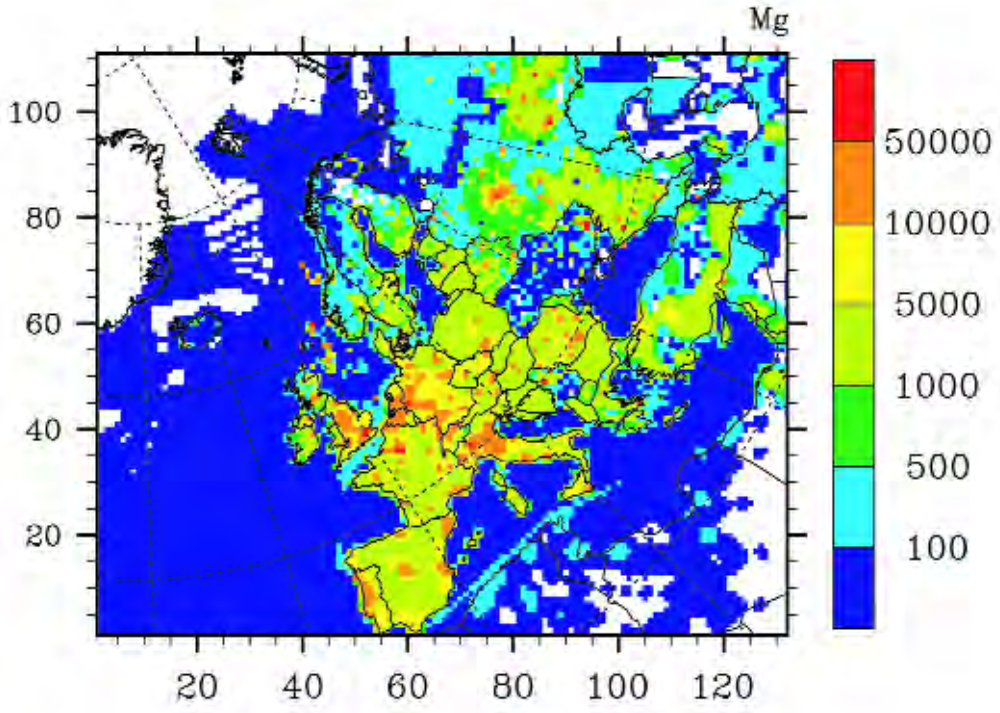

Figure 20: **Emissions of NMVOCs in 2001 at 50km resolution (Mg as NMVOC)**

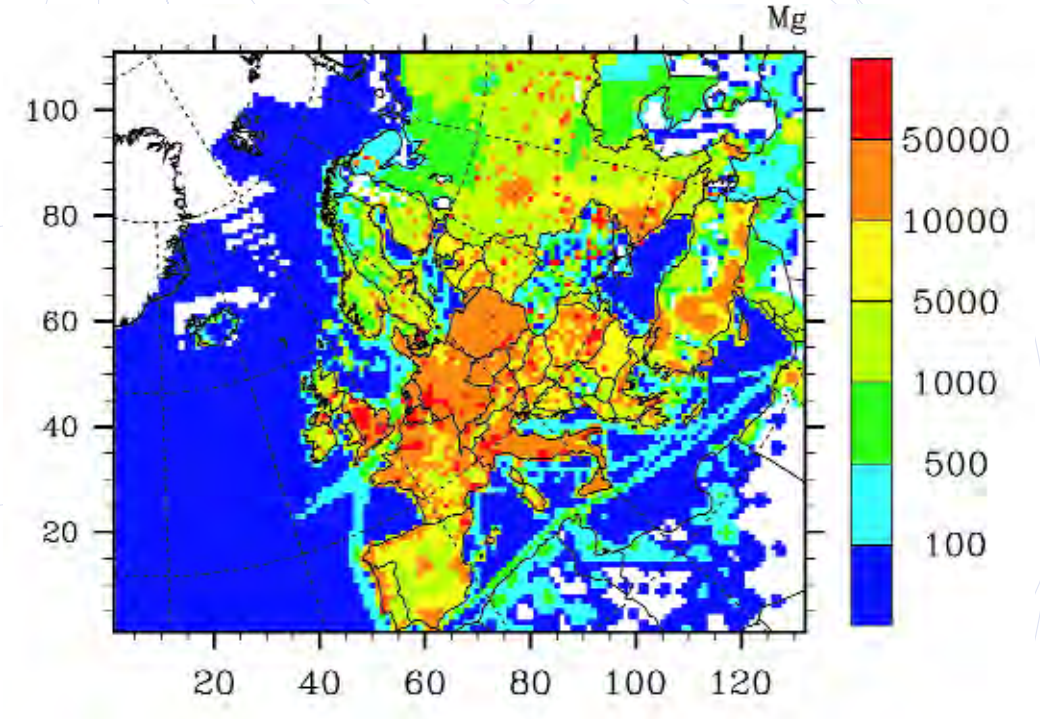

Figure 21: **Emissions of carbon monoxide in 2001 at 50km resolution (Mg as NMVOC)**

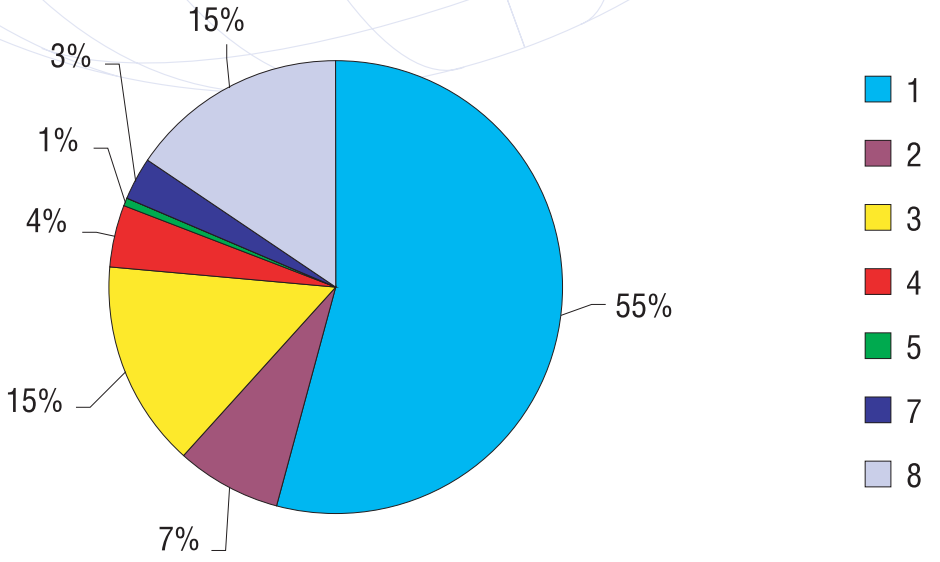

Figure 22: **Anthropogenic emissions per sector of SO_x in 2001 within the EMEP area (per cent of total)**

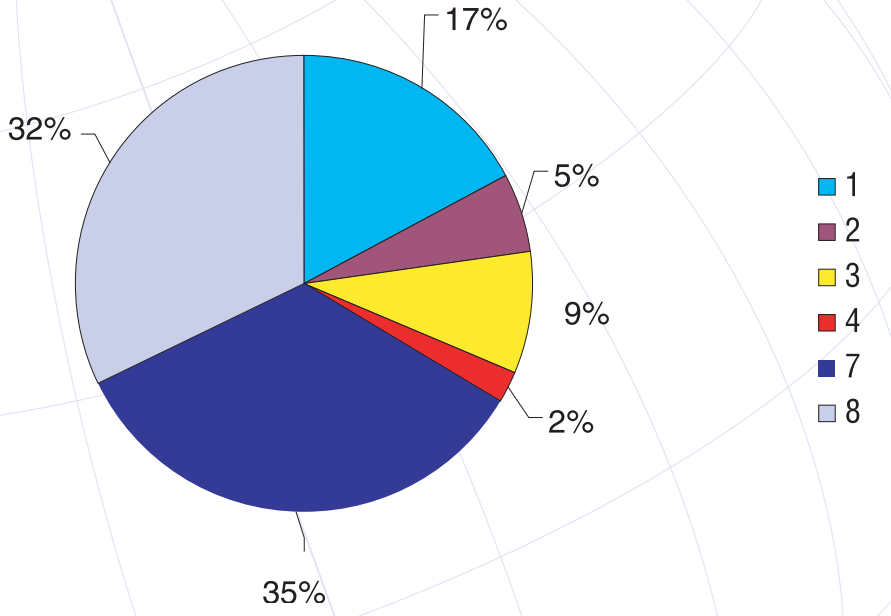

Figure 23: **Anthropogenic emissions per sector of NO_x in 2001 within the EMEP area** *(per cent of total)*

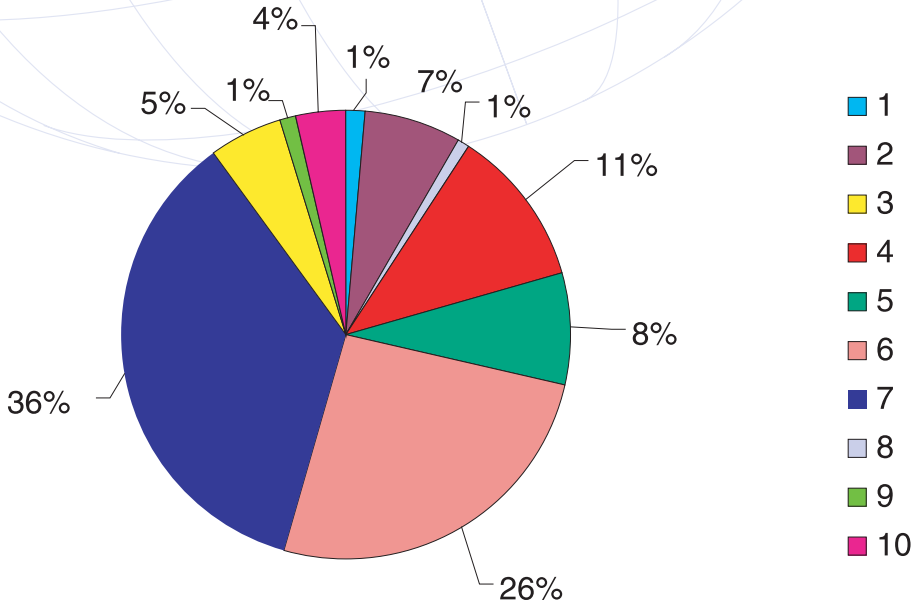

Figure 24: **Anthropogenic emissions per sector of NMVOCs in 2001 within the EMEP area** *(per cent of total)*

Key to Figures 22-24: Source categories for SOx, NOx and NMVOCs. Shading indicates most significant pollutants per source.

SOURCE CATEGORY	SO_x	NO_x	NMVOC
1. Combustion in energy and transformation industries			
2. Non-industrial combustion plants			
3. Combustion in manufacturing industry			
4. Production processes			
5. Extraction and distribution of fossil fuels and geothermal energy			
6. Solvent and other product use			
7. Road transport			
8. Other mobile sources and machinery			
9. Waste treatment and disposal			
10. Agriculture			
(11. Other sources and sinks)			
TOTAL			

Note: Emissions from international shipping in the EMEP area are included in sector 8; pie charts exclude sector 11 (other sources and sinks)

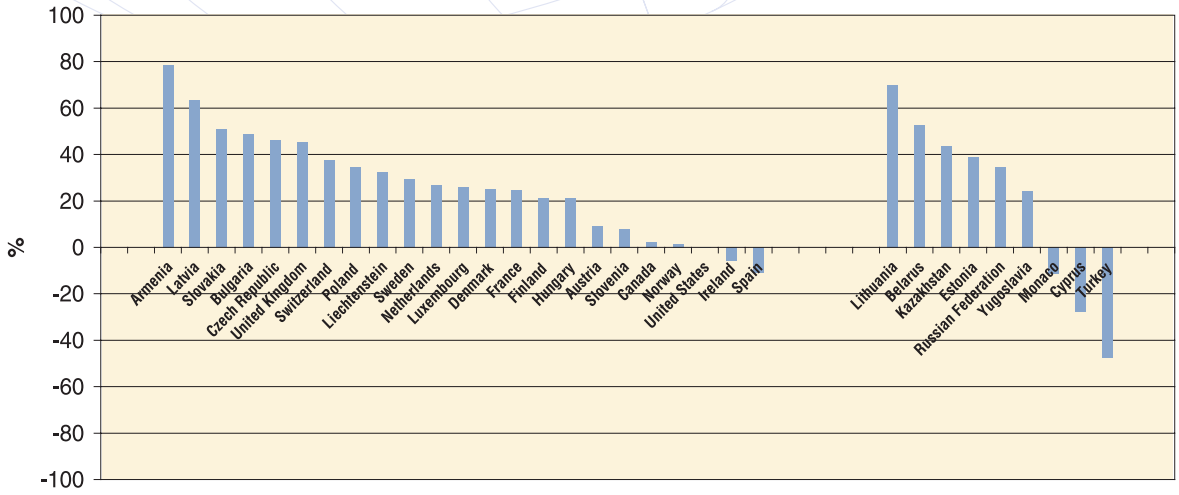

Figure 25: **Reduction in emissions of NO_x in the ECE region (1990-2000) (based on 2000 data).** Signatories to the 1999 Gothenburg Protocol are on the left.

Note: Only countries that have reported emission data for both 1990 and 2000 are listed here.

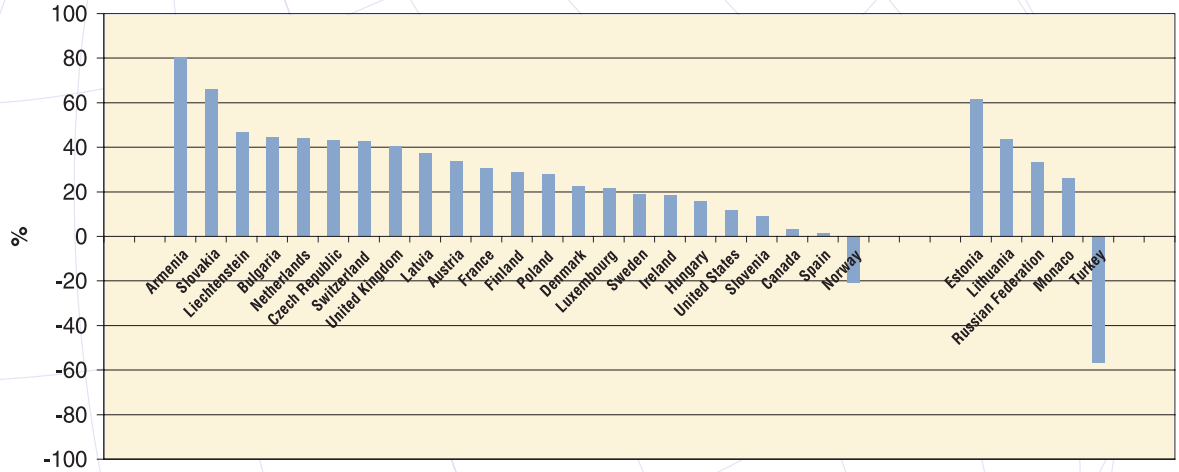

Figure 26: **Reduction in emissions of NMVOCs in the ECE region (1990-2000)**
(based on 2000 data). Signatories to the 1999 Gothenburg Protocol are on the left.
Note: Only countries that have reported emission data for both 1990 and 2000 are listed here.

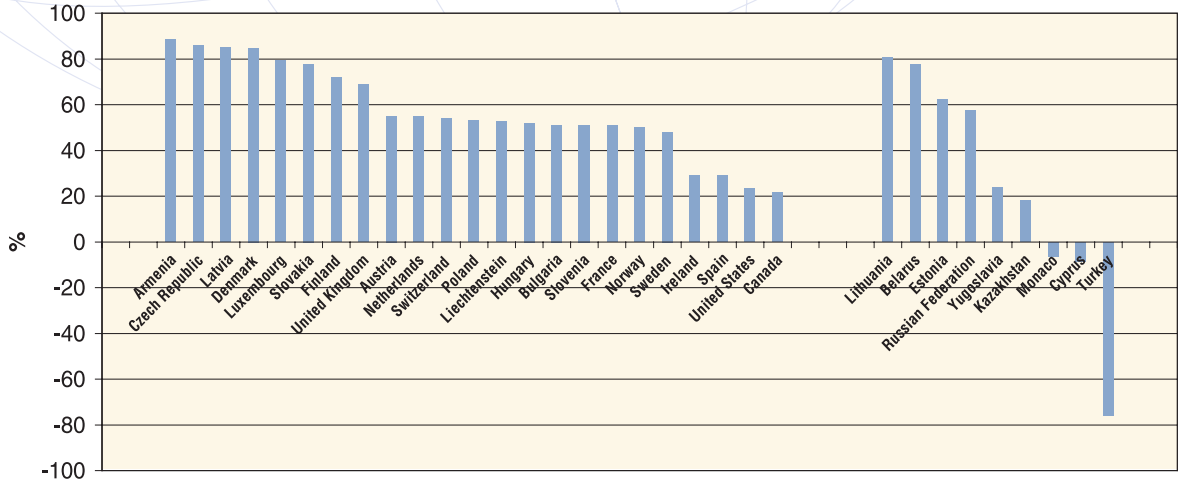

Figure 27: **Reduction in emissions of SO_2 in the ECE region (1990-2000)**
(based on 2000 data). Signatories to the 1999 Gothenburg Protocol are on the left.
Note: Only countries that have reported emission data for both 1990 and 2000 are listed here.

Party to Convention	SO_2			NO_x			NH_3			NMVOC		
	1990	2000	Reduction	1990	2000	Reduction	1990	2000	Reduction	1990	2000	Reduction
Units	Gg SO_2		%	Gg NO_2		%	Gg NH_3		%	Gg NMVOC		%
Signatories to the Gothenburg Protocol (as of August 2001)												
Armenia [1]	72	8.403	88.33	46.2	9.97	78.42	25	0.002		81	15.96	80.3
Austria	90.74	40.75	55.09	201.8	183.6	9.034	79.86	67.68	15.25	359.7	238.7	33.64
Belgium	357			320.6			107.3			303		
Bulgaria	2008	982	51.1	361	184.4	48.91	144	56.23	60.95	217	120.4	44.51
Canada [2]	3236	2534	21.69	2104	2058	2.186				2880	2790	3.125
Croatia	180			87.6			37.1			105		
Czech Republic	1876	264.7	85.89	742	397.7	46.4	156	74.48	52.26	435	246.7	43.28
Denmark	180.6	27.5	84.78	276.9	207.2	25.17	132.2	101.1	23.48	170.5	131.9	22.64
Finland	260	73.5	71.73	300	235.8	21.4	38	33.1	12.89	224.4	159.9	28.74
France	1341	659	50.86	1899	1432	24.59	763	788	-3.28	2385	1659	30.44
Germany	5321			2706			765			3221		
Greece	479			311			79			317		
Hungary	1010	485.3	51.95	238	187.2	21.36	124	70.81	42.9	205	172	16.1
Ireland	185.7	131.5	29.19	118.1	125.1	-5.95	112.4	122.4	-8.93	111.1	90.27	18.76
Italy	1651			1938			466			2213		
Latvia	119.2	18.06	84.85	92.28	33.63	63.56	43.85	11.61	73.52	152.4	95.61	37.25
Liechtenstein	0.113	0.053	52.74	0.525	0.355	32.4	0.205	0.207	-0.93	0.988	0.527	46.61
Luxembourg	15	3.092	79.39	23	17.03	25.96	7	7.233	-3.33	19	14.92	21.45
Netherlands	202.4	91.2	54.93	573.8	421	26.63	226.8	152.6	32.71	503.5	280.7	44.25
Norway	52.55	26.21	50.11	226.5	223.2	1.443	22.73	25.32	-11.4	300.5	363	-20.8
Poland	3210	1511	52.93	1280	838	34.53	512	322	37.11	831	599	27.92
Portugal	359.4			317			104.6			379.9		
Republic of Moldova	265			100			49			157		
Romania	1311			546			300			772		
Slovakia	542	120	77.86	215	106	50.7	63	29.6	53.02	262	89	66.03
Slovenia	196	96	51.02	63	58	7.937	24	19	20.83	44	40	9.091
Spain	2167	1535	29.16	1279	1419	-10.9	472			1610	1584	1.615
Sweden	111.1	57.65	48.12	348.9	246.6	29.3	51	55.87	-9.55	516.7	417.8	19.13
Switzerland	41.96	19.26	54.11	153.7	95.69	37.74	71.5	68.29	4.49	278.8	158.8	43.03
United Kingdom	3721	1165	68.69	2763	1512	45.28	341	297	12.9	2508	1498	40.27
United States [2]	21478	16483	23.26	21747	21713	0.156	3925	4503	-14.7	18421	16252	11.77
Non Signatories to the Gothenburg Protocol (as of August 2001)												
Belarus [3]	637	142.8	77.59	285	134.8	52.69	4	142.1		533		
Bosnia and Herzegovina	480											
Cyprus	46	50	-8.7	18	23	-27.8						
Estonia	252.1	95.46	62.13	67.7	41.4	38.84	24.25	8.764	63.86	88.4	33.69	61.89
Georgia	248.3			129.5						46.4		
Iceland	24			26.3						12.8		
Kazakhstan [4]	1156	948	18.02	355.7	200.9	43.52	0.49	0.27		0.394	0.22	44.16
Kyrgyzstan												
Lithuania	222	43.1	80.59	158	47.5	69.94	84	25.2	70	108	60.8	43.7
Malta												
Monaco [5]	0.063	0.067	-6.35	0.53	0.59	-11.3	0.001	0.006	-500	0.702	0.518	26.21
Russian Federation	4671	1997	57.25	3600	2357	34.53	1191	650	45.42	3668	2450	33.21
Serbia and Montenegro	508	387	23.82	66	50	24.24						
The FYR of Macedonia		105.2			30.4							
Turkey [4]	764.6	1347	-76.2	643.7	951.1	-47.8		0.007		462.9	725.6	-56.8
Ukraine [4]	3782			1097			23			1369		
European Community	16325			13292			3795			16633		

[1] Emissions of NH_3 from agriculture are not included in the 2000 emission value.
[2] Special notes for NH_3 and NMVOC are stated in the Gothenburg Protocol.
[3] Emissions of NH_3 from agriculture are not included in the 1990 emission value.
[4] Emissions of NH_3 from agriculture are not included.
[5] The NH_3 emission reduction (increase) is not included in the NH3 reduction figure.

Figure 28: **Percentage reduction in SO_2, NOx, NH_3 and NMVOC (1990-2000) of 1990 level** (a negative number indicates an increase)

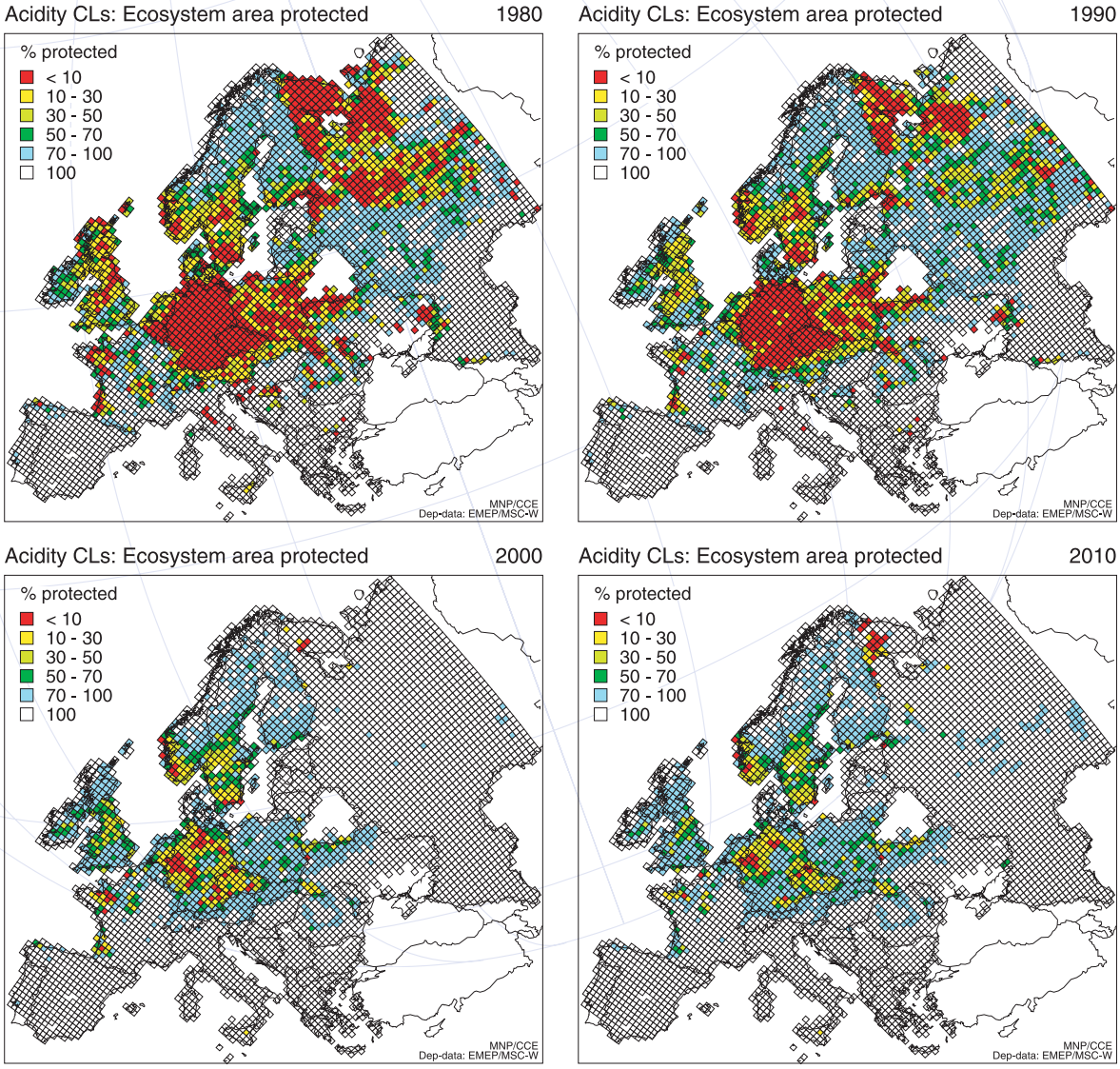

Figure 29: **Ecosystem area protected from acidification in every EMEP-50 km grid cell for the years 1980, 1990, 2000 and 2010.**

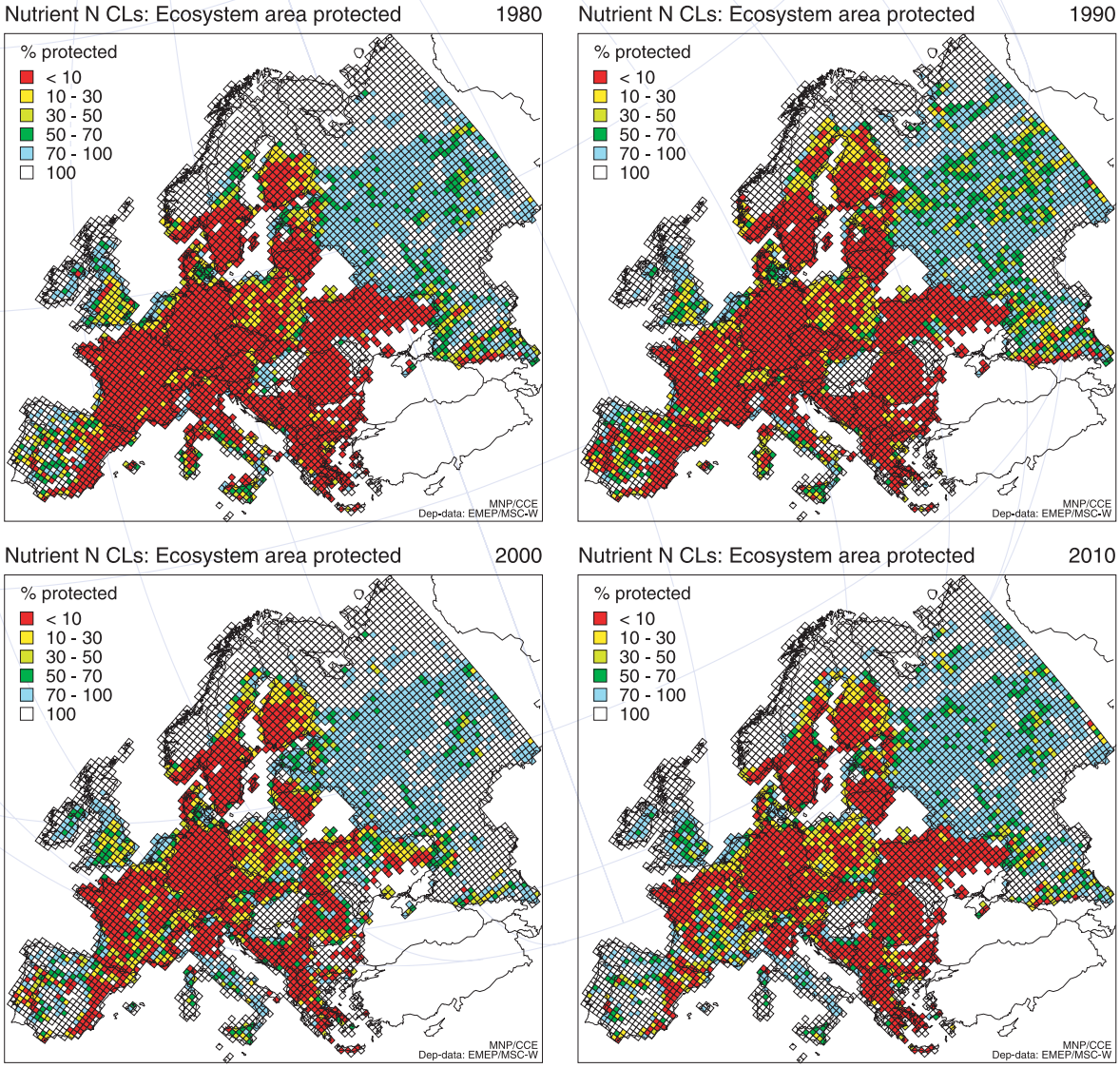

Figure 30: **Ecosystem area protected from eutrophication in every EMEP-50 km grid cell for the years 1980, 1990, 2000 and 2010.**

Table 1. **Effects of pollutants covered by the Convention's protocols**

Pollutant	Health Effects	Ecological Effects
SO_2	• Respiratory and cardiac diseases • Respiratory symptoms in asthmatics	• Acid rain (e.g. damage to fish populations and forest soils)
NO_x	• Lung irritation (e.g. inflammation, respiratory cell damage, premature ageing) • Increased susceptibility to respiratory infection • Respiratory and cardiac diseases • Asthma attacks	• Acid rain (e.g. damage to fish populations and forest soils) • Eutrophication (e.g. disruption of ecosystem functions, acidification of surface and ground waters) • Regional haze
VOCs	• Lung irritation (e.g. inflammation, respiratory cell damage, premature ageing) • Increased susceptibility to respiratory infection • Asthma attacks	• Decreased commercial forest productivity • Damage to ecosystem functions • Regional haze
Ozone (from NOx and VOC precursors)	• Lung inflammation • Respiratory disease (e.g. asthma and emphysema) • Impairment of immune system defences	• Impede growth, reproduction and health of plants • Increase plants' susceptibility to disease, pests and environmental stresses • Reduce agricultural yields • Alter ecosystems through changes in water movement, mineral/nutrient cycling and habitat • Kill/damage leaves • Disintegration of organic materials
Heavy metals	• Food contamination • Premature deathBronchitis - chronic and acute • Asthma attacks • Lower and upper respiratory illness • Blood disorders (e.g. lead poisoning) • Effects on functioning of liver, kidneys, circulatory and nervous systems • Effects on the development of the foetus and other human health problems caused by mercury in fish	• Affects on the decomposition of organic matterImpairs the recycling of important forest nutrients • Reproductive problems in birds and other wildlife • Wildlife also harmed by mercury in fish
POPs	• Reproductive and immune effects • Developmental and behavioural abnormalities • Cancer	• Bioccumulates in animals • Ability to build up in the food chain
Ammonia	• Eye and upper respiratory tract irritation • Burning and scarring of tissues • High blood pressure • Lethal at higher concentrations (can cause blindness, lung damage, heart attack, death)	• Eutrophication (e.g. disruption of natural ecosystems) • Reduction in egg hatching success in fish, reduction in growth rate and morphological development (esp. gills, liver and kidney) • Toxic to fish and aquatic organisms at high concentrations

Table 2. **Status of ratification of protocols as of 13 April 2004 a/**

Protocol	Open for signature	Entry into force[b]	Number of signatures	Number of ratifications
Acidification, Eutrophication and Ground-level Ozone	1999		31	9[c]
Persistent Organic Pollutants	1998	2003	36	19[d]
Heavy Metals	1998	2003	36	21[e]
Further Reduction of Sulphur Emissions	1994	1998	28	25[f]
Volatile Organic Compounds	1991	1997	23	21[g]
Nitrogen Oxides	1988	1991	25	28[h]
Reduction in Sulphur Emissions	1985	1987	19	22[i]
European Monitoring and Evaluation Programme (EMEP)	1984	1988	22	41[i]

[a] Updated status can be found at http://www.unece.org/env/lrtap/status/lrtap_s.htm.
[b] Sixteen ratifications are needed for a protocol to enter into force.
[c] Denmark, Finland, Lithuania, Luxembourg, Netherlands, Norway, Romania, Sweden, and European Community.
[d] Austria, Bulgaria, Canada, Czech Republic, Denmark, Finland, France, Germany, Hungary, Iceland, Liechtenstein, Luxembourg, Netherlands, Norway, Republic of Moldova, Romania, Slovakia, Sweden and Switzerland.
[e] Austria, Bulgaria, Canada, Czech Republic, Denmark, Finland, France, Germany, Liechtenstein, Luxembourg, Monaco, Netherlands, Norway, Republic of Moldova, Romania, Slovakia, Slovenia, Sweden, Switzerland, United States and European Community.
[f] Austria, Belgium, Canada, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Liechtenstein, Luxembourg, Monaco, Netherlands, Norway, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom and European Community.
[g] Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Liechtenstein, Luxembourg, Monaco, Netherlands, Norway, Slovakia, Spain, Sweden, Switzerland and United Kingdom.
[h] Austria, Belarus, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Russian Federation, Slovakia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, United States and European Community.
[i] Austria, Belarus, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Russian Federation, Slovakia, Sweden, Switzerland and Ukraine.
[i] Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Serbia and Montenegro, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, United States and European Community.

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