



GSE - PROMOTE
C1 Policy Foundations
Review

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Version 2

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EXECUTIVE SUMMARY

This Policy Foundations Review identifies all policy areas (policy-sector) that the PROMOTE Service Portfolio is intended to support.

It includes a description and discussion of the overall policy-sector and for each specific policy it provides all necessary details, in particular all aspects concerning information and monitoring.

This document stands at the root of the GSE PROMOTE actions. The reporting obligations and information needs entailed by present and future policies create a need for information derived from observations, modeling and scientific interpretation. These needs are explicitly formulated and stand at the basis of the definition of the Service Portfolio.



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1. INTRODUCTION

1.1 Purpose

This Policy Foundations Review identifies all policy areas (policy-sector) that the PROMOTE Service Portfolio is intended to support.

It includes a description and discussion of the overall policy-sector and for each specific policy it provides all necessary details, in particular all aspects concerning information and monitoring.

This document stands at the root of the GSE PROMOTE actions. The reporting obligations and information needs entailed by present and future policies create a need for information derived from observations, modeling and scientific interpretation. These needs are explicitly formulated and stand at the basis of the definition of the Service Portfolio.

1.2 Scope

This document is the Policy Foundations Review (C1) of the GMES Service Element PROMOTE.

1.3 References

1.3.1 Applicable Documents

[AD1] Statement of Work, Service Consolidation Actions of EARTHWATCH GMES Services Element, EOEP-GSE-EOAD-SW-02-0002, Issue 6.4, Sep-10, 2002

1.3.2 Reference Documents

[RD1] PROMOTE, Protocol Monitoring for the GMES Service Element, KNMI Proposal in response to ESA Invitation to Tender AO/I-4302/02/I-IW, Stage 1 – Service Consolidation actions for the Earthwatch GMES Service Element (GSE), 1 March 2004

[RD2] UNCED, Agenda 21

[RD3] The Global UV Project, A Guide and Compendium, World Health Organization 2003.

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1.4 Document Overview

The next four Chapters describe the policies related to Stratospheric Ozone, Surface UV exposure, Air Quality and Climate Change. Each Chapter contains several sections describing individual policies. For each policy a general outline is given in terms of objectives, status and timeline and the reporting obligations and information needs for each policy are summarized.

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2. POLICIES RELATED TO STRATOSPHERIC OZONE DEPLETION

2.1 Vienna Convention for the Protection of the Ozone Layer

2.1.1 General policy outline

2.1.1.1 General scope and objectives of the policy

Global efforts to protect the stratospheric ozone layer are based on two international agreements. The Vienna Convention for the Protection of the Ozone Layer signed on 22 March 1985 by 20 countries, and the Montreal Protocol on Substances that Deplete the Ozone Layer signed on 16 September 1987 by 24 countries. The Vienna Convention provides for scientific and technical co-operation and has built the basis for negotiations leading to the Montreal Protocol. The Montreal Protocol introduces international control measures for the production and consumption of ozone depleting substances (ODS). Since 1987 the Montreal Protocol has been amended and adjusted six times to include an increasing number of ODS, strengthen the applicable phase out schedules and improve effective implementation of its provisions.

2.1.1.2 Status of participation/Ratification and Implementation

The Vienna Convention has been ratified by more than 100 countries worldwide including the European Union, the United States of America, Russia and other former Eastern European countries, OECD countries, and developing countries in Africa, Asia and South America.

The implementation of the Vienna Convention is carried out through the Montreal Protocol. See Section 2.2.1.2.

2.1.1.3 Policy timeline and agenda

See Montreal Protocol Sec 2.2.1.3.

2.1.1.4 Access to information

See web-site Montreal Protocol.

2.1.2 Relations to or inter-linkages between policies

The Montreal Protocol (1987), the UNCED Agenda 21 (1992), the Earth Summit of Rio de Janeiro (1992), the Kyoto Protocol (1997) and the World Summit of Sustainable Development of Johannesburg (2002) are related to the Vienna Convention.

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2.1.3 Terms and definitions

ODS Ozone Depleting Substances

2.1.4 Reporting requirements and information needs with EO potential

Reporting requirements are specified in the Montreal Protocol, see section 2.2.4.

In October 1986 NASA, NOAA, FAA, WMO and UNEP formed an Ozone Trend Panel that critically (re)analysed and interpreted nearly all ground-based and satellite data for total column and vertical profiles of ozone. It also performed model calculations for comparison with observations and for predictions on future change of the ozone layer. The report was issued in August 1988 and set the scene for a more systematic global ozone monitoring programme, for more rigorous analysis of data, and for coordinated Arctic and Antarctic measurement campaigns.

One of the salient points of this analysis was the assessment of the accuracy and precision of the ozone measurements and the underlying calibration issues. To date, data accuracy and precision is still very much the topic of interest as it was in the eighties. Earth Observation should and will play a crucial role in establishing the much needed long term global ozone record at required accuracy and precision.

2.2 Montreal Protocol on Substances that Deplete the Ozone Layer

2.2.1 General policy outline

2.2.1.1 General scope and objectives of the policy

Within the framework of the Montreal Protocol production and consumption of eight groups of Ozone Depleting Substances (ODS) are regulated. The ODS are specified in a number of Annexes to the Protocol: five main chlorofluorocarbons (CFC) are contained in Annex A1, halons in Annex AII, ten other fully halogenated CFC's in Annex B1, carbon tetrachloride in Annex BII, methylchloroform in Annex BIII, hydrochlorofluorocarbons (HCFC) in Annex C1, hydrobromofluorocarbons (HBFC) in Annex CII, and methyl bromide in Annex E1.

A number of controlled substances have been exempted from controls. These include (UNEP 1999, 12-13):

- Amounts of ODS used in the manufacture of other chemicals and transformed completely in the process
- Amounts destroyed by approved destruction technology
- Used substances (recovered, recycled, reclaimed)

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- Increased production ODS for basic domestic needs of developing countries (10 to 15% depending on phase of reduction schedule)
- Methyl bromide for quarantine and pre-shipment applications
- Essential uses approved by the Meeting of Parties (mostly medical metered dose inhalers)

In addition, in 1997 a licensing system was adopted for the import and export of new and used controlled ODS and implemented in January 2000. This licensing is expected to help control trade in ODS.

Under the Montreal Protocol only overall production and consumption are controlled. Specific use of ODS is not prohibited or restricted. Furthermore, not all known ODS are regulated internationally. Some new ODS have been identified that are not covered by the Montreal Protocol. Recent evidence suggests that their use may be increasing. The most important of unregulated substances are: Halon-1202, Bromochloromethane and its derivative Borothene, n-propyl bromide. Bromochloromethane was included in the Montreal Protocol by the Beijing Amendment of 1999. It is to be phased out in 2002.

In total six Amendments and Adjustments of the Montreal Protocol have been produced in 1990, 1992, 1995, 1997, 1999 and 2002. These amendments must be based, according to Article 6, on current scientific, environmental, technical, and economic information. To provide that input to the decision-making process scientific assessments were carried out under the international auspices of the WMO and/or UNEP in 1981, 1985, 1989, 1991, 1994, 1998 and 2002. The next scientific assessment is due in 2006.

2.2.1.2 Status of participation/Ratification and Implementation

The Montreal Protocol has been signed by over 160 countries worldwide. As of September 1999, the EC and its Member States are Parties to the Montreal Protocol and its amendments, except the one of 1997 requiring an import/export licensing system to be established. All phase out schedules under the Montreal Protocol also apply to the EU. The EC has implemented the provisions of the Montreal Protocol by way of Regulation. Currently, Regulation EC 3093/94 is in force. The phase out schedules contained in this Regulation has gone partly beyond international requirements.

The focus of international cooperation on the protection of the ozone layer has shifted from passing substantive restrictions to implementation and enforcement. Several enforcement problems have occurred in OECD countries, countries with economies in transition and developing countries. Production and consumption of ODS in Central and Eastern Europe and, in Russia in particular, have continued despite the phase out agreed by the Protocol. Developing countries are facing difficulties in stabilising and reducing their production and consumption levels as is evident from the increased ODS use in these countries. In OECD countries successful implementation has been hindered by illegal imports and continued incentives to sell virgin ODS on an evolving black market. On a global scale the implementation problems have contributed to the level of worldwide consumption of ODS at around 300,000 tonnes in 1997, equalling more than 20% of levels before international control. For recovery of the ozone layer a total phase out of ODS will be required.

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Implementation problems have occurred also within the European Union. As of September 1999, regulation EC 3093/94 of 15 December 1994 is in force mirroring the Montreal Protocol obligation. The EU has encountered special difficulty in controlling trade in ODS. Also it has been slow in reaching agreement on a revised Regulation implementing the Adjustments and Amendments to the Protocol. Information about the implementation of the Montreal Protocol in the EU has been made available in the Final Report to the European Commission (February 2000). Analysis of national legislation and further policy instruments elucidates differences in approach of EU Member States.

Revised Regulations will help to overcome existing shortcomings with respect to implementation of the Montreal Protocol in the European Union. According to the Environmental Investigation Agency (EIA) implementation and enforcement in the EU has suffered from three main problems:

- Trade in controlled substances has been subject to insufficient control. While imports were subject to a licensing system, exports were not. Imports for processing and repackaging in the EU have been allowed, if the material was to be exported afterwards. This has led to illegal trade.
- Any ODS introduced in the internal market has generally been allowed to be sold under European rules. Once controlled ODS have crossed the border of the internal market, illegally imported material cannot be distinguished from legal supplies and can be sold with profit.
- The Montreal Protocol and Regulation 3093/94 leaves the enforcement competence to individual Member States. Enforcement efforts have differed between EU Member States providing room for introducing ODS in the internal market by selecting weak links in the European chain.

The implementation problems in the EU have led to accusations by the US and others that the EU is neglecting its international obligations. This has weakened the EU position in the Montreal Protocol process, and in general, the EU leadership role claimed in environmental issues.

2.2.1.3 Policy timeline and agenda

Different phase out schedules have been agreed for industrialised and developing countries. For Industrialised countries a more demanding phase out schedule applies compared with Article 5 Developing countries. For all the baseline substances defined in 2.2.1.1 a total phase out is required in 2005, except for HCFC where a total phase out is scheduled for 2030. For Developing countries schedules are more relaxed: total phase out of CFC, halons, fully halogenated CFC and carbon tetrachloride is required by 2010, methyl chloroform and methyl bromide in 2015, whilst HCFC is required to be phased out in 2040.

Article 6 of the Montreal Protocol calls for assessment of control measures by Parties at least every four years on the basis of available scientific, environmental, technical, and economic information. The Protocol states that the Parties shall convene appropriate panels of experts and that the panel will report their conclusions to the Parties.

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To meet this request, a Scientific Assessment Panel, an Environmental Effects Panel, and a Technology and Economic Assessment Panel have been commissioned. Every 3 to 4 years, major assessments have been prepared that update the state of understanding. These reports have been made available to the Parties in advance of their meetings at which they will consider the need to amend or adjust the Protocol.

2.2.1.4 Access to information

Full text of the Montreal Protocol and web-site Montreal Protocol.

Scientific Assessment of Ozone Depletion: 2002. WMO Report 47, ISBN 92-807-2261-1, Geneva 2003.

The Implementation of the Montreal Protocol on Substances that Deplete the Ozone Layer in the European Union, Final Report, February 2000.

2.2.2 Relations to or inter-linkages between policies

The Vienna Convention (1985), the UNCED Agenda 21 (1992), the Earth Summit of Rio de Janeiro (1992), the Kyoto Protocol (1997) and the World Summit of Sustainable Development of Johannesburg (2002) are related to the Montreal Protocol.

2.2.3 Terms and definitions

Convention means Vienna Convention

Parties means Parties to the Protocol

Controlled substance means a substance in Annex A, B, C, or E to the Protocol.

Production means the amount of controlled substances produced, minus the amount destroyed and minus the amount entirely used in the manufacture of other chemicals.

Consumption means production plus imports minus exports.

Calculated level of production, imports, exports and consumption means levels determined in accordance with Article 3.

Industrial rationalisation means the transfer of calculated level of production of one Party to another, for the purpose of achieving economic efficiency or responding to anticipated shortfall in supply as a result of plant closure.

2.2.4 Reporting requirements and information needs with EO potential

Article 7 contains the following reporting provision:

Each Party shall provide the Secretariat with statistical data on its production, imports and exports for each of the controlled substances specified in Annexes A to E. Separately

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it shall specify amounts used for feedstock and amounts destroyed by approved technology.

At the 11th meeting of the Parties in Beijing, China, the scientific needs of the Parties were defined in Decision XI/17.5a:

- a. Evaluation of observed trends in controlled substances and their consistency with reported production of ODS
- b. Quantification of ozone depleting of new (short-lived) halogen containing substances
- c. Characterisation of methyl bromide sources and sinks and quantitative implication for the ozone layer
- d. Characterisation of the interrelation between ozone depletion and climate change including feedback between the two
- e. Description and interpretation of observed global and polar ozone trends and UV trends as well as future scenario projections of these variables, taking into account the expected impact of climate change

In order to verify compliance with the Montreal Protocol it is necessary to monitor the emissions of ODS. This is possible by making ground-based in situ measurements at high temporal resolution coupled to meteorology based inverse models, from which sources can be inferred (see EC 5th FP SOGE). In order to verify the success of the Montreal Protocol, it is necessary to monitor the expected recovery of the stratospheric ozone layer on a global scale. Space based EO techniques are presently successfully employed and are appropriate technology for this purpose. See also Sec 2.1.4.

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3. POLICIES RELATED TO SURFACE UV EXPOSURE

3.1 Vienna Convention for the Protection of the Ozone Layer

The Vienna Convention for the Protection of the Ozone Layer was signed in March 1985. It mainly provides for scientific and technical co-operation. It formed the basis of the subsequent Montreal Protocol signed in September 1987 where international control measures for the production and consumption of ozone depleting substances (ODS) were introduced. It also led in 1992 to the UNCED declaration on mitigation of the effects of increased UV exposure.

The United Nations Conference on Environment and Development (UNCED, 1992) under Agenda 21¹, produced a plan for achieving sustainable development in the 21st century. It contains a declaration on activities to be undertaken mitigating the effects of increased UV radiation. It recommends to undertake, as a matter of urgency,

- research on the effects of increased levels of ultraviolet radiation on human health as a consequence of stratospheric ozone depletion
- and, on the basis of the outcome of this research,
- to take appropriate remedial action to mitigate the above mentioned effects on human health.

WHO, in collaboration with the United Nations Environment Programme (UNEP), the World Meteorological Organization (WMO), and the International Commission on Non-Ionising Radiation Protection (ICNIRP), developed and published the Global Solar UV Index in 1995. The UV Index (UVI) is an important measure to raise public awareness on the risks of excessive exposure to UV radiation and the need to adopt protective measures, see also COST-Action 713 (2001).

3.1.1 General policy outline

3.1.1.1 General scope and objectives of the policy

See 2.1.1.1

3.1.1.2 Status of participation/Ratification and Implementation

See 2.1.1.2

3.1.1.3 Policy timeline and agenda

See 2.1.1.3

¹ Agenda 21 is a comprehensive plan of action to be taken globally, nationally and locally by organizations of the United Nations System, Governments, and Major Groups in every area in which human impacts on the environment.

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3.1.1.4 Access to information

See 2.1.1.4

3.1.2 Relations to or inter-linkages between policies

See 2.1.2

3.1.3 Terms and definitions

See 2.1.3

3.1.4 Reporting requirements and information needs with EO potential

There are no reporting requirements in prescribed ways, but statements in issue 2b Annex I of the Vienna Convention, are given that countries should measure and research the UV-exposure and its adverse effects on Humans and the environment. Therefore, RIVM contributes to ozone assessments and reports in the "Milieu compendium" annual UV-sums in relation to previous years, monthly variability, and UV risk and trend assessment maps of Europe.

3.2 United Nations Conference on Environment and Development: Agenda 21 on the effects of UV radiation

3.2.1 General policy outline

3.2.1.1 General scope and objectives of the policy

The United Nations General Assembly, at the end of 1989, called for a global meeting that would devise strategies to halt and reverse the effects of environmental degradation “in the context of increased national and international efforts to promote sustainable and environmentally sound development in all countries”. Agenda 21, a comprehensive programme of action to be implemented into the twenty-first century, is the international community's response to that request [RD2]. It was adopted by the United Nations Conference on Environment and Development on 14 June 1992 (the Earth Summit, Rio de Janeiro, Brazil, 3 to 14 June 1992) and is to be implemented by Governments, development agencies, United Nations organizations and independent sector groups in every area where human (economic) activity affects the environment.

At the World Summit on Sustainable Development (WSSD) held in Johannesburg, South Africa from 26 August to 4 September 2002 the full implementation of Agenda 21 was strongly reaffirmed.

The subject of increased surface UV is included in Section I, Chapter 6: *Protecting And Promoting Human Health* and specifically the programme area E: *Reducing health risks*

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from environmental pollution and hazards. The main objective of this area is to 'minimize hazards and maintain the environment to a degree that human health and safety is not impaired or endangered and yet encourage development to proceed'. Activity (i) deals with the effects of ultraviolet radiation. Apart from an action on research on the effects of increased UV, it urges to consider taking measures to mitigate effects on human health of the increasing ultraviolet radiation due to stratospheric ozone depletion.

3.2.1.2 Status of participation/Ratification and Implementation

More than 178 Governments have adopted Agenda 21 at the UNCED meeting. The Commission on Sustainable Development (CSD) is responsible for the effective follow-up of UNCED. It has prepared and organized the five and ten year reviews of UNCED.

The global UV project INTERSUN has been established by WHO, UNEP, WMO, the International Agency on Cancer Research and the International Commission on Non-Ionizing Radiation Protection in response to Agenda 21 on UV [RD3]. The mission of INTERSUN is to reduce the global burden of disease resulting from exposure to UV radiation. It does so by providing sound scientific information and practical advice on the health impact and environmental effects of UV radiation exposure.

The founders of INTERSUN have developed and published the Global Solar UV Index in 1995. The UV Index (UVI) is an important vehicle to raise public awareness of the risks of excessive exposure to UV radiation and the need to adopt protective measures. The Index is intended to be used by national and local authorities, and non-governmental organizations, meteorological offices and media outlets. In many countries the public is daily informed on current and near-future UV levels by publication of the UV Index through various communication channels, like television and Internet.

3.2.1.3 Policy timeline and agenda

Every five years the status of the implementation of Agenda 21 is monitored. This has been done at the Nineteenth special session of the UN General Assembly in June 1997 and at the World Summit on Sustainable Development (WSSD) in Johannesburg in September 2002.

In 2003 the CSD adopted a multi-year programme of work consisting of cycles of two years, with each cycle focusing on a selected thematic cluster of issues. Atmospheric issues are included in the 2006/2007 cycle. The programme ends in 2017.

3.2.1.4 Access to information

The INTERSUN web pages (<http://www.who.int/uv/en/>) provide much background information on surface UV. Information on the local levels and trends of surface UV is made available by responsible national (environmental) agencies.

Providing the public with actual and forecasted information on surface UV levels so they can adjust their behaviour to reduce exposure is an effective way of preventing health effects. This requires the availability of daily UV data, presented in a user-friendly way.

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Actual UV forecasts, mostly based on the UV Index, is made available through various media at national level.

3.2.2 Relations to or inter-linkages between policies

UNCED Agenda 21 deals with the environment in a wider sense: the sections of UV are only a part of it. The Vienna Convention and the Montreal Protocol are specifically aimed at stratospheric ozone loss and the resultant surface UV increase.

3.2.3 Terms and definitions

UNCED United Nations Conference on Environment and Development

CSD Commission on Sustainable Development

UVI Ultra-Violet Index: The UVI is an international harmonized measure for the UV effects on the human skin. It is a dimensionless value defined as the integral over the spectral UV irradiance on a horizontal plane weighted with the erythral action spectrum (CIE 1987¹) in $W\ m^{-2}$ and multiplied by a constant $40\ m^2\ W^{-1}$

WMO World meteorological Organisation

WHO World Health Organisation

WSSD World Summit on Sustainable Development

IACR International Agency on Cancer Research

ICNIRP International Commission on Non-Ionizing Radiation Protection

3.2.4 Reporting requirements and information needs with EO potential

The Agenda 21 related INTERSUN programme provides sound scientific information and practical advice on the health impact and environmental effects of UV radiation exposure. Reporting of the UV Index and its associated health protection messages is an important objective of INTERSUN to take appropriate remedial measures to mitigate the UV related effects on human beings.

In a number of countries, the media present the weather forecast together with expected UV radiation levels for the following day. According to the WHO (2002) recommendations the public should be supplied with the daily maximum of the UV Index whenever it occurs; or - as minimum requirement – with irradiance values at local solar noon and for clear sky conditions.

The effects of stratospheric ozone depletion on the biosphere is an enhanced UV irradiation. In scientific applications and in occupational health the daily accumulated (erythral effective) irradiances, the UV dose, $kJ\ m^{-2}$, is the frequently applied measure of the UV exposure and has to take into account inter alia the important effect of clouds. This necessitates a specific choice for the prediction of cloud cover during the day.

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Various algorithms have been developed that obtain the necessary input parameters from a variety of sources. There are no prescribed reporting requirements for UV doses.

In addition to clouds near real time observations of aerosols and surface UV albedo can reduce the uncertainties in UV Index and UV dose monitoring and forecasting. EO combined with data assimilation techniques has the potential to achieve the required regional and global coverage. UV monitoring and forecasting requires ozone columns and profiles as input linking them to the UV aspects of the Vienna Convention.

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4. POLICIES RELATED TO AIR QUALITY

4.1 Convention on Long-Range Trans-boundary Air Pollution

4.1.1 General policy outline

The United Nations Economic Commission for Europe (UN/ECE) Convention on Long-Range Trans-boundary Air Pollution (CLRTAP) (http://www.unece.org/env/lrtap/lrtap_h1.htm) requires a consistent long-term monitoring programme for air pollution. Since its introduction in 1979 the convention has been ratified by almost all European countries, the Russian Federation, the USA and Canada. Following the convention the EC has introduced controls on emissions of sulphur, nitrous oxides (NO_x), volatile organic compounds (VOCs), heavy metals, persistent organic pollutants (POPs). The most recent Protocol (Gothenburg, 1999) introduces a multi-pollutant, multi-effect approach to reduce emissions of sulphur, NO_x, VOCs and ammonia (NH₃), in order to abate acidification of lakes and soils, eutrophication, ground-level ozone, and to reduce the release in the atmosphere of toxic pollutants (heavy metals) and Persistent Organic Pollutants (POP).

It is stated in the Convention that monitoring of the concentrations of air pollutants is necessary in order to achieve the objectives. The Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) provides this information. Parties to the Convention monitor AQ at regional sites across Europe and submit data to EMEP. EMEP has three centres that coordinate these activities of which NILU is one. There are two large databases; the measurement database and the emission database. The AIRBASE database of the ETC/ACC forms the reference data set for the European ground-based observation network. In addition to measurements, EMEP maintains and develops an atmospheric dispersion model. The model calculates averages over a grid with a resolution of 50 km x 50 km. EMEP network density depends on the species measured, for NO₂ there are close to 100 sites, for VOC the number of measurement sites is less than 10. The required laboratory accuracy is 10 to 25%. At present 24 ECE countries participate in the EMEP programme.

The EU is strongly committed towards cleaner air and has introduced the Clean Air for Europe (CAFE) programme (<http://europa.eu.int/comm/environment/air/cafe.htm>). The objective of CAFE is to develop, collect and validate scientific information relating to the effects of outdoor air pollution, emission inventories, air quality assessment, emission and air quality projections, cost-effectiveness studies and integrated assessment modelling. This information is needed for development of air quality objectives and for the identification of measures required to reduce emissions.

The EC has introduced a series of Directives to control levels of certain pollutants and to monitor their concentrations in the air. In 1996, the Environment Council adopted Framework Directive 96/62/EC on ambient air quality assessment and management. This Directive covers the revision of previously existing legislation and the introduction of new air quality standards for previously unregulated air pollutants. The list of atmospheric pollutants to be considered includes sulphur dioxide, nitrogen dioxide,

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particulate matter, lead and ozone, benzene, carbon monoxide, poly-aromatic hydrocarbons (PAH), cadmium, arsenic, nickel and mercury (1-5).

Community-wide procedure for the exchange of information and data on ambient air quality in the European Community is established by the Council Decision 97/101/EC. The decision introduces a reciprocal exchange of information and data relating to the networks and stations set up in the Member States to measure air pollution and the air quality measurements taken by those stations (6).

The European Environmental Agency (EEA) is the European coordinating facility of the EC DG Environment. The EEA conducts the European State of the Environment assessments, the next one being planned for 2005. The actual work is carried out by a number of Topic Centres. Relevant here is the European Topic Centre on Air and Climate Change. The ETC/ACC consists of a consortium of 13 European institutes lead by RIVM. The products and services from the ETC/ACC on air pollution include the Report on Air Pollution in Europe containing trends and appraisal of current policies, CLRTAP emission inventory, maintenance of the air quality information system AIRBASE (7) and support to the CAFE programme (8). It will also develop information systems on air quality and emissions via Internet.

Besides international directives and convention, each state and region has to its own policy, limit values and monitoring standards for air pollution. However, international standards are gradually taking over, allowing a more uniform approach to the problem.

Major environmental treaties and Council Directives on Air Quality:

- (1) Council Directive 96/62/EC on ambient air quality assessment and management.
- (2) Council Directive 1999/30/EC on limit values for SO₂, NO_x, particulate matter and Pb in ambient air. Revised by decision 2001/744/EC (OJ L 278/35)
- (3) Directive 2000/69/EC on CO and benzene.
- (4) Directive 2001/81/EC on national emission ceilings for SO₂, NO_x, VOC and NH₃ attained by 2010
- (5) Directive 2002/69/EC of the European Parliament and of the Council relating to ozone in ambient air and ceilings on atmospheric pollutants. (OJ L 67/14).
- (6) Commission Decision 97/101/EC on reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States 2001/752/EC.
- (7) Commission Decision 2001/839/EC of Nov 2001 laying down a questionnaire for annual reporting on ambient air quality under Council Directives 96/62/EC and 1999/30/EC (OJ L 319/45)
- (8) Clean Air For Europe (CAFE) programme, COM(2001)245 of 4.5.2001

4.1.1.1 General scope and objectives of the policy

During the first half of the 1970s the OECD project on long range transport of air pollutants was run, concluding that sulphur compounds could be transported over several hundred kilometres or more in the atmosphere (OECD, 1977). Effect studies also became operative at that time, and in response to the acute problems, a High-level Meeting within the Framework of the ECE on the Protection of the Environment was held at ministerial level in November 1979 in Geneva. It resulted in the signature of the Convention on Long-range Trans-boundary Air Pollution by 34 Governments and the European

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Community (EC). The Convention was the first international legally binding instrument to deal with problems of air pollution on a broad regional basis.

Articles 3 to 5 of the Convention read

- The Contracting Parties, within the framework of the present Convention, shall by means of exchanges of information, consultation, research and monitoring, develop without undue delay policies and strategies which shall serve as a means of combating the discharge of air pollutants, taking into account efforts already made at national and international levels.
- The Contracting Parties shall exchange information on and review their policies, scientific activities and technical measures aimed at combating, as far as possible, the discharge of air pollutants which may have adverse effects, thereby contributing to the reduction of air pollution including long-range trans-boundary air pollution.
- Consultations shall be held, upon request, at an early stage between, on the one hand, Contracting Parties which are actually affected by or exposed to a significant risk of long-range trans-boundary air pollution and, on the other hand, Contracting Parties within which and subject to whose jurisdiction a significant contribution to long-range trans-boundary air pollution originates, or could originate, in connection with activities carried on or contemplated therein.

The Protocols to the Convention specify the Parties' obligations. Eight Protocols have extended the Convention focusing on acidification, eutrophication, photochemical pollution, heavy metals (HM) and persistent organic compounds (POP). The chemical compounds and groups of compounds are sulphur dioxide, nitrogen oxides, ammonia, volatile organic compounds except methane (NMVOC), ground-level ozone, POP, and HM.

The Convention has an Executive Body (EB) and an Implementation Committee. The Working Groups on Effects, the EMEP Steering Body (SB), and the Working Group on Strategies and Review are active instruments of the Convention. The two Working Groups and the EMEP SB have scientific centres, task forces and expert groups (http://www.unece.org/env/lrtap/conv/lrtap_o.htm). The Working Groups and SB are responsible for measurements and modelling of the air pollutants. EMEP is organised with four scientific and technical centres for air pollution measurements, modelling of acidic, eutrophying and photo-chemically active substances, modelling of heavy metals and POP, and for integrated assessment modelling. EMEP has three task forces that support the programme; -on measurement and modelling , -on emission inventories and projections, and on integrated assessment modelling.

4.1.1.2 Status of participation/Ratification and Implementation

The Convention has been extended by eight protocols:

- The 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone; 31 Signatories and 9 ratifications. Not yet in force. (Gothenburg Protocol)

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- The 1998 Protocol on Persistent Organic Pollutants (POPs); 36 Signatories and 19 ratifications. Entered into force on 23 August 2003.
- The 1998 Protocol on Heavy Metals; 36 Signatories and 21 ratifications. Entered into force on 29 December 2003.
- The 1994 Protocol on Further Reduction of Sulphur Emissions; 25 Parties. Entered into force 5 August 1998.
- The 1991 Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Trans-boundary Fluxes; 21 Parties. Entered into force 29 September 1997.
- The 1988 Protocol concerning the Control of Nitrogen Oxides or their Trans-boundary Fluxes; 28 Parties. Entered into force 14 February 1991.
- The 1985 Protocol on the Reduction of Sulphur Emissions or their Trans-boundary Fluxes by at least 30 per cent; 22 Parties. Entered into force 2 September 1987.
- The 1984 Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP); 41 Parties. Entered into force 28 January 1988.

4.1.1.3 Policy timeline and agenda

The twenty-eight session of the Steering Body of EMEP will meet in Geneva in September this year for its annual meeting. The draft EMEP monitoring strategy and measurement programme for 2004-2009 will be discussed in this meeting, and in the Executive Body meeting November this year.

The Protocols on HM and POP have entered into force and the EB is in process of initiating reviews of the Protocols. The Protocols give limit values to be reached for emission sources by use of best available technique. The limit values should be reached in 2005 for new installations and in 2011 for existing emission sources. The Gothenburg protocol give limit values and set ceilings to be reached for nation total emissions of sulphur and nitrogen dioxides, ammonia, and VOC, in 2010. This protocol has, however, not entered into force.

4.1.1.4 Access to information

EMEP has a homepage at <http://www.emep.int/> with news and updates and links to all four Centres giving access to reports and publications, emission data, and air pollutant measurements. EMEP has reporting every year from its four Centres and the reports are derestricted by SB in its annual meetings. The normal delay in access to annual measurement data is twenty months; the 2002 measurements will be derestricted in September 2004.

The air pollution measurement programme has been extended over the years, from measurements of sulphur components in air and precipitation only to the wide suit of

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pollutants in the measurement programme today. The measurements have three levels of activity. Level 1 covers major inorganic compounds in air and precipitation, ozone and particulate matter, while Level 2 contains more technically and economically demanding measurements. The main objective of the Level 3 activities is to provide information that can improve the scientific understanding of atmospheric chemical and physical processes. Observations would typically include parameters requiring sophisticated instrumentation and high scientific competence.

4.1.2 Relations to or inter-linkages between policies

There are strong links between the activities under the Convention and the corresponding CAFE engagements. There is a close co-operation between the EMEP scientific centres and corresponding activities under the WMO-GAW. The EMEP centres also co-operates with sister organizations in North America, and Asia.

4.1.3 Terms and definitions

"Convention" means the Convention on Long-range Trans-boundary Air Pollution, adopted in Geneva on 13 November 1979.

"EB" means the Executive Body of the Convention

"ECE" means United Nations Economic Commission for Europe

"EMEP" means the Cooperative Programme for Monitoring and Evaluation of Long range.

"EMEP Centres" and EMEP scientific and technical centres means the Chemical Co-ordinating Centre, the Meteorological Centres East, and –West, and the Centre for Integrated Assessment Modelling;

"Emission" means a release from a point or diffuse source into the atmosphere.

"Executive Body" means the Executive Body for the Convention.

"Gothenburg Protocol" means the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone;

"Heavy metals" (HMs) means those metals or, in some cases, metalloids which are stable and have a density greater than 4.5 g/cm³ and their compounds..

"Persistent organic pollutants" (POPs) are organic substances that: (i) possess toxic characteristics; (ii) are persistent; (iii) bio-accumulate; (iv) are prone to long-range trans-boundary atmospheric transport and deposition; and (v) are likely to cause significant adverse human health or environmental effects near to and distant from their sources;

"PAH" means Poly Aromatic Hydrocarbons;

"Secretariat" means the secretariat for the activities under the Convention in the United Nations Economic Commission for Europe in Geneva

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“SB” means the Steering Body to EMEP

“WMO GAW” means the World Meteorological Organization Global Atmosphere Watch

4.1.4 Reporting requirements and information needs with EO potential

Both reporting of air measurement data in accordance with the programme, and of emission data from the Parties to the EMEP Centres and the Secretariat are annual. The annual emission reporting from the Parties are the national totals and sector emissions. Every five years gridded emission data (50 x 50 km²), and historical and projected activity data and national total emissions should be reported.

The EMEP Centres report annually the progress in their work as required in the Work Plan, to the SB. The EB evaluates annually the progress of EMEP and the two Working Groups on Effects and on Strategies and Review.

The draft monitoring/measurement strategy for EMEP 2004 – 2009 gives a specific reference on the potential future use of EO-data in support of its technical work. There is a need for observations of vertical profile data including air concentrations extending into the free troposphere due to their significance for the understanding for the intercontinental transport processes. In the future remote sensing from satellites might become an integral part of the network where ground-based stations and remote sensing complement each other. The PROMOTE products could therefore give a good complement particularly to the Level 3 measurements that are the research oriented part focusing on process understanding.

4.2 EU air quality directives 96/62/EC and its Daughter Directives and Amendments

4.2.1 General policy outline

4.2.1.1 General scope and objectives of the policy

The general aim of this Directive is to define the basic principles of a common strategy to:

- define and establish objectives for ambient air quality in the Community designed to avoid, prevent or reduce harmful effects on human health and the environment as a whole,
- assess the ambient air quality in Member States on the basis of common methods and criteria,
- obtain adequate information on ambient air quality and ensure that it is made available to the public, inter alia by means of alert thresholds, maintain ambient air quality where it is good and improve it in other cases

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The guidelines for selecting air pollutants for consideration are given in Annex III to the Directive;

the possibility, severity and frequency of effects with regard to human health and the environment as a whole, the irreversibility of effects, the environmental transformations or metabolic alterations into more toxic substances, the persistency in the environment and accumulations in humans, in the environment, or in food chains are all emphasized. Further, the size of exposed population, living resources or ecosystems, and the existence of particularly sensitive targets in the zone concerned were stressed in this Annex.

The pollutants that were named in the Directive 96/62/EC , in Annex I, were

Pollutants to be studied at an initial stage, including pollutants governed by existing ambient air quality directives were sulphur dioxide, nitrogen dioxide, fine particulate matter such as soot (including mw 10), suspended particulate matter, lead, ozone, and

Other pollutants: benzene, carbon monoxide, poly-aromatic hydrocarbons, cadmium, arsenic, nickel, and mercury.

The Commission submits proposals for the setting of limit values and alert thresholds for ambient air for the pollutants mentioned in the Directive, to the Council.

The European Environmental Agency (EEA) was established in 1990 given the task to establish the European environment information and observation network and for the collection, processing and analysis of the data. The Agency is also responsible for the provision of uniform assessment criteria for data to be applied in the Member States, and to publish a report on the state of, trends in, and prospects for the environment every five years. The full mandate of the EEA with amendments is given in (CONSLEG:1990R1210).

4.2.1.2 Status of participation/Ratification and Implementation

The Directives are addressed to all Member States.

The European Parliament and the Council of the EU have so far given three Daughter Directives relating to the limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air (Council Directive 1999/30/EC of 22nd April 1999, relating to limit values for benzene and carbon monoxide in ambient air (Directive 2000/69/EC of 16th November 2000), and relating to ozone in ambient air (Directive 2002/3/EC of 12th February 2002). These Daughter Directives have all entered into force.

The Commission has prepared a proposal for a fourth Daughter Directive relating to arsenic, cadmium, mercury, nickel, and polycyclic aromatic carbons in ambient air, that was passed on to the Parliament and Council in July 2003. Benzo(a)pyrene is proposed used as a marker for the carcinogenic risk of polycyclic aromatic hydrocarbons, but at least six more PAHs should be included in the measurements. Requirements for assessments of the heavy metal and benzo(a)pyrene concentrations were included in the proposal. The fourth directive has not entered into force.

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4.2.1.3 Policy timeline and agenda

The limit values set in the Directives for sulphur dioxide, nitrogen dioxide, particulate matter (PM10), lead, benzene and carbon monoxide were accompanied by margins of tolerance that give a stepwise reduction of the ambient air concentrations over a series of years before the targeted limits should be reached. The limit values for sulphur dioxide and for nitrogen oxides should be fully met by 1 January 2005 and 2010 respectively, for PM10 and lead by 1 January 2010.

Except for zones and agglomerations where time-limited extensions have been given, the limit value for benzene should be met 1 January 2010, and by 1 January 2005 for carbon monoxide. The Commission shall submit a report on the experience gained in application of the Directive on benzene and carbon monoxide before the end of 2004 to the European Parliament and to the Council. The report could give amendment proposals that could include further extensions to the timetable for meeting the benzene limit values.

Target values as well as long-term objectives have been set for ozone. The target value should be estimated through three year averages, taken as specified in the ozone Directive, by using the 2010 data as the first year. The long-term objective uses the year 2020 as a benchmark and shall be reviewed by the end of 2004 when the Commission submits a report based on the experience of the application of the Directive to the European Parliament.

4.2.1.4 Access to information

Measurement data can be accessed through EEA's database at <http://www.eionet.eu.int/> that receive data regularly from the Member States. Information about the activities and progress made under the Directives can be found under <http://europe.eu.int/comm./environment/air/>.

The Directives instruct the Member States to make up-to-date information on ambient concentrations routinely available to the public. The information shall be updated at least daily and when possible on an hourly basis. The Directives specify the public information to be given; with respect to measurement periods, statistics, and when exceeding objectives.

4.2.2 Relations to or inter-linkages between policies

The CAFE programme relates the Directives to the activities under the UN-ECE Convention.

4.2.3 Terms and definitions

“Agglomeration” means a zone with a population concentration in excess of 250 000 inhabitants or, where the population concentration is 250 000 inhabitants or less, a population density per km² which for the Member States justifies the need for ambient air quality to be assessed and managed;

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“Commission” means the European Commission that consists of the 36 Directorates-General and specialised services;

“Convention” means the Convention on Long-range Transboundary Air Pollution, adopted in Geneva on 13 November 1979;

“Council” means the Council of Ministers representing the governments of the Member States;

“Directives” means the set objectives that have to be achieved by the Member States. The Directives allow Member States to choose how to achieve them. Directives must normally be transposed into national legislation within two to three years after adoption;

“EEA” means the European Environmental Agency;

“Gothenburg Protocol” means the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone;

"Persistent organic pollutants" (POPs) are organic substances that: (i) possess toxic characteristics; (ii) are persistent; (iii) bio-accumulate; (iv) are prone to long-range transboundary atmospheric transport and deposition; and (v) are likely to cause significant adverse human health or environmental effects near to and distant from their sources;

“PAH” means Poly Aromatic hydrocarbons;

“Zone” means part of their territory delimited by the Member States;

“UN-ECE” means the United Nations an Economic Commission for Europe

4.2.4 Reporting requirements and information needs with EO potential

The Member States shall inform the Commission about of the occurrence of levels exceeding the limit value, plus the margin of tolerance if fixed, in the zones, of the dates or periods when these were observed, and the values recorded within nine months after the end of each year.

The Commission publishes annually a list of the zones and agglomerations, and every three years a report on the ambient air quality in the Community.

PROMOTE products could be useful for a possible extension of CAFÉ in time, vertical profiles of ozone, and SO₂ and HCOH in high polluted regions and episodes in Europe could give a good complement to the currently used data.

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4.3 Clean Air for Europe (CAFE)

4.3.1 General policy outline

4.3.1.1 General scope and objectives of the policy

Thirty years of environmental policy in the EU has led to a comprehensive system of environmental controls. The 5th Environment Action Programme (5EAP) 1992 – 1999 brought a broader commitment to an integration of environmental concern into other politics, and guided the strategic focus of the 6EAP. The 6EAP sets out the major priorities and objectives for environmental policy towards 2010 and refers to the development of seven Thematic Strategies, the thematic strategy on air pollution being called “Clean Air for Europe” – CAFE. The Thematic Strategy has the overarching objective to achieve levels of air quality that do not give rise to significant negative impact on and risks to human health and the environment. The other strategies relate to soil protection, sustainable use of pesticides, to protect and conserve the marine environment, waste prevention and recycling, sustainable use of natural resources, and urban environment.

CAFE should involve

- a review of the complementation of the air quality directives and effectiveness of air quality programmes in the Member States,
- improving the monitoring of air quality and the provision of information to the public, including by indicators,
- priorities for further actions, the review and updating of air quality thresholds and national emission ceilings and the development of better systems for gathering information, modelling and forecasting.

The CAFÉ programme has been given an extensive and most important role in improving the European environment. CAFÉ has the general aim of developing a long-term, strategic and integrated policy to protect against the effects of air pollution on human health and environment. The policy aims at a high level of environmental protection based on the precautionary principle, taking into account of the best available scientific and technical data and the costs of benefits of action or lack of action.

The specific objectives (COM(2001) 245 final) are

- to develop, collect and validate scientific information relating to the effects of ambient, i.e. outdoor air pollution, emission inventories, air quality assessment, emission and air quality projections, cost-effectiveness studies and integrated assessment modelling, leading to the development and updating of air quality and deposition objectives and indicators and identification of the measures required to reduce emissions;
- to support the implementation and review the effectiveness of existing legislation, in particular the air quality daughter directives, the decision on

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exchange of information, and national emission ceilings as set out in recent legislation, to contribute to the review of international protocols, and to develop new proposals as and when necessary;

- to ensure that the measures that will be needed to achieve air quality and deposition objectives cost-effectively are taken at the relevant level through the development of effective structural links with the relevant policy areas;
- to determine an overall, integrated strategy at regular intervals which defines appropriate air quality objectives for the future and cost-effective measures for meeting those objectives;
- to disseminate widely the technical and policy information arising from implementation of the programme.

CAFÉ has a Steering group with more than a hundred participants from the different stakeholder groups.

4.3.1.2 Status of participation/Ratification and Implementation

The programme was launched in March 2001.

The programme has three working groups,

- Working Group on Particulate Matter (WG on PM),
- Working Group on Target Setting and Policy Assessment (WG on TSPA),
- Working Group on Implementation (WG on I).

The WG on PM assists the Commission in the review in the 1st DD with respect of PM, aims at giving recommendations on targets for IAM on PM based on the WHO work, and takes part in the review of results from IAM on PM. A Final Draft of the "Second Position Paper on Particulate Matter" has been delivered to the Commission (finalising date: 6 April, 2004). The WG on TSPA assists the Commission in setting targets for the IAM as well as on issues related to the qualitative and quantitative assessment of the IAM, including cost-benefit analysis. The WG on I assists the Commission to a harmonized implementation of the air quality framework directive with the daughter directives and the directive on national emission ceilings.

4.3.1.3 Policy timeline and agenda

According to the CAFÉ work plan the review report of the implementation of the first daughter directive was adopted in spring 2004. The corresponding reviews of the second and third daughter directives, with amendments if appropriate, should be finished by December 2004.

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Baseline scenarios will be used to help understanding how air quality in Europe most likely will evolve between now and 2020 on the basis of current policy and measures. This will provide a benchmark that can be compared with other policy scenarios.

CAFÉ will lead to the adoption of a thematic strategy on air pollution under the Sixth Environmental Action Programme by mid 2005.

4.3.1.4 Access to information

A wide dissemination of technical and policy information arising from the implementation of the programme is one of CAFÉ's specific objectives. A publicly accessible web site has been designed to communicate information to the CAFÉ participants in a transparent way (<http://europa.eu.int/comm/environment/air/cafè/index.htm>).

4.3.2 Relations to or inter-linkages between policies

The WHO has set up a project on reviews on health aspects of air quality in Europe and reported on the health aspects of particulate matter, ozone and nitrogen dioxide in 2003. WHO is expected to give further guidance during 2004.

The need to enhance co-operation with the work under the Convention has been one of the strongest messages arising from discussions with national and stakeholders representatives. There is an increasingly large overlap in both policy and geographical terms between the Convention and EU air quality policy. Enhanced co-operation is therefore considered essential if CAFÉ is to add real value to policy-making and avoid wastage of resources. Members of the CAFÉ Secretariat regularly attend key Convention meetings and vice versa.

The technical co-operation is related to development and use of models, the establishment of reliable emission inventories, and to define a common approach on air pollution effects. The technical work carried out in connection with proposals for national emission ceilings (NEC) was carried out in co-operation with the Convention. The ceilings agreed on by the Parties to the Convention did, however, not correspond to the level of ambition of the technical work, and the European Community declined to sign the relevant (Gothenburg) protocol pending more stringent set of ceilings to be agreed about between the Council and Parliament.

4.3.3 Terms and definitions

“1st DD” means the first Daughter Directive i.e. Council Directive 1999/30/EC;

“Commission” means the European Commission that consists of the 36 Directorates-General and specialised services;

“Convention” means the Convention on Long-range Trans-boundary Air Pollution, adopted in Geneva on 13 November 1979;

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“Directives” means the set objectives that have to be achieved by the Member States. The Directives allow Member States to choose how to achieve them. Directives must normally be transposed into national legislation within two to three years after adoption;

“EEA” means the European Environmental Agency;

“Gothenburg Protocol” means the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone;

“IAM” means integrated assessment modelling;

“NEC” means the Directive 2001/81/EC on national emission ceilings;

“PM” means particulate matter;

“WG on PM” means the Working Group on Particulate Matter;

“WG on TSPA” means the Working Group on Target Setting and Policy Assessment;

“WG on I” means the Working Group on Implementation.

4.3.4 Reporting requirements and information needs with EO potential

CAFÉ does not seem to mention the use of EO data. PROMOTE products nevertheless could be useful for a possible extension of CAFÉ in time, vertical profiles of ozone, and SO₂ and HCOH in high polluted regions and episodes in Europe could give a good complement to the currently used data.

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5. POLICIES RELATED TO CLIMATE CHANGE

5.1 UN Framework Convention on Climate Change (UNFCCC)

5.1.1 General policy outline

5.1.1.1 General scope and objectives of the policy

The United Nations Framework Convention on Climate Change was adopted in June 1992 at the Rio de Janeiro Earth Summit and it entered into force on 21 March 1994.

Article 2 of the UNFCCC states that: “The ultimate objective of the Convention is to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a timeframe sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.”

It should be noted that the above text of the UNFCCC refers to greenhouse gas concentrations in the atmosphere rather than anthropogenic emissions and restrictions therein. This Convention therefore is far less committal than the Kyoto Protocol were reductions of GHG emissions are imposed. Commitments, Article 4 of the Convention, are rather general and include publication of national GHG emission inventories and implementation of programmes for mitigation of climate change by addressing the anthropogenic emissions and removals of greenhouse gases. It promotes research, monitoring, policy development, exchange of information, training and education related to climate change. However, the Convention does not impose legally binding emission reduction standards.

Signatories to the UNFCCC meet during the Conference of Parties (COP). The COP is the decision making body of the UNFCCC and is responsible for preparation of the ratification of the Kyoto Protocol. The Marrakech Accord (COP-7, UNFCCC 2001), the Dehli Declaration (COP-8, UNFCCC 2002) and the Milano Decisions (COP-9, UNFCCC 2004) are recent step taken in this process.

On Scientific matters the COP is assisted by the UNFCCC Subsidiary Body for Scientific and Technological Advise (SBSTA) and by the Intergovernmental Panel for Climate Change (IPCC). The SBSTA assists in the analysis of the yearly reporting by national governments of greenhouse gas inventories. The IPCC provides guidelines and methodological standards for reporting of national GHG inventories. The IPCC best known for its assessments of climate change and its scenarios for future development.

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5.1.1.2 Status of participation/Ratification and Implementation

More than 180 sovereign nations have ratified the UNFCCC including USA, Europe, Russia, Australia, China and Japan. The Convention was signed on 21 March 1994. For most countries, the Convention has entered into force in 1994, for some in 1997/8. Notable exceptions include Turkey.

5.1.1.3 Policy timeline and agenda

Controls of emissions that are legally binding are formulated in the Kyoto Protocol which has a distinct timeline of the policy process, see Section 5.2.1.3.

5.1.1.4 Access to information

See web site UNFCCC: <http://maindb.unfccc.int>.

5.1.2 Relations to or inter-linkages between policies

The Vienna Convention (1985), the Montreal Protocol (1987), the UNCED Agenda 21 (1992), the Earth Summit of Rio de Janeiro (1992), the Kyoto Protocol (1997), and the World Summit of Sustainable Development of Johannesburg (2002) are related to the UNFCCC. Cooperation exists between the UNFCCC and the Convention on Biological Diversity. There is also cooperation with the UN Convention to Combat Desertification (UNCCD)

5.1.3 Terms and definitions

GHG means greenhouse gas

5.1.4 Reporting requirements and information needs with EO potential

Article 5 of the Convention calls for research and systematic observation.

5.2 The Kyoto Protocol to the UNFCCC

5.2.1 General policy outline

5.2.1.1 General scope and objectives of the policy

The Kyoto Protocol to the UN Framework Convention on Climate Change (UNFCCC) was adopted in Kyoto at the third session of the Conference of Parties (COP-3) on 11 December 1997. The Kyoto Protocol (1997) commits signatories to cut the collective emissions of six key greenhouse gases by at least 5% in the period 2008-2012 compared with 1990 levels. The Kyoto Protocol confines itself to the emission of six main

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greenhouse gases, CO₂, CH₄, N₂O, HFC's, PFC's and SF₆, not covered by the Montreal Protocol. The emission targets apply to those countries listed in Annex 1 of the UNFCCC. These are OECD countries, including countries in transition to a free market economy.

Besides reducing primary emissions the Parties are allowed to reach Kyoto targets by enhancing removal of GHG by sinks (Article 3.3 and 3.4) and by trading their emissions with countries that are exceeding their emission reductions targets (Articles 6, 12, 17).

After ratification of the Protocol, the COP will also serve as the Meeting of Parties (MOP) which will keep the implementation of the Protocol under regular review.

5.2.1.2 Status of participation/Ratification and Implementation

Article 25 states that the Protocol shall enter into force after not less than 55 Annex 1 Parties to the Convention, accounting for at least 55% of total carbon dioxide emissions for 1990, have ratified the Protocol.

To date the Kyoto Protocol has been ratified by more than 140 countries, including the European Union and Japan. Most recently Russia has ratified the Protocol raising the accounted for 1990 emissions of CO₂ to a total of 61.6%. Notable exceptions include the US of America, Australia, and China which have not ratified the Protocol.

The European Community has ratified the Kyoto Protocol on 31 May 2002 following Commission Decision 2002/358/EC. The Kyoto Protocol is legally regulated in the EU by Council decision 93/389/EEC for a monitoring mechanism of Community CO₂ and other greenhouse gas emissions and its amendment (Council Decision 99/296/EC). These decisions establish a mechanism designed to monitor all anthropogenic greenhouse gas emissions not controlled under the Montreal Protocol and its Amendments and evaluate progress made in this field to ensure compliance with the Community's commitments concerning climate change.

In the evaluation of these Decisions by the EU (1999/296/EC) the progress towards reduction was assessed. Projections indicate that existing measures will not be sufficient to reach reduced emission goals for 2008-2012. To close this gap the ECCP (European Climate Change Programme) was initiated.

The European Climate Change Programme and a number of Council and Commission decisions stress the need for monitoring GHG emissions and sinks as a means for assessment of progress toward meeting Kyoto Protocol targets. There is a decision for a new monitoring mechanism recently ratified by Parliament, which replaces the former decisions. It reflects the guidelines from the UNFCCC as newly set out in Bonn and Marrakech (COP 6 and 7), and provides further harmonization of emission forecasts and addresses requirements relating to ratification of the Kyoto Protocol and the burden-sharing between the Community and its member states.

Implementation of the Kyoto Protocol will take effect toward the end of 2004 which requires compliance with the Convention and Protocol stated GHG emission reductions. Reporting must be based on scientifically sound data. Lack of such information may result in sanctions to the Party, possibly of monetary nature.

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5.2.1.3 Policy timeline and agenda

The Kyoto Protocol contains legally binding emission targets for developed (Annex 1) countries, which together must reduce their combined emissions of six key greenhouse gases by at least 5% by the period 2008-2012, calculated as an average over these five years. For the European Union as a whole this target amounts to 8% GHG emission reduction. COP-10 is scheduled for 6-10 December 2004 in Buenos Aires, Argentina.

5.2.1.4 Access to information

Pertinent information to the Kyoto Protocol may be found on the web-site maindb.unfccc.int.

The Intergovernmental Panel on Climate Change (IPCC), established by WMO and UNEP in 1988, has conducted assessments of climate change and provided advice to the COP. It has produced a series of assessment reports in 1990, 1994 and 2001 based on available scientific and socio-economic information. The fourth IPCC assessment report is due in 2007. See IPCC 2001, ISBN 0521 80767 0 or 0521 01495 6 (2001).

Relevant information can also be found in publications from the EEA, for example: Greenhouse gas emissions trends and projections in Europe 2003, Environmental Issue Report 36, ISBN 92-9167-632-2 (2004).

And from the EC Joint Research Centre, for example: Inverse modelling of national and EU greenhouse gas emission inventories, JRC Institute for Environment and Sustainability, European Communities EUR 21099 EN, ISBN 92-894-7455-6, (2004).

5.2.2 Relations to or inter-linkages between policies

The Vienna Convention (1985), the Montreal Protocol (1987), the UNCED Agenda 21 (1992), the Earth Summit of Rio de Janeiro (1992), and the World Summit of Sustainable Development of Johannesburg (2002) are related to the Kyoto Protocol (1997).

5.2.3 Terms and definitions

COP, Conference of the Parties is the supreme body of the Parties to the Convention

Convention means the United Nations Framework Convention on Climate Change adopted in New York on 9 May 1992

Intergovernmental Panel on Climate Change means the Panel established in 1988 jointly by WMO and by UNEP.

Party means a Party to the Kyoto Protocol

GCOS Global Climate Observing System

GOOS Global Ocean Observing System

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GTOS Global Terrestrial Observing System

5.2.4 Reporting requirements and information needs with EO potential

Article 5 calls for a national system for estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol. Article 7 calls for additional information on policies and measures to enhance energy efficiency, research on renewable forms of energy, sustainable forms of agriculture, reforms, market, fiscal and tax incentives, cooperation between Parties etc carried out in order to fulfil the objectives of the Protocol.

The Convention requires the Parties to report GHG inventories by April 15th each year as from 1996. Parties are requested to report a fourth national communication to the UNFCCC by 1 January 2006. Not later than 1 year prior to the start of the first commitment period Parties must have a national system in place for the estimation of anthropogenic emissions by sources and removals by sinks of all GHG not controlled under the Montreal Protocol (Article 5). The first quantified emission limitation and reduction commitment period starts 1 January 2008 and end 31 December 2012.

Methodologies for estimating the emissions shall conform the standards of IPCC and accepted by the COP. In particular, this refers to the calculation of global warming potentials used to calculate the carbon dioxide equivalent of listed greenhouse gases. The information submitted by each Party are reviewed by experts (Article 8) as part of the annual compilation and accounting of emission inventories and assigned amounts.

Emission trading will be an important instrument in future for individual countries to comply with the Protocol. The COP shall define (Article 17) the relevant principles, modalities, rules and guidelines, in particular for verification and accountability of emission trading.

Cooperation in scientific and technical research and the maintenance and development of systematic observation systems are called for in Article 10. Decision 8/CP.3 calls for the development of global observational networks of the climate system, referring to GCOS, GOOS and GTOS.

It is clearly important to monitor progress in achieving the emission reductions committed to under the Protocol. Global greenhouse gas emissions and removals by sources and sinks, are not well known. There is a large discrepancy between bottom-up emission estimates, derived from national government energy, transport, agricultural, etc figures, and top-down estimates derived from atmosphere concentration distributions. Better source and sink estimates are needed in support of the Kyoto Protocol monitoring, verification and reporting requirements. To date, an independent global observation system for the monitoring of GHG emissions does not exist. This seriously limits the (independent) verification of Protocol targets. EO technology in combination with (inverse) modelling and ground-based in situ observations are considered to be most appropriate technology to be developed in order to establish a global monitoring system of greenhouse gas emissions (see EC 5th FP RTD projects EVERGREEN, AEROCARB, CAMELS, CHIOTTO, COCO, and SOGE).

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Notwithstanding the efforts devoted to a reduction of GHG emissions, it will be clear that in future society is bound to have to adapt to climate change. Here, observation and modelling will be essential tools for providing information needed by government and the general public in order to recognise and understand climate change and to evaluate the risks it will impose on society. Here, GMES can play an important role to help providing pertinent information.

5.3 The Decision of the European Parliament and of the Council concerning a Mechanism for Monitoring Community greenhouse gas emissions and for implementation of the Kyoto Protocol (280/2004/EC)

5.3.1 General policy outline

5.3.1.1 General scope and objectives of the policy

The Decision establishes a mechanism for:

- (a) monitoring all anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol on substances that deplete the ozone layer (hereinafter "greenhouse gases") in the Member States;
- (b) evaluating progress towards meeting commitments in respect of these emissions by sources and removals by sinks;
- (c) implementation of the UN Framework Convention on Climate Change (hereinafter "UNFCCC") and the Kyoto Protocol, in particular as regards greenhouse gas inventories, national systems and registries of the Community and its Member States; and
- (d) ensuring the timeliness, completeness, accuracy, consistency, comparability and transparency of reporting by the Community and its Member States to the UNFCCC.

5.3.1.2 Status of participation/Ratification and Implementation

The Mechanism took effect on 11 February 2004

5.3.1.3 Policy timeline and agenda

The Mechanism is overseen by the Climate Change Committee of the European Commission and is chaired by DG Environment. The committee oversees three working groups. The Working Group I on Monitoring and Reporting meets two times a year to prepare input to the Climate Change Committee meeting, which also meets twice a year and takes decisions.

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5.3.1.4 Access to information

The Mechanism includes the EU Greenhouse Gas Inventory System. The data are collected and made available by the European Environment Agency (EEA) for the European Commission. Annual greenhouse gas inventories, as they are sent to the European Commission and later to the UNFCCC secretariat, are available from the EEA.

5.3.2 Reporting requirements and information needs with EO potential

- a. anthropogenic emissions of greenhouse gases listed in Annex A to the Kyoto Protocol (carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆))
- b. provisional data on emissions of carbon monoxide (CO), sulphur dioxide (SO₂), nitrogen oxides (NO_x) and volatile compounds (VOC)
- c. their anthropogenic emissions or removals of carbon dioxide by sinks

EO has potential for measuring the concentrations in the atmosphere of most of the listed gases, and through inverse modelling information on the emissions could be obtained. This technique is still very much a research topic, but progress has been made e.g. with CH₄ emissions and CO₂ sinks, which make the results useful for checking the official bottom-up inventories at country and EU level.