European Topic Centre on Air Emissions

Annual Topic Update 1997

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ETC/AE Leader

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NOTE

A great deal of information on the European Union is available on the Internet. It can be accessed through the Europa server (http://europa.eu.int)

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1. INTRODUCTION

This report outlines the objectives and results achieved in the third year of the activities of the European Topic Centre on Air Emissions (ETC/AE) and presents the type of tools and applications emerging in the European Environment Agency (EEA) member countries and other countries which work closely together through the European Information and Observation Network (EIONET).

1.1. The European Topic Centre on Air Emissions (ETC/AE)

The Federal Environmental Agency (UBA Berlin) was appointed by the EEA as the lead organisation of the ETC/AE. The ETC/AE consists of a consortium of experts from several European organisations. A Steering Committee (SC) has been established which is chaired by the ETC Leader:

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Members of the SC are Dr Simon Eggleston (AEA Technology) and Dr Tinus Pulles (TNO). Other experts participate in the SC if the need arises. The Committee supports the Leader's management through scientific advice and technical assistance thus serving all ETC partners, the EEA and other bodies. The SC met four times during 1997 (12 January, 24 March, 29 May, 15/16 September). The SC has reviewed draft ETC reports, prepared updated work plans and the quarterly progress reports and the Annual Topic Update 1997 to the Agency.

Organisations represented in the Topic Centre, in addition to the lead organisation, are:

- **ENERO** (European Network of Environmental Research Organisations):
    - AEA Technology (Culham, UK)
    - ENEA (Roma, Italy)
    - RISØ (Roskilde, Denmark)
    - TNO (Apeldoorn, The Netherlands)
- **Umweltbundesamt Vienna** (Austria)
- **CITEPA** (Paris, France)
- **POSEIDON** (Thessaloniki, Greece)

1.2. National Reference Centres for Air Emissions

There are a number of organisations throughout Europe who also contribute to EEA's work programme, the (NRC) National Reference Centres. These are appointed and funded by the participating countries and are in charge of collaboration with their National Focal Points (NFPs) and the ETCs to cover various topics, of which one is Air Emission Inventories. NRCs in the 18 EEA countries were appointed by their NFPs in 1994/95, while in the 13 PHARE countries they have been appointed following the nomination of NFPs in 1996/97. Furthermore, the ETC co-operates with several other countries, where there is neither a nominated NFP nor NRC, but a contact point. NRCs are the regular collectors and suppliers of environmental data and information and/or possess relevant knowledge regarding environmental science, monitoring and modelling. A full overview of NRCs for Air Emissions is given in the Annex.

2. WORK PROGRAMME

2.1. Tasks, Clients and the User Needs

The tasks of the EEA include (EC Regulation 1290/90 Art. 2):

- establish, in co-operation with the Member States, and co-ordinate the EIONET (European Information and Observation Network). In this context the EEA shall be responsible for the collection, processing and analysis of data, and information;
- provide the Community, Member States, policy agents and the public with timely, targeted, relevant and objective information necessary for framing and implementing sound and effective environmental policies that help to achieve significant and measurable improvement in Europe's environment;
- record, collate and assess data on the state of the environment, to draw up expert reports on the quality, sensitivity and pressures on the environment.

Based on this, the main objective of ETC/AE is to provide EEA and its clients with all necessary information on air emissions in order to support the main tasks of the EEA. The main *clients* are the European Commission (DG-XI) and the national governments. *The tasks of the Topic Centre* identified by the Agency to be undertaken by ETC/AE are laid down within two projects of the EEA work programme :

SA1: Air emissions - General Approach and Assessment
SA2: Air Emissions Inventories 1990 and 1996/97

While the project SA1 was completed in early 1996, the project SA2 continues during the second term of the ETC agreement (1998-2000).

These projects aim to compile air emissions inventories that are based on the EMEP/CORINAIR methodology. ETC collates emissions data for 1990 and all subsequent years so that a *European* A*nnual Inventory* can be established. This is needed to serve assessments and reporting dealing with environmental problems such as acidification, tropospheric ozone, climate change and dispersion of hazardous substances. Clients require information on all aspects of air pollution issues. The CORINAIR inventory provides emissions data for all types of sources responsible.

ETC/AE collated emissions data and the accompanying information from participating countries which includes all details on which the estimates are based. It also contributes to assessment reports which are published by EEA such as:

- Air Pollution in Europe 1997
- Dobris+3 Report (chapter on climate change)
- State of the Environment in the EU 1998 (chapter on climate change)

2.2. Project SA1 - General Approach and Assessment

The main objective was to analyse the situation regarding air emissions inventories at different levels and Europe-wide. A summary of the result of this project was presented in the **Annual Summary Report 1995**, published as EEA Topic Report 9/1996, while the reports "Recommendations for Revised Data System for Air Emission Inventories (EEA Topic Report 12/1996) and "Review of CORINAIR90-Proposals for Air Emissions1994" (EEA Topic Report 6/1996) present additional details. An overview of subsequent products is presented in chapter 4 of this report.

2.3. Project SA2 - Air Emissions Inventories 1990 to 1995/1996

The main objectives of this project in 1997 were:

- to review, consolidate and adjust the CORINAIR methodology to contribute to the development of the common tools for integrated inventories.

- to collate, record and assess data and information on the state of the environment.
- to compile an emissions inventory for Europe for the year 1995 and preliminary estimates for the year 1996 covering the eight pollutants that were covered by CORINAIR90 as well as heavy metals (HM), persistent organic pollutants (POP) and as far as possible other pollutants required under various international conventions and legislation.

The work requires a very close collaboration with Member States and other countries to get best available data from their national networks. First results of this project were presented in the **Annual Summary Report 1996**, published by EEA as Topic Report 06/1997.

2.4. Relation to Other Projects

ETC/AE works closely with EEA and other ETCs, National Focal Points (NFP), National Reference Centres (NRC), DGXI and others. In addition to these, it also collaborates with EUROSTAT, UNECE/EMEP, IPCC/OECD/IEA and other international organisations which are responsible for or interested in methods on estimating air emissions and establishing and maintaining inventories and issues associated with these.

The air emissions project is co-ordinated and developed in conjunction with several other projects from EEAs Annual Work Programme for 1997 (AWP97) such as projects on periodical reports on the state of the environment in Europe within programme area 2, on air quality within programme area 4, and on scenarios for environmental improvement, tools for prediction and analysis of trends within programme area 7.

In addition the ETC collaborates with the ETC on Inland Waters to develop a methodology for integrated inventories within the programme on "Source Oriented Monitoring and Assessment of Pressures". It will also contribute to the development of inventories of emissions to land and soil and of generated waste.

With regard to integrated emission inventories it is proposed, within the EEA Work Programme, to identify and classify all possible sources of emissions to air, water and of generated waste. It was found logical to merge inventories for emissions to air (gaseous waste), emissions to water and possibly generation of solid waste in one inventory in the future provided that existing information on waste generation, collection, treatment and disposal at European level has been further improved and evaluated (a task of the new ETC on Waste established in 1997). ETC/AE started in 1997 to consider the development of the design for an integrated emissions inventory (see item 3.2.3).

3. PROGRESS IN 1997

3.1. Assistance to NRCs and the State of Play of CORINAIR Inventories

3.1.1. Assistance to NRCs

ETC advisors continue providing direct assistance, training and ad hoc advice to EEA member countries and in a more limited way in 1997 to PHARE countries and other countries involved in the CORINAIR project. The European air emissions inventory CORINAIR (CORe INventory of AIR emissions) and its major achievements have been made possible through this kind of assistance. ETC advisors are guiding experts in about 35 countries. The establishment of a PHARE Topic Link, expected in 1998, will be of valuable help for this process.

Another important part of the ETC *mission* is to maintain and develop ETC/AE co-operation within EIONET. NFPs, NRCs and National Experts have been regularly informed about progress of the ETC work. ETC/AE is requesting relevant data and information from national networks. Through the technical assistance, ETC advisors have corresponded regularly with national experts in order to enable delivery of timely and comparable data from the participating countries.

3.1.2. State of Play of CORINAIR Emission Inventories

3.1.2.1.CORINAIR94

In 1997, the ETC reviewed the CORINAIR94 data collection process, methodology and guidelines and the software in use. Several proposals and recommendations were made to provide a better system. Progress with the development and the use of the system was presented in the Annual Report 1996. The inventorying procedure was adjusted in order to satisfy the needs of clients and users for timely data and information. Most of the EEA countries provided CORINAIR94 estimates by the end of 1996, but not all at the requested level of detail. Furthermore a number of countries did not provide data in 1996. Therefore the CORINAIR94 data collection was continued in 1997.

Based on the direct assistance as described above and the co-operation from participating countries, national air emission estimates for the year 1994 were produced by the NRC experts in the countries and delivered to the ETC/AE. The European database for CORINAIR94 was created and **a topic report „CORINAIR94 Summary Report"** produced to make data publicly available. This report will be published by EEA in 1998. Updated emissions estimates for the year 1994 in different presentation formats can be derived electronically via Internet from the ETC/AE web site, which is linked to the EEA Internet homepage. The Internet address is as follows:

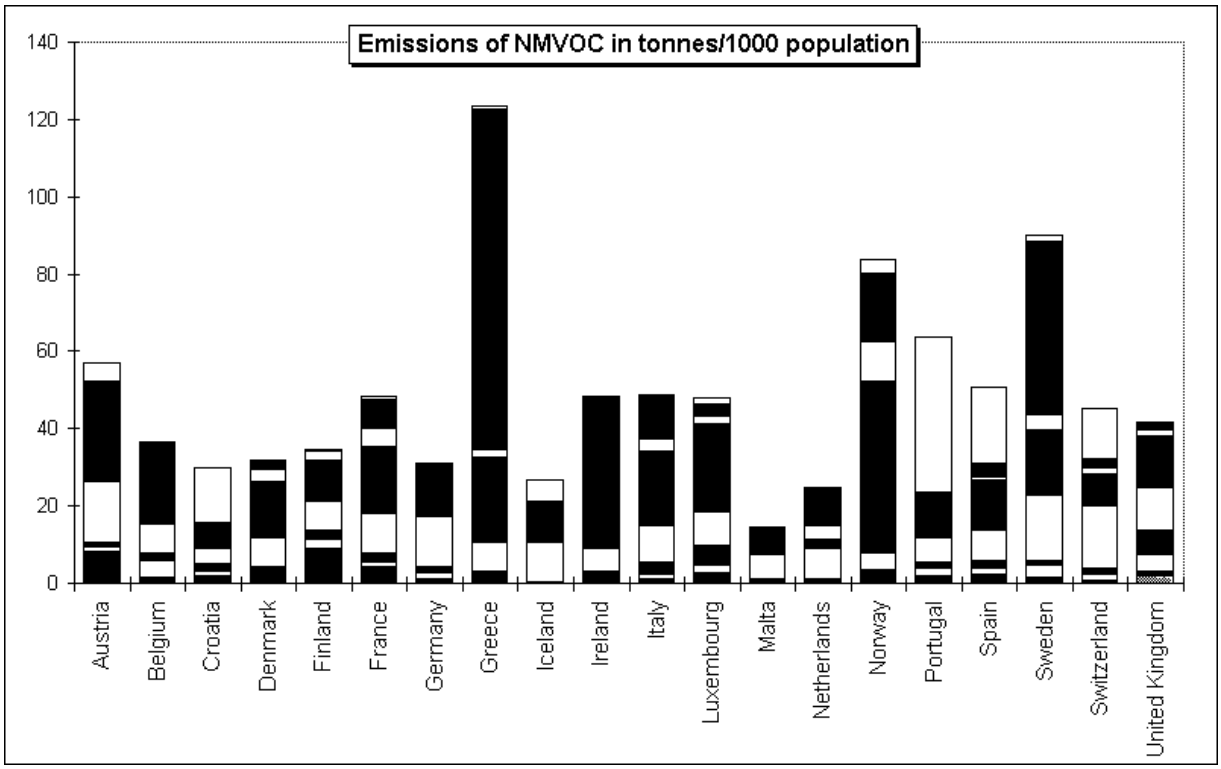
http://www.aeat.co.uk/netcen/corinair/94

This web page also provides a link to CORINAIR90 data. The following page provides an example of what you can obtain from this URL:

http://www.aeat.co.uk/netcen/corinair/94

CORINAIR 94

Non-Methane Volatile Organic Compounds Air Emissions Information



Source Categories

- 1 Combustion in energy and transformation industries
- 2 Non-industrial combustion plants
- 3 Combustion in manufacturing industry
- 4 Production processes
- 5 Extraction and distribution of fossil fuels/ geothermal energy
- 6 Solvent and other product use
- 7 Road transport
- 8 Other mobile sources and machinery
- 9 Waste treatment and disposal
- 10 Agriculture and forestry, land use and wood stock change
- 11 Nature

The data collection exervise may look complete, but by the end of 1997 there were still gaps in the database that need to be filled with the latest updated information and details at SNAP level 2 and 3. Those countries which have completed their national CORINAIR94 database now largely benefit from their efforts. By simply inserting statistical data for the year 1995 such as fuel consumption, process output (number of a product), number of cattle etc. and the related emission factors when they have changed, the new CORINAIR system then calculates the emissions for the year 1995.

3.1.2.2.CORINAIR95

Emissions estimates for 1995 at SNAP level 1 and/or 2 were delivered by about 60% of EEA member countries in 1997/early 1998. The ETC can only satisfy the need for a European emissions inventory if countries supply the requested data on time. The following table provides a summary of emissions estimates for the year 1995 (national totals, latest update February 1998).

Table 1: Emissions estimates for the year 1995 (first 8 pollutants) [1]

COUNTRY 1995	Population (Mio)	SO_2 (Mg)	NO_X (Mg)	NMVOC (Mg)	CH_4 (Mg)	CO (Mg)	CO_2 (Gg)	N_2O (Mg)	NH_3 (Mg)	Status
Austria	8.0	59,994	176,280	280,502	580,193	1,146,744	61,608	12,789	78,754	**A**
Belgium	10.1	-	-	-	-	-	-	-	-	-
Denmark	5.2	150,437	253,875	131,088	430,304	701,596	58,928	11,287	127,468	**A**
Finland	5.1	-	-	-	-	-	-	-	-	-
France	58.1	988,830	1,692,382	2,190,250	2,891,567	9,289,194	307,010	172,686	664,831	**A**
Germany	81.1	2,130,000	1,932,000	1,993,000	4,734,000	6,928,000	895,000	222,000	649,000	**C**
Greece	10.4	609,345	356,599	403,186	465,207	1,418,780	92,777	17,085	110,267	**A**
Ireland	3.6	161,189	114,978	91,070	814,225	305,918	34,116	26,175	124,102	**A**
Italy	57.0	1,321,508	1,848,769	2,214,428	2,555,379	7,754,528	439,182	161,750	460,724	**A**
Luxembourg	0.4	8,591	20,114	16,598	22,110	104,543	7,251	688	7,132	**A**
Netherlands	15.3	147,000	497,700	363,600	1,068,631	892,300	182,000	68,300	146,110	**B**
Portugal	9.9	-	-	-	-	-	-	-	-	-
Spain	39.1	-	-	-	-	-	-	-	-	-
Sweden	8.7	78,591	393,058	341,258	274,543	1,097,701	58,108	21,494	54,722	**C**
United Kingdom	58.2	2,364,887	2,294,814	2,257,235	3,817,209	5,478,361	541,831	94,615	-	**A**
Iceland	0.3	8,329	32,050	12,111	13,670	50,752	2,595	380	-	**A**
Liechtenstein	0.03	-	-	-	-	-	-	-	-	-
Malta	0.4	-	-	-	-	-	-	-	-	-
Norway	4.2	34,102	216,573	370,565	491,917	748,478	37,805	17,502	25,755	**C**
Switzerland	6.7	34,322	135,636	202,460	313,287	509,684	43,646	17,531	60,195	**A**
Bulgaria	9.0	1,496,660	266,246	173,520	505,994	844,470	-	-	99,852	**C**
Croatia	4.7	63,174	55,284	72,042	102,989	478,792	15,560	14,982	24,641	**C**
Czech Republic	10.3	1,091,056	412,487	286,101	733,266	874,002	-	-	86,225	**C**
Estonia	1.6	41,707	37,370	59,410	156,782	340,974	19,291	2,020	12,040	**A**
Hungary	10.5	-	-	-	-	-	-	-	-	-
Latvia	2.7	-	-	-	-	-	-	-	-	-
Lithuania	3.8	-	-	-	-	-	-	-	-	-
Poland	38.4	2,276,288	1,121,887	-	1,803,201	4,548,139	33,324	-	378,613	**A**
Romania	23.3	-	-	-	-	-	-	-	-	-
Slovakia	5.3	238,000	181,000	41,000	313,000	400,002	-	-	30,000	**C**
Slovenia	2.0	119,302	66,591	-	-	91,427	14,207	-	-	**C**

1) State of play February 1998; to ensure consistency the following emission estimates are excluded from the totals :

- „*Nature*" (SNAP 11);
- NMVOC and CO_2 Emissions from „A*griculture and Forestry, land use and wood stock change*" (SNAP 10);

Status
A estimates at SNAP level 3 (fully detailed)
B estimates at SNAP level 2 (detailed)
C estimates at SNAP level 1 (11 source categories)
- data not available

EEA has recommended NFPs to adapt their national systems for estimating of emissions in order to ensure consistency with national and international reporting requirements. This can easily be done by applying only one system - the CORINAIR methodology. Some of the PHARE countries and a number of EEA countries such as Austria, Denmark, Greece, Luxembourg, Ireland and Italy have done this with improvement in timeliness, comparability and consistency of data.

The ETC has asked EEA countries to also supply emission estimates for heavy metals (HM) and POPs, that need to be reported to OSPARCOM, HELCOM and UNECE/CLRTAP. NRCs made good progress with data for HM, but less for POPs, and have supplied HELCOM and OSPAR Conventions with the requested information. CORINAIR has helped in this process since the software allows to store and calculate emissions data while methodical aspects are partly described in the joint EMEP/CORINAIR Atmospheric Emission Inventory Guidebook (available from EEA on CD-Rom). The following Table 2 provides a summary of Heavy Metals emissions estimates for the years 1994/95.

Table 2: Emissions estimates for the year 1995 (Heavy Metals)

COUNTRY 1995	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn	Status
	Emissions in kg									
Austria	-	-	-	-	-	-	-	-	-	-
Belgium	-	-	-	-	-	-	-	-	-	-
Denmark	806	1,108	3,610	13,312	7,996	21,043	41,035	1,220	63,524	A
Finland	-	-	-	-	-	-	-	-	-	-
France	-	-	-	-	-	-	-	-	-	-
Germany	33,000	11,000	115,000	79,000	31,000	159,000	624,000	25,000	452,000	C
Greece	4,316	2,129	9,223	16,254	12,359	87,992	7,191	849	20,776	A
Ireland	-	-	-	3,307	-	-	62,197	-	1,653	A
Italy	38,091	29,898	162,785	114,831	13,228	539,965	2,178,898	84,518	1,662,312	A
Luxembourg	1,897	385	2,066	2,384	190	2,014	25,560	2,012	88,763	A
Netherlands	1,380	1,510	9,230	50,400	10,400	96,900	152,000	341	270,000	B
Portugal	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-
Sweden (1996)	646	229	7,423	6,975	565	9,333	15,601	160	30,028	B
United Kingdom	97,643	24,186	60,203	74,100	19,715	402,430	1,468,343	92,269	1,290,998	A
Iceland	-	-	-	-	-	-	-	-	-	-
Liechtenstein	-	-	-	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-	-	-	-
Norway	96	709	12,086	9,166	654	37,957	22,446	-	109,338	A
Switzerland	-	2,496	-	-	3,313	-	225,760	-	628,829	A
Bulgaria	-	12,823	-	-	6,877	-	297,495	-	-	C
Croatia	-	2,345	-	-	246	-	285,594	-	-	C
Czech Republic	-	-	-	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	94,247	-	-	A
Hungary	-	-	-	-	-	-	-	-	-	-
Latvia	-	-	-	-	-	-	-	-	-	-
Lithuania	-	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-	-	-	-
Romania	-	-	-	-	-	-	-	-	-	-
Slovakia	-	-	-	-	-	-	-	-	-	-
Slovenia	-	-	-	-	-	-	-	-	-	-

Data for POPs in 1994/95 is not shown, because only five countries reported these by the end of 1997. ETC/AE, in collaboration with the UNECE preparatory working group on a POP protocol, is supporting this process by improving guidelines for estimating the emissions. Data for POPs will be collected in co-operation with OSPARCOM and will be published as soon as they are available. The focus will be on those HMs and POPs that are under consideration in the Protocols under the Convention on Long Range Transboundary Air Pollution for inclusion (expected in 1998).

ETC/AE will publish time series, including fully detailed CORINAIR95 data, in a Topic Report in 1998, presenting:
1. the state of play of the European Air Emissions Inventory CORINAIR;
2. provide a comprehensive picture of air emissions in Europe (EU15, NO, IS, LI, CH, and PHARE) 1990 to 1996,
3. focus on CORINAIR95 data, by means of data summaries, graphs and maps.

3.1.2.3.Data flow

The use of the CORINAIR approach has improved air emissions reporting in Europe the past years. CORINAIR emissions data for the year 1994 was used in the report „Air Pollution in Europe 1997" and data for 1995 was used for EEA's report "Europe's Environment: the Second Assessment". In addition to this, data from CORINAIR96 and updated information from previous years will be used for the EEA report "State of the Environment in the EU 1998".

However the data flow from countries to EEA and to the various international reporting obligations can still be further improved. The ETC has the ambition to automate data collection, storing and handling to improve this process. Within the telematics EIONET, a pilot project on air emissions data flow was launched at the EIONET User Group meeting in December 1997. It aims to test several tools developed for efficient data flow and management from NFPs/NRCs to EEA, taking into consideration as well the data flow from member countries to the European Commission, UNECE/CLRTAP and UNFCCC. The project continues in 1998 with first expected results in Q2/98.

3.1.3. Harmonising International Guidelines for Preparing and Reporting of Emissions Inventories

The CORINAIR methodology is designed for the collection of air emissions data on the level of detail required to report according to EU legislation and different international obligations, in particular UNECE/CLRTAP and UNFCCC. Through the close co-operation over the past years and also in 1997 in particular with EMEP and its Task Force on Emission Inventories (TFEI), full compatibility between CORINAIR and UNECE/CLRTAP has been ensured.

Within the CORINAIR methodology the further development of the scope and the definition of the source categories is considered to be one of the main ways to ensure the possibility of emissions reporting, harmonised between the various international obligations. The source nomenclature should provide an internally consistent structure with no overlaps between sources. It should be possible to create a clear correspondence between the sources of selected different nomenclatures. For this the Selected Nomenclature for sources of Air Pollution (SNAP) was developed further in 1997 into SNAP97 from the previous SNAP94.

The new SNAP97 was developed in co-operation with Expert Panels of the UNECE/EMEP Task Force on Emission Inventories which is in charge of the development, revision and updating of the EMEP/CORINAIR Atmospheric Emission Inventory Guidebook. Adjustments of activities and changes in definition such as the renamed source category 11 "Other Sources and Sinks", have been taken into consideration by this Task Force. TFEI is compiling the second edition of the Guidebook to be published by EEA in 1998. Following the source nomenclature SNAP97, it provides guidelines to estimate emissions. ETC/AE contributed in 1997 to the further improvement of the contents of the Guidebook, by participation in expert panels in particular the expert panel on emissions projections. The work of the Expert Panels included the following tasks :
- prepare update to take into account e.g. SNAP97, information on HMs and POPs;
- review to ensure compatibility and cross-referencing to the IPCC (1996) Guidelines;
- include information on particulate emission estimation methods;
- assess current use of the Guidebook and promote further use.

Draft chapters for inclusion in the second edition of the Guidebook were prepared in late 1997. The work continues and TFEI will review progress at its meeting scheduled for June 1998.

Based on the latest improvements in both methodology and CORINAIR data collection, UNECE/CLRTAP is since December 1997 requesting emissions data reporting at SNAP level 2.

Regarding reporting to UNFCCC, the revision of the 1995 OECD/IPCC Guidelines for National Greenhouse Gas Inventories took place over a two-year period, resulting in the publication of the "Revised 1996 IPCC Guidelines for National GHG Inventories" in mid 1997. Members of the ETC participated in many of the working groups. The co-operation between EEA and ETC/AE and OECD/IPCC was very efficient and enabled ETC/AE to revise the SNAP94 nomenclature into SNAP97, which can be directly and automatically aggregated to the requirements of the revised 1996 IPCC Guidelines at the required level of the "Sectorial Tables". There is the added benefit that countries that use the CORINAIR methodology on the SNAP 3 level do not have to trouble themselves with the IPCC Worksheets as the details are already available in the CORINAIR database. SNAP97 covers sources of all air pollutants covered by UNFCCC.

Furthermore SNAP97 was adapted to accommodate reporting of other pollutants (heavy metals and persistent organic pollutants) according to the requirements of the UNECE/CLRTAP (new protocols expected in 1998) and OSPARCOM/HELCOM.

Regarding harmonisation with EUROSTAT, it was agreed that in the 1997 publication of EUROSTAT on CO_2 emissions from fossil fuels, the difference with national and CORINAIR emissions estimate were made clear with the following text in the introduction : "Both approaches can be regarded as complementary, especially since the EUROSTAT method corresponds to the IPCC Reference Approach and the CORINAIR method produces the complete IPCC Sectoral Approach which is the approach required for UNFCCC reporting."

The knowledge on environmental effects of air pollution is steadily increasing. At the same time the political awareness is rising. The number and coverage of international agreements on pollution prevention and reporting is therefore also increasing. The requirements of Emission Inventories in terms of precision, transparency, timeliness, consistency and the number of pollutants is therefore expected to rise in the near future, which will require much effort and support from ETC/AE.

Harmonisation of inventories and reporting involves a number of international organisations which need to co-operate closely. Through a number of Memoranda of Understanding (MoUs), co-operation is being developed between EEA and for example EUROSTAT, EMEP, OSPARCOM and HELCOM. Based on the (draft) MoU between EEA and OSPARCOM, end of 1997 a draft agreement was prepared between ETC/AE and the OSPARCOM INPUT working group (inputs to the marine environment) in the fields of :

- promotion of new methods for estimating,
- provision of data and information,
- harmonisation of reporting procedures.

It becomes widely recognised that the only way to succeed is through sharing workload, co-ordinating effectively and exchanging information so as to avoid unnecessary duplication of effort.

3.2. Development of the CORINAIR System

3.2.1. The CollectER System for CORINAIR

The software used for CORINAIR90 and CORINAIR94, is being developed into a new MsAccess system designed for more efficient, integrated emissions data collection,

calculation, storing and presentation. Within the 1997 workplan and budget, it was decided to develop the new system with more or less independent tools, each adapted to a specific task within the process (see: Proposal for redesigning the CORINAIR software, Technical report, available from EEA). On the basis of this proposal, the main tool CollectER (Emissions Register) was created in September 1997. Amongst other improvements, the tool provides the basis for inclusion of emissions projections data that are calculated from a reference year already prepared and stored in the same system.

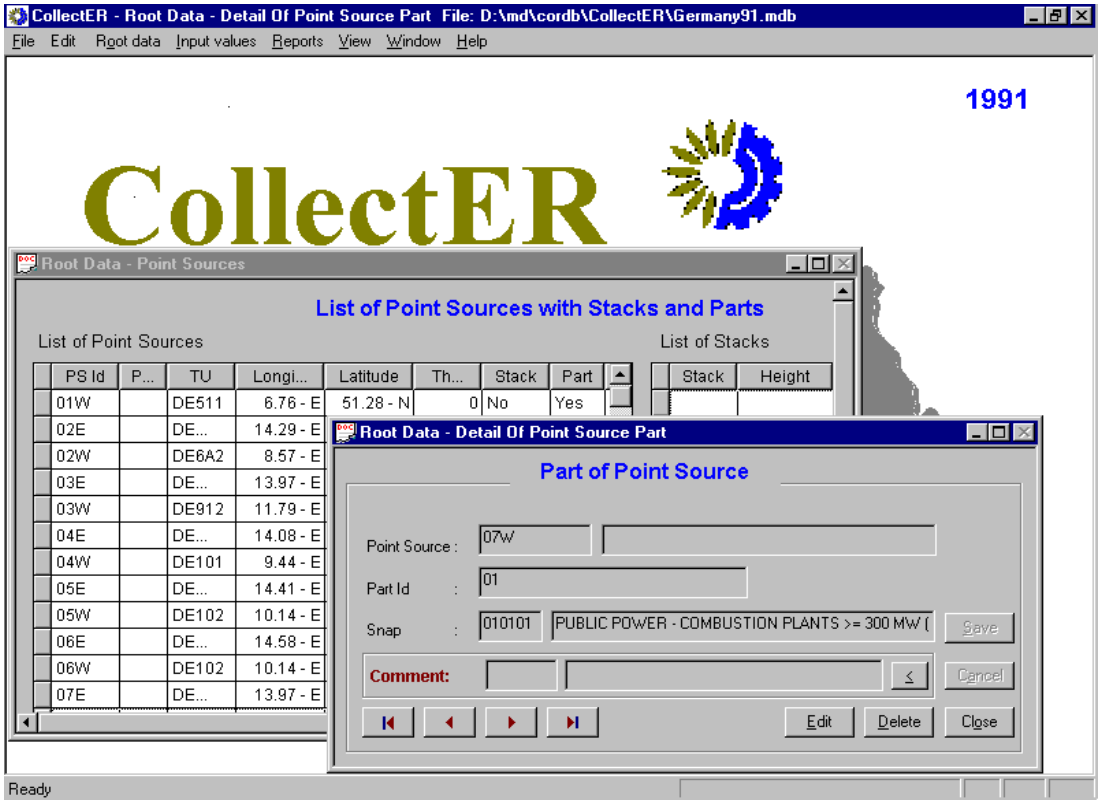
A pre-alpha version of CollectER and its functionality was demonstrated at the third ETC/CORINAIR workshop in April 1997 in Apeldoorn. NRCs provided comments addressed to the development team members (TNO, the Netherlands and others) during and after the workshop. These were taken into account when the alpha version was being completed. In the period July to September 1997, ETC/AE, including the subcontractor SPIRIT, tested the system further. This resulted in a beta-version that was distributed to all NRCs, before the fourth ETC/CORINAIR workshop held in November 1997 in Bratislava. At this workshop the system was demonstrated to all NRCs for the first time and NRCs had the possibility to extensively test the system at the workshop. Based on comments from participants, the system was further improved and the final beta-version (2.0) was delivered to all NRCs and other users in December 1997, via the Internet Homepage of SPIRIT.

http://www.spirit.sk/aprod03.htm

Furthermore, SPIRIT included in the distribution to countries the national CORINAIR databases for the latest year available, in the format of the new system. The ETC/AE and SPIRIT also provided assistance to NRCs.

Based on the overall design of CollectER, the nomenclature (SNAP) was implemented in a way that can easily be supplemented by sources of emissions released into other media than air such as water. Figure 1 shows an example of some of the functionalities of CollectER with data from the German CORINAIR91.

Figure 1 CORINAIR data collection system



The Beta-version 2.0 has also provided an import module „ImportER" that was implemented to import data generated separately by the COPERT II module for estimating emissions from road transport.

The ETC will develop the CORINAIR software tools further. The next step planned includes development of the tool for reporting. The development of the so called „ReportER" tool is largely dependent on funding to be made available either from the Agency's work programme or through a PHARE funded Topic Link.

3.2.2. COPERT II Module

The ETC partner POSEIDON has developed the COPERT II module for estimating emissions of road transport. A Manual and the methodology (version 0.6), was distributed to national experts and ETC/AE partners. The following work was performed over the year:

- implementation of updated emission factors resulting from the MEET project (DGVII)
- version 1.1 introducing new tools and the updated emission factors launched in Nov 1997.
- support to users for national runs through a hot-line (phone)
- **final draft technical report COPERTII Manual and COPERTII Methodology**

The report describes the methodology and relevant emission factors which are suggested to be used for the calculation of emission estimates from road transport. The methodology is fully incorporated in the computer programme COPERT II (Ntziachristos and Samaras 1997), which facilitates its application. It is proposed to be used by EEA member countries for the compilation of CORINAIR emission inventories. In principle the COPERT II methodology can be applied for the calculation of traffic emission estimates at a relatively high aggregation level, both temporally and spatially, e.g. on a yearly basis for NUTS 0. However, it has been shown that the methodology can also be used with a sufficient degree of certainty at a higher resolution too, e.g. for the compilation of urban emission inventories with a spatial resolution of 1x1 km^2 and a temporal resolution of 1 hour.

Results from this exercise are being incorporated in the Atmospheric Emission Inventory Guidebook. The updated methodology is largely based on the work of a working group which was set up for this purpose. The group drew its main principles from two ongoing European activities:

* The action COST 319 on the Estimation of Emissions from Transport and
* MEET (Methodologies to Estimate Emissions from Transport), a European Commission (DGVII, Directorate for Transport) sponsored project in the framework of the Fourth Framework Programme in the area of Transport

Both activities aimed at harmonising emission factors and national methodologies concurrently and independently developed in the past years. In this respect, the methodology presented should be considered as an anticipation of the final product of the above activities, especially MEET, which, after it is completed, should be fully adopted in a future update of COPERT.

In comparison with the 1990 approach, the following significant modifications have been made:

1. The methodology includes all necessary technological data for the estimation of emissions from road traffic for a single year. The methodology can also be applied for a year in the near future, as emission factors for future (known) regulations are also included. However, the activity data needed for the emissions estimates have to be provided by national experts.
2. The vehicle category split has been revised, including a number of weight classes for heavy duty trucks, and considering urban buses and coaches separately.
3. Speed dependent emission and fuel consumption factors are introduced for all vehicle categories (except mopeds <50cc). As far as the emission factors of improved or future technologies are concerned an appropriate pollutant related reduction factor is introduced, applicable to the emission factor of the best current technology.
4. The emissions calculations of heavy duty vehicles are updated, in order to account for the gradient of the road and the weight carried.
5. The list of pollutants covered has been extended. The report includes emission factors for all the pollutants of the 1990 report with the addition of heavy metals (cadmium, copper, chromium, nickel, selenium and zinc) related to the fuel consumption factors.

As in the previous approaches, emissions from road traffic are divided into three types. The first are the “hot emissions”. These are the emissions from vehicles after they have warmed up to their normal operating temperature. The second are the so-called “cold-start emissions” which are the emissions from vehicles while they are warming up. The third type are evaporative emissions. These only occur in significant quantities for gasoline vehicles in the form of NMVOC emissions. For some vehicle classes and some pollutants, the different types of emissions are aggregated together into one emission factor; for some others, individual emission factors are proposed.

The vehicle category split required for reporting in CORINAIR does not meet all aspects of vehicle emissions considered important. In particular, the age of vehicle (year of production) and the engine technology, especially for the categories equipped with diesel engines, is not sufficiently reflected. Thus, a more detailed vehicle category split has been developed. In addition, as in the 1990 report, in the category Passenger Cars national legislation is taken into account with the classes 'Improved Conventional' and 'Open Loop'. In contrast with the previous reports, the category 'Buses' is specifically differentiated.

The report contains emission factors for SO_x, NO_x, VOC, CH_4, CO_2, CO, N_2O, NH_3, diesel particulates, and for heavy metals (lead, cadmium, copper, chromium, nickel, selenium and zinc).
The baseline methodology is defined in such a way that it uses firm technical data and national variations can be incorporated. The variations may include parameters such as

composition of vehicle fleet, vehicle age, driving patterns, some fuel parameters and climatic conditions. Other variations which may exist, e.g. variations in vehicle maintenance, are not accounted for because there is not enough data available to do so. The calculation is based mainly on five main types of input parameters such as total fuel consumption, vehicle fleet, driving condition, emission factors and other parameters.

In order to meet the CORINAIR requirements, in particular the one that data should be suitable for advanced long-range dispersion models, this information in principle should be available for the smallest territorial unit (NUTS level III). For countries for which the required input data are not available at this level of resolution, it seems to be more appropriate to start at NUTS level 0 (national level) and to allocate emissions to other NUTS levels with the help of available surrogate data. National particularities can be taken into account by this top-down approach via the composition of the vehicle fleet, the driving conditions and the temperature dependency of some emission factors, and the influence of road gradient on heavy vehicle's emissions.
For countries which have the required input available at smaller NUTS level (including for example traffic counting) it is proposed to make use of this information and to apply a bottom-up approach.

The ETC partner POSEIDON has created a web-site for downloading the COPERT II report, manual and software as follows:
http://vergina.eng.auth.gr/mech/lat/copert/copert.htm

The work on COPERT continues under the 1998 subvention.

3.2.3. Towards Integrated Emissions Inventories

The project „Common Tools for air and waste integrated emissions inventories" was undertaken jointly with the ETC on Inland Waters. The ETCs have jointly prepared a first draft delivered to the EEA in January 1998 of the technical report **„First approaches to an assessment of establishing emissions to inland waters"** to be published by EEA in 1998. This report describes the progress made so far in defining an overall framework methodology for emissions inventories to water. The difficulties inherent in water emissions assessment are considered in order to establish a simplified, robust approach which could provide for a minimum set of reliable data in the short term. The assumption that a water emissions inventory could be treated as an extension of the CORINAIR system is considered and discussed.

The approach taken by the ETCs concentrates on three main issues:
⇒ **The substances to report**. Methods to be used for the selection should be based on legal requirements, environmental needs, and feasibility.
⇒ **The spatial scale for reporting**. The river or lake basin is the relevant unit for the assessment of emissions to water. For the purposes of EEA, it appears reasonable and appropriate to consider only the topographic surface catchments. There are potential problems in that currently much pressure data is gathered on the basis of administrative units rather than the catchment level.
⇒ **The time scale for reporting**. For water issues annual reporting is appropriate for many legal purposes and for state of the environment reporting, although sometimes different temporal resolutions are needed.

Emission inventories are required under a number of directives aimed at controlling and reducing pollution in the water environment. Many of these directives are likely to become subsumed under the Water Resources Framework Directive but the need for Member States to monitor and collect information on the state of inland waters and the pressures arising from catchment activities will still be a fundamental legal requirement. In particular, the Integrated Pollution, Prevention and Control (IPPC) Directive requires the Commission to report every three years an inventory of the "principal emissions and sources" based on data supplied by the Member States. Thirdly, EEA's information needs on pollution sources are governed by its obligations for regular reporting about

the state of the environment, e.g. the Dobris+3 assessment and updates and the EU State of Environment reports. Specific issues are addressed through the production of monographs and other types of report. These needs are likely to increase and evolve as a result of the integrated assessments of environmental problems prepared by the ETCs and the implementation of media-oriented networks enabling the identification and quantification of new environmental issues.

In Europe, the available information on pollution sources can be divided into registers on Urban Waste Water (UWW), Industrial Waste Water (IWW) and diffuse pollution sources registers (DPSR). A review of existing sources of information has been carried out and relevance to the EEA assessed.

While guidelines for the estimation of emissions into air are widely availabe through the Atmospheric Emission Inventory Guidebook, these are not available in a harmonised way for both point and diffuse source emissions to water. There is, however, experience in France, Denmark and the Netherlands on which to build.

The anticipated difficulties suggest that a pragmatic approach be taken and that the construction of an Emissions Inventory at the European level should be attempted on a step by step basis and should focus on a limited set of substances which can be evaluated by simple means and which would not require too much data. The main principle is to achieve good precision for individual large sources, and a lower precision for diffuse small sources.

The main issues requiring specific attention are:

- Finalisation of a comprehensive source nomenclature.
- Availability of a common GIS that is capable of dealing with administrative and watershed aggregations.
- Choice of a common agricultural load assessment method.
- Transfer assessment methods need to be developed, and calibrated.

It is recommended to undertake a pilot testing with volunteer countries (e.g. France, Denmark, the Netherlands) focusing on the methodology and the computation model, using readily available data. This test should deal first with the determinands related to nutrient issues (eutrophication), which are common to urban, industrial and agricultural emissions, and are partly originating in airborne emissions. This is a general problem in most of Europe and for which there is considerable experience in the coupling of information on emissions and environmental state.

The ETCs on Air Emissions and Inland Waters will continue in 1998 to develop a method and guidance material for a systematic approach for pressure information on a catchment area basis. This would support current and future activities of the EEA in carrying out integrated assessments.

3.3. EEA Assessment Reports

3.3.1. EEA Monograph "Air Pollution in Europe 1997"

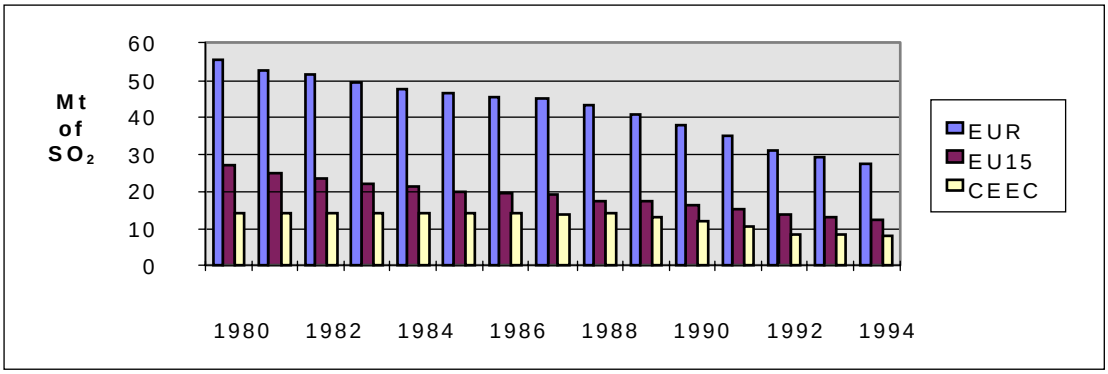
ETC/AE, in collaboration with the ETC/AQ, jointly prepared the report on „**Air Pollution in Europe 1997" (EEA Environmental Monograph no. 4)**, published in June 1997. EEA presented the report at the Princes' Award Ceremony (Copenhagen, 5 June 1997). The report has addressed key air related environmental problems, the main socio-economic driving forces and the related policy initiatives that are being supported by this report as follows.

The problem	The impacts	The main policy initiatives
Climate change	green-house gas effect/ global warming	• UNFCCC conference in Kyoto in Dec.'97 • A new Community strategy to come in 1998
Acidification	acidification of ecosystems due to exceedance of its maximum (critical) load	Community Strategy which has been published in 1997
Eutrophication	excess nitrogen has adverse effects on ecosystems	
Urban Air Quality and ground-level Ozone	ground-level ozone and urban air quality effects human health negatively	• Community Ozone Strategy to come in 1998 • The new Community Framework Directive • The development of the new multi-pollutant, multi-effect UNECE/CLRTAP Protocol that will also address acidification and eutrophication • The Community Auto-Oil 2 Programme

The report provides trends in these key environmental problems, for instance acidification. After emissions of the acidifying compounds sulphur dioxide (SO_2), nitrogen oxides (NO_x) and ammonia (NH_3) in the atmosphere, these compounds undergo long range (thousands kilometres) transboundary transport, chemical transformations and deposition to the surface (forests, soil, lakes) resulting in acidification. Acidification causes damage to ecosystems, for example fish populations in many freshwater systems (lakes) in Scandinavia are either extinct or strongly affected by acidity. Due to reduction of emissions of sulphur compounds since 1980 resulting in a decrease of sulphur deposition there has been a significant decline in the sulphate content in surface waters in Scandinavia. In general the area in Europe, where exceedance of "critical loads" on ecosystems due to acidifying compounds, has therefore decreased in the same period. However it should be noted that exceedance of critical loads in Europe still occurs and that further emission reductions are necessary to minimise this.

Figure 2 shows the significant decline in SO_2 emissions that goes along with large reduction in sulphate deposition registered in recent years.

Figure 2: Trends in SO_2 Emissions



Total European emissions of SO_2 show about a 50% reduction in 1994 compared to 1980. The decrease is most pronounced for the EU15. The SO_2 emissions of EU15 have been reduced from 20100 kt in 1985, to 16500 kt in 1990 and 12000 kt in 1994. The decrease in the CEE countries is most notable since 1990. Much less evident reductions are found for NO_x, but a 14% decline is found for the total emissions in the period 1990

to 1994. Larger reductions are seen in the CEE countries than in EU15 for this period. The EU15 emissions of NO_x decreased by about 8 % (from 13500 to 12400 kt) in the same period.

The report covers the EU15 Member States and other European countries and parties to the UNECE Convention on LRTAP. This Convention plays a major role in reducing transboundary air pollution in Europe. The report illuminates the urgent need to further reduce emissions from traffic, energy and industry sectors.

3.3.2. Contribution to the EEA Report "Europe's Environment, the Second Assessment"

3.3.2.1.Introduction

ETC/AE has collected and delivered air emissions data to EEA for inclusion in several chapters and written the chapter on climate change for the **EEA report "Europe's Environment, the Second Assessment"** to be published in June 1998 for the pan-European Ministerial Conference in Aarhus, Denmark.

3.3.2.2.Collect Air Emission Data

The purpose of the air emission data collection was to enable the presentation in a consistent way of time series for 1980-95 by source sectors of air emissions which are related to the main environmental problems reported in "the Second Assessment" (climate change, acidification, tropospheric ozone, urban air quality, hazardous substances/chemicals).

National reporting under various conventions and legislation has made information available as follows:

1. CLRTAP/EMEP provides national totals for 6 pollutants (SO_2, NO_x, CH_4, NMVOC, CO, NH_3) from most European countries from 1980 to 1989 but with little or no sectoral breakdown.
2. CLRTAP/EMEP provides national totals and the 11 main EMEP/CORINAIR sectoral subtotals for these 6 pollutants from a number of European countries from 1990 to 1995.
3. UNFCCC provides national totals and the 6 main IPCC sectorial subtotals for 6 greenhouse gas and ozone precursors (CO_2, CH_4, N_2O, NO_x, NMVOC, CO) from a number of European countries (including most EU countries) for 1990 to 1995.
4. EU Monitoring Mechanism provides national totals and the 6 main IPCC sectorial subtotals of up to 6 greenhouse gas and ozone precursors (CO_2, CH_4, N_2O, NO_x, NMVOC, CO) from most EU15 countries for 1990 to 1995.
5. CLRTAP/EMEP and HELCOM provide a few national total and subtotal emission estimates for a range of heavy metals and persistent organic compounds for recent years.

National participation in the CORINAIR programme has provided:

a) a spatially disaggregated inventory by sectors and for 8 pollutants from nearly 30 European countries for 1990 (CORINAIR90).
b) spatially disaggregated inventories by sectors and for 8 pollutants from about 20 European countries for 1994 and/or 1995 (CORINAIR94/CORINAIR95).
c) inventories by sectors for several heavy metals and persistent organic compounds from less than 10 European countries for 1994 and/or 1995 (CORINAIR94 and 95).
d) national emissions estimates by sectors and sub-sectors for the years 1990-1995 for a range of European countries as part of the programme to transpose CORINAIR into an annual collection and information system.

Despite continuous activities through the CORINAIR programme to provide a single European emission inventory, current inconsistencies in national emissions estimation

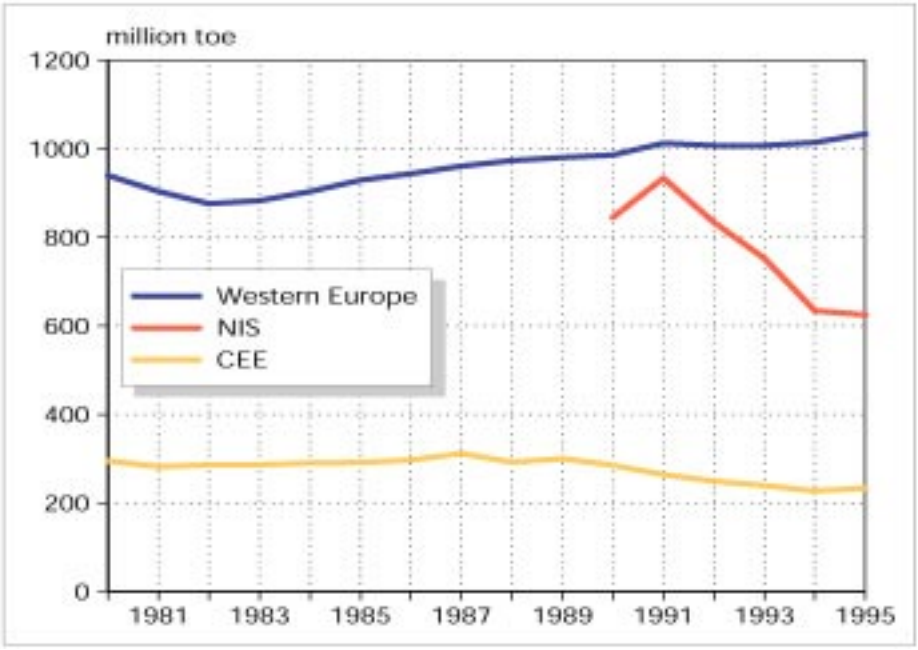
and reporting have forced EEA and ETC/AE to make use of, and combine, the different data sources mentioned above to produce the emissions database for "the Second Assessment".

3.3.2.3.Chapter on Climate Change

Human activities have led to increases in the concentrations of greenhouse gases (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6) in the past hundred years, while an increase in global mean temperature has also been observed in the same period. There is evidence that human activities, like fossil-fuel burning, are causing an enhanced greenhouse effect or global warming (IPCC 199X). In the chapter included in "the Second Assessment" the current and potential impacts of climate change have been described, based on the indicators temperature, sea levels, soil moisture and precipitation. The effects of climate change on natural flora and fauna and on agriculture and forestry in Europe are complex. Because of the large natural variability, estimates are tentative and subject to large uncertainty.

The main socio-economic driving forces of climate change are energy use, agriculture, waste disposal and industrial activities The critical issue is the achievement of stabilisation of carbon dioxide concentrations and the key to this is a reduction in fossil fuel burning. ***Figure 3*** shows how final energy consumption in Western Europe has been growing gradually, with a total increase of 10% between 1985 and 1995.

Figure 3: Energy Consumption in Europe, 1980 - 1995

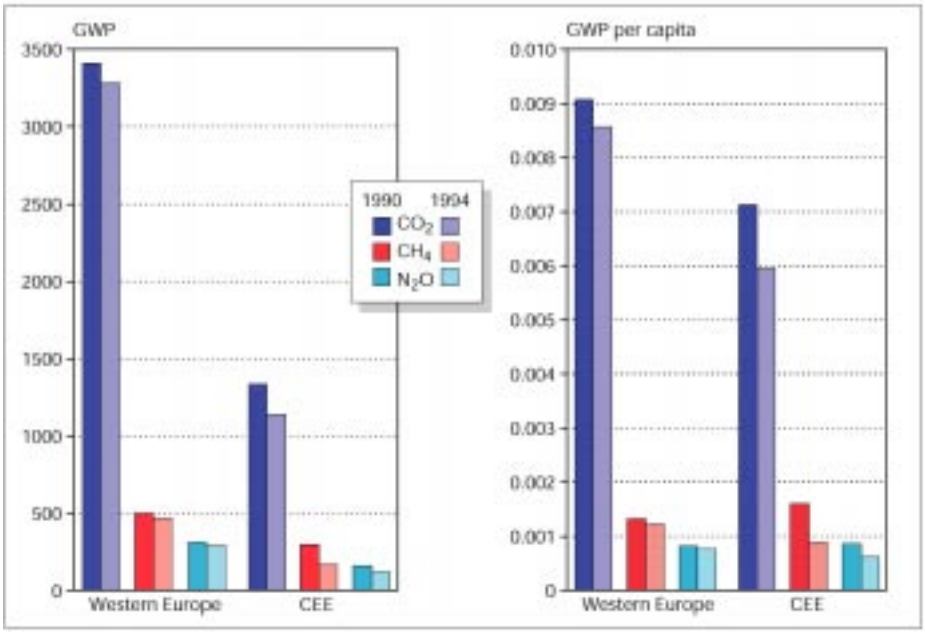


However, energy consumption fell by 18% in Countries of Central and Eastern Europe and by 26% in the Newly Independent States between 1990 and 1995. Overall energy use in Europe fell by 11% between 1990 and 1995. Global energy use has increased at an unprecedented rate throughout most of this century, and despite growing contributions from renewable and nuclear sources during the past few decades, fossil fuels still provide over 90% of the world's energy needs.

The contribution of greenhouse gases to global warming, and thus their effects on sea level, precipitation and ecosystems, depends on their atmospheric concentration, their residence time in the atmosphere and their effectiveness in trapping radiation. In the Second Assessment, the impact of different gases was described on a comparable basis by using the GWP (global warming potential) relative to CO_2 which is strongly

dependent on the time horizon considered. ***Figure 4*** shows CO_2 equivalents for CH_4 and N_2O emissions for the year 1990 and 1994 (GWP, 100 year time horizon).

Figure 4: European Emissions of GHGs as CO_2 Equivalents in 1990 and 1994



Some reductions in emissions of greenhouse gases have been achieved. Carbon dioxide emissions in Europe fell by 12% between 1990 and 1995, and in western Europe by 3%. Many of these reductions have resulted from economic changes, such as the closure of much heavy industry in Eastern Europe and the switch from coal to gas for electricity generation in some western European countries. The *energy* supply sector is the largest contributor (about 35% in 1995) to carbon dioxide emissions, with emissions from *industry*, *households* and the *commercial sector*, and *transport* are on a roughly comparable level (around 20%, with an increasing contribution form the transport sector).

The largest increase in energy consumption and in the resulting CO_2 emissions in Western Europe in the past years was in the transport sector. Although CO_2 emissions from all sectors decreased in CEEC between 1990 and 1995, it can be expected that emissions from road transport will increase in these countries in the coming years in a similar way as in Western Europe.

For the EU, the Commission's latest "business as usual" scenario suggests an increase of carbon dioxide emissions by 8% between 1990 and 2010. This possible increase stands in striking contrast to the current target of a reduction of 8% (for a basket of six gases including carbon dioxide) for the European Community, as agreed in Kyoto in December 1997. There clearly is a need for action at all levels affecting all economic sectors to achieve this target. Action by the Parties to the UNFCCC, in particular the European Community, will include: the reduction of the margins of uncertainty about the three new gases introduced in the protocol (HFCs; PFCs and SF6), options for their reduction; insights into sinks; application of flexible instruments such as emissions trading, joint implementation and the development of Clean Development Mechanism; the way in which developing countries can be involved in future agreements on emissions reduction; what an effective sanction regime might look like; and the opportunities for the business community.

3.3.3. Air Emissions Projections and the EU1998 State of the Environment report

Under a supplementary subvention from the 1997 budget, ETC/AE started to contribute to the EEA report on the „State of the Environment in the EU1998". The main objective

of the ETC contribution is to prepare and report on projected, baseline, emissions for Heavy Metals, Persistent Organic Pollutants and fine particulates. Future environmental trends are to be estimated using these baseline emission scenarios for the environmental problems „Chemical Risk" and „Urban Stress". This work has mainly been carried out by the ETC partner TNO. Activities and main products expected, are:

I. Collate data on emissions factors and emissions inventories for pollutants relevant to chemical risk and urban stress
II. Compile emission projections using baseline scenarios
III. Prepare preliminary cost estimates of abatement measures
IV. Report on methodologies used

The work started in October 1997, with first results expected in early 1998.

For the EU98 Report, the ETC/AE will again prepare the chapter on climate change.

3.4. Support to Assessment under EU Legislation

3.4.1. Inventories for the CO_2 Monitoring Mechanism

The ETC/AE under the supervision of the EEA has prepared for the Commission Services (DGXI) a Technical report (final draft) of **National Emissions Inventories 1994/1995 for the Monitoring Mechanism of Community CO_2 and other GHG Emissions**. Although the emphasis has been on mitigating CO_2 emissions, the monitoring mechanism also includes other gases CH_4, N_2O, HFCs (hydrofluorocarbons), PFCs (perfluorocarbons) and SF6 (sulphurhexafluoride). The draft report was presented at the meeting of the Monitoring Mechanism Committee in January 1997 in Brussels. The report supplies the Commission with a consistent and transparent summary of greenhouse gas emissions for 1994, preliminary estimates for 1995, updated estimates for 1990 and the trend in emissions based upon national inventories submitted under the Monitoring Mechanism, supplemented with information from Eurostat and CORINAIR. In the final draft, ETC/AE included data and information submitted by member states up to 1 January 1997.

DGXI has furthermore asked the ETC to assist in the preparation of the third Evaluation Report required under the Monitoring Mechanism. This work will start in 1998 and a final draft is expected mid 1998.

The Monitoring Mechanism is being revised and a new decision is expected to be adopted in 1998. It is likely that the role of the EEA will be more explicitly defined in this revised mechanism.

3.4.2. Inventory for EU Second Communication to UNFCCC

The European Community is Party to the UN Framework Convention on Climate Change (UNFCCC). The second communication under the Convention was due in April 1997. The Commission Services (DGXI) asked EEA-ETC/AE to prepare the chapter, and annexes, with air emission estimates for all greenhouse gases for 1990 (updated), 1994 and preliminary 1995 for inclusion in the Community's communication. ETC/AE prepared this inventory, based on the member states' submissions to UNFCCC and to the Commission (under the Monitoring Mechanism). ETC/AE has cross-checked these estimates with data from the CORINAIR programme and from the statistical office EUROSTAT. Certain adjustments have been made in a transparent way to improve the internal consistency, including separate treatment of final non-energy consumption of energy commodities and the elimination of adjustments that some member states had made for temperature and electricity trade. Not all member states reported emissions of HFCs, PFCs and SF6. Also carbon dioxide removals, to be reported in the land-use change and forestry sector, were not reported by all member states.

The Commission produced a complete draft communication, translated into the EU languages, in November 1997, including the ETC/AE contributions. However publication of the communication was postponed to 1998.

Based on preliminary figures, emissions in 1995 were considered to be at the 1990 level, following a dip in the early 1990s. This return to 1990 levels in 1995 was caused mainly by the reduction in emissions in Germany's new states, where there was a 50% drop between 1987 and 1993, equivalent to 4 % for the Community as a whole, substitution of coal by gas in electricity production, particularly in the United Kingdom, and low economic growth.

Regarding CO_2 emissions in 2000, the communication concludes that by adding up the member states projections there is an indication that EU CO_2 emissions will be stabilised in 2000 at 1990 levels. An alternative projection which uses some common assumptions on growth rates and shows likely increase of 3-5 % in 2000 above the 1990 level was presented by the Commission in the second evaluation report under the EU Monitoring Mechanism.

The communication included a baseline scenario ("pre-Kyoto") showing that CO_2 emissions could grow after 2000, up to an increase by 8 % in 2010 from 1990 levels, in the absence of marked improvements in energy efficiency or the carbon ratio in fuels, but that there is scope for political action to prevent this. The communication did not include projections for other gases. The use of HFCs is expected to grow as they are used to replace gases regulated by the Montreal Protocol on substances that deplete the ozone layer. PFCs have already been reduced significantly in some member states.

In 1997 the UNFCCC published the results of its in-depth review of the first national communication of the European Community to UNFCCC which was submitted to UNFCCC in July 1996 (UNFCCC, Secretariat, 15 July 1997). The review team noted "the efforts that had been made to develop a uniform inventory system, CORINAIR, at the Community level and to extend it to the pan-European level, and the efforts to make this compatible with the IPCC system". The review team also noted that "the CORINAIR activities have helped to enable Parties both inside and outside the Community to compile inventories for direct as well as indirect GHGs and thus implement the Convention. Information and capacity building are given priority in the Community's programmes, but this will only be complementary to efforts by member states".

3.4.3. Supplementary Information for AQ Framework Directive

On request of DGXI, the ETC/AQ has in collaboration with ETC/AE, DGXI and JRC-ERLAP prepared a **draft Guidance Report** on supplementary assessment under the EC Framework Directive on air quality assessment and management. The ETC/AE delivered air emissions data and a chapter on „Human activity and emissions inventories". The report provides guidance, not on assessments for compliance under the Directive, but rather in preparation for such assessments in cases where representative monitoring is not available. The report recommends to use combinations of measurements, emissions data, and modelling for these assessments. It contains information on emissions and emission fluxes in the entire zone, which will enable a first estimate of places at risk of exceeding limit and target values. The maps also provide information needed to run simple models for calculation of the concentration of air pollutants as described in chapter 5 of the guidance document. In this case, the specifications of the emission inventory should be determined by the input requirements of the model and hence, indirectly, by the chemical, spatial and temporal resolutions of the air quality quantities (concentrations) as specified in the Directives.

To ensure comparability of the data and the subsequent assessment, it was recommended to use a standard methodology for estimating emissions, harmonised at the European level. Such a methodology has been developed and applied in the CORINAIR project and documented in the EMEP/CORINAIR Atmospheric Emission

Inventory Guidebook. It was recommended that, if no specific emission inventory for the zone under study is available, such an inventory should be derived from the most recent CORINAIR inventory available, using the methodology described in the „Human activity and emissions inventories" chapter.

3.4.4. Participation in the EU Auto-Oil II Programme

The overall aim of the second Auto-Oil Programme (AOP2) is to identify how air quality objectives can be met at least cost through the application of various technical and non-technical policy instruments. An important step in the overall cost-effectiveness approach is the assessment of urban air quality and population exposure for the pollutants identified in Working Group 1 (CO, NO_x/NO_2, Benzene, PM_{10} (particulate matter), tropospheric ozone and possibly in addition 1,3 butadiene and PAH). For this, reliable emissions data and estimates of emissions reductions to meet targets in selected cities are requested.

Based on a decision made at the first meeting of WG1 in May'97, EEA has prepared a proposal for so-called "top-down" or "generic" city modelling. This proposal discusses different approaches and highlights major benefits and includes a work plan and the expected output. The main work will be done by ETC/AQ in 1998, with ETC/AE assisting if needed in the preparation of the required city emission estimates. Also the results of the ETC/AE work done in 1996 on the estimation of urban emissions from the NUTS3 CORINAIR (1990) emission estimates, can be used for AOPII (see Topic Report 30, 1996 "Review Study on European Emissions Inventories").

3.4.5. Polluting Emissions Register (PER) of the IPPC Directive

DGXI has asked EEA-ETC/AE to assist in preparing documents for the Committee which was established in 1997 on the implementation of Article 15(3), concerning the Polluting Emissions Register (PER) of the Council Directive 96/61/EC of 24 September 1996 on Integrated Pollution Prevention and Control. EEA recommended to consider the use of EIONET and in particular the CORINAIR methodology and the related network of NRCs for the purpose of a European PER (Pollution Emissions Register). This is still to be decided by the Committee of Article 19 IPPC at future meetings in 1998.

According to the IPPC Directive an inventory of the principal emissions and sources responsible shall be published every three years by the Commission on the basis of the data supplied by the Member States. Before publication, the Commission must ensure inter-comparability between data of a PER (Pollutant Emissions Register) and complementary data from other registers and sources of emissions. The inventory should :

1. contain information on the emissions of a number of substances into the air, water and soil,
2. also indicate the installations responsible for these emissions, together with their location and
3. provide the basis for reporting on the evolution of such emissions over time.

The main issues for decision in 1998 are:

- the purposes of the inventory and its possible uses.
- reporting obligations,
- installations covered,
- substances covered,
- data transmission,
- use of a specific nomenclature.

The obligations of the parties (Member States, Commission, individual installations) need to be defined, as well as the means by which the Commission will gather the needed information. Only installations covered by the IPPC Directive should be included in the report. However, a report covering all IPPC installations would be too burdensome to publish. The Committee should therefore agree on criteria for selecting reporting installations and on the way and the extent to which these installations should

be reported and identified in the inventory. The inventory will not cover emissions of all possible chemical substances. A difficult choice will have to be made on criteria for defining the principal emissions. Furthermore it is still to determine the way the information needed for the inventory will be transmitted by the Member States to the Commission. This will include decisions on the use of electronic systems, on the assistance of the EIONET, as well as on the relationship with reports the Member States already produce in relation to other existing obligations and inventories (e.g. CORINAIR, the reports under the Directives on water, etc.).

Some conclusions from the first meeting of the IPPC Article 19 Committee in Nov. 1997 were:

- the interface with other reporting obligations needs to be closely examined. There is a strong potential role for both the European Environment Agency and Eurostat. For the EEA this could involve using the existing EIONET infrastructure, developing a software tool for Member States and possibly also for companies, developing a PER database and providing results from this database by means of reports and the Internet.
- the format of transmitted data needs to be compatible and appropriate to the agreed purpose. Use of the NOSE nomenclature appears to be a promising solution. IPPC Annex I should define the scope of the inventory but does not need to be used for classifying data.
- quality of data is an important issue. The CORINAIR system for expressing data quality could provide a useful model for the inventory. Eurostat is able to handle confidential information for the purposes of quality control at branch level but will have constraints on what information they can report.
- a pilot exercise would be useful but should preferably occur after the deadline for transposition of the Directive.

CORINAIR has for many years collated point source air emissions data, supplied by the EU15 and many other countries in Europe. The CORINAIR methodology and its latest developments can satisfy the IPPC/PER requirements. The revised CORINAIR software has included a window for collecting data from point sources, which was originally developed for sources specified by the Large Combustion Plant Directive. Now it provides a template for any kind of installation that is to be registered according to Annex I of the IPPC Directive.

3.4.6. The new Large Combustion Plant (LCP) Directive

DGXI is in charge of collecting LCP data from the member states under the existing LCP Directive. Data collection has been supported by ETC/AE, by means of the point source concept incorporated in the CORINAIR software. This has provided templates for all data and information requested by the Directive.

The LCP Directive is currently being revised. On EEA/ETC initiative first contacts have been made with DGXI in 1997 on possible ETC/AE assistance to DGXI in data collection, storage and presentation as required under the new LCP directive. It was agreed that in the beginning of 1998, the EEA/ETC-AE would give comments on the draft text of the revised directive and prepare a proposal for assistance to DGXI.

4. DELIVERABLES/OUTPUTS PROVIDED BY ETC/AE IN 1997

4.1.1.1. Topic Reports

Annual Summary Report 1996 (Topic Report 6/1997 Air Emissions)

4.1.1.2. EEA Environmental Monographs

Air Pollution in Europe 1997 (Monograph no. 4), jointly with ETC/AQ.

4.1.1.3. Other Products

1) CORINAIR94, European Database and data on Internet, July 1997 (available on ETC/AE Internet site http://www.aeat.co.uk/netcen/corinair/94);
2) CORINAIR94 Summary Report, final draft April 1997 (to be published in 1998 as Topic Report);
3) CORINAIR95, summary tables, draft November 1997 (to be included and published in 1998 in the Topic Report on air emissions estimates 1990-1996);
4) Proposal for redesign of the CORINAIR software, final draft April 1997 (to be published in 1998 as Technical Report);
5) Technical report for the Monitoring Mechanism Committee "Monitoring Mechanism of Community CO_2 and other Greenhouse Gas Emissions, National Emission Inventories 1994/1995", final draft, April 1997;
6) Chapter on climate change for the Second Assessment report, final draft, December 1997;
7) New CORINAIR software for data collection (CollectER beta version), final draft December 1997 (available on the ETC/AE Internet site, http://www.spirit.sk/aprod03.htm);
8) Technical report "COPERT II, methodology and emission factors to estimate emissions from road transport". Software and user's manual. Final draft November 1997. Available on ETC/AE Internet site: http://vergina.eng.auth.gr/mech/lat/copert/copert.htm);
9) Chapter 4 „The EC inventory of GHG emissions and removals" of the second Communication from the European Community under the UNFCCC, final draft, November 1997 (to be published by the Commission in 1998);
10) Selected Nomenclature for sources of Air Pollution SNAP97, version 0.6, December 1997 (to be included in the 1998 revision of the joint EMEP/CORINAIR Atmospheric Emission Inventory Guidebook);
11) Guidance Report for EU air quality directives, chapter on „Human activities and emissions inventories", final draft, February 1997 (to be included in Commission report, to be published in 1998 and made available on EEA Homepage).

5. WORKSHOPS AND MEETINGS IN 1997

5.1. Introduction

ETC/AE organised two workshops, on 17 April 1997 at TNO Institute in Apeldoorn and on 17 November 1997 held at SUZA in Bratislava/SK. Experts and observers from about 26 countries attended each of the workshops. Representatives from other organisations including EMEP MSC-W and OECD/IPCC also participated.

At both workshops, the inventorying process and the state-of-play of national data deliverables were reviewed. National experts were given the opportunity to report on progress with their national data collection and their use of EMEP/CORINAIR methods and software. They were also trained in the use of the new software developed by the ETC/AE. Main discussion points were the lasting problem of completion of databases, exchange of experiences and discussion on the new EEA/PHARE Topic-Link project to be established in 1998. ETC members have presented the latest results of the ETC/AE products, in particular regarding software developments.

5.2. Workshop April 1997

The workshop was attended by NRCs on air emission inventories plus a number of observers who had stayed over from the preceding meeting of the UNECE/EMEP Task Force on Emission Inventories and/or wanted to take part in the IPCC/OECD/IEA workshop on the following day. Unfortunately, experts from Albania, Cyprus, Croatia, Ireland, Iceland, Liechtenstein, Lithuania, Latvia, FYROM and Russian Federation were not able to attend. The workshop aimed to:

- keep national experts informed about the EEA work programme and related activities within the EU and UNECE,
- review the inventorying process in the light of the development of international protocols,
- discuss the annual emissions reporting system,
- finishing the CORINAIR94 inventory,
- achieve joint data reporting requested by Conventions, current legislation and protocols,
- discuss the ETC work plan and latest priorities,
- specify details for future collaboration with the PHARE Topic-Link for Air Emissions.

The results of the 1994 CORINAIR inventory and a number of analyses on these data were presented. All countries delivered data at the SNAP 1 level and most of them delivered at the SNAP 2 level for the "traditional" 8 pollutants. Data for HM and POP's are scarcer. Three sets of data were compared: EMEP reports, UNFCCC National Communications and CORINAIR. Examples of individual inconsistency in the information were presented and discussed. Again national experts were asked to look at these. ETC has carried out trend analyses on a number of pollutants (on SNAP 1 level) and distributed the results to the countries for comments. Countries were invited to replace ETC data with their own if available.

The current state-of play of the revision/redesign of the CORINAIR software was presented and changes discussed. It was agreed that the ETC/AE and the subcontractor who is developing the software, would incorporate the comments made and send a first version of the software to all participating countries in September 1997. This means there will be a short transition period in which the previous CORINAIR94 software will still be used for the 1995 inventories and that the CORINAIR experts would be able to start using the new software for the 1996 inventory.

Improvements of the COPERT II methodology were presented. It was announced that the software tool and accompanying documentation would be distributed immediately

after the workshop. Again it was stressed that CORINAIR should be seen as a common methodology to provide a basis for consistent reporting to various international legislation and conventions.

The ETC/AE is continuing the CORINAIR process and producing the 1994 European Air Emissions Inventory for members of the EEA. Other European countries (PHARE and TACIS) will be involved as much as possible (for further details see the workshop minutes, distributed to all participants and available from ETC/AE on request).

5.3. Workshop November 1997

The workshop was held on 17 November 1997 at SUZA in Bratislava and was attended by about 50 participants representing 26 European Countries. The aims of the workshop were to review the inventorying progress, finalise the CORINAIR inventory for 1995, discuss preparation of the 1996 inventory and introduce and provide training on the newly developed CORINAIR (CollectER) software.

ETC/AE presented the state of play of the data collection and the writing of the chapter on climate change for the Dobris+3 assessment report. Also the use and presentation of air emissions data in the Dobris+3 was explained (see section X).

The updated annual cycle of reporting emissions to the main international obligations (EU Monitoring Mechanism, to be revised; UNFCCC; UNECE/CLRTAP) and ETC/AE involvement in the annual inventory process were discussed and summarised as follows:

National reporting obligations	*Response deadline*
⇒ EC Monitoring Mechanism (under revision)	currently 31 July
⇒ LCP Directive (current)	30 September 1997
⇒ UNECE/EMEP	31 December 1997
⇒ UNFCCC	15 April (2nd year) 1998

EEA/ETC-AE involvement is shown in the next table.

Date	Requirement	Data flow	EEA and ETC/AE 1)
31 July	Current EC Monitoring Mechanism and LCP Directive	First estimates from NRC to Commission (DGXI)	Copy to ETC/AE
Aug-Dec			review/validation
31 Dec	UNECE/CLRTAP (EMEP)	Estimates from NRC to UNECE/EMEP	Copy to ETC/AE
Jan/Mar		EMEP review	review/validation
15 April	UNFCCC	Estimates from NRC to UNFCCC	Copy to ETC/AE preparation of EU15 estimate for UNFCCC
May-June		UNFCCC review	review/validation, Annual workshop
July			Annual EEA report, database, Internet

1) together with Eurostat

The newly developed software was presented. It was made available at the home page of ETC subcontractor SPIRIT: www.spirit.sk/aprod03.htm. Experts asked for a procedure for converting data from the old system into the new one. ETC/AE will provide all NRCs with a conversion of their most recent CORINAIR data in the new (MsAccess) format.

Reviewing the data collection procedure, activities foreseen in 1998 are as follows:

a) NRCs were asked to fill the gaps in their databases especially with regard to the completion of CORINAIR95. The inventory year 1995 is the second reference year (first 1990), for which the inventories ideally should contain :
   ⇒ Activity rates and emissions factors at SNAP level 3 and by pollutant,
   ⇒ Emissions estimates for area and point sources,
   ⇒ Emissions estimates disaggregated at NUTS level 3
b) NRCs should include data for preceding years, when submitting a new inventory year;
c) The ETC asked NRCs to apply the new software for the collection of data for CORINAIR96. To enable the use of the new software for the preparation of the national submission to UNFCCC due in April 1998, the ETC will prepare a reporting module in the required format (IPCC 1996 Guidelines) in early 1998.

Further information of the workshop is provided in the minutes available from the ETC.

Next workshop: The Ministry for Environment and Nuclear Safety of Germany supports the EMEP Task Force on Emissions Inventories by hosting its annual meeting in 1998. This will be held on 2-3 June 1998, followed by the next EEA-ETC/AE (CORINAIR) workshop on 4 June 1998, both in Wismar, Germany.

6. PROPOSED WORK PROGRAMME 1998

Additional subvention under the 1997 budget has been provided by the Agency to prepare projected air emissions data of HM, POPs and fine particulates for the EEA State of the Environment, the EU98 Report. The work will mainly be carried out by the ETC partner TNO. Activities and main products are described in chapter 3.3 of this report. This activity will be finalised in April 1998.

After the evaluation of the ETC in 1996/97, EEA asked the lead organisation to continue leading the Topic Centre for a second period of three years. This was agreed provided that resources in the lead organisation will be allocated to ensure enhancement of technical and scientific support to the Topic Centre as a whole. The draft technical annex for 1998 was agreed by EEA and the ETC lead organisation in December 1997 and includes:

1. Annual air emissions inventories 1996 and 1997, including finalisation of 1995 (for some participating countries). This also includes preparation of consistent time series of sectoral emissions estimates 1990-1996.
2. Develop the CORINAIR methodology. This includes finalising the tools CollectER and ReportER and preparing an updated of COPERTII.
3. Prepare for air emission projections, by incorporating an emission projection tool into the CORINAIR methodology/software.
4. Support under EU legislation and policy development. This includes assisting DGXI in the preparation of the third evaluation report under the EC Monitoring Mechanism for CO_2 and other GHG emissions, the preparation of the EU GHG inventory for UNFCCC, developing proposals for reporting under the revised LCP Directive and supply of emissions data for the Auto Oil II programme.
5. Contribute to the State of the Environment 1998 Report. This means the preparation of the chapter on climate change and the collection, storage and presentation of air emissions data.
6. Common tools for emissions and waste integrated inventories. This is done in co-operation with ETC/IW and includes assisting DGXI on the development of the PER as required under the IPPC Directive and further development of a guidance document and conceptual model for an integrated emissions inventory (air and water).

The following overview of activities and expected outputs in 1998 and beyond is mainly addressed to NFPs and NRCs to ensure allocation of national resources in order to meet the requirements of EEA and its clients.

EVENT/ACTIVITY	DATE	RESPONSE DEADLINE*	EXPECTED OUTPUT	OUTPUT DATE
Workshops	4 June1998 4)		Workshop Proceedings (and together with UNECE task force revised Atmospheric Emission Inventory Guidebook)	July 1998
Country visit to :				
Questionnaires				
Data Update Requests	April 1998 1)	June 1998 1)	EU15 emission inventory GHG (1996 data) for EU submission to UNFCCC + Corinair95/96 data (Technical report)	July 1998
	June 1998 1)	31 July 1998 1)	EU15 emission inventory GHG (1997 data) as required under current EU CO2 Monitoring Mechanism (Tech report)	Oct 1998
	Dec. 1998 2)	31 December 1998 2)	EU15 emission inventory for EU submission to UNECE/CLRTAP/Corinair97 data (GHG+other gases) (Tech report)	Jan-March 1999
Draft reports for review	1 Sept. 1998	1 Oct. 1998	Corinair 1990-1996 emission inventories (main Topic Report)	Oct/Nov 1998
	1 July 1998		Evaluation of national programmes under the Monitoring Mechanism of CO2 and other greenhouse gas emissions 3)	Oct 1998
	1 June 1998	1 July 1998	Updated Corinair software and technical report/manual	July/Aug 1998
	1 Aug 1998	1 Oct 1998	Contribution to ETC/IW report "Methodology for estimating emissions to water"	Dec 1998
	1 Oct.1998	1 Nov. 1998	Updated COPERT software and technical report	Nov. 1998
	1 Oct 1998		AOPII technical report on EEA air quality generalisation approach for Auto Oil II with ETC/AQ 3)	Nov 1998
	Dec 1998	1 Feb. 1999	Preliminary Corinair software module for emissions to water	Feb. 1999
	Dec 1998		Technical report on a proposal for a pilot PER (IPPC Directive) 3)	Feb. 1999
	Dec 1998	1 Feb. 1999	Preliminary model for air emission projections and technical report	Feb. 1999

1) data request for EU submission will be done by DGXI, with EEA/ETC-AE assisting in data collection, validation and reporting for both the Monitoring Mechanism and the EU15 estimates for UNFCCC. Data request for Corinair95/96 is done by ETC/AE.

2) data request will be done by UNECE/CLRTAP/EMEP, with EEA/ETC-AE assisting EMEP in validation and also assisting DGXI to prepare the EU15 estimates

3) reports prepared by ETC/AE as part of assistance to DGXI

4) in conjunction with UNECE/CLRTAP Task Force on Emission Inventories meeting on 2-3 June

Annex 1 List of NRCs for Air Emissions inventories

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Annex 1 List of NRCs for Air Emissions inventories (continued)

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