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**DRAFT SUMMARY
2002 REVIEW OF STRATEGIES AND POLICIES FOR AIR POLLUTION
ABATEMENT**

Prepared by a consultant in cooperation with the secretariat

Addendum

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

1. 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.

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

A. 1998 Protocol on Heavy Metals

2. 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.

3. 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.

4. 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.

National strategies, policies and programmes

5. Eighteen Signatories to the Protocol^{1/} provided information on their national strategies, policies and programmes developed to implement the Protocol and reduce emissions of heavy metals. The most common strategies include 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.

6. 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

^{1/} Austria, Bulgaria, Canada, Croatia, the Czech Republic, Denmark, Finland, Germany, Hungary, Italy, Latvia, Liechtenstein, the Netherlands, Norway, Poland, Switzerland, the United Kingdom and the United States.

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.

7. 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.

8. 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 and Latvia, 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).

Emission limit values

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

Product control measures

10. Many Signatories have already banned or phased out the use of leaded petrol for on-road vehicles. Some Signatories have 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 include 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).

11. The most common additional product management measures being 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 is considering using this type of programme. In addition to voluntary agreements with manufacturers, many Signatories including Denmark, Germany, and Italy are using labelling programmes to encourage the use of product alternatives that have fewer or no heavy metals.

B. 1998 Protocol on Persistent Organic Pollutants (POPs)

12. 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, hexachlorobenzene, 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.

13. 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.

14. 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. (Insert graphic box in final report Figure 17: The POPs Protocol controls emissions of 16 POPs: aldrin, chlordane, chlordecone, DDT, dieldrin, dioxins and furans, endrin, heptachlor, hexachlorobenzene, hexachlorocyclohexane (HCH), hexabromobiphenyl, mirex, PAHs, PCBs, and toxaphene.)

15. 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/>).

16. 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

17. Sixteen Signatories to the Protocol^{2/} 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

^{2/}Austria, Bulgaria, Canada, Croatia, the Czech Republic, Denmark, Germany, Italy, Latvia, Liechtenstein, the Netherlands, Norway, Poland, Switzerland, the United Kingdom and the United States.

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.

18. 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 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. 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

19. The following Signatories have eliminated the production and use of some or all of the substances listed in annex I to the Protocol: Austria, 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 have 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 the sales market for its export is non-existent. There are other circumstances under which pollutants in annex I are still produced or consumed. For example, Latvia has permitted the use of DDT, heptachlor and toxaphene. The use of the gamma isomer lindane is 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, are finding and eliminating older stocks of PCBs.

Waste disposal and destruction

20. Many Signatories suggest that waste containing PCBs is the only hazardous waste relevant to this Protocol, and have taken steps to ensure its responsible destruction and disposal. Most Signatories require permits for the handling of hazardous wastes, and have policies that control 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, Bulgaria, Canada, Croatia, the Czech Republic, Germany, Hungary, Italy, Latvia, the Netherlands, Norway and Poland have aligned their national policies with the Basel Convention, resulting in strict rules on the import, export and transit of hazardous waste. Most Signatories require documentation, permits and fees for the handling of hazardous waste.

Domestic POPs disposal

21. 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 admits 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 is expected to be ready by 2004 and the Government is planning to install a waste incinerator. Companies generating hazardous waste are storing it until the planned incineration plant is in operation. Poland also has 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 has begun to collect and store pesticide waste in concrete containers, or "tombs", and is planning a programme of elimination.

Transboundary movement of POPs

22. 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 chooses to export some of its PCBs in order to achieve sound thermal destruction. Norway and Switzerland also export 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, note 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 have 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

23. 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.

24. The Protocol sets emission ceilings for 2010 for four pollutants: sulphur, NO_x, 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%), NO_x (41%), VOCs (40%) and ammonia (17%), compared to 1990.

25. 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.

26. 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 and excessive levels of eutrophying nitrogen deposition will fall from 165 million to 108 million hectares. 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.

27. 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

28. Ten Signatories to the Protocol (Bulgaria, Czech Republic, Denmark, Greece, Hungary, Netherlands, Norway, Switzerland, United Kingdom and United States) have plans in place to implement the Gothenburg Protocol. Austria, Canada, Finland, Latvia and Poland are in the process of developing national action plans that address acidification, eutrophication and ground-level ozone. The most common strategies include 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 are relying 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

29. 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 eleven Signatories^{3/} in their responses. Most Signatories' limit values for SO₂ and NO_x 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. Guidance is given for new stationary sources in the electric power sector for SO₂, NO_x and particulate matter, for major stationary combustion sources for NO_x and for other sectors/processes for VOCs. Existing source categories include industrial processing and combustion for SO₂, petroleum and mineral industries and processes for NO_x, and emissions from the transport of crude oil for VOCs.

Mobile sources

30. 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 SO₂, NO_x and VOC Protocols for additional information on mobile source limits and controls.

Best available techniques

31. 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 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

32. Austria and Canada have 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, address fuel content by offering lower taxes on alternative fuels like bio-diesel fuel, LPG and CNG, whose VOC emissions are low relative to traditional petrol. Switzerland also uses tax incentives as a product control, discouraging the use of VOC-rich solvents by imposing a solvent tax. The

3/ Austria, Bulgaria, Canada, Czech Republic, Denmark, Finland, Latvia, Netherlands, Norway, Switzerland, and the United States.

revenue of the incentive tax on VOC will be redistributed to the population through the mandatory health insurance scheme.

Ammonia control measures

33. The majority of ammonia emissions originate from agriculture. Many Signatories, including Austria, 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. 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

34. The 1988 NO_x 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 prepare EU-wide BAT reference documents for each industrial sector under the IPPC Directive. Other bilateral/multilateral forums to exchange information include the Twinning Programme of the EC, in which Germany takes part, and the EURECA Programme, in which Poland participates. Many Parties, including Germany, Latvia and the United States, host web sites that disseminate information on national projects and the latest technology being deployed to combat air pollution.

35. 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 is 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

36. 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 the Czech Republic, Denmark, Hungary and Italy is to sponsor a car-free day once a month. Car-pooling, 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 has a national centre for documenting and spreading practical examples of achieving sustainable development called the Ideas Bank Foundation. Canada sponsors 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.

37. Other public campaigns address 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

38. 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.

39. 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

40. 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

41. Energy policies that aim to reduce the emissions of harmful air pollutants range 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 re-using harmful by-products of energy production. Canada's CO₂ Capture and Storage Initiative aims to capture CO₂ 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, are also considering emissions trading to control emissions from utility plants. Other strategies focus on increasing the reliance on alternative forms of energy. Cyprus is involved in negotiations to secure the supply of natural gas for use in the energy sector. Austria and Latvia are 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 has established a programme on the production and use of biofuels to analyse the possibility of producing petrol-bioethanol mix, rapeseed oil and biogas. Latvia has also developed an energy efficiency strategy that identifies measures to decrease the primary energy consumption per unit of GDP by 25% by the year 2010. Other countries are also developing policies that promote conservation and discourage unsustainable energy consumption.

Industry

42. 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) have established eco-labelling programmes that promote awareness and put pressure on industry to improve environmental performance and reduce emissions.

Agriculture

43. 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

44. Policies that integrate environmental and waste management strategies often address combustion and conservation. For example, Cyprus has decided to erect an incineration plant that will 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.

Finance

45. Many countries have notable examples of policies that integrate environmental goals with financial incentives. Most focus on "greening" the national system of taxation. For example, Belarus imposes an environmental tax on air pollutant emissions from gas-operated transport. Other policies support 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 consumption, CO₂ emissions, sulphur emissions, charges on NO_x 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 are 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

46. 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

47. 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

48. 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. Austria, Cyprus, Denmark, Italy, Latvia and the Netherlands provided data on solid fuel consumption. Solid fuel consumption for these countries peaked in 1985 and declined to an average low in 1995 of 17.99 million tons of oil equivalent. Solid fuel consumption has been rising since 1995 and is expected to continue to increase through 2010. Austria, Cyprus, Denmark, Germany, Hungary, Italy, Latvia and the Netherlands provided data on liquid fuel consumption. Liquid fuel consumption in these countries has been declining since 1995 but is on the rise again and consumption will reach record levels in 2010, when average consumption among these countries will be 39.43 million tons of oil equivalent. Liquid fuels have been the largest single source of energy in these countries since before 1990. Gaseous fuels have a similar trend among these same countries. Gaseous fuel consumption peaked in 1995 but is expected to increase by an average of over 40% of 1995 levels by the year 2010. Data on nuclear energy consumption were given only by Finland, Germany, Hungary and the Netherlands. These countries have gradually decreased nuclear energy consumption since 1995, but expect to maintain average consumption levels of about 10 million tons of oil equivalent in to the latter part of this decade. Eight countries gave data on electricity consumption: Austria, Denmark, Finland, Germany Hungary, Italy, Latvia and the Netherlands. Electricity consumption among these countries rose sharply from 1985 to 1990, but has been declining ever since. These countries expect that electricity consumption will rise again between 2005 and 2010, to reach a record average high of 2.31 million tons of oil equivalent in 2010. Consumption of hydro- and geothermal, steam and hot water, and other forms of energy are expected to rise between 2005 and 2010 as overall consumption increases and other, more polluting forms of energy are phased out. (See Figure [x] for overall trends on energy consumption.)

B. Legislative and regulatory framework

49. All responding Parties to the Convention^{4/} 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. Kazakhstan's complete environmental legislation contains around 170 documents that are not considered to be working well. 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.

50. 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 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.

51. 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. If enacted, this initiative is expected to accomplish the following actions: 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.

Fuel quality standards

52. Fuel quality standards for the responding Parties to the Convention are shown in Figure [x].

^{4/} The 16 Parties responding were Austria, Belarus, Bulgaria, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Kazakhstan, Netherlands, Norway, Switzerland and the United States.

C. Economic instruments**Using charges/taxes to meet environmental goals: 'greening' the taxation system**

53. More than half the responding Parties to the Convention^{5/} have a system of charges or taxes that are tied to environmental goals. Most of these^{6/} have charges and/or taxes on emissions which 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 each class of pollutants. 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, CO₂ and NO_x emissions.

54. 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.

55. Almost all responding Parties to the Convention^{7/} 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.

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

6/ The Parties responding "Yes" were Bulgaria, the Czech Republic, Denmark, Estonia, Latvia, Norway, Slovenia and Sweden. Those responding "No" were Austria, Cyprus, Finland, Hungary, the Netherlands and Switzerland.

7/ 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, the Czech Republic, Denmark, Finland, Hungary, Latvia, the Netherlands, Norway, Spain, Sweden and Switzerland.

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

57. 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.

58. Most responding Parties^{8/} 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 NO_x 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.

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

Emission reductions

59. 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

8/ 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.

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 NO_x emissions from ships.

Energy saving

60. 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 purchase price is financed by increasing the average sales tariff on electricity. 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

61. 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

62. 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

63. 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

64. 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

65. 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 emissions 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

66. Eighty-five per cent of responding Parties to the Convention^{9/} 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

9/ Austria, Canada, the Czech Republic, Denmark, Germany, Hungary, Latvia, the Netherlands, Norway, Sweden and Switzerland all use labelling as a market incentive; Bulgaria and Cyprus do not.

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^{10/} have highlighted programmes that classify products based on environmental preferability. Most classify household appliances, fuels, coatings and vehicles on fuel economy and CO₂ emissions.

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

67. 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

68. Seventy-eight per cent of responding Parties to the Convention^{11/} 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

69. The only responding countries with systems of tradable permits already in force are Canada, Germany 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 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 allows 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

10/ Austria, the Czech Republic, Denmark, Estonia, the Netherlands, Norway and Sweden indicated they have product standards of environmental preferability.

11/ Austria, Canada, the Czech Republic, Denmark, Germany, the Netherlands and Norway, all have 'green' procurement policies; Cyprus and Switzerland do not.

smog and acid-rain-causing emissions from fossil fuel plants: nitrogen oxides by 53%; and sulphur dioxide by 25%.

70. 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.

71. The Czech Republic, Finland, the Netherlands and Norway all responded that studies have been carried out to examine the cost-saving potential of emission 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

72. 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.^{12/} 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

^{12/} Canada, Italy and the United States have voluntary agreements with engine and vehicle manufacturers.

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.

H. Bilateral activities

73. All responding Parties to the Convention^{13/} 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

74. 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 are about to enter into force, which may lead to recommendations for revising Parties' obligations to these protocols. 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.

75. 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

13/ Austria, Bulgaria, Canada, Cyprus, the Czech Republic, Denmark, Germany, Hungary, Latvia, the Netherlands, Norway, Sweden, Switzerland and the United States.

be transported around the northern hemisphere. These pollutants not only cause human health and environmental damage, but also are important greenhouse gases. Two workshops have been held thus far on dealing with air pollution transport across the North Atlantic and the Arctic (EMEP workshop in Palisades, United States, 2001 (<http://www.ciesin.columbia.edu/pph/>) and across the Northern Pacific (in Seattle, United States, 2000). A third workshop takes place in Bad Breisig, Germany on 7-9 October, 2002 (http://www.physchem.uni-wuppertal.de/PC-WWW_Site/Bad_Breisig/breisig_welcome.html).

76. For over two decades, the Convention on Long-range Transboundary Air Pollution has played a major role in protecting the environment from atmospheric pollution. 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 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 toward cleaner air in Europe and North America and should serve as a model for other regions of the world.

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 NO _x 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 death Bronchitis - 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 matter Impairs 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	Biocumulates 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 15 August 2002 ^{a/}

Protocol	Open for signature	Entry into force ^{b/}	Number of signatures	Number of ratifications
Acidification, Eutrophication and Ground-level Ozone	1999		31	4 ^{c/}
Persistent Organic Pollutants	1998		36	10 ^{d/}
Heavy Metals	1998		36	12 ^{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	39 ^{j/}

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, Luxembourg, Norway, Sweden.

d/ Bulgaria, Canada, Czech Republic, Denmark, Germany, Luxembourg, Netherlands, Norway, Sweden, Switzerland.

e/ Canada, Denmark, Czech Republic, France, Finland, Luxembourg, Netherlands, Norway, Sweden, Switzerland, United States, 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, European Community.

g/ Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Liechtenstein, Luxembourg, Monaco, Netherlands, Norway, Slovakia, Spain, Sweden, Switzerland, 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, 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, Ukraine.

j/ Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, United States, Yugoslavia, European Community.