

European Topic Centre on Air Emission

ANNUAL SUMMARY REPORT 1996

by
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Note

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1. BACKGROUND

European Topic Centre

The Federal Environmental Agency (UBA Berlin) has been appointed by the European Environment Agency (EEA) as the lead organisation of the Topic Centre on Air Emissions (ETC/AE). The ETC/AE consists of a consortium of several European organisations. A Management Committee has been established which is chaired by Dr Dietmar Koch (UBA Berlin) and furthermore consists of Dr Simon Eggleston (AEA Technology) and Dr Tinus Pulles (TNO). The Management Committee manages the ETC and also provides scientific service and technical assistance to the ETC and the Agency.

Organisations represented in the Topic Centre are:

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

National Reference Centres for Air Emissions

There are a number of organisations throughout Europe who also contribute to the EEA's work programme, the National Reference Centres. These are appointed and funded by the participating countries and are in charge of national co-operation with EEA and ETC to cover various topics, of which one is Air Emission Inventories. The NRCs are regular collectors and suppliers of environmental data and/or possess relevant knowledge regarding environmental science, monitoring and modelling.

The NRCs were appointed by the EEA countries in 1994/1995. In 1996 NRCs were also appointed by the PHARE countries, although this process is not completely finalised yet. Furthermore the ETC co-operates with several other countries, as indicated below.

| <i>EEA Member State</i> | <i>National Reference Centre</i> |
|-------------------------|--|
| Austria | National Environment Agency |
| Belgium | Cellule Interrégionale de l'Environnement |
| Denmark | N E R I Dept. of Emissions and Air Pollution |

| | |
|-----------------|--|
| Finland | Suomen Ympäristökeskus |
| France | Centre Interprofessionnel Technique d'Etude de la Pollution Atmosphérique (CITEPA) |
| Germany | Umweltbundesamt |
| Greece | National Observatory of Athens |
| Iceland | Environment and Food Agency - Air Pollution Dept. |
| Ireland | Environmental Protection Agency |
| Italy | ENEA - AMB/SAFCont Task Force |
| Liechtenstein | Landesforstamt |
| Luxembourg | Administration de l'Environnement |
| Norway | Norwegian Institute for Research (NILU) |
| Portugal | Instituto de Meteorologica |
| Spain | S.G. de Protección de M.Ambiente Atmosférico (MOPTMA) |
| Sweden | Swedish Environmental Protection Agency |
| The Netherlands | Ministry of Housing, Spatial Planning and the Environment |
| United Kingdom | National Environmental Technology Centre/AEA Technology |

Other Countries

NRC or related institutes

| | |
|----------------|--|
| Croatia | Energy Research and Environmental Protection Institute |
| Malta | Pollution Control Co-ordinating Unit |
| Russia | Scientific Research, Institute of Atmospheric Air Protection |
| Switzerland *) | Bundesamt für Umwelt, Wald, Landschaft |

*) by Memorandum, costs of including Swiss information in the pan-European reporting is covered by Switzerland

PHARE Countries

NRC or related institutes

| | |
|-------------------|---|
| Albania | Committee of Environmental Protection & Preservation |
| Bulgaria | Ministry of Environment, National Centre for Environment and Sustainable Development |
| Czech Republic | Hydrometeorological Institute |
| Estonia | Environment Information Centre |
| Hungary | Institute for Environmental Management |
| Latvia | Ministry of Environmental Protection and Regional Development, Environment State Inspectorate |
| Lithuania | Ministry of Environment |
| Macedonia (Fyrom) | Ministry of Environment, Urban and Building |
| Poland | State Inspectorate for Environmental Protection |
| Romania | ICIM, Research & Engineering Institute for Environment |
| Slovakia | Slovak Hydrometeorological Institute |
| Slovenia | Hydrometeorological Institute of Slovenia |

2. WORK PROGRAMME

2.1. Tasks, Clients and the User Needs

Tasks of the EEA are:

- “to establish, in co-operation with the Member States, and co-ordinate the European environment information and observation network (EIONET). In this context the EEA shall be responsible for the collection, processing and analysis of data, in particular in the fields of e.g. air quality and air emissions”;
- “to provide the Community and Member States with objective information necessary for framing and implementing sound and effective environmental policies”;
- “to 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”.

Summarised it can be stated that the objective of the ETC is to provide the EEA and its clients with all necessary information on air emissions to support the main tasks of the EEA. The main *clients* of the EEA and therefore also of the ETC are the European Commission (DG-XI) and the national governments.

Tasks of the Topic Centre are described within two projects from the EEA work programme (SA1 and SA2) and were identified by the Agency to be undertaken by the ETC/AE during 1995 to 1997. While the project SA1 was completed in early 1996, the project SA2 is to be finalised by the end of the year 1997. The project titles are outlined as follows:

SA1: Air emissions - General Approach and Assessment

SA2: Air Emissions Inventories 1990 and 1994/95

These projects aim to compile air emission inventories (1990 to 1995 and subsequently) and to provide assessment reports. *Inventories* are needed to contribute to the assessment of problems, sectors and areas for themes such as acidification, tropospheric ozone, climate change and air quality. *Assessments* will follow the DPSIR approach of environmental themes (Driving forces, Pressures, States, Impacts and political Responses).. Clients require information on all aspects of this causal chain. For the air pollution issues this means information on

- main economic sectors and human activities causing air pollution,
- air emissions from all known and located sources,
- air quality at relevant scales, physical, chemical and biological,
- impacts on ecosystems, human health and functions (materials, food production etc.),
- evaluation of possible and prioritised abatement options and the cost and benefit of such options with regard to environmental targets.

ETC/AE will mainly deliver the required information on air emissions (pressures) related to the main economic sectors (industry, energy, transport, agriculture and households). The ETC/AE will contribute to assessment in several ways, firstly by producing a key report in 1997 "Air Pollution in Europe" together with the ETC on Air Quality and by means of the activities related to urban air quality (urban inventories). Secondly the ETC will in 1997 collate, analyse data and write the chapter on "Climate change" for the pan-European environment assessment, the „Dobris+3 Report“. Thirdly, some results of both reports will be fed into the report „EU State of the Environment“ SoER due to be published by the end of 1998.

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. The result of this project was laid down in **the Annual Summary Report 1995**, published in 1996. Subsequent reports have been produced by the ETC. They mainly contain data summaries, recommendations for the revised datasystem and the inventorying procedure. An overview of products is provided under item 5.

2.3. Project SA2 - Air Emissions Inventories 1990 and 1994/95

The main objectives are:

- Review, consolidate and adjust the CORINAIR methodology to contribute to the development of the common tools for integrated inventories
- Compile an emissions inventory for Europe for the year 1994 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 ETC carries out this tasks under both the 1996 and the subsequent subvention period. The work requires a very close collaboration with member states and other countries to get best available data from their national networks.

2.4. Relation to Other Projects

The ETC/AE works closely with the EEA and otherETCs, National Focal Points (NFP), National Reference Centres (NRC), DGXI and otherDGs. In addition it works closely with EUROSTAT, UNECE/EMEP, JRC, 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 this.

The air emissions projects are being co-ordinated and developed in conjunction with several other projects from the Agency's Annual Workprogramme 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.

Especially, the ETC will be asked to contribute to the development of inventories to land and soil (SS1+2) and of inventories on emissions to water within the programme area 5, "Source-oriented Monitoring and Assessment of Pressures".

With regard to integrated emission inventories it is proposed to identify and classify all possible sources of emissions to air, water and of the generation of waste. It seems to be 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 Topic Centre on Waste proposed for 1997). The ETC/AE expects to be fully involved in the development of an integrated emission inventory in 1997.

3. PROGRESS in 1996

3.1. Assistance to National Reference Centres

The major part of the *ETC mission* within this project was and, still remains, “Support to national experts“. An important step forward was the establishment of a group of technical advisors from the ETC. They are guiding experts in the countries involved (EEA MS and beyond). The procedure established through the ETC co-ordination strategy was appreciated and seems to be widely recognised by the countries involved, NFPs and their NRCs. ETC advisors continue to provide direct assistance, training and ad hoc advice to the EEA member states (18) and in a much more limited way to other countries (4). Initial contacts have been established with experts from the PHARE countries (13). Important progress has been made in guiding experts from the countries involved. At the Launch Seminar held at EEA in June 1996 the ETC/AE handed over the revised software and the accompanying technical documents to the PHARE experts while EEA member states had already received these in January 1996. These tools enable them to prepare their national inventories using the CORINAIR94 methodology and the first edition of the joint EMEP/CORINAIR Guidebook.

Another important part of the *ETC mission* is to maintain and develop ETC/AE co-operation within EIONET. NFPs/NRCs/National Experts have been regularly informed about progress of the ETC work. ETC/AE produced two Newsletters and distributed them within EIONET. It also requested relevant data and information from national networks. The ETC is considering establishing a technical working group on data exchange in the near future. The air emissions aspect of this service needs to be developed further under national responsibility. Through the technical assistance, ETC advisors have corresponded regularly with national experts in order to obtain timely, quantitative and comparable data from the MS.

3.2. Project SA2 - Air Emissions Inventories 1990 and 1994/95

3.2.1. Emissions Inventories

Under the 1995 subvention, the ETC reviewed the CORINAIR85 and 90 process as a whole, the software in use as well as its methodology and guidelines. Several proposals and recommendations were made to revise and speed up the system. The inventorying procedure was adjusted in order to satisfy the clients and the user requirement for timely data and information. Progress with the system to be applied was laid down in the Annual Report 1995. The work continues under the 1996/97 subventions.

Due to the direct assistance as described above and the co-operation from participating countries, air emission estimates for the year 1994 have been produced and delivered. A preliminary database for CORINAIR94 was compiled by the ETC in July 1996 and

delivered to the EEA. In 1996, an **Internet (<http://www.aeat.co.uk/products/centres/netcen/corinair/94/corin94.html>) webpage** was created. Now the emission estimates for 1990 and 1994 at SNAP level1 can be derived electronically via Internet from the ETC/AE homepage at AEA Technology which is linked to the EEA homepage. Estimates at SNAP level 2 on Internet are in progress.

Emissions estimates for 1994 at SNAP level 1 and 2 have been delivered by almost all countries involved, while missing data at level 3 is still being compiled. The CORINAIR94 summary report no 1 (first draft) was produced in December 1996. The final draft was compiled in January 1997 and sent to theNFPs and EIONET for review and included in the accompanying table.

Table 1.1: National total emissions 1994

| COUNTRY | Popu- lation (Mio) | SO ₂ (Mg) | NO _x (Mg) | NM VOC (Mg) | CH ₄ (Mg) | CO (Mg) | CO ₂ (Gg) | N ₂ O (Mg) | NH ₃ (Mg) | Status |
|----------------|-----------------------|-------------------------|-------------------------|-------------------|-------------------------|-------------------|-------------------------|--------------------------|-------------------------|--------|
| | 1994 | 1994 | 1994 | 1994 | 1994 | 1994 | 1994 | 1994 | 1994 | |
| Germany | 81,1 | 2 997 866 | 2 267 749 | 2 146 932 | 5 216 628 | 6 806 994 | 904 397 | 186 820 | 622 518 | A |
| United Kingdom | 58,2 | 2 718 821 | 2 215 974 | 2 144 835 | 3 879 290 | 4 878 501 | 545 035 | 93 600 | 320 000 | C |
| France | 57,7 | 1 013 222 | 1 682 117 | 2 307 951 | 2 841 539 | 9 602 337 | 340 976 | 196 487 | 666 816 | A |
| Italy | 57,0 | 1 436 554 | 2 157 285 | 2 238 540 | 4 131 655 | 9 226 465 | 427 024 | 130 936 | 388 948 | C |
| Spain | 39,1 | 2 060 904 | 1 223 282 | 1 120 068 | 2 309 407 | 4 801 223 | 246 673 | 88 314 | 344 469 | C |
| Netherlands | 15,3 | 154 044 | 532 539 | 397 042 | 960 418 | 921 289 | 153 934 | 37 579 | 171 392 | B |
| Greece | 10,4 | 443 945 | 380 185 | 347 445 | 579 381 | 1 194 363 | 86 081 | 46 285 | 426 675 | A |
| Belgium | 10,1 | 279 190 | 374 095 | 337 432 | 420 684 | 1 166 097 | 113 628 | 27 044 | 78 865 | A |
| Portugal | 9,9 | 272 999 | 248 976 | 225 497 | 252 881 | 1 195 167 | 51 079 | 38 364 | 92 634 | C |
| Sweden | 8,7 | 69 056 | 438 587 | 377 885 | 272 619 | 1 313 112 | 57 350 | 23 340 | 127 975 | A |
| Austria | 8,0 | 54 870 | 170 838 | 289 644 | 574 963 | 1 180 548 | 59 680 | 12 654 | 86 248 | A |
| Denmark | 5,2 | 158 004 | 275 800 | 154 437 | 430 640 | 715 402 | 62 846 | 12 200 | 93 566 | A |
| Finland | 5,1 | 110 600 | 287 900 | 177 100 | 237 100 | 438 000 | 79 000 | 16 400 | 41 000 | C |
| Ireland | 3,6 | 177 151 | 117 348 | 93 109 | 807 761 | 333 056 | 33 413 | 25 985 | 124 598 | C |
| Luxembourg | 0,4 | 12 828 | 22 556 | 17 651 | 21 909 | 145 207 | 9 484 | 689 | 7 119 | A |
| EU-15 | 370 | 11 960 054 | 12 395 231 | 12 375 569 | 22 936 875 | 43 917 761 | 3 170 600 | 936 697 | 3 592 823 | |
| Switzerland | 6,7 | 30 730 | 139 887 | 217 662 | 315 597 | 549 059 | 43 113 | 17 476 | 60 160 | A |
| Norway | 4,2 | 34 123 | 218 961 | 364 511 | 466 678 | 863 065 | 37 632 | 14 196 | 24 801 | A |
| Malta | 0,4 | 15 798 | 16 297 | 5 506 | 9 410 | 23 708 | 2 395 | 13 007 | 6 370 | C |
| Iceland | 0,3 | 7 986 | 22 193 | 7 126 | 21 386 | 25 377 | 2 182 | 493 | 0 | A |
| Liechtenstein | 0,03 | - | - | - | - | - | - | - | - | - |
| Poland | 38,4 | - | - | - | - | - | - | - | - | - |
| Romania | 23,3 | - | - | - | - | - | - | - | - | - |
| Hungary | 10,5 | - | - | - | - | - | - | - | - | - |
| Czech Republic | 10,3 | - | - | - | - | - | - | - | - | - |
| Bulgaria | 9,0 | - | - | - | - | - | - | - | - | - |
| Slovakia | 5,3 | - | - | - | - | - | - | - | - | - |
| Croatia | 4,7 | - | - | - | - | - | - | - | - | - |
| Lithuania | 3,8 | - | - | - | - | - | - | - | - | - |
| Latvia | 2,7 | - | - | - | - | - | - | - | - | - |
| Slovenia | 2,0 | - | - | - | - | - | - | - | - | - |
| Estonia | 1,6 | - | - | - | - | - | - | - | - | - |
| Total | 493 | 12 048 691 | 12 792 570 | 12 970 374 | 23 749 946 | 45 378 970 | 3 255 921 | 981 869 | 3 684 154 | |

Legend: Emission Status

- A emission estimates on SNAP level 3 (fully detailed)
- B emission estimates on SNAP level 2 (detailed)
- C emission estimates on SNAP level 1 (main source sectors)
- not available

¹ National total excludes emissions from sector "agriculture" (SNAP 11). Emissions from sector "agriculture and forestry, land use and wood stock change" (SNAP 10) are additionally excluded for the NMVOC and CO₂ national total.

The ETC has been requested to update CORINAIR90 figures with MS in order to be compatible with CORINAIR94 classification and methods. This is a necessary exercise that will provide the basis for the compilation of consistent series of emissions estimates for 1990 to 1995/96 requested by the Agency and required under various reporting obligations. In collaboration with experts from EMEP the compilation is underway.

While emissions data for 1990 including background information were stored in an ORACLE database, air emissions estimates for subsequent years are being stored in an Access database. Emissions data has been used for inclusion in the joint AQ/AE Air Pollution Report and it will be used for inclusion in the Dobris+3 report. Both reports will be fed into the SoE report due in late 1998.

Based upon the **Topic Report „Recommendation for a revised data system“ (1996)** the main changes in the model and the software were tested and implemented in 1995. Further improvements such as output modules for reporting and adjustment of the nomenclature have been made in early 1996. The modules produce data reports required by customers and clients such as UNECE/EMEP, IPCC, DGXI, OSPARCOM/HELCOM etc.

The ETC furthermore has delivered a beta version of COPERT II (version 0.6), the software tool for estimation of emissions of road transport and off-road transportation, which was tested by other ETC partners. After comparison with the DRIVE-Modem and the Graz DGV model, emissions factors for passenger cars have been updated. Version 0.6 introduced new tools, which will also be incorporated in the final version. The software evolution was finalised by launching the beta version end of December 1996. The beta version was designed to be used as the full test version, before launching the final one. It was provided with a custom Windows help file and was distributed to National Experts. The export to the CORINAIR software was completed with inclusion of factors for heavy metals emissions estimates. A full set of CORINAIR/COPERT average representative emission factors was prepared to be incorporated in the revision of the IPCC guidelines. Methodological aspects mainly of SNAP source sector 8 are being reviewed in collaboration with the UNECE Task Force on Emission Inventories, expert panel on transport.

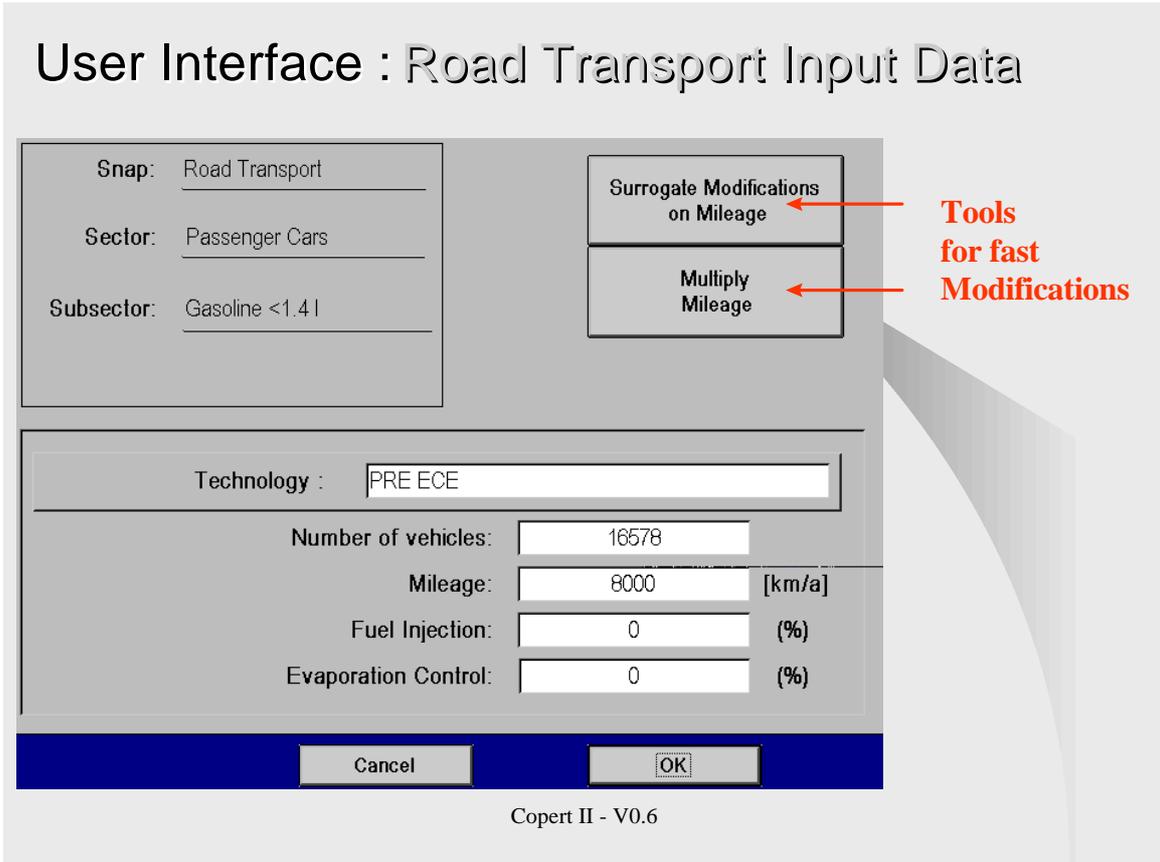


Figure 1. Example of input window of COPERT II

Supplementary work has been performed by the ETC/AE under the supervision of the EEA to prepare a report on **National Emission Inventories 1994/1995 for the Monitoring Mechanism of Community CO₂ and other Greenhouse Gas Emissions** for the Commission (DGXI). The report was drafted in December 1996 and presented at the EU meeting of the Monitoring Mechanism Committee on 20th of January 1997 in Brussels. The report supplies a consistent and transparent summary of greenhouse gas emissions for 1994 and (preliminary) 1995, updated emissions estimates for 1990 and the trend of emissions based upon the national inventories, supplemented with information from Eurostat and Corinair. In the final draft (January 1997) the ETC/AE will include data and information submitted after January 1, 1997 by member states.

3.2.2. Model for Emissions Inventories and Projections

This task aims to design/revise a recognised model and software tool for both the inventory and the projection of emissions to air (water, soil and possibly of generated waste). For *Inventories*, a revision of the CORINAIR software was made in 1995/96 while the future design of a new database structure and input tools has been developed over the year. The design that applies modern available software has been described and reported to the Agency in late 1996. A full design which must incorporate most of the requirements from our clients needs assistance from a software bureau for which

however only a small budget was available in 1996. The design and revision is to be finalised in early 1997. The next steps in the implementation of the new software need to be discussed further.

Below the general data system and an example of a possible window are presented :

CORINAIR methodology

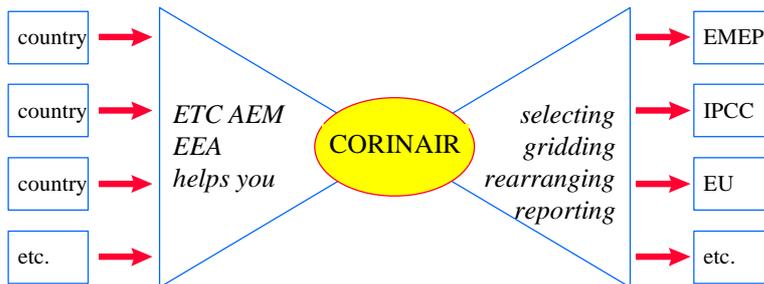


Figure 2. CORINAIR data system

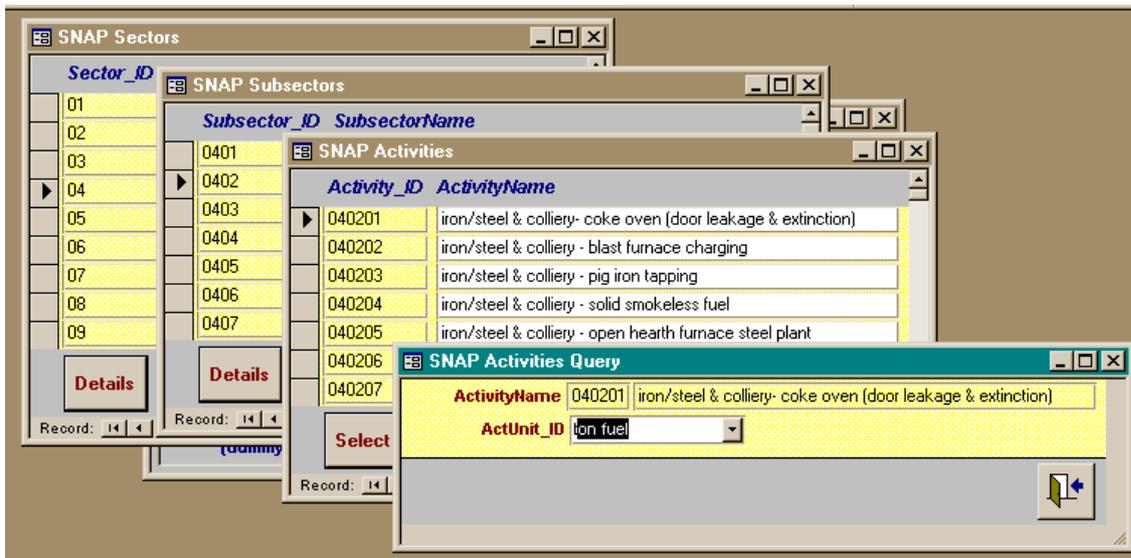


Figure 3. Possible window for activities (SNAP) in the revised CORINAIR software

For *Projections*, the ETC/AE and several other institutes and organisations have assessed the CASPER model on behalf of the EEA and DGXI. The main conclusion summarised in the Agency's evaluation report to DGXI was that this model can be useful for several applications provided that it is extensively calibrated and validated and that a number of improvements are implemented. In addition, the Commission who has funded the development of this model wants to see some results at least incorporated in the further development.

Regarding the design of the new software the ETC has produced technical papers containing needs and requirements to be prioritised. This information has been reported to the Agency in November 1996. As agreed with the EEA the ETC will focus the development of the new model on separate tools for inventories and for projections, which should be however be linked in a logical way. The work is being continued in order to focus on a model which can lead to a recognised national and European standard.

The UNECE (LRTAP Convention) Task Force on Emissions Inventories (TFEI), expert panel on Projections and Verifications led by the EEA is organising a meeting to be held in March 1997. It aims to link the activities undertaken by the TF on Integrated Assessment Modelling and the TFEI expert panel. The main objective of the meeting is to gather information on the current use of emissions projections and to discuss draft guidelines for projections which participating parties to the UNECE/LRTAP Convention countries should prepare. The basic elements of projection models and common areas of joint efforts need to be identified, the revised guidelines for projection will be reviewed and the developed workplan discussed.

This meeting will provide important results to be used by the ETC for the future development of the model(s) for emission inventories and projections.

3.2.3. *Urban Emissions Inventories*

The work on this task began in 1995 with a review of urban/local air emissions activities in the EC, ECEH/WHO, ETC/AQ and other bodies. A contents proposal for an urban air emissions report was drafted early 1996. After a meeting with ETC/AQ, the ETC/AE (ENEA, TNO) in close collaboration with ETC/AQ decided to :

- identify databases of cities available and how to access these;
- incorporate best available statistical data (e.g. country area, population, geographical location/co-ordinates, etc.) already produced by EUROSTAT and elsewhere;
- determine needs in order to serve potential users such as ETC/AQ for feeding air quality models;
- prepare a top-down approach for urban inventories using CORINAIR90 estimates at SNAP level 3 on regional scale (NUTS 3) and using point source emissions estimates;
- develop guidelines for urban/regional air emission inventories;
- produce an overview of existing inventories.

This activity continues in very close collaboration with the ETC/AQ. The Topic Report „**Review study on European urban emission inventories**“ (1996) finalised in September was widely disseminated by the Agency for expert review and comment. In December the top-down urban inventory of area sources (database of EU15 cities) was produced. It has been reviewed and sent to the ETC/AQ, to be used for preparing source-receptor relationships (using simple dispersion models and air quality measurement data). A database of Large Point Source emissions estimates is being prepared. The final step will be to decide how urban emissions inventories can be extended to include fine particulates (PM₁₀) and benzene. There is no consistent emissions data set for urban areas available at a European level. In a recent study (RIVM/TNO, Netherlands, to be finalised) particulates emissions in European countries have been estimated, and could be converted into the common CORINAIR format. It is expected that the result will be seen as a major step forward to support assessment studies within the framework of EU Air Quality Directives. Further development and validation of a procedure which is to be applied to compile such data and background information from the countries, and the verification of existing emission factors would facilitate the inclusion of the two compounds in the CORINAIR system and the joint EMEP/CORINAIR Atmospheric Emission Inventory Guidebook.

3.2.4. Preparation for Assessment Reports

Guidance report Air Quality Directives

The ETC is committed to providing support to the Agency in compiling assessment reports. The ETC was asked to contribute to a **Guidance Report** (prepared by ETC/AQ, JRC and the Commission), for supplementary assessments in support of Air Quality Directives under the forthcoming Council Directive on Air Quality Assessment and Management. The ETC/AE has delivered a chapter on „Human activity and emissions inventories“. The primary objective of the guidance report is to produce emissions maps for all zones and agglomerations where monitoring stations provide measurements of the level of pollutants. This information will be mapped and will contain comprehensive 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 will 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.

In principle, calculation of peak concentrations (both in space and in time), requires emission inventories containing very high space and time resolution; however, in a number of cases, these peak concentrations may be assessed on the basis of more aggregated emissions information using statistical information on the time variation of the emissions, while the emission factor methodology allows to compile emission estimates for individual sources, streets and other areas where high concentrations are expected. For secondary pollutants, such as ozone, nitrogen dioxide, and sulphate or

nitrate particulates, more complex models are needed requiring data on emissions of so-called precursors, from which the pollutant is formed by chemical conversion.

To ensure comparability of the data and the subsequent assessment, it was necessarily recommended to use a standard methodology, 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**. Within this project a complete, consistent and transparent emissions databases for all of the European territory for the base years 1990 and 1994 are available. 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 chapter on emissions. It was recommended to use the CORINAIR database directly to calculate background concentrations, resulting from emissions outside the region under study.

Report "Air Pollution in Europe" (jointly with ETC/AQ)

The ETC/AE is also involved in the preparation of the report on **Air Pollution in Europe 1997**. This report will be published as a key EEA Topic Report in June 1997. It will focus on key environmental indicators and is addressed to a broad audience and the general public. At the first meeting in November 1996, ETC/AE, ETC/AQ and EEA discussed contents, organisation and responsibilities, time schedule and layout / printing. The report will be based on up-to-date information and data. Mainly collected directly by the two ETCs on issues as follows:

1. Driving forces
2. Climate change
3. Acidification and Eutrophication
4. Air Quality
5. Tropospheric Ozone
6. Specific urban NO_x and Ozone

The ETC/AE contribution is underway, consistent figures, maps and graphs are being prepared. The first draft will be finalised by end of January 1997 while the final version is due by April 1997. The work to be completed will also be used as input to the Agency's two major reports, the Dobris+3 and the **EU SoE98**.

Contribution to the Dobris +3 report

The aim, scope and objective of the Dobris+3 report have been discussed at several meetings within the NFP/EIONET group and beyond. It was stated that the ETCs will provide most of the inputs. The ETC/AE has commented on the report contents proposals and received additional funding from the Agency to prepare the **chapter on climate change**.

4. AD HOC SUPPORT TO THE AGENCY

During the year the Topic Centre has been asked by the Agency to carry out a number of tasks which were not possible to identify in advance such as :

- assist the EEA on relevant matters to help develop the EEA work programme;
- provide advice to specific clients/users;
- provide reviews and comments on draft reports;
- prepare data summaries and data assessments;
- participate on behalf of the EEA in working groups, committees etc. on air emission inventories, in particular DGXI, EUROSTAT, UNECE/EMEP Task Force on EI and its Expert Panels, EMEP Steering Body, IPCC/OECD Working Groups and others;
- compile an overview of such representations and update this overview regularly;
- promote the EEA/ETC and the results obtained, for example through technical papers and other publications and seminars.

The ETC/AE has provided technical support to the Agency through the following main deliverables/outputs:

- Report on „Human activities and emissions inventories“ , contribution to the Guidance Report to support further development of air quality directives
- Members of the ETC/AEM have participated actively in several IPCC working groups and in the IPCC-OECD Liaison Group (IOLG). Full harmonisation between the CORINAIR methodology and IPCC reporting requirements has been achieved so that CORINAIR now can be used by the members for reporting to all international organisations.
- Extraction from the ORACLE database that contains CORINAIR90 data and from the ACCESSDB of CORINAIR94 for several clients and users
- Report on „Community CO₂ and other Green House Gases“ based on the national Communications of the EU countries.

ETC members took part in several international meetings and conferences (see section 6) on behalf of the Agency. One task that will continue for a long time is the extensive and permanent verification and extraction of data from the CORINAIR databases available at and maintained by UBA Vienna. This work should be budgeted separately from ad hoc support in future years.

5. DELIVERABLES / OUTPUTS PRODUCED IN 1996

5.1. Deliverables from the Work Programme

Topic Reports

- 1) Annual Summary Report 1995 (Topic Report no. 6, 1996)
- 2) CORINAIR90 Summary report no. 3 (Large Point Sources) (Topic Report, 1996)
- 3) Review study on European Urban Emission Inventories (Topic Report, 1996)

Other products

- 1) Quarterly progress reports (4)
- 2) Newsletter no. 2
- 3) Revised CORINAIR software and instruction for use (version 1.01a and 1.01b)
- 4) Revised methodology for estimation of emissions from aircraft“ (has been incorporated in the joint EMEP/CORINAIR Atmospheric Emission Inventory Guidebook and in the revised IPCC/UNFCCC Guidelines for National Greenhouse Gas Inventories), final version.
- 5) COPERT II, revised software for estimation of emissions for transport (beta-version)
- 6) Redesigning the CORINAIR software, proposed design, draft.
- 7) Provisional CORINAIR94 emission estimates (11 source sectors), summary tables and on Internet (ETC/AE Homepage and EEA Homepage <http://www.eea.dk>)
- 8) Proposal for the contents of the chapter on climate change for the Dobris+3 report.
- 9) CORINAIR94 Summary report no. 1, first draft

5.2. Deliverables from the Ad Hoc Support Programme

- 1) Report on „Human activities and emissions inventories“ , contribution to the Guidance Report for the EU air quality directives, final draft;
- 2) “Monitoring Mechanism of Community and other Greenhouse Gas Emissions, National Emission Inventories 1994/1995”, report for the Monitoring Committee, draft.
- 3) Extraction of emission data of 1990 from the ORACLE database for several clients and users.

6. WORKSHOPS & MEETINGS

6.1. Review of the Workshops Held over the Year

The ETC has organised two ETC/CORINAIR workshops for the experts from the National Reference Centres, the first on 28 March 1996 held at AEA Technology in Culham and the second on 17 October 1996 held at EEA Copenhagen. About 45 experts attended each of the workshops.

The first workshop aimed to :

- finalise the CORINAIR90 inventory ;
- keep national experts informed about the EEA work programme and related activities within the EU and UNECE;
- present the ETC work plan, explain the steps forward to an faster data collection system;
- train experts with the revised software and extended tools.

The second workshop aimed to :

- review the inventorying process and stimulate, where necessary, the development of national capacities;
- get feedback from MS, DGXI, UNECE/EMEP, IPCC/OECD;
- discuss the annual emissions reporting system and the way towards emissions and projections;
- meet experts for air emissions from PHARE countries;
- discuss the EEA/PHARE Topic-Link project.

The inventorying process and the state-of-play of national data deliverables have been reviewed and decisions made forward to the timetable made. National experts to be nominated for air emissions from PHARE (13) also attended the second meeting. They reported on progress with the revised CORINAIR software which they received in June 1996, exchanged experiences and discussed the new EEA/PHARE Topic-Link project to be established in 1997. Assistance to PHARE and other countries will be provided by the ETC which also is ready to expand its technical assistance to the Commonwealth of Independent States (TACIS) in the near future.

6.2. First Workshop

The major part of the ETC meetings within SA consisted of was the *first* ETC/CORINAIR Workshop held at AEA Technology Culham UK on 28 March 1996. The meeting was attended by national CORINAIR experts 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 two days. McInnes welcomed the participants, including national CORINAIR experts from 29 countries (experts from Albania, Cyprus, Romania,

Liechtenstein and Malta were not present); He stressed that CORINAIR should be seen as a common methodology to provide a basis for consistent reporting to various international legislation and conventions and that the ETC/AEM is continuing the CORINAIR process and producing the 1994 European Air Emissions Inventory for members of the EEA and other European countries (PHARE and TACIS) will be involved as much as possible. The aim of this meeting was to guide this development. Direct assistance was given to the national experts who are producing the inventories for their countries. These experts have been contacted by the ETC/AEM advisors prior to the meeting ensuring that the new CORINAIR software has been successfully installed, queries from the previous CORINAIR90 exercise verified/resolved and the top-down approach for the 1994 inventory was started.

At this first workshop, some of the EEA member countries' experts were able to report on their initial 1994 emission estimates (AT, DE, DK, FR, FI, GR, NL, UK, ...) which gave confidence for the delivery of the final emission estimates on time end of 1996. No major doubts were raised by the representatives to keep the very strict deadlines agreed upon except on the provision of emission data for some new substances HMP@Ps (by FI and SE). Experts from the PHARE countries were not able to report on their national emissions estimates based on the CORINAIR94 system. As agreed with the EEA, the ETC/AE had not yet distributed the new software to these countries. It was decided by the EEA to postpone this to the official PHARE launch workshop held on 11/12 June 1996 at EEA (Copenhagen). Furthermore it was decided that extensive technical assistance would not yet be given by the ETC to PHARE countries, because that would be a task of the ETC/PHARE Topic Link, to be established end of 1996/beginning of 1997.

Participants took note of the ETC request that by 31 May '96 preliminary estimates for the first 8 pollutants by 58 sub-categories should be submitted to CITEPA via the ETC Advisors who act as 'check-points'. Experts were given the opportunity to use pre-loaded PC equipment at AEA so that any problem could be addressed and the assistance tailored specifically to each expert's needs.

The approach applied to compile the European air emissions 1994 database was also discussed at this meeting. Experts in principle confirmed to be able to deliver their completed national databases by the end of Nov'96. A very demanding goal was that the European database of CORINAIR94 is to be compiled and transmitted to the EEA by end of 1996. It provides the basis for the evaluation of national emission estimates and results in terms of quality, reliability and usefulness for environmental assessment which is needed to identify problem areas and trends in support of the EU's 5th Environmental Action Programme as well as to support the decision making process at European level.

During the first workshop the performance of the current CORINAIR software was also discussed and evaluated by the experts. The evaluation was based upon the experiences with the 1990 software and on a demonstration of the changes and improvements added to this software for the 1994 inventory. The ETC has highly welcomed the feedback from the users which has led to a number of questions raised by the experts and problems

identified which have been reviewed by the ETC for inclusion in the future design of a new software.

6.3. Second Workshop

The second workshop was held on 17 October 1996 at EEA. It was opened by the Director of the Agency, Mr Domingo Jiménez-Bertrán. He stressed the major objectives of the ETC/AE and the aim of this workshop as follows:

- speeding up of inventory compilation ;
- integration with ETC Air Quality to produce state of the environment with respect to air pollution
- linking the inventories more and more to economic projections and scenarios

A paper “Towards annual Reporting on European Air Emissions Inventories” was distributed and discussed at the meeting, containing the following elements :

- tasks, clients and products of ETC/AE;
- annual reporting process and deadlines (based on international obligations)
- redesign of model for inventories and projections;
- urban emission inventories;
- inventories and assessment of air pollution.

Requirements from potential clients and users were presented by DGXI (especially in relation to the PER under the IPPC Directive), UNECE/EMEP, OECD/IPCC.

All participants presented the state-of-play of the CORINAIR94 inventory and in general the EEA18 countries expressed that they expected to be able to meet the deadline (December 1996). However most Central and Eastern European Countries said that they would not be able to meet the deadline and would prefer to deliver 1995 emission estimates (in stead of 1994) during 1997.

Based upon the input from the participants and the group discussion during the workshop, *conclusion and recommendations* were made, as summarised below. These are supplemented by the need to comply with the aims of the EEA’s work programme.

General conclusions/recommendations

- a workshop attended by all National Reference Centres (45 experts) is very important to get feedback from the National Reference Centres and to facilitate the inventorying process;
- several good proposals have been made by participants (e.g. regarding the redesign of the emissions/projection model). They will be incorporated into the (revision of the) CROINAIR methodology and model;
- the EEA and ETC will develop the publication process further. An important aspect is the publication on Internet. The EEA and ETC have to follow sound quality

procedures to ensure that these “electronic” data are identical to data published on paper. Both have to be updated regularly but only twice a year;

- all drafted reports foreseen for publication are always first sent to the National Focal Points to enable them but also the National Reference Centres to comment. The reports will be published (whether electronically or on paper) after the approval by NFPs. It is important that experts from designated NRCs have direct and regular contact to their NFPs.

Towards annual reporting

- the EEA will make use of the 5-year cycle as presented in the position paper. Every 5 years, a spatially detailed inventory (SNAP3, NUTS3) is required and for the intermediate years only national totals (SNAP3);
- emission data on SNAP2 is in both cases the minimum required detail, but data on SNAP3 level is considered desirable and the efforts should be directed to obtain these data;
- in the 5-year cycle the 1995 inventory should be a spatially detailed inventory. To achieve results for 1995 as soon as possible, countries were asked to use their 1994 spatially detailed inventory as a basis to construct the 1995 inventory assisted by the ETC/AE.

Pollutants

- EEA will ask countries to report mainly those pollutants that are required under the relevant international conventions and programmes. If pollutants are not yet clearly defined the EEA can ask to start the inventory based on a preliminary list of pollutants;
- the need for information on emissions of “new” pollutants such as fine particles (PM10) and benzene may arise from the EEA’s work programme, e.g. because of requests from the Commission. The EEA has to consider incorporating those specifically requested pollutants in the near future. In collaboration with other bodies, the ETC/AE will provide guidelines and assistance to help countries to prepare comparable information at European level.

Time schedule

The following time schedule explains the distinction between data delivery by the National Reference Centres to the ETC and the publication of these data by the EEA.

| Emissions estimates | Data delivery to ETC/AE by | Publication by EEA by |
|--|---|---|
| 1994 data <i>revision</i> | 31 Dec' 96 | Q1/97: CORINAIR94 Inventory, SNAP 2 + EU95 national totals |
| 1995 data <i>first estimates</i> | 31 Dec' 96 (LRTAP Convention) | |
| 1995 data <i>revision</i> | 31 March' 97 | Q2/97: Joint EMEP/CORINAIR Inventory, regional and grid-square data for 1995 |
| 1996 data <i>CO₂ + other GHGs</i> | 30 Sept' 97 (date proposed by the CQ Monitoring Committee) | Q4/97: Report on Community CQ and other GHG (93/389/EEC) |
| <i>SO₂ + NO_x</i> | 30 Sept' 97 (EU LCP Directive) | { Report on Large Combustion Plants (88/609/EEC) } |
| <i>estimates for all pollutants</i> | 31 Dec' 97 (LRTAP Convention) + SNAP 2 | Q1/98: CORINAIR96 Inventory, SNAP 2 |
| 1997 data <i>first estimates</i> | 31 Dec' 98 (LRTAP Convention) | Q2/98: Joint EMEP/CORINAIR Inventory, regional and grid-square data for 1996 |

6.4. Main Meetings Attended by ETC Members

Members of the ETC/AE have participated actively in several meetings. The regular meetings where the Agency discusses with NFPs and ETCs (within the EIONET) the work programme and the collaboration are highly appreciated by the ETC Project Leader. At international level the ETC/AE participated in IPCC working groups and the IPCC-OECD Liaison Group (IOLG) to harmonise the CORINAIR methodology and the IPCC reporting requirements.

Main meetings held over the year 1996 are listed below.

| No. | Meetings | Date 96 | Objective | <u>JAN - JULY 1996</u> |
|------|-------------------|--------------|--|------------------------|
| 1 | Paris, CITEPA | 16 Jan | CORINAIR94 Software training, demonstrate output modules and set priorities for further enhancement | |
| 2 | CPH, EEA | 5-7 Feb. | COST CITAIR, ETC/AQ Discuss structure of CORINAIR90 comprehensive Report | |
| 3 | CPH, EEA | 26/27 Feb. | NFPs / EIONET with ETCs (Project Leader) | |
| 4 | Oxford / Culham | 25-27 March | Task Force on Emission Inventories (Oxford) 28 CORINAIR94 expert meeting at AEA(Culham) 29/30 IPCC/OECD/IEA expert group(Culham) | |
| 5 | Brussels, DGXIII | 13 March | Telematics, pre meeting | |
| 6 | Brussels, DGXIII | 20/21 March | 1st Telematics (ETC project leader is rapporteur) | |
| 7 | CPH, EEA | 23-25 April | ETC/AQ Monitoring & Assessment (PL) | |
| 8 | CPH, EEA | 6/7 May | ETC/NC (PL +Kilde) | |
| 9 | Brussels, DGXI | 8 May | EUROMOT brief meeting (PL) | |
| 10 | Bilthoven, RIVM | 14 May | ETC/AQ+AEM consultation on Urban Inventories and Guidance report on supplementary assessment under the EC AQ Directives | |
| 11 | Berlin, UBA | 28/29 May | ETC/AEM - technical annex 1996 subvention., CASPER, SNAP94, data received and compiling, work plan | |
| 12.1 | CPH, EEA | 10/11 June | EEA/Phare Launch Seminar (PL) | |
| 12.2 | CPH, EEA | 11/12 June | EEA/NFP +ETCs (PL) | |
| 13 | Thessaloniki, UNI | 11/12 June | Review and Agree on new revised COPERT II methodology (Eggleston) | |
| 14 | Geneva, 24 June | IOLG Meeting | IPCC/OECD Liaison Group | |
| 15 | Brussels, DGXIII | 27/28 June | 2nd Telematics Meeting (PL) | |

| No. | Meetings held | Date 96 | Objective | <u>AUGUST-DEC 1996</u> |
|------------|------------------------|----------------|---|-------------------------------|
| 1 | Leicester, County Hall | 2 July | Review the 2nd Concertation Meeting on Telematics (PL) | |
| 2 | Medmenham, UK | 18 July | PL visited WRC to discuss collaboration with ETC/IW | |
| 3 | Berlin, UBA | 30 July | Consultation at UBA Berlin, Review the work done under the 1995 subvention, Discuss EEA work programme and the objectives for the 1996 subvention, adjust ETC/AE work plan, administrative and financial issues | |
| 4 | Leicester, County Hall | 16 Aug. | Preparation of the 3rd Concertation Meeting on Telematics (PL) | |
| 5 | EEA, CPH | 16/17 Sept. | ETC/CDS workshop (Chang) | |
| 6 | Berlin, UBA | 18 Sept. | Workshop on „Road traffic emission factors -heading for a European solution“ (Eggleston, Samaras) | |
| 7 | Brussels, DGXIII | 27/28 Sept. | 3rd Concertation Meeting on Telematics (PL) | |
| 8 | Apeldoorn, TNO | 30 Sep./1 Oct. | ETC/AE full meeting to revise workplan and prepare 2nd CORINAIR workshop | |
| 9 | Berlin, UBA | 2 Oct. | PL met Mr A. Thoernqvist from Comfact AB; (EUROSTAT funds the DSIS info-service project) | |
| 10 | CPH, EEA | 7-9 Oct. | NFPs / EIONET with ETCs (PL) | |
| 11 | CPH, EEA | 10 Oct. | ETC/AQ +AE, Air Poll. and Guidance report (Illes) | |
| 12 | Paris | 10 Oct. | IOLG Meeting (Kilde) | |
| 13 | CPH, EEA | 17/18 Oct. | 2nd CORINAIR workshop | |
| 16 | CPH, EEA | 23 Oct. | Follow-up Committee for ETC/AE and AQ (Illes, PL) | |
| 17 | Leicester, County Hall | 24 Oct. | Prepare records from the 3rd CM on Telematics (PL) | |
| 18 | Paris, CITEPA | 18-20 Nov. | ETC/AE full meeting and Management Committee (MC01) | |
| 19 | Paris, OECD | 18/19 Nov. | IOLG experts on harmonisation IPCC/CORINAIR (Kilde) | |
| 20 | Paris, IEA | 20/21 Nov. | IEA „Closing the efficiency gap in energy response to climate change“ (Kilde) | |
| 21 | Brussels | 29 Nov. | UNECE TF on EI / Panel on Strategy and Overview (Samaras and PL) | |
| 22 | Brussels, DGXIII | 2/3 Dec. | 1st Annual Concertation Meeting „Applications for the European Information Society“ (PL) | |
| 23 | Berlin, UBA | 18 Dec. | ETC/AE Management Committee (MC 02) | |

7. ETC MANAGEMENT AND CO-ORDINATION

The ETC consortium has aimed at providing efficient and effective work and deliverables in time and quality as expected by the Agency and its clients. Main tasks required within Project SA2 under the 1996 Subvention are progressing well. The ETC is managed by the project leader who is supported by an Management Committee (MC) which was established in October 1996. Depending on the priorities of the work plan, some small changes in involvement of ETC members have occurred in 1996, which were approved by the EEA via change requests from the ETC/AE (Project Leader). Current members of the MC are:

| | |
|-------------------------|--------------------------------|
| Dietmar Koch (chairman) | UBA, Germany |
| Simon Eggleston | AEA Technology, UK |
| Tinus Pulles | TNO Institute, The Netherlands |

The MC meets regularly to :

- review the progress of work
- keep track on all activities associated with the work plan such as requests, meeting announcements, documents which the ETC has received
- decide who should respond or attend
- assess progress in all activities
- elaborate and adjust the work plan regularly.

The MC has reviewed the work plan and all activities associated with it, identified possible problems and reported on progress to all ETC members and the EEA project manager by email and/or paper monthly and via the quarterly progress reports. Rather than just reacting to problems as they arise, more strategic, pro-active approaches are being developed with the aim of controlling the project as a whole. The activities of the Topic Centre are managed by the EEA project manager (Mr Andrew) who for example has the responsibility to ensure that the work undertaken by the ETC follows the specification laid down in the technical annex of each of the subventions (1995/1996). Frequently the EEA project manager participates in meetings of the ETC and its MC to observe the performance and help to adjust priorities and identify common areas of joint activities between the parties involved. He also fosters the relationship to and the collaboration of the ETC with other European bodies and international organisations.

The Management Committee has met during 1996 at the following locations:

- | | | | |
|---|-------|---------------------|------------------|
| • | MC 00 | 16 October 1996 | Copenhagen (EEA) |
| • | MC 01 | 18/19 November 1996 | Paris (CITEPA) |
| • | MC 02 | 18 December | Berlin (UBA) |
| • | MC 03 | 22 January 1997 | Paris (CITEPA) |

The MC has elaborated reports and recorded meetings. Full minutes have been sent to all ETC partners and the EEA for review and comment. Updated work plans have been copied to the Agency regularly. The MC has also provided the basis for the scheduled Quarterly Progress Reports and the Annual Report to the Agency.

8. PROPOSED WORK PROGRAMME FOR 1997

8.1. Subvention 1996 (Continuing until 31 March 1997) ECU

| | |
|---|-----|
| 1. ETC Management and Co-ordination | 40 |
| 2. Maintain and develop the air emissions aspects of EIONET | 35 |
| 3. Ad hoc technical support to the Agency | 30 |
| 4. Air Emission Inventories 1994 and 1995 | 185 |
| 5. Revised model for inventories and projections | 55 |
| 6. Urban emissions inventories | 35 |
| 7. Preparation for EEA assessment reports (Dobris 3+, SoER98) | 55 |
| Total | 435 |

8.2. Subvention 1997

The following outlines the main tasks to be performed by the ETC/AE under the 1997 subvention which is scheduled for the period from 1st April to 31st December 1997. As proposed in the AWP97, approx. 400 ECU have been allocated to this subvention. The ETC is delivering major contributions to the EEA's three year reporting and development of annual reporting by providing data and information and important products to DGXI and Member States.

The ETC/AE Management Committee (MC) has identified some objectives that have become a regular annual task and those that can most likely not be completed within the timescale. It is proposed to concentrate efforts on the following main tasks :

1. ETC Management and Co-ordination.
2. Maintain and develop the air emissions aspects of EIONET (including further ETC and NRC integration in networking supported by the IDA project).
3. Ad hoc technical support to the Agency.
4. Annual emissions inventories (CORINAIR) 1995 and 1996 and prepare for air emission projections.
5. Develop CORINAIR model and software further. Implementation of the new software for air emissions inventories (based on agreed design) and develop and test software for air emission projections.
6. Contribute to EEA assessment reports : Finalise Air Pollution Report and prepare for State of the Environment report 1998 (under additional funding).
7. Support under EU legislation and policy development (report under CO2 Monitoring Mechanism, report under LCP Directive, development of PER/IPPC Directive, assist in Auto Oil II programme).
8. Common tools for emissions and waste integrated inventories (project SG1) in co-operation with ETC/IW. Assist DGXI in development of PER (IPPC Directive), develop Guidance documents for estimation of emissions to water (e.g. as needed for the Water Framework Directive).