Technical report No. 21

Third EIONET Workshop on Air Quality Management and Assessment

Workshop proceedings

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June 1999

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Printed in Copenhagen

Printed on recycled and chlorine-free bleached paper

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Executive summary

The third EIONET Workshop on Air Quality Management and Assessment was held in Copenhagen on 12-13 October 1998. The main objective of the Workshop was to discuss current European air quality issues and the work of the European Topic Centre on Air Quality (ETC/AQ) and its partners in the PHARE Topic Link Air Quality (PTL-AQ) with institutions and experts from European countries, the European Commission, and with collaborating international institutions. This is part of the key task of the European Environment Agency (EEA) to co-ordinate and develop the Environmental Information and Observation Network EIONET.

The Workshop was attended by 63 participants from 31 European countries and collaborating international bodies.

Sessions with presentations and discussion were held on:

- Monitoring systems, and data transfer: status and development of EUROAIRNET and AIRBASE;
- Urban air quality management;
- Europe-wide assessments;
- Programmes and strategies of EEA/DGXI/ETC/PTL-AQ;
- Discussion and key recommendations.

In addition to the Workshop conclusions and recommendations, this report presents brief summaries of each presentation as well as copies of selected transparencies shown. Discussions are summarised.

Workshop conclusions and recommendations

Conclusions and recommendations presented during the Workshop were drafted by the ETC-AQ to structure the discussion. Workshop participants discussed and amended these at the workshop.

Session 1/2 Monitoring systems and data transfer

1. Collection of quality assured air quality data is a key activity for obtaining comparable European information and for providing European assessments, as basic information for framing and implementing environmental policies, aiming at improving air quality in Europe. In this context, EC air quality legislation is an essential framework.

2. The process of building EUROAIRNET is well underway. Main areas for further progress are:
- contributions from countries that have not responded so far (7 EEA, 6 PHARE countries)
- completion of large cities monitoring site selection
- information on station representativeness and measurement uncertainty

It appears that shortening the data reporting delay to within 6 months is achievable for the majority of the EEA and PHARE countries (the EU Exchange of Information (EoI) Decision now requires reporting within 9 months).

3. For practical purposes, it is recommended to concentrate first on data exchange under the EoI procedures, both for EEA and PHARE countries, while in the meantime work continues on EUROAIRNET site selection/acceptance, improving QA/QC and shortening the monitoring to reporting cycle.

4. QA/QC is essential for EEA and the ETC since it determines the quality and reliability of the assessment information. The ETC would rely on the countries for QA/QC of data, on JRC and other European fora such as EMEP, WMO-GAW, and WHO, for European laboratory and field intercomparisons, and on CEN and ISO for standardisation. The ETC could contribute in the field of QA/QC by defining and assessing station spatial representativeness, in deriving data quality objectives from monitoring objectives, and in providing guidance on QA/QC procedures for modelling, assessment and mapping, particularly under the EC air quality Framework Directive.

Standardisation of terminology in the European languages could be helpful in QA/QC.

5. Data quality objectives should be explicitly derived from monitoring objectives. They should be evaluated against the quality achieved under best current practice to judge feasibility of monitoring for various purposes. Current data quality is often not sufficient to assess trends for components such as ozone, VOC, PM10, and others.

6. The Data Exchange Module proves to be a useful tool in data transmission under the Exchange of Information Decision, Ozone Directive, and for EUROAIRNET. It provides a major step forward in data exchange. Some problems need to be addressed, such as:
- inserting historic data and station/network configurations
- translating terms in various languages
- inconsistencies in station characterisation under EoI and Ozone Directive
- incorporating reporting under new EC daughter directives

Countries could take advantage of the experience gained in defining and implementing the Data Exchange Module DEM (see also 8).

7. The AIRBASE website functionality is to be extended substantially in the coming months. Most important extensions, as derived from country responses to a questionnaire, are related to:

- presentation of the data (extended query features, map, table and graph output)
- presentation of meta-information
- results mailing facility
- component specific reports
- selection from clickable maps

8. The additional functionality of the AIRBASE database for national uses, foreseen in a PC application, may also be realised by Internet applications. It could be considered to make the design and source code of the AIRBASE database and the Data Exchange Module available to national experts, as this could help facilitate national data collection from regional and local sources.

9. In the field of ozone forecasting and data exchange, some workshop participants showed interest in:

- an extension of the Internet based near-real time data exchange system as currently operated by AEA Technology in the UK
- a regional meeting for central and southern European countries.

Session 3 Urban air quality management

10. Air quality management in cities needs air quality information and assessments. For local air quality managers, it is important to relate air quality to air pollution sources from various sectors and to impacts. The necessary information can be provided by combinations of monitoring, emission inventories, and modelling. At the European level, the relation with driving forces and integration of environmental policies into sectoral policies is the most important. At both levels, the costs of the measures and the implementation of effective responses is of key importance.

11. In further developing practical guidance to (national to local) air quality managers, the ETC should liaise with various existing fora such as Clean Air in European Cities, and take advantage of the work in scientific groups, such as SATURN and COST 615-618. The experience in EEA member countries in developing guidance and getting feedback should be taken into account.

12. EEA (through ETC Air Quality in collaboration with ETC Air Emissions), in the framework of the EC Working Group on Guidance on assessment under the Framework Directive, should proceed in developing practical, specific guidance on urban emission inventories, urban monitoring and data processing, and urban modelling. The guidance should be generic, in the sense that it defines criteria and output specifications, rather than recommending specific methods or tools. Broadening the scope of interest of the ETCs to consider costs of measures, benefits, and implementation of measures for reduction of urban air pollution is not seen as a priority by some participants.

Session 4 European assessments

13. The ETC will continue to be actively involved in EEA European assessment reports (such as the Second Assessment, EU98, and the regular Indicator-based reports). As an important feedback from these assessments, the ETC should work on:

- optimising monitoring strategies and data collection, tailored to the needs of European assessments
- adapting and synchronising database updating schemes to these needs
- selecting, evaluating and applying air pollution models as needed in these assessments.

14. Further consideration should be given to how to involve NRCs more in the widened scope of EEA work on air quality, covering the full DPSIR assessment framework, rather than air quality (state of air medium) alone.

Session 5 Strategies and future work

15. Focus of the work of the ETC, as part of EEA, has been in the past, and will be in future, to provide targeted, timely and relevant information related to air quality to the EC and to the European countries, in support of framing and implementing environmental policies.

16. An important goal for the future is streamlining and harmonising data collection from various international organisations, such as UN-ECE, EUROSTAT, OECD, WHO, and WMO-GAW, in order to avoid duplication and multiple data requests to the countries with various formats and delivery deadlines. It is equally important to streamline the production of output, and attempt to avoid duplication in reporting.

17. Collaboration between the PHARE Topic Link on Air Quality and the ETC has been intense and constructive to produce an extended ETC on Air Quality. Integration has been carried out at the level of work plans and products, but also at the working level in task teams and progress reporting, leading to one programme serving 31 European countries.

18. The new air quality strategy proposed within DGXI will be a challenge for EEA to provide – in close collaboration with JRC, countries, and others – the necessary baseline information required by the Commission.

19. The ETC, in future work, should continue to strike a balance between work on
- interaction with countries, particularly NFPs and NRCs Air Quality
- providing guidance on monitoring and building/improving EUROAIRNET
- collecting, processing and managing air quality data and making these widely accessible
- selecting and applying air pollution models for assessment, and providing guidance on models and model application
- supporting countries, EU and other international organisations with targeted, timely and relevant information
- contributing to EEA periodical assessment and reporting.

WORKSHOP PROCEEDINGS

Third EIONET Workshop on Air Quality Management and Assessment

EEA, Copenhagen, 12-13 October, 1998

1. Introduction

The EIONET workshop on Air Quality Management and Assessment was held in Copenhagen on 12-13 October 1998, organised by the EEA European Topic Centre on Air Quality (ETC-AQ).

The workshop represents the annual meeting between the ETC-AQ/PTL-AQ and EIONET partners, especially the National Reference Centres (NRCs) of the EEA member countries and the PHARE countries.

The main objective is to discuss the work of the Topic Centre and current European air quality issues with the Topic Centre's main contact points in EIONET. Representatives of other European countries were also invited, as were representatives of other institutions working in the air quality field in Europe, such as European Commission, EMEP and the WHO.

Specific objectives of the workshop were to:

- discuss progress, status and further development of EUROAIRNET, AIRBASE and European air quality data transfer;
- discuss methodologies of and results from European air quality assessments;
- improve the links between EEA and PHARE countries regarding European air quality data transfer and assessment.

There has been a progression in the scope of the three annual workshops held.

The first workshop (April 1996, Copenhagen) concentrated on first discussions with the EIONET circle on the main priorities of the work that the ETC-AQ should do:
i) emphasis on monitoring or/and assessments?
ii) ii) emphasis on local AQ, and on which Air Pollution problems?

The second workshop (September 1997, Brussels), concentrated more on the criteria for and development of EUROAIRNET and AIRBASE, a discussion which started at the first workshop, and a starting discussion on assessment methodology. In this third workshop, the full range of the results of ETC/PTL-AQ work was presented and collaborating institutions were invited to present their work and strategy. Also the topic of Air Quality Management was treated in more detail.

There were changes in the name of the workshop, from "**European**" to "**EIONET**", and from "AQ **Monitoring** and Assessment" to "AQ **Management** and Assessment". This indicates the desire of the EEA and the ETC to work closer with EIONET partners in a common activity towards better European assessments, and also the broadening of the scope of our work. Monitoring (i.e. measuring) of air quality is just one of the activities necessary for the management of our air resources. To contribute to the better management of the air resources is the aim of our work.

The following papers were distributed to the participants, before the workshop:

➢ Criteria for EUROAIRNET. Final Draft Report;
➢ EUROAIRNET Site Selection Report. Draft;
➢ Model applications in the assessment of urban air quality. Final Draft Report.

The contents of the reports were presented and discussed at the workshop. The participants were invited to comment further on the reports before 30 November, 1998.

At the workshop, the following papers were made available:

- Workshop communication of AIRBASE and DEM developments;
- EoI Pilot reports: * Technical Report with meta-information
  * Air Quality Report, 1998;
- AIRBASE Web Extensions. Proposal.

Brief factual information about the workshop is as follows:

- Attended by 63 participants from 31 countries:
  - 19 from EEA member countries;
  - 13 from PHARE countries;
  - 3 from other countries (Belarus, Croatia, Switzerland)
  - 7 from collaborating institutions (DGXI, JRC-ERLAP, WHO, EMEP)
  - 21 from EEA/ETC-AQ/PTL-AQ.

- The workshop programme and list of participants are attached as Annex 1 and 2.
  There were Sessions on the following topics:

– Monitoring systems, and data transfer:
– Status of EUROAIRNET and the Exchange of Information process, and the QA/QC topic;
– AIRBASE: Status, and development of related software (DEM and web);
– Urban Air Quality Management: Concept, methodologies, models;
– Assessments, Europe-wide:
– Dobris+3, EU98 and AOP2 assessments and studies, as well as the Transport and Environment (TEN) reporting mechanism;
– Programmes and strategies of EEA/ETC/DGXI/PTL-AQ;
– Discussion and key recommendations.

2. Summary of the workshop presentations and discussions

In the following, the presentations and discussions at the workshop are summarised. From the discussions, only the main points are mentioned. However, all the comments and contributions from the various countries and of ETC/AQ representatives have been recorded, and are taken into account in further work of ETC/AQ. So, comments not mentioned in this report are still acknowledged and used.

Gordon McInnes, EEA Programme Manager/Monitoring and Databases, welcomed the participants, and was particularly happy to see representatives from all the PHARE countries, and also some additional countries, improving the pan-European scale of the ETC-AQ activities.

2.1. Monitoring systems, data transfer

2.1.1. Goals of EEA AQ data collection (Roel van Aalst, ETC-AQ)

Roel van Aalst asked the question: Why do we collect data?

His answer was given in the following fashion, which reflects the more "official" formulation:

We collect data:
- not only because of our legal obligations;
- not only because we like to build information systems; but:
- to obtain comparable information across Europe;
- to make European assessments;
- for managing air pollution problems;
- leading to improved air quality!

Therefore, the name of the annual "European Workshop on Air Quality Monitoring and Assessment" is changed to "EIONET Workshop on Air Quality Management and Assessment". There is progress in collecting air quality data. The Topic Centre must be highly selective on which data it takes on board, since it serves as an information provider and not as a data collector.

The question of emission data collection was raised, especially urban emission inventories. This is a topic for the ETCs on air quality and air emissions to clarify.

2.1.2. Status of EUROAIRNET

Criteria for EUROAIRNET and Site Selection (Steinar Larssen, ETC-AQ)
(Selected slides on the next pages)

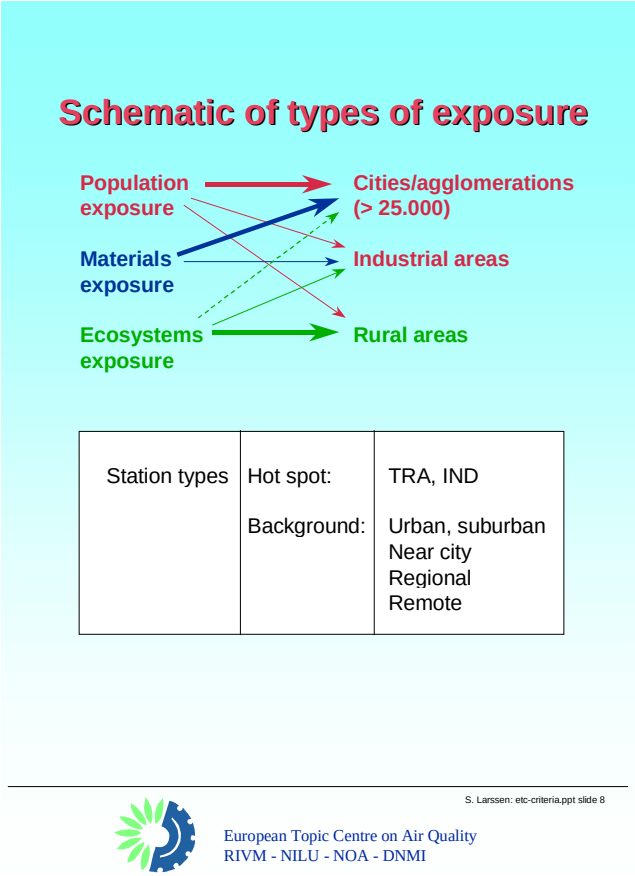
The report "Criteria for EUROAIRNET" was presented as final draft.
The criteria relate to:

i. the selection of areas for monitoring,
ii. classification of stations,
iii. selection of compounds, and
iv. quality control and assurance procedures.

The criteria now form an appropriate basis for the establishment of EUROAIRNET as a representative network for assessment of European air quality and exposure. The network will be based upon monitoring stations already in operation under national, regional and local networks, although the evaluation of the EUROAIRNET coverage for countries and regions may show a need to fill "holes" that may show up. The availability of data in AIRBASE within 6 months after the end of each calendar year of monitoring is an essential requirement for the "operation" of the network, and the fulfilment of this requirement, hopefully already in 1999 (with 1998 data), will be the main test of its success.

The starting base of EUROAIRNET is the stations reported by EU member countries under the Exchange of Information (EoI) Decision (see below). EUROAIRNET extends this selection to PHARE and other countries and also provides a tool for modifying and if necessary, extending the EoI selection, so that EUROAIRNET can give a fully representative picture of European air pollution exposure.

The report "Station Selection for EUROAIRNET" was presented as a draft.



Goal of the work to establish a EUROAIRNET

- "To establish a network with sufficient
  - spatial coverage
  - representativeness
  - quality
  - ease of data transfer

to provide the basic data, with a time delay of maximum 6 months, that is necessary to fulfil the information requirements to the EEA"

This is **not** the same as EU Directives or EoI Networks.

EUROAIRNET Stages/Objectives

Stages	Requirements
Stage 1 Exposure assessments from ***monitoring*** alone	• A network representative of the different exposure situations in Europe
Stage 2 Exposure assessments from ***monitoring and modelling***	Additional: • Network for model testing • Emission inventories • Meteorological/dispersion data
Stage 3 Quantitative ***assessment of effects*** basis for cost-effective abatement	Additional: • Realistic distribution of exposed "objects" • Dose-response relationships

Criteria for design of EUROAIRNET

Important criteria:

- Selection of areas to be monitored
- Classification of monitoring sites
- Selection of compounds
- QA/QC

Representative monitoring for estimation of exposure

Area selection criteria must relate to

- the spatial distribution of "targets",
- the span of exposure situations, from high to low exposure

"Targets": Population, materials, ecosystems

Areas selected by countries for EUROAIRNET

	Cities/agglomerations				Industrial outside large cities (<25,000)	Rural areas
	Total	>0.5 mill.	0.25-0.5 mill.	0.05-0.25 mill.		
Austria	4	1		3		
Belgium	13	1	1	5	6	22
Bulgaria	21	1	2	15		
Czech Rep.	18	1	2	15	3	6
Estonia	1	1				3
Finland	4	1		3		1
Germany	96	14	15	57	9	30
Hungary	6	1		5		
Luxembourg	1			1	1	2
Italy	8	6	2			
Netherlands	9	2	2	5		
Norway	3	1		2		12
Poland	5	5				
Portugal	2	1	1			
Romania	9	1	4	4		
Sweden	9	1	1	7		
Slovak Republic	5		1	4		
U. K.	29	9	11	9	4	19
EEA Total	178	37	33	92	20	86
PHARE Total	65	10	9	43	3	9
Overall Total	**243**	**47**	**42**	**135**	**23**	**95**

Number of stations selected

Country	Number of stations							
	Total	Local pollution stations				Ind. areas and small towns		Rural/ remote pollution stations
		In urban areas			Near city stations	Ind. areas	Small towns2)	
		T	I	U				
Austria	30	9		17	4			
Belgium	79	15		19		8	5	32
Bulgaria	75			61			14	
Czech Rep.	46	2	1	29	2	6		6
Estonia	6	1	1	1				3
Finland	18	11	3	1	2			1
Germany	261	50	18	75	463)	21	5	46
Hungary	15	5	1	9				
Luxembourg	5	2				1		2
Italy	82	65		13	4			
Netherlands	21	134)		7	1			
Norway	18	2	1	3				12
Poland	20	1		17	2			
Portugal	12	8		4				
Romania	54		2	52				
Sweden	9			9				
Slovak Rep.	10	7	2	1				
U. K.	103	17	3	55	5	4		19
EEA Total	639	192	26	203	62	34	10	112
PHARE Total	226	16	7	170	4	6	14	9
Overall Total	865	208	33	373	66	40	24	121

QA/QC procedure classification, as reported by the countries

EEA	QA/QC class	PHARE	QA/QC class
Austria	1, 2	Bulgaria	3, 5
Belgium	2, 3	Czech Republic	2, 3, 4
Finland	2	Estonia	3, 4
Germany	2, 3, 4	Hungary	2
Luxembourg	2	Poland	2, 3, 4
Italy	2	Romania	3
Netherlands	4	Slovak Republic	1, 2
Norway	2, 4		
Portugal	2, 3		
Sweden	4		
U.K.	3		

1. 1st level : No documented QC
2. 2nd level : Local QC procedures
3. 3rd level : National QA procedures
4. 4th level : QC by accredited institution.

Data availability
as reported by countries

Country	Quality controlled data available for transfer to AIRBASE after …… months
Austria	
Belgium	6
Bulgaria	6
Czech Republic	6-12
Estonia	6
Finland	3-8
Germany	1-6
Hungary	6
Luxembourg	2
Italy	6
Netherlands	2-4
Norway	6
Poland	6
Portugal	6
Romania	6
Sweden	6
Slovak Republic	
U. K.	3

At the time of the workshop, 18 countries had made their first selection of stations for EUROAIRNET:

EEA	**PHARE**
Austria	Bulgaria
Belgium	Czech Republic
Finland	Estonia
Germany	Hungary
Luxembourg	Poland
Italy	Romania
The Netherlands	Slovak Republic
Norway	
Portugal	
Sweden	
U. K.	

EUROAIRNET status, October '98:

- 18 countries
- 243 cities
- 23 industrial areas
- 95 rural stations

865 stations

- 60% NO_X (incl. NO_2)
- 40% O_3, CO and TSP
- 25 % PM_{10}
- 15 % Pb
- 10 % Benzene

- Reference methods are used to a large extent
- 6 months data availability seems to be possible for most countries.

The first version of the network should be finalised during the first half of 1999. This will involve work with each country in finalising a first selection, e.g. by means of a station and network acceptance procedure.

Fulfilment of area selection criteria so far:

The fulfilment of area selection criteria for *population exposure assessment* is satisfactory both for the EEA and PHARE countries, which have made a selection. For assessment of exposure of materials and ecosystems, the coverage is so far not satisfactory. 11 of the 18 countries have selected areas and stations with monitoring programme suitable to *assess material exposure*. For *ecosystem exposure* there are only 9 countries that have indicated that they have selected areas and stations suitable to assess such exposure.

Continuing work after the workshop:

- Countries were urged to report 1997 data, using the DEM;
- Countries were urged to make the first EUROAIRNET station selection;
- ETC/PTL and countries should, in co-operation, evaluate the selection, and modify it, if necessary;
- ETC should
  - make data available from AIRBASE;
  - present summaries, maps, etc.

Comments and discussion related to topics such as:

1) the difficulties in assessing and using the "area of representativeness";
2) how to deal with the moving and termination of stations and establishment of new ones as a result of the new Directives;
3) the need to work the requirements of the new Directives fully into EUROAIRNET;
4) the need for quantitative criteria for the station classification.

These topics will be given attention in the further work, and will improve the definition and applicability of EUROAIRNET data.

2.1.3. Exchange of Information (EoI)

1996 Data transfer, and EoI Pilot Report (Rob Sluyter, ETC-AQ)

1998 is the first year of data exchange under the new EoI Decision (97/101/EC). 1997 data should be reported to the Commission before 1 October 1998, and will then be entered into AIRBASE by the ETC-AQ. To assist countries in this work of transferring large amounts of monitoring data efficiently, the Topic Centre has organised the evelopment of a software tool, called the Data Exchange Module (DEM). Data for 1997 are now coming in, with almost all countries using the DEM software.

PILOT EOI META INFO REPORT

- **OVERVIEW OF META INFO AVAILABLE AND LATEST YEAR OF REPORTING**

Country	Nr of networks	Nr of stations	Latest year of reporting	AIRBADM used
Austria	1	40	1996	yes
Belgium	5	265	1995	no
Denmark	5	44	1990	-
Finland	7	18	1996	yes
France	47	747	1990	-
Germany	13	493	1997-98	yes
Greece	15	34	1996	yes
Ireland	17	58	1990	-
Italy	72	567	1990	-
Luxembourg	4	22	1990	-
Netherlands	10	245	1990	-
Portugal	16	88	1990	-
Spain	46	599	1990	-
Sweden	1	6	1996	no
UK	24	479	1996	no

NORWAY 4 NETWORKS, 8 STATIONS, AIRBADM (96)

AIRBASE

PILOT EOI META INFO REPORT

Country	Latest year	Format used	Status
Austria	1996	NS 1001	being processed, not all data will be loaded due to missing station identifiers
Belgium	1996	EoI	processed
Denmark	1996	EoI	processed
Finland	1996	Iso-7168	processed
France	1990		
Germany	1995	EoI	*92 processed, 93-95 files corrupt
Greece	1995		processed
Ireland	1996	EoI	processed
Italy	1995	Excel	90-95 in files with various structure could not be processed
Luxembourg	1993		
Netherlands	1996	EoI	processed
Portugal	1992		
Spain	1996	EoI	1995 processed, 1996 in progress
Sweden	1996	NS 1001	partly processed, not all data has been loaded due to missing station identifiers
United Kingdom	1996	Iso-7168	partly processed due to miscommunication
Norway	1996	NS 1001	processed

AIRBASE

PREL CONC PILOT AQ REP

- **FOR EVERY COMPONENT REPORTED, THE NUMBER OF TIME SERIES TRANSMITTED IS FAR TOO LOW TO BE ABLE TO MAP POLLUTION LEVELS THROUGHOUT THE COMMUNITY WITH SUFFICIENT ACCURACY AND COVERAGE**

Number of stations for which 1996 data was reported

component	number of stations	component	number of stations
Sulphur dioxide	64	Nitrogen dioxide	40
Strong Acidity	23	Lead	7
Black smoke	26	Carbon monoxide	32
TSP	29	Ozone	30

AIRBASE

PREL CONC PILOT AQ REP

- **NO LINK ESTABLISHED BETWEEN AQ DATA TRANSMITTED UNDER EXISTING LEGISLATION AND EoI**
- **RECENT TRENDS IN POLLUTION CONCENTRATIONS CANNOT BE DEDUCED AS THE DATABASE OVER THE LAST YEARS HAS BECOME TOO FRAGMENTED.**
- **(IN ACCORDANCE WITH ARTICLE 5.4 OF DECISION 97/101/EC) MEMBER STATES ARE REQUESTED TO TRANSMIT, AS FAR AS POSSIBLE, DATA COLLECTED BETWEEN 1989 AND 1996 TO ENABLE TREND ANALYSIS**

AIRBASE

PREL CONC PILOT AQ REP

- **IN ORDER TO ENABLE PROPER ASSESSMENT, STATIONS SHOULD BE GROUPED TO THEIR EMISSION ENVIRONMENT.**
- **MANY STATIONS COULD NOT BE CLASSIFIED BECAUSE KEY META INFORMATION IS (PARTLY) MISSING**

AIRBASE

EoI reporting has been in process, however, under the previous Decision on a voluntary basis. The status of this data transfer was summarised at the workshop. The extent of data transferred to the Commission and entered into AIRBASE for 1995 and 1996 (the 1996 and 1997 EoI data transfers) is inadequate (see slides, for details):

- Meta-data (on networks and stations):
  8 EEA member countries provided metadata for a total of 70 networks and 1343 stations, many of them using the AIRBADM software tool (predecessor of DEM);
  (There are metadata from 1990 available for many more networks and stations);
- Air Quality data:
  - 11 EEA member countries transferred 1995 and/or 1996 data in a format which could be fully or partly processed.
    Those data are loaded into AIRBASE. For 1996, there is data for:
    - 64 stations with SO_2 data;
    - 40 stations with NO_2 data;
    - 32 stations with CO data;
    - 30 stations with O_3 data;
    - and less number of stations with other compounds.

Rob Sluyter's conclusions from this pilot work on EoI data reporting were as follows:

- For each component, the extent and data transmitted is far too low to assess and map air pollution levels throughout the Community with sufficient coverage and accuracy;
- No link has been established between AQ data transmitted under the existing Directives and EoI.
- Recent trends in concentrations cannot be deduced, as the database has become too fragmented over the last years;
- To enable trend analysis, MS has been requested to transmit data collected between 1989 and 1996. Few have done that.
- Many stations could not be classified because meta information was missing or incomplete. This affects the ability to assess air quality in a comparable way.

Different formats have been used in the past for data transfer, and data transcription has caused excessive demands on the limited resources of the ETC, as well as delays. The DEM has been developed to improve the efficiency of data transfer. Transfer in 1998 should be more efficient, with most countries already using the DEM tool, and we are looking forward to an extensive amount of 1997 data in AIRBASE by the end of 1998.

Discussion: See chapter 2.2 "AIRBASE".

PHARE Country data collection (Libor Cernikovsky, PTL-AQ)

(Selected slides on the next page)

The PHARE Topic Link on Air Quality (PTL/AQ) extends the ETC-AQ work to the PHARE countries and assists the integration of the PHARE countries into EEA in the field of air quality. PTL organises the AQ data collection and data transfer from the PHARE countries, and assists in incorporating these data into AIRBASE.

Meta-data on stations and networks have been transferred to AIRBASE by 7 PHARE countries (Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Poland, and Slovak Republic), and 1997 AQ data has been transferred by 3 countries (Czech Republic, Latvia and Slovak Republic, 1996 data also by Lithuania).

The data flow between PHARE NRCs, PTL and ETC is visualised on the next page.

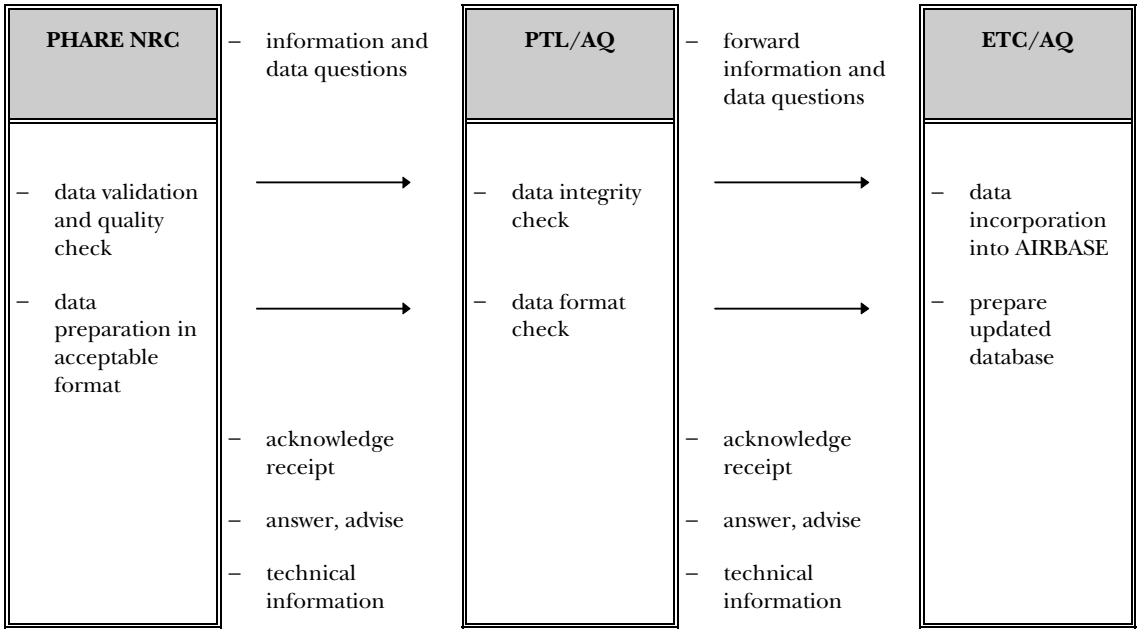
Metainformation on PHARE AQ stations and AQ data transmission status
(status as of September 30th, 1998)

Country name	Metadata (Nr of networks/stations)	Metadata in AIRBADM format	1996 data (format)	Ozone exceedances 1997	1997 data (format)
Albania	-	-	-	-	-
Bosnia and Herzegovina	-	-	-	-	-
Bulgaria	1 / 52	+	-	-	-
Czech Republic	1 / 63	-	ISO 7168	+	ISO 7168
Estonia	5 / 2, 7, 0, 3, 4	-	-	-	-
F.Y.R.O.M.	-	-	-	-	-
Hungary	-	-	-	-	-
Latvia	2 / 2, 2	+	-	-	NASA 1001
Lithuania	2 / 2, 4, 22	-	Dobris+3	-	-
Poland	1 / 16	+	-	+	-
Romania	-	-	-	-	-
Slovak Republic	1 / 32	-	ISO 7168	(+)	(ISO 7168)
Slovenia	-	-	-	-	-

Remarks:
Metadata which were reported to PTL/AQ in AIRBADM format are not incorporated into AIRBASE at present, but will be in near future; not all data are in acceptable formats and/or without mistakes.

PHARE data delivery and data flow

1. PHARE NRC transfer data to the own FTP „country" directory and notify the PTL/AQ data administrator and PTL/AQ Leader.
2. PTL/AQ data administrator check data integrity and confirm delivery to the NRC.
3. PTL/AQ data administrator check data in detail and send the result to NRC.
4. PTL/AQ data administrator forward data to the ETC/AQ.



Relations between EUROAIRNET and EoI (Steinar Larssen, ETC-AQ)

The relations between EUROAIRNET and EoI, especially as regards requirements for data transfer, were clarified. The table below, shown at the workshop, gives an overview of similarities and differences concerning topics such as database, station selection, etc.

In addition, for clarification, the following should be noted:

- For the EU Member States who have to report under EoI, there will only be one data transmission per year, for EUROAIRNET and EoI together. The official deadline is 1 October; the ETC will request countries to transfer data earlier, if possible by 1 July.
- Other countries transfer data only under EUROAIRNET, and the ETC will request them to report by 1 July, with 1 October as the final deadline.

EUROAIRNET vs. EoI network.

	EoI	EUROAIRNET
Database	AIRBASE	AIRBASE
Transfer tool	DEM	DEM
Station selection	Regulatory Network stations Old EoI stations additional	Representative for exposure of "targets".
		Possibly enhanced selection
Geographic coverage	EU Member States + Norway, Iceland, Liechtenstein (EEA member countries)	Pan-European (more than 30 countries)
Time delay	Within 9 months	Within 6 months
Additional data (in later phases)		Meteorological parameters Emissions (gridded, urban)

2.1.4. QA/QC

Planned QA/QC activities under EUROAIRNET (Costas Helmis, ETC-AQ)
(Selected slides on the next pages)

Data quality and reliability are key elements for the achievement of EUROAIRNET's goals. The QA/QC procedures are a necessary feature to ensure reliability of the air quality monitoring data. EUROAIRNET is being built from already existing air quality monitoring stations with various QA/QC plans, so a set of QA/QC criteria has been developed for the selection and classification of the networks/stations (see slide).

Data Quality Objectives (DQO) have developed (see slide), based upon the following monitoring objectives of EUROAIRNET:

- the data shall enable comparison of air quality across Europe,
- the data shall enable detection of the current trends in air quality in Europe, as well as in each area where stations are located, over a reasonable time period,
- the data shall enable the assessments of exposure.

The DQOs refer to accuracy and precision, data coverage (temporal) and representativeness (spatial).

Criteria have been formulated for a minimum, and for a complete, QA/QC plan (see slide, summaries).

The work on actual QA/QC procedures development and auditing should be covered by institutions such as JRC. ETC/PTL will, however, to help support improvement of AQ data to be reported to EC/ETC, ask operators to provide essential information about their QA/QC procedures, and references to their documentation. For this purpose a QA/QC information note has been formulated. This will be used in the continuing co-operation with each country.

QA/QC criteria for classification and the selection of stations accepted to be included in the EUROAIRNET

Levels	Criteria						
	Type of network/station			Type of QC/QC procedure			
	National Network		Local Network or Affiliated Station	Accredited central laboratory & complete QA/QC plan	Central laboratory & complete QA/QC plan	Minimum documented QA/QC plan	No documented QA/QC plan
1	√			√			
2 a	√				√		
b			√	√			
3			√		√		
4	√	or	√			√	
5							√

S. Larssen: euroairnet. ppt slide 1

A summary of DQOs for EUROAIRNET

Monitoring objective	Data Quality Objectives				
	Accuracy	Precision	Data completeness		Representative-ness (spatial)
			Temporal	Spatial	
Mapping/comparability	≤ 10%	<2 ppb	>90%	1)	1), 2)
Trend detection	3)		≥90%	1)	1), 2)

1) The DQOs are set for station-by-station comparison (for same station class) and for trend detection at any one station.
In the case of comparisons of e.g. cities or larger entities, or trend assessment for larger areas, the requirements to spatial coverage and representativity would be strict, and to quantify those requires more analysis.
2) To be eligible for comparison with a station of the same class in another location (city, country), representativeness criteria should be complied with, as described on page 37-39.
3) To detect a trend with a certain accuracy, the combined accuracy and precision of the measurement must be considerably better than the expected trend (expressed as relative change) (see page 39).

S. Larssen: euroairnet. ppt slide 2

The minimum QA/QC plan

Minimum quality procedures:

- DQOs are set on a minimum basis regarding :
  - Accuracy and precision.
  - Data capture. Comply with EU Legislation/Directives
  - Time coverage.

  Those minimum DQOs will enable a first comparison of data from different countries and networks.
- A reporting organization
- Site selection was done according to criteria.
- The measuring methods must be either reference or reference equivalent.
- A documented calibration program along with an instrument performance checking program.
- Data validation procedures complying with the EoI Decision (97/101/EC).

S. Larssen: euroairnet. ppt slide 4

The complete QA/QC plan

Quality control

- Site operation and equipment maintenance routines.
- Calibration, which is the most important operation in the measurement process.
- Data validation procedures should comply with the EoI Decision (97/101/EC).

S. Larssen: euroairnet. ppt slide 6

The complete QA/QC plan

Quality Assessment

Quality Assessment procedures may be:

- Ring test.
- Inter-calibration of networks.
- Round robin tests.
- Audits.

S. Larssen: euroairnet. ppt slide 7

The complete QA/QC plan

Quality Assurance

- Setting monitoring objectives and associated DQOs.
- Procedures for site selection and air quality monitoring network design.
- A main feature:
  the central institution or laboratory that is responsible for the implementation of the QA/QC plan.
- Instrumentation must fulfil the requirements of a reliable QA/QC plan.
- Adequate education and training of personnel.
- A detailed QA/QC manual.

S. Larssen: euroairnet. ppt slide 5

Intercomparison exercises, AQ measurements (Emile de Saeger, JRC ERLAP)

(Selected slides on the next pages)

JRC-ERLAP at Ispra is the institution with the formal responsibility for basis data quality issues within the EU. The Topic Centre will rely on the JRC activities to improve the various aspects of data quality work, and cooperate with EMEP, WMO, WHO and others.

The EU Quality Assurance Programmes carried out by JRC include:
- validation of measurement methods (sampling, calibration, analysis);
- interlaboratory exercises for calibration methods used in Member States;
- quality control of routine measurements in the monitoring networks;
- round-robin tests for particle analysis (PAHs, heavy metals);
- pilot studies for network design/optimisation and standardisation activities (CEN, ISO).

Examples of results from intercalibration projects were shown, as was an overview of visited stations for QA/QC work (see slide).

The quality of air pollution measurements depends on: sampling, calibration chain, instrument response, spatial representativeness, and the quality system implemented in the laboratory (see slide).

Three quality levels were described (see slides):
- Quality control (QC) at station level;
- Quality assurance (QA) at network level;
- Accreditation (AC) of laboratory.

Mr. de Saeger's estimation of maximum uncertainty, in actual field work, of AQ measurements, related to these three quality levels, is given in the table below. Problems have been reported with measurements of species such as SO_2, in which there could occur losses up to 50%! He also gave an overview of the quality provisions in the Framework and Daughter Directives (see slide).

He also presented for the workshop JRC's plan for further intercomparison exercises in Europe. Since there are many problems in connection with the measurements of airborne Particulate Matter, future intercomparisons will help in getting better QA/QC. JRC will organise intercomparisons for a range of pollutants in the near future.

Discussion on QA/QC

Comments and discussion related to:

- Accuracy: It was forwarded that there should be the same accuracy requirements in Daughter Directives, EoI and EUROAIRNET.
  Response: The minimum QA/QC plan of EUROAIRNET requires the same accuracy as in the Daughter Directives, while, to fulfil the monitoring objectives of EUROAIRNET, the accuracy requirements are higher.
- It is probable that monitoring in Europe will be done more and more by private companies. Thus, the need for quality control and accreditation is ever increasing.
- Although most of the ETC-AQ participating institutes have accredited laboratories, ETC as such has no laboratory, and can thus not contribute to intercomparisons, or other basic data QA/QC activities.
- ETC will collaborate closely with JRC, WMO, EMEP, WHO to further develop QA/QC procedures for AQ monitoring in Europe.

QUALITY OF AIR POLLUTION MEASUREMENTS

Depends on:

Sampling
Sampling efficiency
Losses in the sampling line

Calibration chain
Primary calibration
Transfer standard
Calibration check in station

Instrument response
Precision, stability, linearity
Selectivity
Environmental variables (T, P, RH %)
Maintenance

Spatial representativeness
Siting criteria
Station micro-scale configuration

and on:

Quality system implemented in the laboratory

QUALITY OF AIR POLLUTION MEASUREMENTS
Implementation of quality systems

1st. QUALITY LEVEL

QUALITY CONTROL (QC) AT STATION LEVEL, including:

- criteria for site selection;
- criteria for station micro-scale configuration;
- compliance of measurement method versus reference method;
- periodic in-situ calibration and calibration check;
- proper maintenance of instrumentation.

2nd. QUALITY LEVEL

QUALITY ASSURANCE (QA) AT NETWORK LEVEL, including QC and:

- criteria for network design and optimisation of site selection;
- implementation of standardised or validated measurement methods;
- type approval of instrumentation;
- participation to regular intercomparisons at regional/ national level;
- traceability to national/ international standards.

3rd. QUALITY LEVEL

ACCREDITATION (AC) OF LABORATORY, including QC+QA and:

- implementation of standardised quality system;
- implementation of standard operation procedures;
- organisation and management of the laboratory;
- education and training of staff;
- system and performance audits;
- periodic internal/ external audits.

QUALITY OF AIR POLLUTION MEASUREMENTS
Estimated uncertainty of measurements

	Estimated maximum uncertainty		
Source of errors	**QC**	**QC+QA**	**QC+QA+AC**
Spatial representativeness Siting criteria Station micro-scale configuration	±30%	±15%	±10%
Sampling Losses in the sampling line	-25%	-20%	-15%
Calibration chain Primary calibration Transfer standard Calibration check in station	±20%	±15%	±10%
Instrument response Precision, stability, linearity Selectivity Environmental variables (T, P, RH %) Maintenance	±20%	±15%	±10%
Propagated uncertainty	**±45%**	**±30%**	**±20%**

QUALITY OF AIR POLLUTION MEASUREMENTS
Provisions of the Framework Directive

- **Criteria for network design and site selection**
- **Data quality objectives**
- **Reference measurement method**
- **Certification of equipment**
- **National reference laboratory**
- **Intercomparisons at EU level**
- **Implementation of quality system**
- **Accreditation of laboratories**

2.2. AIRBASE

Status of the development of AIRBASE/DEM (Rob Sluyter, ETC-AQ)

(Selected slides on the next page)

While AIRBASE (the basic layer) is being filled with data, application tools are being developed. The successful development of the PC-tool the Data Exchange Module (DEM) has been mentioned. Efforts are now planned to improve accessibility of the AIRBASE data by extending the functionality of the AIRBASE website, e.g. by presenting and showing data summaries, tables and maps. Countries were asked to prioritise the various options for presentation and processing of data and information.

Discussion:

Comments and discussion on this session centred on the use of the DEM. It was considered a user-friendly tool, but some countries request a possibility to enter data more directly.

The problems connected to the long time required to load data in AIRBASE were discussed. As an example, UK reported that it took them 2 hours of PC time to load annual time series of hourly data for 10 sites. The reason for the time consumption is the extensive data checking and control which takes place in the program. This checking is necessary to assure data of acceptable quality.

In this connection, the discussion was on how the DEM could be modified, to enable a more efficient data loading process. It could be considered to make the design and source code of the AIRBASE database and the Data Exchange Module available to national experts, since this could help facilitating national data collection from regional and local sources.

DATA EXCHANGE MODULE
Web EXTENSTIONS
PILOT EOI REPORTING

3rd EIONET Workshop on
AQ Monitoring and Assessment

Copenhagen, 12/13-10-98

Rob Sluyter (RIVM, ETC-AQ)

AIRBASE

DEM: HELP!

- **SOFTWARE MANUAL ON PAPER**
- **SOFTWARE MANUAL AT PC**
- **CUE CARDS (REPORTING CYCLE)**
- **HELP DESK (airbase@ rivm.nl)**

- **GENERAL AIRBASE INFORMATION:**
- **http://www.etcaq rivm nl/airbase.html**

- **DOCUMENTED FEATURES DEM:**
- **http://www.etcaq rivm nl/airbase/docfeat.html**

- **FREQUENTLY ASKED QUESTIONS DEM**
- **http://www.etcaq rivm nl/airbase/faq.html**

- **DEM DOWNLOAD PAGE**
- **http://www.etcaq rivm nl/airbase/dem.html**

AIRBASE

DEM: INTRODUCTION

- **DEM v.1 (AUG98) CAN BE USED TO:**

- Exchange AQ data
  (raw data, statistics, ozone exceedances)

- manage and exchangemeta information on AQ networks, stations and measurement configurations
  (according to Annex II of Dec. 97/101/EC)

- **IN THE FRAMEWORK OF:**

- EU DECISION 97/101/EC (EoI)
- EUROAIRNET
- DIRECTIVE 92/72/EC (Ozone)

AIRBASE

DEM: FILE IMPORT I

- **FORMATS SUPPORTED:**

- **IS0-7168 (UNREVISED)**
- **NASA AMES 1001 AND 1010**
- **"EoI" (DEC. 82/459)**
- **DEM**
- **COMMISSION OZONE FORMAT**

- **WIZARD GUIDES YOU THROUGH IMPORT PROCESS**

AIRBASE

AIRBASE Web developments (Gabriel Kielland, EEA)

Website functionality extension

The ETC-AQ plans to extend the functionality of the AIRBASE web application (at http://www.etcaq.rivm.nl) taking into account EoI requirements.

ETC-AQ is seeking guidance from national experts.

The experts are invited to rank the proposed functionality extensions according to priority.

Proposed AIRBASE web extensions

Selection:	• Extended query features • Clickable maps
Meta info:	• Tables
Data presentation:	• Graph/table/map output • User statistics • Extended mapping • Air quality reports
Data transfer:	• Mail results to ….. • Data transfer status • Link to national servers
Background info sheets:	• Pollutant facts sheets

Ozone forecasting and data exchange (Roel van Aalst, ETC-AQ)

The recommendations of the Technical Working Group on ozone forecasting and data exchange (10 countries) are:

- The production of joint evaluation criteria;
- Simple near-real time data exchange system on world wide web;
- No need for central forecasting system;
- Extension of work to central, eastern and southern Europe.

A letter proposing extension of the work to south and central Europe and inviting contributions was distributed in early 1998 with rather low response. The work was postponed in 1998 in view of other urgent priorities. The European National Meteo centres (EUMETNET) showed interest in the ozone forecasting programme. A draft EU ozone daughter directive foresees guidance on short term measurements during episodes, which is likely to include guidance on forecasting.

The proposals for future ETC-AQ work include:

- the establishment of an Internet data exchange system, open to the public;
- extending the O3 forecasting work to south and east Europe, through an introductory meeting with representatives from countries such as Italy, Czech Republic, Slovakia, and Austria, Hungary
  However, the interest for such a meeting has been weak so far;
- a workshop on evaluation of forecasting systems.

The discussion showed some interest for a meeting with south and central European countries. Further initiatives will be taken by the ETC.

2.3. Urban AQ management

Concept and tools for urban air quality management (Steinar Larssen, ETC-AQ)

(Selected slides on the next page)

A concept was presented, relating the various parts that make up the analysis loop that enables cost-efficient pollution abatement (see figures below). Software tools for implementation of these concepts are available. Such methods, either complete or in simplified form, are needed in the assessment of urban air quality and its abatement, as required in EU Directives. As an example, Ken Stevenson presented UK experience in using assessment tools in a "preliminary assessment" exercise. This session indicated that tools and experience for cost-efficient abatement of urban air pollution, based upon exposure, are indeed available.

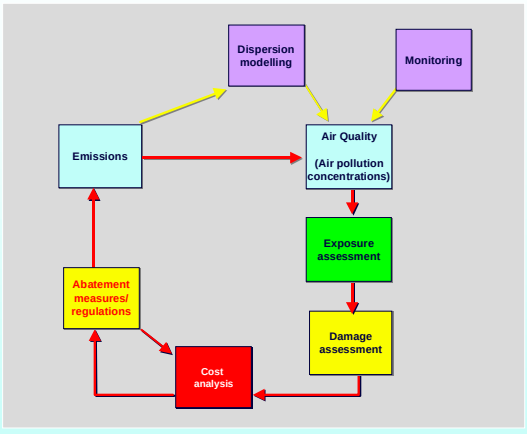
Air Quality Management

Assess and understand present situation and relations	• Monitoring • Sources/emissions • Exposure • Activity (D) → Sources (P) → Exposure (S) → Damage (I) relationships
Establish AQM tool(s)	• Set up model(s) • Develop scenarios
Analyze future	• Run the model(s)
Develop control strategies (R)	• Control options • Cost analyses • Alternative strategies
Measure effects	• AQ Information System

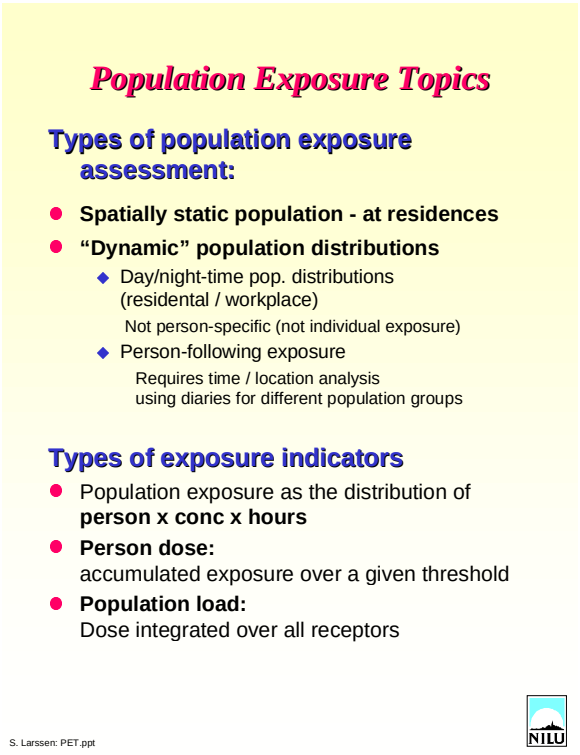
S. Larssen: etc-criteria-3.ppt slide 10

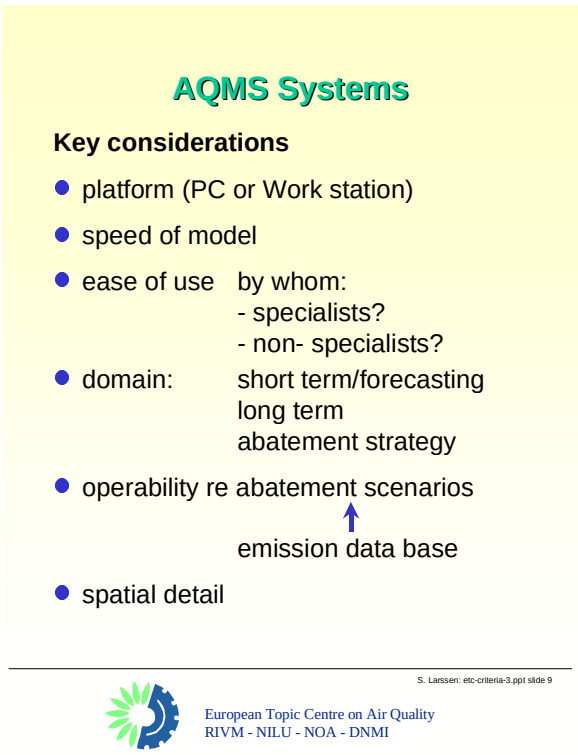
European Topic Centre on Air Quality
RIVM - NILU - NOA - DNMI

Air Quality Management Model Concept



S. LARSSEN: AQMS.PPT slide 12





Methodologies for urban air quality management in the UK ***(Ken Stevenson, PTL-AQ)***

(Selected slides on the next page)

The UK air quality strategy includes:

- Effects assessment;
- Air Quality Standards;
- Air Quality Objectives to be achieved by 2005;
- Air Quality to be assessed at a local level;

Air quality assessment in UK is based on collaboration with the local authorities and follows EU guidance reports. Consistent air quality assessments rely on reliable monitoring, emissions inventories and modelling. A stepwise procedure is followed, customised for each area, depending on the severity of the pollution: from emissions assessment, to simple monitoring/modelling, to detailed monitoring/modelling.

Similar techniques will be used on a national basis in the UK to undertake the preliminary assessment required by Article 5 of the EC "Framework Directive". This assessment will involve the use of a combination of automatic monitoring data, diffusion tube data, emission inventories and interpolated maps of pollutant concentrations.

Air Quality Assessment

WHO Pamphlet → Local Authorities
EC Guidance Report → Member States
Consistent message-
Assessment requires

Monitoring
+
Emission inventory
+
Modelling

The United Kingdom National Air Quality Strategy

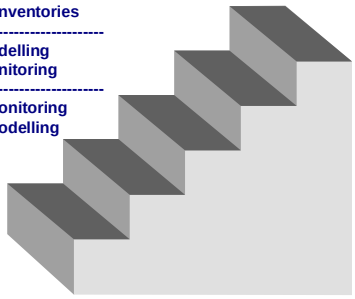
- Effects assessment
- Air Quality Standards
- Air Quality Objectives to be achieved by 2005
- Air Quality to be assessed at a local level

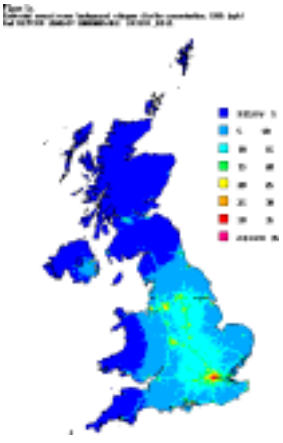
Local Review and Assessment

STAGE 1 Historical Data
Pollution Sources
Emission Inventories

STAGE 2 Simple Modelling
Simple Monitoring

STAGE 3 Detailed Monitoring
Detailed Modelling





NO_2 in The UK

Model applications in the assessment of urban air quality (Dag Tønnesen, ETC-AQ)

The ETC-AQ report "Model applications of urban air quality management" was presented. The report had been distributed to the NRCs for comments.

Urban AQ models should provide, through calculation procedures, a link between source-specific emissions and occurring concentrations. Validation of these models and documentation of the accuracy of calculated results is presently limited, as adequate validation data in urban environments are sparse; most urban monitoring stations are not designed for this purpose.

Guidance in model selection was presented. The selection criteria can be summarised as:

- Define pollutant, output quantity and required accuracy;
- Define needed time resolution;
- Define model output area and spatial resolution;
- Determine model area;
- Investigate availability of emission data;
- Investigate availability of meteorological data;
- Investigate availability of air quality data (including background values);
- Check available computer resources and resources needed to prepare input;
- Select models suitable for pollution, output quantity and resolution;
- Consider computer requirements, reconsider model choice if these surpass available resources;
- Reconsider requirements on emission and meteorology – if necessary collect more detailed input data or reconsider model choice;
- Prepare input data – run model – compare results to available AQ data;
- If necessary, rerun model with additional sources of input;
- Map output and assess uncertainty.

An important consideration in actual model selection is that the local authorities need simple tools which provide reasonable results.

In the ETC-AQ there are no resources available for evaluating the quality of air pollution models. It is also not the task of the ETC to recommend the use of certain models. The direction up to now has been to improve the available information on their status with respect to validation. It is up to each country and user to decide which air quality models to use.

Discussion on urban air quality management

In the discussion, two important issues were raised: the guidance on use of models and their validation, and the topic of cost analysis. More specific information on tested and evaluated models was requested. ETC recommended that countries use the Model Documentation Centre (MDC) of the ETC-AQ. Information on validation of the models will be reviewed in the coming year, based upon work within the EUROTRAC-2 SATURN project, and other activities.
The ETC invited countries' views on the incorporation of cost-benefit or cost-effectiveness analysis in urban air quality assessment work. Air quality managers need integrated information on the air quality issue including costs, benefits and evaluation of effectiveness of different control measures. While this was acknowledged, some participants indicated that the necessary expertise was to be found elsewhere and was not considered a priority for ETC to develop.

2.4. Assessments, Europe-wide

The Topic Centre contributed to the Dobris+3 and EU98 environmental assessments for problems related to air pollution. While the Dobris assessments are restricted to Pressure and State, participation in the EU98 assessment provided the opportunity to assess the full DPSIR chain, from Driving forces to Impact and Response, when assessing the future (2010) pollution situation. The Topic Centre also participates in the AutoOil II project, producing a harmonised air pollution assessment for more than 100 European cities using simplified methods, complementary to a detailed analysis of 10 selected cities. In this session the Agency's work on the Transport and Environment reporting mechanism (TERM) was also presented. The concept here is to arrive at integrated assessments of the environmental effects of European transport, using policy-relevant indicators. For air pollution, a suitable indicator would be exceedance of limit values, and the contribution to this from the transport sector.

Dobris +3 report, and EU 98 study of air pollution related problems (Roel van Aalst, ETC-AQ)

The main problems related to air pollution as identified in these reports are: climate change, stratospheric ozone depletion, acidification, tropospheric ozone and urban environment.

The move from Dobris+3 to EU98 represented a change in ETC's work on such assessment report:

- Dobris+3 involved recent state and trends assessment based upon emissions and AQ data collection (pressure and state mainly), while
- EU98 included projections to 2010 and effects assessment/management (full DPSIR).

Challenges were to be:

- timely i.e. updated information;
- targeted i.e. to policy process;
- relevant i.e. representative of the problem area;
- reliable i.e. data and assessments of known quality/accuracy.

ETC-AQ contributed to EU98 on chapters Stratospheric ozone depletion, Transboundary air pollution, and Urban Stress (AQ part). Roel van Aalst presented some examples of results from the chapters.

DGXI has previously commissioned a consortium by RIVM to carry out the EAP study (Economic assessment of priorities for a European environmental policy plan), which studies policy options for 1990-2010 for 13 environmental problems, under 3 scenarios. There has been cross-benefits in the work on the EAP study and EU98 report at RIVM.

European AQ data for health impact assessment (Kees Huijsmans, WHO ECEH)

(Selected slides on next page)

The WHO European Centre for Environment and Health (ECEH, Bilthoven division) has four main programmes:

- Health and Environment Information Systems;
- Environmental Epidemiology;
- Chemical Safety;
- Occupational Health.

The main objective of the WHO ECEH is the assessment of the impact of environmental factors on health of the population. In the field of air pollution the focus is on factual description of the levels and trends in air quality in Europe, and its estimated health impact.

Assessment of the health impact of air pollution is made through the following steps:

- calculation of the exposure to selected air pollutants (O_3, SO_2) in Europe;
- exposure-response relationships for selected pollutants; and
- impact estimation of selected air pollutants on health.

Major sources of air quality data used for the assessments are the EoI database, data directly from countries (WHO protocols for CET; DOBRIS Assessment), EMEP model data, AIRBASE, and data found on Internet (WWW).

ECEH has used AQ data in the following assessment reports: the Concern for Europe's Tomorrow report (1994); the joint EEA&WHO Monograph on main European Issues concerning Environment and Health (1996); contribution to background paper of the third Ministerial Conference on the Environment and Health (London, June, 1999).

The main conclusions from the WHO ECEH studies on air pollution exposure and effects are:

- There is reduction of SO_2 and Pb exposure;
- Levels, trends and health impacts of PM remain to be of concern;
- No improvement in NO_2 and O_3 levels;
- No improvement in AQ data availability for pan-European analysis.

WHO ECEH is developing a software tool, the AirQ model for health impact assessment.

Some summary data on air quality and related health impacts in Europe were shown (see slides).

Data on concentration of selected air pollutants (annual means) in 1994 or later available for the analysis

Pollutant	No. of cities	Population of cites with data (million)	No. of countries
PM10	*19*	*26.0*	*5*
TSP	*49*	*36.1*	*14*
BS	*22*	*12.4*	*9*
SPM(1)	86	69.9	21
SO2	80	58.3	21
NO2	91	70.8	20
O3	400(2)	41(3)	15

(1) SPM: data on at least one indicator of suspended particulate matter
(2) Number of monitors from which ozone data was available in 1995
(3) Estimated number of people in 10 km circle around the monitor (urban and rural)

WHO European Centre for Environment and Health

Overview of estimated health impacts of ambient air pollution in Europe in mid-1990s (1)

Exposure indicator	Health indicator, population at risk	Attributable proportion	Estimated number of cases per year (x1000)
	Long term exposure		
SPM (PM10)	Mortality[1)], urban, age >35	4% - 13%	102 - 368
	Short term variability of exposure		
SPM (PM10), daily levels	Daily number of deaths[1)], urban	1.4% - 3.2%	41 - 89
SO2, daily levels	Daily number of deaths[1)], urban	0.4% - 0.7%	12 - 20
Ozone, 8-h mean exceeds 110 µg/m3	Daily number of deaths[1)], all pop. in 15 EU countries	0.1% - 0.2%	2 - 4

1) All deaths except accidents

WHO European Centre for Environment and Health

WHO - Euro Programmes on ambient AQ monitoring for health impact assessment (Hans-Guido Mücke, WHO-CCAQM, Berlin)

(Selected slides on next page)

Dr. Mücke presented two programmes/reports related to AQ exposure and health effects:

- ➢ The project "Strategies of ambient air quality monitoring for health impact assessment". Several international experts from Europe and North America contributed to the production of a report on the principles for a strategy for monitoring for health impact assessment (see slide). This project is foreseen to be published as a WHO monograph in 1999.
- ➢ The project "Measurement of particulate matter (PM_{10} and $PM_{2.5}$) in Europe". A WHO report (EUR/ICP/TRNS 020403) describes proceedings from a workshop on PM measurements held in Berlin, October 1997 (see slide).

(A follow-up PM_{10} workshop was held in Berlin also, in September 1998, on the topic "Intercomparison results, PM_{10} and $PM_{2.5}$". The WHO workshop report (EUR(ICP/EHBI 040102) presents the conclusions and recommendations of this meeting.)

These efforts show the interest and the contribution of WHO to promote, and to provide guidance on, monitoring and assessment of air quality which is relevant for health impact assessment. This agrees well with similar efforts carried out by ETC-AQ, cf. for example. the objectives of EUROAIRNET.

Content of the WHO 'Strategies Programme'

- **Previous WHO activities**
  GEMS/Air, AMIS, AQG, HEGIS
- **Air Quality Information for Health Impact Assessment**
  Relationship Air Quality with Exposures
  Relevance of Exposures to Health Effects
  Relationship Air Quality with Sources
- **Monitoring System Design**
  QA/QC, Network Design, Instrumental Issues,
  System Operation, Data Management
- **Strategies of Monitoring for Selected Pollutants**
  CO, O_3, SO_2, NO_2, PM10/PM2.5, Benzene,
  PAH (BaP), Lead, Cadmium
- **Reporting / Assessment**
- **Conclusions / Recommendations**
- **Annexes**
  WHO-AQG, EU-AQDD, Emission Inventories,
  Air Quality Modeling, Personal Exposure Models

11th World Clean Air and Environment Congress, Durban/South Africa, 13-18 September 1998

Content of the WHO 'Particulate Matter Programme'

- **Overview on:**
  - **Epidemiological multicentre studies on health effects of particulate matter (PM10/PM2.5)**
  - **PM10/PM2.5 measuring and assessment techniques**
  - **PM10/PM2.5 monitoring in the WHO Euro Region**
- **Conclusion:**
  - **Comparing the limited data available on PM10 and PM2.5 concentrations in Europe with WHO risk estimates,**
  - **Particulate air pollution constitutes a significant public health problem in most of the Region**
- **Recommendations:**
  - **Use of the most cost-effective and efficient PM10 monitoring methods**
  - **24-hour average concentration levels are relevant to health**
  - **Preliminary continuation of TSP and/or BS measurement in addition to new co-located PM10 samplers**
  - **PM assessment and control should be considered in National Environmental Health Action Plans**

11th World Clean Air and Environment Congress, Durban/South Africa, 13-18 September 1998

AOP 2. Contribution from the ETC-AQ (Alena Bartonova, ETC-AQ)

The aim of the AutoOil 2 (AOP2) project is to assess the impact of technical and non-technical policy measures and instruments on air quality target levels, on urban air quality and exposure of urban population. The selected pollutants are NO_2, O_3, CO, PM_{10}, benzene, PAH, and 1,3 butadiene. The main assessment is being carried out using air quality modelling in 10 selected European cities.

The ETC-AQ contribution includes:
- making AIRBASE data available;
- Generalised Empirical Approach (GEA) – assessment of urban contribution to NO_x/NO_2, PM_{10}, O_3 using simple empirical modelling in a number of cities with sufficient AQ data available.

The aim of the GEA assessment is to provide a basis for generalisation of the results of the10-city modelling, utilising the information available to ETC-AQ and ETC-AE. The GEA method is to use empirical and simple emissions-air quality relationships (based on emissions and AQ data (the c-Q model), or box modelling (the UAQAM model), and the OFIS model foe Ozone) for examining compounds such as NO_2, PM_{10} and O_3. More than 100 urban areas in Europe have sufficient data to be included in this analysis, among them all cities with more than 250,000 inhabitants, and a selection of smaller cities.

Ms. Bartonova gave an overview of the data-base to be used in the analysis.

Transport and Environment Reporting Mechanism (Ann Dom, EEA)

The aim of the Transport and Environment Reporting Mechanism for the EU (TERM) is to report on progress of integration of environmental policies in transport policies. TERM is being developed in co-operation between the Commission (DGVII, DGXI, and Eurostat) and EEA. The products from TERM include an annual indicator-based report (EU), focus reports (policy related topics) and technical papers (methodological studies). The principles of the activities in TERM are to have a simple start with gradual improvement of data, indicators and assessment methods with involvement of Member States. There is also a co-ordination with related initiatives by other international organisations (OECD, ECMT, UN-ECE, IEA, WHO) and consultation of NGOs and experts. The main concept is based on integrated assessment, using policy-relevant indicators and the DPSIR assessment framework (Driving Forces, Pressures, State, Impact and Responses).

The annual indicators produced by TERM should allow to show trends and progress in sectoral integration of environmental concerns, measure effectiveness of various transport/ environment policy measures and compare transport modes. The indicator groups are:

- Contextual;
- Environmental impacts of transport;
- Transport efficiency;
- Transport demand and intensity;
- Price signals;
- Land use and access;
- Transport supply.

Until now a first meeting of experts took place during a workshop, a background paper with illustrative set of indicators has been produced and a preliminary survey of data availability has started. The next steps include the organisation of a workshop with other international organisations (e.g. OECD, UN-ECE, IEA), a feasibility study, a first version of indicator report and the establishment of longer-term work programme for data and indicator improvement.

The proposed air pollution based indicators are:
- emissions per passenger km and per ton km
- exceedances of AQ guidelines.

2.5. EEA/DGXI/ETC/PTL – programme/strategy

This session gave an overview of the activities to be expected in the coming years to assess and control future European air quality. Efficient use of the combined resources of DGXI, EEA, JRC, WHO, EMEP and other institutions and organisations is paramount for the strategies to become efficient tools for work towards satisfactory future air quality.

EEA Strategy (Gordon McInnes, EEA)

The strategy of EEA and its main elements were presented:
Envision: Networking/monitoring to Reporting Cycle / Reference Centre of Environmental information

Mr. McInnes highlighted the 12 Key Environmental problems in the EU. These are: Climate Change, Stratospheric Ozone Depletion, Acidification, Tropospheric Ozone, Chemicals, Waste, Biodiversity, Inland Waters, Marine and Coastal Environment, Soil degradation, Urban Environment and Technological Hazards.

Mr. McInnes also showed proposed budget figures for EEA work programme 1999 which reflect the volume and importance of the various activities in the operational side of the budget:

Topic databases/reporting	:	2.6 mecu
Integrated assessments	:	1.4 "
Periodic reporting	:	0.6 "
Support to reporting system	:	1.2 "
Service/network infrastructure	:	1.9 "

DGXI Strategy (Andreas Skouloudis, JRC)

(Selected slides on the next page)

DGXI has initiated discussion on its new Clean Air for Europe Strategy, integrating current activities in a multi-pollutant/multi-sector approach.

EU has introduced several measures for achieving better air quality standards in Europe including several Council Directives. More specifically the existing measures in Europe include:

- Air quality standards (pre-96 and Daughter Directives);
- Emissions regulations for stationary sources;
- Product control (lead, benzene);
- Mobile sources: emissions standards for road vehicles, AO1P, inspection & maintenance.

AQ planning until 2005 is now guided by, e.g. the following strategically relevant directives:
- Air Quality directives;
- Daughter Directives;
- Acidification strategy;
- Ozone strategy (under development).

Under the Clean Air strategy being developed, it is intended, in 5-year cycles, to:

- review present status and knowledge;
- predict future status;
- propose new standards, cost-effective abatement, etc.

Extensive use of air quality models is foreseen. Criteria of the new programme, and data needs: see slides next pages.

Mr. Skouloudis had the following final remarks:

- The main area where we believe that we can improve is in managing the interrelationships between areas of activity and in making the maximum use of available resources.
- In essence, it is proposed that the activities on air quality should concentrate on "Clean Air for Europe" leading to a single integrated strategy for Europe.

Planning until 2005

Issue	Nature of report or review	Timing
Air Quality Framework Directive	List of non compliant zones and agglomerations Report on ambient air quality in the Community	Anually Every 3 years
Proposed daughter directive on SO_2, NO_2, PM and lead	Report on experience of application of directive; results of scientific research on human health effects of SO_2, lead and different fractions of PM; progress achieved in measuring methods for PM and lead deposition	End 2003
Acidification strategy - Commission Communication	Report on progress towards meeting 2010 objectives; revised strategy	End of 2004
Ozone strategy - under development	To be defined, but should include at least an assessment of the scope for making further progress towards the long term objective	To be defined

A.N. Skouloudis, AQ Unit/EEA-13 Oct 1998

Criteria of the New Programme:

- To produce an AQ strategy every 5 years
- Strategy for a longer term programme (research and analytical activity)
- Consistent & Compatible assembly of Data
- Integrating function of modelling activities
- Strong & close management from DG-XI
- Transparency & Members involvement

A.N. Skouloudis, AQ Unit/EEA-13 Oct 1998

Overview of the Approach

Review	Predict	Propose
• health/effects	• base case for emissions	• revisions to air quality standards/objectives
• air quality standards/objectives	• future air quality: regional/local	• cost effective strategy and measures to close gap between forecast air quality and objectives
• current air quality	• costs and effects of abatement options at EU/national/local scale	
• current directives, strategies, recommendations		• implementation and monitoring arrangements • future research needs

A.N. Skouloudis, AQ Unit/EEA-13 Oct 1998

Summary of Data Needs

- latest health/effects information
- monitoring data - all pollutants, including potential additions
- information on implementation in member States
- emission inventories - regional and local, all pollutants
- base case - regional and local; databases, e.g. on vehicle stock, demand in tonnes-km passengers-km, load factors, price/tax levels
- air quality models - global, regional, city, street canyon
- data on costs and effects of abatement options
- transport and energy models
- cost effectiveness models

A.N. Skouloudis, AQ Unit/EEA-13 Oct 1998

Final remark

- The main area where we believe that we can improve is in managing the inter-relationships between areas of activity and in making the maximum use of available resources.
- In essence, it is proposed that the activities on air quality should concentrate over:

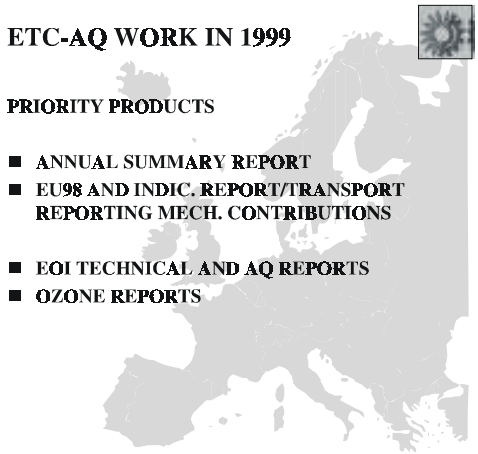
"Clean Air in Europe" leading to a single integrated strategy for Europe"

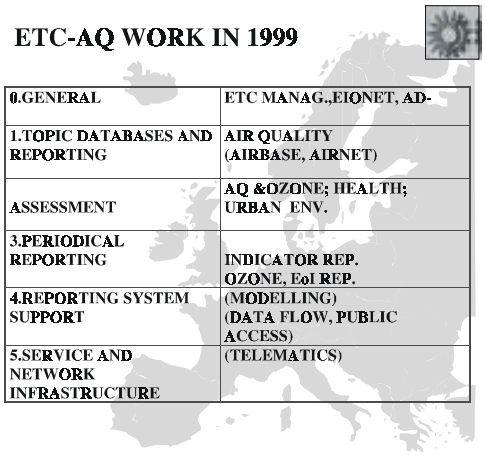
A.N. Skouloudis, AQ Unit/EEA-13 Oct 1998

ETC-AQ Programme 1999 (Roel van Aalst, ETC-AQ)

The 1999 Work Plan of ETC-AQ is being developed in line with the EEA strategy. Main elements are continued work on EUROAIRNET, AIRBASE and EoI, continued support to DGXI, continued work on Model Documentation Centre, and contribution to assessments such as AOP2 and the EEA indicator report.

The discussion touched upon the connection between ETC work and the scientific community. Assessments in support of policy formulation and implementation require scientifically sound state-of-the-art methods and information. The ETC therefore needs systematic interaction with the scientific and policy communities. Next to scientific work and contacts of the individual ETC scientists, the ETC seeks to establish and maintain more institutional contacts with programmes of scientific research on air pollution, such as EUROTRAC, EMEP and DGXII.





PTL-AQ Main achievements, first year (Jaroslav Fiala, PTL-AQ)

PTL-AQ objectives are to assist in extending EEA work to PHARE countries, to help PHARE countries to integrate into the EEA field of AQ issues, and, for that purpose, to form with the ETC-AQ an extended ETC on air quality.

The PTL-AQ consortium includes experts from the AEA Technology (UK), the Czech Hydrometeorological Institute, CHMI (CZ), the Slovak Hydrometeorological institute, SHMI (SK) and the Decision and Systems Management Institute, DASY (HU).

Main achievements from the PTL-AQ consortium are:

- Principal product.: Reports
  - EEA/WHO pamphlet on Air Quality Monitoring
  - Contribution to EU98 report;
  - Contribution to Report on EC ozone exceedances;
  - Contribution to EoI Pilot report.
- AQ data updates from PHARE countries
  - Data to AIRBASE, O_3 exceedance data, and data for the EU98 and Dobris reports.
- EUROAIRNET
  - Country visits, Station selection, PHARE countries, QA/QC evaluation.
- Meetings, workshops, training sessions, e.g. DEM training sessions, PHARE countries.

2.6 Discussion on conclusions and recommendations

Draft conclusions and recommendations were submitted to the participants for consideration, discussion and amendments. All conclusions were discussed in succession, and comments and suggestions of participants were noted. This resulted in the formulation of the conclusions as given at the start of this report.

Appendix 1 Programme

Third EIONET Workshop on AQ Management and Assessment

Copenhagen 12-13 October, 1998

Monday 12 October

1000-1500 Session 1

Chairman: Gabriel Kielland, EEA

0900-0920:	**Opening. Introduction**.	Gordon McInnes Programme Manager, EEA
	Monitoring systems, data transfer	
0920-0930:	* Goals of EEA AQ data collection	Roel van Aalst Leader, ETC-AQ
	Status of EUROAIRNET	
0930-0950	* Criteria for EUROAIRNET	Steinar Larssen, ETC-AQ/NILU
0950-1010	* Site selection	Steinar Larssen, ETC-AQ/NILU
1010-1030	* Discussion	
1030-1100:	Coffee	
	Exchange of Information	
1100-1130:	* 1996 Data transfer and EoI Pilot reports	Rob Sluyter, ETC-AQ/RIVM
1130-1150:	* PHARE country data collection	Libor Cernikovsky, PTL-AQ/CHMI
1150-1200:	* Relations between EUROAIRNET and EoI	Steinar Larssen, ETC-AQ/NILU
1200-1230:	* Discussion	
1230-1400:	Lunch	
	QA/QC	
1400-1420:	* Planned activities under EUROAIRNET	Costas Helmis, ETC-AQ/UOA
1420-1440:	* Intercomparison exercises, AQ measurements	Emile de Saeger, JRC
1440-1500:	* Discussion on how to proceed	
1500-1530:	Coffee	

1530-1700 Session 2

Chairman: Gabriel Kielland, EEA

AIRBASE

1530-1610:	* Status of development of AIRBASE/DEM	Rob Sluyter, ETC-AQ/RIVM
1610-1625	* AIRBASE WEB developments	Gabriel Kielland, EEA
1625-1640:	* Discussion	
1640-1700:	* O3 Forecasting and Data Exchange Presentation and discussion	Roel van Aalst, ETC-AQ/RIVM
1900:	Workshop dinner	

Tuesday 13 October

0900-1100 Session 3

Chairman: Roel van Aalst, ETC-AQ

Urban AQ Management

0900-0920:	* Concept and tools for Urban AQM	Steinar Larssen, ETC-AQ/NILU
0920-0940:	* Methodologies for urban AQM developed in the UK	Ken Stevenson, PTL-AQ/AEAT
0940-1000:	* Model applications in the assessment of urban AQ	Dag Tønnesen, ETC-AQ/NILU
1000-1030:	* Discussion	
1030-1100:	Coffee	

1100-1300 Session 4

Chairman: Jaroslav Fiala, PTL-AQ

Assessments, Europe-wide

1100-1120:	* Dobris+3 report and EU 1998 study. AQ parts	Roel van Aalst, ETC-AQ/RIVM
1120-1140:	* European AQ data for health impact assessment	Kees Huijsmans, WHO ECEH
1140-1200:	* AOP II. Contribution from the ETC-AQ	Gabriel Kielland, EEA/ Alena Bartonova, ETC-AQ/NILU
1200-1220:	* Transport and Environment monitoring mechanism	Ann Dom, EEA
1230-1400:	Lunch	

Session 5

Chairman: Steinar Larssen, ETC-AQ

EEA/ETC - Programme/Strategy

1400-1420:	* EEA Strategy	Gordon McInnes, EEA
1420-1440:	* DGXI Strategy on AQ work	Andreas Skouloudis, JRC-Env. Inst.
1440-1500	* ETC-AQ Programme 1999	Roel van Aalst, ETC-AQ/RIVM
1500-1520	* PTL-AQ Main achievements, 1st year	Jaroslav Fiala, PTL-AQ/CHMI
1520-1550:	Coffee	

1550-1630: **Final discussion/Key Recommendations**
- EUROAIRNET/QA QC
- AIRBASE/DEM
- ETC-AQ 1999 Programme

Appendix 2 List of participants

Third EIONET Workshop on AQ Management and Assessment
Copenhagen 12-13 October, 1998

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