EuroAirnet

Status report 2000

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Executive summary

The main goal for EuroAirnet, the European–wide air quality monitoring network being developed by the European countries and co–ordinated by the EEA, is to improve significantly the extent and quality of reporting of air quality in Europe and thus to improve the basis for representative assessments of European air quality.

The EuroAirnet development process has since 1996 gone through stages of criteria development, area and station selection, evaluations and modifications of these, development of data quality assurance, and reporting of EuroAirnet data to the European air quality database Airbase. A report describing the status of EuroAirnet in 1998 has been produced. The present report describes EuroAirnet status as of November 2000, summarising the euroairnet work in 1999 and 2000.

As of November 2000, 29 countries have selected areas and monitoring stations to be included in the EuroAirnet network. Seventeen of the countries have re–evaluated and modified their selection during 2000. In total 850 areas and 1 506 stations are included.

The 411 cities and agglomerations included (with 946 stations) cover a population of about 126 million people in total. There are 297 rural stations included in the network.

The EuroAirnet criteria for selection of urban areas are largely fulfilled. For selection of industrial areas and rural areas for assessment of population and ecosystems exposure, it is left to the countries to ensure that the criteria are fulfilled. Pollutant coverage is extensive, but some shortcomings exist in coverage of priority pollutants as defined in the air quality framework directive. The coverage of PM_{10} and benzene needs to be improved, especially at urban stations. Priority pollutant coverage at ecosystems and material exposure stations should be improved.

Further analysis is needed to develop more cost–effective European air quality monitoring, in accordance with Article 6 of Directive 96/62/EC. In this context, the still very substantial coverage of SO_2, TSP and CO may be subject to reconsideration.

Activities related to data quality (QA/QC) are important; currently the overall quality of the data is often not known, and accuracy and precision are not sufficient for trend analysis and for mapping air quality across Europe. Countries have evaluated their own QA/QC procedures, and since estimated data quality often does not meet the data quality objectives it is necessary to continue to concentrate on improving QA/QC work and thus the quality of the data reported to the European Commission and the EEA.

Data from the EuroAirnet stations are now reported extensively to Airbase. The number of 1998 time series reported to Airbase was close to 1 200 for SO_2 and NO_2, 900 for O_3, 5–600 for CO and TSP, and about 250 for PM_{10}. In many Member States, EuroAirnet stations and EU Exchange of Information decision stations largely overlap.

A EuroAirnet Internet web site has been produced with status summaries and detailed information on EuroAirnet stations for each country.

Improvements in EuroAirnet during 2000, in addition to the extended and improved selection and reporting, are connected to ongoing work on development of a quantitative station classification scheme (within the EU Exchange of Information decision working group), and to guidance on station location and representativeness provided to the EEA by its Topic Centre on Air Quality.

1. Introduction

The main goal for EuroAirnet, the European–wide air quality monitoring network being developed by the European countries and coordinated by the EEA, is to improve significantly the extent and timeliness of reporting of air quality in Europe and thus to improve the basis for representative assessments of European air quality.

This EuroAirnet status report 2000 describes the preparation for and the development of EuroAirnet up to November 2000 and updates the earlier report (EUROAIRNET site selection 1998, EEA Technical Report No 16, 1999)

Until 1997 the reporting of air quality data from European countries to the European Commission and to the EEA was by far neither complete nor representative enough to allow European–wide assessments of air quality on the urban and other scales to be made. The development of EuroAirnet has helped to improve that situation. Through the EuroAirnet criteria, 29 countries (including 11 of the Phare countries) have made a selection of areas and stations, and, beginning with 1997 data, have reported data from these stations to the European air quality database Airbase. EEA member countries have done this under the requirements of the EU Exchange of Information (EoI) decision.

The development of EuroAirnet has gone through the following stages:

1. The development of criteria for EuroAirnet. This process started during the first EIONET workshop in 1996 at the EEA in Copenhagen. Draft criteria reports were discussed at the following two workshops, in 1997 and 1998 in Brussels and Copenhagen, leading to the final criteria report published early in 1999 (EEA Technical Report No 12).

2. The site selection process. Site selection started in mid–1997, when site description tables were sent out to all EEA member countries and all Phare countries, with a request to select networks and monitoring stations according to the criteria. The status of the site selection process was reported at the Eionet Air Quality workshop in 1998. Since 1997, the Phare Topic Link for Air Quality (PTL/AQ) has worked with ETC/AQ, taking care of the EuroAirnet activities with the Phare countries.

3. Visits to national reference centres were conducted throughout 1996–2000, to discuss criteria, networks selection, data quality and data availability. The ETC/AQ made a total of 26 visits to 15 countries. The PTL/AQ have made 13 visits to 11 countries.

4. In the evaluation and acceptance process, up to mid–1999, 29 countries had made their first (and some their second, modified) selection of sites for inclusion in EuroAirnet. The evaluation of each country's selection was carried out in mid–1999 by means of an evaluation scheme where the selection was evaluated against each of the criteria for EuroAirnet. The schemes were sent back to each country for comments and re–evaluation of the EuroAirnet selection. As of November 2000, many countries have made their re–evaluation and modified the selection. A country summary has also been made for each country and sent to countries for comments.

5. EuroAirnet selection and status reports have been prepared, representing the status by the end of 1998, 1999 and by late 2000 (the present report).

6. Data reporting: The countries report data from EuroAirnet stations to Airbase, using the Air Quality Data Exchange Module (DEM) data reporting tool. In practice, this reporting is done concurrently under the EoI reporting, which is obligatory for all EU Member States, and also for Iceland, Liechtenstein and Norway, under the European Economic Area agreement. Reporting under the present EoI decision started in 1997, for 1996 data. In the reporting tool, it has been possible to mark which of the stations reported are EuroAirnet stations. The deadline for

this reporting is 1 October each year. Since 1998, Phare countries also report data to the EEA.

This report summarises the status of the EuroAirnet selection, and its evaluation and improvements, as well as the status of data reporting by November 2000. In the future, it is the intention that information as presented in this report will be made available at the EuroAirnet web site (see Chapter 5).

2. EuroAirnet objectives

The goal of EuroAirnet is:

to establish a network with sufficient spatial coverage, representativeness and quality to provide the basic data as soon as possible, with a time delay not longer than 6 months, to fulfil the information requirements of EEA.

Objectives of EuroAirnet
The data from the EuroAirnet stations may be used in many ways. The objectives of EuroAirnet are stated below, in order to enhance the understanding of the importance of collecting air quality data as comprehensively as intended to meet the goal of EuroAirnet.

EuroAirnet shall provide information to support and to facilitate the assessments of air quality to be produced by the EEA. The information shall be available in such a form that it may be used to:

- facilitate a general description of air quality, and its development over time (trend);
- enable comparison of air quality across Europe;
- produce estimates of exposure of the European population, and of materials and ecosystems;
- estimate health effects;
- quantify damage to materials and vegetation;
- produce emissions/exposure relations and exposure/effect relations;
- support development of cost–effective abatement strategies;
- support legislation (in relation to air quality directives);
- influence/inform/assess effectiveness of future/previous policy.

The assessments should be based upon air quality concentration fields (space–time fields) produced by the monitoring and information network or by a combination of monitoring and transport/dispersion modelling, and should cover local as well as regional scale. The modelling efforts are essential in forming the link between emissions on the one hand and exposure and effects on the other hand.

The specific objectives for the EuroAirnet network can be separated in three stages:

Stage 1 objective:
Air pollution exposure assessments on the European scale to be produced by monitoring alone.

Stage 2 objective:
Air pollution exposure assessments to be produced by a combination of monitoring and modelling, for improved spatial resolution (e.g. by dispersion modelling or kriging techniques).

Stage 3 objective:
The network will support quantitative assessments of exposure and effects as a basis for proposing cost–effective abatement strategies.

The Stage 1 objective requires a network which is representative of the different exposure situations in the various cities and regions in Europe.

The Stage 2 objective requires in addition that stations are selected which are suitable for comparison with calculations using dispersion models. Also, meteorological measurements in the various areas (i.e. cities) are necessary, as well as local inventories of emissions spatially distributed in a grid net.

The Stage 3 objective requires in addition detailed quantitative information about the distribution of the exposed objects (population, materials, ecosystems), and dose–response relationships. For assessment of, for example, detailed population exposure to quantify health effects, models are needed to couple air quality and population in space and time, as well as dose–response relationships for the various health effects.

In the first phase of EuroAirnet establishment, the Stage 1 objective should be the guiding one, but the Stage 2 objective should also be fulfilled in some selected cities.

EuroAirnet is presently in the consolidation phase of Stage 1. In this stage, the objectives

that guide the development are that the EuroAirnet data should enable:

- the general description of European air quality;
- the comparison of air quality between cities and states;
- the estimation of the exposure of population, ecosystems and materials to pollution on the European scale.

3. EuroAirnet criteria in relation to EU air quality directives

The EuroAirnet criteria are given in the 'EuroAirnet criteria report' (EEA Topic Report 12/1998). A summary of this is included here as Annex 1. The EuroAirnet criteria concern the following items:

- Area and station selection;
- Classification of monitoring stations;
- Area of representativeness;
- Quality assurance and quality control (QA/QC).

In Chapter 6 the EuroAirnet status is evaluated in terms of fulfilling these criteria.

In Table 3.1 an effort has been made to compare, EuroAirnet criteria are compared with similar ones in the EU air quality directives, under the topics 'stations', and 'station location'. There are similarities and differences, but no direct contradictions.

The use of such criteria is different when seen from the directives and seen from EuroAirnet:

— the directives set requirements to the minimum monitoring network needed in a Member State to assess its air quality according to the directives, and criteria for the needed number and location of stations;

— the EuroAirnet criteria have been set to guide the countries in how to select stations from their existing networks, so that the EuroAirnet objectives to create a network suitable for European–wide assessment of air quality can be met.

Table 3.1 **Comparison of criteria items in the EU AQ Directives and in EuroAirnet**

Topic	EU AQ Directives	EuroAirnet
Stations		
• Areas where monitoring is needed	Obligatory in — AgglOmerations with more than 250 000 inhabitants — Zones where AQ> upper assessment level (UAL)	All areas which have been selected according to criteria, including cities of various size, industrial areas, rural.
• Number	Dependent on population size	All relevant stations
• Types	The EoI classification	The EoI classification
Station location		
• **Representativeness area**		
—Traffic hot-spots	> 200 m^2	Representative length of road, to be specified
— Industry hot-spots	Nothing specific	Nothing specific
— Background stations		
— Urban	Several km^2	3–6 km^2 (< +– 20 % from average)
— Rural	> 1 000 km^2 (ecosystems exposure)	Near–city: >100 km^2 Regional: >1 000 km^2 Remote: >10 000 km^2
• **Macrositing**		
— Traffic hot–spots	> 25 m from crossings, 4–5 m from kerb, and where people live	> 25 m from crossings, and where people live [1)]
— Industry hot–spots		Located at most exposed residential area [2)]
— Background stations		
— Urban	Nothing specific	> 50 m from roads/other local sources
— Regional	> 20 km from large aggl. > 5 km from other built–up areas	> 10–50 km from large sources

[1)]: Additional metadata requested: distance from kerb, traffic volume, speed, composition
[2)]: Additional metadata requested: type of industry(ies), distance and direction.

4. EuroAirnet selection status

4.1. Status on selection, evaluation and modification

As of November 2000, 29 countries made a selection of areas and stations for EuroAirnet based upon the criteria.

The first selection of the countries, made for most countries during 1996–98, was evaluated by ETC/AQ during the summer and early autumn of 1998. During 1999 and during 2000, there have been activities to re–evaluate and, if necessary, update and modify the initial selection. ETC/AQ sent out a reminder to each country in November 1999 to carry out a re–evaluation of its selection. Many countries responded by returning the evaluation scheme, including their re–evaluation. This was followed up by ETC/AQ with a renewed request to the non–responding countries for re–evaluation and update of the selection. Table 4.1 gives the status of selection, evaluation and updating for each country (as of early November 2000). The country–wise evaluation and acceptance reports are included in the EuroAirnet web site (see Chapter 5).

The country evaluation process that was carried out in 1999 and 2000 has shown that improvement of the selection and quality of the networks is possible in many countries. Improvements and extensions are in some cases necessary in order to fulfil the selection criteria for EuroAirnet.

For each country a summary report has been produced that briefly describes the findings from the evaluation and acceptance process. These summary reports are included in the EuroAirnet web pages.

The following countries have updated and modified their EuroAirnet selection in 2000: Finland, Ireland, Italy, Portugal, Spain, United Kingdom, Bulgaria, Latvia, Romania, Slovak Republic. In addition, many countries have modified and added metadata, although not changed the selection as such.

EEA member countries and Phare countries which have not yet made a selection of areas and stations to be included in EuroAirnet are France, Albania and Bosnia–Herzegovina.

France is now reporting data extensively according to the EoI decision, however not using the DEM so far. This causes delay and makes it difficult for ETC/AQ to process and present the data together with the other countries. However, when this problem has been overcome, by either using the DEM or using special conversion software the French EoI data would provide a basis for making an EuroAirnet selection for France.

4.2. Areas and stations overview

Table 4.2 shows the number of selected areas as of November 2000, in the three categories:

- cities and agglomerations;
- industrial areas (those outside cities with population > 50 000);
- rural areas.

Annexes 2–4 give the names and coordinates of the areas selected.

Figure 4.1 to Figure 4.4 provide maps of the distribution of stations.

An overview of the number of selected areas included in EuroAirnet per country, as of November 2000, is provided in Table 4.4.

Table 4.1 **Overview of the EuroAirnet area and station selection and updating process**

Country	First selection	Evaluation by ETC/ AQ	Re–evaluation by NRC	Updated selection
EEA				
Austria	1997	1999	1999	1999
Belgium	1997–98	1999	1999	
Denmark		1999	1999	
Finland	1997	1999	1999, 2000	1999, 2000
Germany	1998	1999		
Greece		1999		(1)
Iceland		1999	2000	(2)
Ireland	1998	1999		2000
Italy	1997			2000
Liechtenstein		1999		
Luxembourg	1997	1999		
Netherlands	1997	1999		(3)
Norway	1997	1999		1999
Portugal	1997	1999		2000
Spain		1999		2000
Sweden	1997	1999		(3)
UK	1997	1999	2000	2000
Phare				
Bulgaria	1998	1999	2000	2000
Czech Republic	1997	1999	2000	(4)
Estonia	1997	1999	1999	(4)
F.Y.R.O.M	1999	1999		
Hungary	1997	1999		
Latvia	1999	1999	2000	2000
Lithuania	1999	1999	1999	(4)
Poland	1997	1999	1999	(4)
Romania	1997	1999	2000	2000
Slovak Republic	1997	1999	2000	2000
Slovenia	1999	1999		
OTHER				
Switzerland		1999	2000	2000

1) The AQ monitoring system in Greece is being thoroughly modified. Final selection for EuroAirnet can be made only after that process has reached a certain stage. A preliminary selection has been made.
2) Iceland has stated that their monitoring system will be modified, and thus also their EuroAirnet selection.
3) Modified selection is in process, as a result of discussions during 'country visits'.
4) No modifications in area and station selection, but added and modified metadata.

Table 4.2

Overview of selected Cities and Areas for EuroAirnet per November 2000 (per September 1999 in parenthesis)

Area type	Number of areas				
Cities/aggl.	411	(355)	Class 1 cities	66	(63)
			Class 2 cities	60	(57)
			Class 3 cities	236	(198)
			Class 4 cities	49	(37)
Industrial areas	113	(46)			
Small towns	43	(16)			
Rural areas	280	(219)			
Sum areas	850	(636)			

Table 4.3

Overview of numbers of stations selected for EuroAirnet in different types of areas; per November 2000, compared to the situation in September 1999

Overview of selected stations		
	Per December 1999	Per November 2000
Cities/agglomerations	915	946
Small towns	28	47
Industrial areas	96	216
Rural areas	231	297
	1 275	1 506

The present selection can be summarised as follows:

- 411 cities and agglomerations (315 in the EEA, 88 in Phare, 8 in Switzerland);
- 113 industrial areas outside cities, selected in 13 countries (110 in the EEA, 3 in Phare);
- 43 small towns, selected in 10 countries (27 in the EEA, 16 in Phare)
- 280 rural areas, selected in 26 countries (238 in the EEA, 36 in Phare, 6 in Switzerland).

The overview of types of stations is shown in Table 4.3. A more detailed overview is shown in Table 4.5, giving stations per type and country.

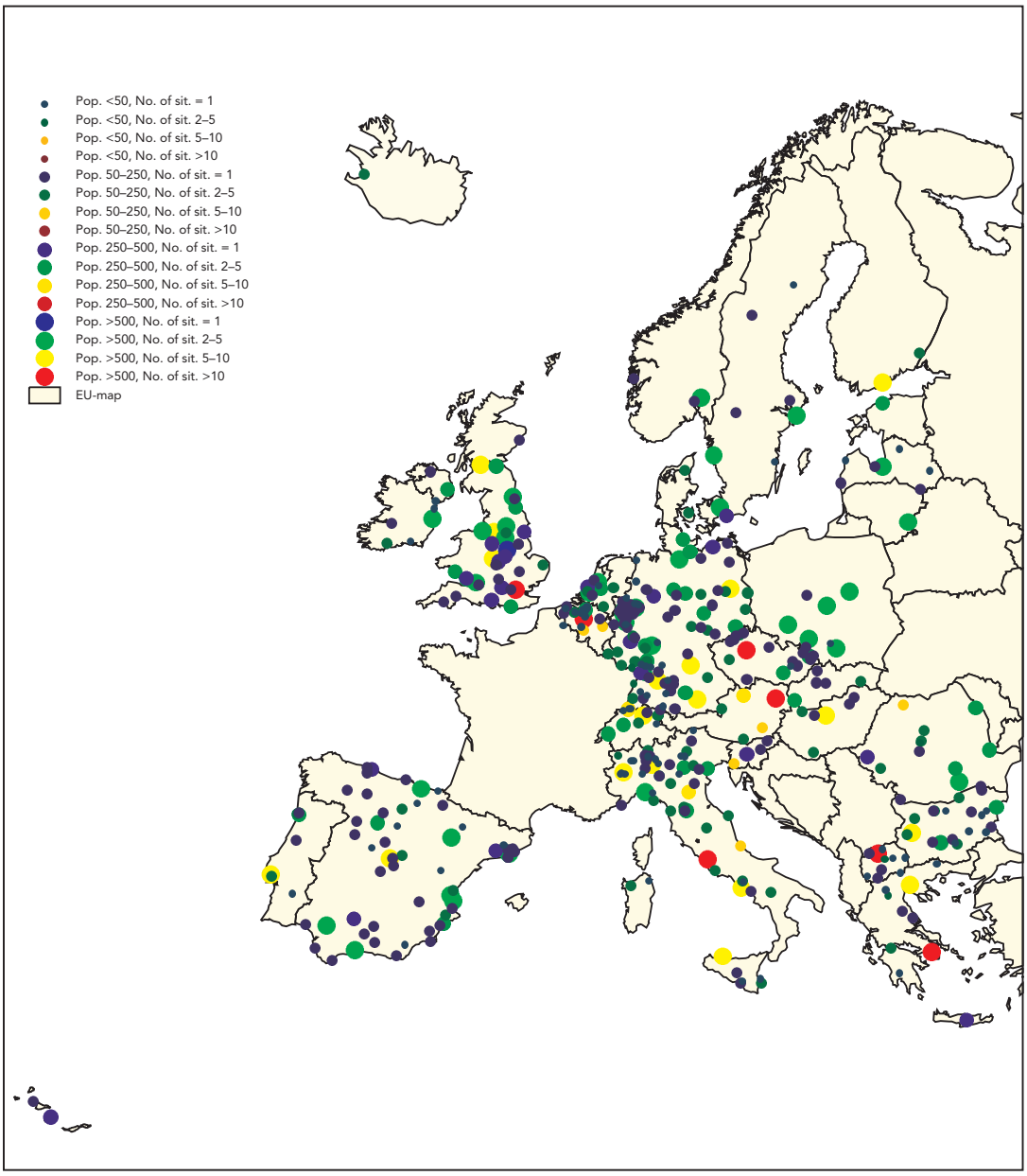
Note that the selection for Greece, the Netherlands (rural stations) and Sweden is not finalised, but we present the probable selection. For Iceland, we include the present selection, but as mentioned, this will be modified in 2001.

Table 4.5 shows the distribution between station types in and near urban areas:

Urban background stations:	466
Urban traffic stations:	388
Urban industrial stations:	63
Near city background stations:	32

We are aware that there may be variations in the way countries/networks are using the classification scheme to classify stations, and that the split between urban background and traffic stations may be affected by this. The ETC will work to improve the classification criteria (see Chapter 8.1).

Figure 4.1 **EuroAirnet stations in cities and agglomerations (November 2000)**



Northwest Europe EuroAirnet stations in cities/agglomerations (November 2000) Figure 4.2

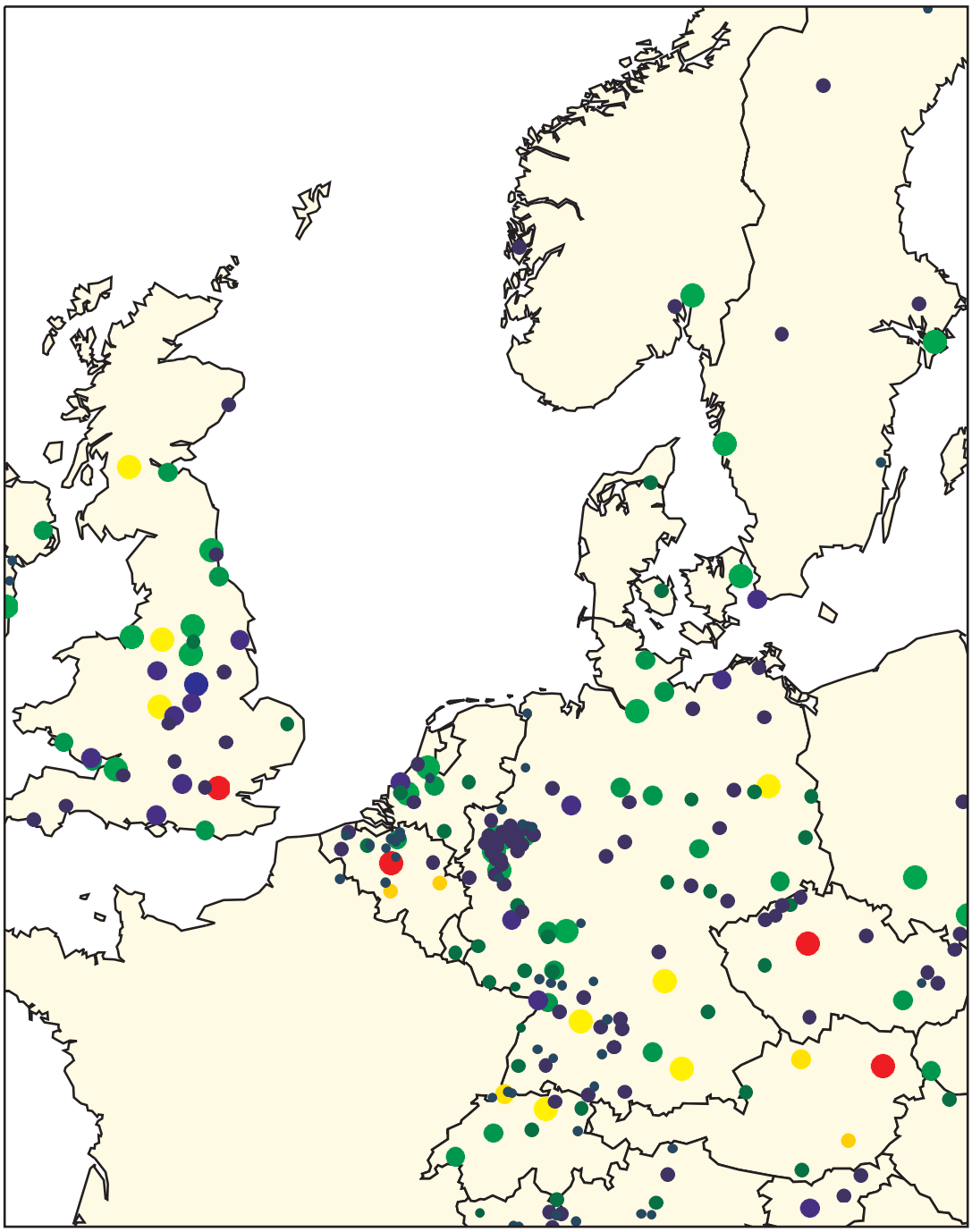
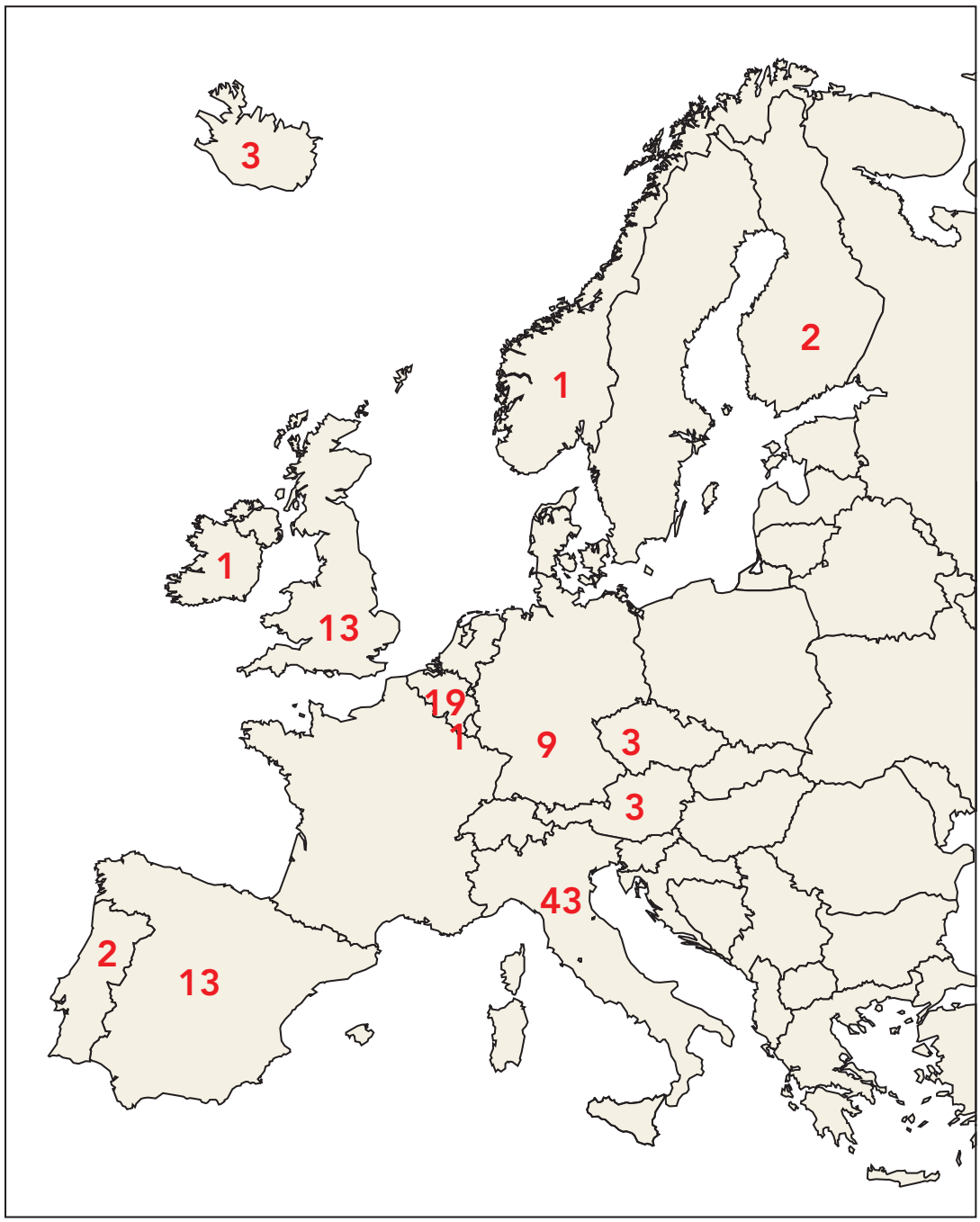


Figure 4.3 **EuroAirnet status, November 2000, industrial areas (number of areas per country)**



EuroAirnet status, November 2000, rural stations (number of stations in countries) Figure 4.4

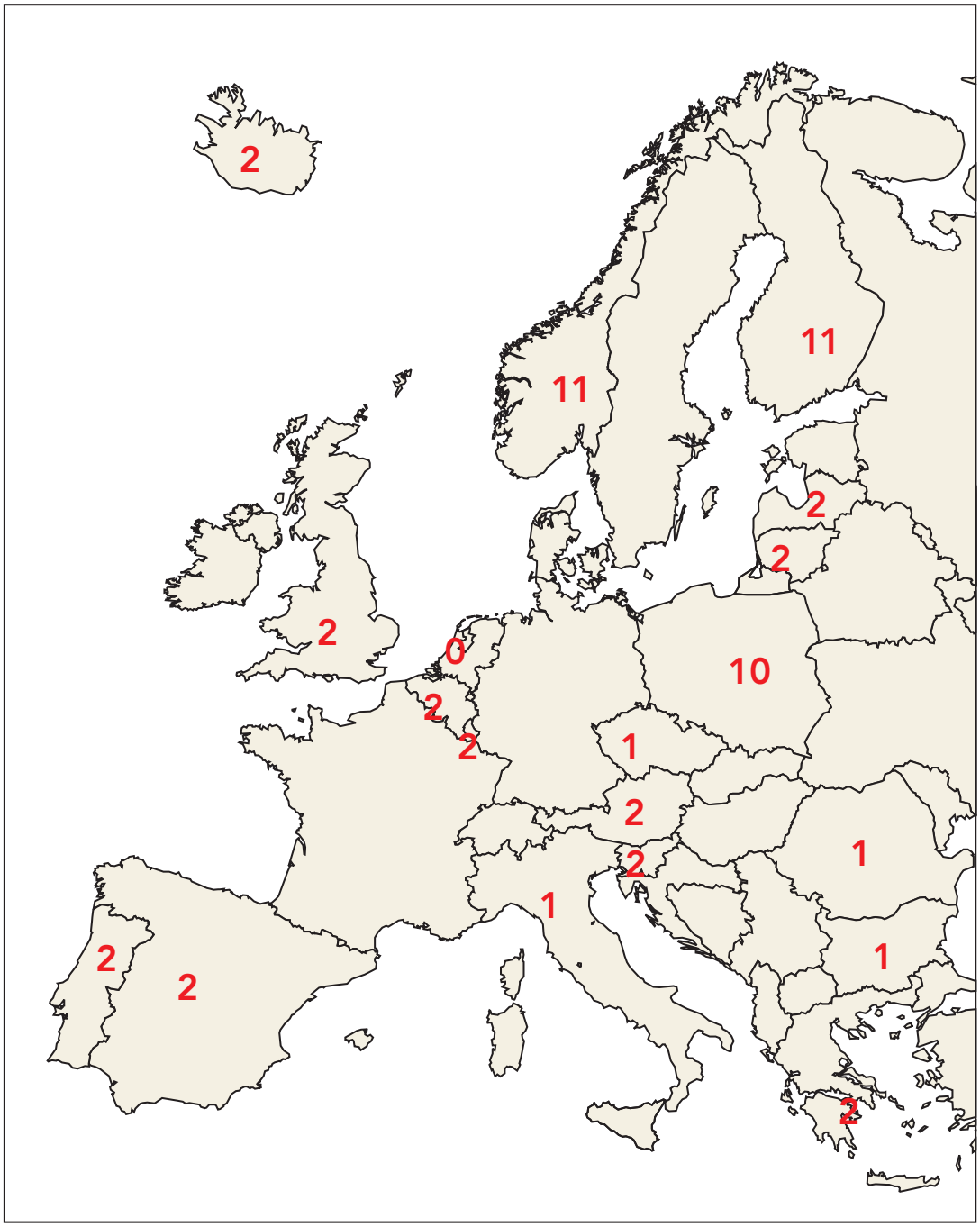


Table 4.4 **Number of selected cities and other areas for EuroAirnet, per country, as of November 2000**

Country	Number of cities/ agglomerations in each population class [1]					% of urban population covered	Number of industrial areas and small towns		Number of rural areas
	Total	1	2	3	4		Ind. areas	Small towns [2]	
Austria	5	1	1	3		79	3	4	31
Belgium	12	1	1	5	5	52	19	5	24
Bulgaria	20	1	2	14	3	~ 70		11	1
Czech Rep.	18	1	2	15		~ 70	3		6
Denmark	3	1		2		63			3
Estonia	1		1			56			3
Finland	2	1		1		42	2		10
FYROM	9	1		3	5	~ 95		1	
Germany	99	14	15	60	10	53	9	9	49
Greece	7	3		3	1	88		3	
Hungary	6	1		5		51			4
Iceland	1			1		~ 70	3		1
Ireland	6	1		2	3	~ 90	1		5
Italy	51	5	4	32	10	40	43	8	19
Latvia	7	1		3	3	89		2	2
Liechtenstein	1				1	100			
Lithuania	1	1				30			2
Luxembourg	1			1		~ 100	1	1	2
Netherlands	9	2	2	5		37			30
Norway	3	1		2		40	1		11
Poland	8	5		2	1	~ 30		1	10
Portugal	7	1	1	5		65	2		2
Romania	10	1	4	5		~ 40		1	1
Slovak Rep.	5		1	4		41			5
Slovenia	3		1	2		~ 90			2
Spain	63	8	9	39	7	70	13		20
Sweden	7	3		4		63		1	4
Switzerland	8	1	3	4		~ 90			6
United Kingdom	38	11	13	14		67	13		27
EEA Total	**315**	**53**	**46**	**179**	**37**		**110**	**27**	**238**
Phare Total	**88**	**12**	**11**	**53**	**12**		**3**	**16**	**36**
Other countries	**8**	**1**	**3**	**4**	**0**		**0**	**0**	**6**
Overall Total	**411**	**66**	**60**	**236**	**49**	**56**	**113**	**43**	**280**

[1] Class 1: > 0.5 mill.; Class 2: 0.25–0.5 mill.; class 3: 0.05–0.25 mill.; Class 4: 0.025–0.05 mill.
[2] Population 0.020–0.025 mill.

Number and types of stations selected for EuroAirnet, as of October 2000 Table 4.5

Country	Number of stations							
	Total	Local pollution stations				Industrial areas and small towns		Rural/ remote pollution stations
		In urban areas			Near city stations	Ind. areas	Small towns [1)]	
		T	I	U				
Austria	80	11	4	22	4	3	4	32
Belgium	107	19		19	4	35	5	25
Bulgaria	53			41			11	1
Czech Republic	58	6	1	27	3	6		15
Denmark	9	3		3				3
Estonia	6	1	1	1				3
Finland	28	5	3	3	1	5		11
FYROM	31	4	5	21			1	
Germany	264	64	16	97	8	21	9	49
Greece	36	7		26			3	
Hungary	19	8	2	5				4
Iceland	8	2			1	3		2
Ireland	17	6		5		1		5
Italy	263	99		35		102	8	19
Latvia	13	3		6			2	2
Liechtenstein	1				1			
Lithuania	5	2		1				2
Luxembourg	5	2				1		2
Netherlands	51	13	1	6				30
Norway	17	2		3		1		11
Poland	31	1	2	17			1	10
Portugal	24	10	1	8		3		2
Romania	32	4	10	16			1	1
Slovak Republic	14	4		5				5
Slovenia	5	1		2				2
Spain	134	48	11	32	4	16		23
Switzerland	33	10	5	12				6
Sweden	17	4		7			1	5
UK	144	49	1	43	6	19		27
EEA Total	**1205**	**344**	**37**	**309**	**29**	**210**	**31**	**246**
Phare Total	**267**	**34**	**21**	**142**	**3**	**6**	**16**	**45**
Other countries	**33**	**10**	**5**	**12**	**0**	**0**	**0**	**6**
Overall Total	**1506**	**388**	**63**	**463**	**32**	**216**	**47**	**297**

[1)] Population 0.020–0.025 mill.

4.3. Coverage of priority pollutants

Pollutants measured at stations for population exposure assessment are shown in Table 4.6, for all countries in total, for each type of area (cities/agglomerations, industrial and rural areas).

The main conclusions are:

Priority 1 pollutants as defined in Annex I of the air quality Framework Directive, especially SO_2, NO_2 and O_3, are monitored extensively, at about 50–70 % of all 1400 EuroAirnet stations, mostly in urban areas. CO and TSP are still measured extensively, while PM_{10} and benzene coverage is increasing; the latter two pollutants are now measured at 321 and 137 EuroAirnet stations, respectively.

$PM_{2.5}$ is measured at only 12 EuroAirnet stations.

Regarding types of stations, there is a fair balance in pollutant coverage between urban background and hot–spot (mostly traffic) stations, although there are fairly large differences between countries in this balance.

Further analysis is needed to develop a more cost–effective European air quality monitoring, in accordance with article 6 of Directive 96/62/EC. This requires measurements as mandatory for zones where concentrations are above the lower assessment threshold as well as in major urban agglomerations. In this context, the still very substantial coverage of SO_2, TSP and CO may be subject to reconsideration.

In summary:

— 80 % of the pollutant–station combinations are in cities/ agglomerations, and most of these combinations include priority 1 pollutants.

— SO_2, NO_2 (and NO_x) and O_3 are the most frequently measured pollutants, covered at 69 %, 64 % and 46 % respectively of the total number of EuroAirnet stations. They are mostly in urban areas, but 22 % of the O_3 stations are in rural areas. CO and TSP are still measured fairly extensively, while Pb coverage is diminishing (but still included at about 200 stations).

— PM_{10} coverage is increasing, although it is still much less measured than SO_2 and NO_2 etc. There are 321 PM_{10} stations in EuroAirnet, 275 in urban areas (background and traffic stations mostly), and 20 in rural areas.

— Benzene coverage is increasing, and is measured at 137 EuroAirnet stations, mostly at background and traffic stations in urban areas.

— $PM_{2.5}$ coverage is starting, but is still very low at only 12 stations in EuroAirnet in 2000.

— The split between station types shows that there is a fairly even split between pollutant coverage at urban background and traffic stations, and in general much less industrial type stations. Table 4.6 shows that there are large variations between countries regarding the selection of background and traffic type stations, although part of this difference may be due to different station classification practices.

Pollutants measured at stations for ecosystems exposure assessment are shown in Table 4.7, for all countries in total. Such stations are mainly in rural areas (at rural type stations), but there are also some in urban and industrial areas for a few countries.

There are some 200 stations in total selected as representative for assessment of ecosystems exposure, naturally mainly in rural areas. At those stations, the priority 1 pollutants (SO_2, NO_2, NO_x and O_3) are well covered. Sulphate and precipitation ions are not well covered at the selected stations, and are measured at only 50–70 % of them. Of the priority 2 pollutants, O_3 precursor gases are measured, but mainly NO_x (continuously), while VOC speciated is measured only at 11 stations.

Pollutants measured at stations for materials exposure assessment are shown in Table 4.8, for all countries total. Such stations have been selected mainly in urban areas, but there are also some in industrial and rural areas for a few countries.

So far, the selection of stations from which the exposure situation for materials is not so extensive, for Europe as a whole. 124 stations

Pollutant coverage at stations for population exposure assessment (number of stations) Table 4.6

Pollutant		Cities/agglomerations			Industrial areas			Rural areas	
	Total	B	T	I	B	T	I	B	T
Priority 1									
SO_2	1 035	417	258	61	14	3	139	139	4
NO_2	977	388	336	47	9	1	58	135	3
NO_x	852	302	311	37	9	1	85	106	1
O_3	696	277	182	32	4	1	37	161	2
PM_{10}	353	152	135	11	11	0	15	29	0
$PM_{2,5}$.5	15	7	6	0	1	0	0	1	0
CO	601	231	286	30	3	0	26	22	3
Benzene	137	60	68	4	0	0	5	0	0
Pb	199	99	28	5	0	0	40	27	0
Sum	4 865	1 933	1 610	227	51	6	405	620	13
Priority 2									
TSP	533	240	156	41	1	2	70	46	3
BS	56	38	18	5	0	0	0	4	0
PAH	91	55	12	10	0	0	8	6	0
Sum	**680**	**333**	**186**	**56**	**1**	**2**	**78**	**56**	**3**
Other									
Other pollutants are measured at the selected EuroAirnet stations: HM (a few or many) at many stations in 13 countries BTEX at many of the Benzene stations VOC (most often speciated) at some stations in 8 countries 1,3 Butadiene at 12 stations in 1 country (UK). HCHO at 1 station in 1 country (Latvia) H2S at 2 stations in 1 country (Slovakia)									

Pollutant coverage at stations for ecosystems exposure assessment (number of stations) Table 4.7

Pollutant	Total	Rural areas	Cities/ Agglomerations	Industrial areas
Priority 1				
SO_2	191	181	10	1
NO_2	189	181	8	
NO_x (ann. aver.)	162	154	8	
O_3	209	203	6	
SO_4 –(aerosol)	51	51	0	
Precipitation ions	76	76	0	
Priority 2				
NO_x (1–hour)	115	115	0	
VOC (1–hour)	11	10	1	
Other				
Other pollutants measured at the selected stations, such as: — N–ions in air at stations in many countries PM_{10} (at many or all) of the stations in 12 countries TSP at many stations in 5 countries Pb and heavy metals at many stations in 8 countries				

have been selected, mainly in urban areas, but some also in industrial areas. Of the priority 1 pollutants, SO_2 is measured at most of the stations, while NO_2 is measured at about half of them, and O_3 at about 30 % of them. Precipitation ions, and sulfate in air, which is important for materials degradation assessment, are according to the information given, almost not measured at these stations. Also, material degradation, in terms of weight loss of steel sample plates (or other materials), which is a Priority 1 parameter at M stations, is not measured at any of these stations, according to the information given.

Table 4.8 **Pollutant coverage at stations for materials exposure assessment (number of stations)**

Pollutant		Cities/agglomerations			Industrial areas			Rural areas
	Total	B	T	I	B	T	I	B
Priority 1								
SO_2	109	56	22	14	0	0	10	7
NO_2	77	34	23	8	0	0	8	4
O_3	44	22	8	2	0	0	5	7
Weight loss, steel plates	0							
Priority 2								
Precip. ions	1							1
SO_4 –aer)	1	1						
Other								
These material exposure stations are a selection of the population exposure stations selected (see Table 4–6), except for a few stations where there are special stations for material exposure purposes (as in UK). At the stations, there are in general more pollutants measured related to population exposure assessment.								

5. EuroAirnet on the Internet

The EuroAirnet documentation for each of the countries is made available on a EuroAirnet Internet site. This documentation includes:

— station information tables (Excel format), giving the metadata for each station;

— EuroAirnet evaluation tables, where the selection made in each country is evaluated by ETC/AQ relative to criteria, and where country NRCs can re–evaluate their selection. This is a stepwise procedure which is documented in these tables;

— country summary note, summarising the status for EuroAirnet selection in each country, specifying the shortcomings;

— reports from country visits conducted to NRCs under ETC/AQ subventions.

The site contains in addition the addresses of contact persons in each country, as well as summarised EuroAirnet status description, as presented in this report.

The address to the EuroAirnet site is presently:

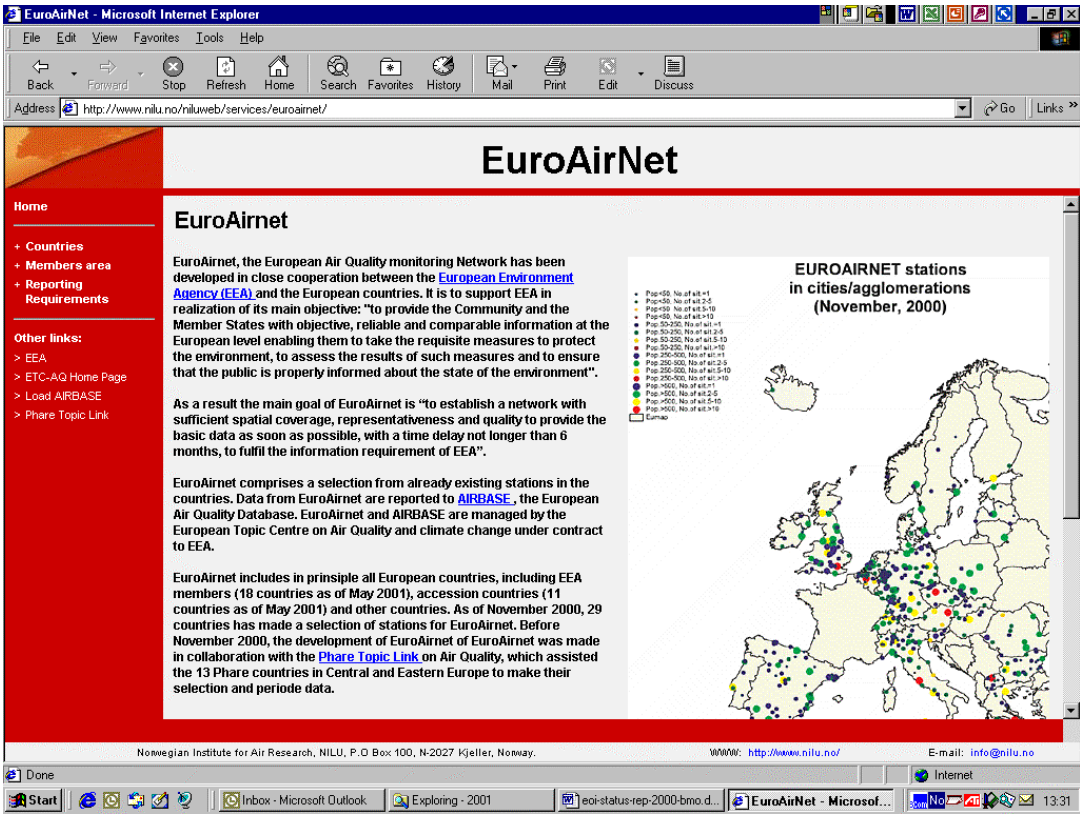
http://www.nilu.no/niluweb/services/euroairnet

A link to EuroAirnet from the ETC/ACC web site (http://air-climate.eionet.eu.int/) will be established.

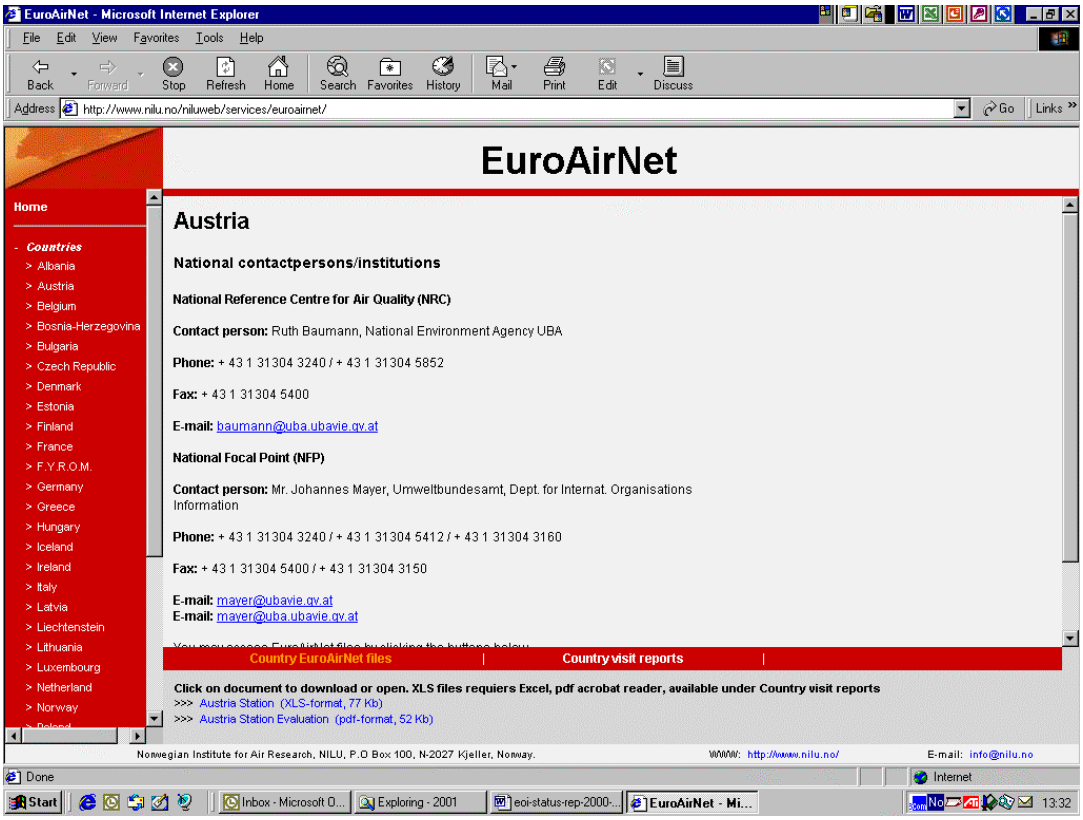
Examples of the contents of the web site are shown below.

The Airbase web site Airview can be opened from the EuroAirnet site, and the Airbase contents, including the actual air quality data, can be displayed in the EuroAirnet site, so EuroAirnet and Airbase can be looked and worked at concurrently.

EuroAirnet homepage



Example 'Country' page (Austria)



6. Fulfilment of EuroAirnet criteria

6.1. Assessment of population exposure

6.1.1. Area and station selection, cities and agglomerations

Area selection

The EuroAirnet criteria are summarized in Annex 1.

The present selection is close to fulfilling the criteria (Table 6.1). Seven of the largest cities (class 1) are still missing, in France, for which we do not yet have a EuroAirnet selection, and the city Poznan in Poland.

For class 2 and 3 cities, the criteria for Europe as a whole are fulfilled well. This is also the case for almost all countries individually, but ETC/AQ recommend that the following countries should select more of their middle–sized cities to fulfil the criteria:

— Estonia and Finland (some Class 3 cities)
— Lithuania (some Class 3 cities)
— Poland (Class 2 and Class 3 cities).

There may be several reasons for these shortcomings, such as in Finland, where a selection will be made after an upgrading of the QA/QC procedures in the networks.

We assume that each country has considered the need to select Class 2 and Class 3 cities with differing degree of industrialisation, as they should according to the criteria. In this context, 14 of the 29 countries have included a total of 65 industrial type stations in the selected urban areas.

In total, the selection is rather impressive, and when data are reported for this full selection, there will be a basis for assessing the population exposure to pollutants in urban areas, based upon measurements. This is one of the main objectives of the first stage of EuroAirnet.

Station selection

The criteria requires that all (relevant) stations in the selected cities are included. Annex 2 lists the number of stations which have been selected in each city, as a function of city size. It is our impression from the re–evaluation carried out by many countries that for those cities the selection of the stations is based upon an evaluation of relevance and suitability, so that we have in EuroAirnet most, if not all, of the relevant existing stations in the selected areas.

The extent of station selection is summarised in Table 6.2, in terms of

average number of stations per city size class, and number of cities in each class of number of stations.The table also gives population data related to this.

The number of stations in a city varies from 26 (London) and down to 1. There are 273 cities and towns with only one station, i.e. about 60 % of all cities selected. The average number of stations in cities > 500 000 inhabitants is 6.1. Five urban areas have selected more than 15 stations.

On the average for all cities and towns, each station 'represents' on the average 126 000 inhabitants, ranging from 197 000 in the largest cities (even if they do have the largest number of stations) and down to 22 000 people per station in the smallest towns.

Number of selected cities and agglomerations according to size class, relative to criteria, total for all countries Table 6.1

City class	Population range	Criteria (% to be selected)	Actual selection	
			No of cities	% of all
Class 1	> 500 K	100 %	65	90 %
Class 2	250 – 500 K	> 25 %	60	62 %
Class 3	50 – 250 K	> 10 %	237	23 %
Class 4	25 – 50 K	No criteria	49	
Small towns	< 25 K	No criteria	35	
Total			446	

Table 6.2 **Number of stations and population covered in cities and small towns**

Average number of stations per city class			
City population class (population in thousands)	**Stations per city Average and range**	**Population covered (million)**	**Population per station**
> 500	6.1 (1 – 26)	77.4	197 000
250 – 500	2.7 (1 – 10)	22.6	135 000
50 – 250	1.5 (1 – 8)	24.1	70 000
< 50	1.1 (1 – 2)	2.3	22 000
Total/average	2.4 (1 – 26)	126.4	126 000
Number of cities in classes of number of stations			
Number of stations	**Number of cities**	**Population covered (million)**	**Population per station**
> 15 stations	5	14.6	146 000
10–15 stations	6	9.2	139 000
5–10 stations	32	29.4	143 000
3–4 stations	65	28.2	132 000
2 stations	73	18.6	128 000
1 station	273	26.0	96 000
Total/average	454	126.4	126 000

Table 6.3 shows the variations between countries in urban population covered by the selection. The number of people 'represented' by each station varies from about 50 000–60 000 (in as much as seven countries, e.g. in Austria, Belgium) and up to 250 000–300 000 (in Poland, Sweden and UK).

6.1.2. Area and station selection, Industrial areas outside cities

The criteria says that industrial areas should be selected in which the air pollution concentrations for one or more pollutants approach WHO guidelines or new EU limit values.

13 countries have selected in total 216 stations in 113 industrial areas (Tables 4–4 and 4–5). All of these have been selected for assessment of population exposure.

This is a rather impressive selection of industrial areas in Europe with potential air quality problems. In addition, many countries have stated that they do not have industrial areas in the country with air quality problems. We don't yet know fully the size of the population represented by these areas and stations.

We have no means for checking whether the selection fulfils the criteria. It is left to the countries themselves to make sure that the selection is complete.

6.1.3. Area and station selection, Rural areas

The criteria say that each country 'should evaluate the extent of rural monitoring necessary ...'. As a guide, 50 % of the population should be covered in terms of being reasonably well represented by monitoring stations'.

20 countries have selected totally 220 stations in rural areas which are considered to represent exposure of the rural population. There is no assessment so far of the size of the population in each country represented by these stations.

6.1.4. Pollutant coverage

At the total of 1323 stations selected for population exposure, the priority pollutants are covered as follows:

For Priority 1 pollutants:

— SO_2 at 78 % of stations
(at almost all urban background stations, and at 65 % of the traffic stations)
— NO_2 at 74 % of stations
(same at all station types)
— NO_x at 65 % of all stations
— O_3 at 53 % of stations
(more often at urban background stations than traffic and rural stations)
— CO at 45 % of stations
(74 % at traffic stations)

Urban population covered by EuroAirnet in each country, and inhabitants represented by each station — Table 6.3

Country	City population covered (> 20 000)		Population per station (x 1 000)
	Millions	Percent	
Austria	2.34	79	56
Belgium	2.48	52	55
Bulgaria	3.70	~ 70	49
Czech Rep.	3.11	~ 70	91
Denmark	1.64	63	273
Estonia	0.41	56	167
Finland	0.97	44	58
FYROM	1.04	~ 95	55
Germany	23.00	53	121
Greece	4.67	88	130
Hungary	2.49	51	155
Iceland	0.16	~ 70	55
Ireland	1.31	~ 90	119
Italy	12.45	40	88
Latvia	1.23	89	112
Lithuania	0.60	30	86
Luxembourg	0.10	~ 100	50
Netherlands	2.71	37	129
Norway	1.03	40	205
Poland	6.20	~ 30	295
Portugal	1.46	65	77
Romania	3.97	~ 40	69
Slovak Rep.	0.92	41	92
Slovenia	0.52	~ 90	170
Spain	16.45	70	173
Sweden	3.15	63	286
Switzerland	2.48	~ 90	92
United Kingdom	24.57	67	251
Total/average	125.35	56	126

— PM_{10} at 27 % of stations (35 % at urban background and traffic stations)
— Benzene at 10 % of stations (about 15 % at urban background and traffic stations)

Of the Priority 2 pollutants, TSP is measured at a large proportion of the stations (40 %), and PAH at only 91 stations (7 %).

Thus, the classic pollutants SO_2 and TSP, and also CO, are still measured to a large extent. Of the 'problem pollutants' currently of most concern, NO_2 is measured extensively, and O_3 to a somewhat lesser extent. PM_{10} and benzene, which are the pollutants for which new EU limit values will be exceeded to the largest extent, is measured at only 27 % and 10 % of the stations respectively, although somewhat more intensively in urban areas.

6.2. Assessment of ecosystems exposure

6.2.1. Area and station selection

The criteria require that 'each country should develop its own plan for ecosystems monitoring, such that a representative picture of exposure of ecosystems can be provided'.

26 countries have selected a total of 286 stations for assessment of ecosystems exposure. About 75 of them are EMEP stations. As a comparison, the full EMEP monitoring network consists of 121 stations (of which 21 are O_3/VOC stations only).

6.2.2. Pollutant coverage

The Priority 1 pollutants SO_2, NO_2 and O_3 are covered well at the ecosystems stations, with monitoring at about 70 % of the

stations. Sulphate and precipitation ions are much less covered. These pollutants are measured at respectively only 51 and 76 of the stations included in EuroAirnet. Obviously, not all available data are reported to Airbase since some 75 of the stations selected are EMEP stations, where sulphate and precipitation is definitely measured.

6.3. Assessment of materials exposure

6.3.1. Area and station selection

The criteria require that in at least 10 % of cities with population above 50 000, stations for assessing material exposure and degradation should be selected, with at least 3 stations per city (high and average urban background, and a traffic exposed area).

Materials exposure stations have been selected in 59 cities, which is about 16 % of the cities above 50 000, so the criteria is fulfilled for EuroAirnet as a whole. There are 124 million stations, about 2 per city on the average.

6.3.2. Pollutant coverage

Of the Priority 1 pollutants, SO_2 is measured at 88 % of the stations, while NO_2 and O_3 are less well covered (62 % and 35 % of stations, respectively). Priority 2 pollutants/ parameters are almost not covered, such as precipitation ions and sulphate. Also, material degradation in the form of weight loss of material sample plates, which are priority parameters, is not measured at all at any of the selected M stations.

6.4. QA/QC

6.4.1. Data quality objectives (DQO)

The criteria for DQOs are described in Annex 1.

DQO for station–by–station comparison (for same station class) and for trend detection at any one station are

- Accuracy < = 10 %, precision < = 2ppb (gaseous pollutants); to be defined for particles
- Temporal data completeness: > = 90 %
- Representativeness: requires more analysis

It is recognised that these DQOs are rather difficult to achieve. However, they are minimum requirements for mapping air quality over Europe and are generally not sufficient for assessment of trends based on EuroAirnet data. All network operators with stations included in EuroAirnet should strive to accomplish these objectives.

ETC/AQ also recognises that further work is needed to define DQO in more detail, and to provide more clear guidance on how representativeness and overall quality should be determined.

Each country and network has been asked to report on its DQOs, through the QA/QC questionnaire distributed to them. 12 countries have returned the questionnaire so far, and 10 of the countries reported on their DQOs, summarised in Table 6.4.

Accuracy and precision

Most networks have a DQO for accuracy and precision of 15 % for SO_2, NO_2 and O_3, while for particles (PM_{10}, TSP), the DQO tends to be a bit higher (20–25 %). Even so, some networks report a DQO of 10 %, such as Finnish networks, Vilnius, Zurich Cantonese network, Swiss national NABEL network, and Romanian networks. Riga even reports 5 % accuracy DQO for gases.

A DQO for accuracy and precision of 15 % is in line with the requirements of the new EU AQ Directives (for SO_2 and NO_2).

Time coverage

The criteria state that the time coverage of measurements at a station, on an annual basis, should be at least 90 %.

Most of the countries which have filled in that part of the QA/QC questionnaire (12 countries) states that their objective is at least 90 % coverage (although a few of these countries reports actual time coverage instead of the objective). Exceptions are Poland, which has a 75 % coverage objective, some Lander in Germany with less than 90 % coverage objective, and some countries which have lower coverage objective for some pollutants related to manual sampling (e.g. Switzerland: > 45 % for TSP, Bulgaria: 75 % for SO_2 and NO_2).

Representativeness area of stations

This is a very useful characteristic of a station, essential in using monitoring data for assessing exposure. The area representativeness (RA) of a station is, however, difficult to assess.

DQOs for accuracy and precision (%) for networks, as reported by countries — Table 6.4

	SO_2	NO_2	O_3	CO	PM_{10}	Other
Austria			15			
Kärnten, Nieder Österreich, Salzburg, Steiermark, Tirol, Vorarlberg, Ntl. Background Network	15	15	15	15		
Ober Österreich	<15	<15	<15	<15		TSP: < 15
Wien	15	15	15	15		TSP: 25
Bulgaria						
Ntl. AQ Mon. Network	Man: 5	15				
	Auto: 1–2	1–2	1–2			
Estonia						
Tallinn	15	15	15	15		Pb, TSP: 25
EMEP	15	15	15	15		
Finland						
Helsinki	10/1	10/1	10/1	10/1	15	$PM_{2,5}$: 15
S. Karelia	10	10			15	TSP: 20
Ntl. background AQ Network	10/1	15/2	10/1			
Latvia						
Riga	5/?	5/?	5/?			BTX: 5/?
Background Network	20/?	20/?	20/?			BTX: 20/?
Lithuania						
Vilnius	10	10	10	10	10	
Backgrond Network	(actual accuracy is reported)					
Germany						
Berlin	10	10	10	10	10	TSP, Be: 10
Brandenburg	10	10	10	15		TSP(ß):20
Rheinland–Pfalz	<15	<15			<25	
Saarbrücken	<10	<10	<10	<10	<10	
Sachsen–Anhalt	15	15	10	15	25	BTX:15
Romania						
Copsa Mica	10/2	10/2				TSP, Pb, Cd: 10/2
Galati		10/2				TSP, C_6H_5OH: 10/2
Iasi	10/2	10/2				NH_4: 10/2
Sibiu, Ploiesti	10/2	10/2				TSP, Pb, Cd: 10/2
Resita, Targu Mures, Timisoara	10/2	10/2				TSP, NH_3: 10/2
Sweden						
Stockholm	15	15	15	15	15	BTX: 15
Switzerland						
Lausanne	5	5	5			
Zürich, Canton	10	10	10			
Ntl. AP Mon. Network	10	15	10			TSP, NMHC: 10

Most countries have assessed the RA of their stations, and most of them have assessed it individually for each station. The others have given RA ranges for each type of stations. The RA assessment of each country was presented in the EuroAirnet status report for 1999. As of now, there are some modifications since then for some countries, but basically the ranges are the same, so a table showing the RAs in each country is not given in this report. We have no information as to the methods used in the RA assessments.

It will be considered how to use the estimated RAs in the exposure assessments that can be made from the EuroAirnet air quality data (see further on this topic in Chapter 8.3.

6.4.2. QA/QC Class of networks

In the classification scheme for data quality control procedures of AQ networks, the QA/QC classes go from Class 1 (best class with full accreditation and documentation) to Class 5 (no documented procedures), see Annex 1.

In the QA/QC questionnaire, countries and networks give the information necessary to classify their QA/QC procedures. 12 countries have responded to this. Other countries have included their own QA/QC classification evaluation in the EuroAirnet Station Information Tables. All this is included in Table 6.5

The table shows that most networks for which we have information have fully or partly documented QA/QC procedures. A few networks formally fulfil the requirements for QA/QC Class 1. Most networks are in classes 2–4. Some networks have no documented procedures, and are thus in class 5, not acceptable in EuroAirnet.

There is an awareness of the data quality issue in most networks.

Table 6.5 **QA/QC classes of networks in countries, as classified by ETC/AQ from questionnaire information, or by NRCs**

From station information tables filled in by NRCs (or by PTL)		
Country/networks	**QA/QC class**	**Documentation**
Czech Republic	1, 2, 4	
Denmark	3	
Germany	2 Berlin, Mecklenburg–Vorpommern, Niedersachsen, Rheinland–falz, Saarland 3 Brandenburg, Hamburg, Hessen, NordRhein–Westphalia, Sachsen–Anhalt, Schleswig–Holstein, Thüringen, UBA Background Network	
	4 Baden Württemberg ? Bavaria, Sachsen	
Greece	?	
Hungary	4	
Iceland	2	
Ireland	2/3	
Italy	?	
Liechtenstein	2	
Luxembourg	2	
Netherlands	1	
Norway	1,5	
Portugal	?	
Slovak Republic	4	
Slovenia	4	
Spain	2a, 3, 4, 5	
United Kingdom	3	

From returned QA/QC questionnaires		
Country/networks	**QA/QC class**	**Documentation**
Austria		
Burgenland, Kärnten, Salzburg, Steiermark, Tiron, Vorarlberg, Wien, Ntl. Background Network	2 or 4	Yes
Oberösterreich	2	Yes
Niederösterreich	4	Yes
Belgium		
Brussels, Flandern, Wallonia	2	Cal. doc. OK, but no QA/QC plan
Bulgaria		
Ntl. AQ Mon. Network	4	Yes
Estonia		
Tallin	1	but: min. QA/QC plan
EMEP	1	
Finland		
Helsinki, S. Karelia	4	
Ntl. Background AQ Mon. Network	2	
Latvia		
Riga	2	
Background Network	1?	
Lithuania		
Vilnius	4	
Background network	4	
FYROM		
Skopje, Veles	4	
Germany		
Berlin	4	
Hamburg	(4)	No documented QA/QC plan
Brandenburg	4	
Saarbrücken	?	Not specified
Sachsen–Anhalt	(4)	No documented QA/QC plan
Poland		
Wroclaw Local, Warszawa Local, Silesia, Lodz and Woclaw NNBS	4	Partly. No operations manual
Krakow	3	Yes
Ntl. Net. Basic Stations (NNBS)	4	Yes ('for some of the stations')
EMEP	4	Yes (ref. to EMEP Manual)
Romania		
Copsa Mica, Galati, Iasi, Sibiu, Ploiesti, Resita, Targu Mures, Timisoara	(4)	No
Bucharest	5	
Sweden		
Stockholm	3	Yes
'Urban Network'	(1)	Partly (no QA/QC plan)
EMEP	1	Yes
Switzerland		
Zürich Canton	3	Yes
Zürich Local	(2b)4	QA/QC plan in preparation
Basel	3 (O_3)	Yes
	4 (NO_x, SO_2)	Partly
	5 (PM_{10})	
Lausanne	4	Partly (in preparation)
Bern, Lugano	(4)	Partly
St. Gallen	5	
Ntl. AP Mon. Network	1	Yes

7. Data reporting and data quality

7.1. Data availability from countries

The present schedule of data reporting to Airbase follows the EU EoI decision requirements: data to be reported by 1 October the following year.

Most countries state that they have the EuroAirnet data available for a given year in a national database ready to be transferred to Airbase by June the next year. Some countries need nine months, and for some pollutants (requiring sampling and subsequent analysis in a laboratory) up to 12 months are needed by a few countries.

The actual situation on reporting to Airbase is more variable. The data exchange module (DEM) has been developed and made available in improved versions every year since 1997, although the improved versions to be used for each year's reporting have sometimes been available after the set date of 1 July. This has resulted in some delay for some countries in sending in the DEM to the European Commission and ETC with data loaded. It is expected that when DEM versions are available in time, or when DEM version is to be used, most countries will not have a problem in meeting the 1 October deadline.

It has been an aim for the EEA and ETC/AQ to collect annual data from countries earlier than 1 October in the following year. Since most countries state that their data are available in central databases six months into the year, it would be technically feasible for countries to report before 1 October. So far, we have not urged countries to do so.

7.2. EuroAirnet data reporting to Airbase

Reporting of data from EuroAirnet stations takes place through the DEM. The countries are requested to include the EuroAirnet stations in their reporting, and mark them as such in the DEM and thus in Airbase. Phare countries and also other countries, which are not required to report according to EoI, report only EuroAirnet data to Airbase.

ETC/AQ has so far not checked to what extent the EoI stations reported to Airbase actually correspond with the EuroAirnet stations. However, many EU and EEA countries have informed us that there is full or almost full correspondence. For the Phare countries, all stations in Airbase are EuroAirnet stations. Table 7.1 presents the number of time series of 1998 data in Airbase and the number of EuroAirnet stations selected, total for all countries, which compare fairly well. It is likely that the air quality data for most, if not all, of the EuroAirnet stations are actually reported to Airbase.

Table 7.2 shows the number of 1998 time series transferred from each country to Airbase.

Table 7.1 **Number of EuroAirnet stations and 1998 time series in Airbase compared**

Pollutant	EuroAirnet stations		Time series in Airbase
	Population exposure (mainly urban stations)	Ecosystems exposure (mainly rural stations)	
SO_2	1 035	260	1 196
NO_2	980	190	1 172
O_3	695	210	903
CO	600	20	496
PM_{10}	350	50	261
TSP	560	50	681

Number of 1998 time series per pollutant transferred from each country to Airbase — Table 7.2

	SO_2	SA	PM_{10}	TSP	BS	NO_2	Pb	CO	O_3
Austria	151			121		139		66	109
Belgium	61	16	17		27	37	46	13	24
Denmark	7			5		8		4	7
Finland	15		6			16		5	11
Germany	436		63	343		430			363
Italy	144			98		152		202	110
Netherlands	40		19		14	45		22	38
Spain	105		34	77		108		81	76
Sweden	9		3			16		1	4
United Kingdom	65	224	50		224	85		63	72
EU countries	1 033	240	192	644	265	1 036	46	452	814
Bulgaria	50		1	39		42	24	11	10
Czech republic	56		56			56		26	33
Estonia	6			1		6		1	2
FYROM	23				26				2
Hungary	1					1			1
Latvia	2					2			1
Poland	13		8		6	14		2	17
Slovak Republic	9			7		9		5	15
Slovenia	3					2			5
Non–EU countries	163	0	65	47	32	89	24	45	86
All countries	1 196	240	257	691	297	1 076	70	500	900

7.3. Data quality and validation

The work of ETC/AQ related to control and assessment of the quality of the data reported from countries to Airbase involves:

— development of QA/QC criteria designed to assist countries in assessing and improving their QA/QC procedures, and thus the accuracy of the data (see Chapter 6.4);

— automatic control of certain aspects of data completeness and quality as data are loaded into the DEM;

— validation of the data as received by Airbase.

The validation of the data received in Airbase is partly automatic, and partly manual. The basis for the automatic part of the validation is the requirements set for data in the EoI decision. In addition, there is a manual part where data statistics are checked for obvious mistakes. When the data are prepared for EoI reporting, a two–step procedure is followed:

1. Data series are checked automatically for time coverage; series that do not fulfil the time coverage requirements of the EoI are kept in Airbase, but not included in the EoI reporting.

2. The statistics tables printed out from the Airbase statistics calculations routines are checked manually for results that obviously seem erroneous.
   Examples of such errors found while checking the 1998 data:
   — statistics values (average, 98–percentile, maximum) which are reported as 0 (zero) or negative.
   — some extremely high values (e.g. several thousand µg/m^3, CO excluded) which were re–checked and were rejected.

   Such errors may originate either from errors in the raw data, or during the process of transferring data via DEM to Airbase.

For 1998 data, this EoI data control process resulted in the non–acceptance of some 500 time series (total for all pollutants) from the EoI summary reports. This is an indication

that there is room for improvement of countries' QA/QC procedures, to reduce the number of errors and to exclude from their own databases erroneous data.

The actual accuracy of the data reported by the countries, and to what extent they actually fulfil the specified DQOs are items for further study.

8. EuroAirnet improvements 2000

EuroAirnet has been improved in 2000 mainly through evaluation of the selection of monitoring stations, extended and improved selection of stations in many countries, and provision of more metadata about stations.

Further work to improve EuroAirnet has taken place to follow up the recommendations from member countries agreed upon at the 1999 EIONET Air Quality workshop at Santorini. The recommendations, briefly described, were:

- Improve selection criteria
- Provide guidance on location/ representativeness of stations, also with regard to pollutants
- Develop quantitative station class criteria, and enhance metadata requirements
- Re–evaluate criteria on data quality objectives
- How to define 'sufficient coverage'
- Connect requirements for EuroAirnet with those from the EU Directives
- Complete Stage 1 of EuroAirnet.

The results of work in 2000 is summarised in the following sections. The comparison between EU AQ Directives and EuroAirnet was addressed in Chapter 3.

8.1. Quantitative station classification criteria

The need for more quantitative criteria for classifying monitoring stations has also been considered as part of the EU AQ directives' work, and particularly within the EU Working Group on the EoI decision and its work in 2000. ETC/AQ presented a proposal for more quantitative criteria already in 1998, but at that time it was considered that one should not deviate from the classification in the EoI Decision. Now work has started to modify the EoI classification to make it more quantitative. ETC/AQ was invited to take part in the working group, to ensure that there would be correspondence between the EoI Decision and EuroAirnet, and so that the WG would benefit from the proposals carried forward by ETC/AQ.

The station classification scheme of the modified EoI decision is shown in Table 8.1.

The scheme is quite similar to the 'old' EoI scheme, but 3 levels of classification/data have been specified:

— Level 1: Area type (same as the 'old' level 2)
— Level 2: Station type (same as the 'old' level 1)
— Level 3: Metadata. This level is additional to the 'old' scheme.

Level 3 will improve the applicability of the EoI/ EuroAirnet data in terms of using them for assessments and comparison of air quality in various areas, cities and countries. Table 8.2 specifies the additional metadata requested for various types of stations.

The quantitative criteria for classifying stations in the new EoI scheme are currently being developed by the EoI Working Group. The types of data that will be used for quantitative classification are specified in Table 8.3. In the classification scheme, the location data types used for classifying will be quantified, and the class of a station will follow from comparing the station's location data types with those in the classification scheme. It is realised that it will be difficult to make a scheme that will cover all types of existing stations in such a way that an unambiguous classification of all stations can be made in the new scheme.

The classification scheme may be used both for classifying existing stations, and for locating new stations in a network.

8.2. Re–evaluation of data quality objectives

The EuroAirnet DQO for accuracy and precision is stricter than the requirements in the new EU AQ directives. The directives specify a combined accuracy and precision of 15 % for SO_2, NO_2, NO_x, CO, O_3 and 25 % for PM_{10}, Pb and benzene. The DQO of EuroAirnet signals to the countries to strive for a 10 % accuracy for all pollutants in their EuroAirnet data, with a precision DQO in addition. This DQO is connected to the monitoring objective of 'mapping and comparability', i.e. the use of the data to

Table 8.1 **Modified EoI Station Classification Scheme**

Level 1	**Level 2**	**Level 3**
Area type	**Station type**	**Metadata**
Urban	Background Traffic Industrial	Same as in existing EoI In addition: • Monitoring objective • NUTS level IV • European Station Code • City population • Representativeness area • Traffic data (for T–stations • Industries (for I–stations) • Rural station classes: — Near city — Regional — Remote
Suburban	Background Traffic Industrial	
Rural	Background Traffic Industrial	

Table 8.2 **New EoI Station Classification Scheme**
Additional meta–data for stations (Level 3), necessary to provide a basis for comparison between stations

Traffic stations	• Distance from the kerb • Width of street/road (between kerbs) • Length between building facades (only for street canyons) • Height of building facades (average over both sides of street, in the general area of the station) • Traffic volume (total both directions, annual daily average, AADT) • Traffic speed (typical, day–time) • Heavy duty fraction of traffic (daily average over the year)
Industrial stations	• Type of industry (ies) • Distance (length) to source/source area • Direction sector to source/source area
Rural background stations	• Distance to nearest built–up area or major source area

Table 8.3 **Types of data to be used for classification of background stations**

Location criteria, background stations
• Area characteristics • Population density • Minimum distance to limit of the area • Minimum representativeness radius (RR) • Minimum distance to traffic • Minimum distance to individual point sources Min. distance to major sources (cities, industrial areas, power plants) • Minimum distance to agricultural activities

compare and map air quality across European areas.

As stated in the EEA TR12 Report ('Criteria for EuroAirnet'):
'A 10 % accuracy means that the statistics of two stations must differ more than 20 % from each other to be sure that they measure different pollution levels. We consider this as an acceptable least accuracy for broad comparisons of air pollution across Europe, in the first phase of EuroAirnet'.

The results from the QA/QC questionnaire (Table 6.5) show that of the 10 countries which have responded so far, some have an accuracy DQO of 10 %, some have 15 %, and for TSP and PM10 it is 20–25 % for some countries. Note: we have few indications of the actual accuracy of the data reported.

This indicates that it is not unreasonable to keep the EuroAirnet DQO for accuracy of 10 %, as a request for countries to strive towards improved accuracy of their monitoring data.

8.3. Improved guidance on station location and representativeness

The differences in practices used in various countries to classify station types indicate that more specific guidance may be needed. This is also revealed from comments given by some countries in the EuroAirnet station evaluation tables. It was also recommended by the participants of the Fourth Eionet Workshop in Santorini in September 1999.

Such guidance will be provided as part of the modified EoI classification scheme (section 8.1).

Some of the topics and problems to be dealt with are:

Traffic stations:
Location:Neither in EoI (97/101/EC) nor in EuroAirnet it is specified exactly how traffic stations should be located. In the EuroAirnet Criteria Report, both 'kerbside' and 'other types' of traffic stations are mentioned, and some specific meta–data are requested (see Table 3.1).

It might be proposed in a new classification scheme to separate more specifically kerb–side stations from stations more generally located in traffic exposed areas. This latter type might actually be considered a type of urban background station. Kerb–side stations will be better defined in terms of the street and traffic that dominates the air pollution level at the station. They are well suited to compare traffic generated air pollution in different cities and countries, related to specific traffic parameters.

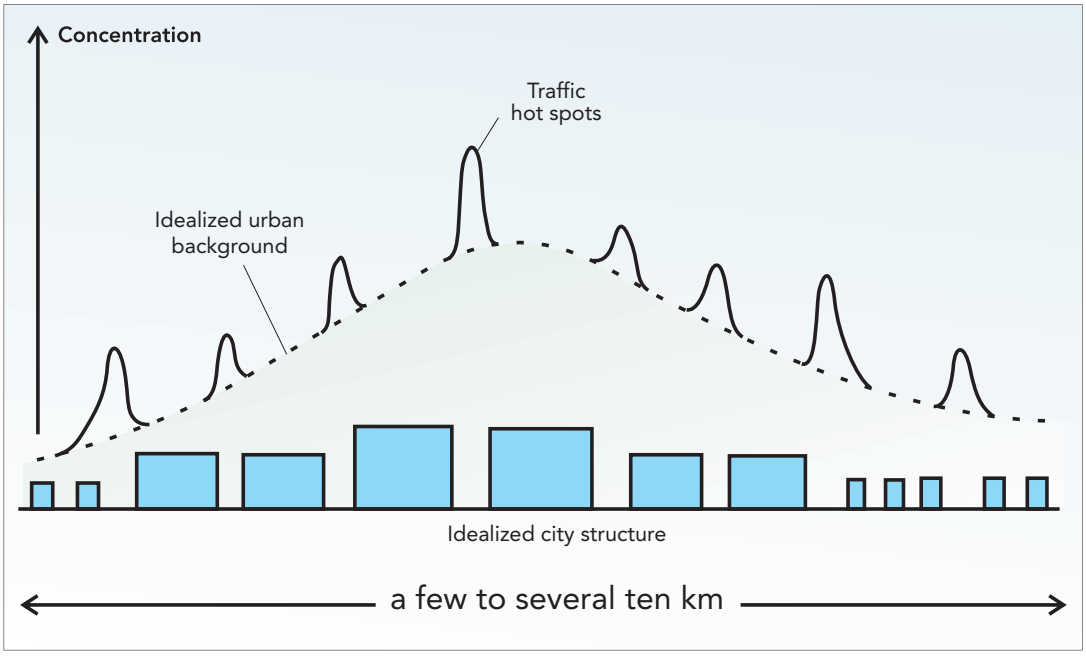
In view of the previous paragraph, the present 'length of road' concept replacing the 'representativeness area' for traffic stations should be re–evaluated.

Urban background stations
In Figure 8.1 a schematic view of urban air pollution levels, the urban background pollution level is shown as the general level of pollution on the spatial scale of a few city blocks or larger. Upon this is superimposed the hot–spot concentrations existing along/near streets and other locally dominating sources.

The objective of 'urban background' type stations would be to represent the general level of an area, representing up to a few km^2, excluding the higher–level sub–areas near the localised sources. This does not mean that urban background stations shall be placed far away from all such local sources (such as streets), but it does mean that they should be located such that they represent the general level, and thus such that they are not considerably influenced by the emissions from the localised sources.

Station representativeness area for each pollutant
The representativeness area normally differs from pollutant to pollutant. This should be reflected in the guidance, and is a topic for further work.

Schematic view of city structure and pollution levels Urban background and traffic hot spot examples Figure 8.1



8.4. Sufficient coverage and exposure assessment

A recommendation from the Fourth Eionet Air Quality Workshop in Santorini was that ETC/AQ should evaluate what should be considered as 'sufficient' spatial coverage of stations. One background for this recommendation was that there is a trade–off between coverage (i.e. number of stations to be operated) and the quality that can be put into the data from the monitoring, since there is in practice limitations to the capacity that can be put into the monitoring efforts.

The spatial coverage of EuroAirnet is 'sufficient' when the exposure situation to air pollution in Europe can be assessed with reasonable completeness. This statement cannot be used as a basis for a precise definition of the term 'sufficient'. It will also depend upon whether the assessment shall be made from monitoring data (Stage 1), or from a combination of monitoring and modelling (Stage 2).

The present EuroAirnet selection represents an urban population of about 234 million people (about 56 % of the urban population in the 29 EuroAirnet countries, see Table 8.4). The total rural population in these countries is about 197 million, and they are represented by the 304 rural stations included. There are thus on average about 126 000 people represented by each urban monitoring station, and about 650 000 people by each rural station. It is a challenge to devise a methodology for assessing the exposure situation based upon these data with sufficient accuracy/precision? (certainty?), whether it is to assess the urban population exposure based upon a certain number of monitoring stations in each city, or whether it is to assess ecosystems exposure.

Regarding the urban situation, there are eleven cities each with more than ten monitoring stations in EuroAirnet. These cities could be studied in detail, in the development of a methodology of how to use urban monitoring data to assess the spatial exposure distribution situation in these and other cities.

ETC/AQ will as part of its assessment activities, try to develop assessment methodologies based on monitoring and modelled air quality data from EuroAirnet and other sources and, in order to use the available data as efficiently as possible, investigate the relationship between spatial coverage and accuracy and completeness of the assessment.

Table 8.4 **Population covered by the EuroAirnet monitoring stations**

	Total population millions	Fraction of population covered by stations	Inhabitants per station
Total population, 29 countries	431		
Urban population (in cities >20 000)	234	56 %	126 000
Rural population	197	?	650 000 (1)

1) Assuming the full rural population is covered by the rural stations.

9. Concluding remarks

At the end of 2000, it could be concluded that Stage 1 of EuroAirnet has been consolidated to the extent that:

— all countries of the EEA/Phare area of Europe except three — France, Albania, Bosnia–Herzegovina — have selected EuroAirnet stations, and have re–evaluated and modified their selection;

— the selection fulfils to a considerable degree the criteria;

— countries report EuroAirnet station data extensively to Airbase.

The EuroAirnet work needs to be continued to further improve the selection of stations, quality of monitoring and reporting, and also to apply the EuroAirnet data effectively in assessments of European air quality.

Important tasks in the continuing work are:

— ETC to develop, in cooperation with WHO, exposure assessment methods, using monitoring data in combination with model results;

— ETC to work towards including EuroAirnet metadata into the DEM;

— countries to keep improving their EuroAirnet area and station selection, based upon the topic 'exposure — spatial coverage';

— countries to complete the station meta–data so that data needed for the assessments are available;

— countries to integrate with EuroAirnet the stations operated under the EU AQ directives;

— countries to improve pollutant coverage at the stations, taking into account EU legislation and data needs for indicators.

— countries to improve QA/QC.

Annex 1
Criteria for EuroAirnet

The criteria are described in detail in the EEA Technical Report No 12 (further referred to as the criteria report). Here, a summary of the criteria is given.

Criteria are described for the following items:

- selection of areas to be monitored;
- classification of monitoring sites;
- area of representativeness of monitoring stations;
- selection of pollutants;
- quality assurance and quality control.

The three exposure categories, population exposure, ecosystems exposure and materials exposure are all covered by the criteria.

1. Summary of EuroAirnet criteria

The criteria to be met by EuroAirnet are outlined in the criteria report. They cover all aspects of air quality site selection, monitoring and data reporting, for the three categories required, i.e. population exposure, materials exposure and ecosystems.

2. Site selection criteria

2.1. Population exposure

Cities

All large cities (population > 0.5M), at least 25 % of medium cities (population 0.25 – 0.5 M), and at least 10 % of small cities (population 0.05 – 0.25 M) should be selected for inclusion in EuroAirnet. (The terms 'large, medium and small cities' in this report refer to these population ranges). Within each size range, cities should be included with low, medium and high levels of industrialisation.

In each selected city, all monitoring stations (up to a maximum of 20) should be included. A good spatial distribution of urban background stations is particularly important (Section 4.1.1 of the criteria report), but there should be a balance with traffic and industrial sites, where applicable.

Rural areas

These are defined as areas outside cities of population > 0.05M. Emphasis should be on secondary pollutants: ozone, PM_{10}, $PM_{2.5}$. The aim should be to ensure that the monitoring network covers a substantial part of the rural population. Each country should evaluate the extent of rural monitoring necessary, based upon:

- identification of the rural areas with the highest population densities
- area of representativeness of monitoring stations located in the areas.

As a guide, 50 % of the rural population should be covered.

Industrial areas outside cities

Areas should be selected where pollution levels approach those of medium size cities, or approach WHO or new EU limit values.

2.2. Exposure of materials

Exposure assessment sites should be representative in terms of local building techniques and materials used. In rural areas, selected areas should also be representative of the range of climatic conditions occurring in the country. It is suggested that > 10 % of large cities (> 0.5 M) and > 5 % of industrial areas should have materials' exposure assessment stations, and that three sites within a city might be selected; representing the highest background pollution levels (possibly near the centre), a more average background site and a 'traffic hot–spot' site.

In industrial areas, two sites (representing high and medium levels of pollution) are suggested. Rural sites should be sufficient to represent the different climatic conditions found within the country — i.e. one per climatic region.

As explained in section 4.1.2 of the criteria report, there is an existing network of stations monitoring atmospheric corrosion–weight loss of materials samples, air pollutants and relevant meteorological parameters. These are operated under the UN/ECE Convention on Long-Range Transboundary Air Pollution (LRTAP). Sites

in this network may be suitable for inclusion in EuroAirnet; the Technical Report recommends that further analysis of data from this network should be undertaken, with a view to assessing whether the network should be extended.

2.3. Ecosystems

Each country should develop its own plan for ecosystem monitoring, such that a representative picture of exposure of ecosystems can be provided. This could include monitoring sites operated as part of the UN/ECE LRTAP International Cooperative Programmes (ICPs), which cover fresh water, forests, agricultural crops and whole ecosystems; alternatively, EMEP and/or GAW sites could be included.

3. Classification of monitoring stations

Monitoring stations must be classified according to the following criteria, as set out in section 4.2 of the Criteria Report:

- type (traffic, industrial, background)
- zone (urban, suburban, rural)
- characterisation of zone (residential, commercial, industrial, agricultural, natural, and combinations such as residential/commercial, commercial/industrial).

These are as used in the Exchange of Information classification. Full details are provided in the Criteria Report, Table 4.4 which is reproduced below;

Table A1.1

Type of station	Type of zone	Characterisation of zone
Traffic (T)	Urban (U)	Residential (R)
Industrial (I)	Suburban (S)	Commercial (C)
Background (B)	Rural (R)	Industrial (I)
		Agricultural (A)
		Natural (N)
		Res/Com (RC)
		Com/Ind (CI)
		Ind/Res (IR)
		Res/Com/Ind (RCI)
		Agri/Natural (AN)

4. Areas of representativeness

For each monitoring station, an evaluation should be provided of the area for which the station is representative. In many cases it is appropriate to provide this in terms of a radius; typical examples for various station classes are given in Section 4.3 of the Criteria Report.

In the case of traffic monitoring sites, which are only intended to be representative of the kerbside environment, definition in terms of length of road is more appropriate. Similarly, for industrial stations, which monitor near specific sources, additional details including the source type, distance, and direction are required.

5. Selection of pollutants, indicators and methods

5.1. Pollutants and Indicators

Selected pollutants and indicators proposed for inclusion in EuroAirnet are tabulated in Table 4.7 of Technical Report 12. This table is reproduced below, and includes the specified averaging times required.

5.2. Methods of measurement

CEN or EU reference methods, or equivalent methods must be used for all pollutants, where available. However, reference methods do not yet exist for all pollutants covered by EuroAirnet. As daughter directives are developed for the relevant pollutants, various CEN committees are working to prepare CEN reference methods.

For the Priority 1 pollutants, reference methods exist for the following pollutants:

— SO_2:
— oxides of nitrogen (NO_x, NO_2):
— Ozone (O_3):
— Lead (Pb):
— PM_{10}

Table A1.2 **Selected pollutants and indicators to be included in EuroAirnet, Stage 1**

	Population exposure		Materials exposure		Ecosystems exposure	
	Aver. time	**Medium/ pollutants**	**Aver. time**	**Medium/pollutant**	**Aver. time**	**Medium/pollutant**
Priority 1	1h (24h) [1)]	Air SO_2, NO_2, NO_x, O_3	24h or longer	Air: SO_2, O_3, NO_2, temp., relative humidity	1h 24h	Air: O_3 SO_2, SO_4^{2-}, NO_2
	1h or 24h	PM_{10}, $PM_{2.5}$	"	Precipitation: mm, pH	aa	NO_x
	24h or [2)] longer	Pb	aa	Materials [3)]: Weight loss, steel panels	24h	Precipitation: SO_4^{2-}, NO_3^-, NH_4^+, Ca^{2+}, pH, (H+)
Priority 2	1h	CO	24h or longer	Air: HNO_3 (gas)	1h	Air: VOC, NO_x
	1h or 24h	SPM (or TSP), BS	"	Precipitation: Cl, SO_4^{2-}, NO_3^-		
	24h or [2)] longer	Benzene, PAH, Cd, As, Ni, Hg	"	Soiling: PM_{10}, SO_4^{2-}		
			aa	Materials [3)]: Weight loss, zinc panels		
Priority 3	Other pollutants		aa	Materials [3)]: Weight loss, copper panels. Damage to calcareous stone		

aa: Annual average/exposure.

(1) To be able to fully evaluate the measured levels relative to guidelines, these pollutants should be reported as 1–hour averages.
24–hour average data from integrating samplers will also be accepted.

2) For these pollutants, mainly long term average concentrations are of interest for the assessment of effects. However, measurement methods often take much shorter samples (e.g. 24–hour or weekly samples), and shorter samples are also needed in order to explain variations in terms of source contributions etc.

3) Measurements of weight loss of standardized panels of material, measured according to standard procedures (Swedish Corrosions Institute, 1989).
Priority 1 Steel
Steel is the most frequently used reference material for characterization of the corrosivity of the environment through out the world. Several ISO standards use this material since the corrosivity of steel is highly reproducible if the same production badge is used for the exposure.
Priority 2 Zinc
Zinc is used as reference material in standards in the same way as steel. Zinc tends to give slightly different results compared to steel mainly because zinc give larger spread in the exposure results.
Priority 3 Copper and calcareous stone
These two materials are to a less extent used as reference materials. However, they are important materials for our cultural heritage. Copper has a slow corrosion rate and may need longer exposure time than one year. Calcareous stone will differ in quality from stone quarry to stone quarry, and different countries are recommended to select their own reference material for stone among the most frequently used calcareous stone types in their country.

6. QA/QC

6.1. Data quality objectives

The data quality objectives for statistics derived from EuroAirnet data are defined in Table 4.9 of the Criteria Report. For the monitoring objective 'Mapping, comparability' these are as follows:

- Accuracy < = 10 %, precision < = 2ppb(for gases. For particles to be decided, but 2–5 µg/m^3 seems likely)
- Temporal data completeness: > = 90 %
- Representativeness:
  The DQO 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, for example cities or larger entities, or trend assessment for larger areas, the requirements to spatial coverage and representativeness would be strict, and to quantify those requires more analysis. 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.

It is recognised that these DQO are very strict. However, they are set in order to ensure that mapping and assessment based on EuroAirnet data are of sufficient accuracy and reliability. All network operators with stations included in EuroAirnet should strive to accomplish these objectives.

ETC/AQ also recognises that further work is needed to define DQO in more detail, and to provide more clear guidance on how representativeness and overall quality should be determined.

6.2. QA/QC classification

Stations to be included within EuroAirnet will be classified by a number from 1 to 5 for data QA/QC, according to Section 4.5.3 and Table 4.8 of the Criteria Report, as shown below.

Table 4-8 of the criteria report:
QA/QC criteria for classification and the selection of stations accepted to be included in the EuroAirnet.

Table A1.3

Levels		Criteria						
		Type of network/station			Type of QA/QC procedure			
		National network		Local network or affiliated station	Accredited central laboratory and 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								✓

Category 1: Stations belonging to a national air quality monitoring network, operating a QC plan implemented on a national level, operated by a central accredited laboratory, providing comparability on a national level.

Category 2a: Stations belonging to a national air quality monitoring network, operating a QC plan implemented on a national level, operated by a central laboratory *(not accredited)*, but still providing comparability on a national level.

Category 2b: Stations belonging to a local air quality monitoring network, operating a QC plan implemented on a local level, but operated by an accredited laboratory.

Category 3: Stations belonging to a local air quality monitoring network, operating a QC plan implemented on a local level, not operated by an accredited laboratory.

Category 4: Individually operated networks or stations implementing a minimum QC plan

Category 5: No documented QC plan, therefore, not acceptable for inclusion in EuroAirnet.

Annex 2
List 1 of areas — agglomerations/ cities selected for EuroAirnet monitoring

Table A2.1 **Agglomerations/cities**

Country	City (c)/Agglomeration (a)	Longitude	Latitude	Population (x 10^3)	No of sites
Austria	Wien	16 174	48 213	1 600	18
Austria	Linz	14 300	48 317	280	10
Austria	Graz	15 367	47 083	230	7
Austria	Salzburg	13 050	47 800	140	3
Austria	Klagenfurt	14 333	46 633	90	3
				2 443	41
Belgium	Brussels (a)	4 350	50 833	952	13
Belgium	Antwerpen (a)	4 400	51 200	459	4
Belgium	Gent (a)	3 717	51 050	226	3
Belgium	Charleroi	4 433	50 417	170	7
Belgium	Liège	5 567	50 633	156	6
Belgium	Brugge (a)	3 217	51 200	116	1
Belgium	Roeselare (c)	3 117	50 933	53	1
Belgium	Beveren (c)	4 250	51 200	44	1
Belgium	Vilvoorde (c)	4 438	50 943	33	1
Belgium	Schoten (c)	4 491	51 253	32	1
Belgium	Zaventem (c)	4 280	50 530	26	1
Belgium	Kapellen (c)	4 446	51 321	25	1
Belgium	Zwevegem (c)	3 200	50 480	23	1
Belgium	Zwijndrecht (c)	4 334	51 215	18	1
Belgium	Destelbergen (c)	3 776	51 062	17	1
Belgium	Puurs–industriegebied (a)	4 170	51 050	15	1
Belgium	Damme (c)	3 170	51 150	11	1
Belgium	Hasselt (a)	5 333	50 933	68	1
Belgium	Wilrijk	4 383	51 167	38	1
				2 482	47
Bulgaria	Sofia	23 300	42 667	1 221	8
Bulgaria	Plovdiv	24 750	42 150	379	3
Bulgaria	Varna	27 917	43 217	315	4
Bulgaria	Burgas	27 467	42 500	205	1
Bulgaria	Ruse	25 996	43 805	192	2
Bulgaria	St. Zagora	25 370	42 250	165	1
Bulgaria	Nikopol	24 550	43 410	158	1
Bulgaria	Pleven	24 617	43 417	138	3
Bulgaria	Shumen	26 550	43 170	111	1
Bulgaria	Pernik	23 033	42 600	100	3
Bulgaria	Pazardjik	24 333	42 200	87	1
Bulgaria	Vratsa	23 550	43 200	85	2

Country	City (c)/Agglomeration (a)	Longitude	Latitude	Population (x 10^3)	No of sites
Bulgaria	V. Tarnova			73	1
Bulgaria	Vidin	22 867	43 983	68	1
Bulgaria	Kardjaly			61	2
Bulgaria	Asenovgrad	27 2830	43 950	60	1
Bulgaria	Dimitrovgrad	25 600	42 050	57	3
Bulgaria	Silistra	27 267	44 117	56	1
Bulgaria	Smolian	24 420	41 340	36	1
Bulgaria	Svishtov	25 220	43 360	31	1
Bulgaria	Sevlievo	27 070	43 000	28	1
Bulgaria	Galabovo	25 510	42 080	12	1
Bulgaria	Pirdop			10	1
Bulgaria	Devnia	27 350	43 150	10	1
Bulgaria	Zlatitza			7	1
Bulgaria	Kameno	27 170	42 330	6	1
Bulgaria	Nokopoi			5.3	1
Bulgaria	Mednikarovo			4	1
Bulgaria	P. Gradetz	26 300	42 460	4	1
Bulgaria	Burgas	27 467	42 500	3	1
Bulgaria	Kuklen			3	1
Bulgaria	D. Ezerovo			3	1
Bulgaria	D.Voden			2	1
				3 695.3	54
Czech Republic	PRAGUE	14 433	50 100	1 217	12
Czech Republic	BRNO	16 667	49 217	390	2
Czech Republic	OSTRAVA	18 250	49 833	325	3
Czech Republic	PLZEN	13 417	49 750	180	2
Czech Republic	OLOMOUC	17 250	49 633	106	1
Czech Republic	HRADEC KRÁLOVÉ	15 833	50 217	100	1
Czech Republic	ÚSTÍ NAD LABEM	14 000	50 683	97	2
Czech Republic	HAVÍROV	18 333	49 767	88	1
Czech Republic	CESKÉ BUDEJOVICE	14 483	48 967	80	1
Czech Republic	MOST	13 650	50 517	72	1
Czech Republic	KARVINÁ	18 500	49 833	67	1
Czech Republic	OPAVA	17 917	49 967	63	1
Czech Republic	FRÝDEK–MÍSTEK	18 333	49 700	63	1
Czech Republic	DECÍN	14 250	50 800	54	1
Czech Republic	TEPLICE	13 817	50 667	53	1
Czech Republic	CHOMUTOV	13 417	50 450	53	1
Czech Republic	PREROV	17 500	49 467	51	1
Czech Republic	PROSTEJOV	17 117	49 467	50	1
				3 109	34
Denmark	Copenhagen (c)	12 536	55 688	1 300	2
Denmark	Odense (c)	10 417	55 400	180	2
Denmark	Aalborg (c)	9 933	57 050	160	2
				1 640	6
Estonia	Tallin	24 750	59 417	411	3

Country	City (c)/Agglomeration (a)	Longitude	Latitude	Population (x 10^3)	No of sites
Finland	Helsinki metropolitan area (a)	24 976	60 199	910	8
Finland	Lappeenranta (c)	28 250	61 067	57	4
				967	12
F.Y.R.O.M.	Skopje (c)	21 433	41 983	650	19
F.Y.R.O.M.	Bitola (c)	21 333	41 017	80	1
F.Y.R.O.M.	Tetovo (c)	20 983	42 000	65	1
F.Y.R.O.M.	Prilep (c)	21 550	41 333	55	1
F.Y.R.O.M.	Veles (c)	21 777	41 717	47	4
F.Y.R.O.M.	Gavgelija (c)	22 500	41 150	40	1
F.Y.R.O.M.	Ohrid (c)	20 800	41 117	35	1
F.Y.R.O.M.	Stip (c)	22 183	41 750	35	1
F.Y.R.O.M.	Kumanovo (c)	21 700	42 117	30	1
F.Y.R.O.M.	Berovo (c)	22 850	41 717	6	1
				1 043	31
Germany	Berlin	13 417	52 500	3 500	10
Germany	Hamburg	10 000	53 550	1 700	4
Germany (Mecklenburg–Vorpommern)	Rostock (a)	12 150	54 100	330	1
Germany (Mecklenburg–Vorpommern)	Schwerin (c)	11 417	53 633	115	1
Germany (Mecklenburg–Vorpommern)	Neubrandenburg (c)	13 267	53 550	80	1
Germany (Mecklenburg–Vorpommern)	Stralsund (c)	13 100	54 300	66	1
				591	4
Germany Baden–Württemberg	Großraum Stuttgart	9 183	48 767	589	10
Germany Baden–Württemberg	Mannheim / Heidelberg	8 467	49 500	316	4
Germany Baden–Württemberg	Karlsruhe	8 400	49 000	277	5
Germany Baden–Württemberg	Freiburg	7 850	48 000	199	2
Germany Baden–Württemberg	Heilbronn	9 217	49 133	122	1
Germany Baden–Württemberg	Pforzheim Mitte	8 683	48 880	118	1
Germany Baden–Württemberg	Ulm	10 000	48 400	115	1
Germany Baden–Württemberg	Villingen–Schwenningen	8 467	48 050	81	1
Germany Baden–Württemberg	Aalen	10 100	48 833	66	1
Germany Baden–Württemberg	Göppingen	9 667	48 700	58	1
Germany Baden–Württemberg	Friedrichshafen	9 483	47 650	56	1

Country	City (c)/Agglomeration (a)	Longitude	Latitude	Population (x 10^3)	No of sites
Germany Baden–Württemberg	Heidenheim	10 150	48 683	53	1
Germany Baden–Württemberg	Ravensburg	9 617	47 783	47	1
Germany Baden–Württemberg	Schwäbisch Hall	9 800	48 817	34	1
Germany Baden–Württemberg	Straßburg / Kehl	7 833	48 583	32	2
Germany Baden–Württemberg	Weil am Rhein	7 671	47 596	26	1
Germany Baden–Württemberg	Wiesloch	8 700	49 283	25	1
Germany Baden–Württemberg	Ehingen	9 733	48 283	25	1
Germany Baden–Württemberg	Freudenstadt	8 250	48 280	24	1
Germany Baden–Württemberg	Rottweil	8 633	48 167	24	1
Germany Baden–Württemberg	Rheinfelden	7 773	47 584	16	1
Germany Baden–Württemberg	Tauberbischofsheim	9 410	49 380	13	1
Germany Baden–Württemberg	Neuenburg	7 340	47 480	8	1
				2 324	41
Germany Bavaria	München (c)	11 583	48 133	1 236	8
Germany Bavaria	Nürnberg/Fürth (a)	11 083	49 450	600	6
Germany Bavaria	Augsburg (c)	10 883	48 367	260	3
Germany Bavaria	Regensburg (c)	12 117	49 017	126	2
Germany Bavaria	Bamberg (c)	10 917	49 895	70	1
Germany Bavaria	Kempten (c)	10 317	47 733	62	1
Germany Bavaria	Ulm/Neu–Ulm (a) davon Neu–Ulm	10 000	48 400	51	1
				2 405	22
Germany Brandenburg	Potsdam (c)	13 067	52 400	138	2
Germany Brandenburg	Cottbus (c)	14 350	51 717	129	2
Germany Brandenburg	Brandenburg a.d.Havel (c)	12 567	52 417	88	1
Germany Brandenburg	Frankfurt(Oder) (c)	14 492	52 344	82	2
				437	7
Germany Bundesland Sachsen	Dresden (c)	13 750	51 050	470	3
Germany Bundesland Sachsen	Zwickau	12 500	50 717	102	1
				572	4

Country	City (c)/Agglomeration (a)	Longitude	Latitude	Population (x 10^3)	No of sites
Germany Hessen	Frankfurt	8 683	50 117	635	3
Germany Hessen	Wiesbaden	8 250	50 083	257	2
Germany Hessen	Kassel	9 500	51 300	191	1
Germany Hessen	Nidda	9 020	50 250	17	1
				1 100	7
Germany Niedersachsen	Hannover	9 717	52 367	500	2
Germany Niedersachsen	Braunschweig	10 533	52 267	258	2
Germany Niedersachsen	Osnabrück	8 050	52 267	161	1
Germany Niedersachsen	Göttingen	9 933	51 533	121	1
Germany Niedersachsen	Hildesheim	9 967	52 150	105	1
Germany Niedersachsen	Emden	7 217	53 367	50	1
Germany Niedersachsen	Lingen	7 317	52 533	49	1
				1 244	9
Germany Northrhine–Westphalia	Köln (c)	6 950	50 933	966	2
Germany Northrhine–Westphalia	Essen (c)	7 017	51 450	615	3
Germany Northrhine–Westphalia	Dortmund (c)	7 450	51 517	599	2
Germany Northrhine–Westphalia	Düsseldorf (c)	6 767	51 217	571	3
Germany Northrhine–Westphalia	Duisburg (c)	6 750	51 433	535	4
Germany Northrhine–Westphalia	Bielefeld (c)	8 533	52 033	324	1
Germany Northrhine–Westphalia	Gelsenkirchen (c)	7 100	51 517	291	1
Germany Northrhine–Westphalia	Krefeld (c)	6 533	51 333	250	1
Germany Northrhine–Westphalia	Hagen (c)	7 433	51 367	212	1
Germany Northrhine–Westphalia	Bonn (c)	7 100	50 733	201	1
Germany Northrhine–Westphalia	Herne (c)	7 217	51 533	180	1
Germany Northrhine–Westphalia	Mülheim (c)	6 883	51 433	177	1
Germany Northrhine–Westphalia	Leverkusen (c)	6 983	51 033	162	1
Germany Northrhine–Westphalia	Neuss (c)	6 700	51 200	149	1
Germany Northrhine–Westphalia	Bottrop (c)	6 917	51 517	121	1
Germany Northrhine–Westphalia	Moers (c)	6 600	51 450	107	1
Germany Northrhine–Westphalia	Witten (c)	7 317	51 417	105	1

Country	City (c)/Agglomeration (a)	Longitude	Latitude	Population (x 10^3)	No of sites
Germany Northrhine–Westphalia	Marl (c)	7 100	51 633	93	1
Germany Northrhine–Westphalia	Lünen (c)	7 517	51 617	92	1
Germany Northrhine–Westphalia	Ratingen (c)	6 830	51 295	90	1
Germany Northrhine–Westphalia	Castrop–Rauxel (c)	7 317	51 550	79	1
Germany Northrhine–Westphalia	Herten (c)	7 133	51 600	69	1
Germany Northrhine–Westphalia	Unna (c)	7 683	51 533	66	1
Germany Northrhine–Westphalia	Wesel (c)	6 607	51 681	62	1
Germany Northrhine–Westphalia	Dormagen (c)	6 833	51 100	61	1
Germany Northrhine–Westphalia	Hattingen (c)	7 167	51 400	59	1
Germany Northrhine–Westphalia	Langenfeld (c)	6 950	51 100	57	1
Germany Northrhine–Westphalia	Stolberg (c)	6 253	50 769	57	1
Germany Northrhine–Westphalia	Hürth (c)	6 867	50 867	52	1
Germany Northrhine–Westphalia	Schwerte (c)	7 340	51 260	51	1
Germany Northrhine–Westphalia	Borken (c)	6 847	51 862	39	1
Germany Northrhine–Westphalia	Datteln (c)	7 383	51 667	38	1
Germany Northrhine–Westphalia	Werne (c)	7 633	51 650	30	1
Germany Northrhine–Westphalia	Niederzier (c)			13	1
Germany Northrhine–Westphalia	Wesseling (c)	6 967	50 833	3	1
				9 064	62

Germany Rheinland–Pfalz	Wörth (Karlsruhe/Oberrhein–Graben (a) / (Ballungsgebiet mit Baden–Württemberg)	8 160	49 030	500	1
Germany Rheinland–Pfalz	Mannheim/Heidelberg – (Ballungsgebiet Baden–Württemberg)	8 467	49 500	480	3
Germany Rheinland–Pfalz	Koblenz–Neuwied (a)			300	1
Germany Rheinland–Pfalz	Mainz (c)	8 267	50 000	180	3
Germany Rheinland–Pfalz	Ludwigshafen (c)	8 450	49 483	150	2
Germany Rheinland–Pfalz	Neuwied (c)	7 467	50 433	140	2
Germany Rheinland–Pfalz	Kaiserslautern (c)	7 783	49 450	110	2
Germany Rheinland–Pfalz	Koblenz (c)	7 600	50 350	110	1
Germany Rheinland–Pfalz	Trier (c)	6 650	49 750	100	2
Germany Rheinland–Pfalz	Pirmasens (c)	7 600	49 200	50	2

Country	City (c)/Agglomeration (a)	Longitude	Latitude	Population (x 10^3)	No of sites
Germany Rheinland–Pfalz	Neustadt/Weinstraße	8 150	49 350	5	1
Germany Rheinland–Pfalz	Speyer	8 433	49 300	1	1
				2 126	21
Germany Sachsen–Anhalt	Halle	11 750	51 500	275	3
Germany Sachsen–Anhalt	Magdeburg	11 500	52 250	250	3
Germany Sachsen–Anhalt	Dessau	12 233	51 833	90	1
				615	7
Germany Saarland	Saarbrücken	7 000	49 233	190	3
Germany Schleswig/Holstein	Kiel (a)	10 133	54 333	330	3
Germany Schleswig/Holstein	Lübeck (a)	10 667	53 867	267	2
				597	5
Germany Thüringen	Erfurt (c)	11 017	50 967	220	3
Germany Thüringen	Gera (c)	12 067	50 867	121	2
Germany Thüringen	Jena (c)	11 583	50 933	100	1
				441	6
Greece	Athens	23 733	37 978	3 027	19
Greece	Thessaloniki	22 967	40 633	706	8
Greece	Iraklion	25 080	35 200	500	1
Greece	Patra	21 733	38 233	155	2
Greece	Volos	22 918	39 383	107	1
Greece	Larisa	22 417	39 633	102	1
Greece	Kozani	21 800	40 300	31	1
Greece	Ptolemais	21 687	40 527	22	1
Greece	Megalopolis	22 080	37 240	20	1
Greece	Drepanos (Kozani)	21 800	40 300	1	1
				4 671	36
Hungary	BUDAPEST (c)	19 050	47 500	1885	8
Hungary	MISKOLC(c)	20 783	48 117	180	1
Hungary	PÉCS(c)	18 250	46 067	162	2
Hungary	GYŐR(c)	17 667	47 683	127	2
Hungary	TATABÁNYA (c)	18 417	47 517	72	1
Hungary	EGER(c)	20 467	47 883	59	1
				2 485	15
Iceland	Reykjavík (a)	–21 580	64 090	164	3
Ireland	Dublin Urban Area (c)	–6 250	53 333	952	5

Country	City (c)/Agglomeration (a)	Longitude	Latitude	Population (x 10^3)	No of sites
Ireland	Cork	–8 500	51 900	180	2
Ireland	Limerick	–8 613	52 670	79	1
Ireland	Waterford	–7 133	52 267	44	1
Ireland	Dundalk	–6 425	54 013	30	1
Ireland	Drogheda	–6 350	53 717	25	1
				1 310	11
Italy	Roma (c)	12 495	41 899	2 646	11
Italy	Milano (c)	9 198	45 471	1 306	6
Italy	Napoli (c)	14 247	40 831	1 050	9
Italy	Torino (c)	7 696	45 080	910	6
Italy	Palermo (c)	13 359	38 116	689	7
Italy	Genova (c)	8 959	44 404	659	4
Italy	Bologna (c)	11 359	44 496	386	6
Italy	Firenze (c)	11 260	43 778	383	4
Italy	Venezia	12 333	45 433	292	4
Italy	Verona	11 000	45 433	255	3
Italy	Trieste	13 783	45 650	218	6
Italy	Padova	11 883	45 400	211	1
Italy	Brescia	10 217	45 550	191	1
Italy	Prato	11 100	43 883	171	2
Italy	Parma	10 317	44 800	168	2
Italy	Perugia	12 383	43 117	155	4
Italy	Salerno	14 767	40 667	143	1
Italy	Ferrara	11 633	44 833	133	1
Italy	Siracusa	15 300	37 067	127	2
Italy	Sassari	8 567	40 717	121	3
Italy	Bergamo	9 667	45 070	117	1
Italy	Pescara	14 217	42 450	117	6
Italy	Latina	12 883	41 467	113	3
Italy	Vicenza	11 533	45 550	109	2
Italy	Trento	11 133	46 067	104	4
Italy	Ancona	13 517	43 617	99	2
Italy	Piacenza	9 683	45 050	99	2
Italy	Bolzano	11 367	46 500	97	1
Italy	La Specia	9 48	44 07	96	2
Italy	Pisa	10 400	43 717	93	2
Italy	Varese	8 817	45 817	84	1
Italy	Como	9 083	45 800	83	1
Italy	Gela	14 250	37 067	78	1
Italy	Caserta	14 333	41 067	74	3
Italy	Potenza	15 800	40 633	70	3
Italy	Caltanissetta	14 067	37 483	63	1
Italy	Vigevano	8 850	45 317	60	1
Italy	San Remo	7 767	43 800	56	1
Italy	Legnano	8 900	45 600	54	1
Italy	Scandicci			51	1
Italy	Mantova	10 783	45 167	49	1
Italy	Biella	8 067	45 567	48	1
Italy	Settimo Torinese	7 767	45 015	47	1

Country	City (c)/Agglomeration (a)	Longitude	Latitude	Population (x 10^3)	No of sites
Italy	Olbia	9 500	40 933	43	1
Italy	Grugliasco	7 583	45 067	40	1
Italy	Maddaloni	14 383	41 050	38	1
Italy	Aosta	7 317	45 717	35	2
Italy	Augusta	15 233	37 233	34	1
Italy	Rovereto	11 050	45 883	34	1
Italy	Niscemi	14 383	37 150	27	1
Italy	Treviglio	9 583	45 533	25	1
Italy	Orbassano	7 533	45 017	22	1
Italy	Meda	8 733	45 100	21	1
Italy	Cossato	8 183	45 567	15	1
Italy	Merate	9 417	45 700	14	1
Italy	Riva del Garda	10 833	45 883	14	1
Italy	Olgiate Comasco	8 967	45 783	10	1
Italy	Vipiteno	11 450	46 900	6	1
Italy	Mignanego			4	1
				12 457	142
Latvia	Riga	24 100	56 950	826	3
Latvia	Daugavpils	26 517	55 867	116	1
Latvia	Liepaja	21 000	56 500	96	1
Latvia	Jurmala	23 583	56 983	59	1
Latvia	Ventspils	21 517	57 367	47	1
Latvia	Rezekne	27 367	56 500	41	1
Latvia	Valmiera	25 483	57 533	29	1
Latvia	Olaine			13	1
Latvia	Nigrande			2	1
				1 229	11
Liechtenstein	Vaduz (a)	9 320	47 080	5	1
Lithuania	VILNIUS	25 317	54 683	600	3
Luxembourg	Luxembourg (c)	6 133	49 617	100	2
the Netherlands	Amsterdam (c)	4 900	52 350	718	2
the Netherlands	Rotterdam (c)	4 483	51 917	593	2
the Netherlands	The Hague (c)	4 289	52 078	443	1
the Netherlands	Utrecht	5 117	52 100	269	5
the Netherlands	Eindhoven (c)	5 500	51 433	197	3
the Netherlands	Apeldoorn (c)	5 950	52 217	151	3
the Netherlands	Haarlem (c)	4 633	52 383	148	1
the Netherlands	Dordrecht	4 667	51 800	116	1
the Netherlands	Vlaardingen (c)	4 327	51 911	74	2
				2 710	21
Norway	Oslo (a)	10 750	59 933	761	3
Norway	Bergen	5 333	60 383	213	1
Norway	Drammen	10 250	59 750	52	1
				1 026	5

Country	City (c)/Agglomeration (a)	Longitude	Latitude	Population (x 10^3)	No of sites
Poland	Silesia Agglomeration (GOP) (A)	18 250	50 500	2 144	5
Poland	Warszawa (c)	21 000	52 250	1 632	3
Poland	Lodz (c)	19 467	51 750	823	2
Poland	KRAKÓW (C)	19 917	50 083	745	4
Poland	Wroclaw	17 033	51 100	642	3
Poland	Konin	18 267	52 217	82	1
Poland	Kadzierzyn–Kozle	18 06	50 20	71	1
Poland	Olkusz	19 567	50 283	41	1
Poland	Ustron			20	1
				6 200	21
Portugal	Lisboa	–9 133	38 733	663	8
Portugal	Porto (c)	–8 617	41 150	329	3
Portugal	Matosinhos (a)	–8 700	41 183	150	2
Portugal	Coimbra (a)	–8 417	40 200	139	1
Portugal	Maia (a)	–8 633	41 233	90	1
Portugal	Barreira	–9 083	38 667	85	3
Portugal	Vila Nova Gaia (a)	–7 900	38 250	5	1
				1 461	19
Romania	Bucharest	26 117	44 417	2 060	4
Romania	Iasi	27 633	47 150	340	4
Romania	Timisoara	21 250	45 750	328	1
Romania	Galati	28 033	45 450	327	2
Romania	Ploiesti	26 017	44 950	254	4
Romania	Sibiu	24 150	45 767	170	1
Romania	TG.Mures	24 567	46 550	167	3
Romania	Baia Mare	23 600	47 650	150	6
Romania	Resita	21 917	45 267	96	2
Romania	Medias	24 350	46 167	63	3
Romania	Copsa Mica	24 250	46 100	10	2
				3 965	32
Slovak Republic	Bratislava (Capital)	17 263	48 127	452	3
Slovak Republic	Košice (c)	21 250	48 733	241	3
Slovak Republic	ilina(c)	18 667	49 233	87	1
Slovak Republic	Banská Bystrica(c)	19 167	48 733	85	1
Slovak Republic	Prievidza(c)	18 583	48 783	55	1
				920	9
Slovenia	Ljubljana	14 517	46 050	300	1
Slovenia	Maribor	15 650	46 550	150	1
Slovenia	Celje	15 267	46 233	65	1
				515	3
Spain	MADRID (c)	–3 717	40 417	3 500	7
Spain	BARCELONA (c)	2 167	41 417	1 508	4
Spain	GRAN BILBAO (a)	–2 933	43 250	900	5
Spain	VALENCIA (c)	–0 400	39 483	800	5
Spain	SEVILLA (c)	–5 983	37 400	698	4

Country	City (c)/Agglomeration (a)	Longitude	Latitude	Population (x 10^3)	No of sites
Spain	ZARAGOZA (c)	–0 900	41 650	602	3
Spain	ALREDEDORES VALENCIA (a)	–0 240	39 290	568	3
Spain	MALAGA (c)	–4 417	36 717	549	2
Spain	LAS PALMAS DE GRAN CANARIA	–15 436	28 116	356	1
Spain	VALLADOLID (c)	–4 718	41 631	334	2
Spain	CORDOBA (c)	–4 767	37 883	306	1
Spain	ALICANTE (c)	–0 483	38 350	266	2
Spain	GIJON (c)	–5 667	43 533	260	1
Spain	L¨HOSPITALET DE LLOBREGAT (c)	1 45	41 45	255	1
Spain	COMARCA DE PAMPLONA (a)	–1 650	42 817	250	1
Spain	DONOSTIALDEA (a)			250	2
Spain	MURCIA (c)	–1 133	37 983	250	1
Spain	GRANADA (c)	–3 583	37 167	246	1
Spain	BADALONA (c)	2 150	41 270	211	1
Spain	Sta CRUZ DE TENERIFE (c)	–16 250	28 467	204	1
Spain	OVIEDO (c)	–5 838	43 369	200	1
Spain	VICTORIA (c)	–4 150	37 410	200	1
Spain	GETAFE (a)	–3 440	40 180	200	1
Spain	SANTANDER (c)	–3 800	43 467	190	1
Spain	ELCHE (c)	–0 683	38 267	188	1
Spain	SABADELL (c)	2 117	41 550	186	1
Spain	ALMERIA (c)	–2 433	36 833	171	1
Spain	SALAMACA (c)	–5 667	40 967	167	1
Spain	BURGOS (c)	–3 683	42 350	166	2
Spain	CARTAGENA (c)	–0 983	37 600	150	1
Spain	LEON (c)	–5 566	42 600	147	1
Spain	CADIZ (c)	–6 261	36 491	146	1
Spain	HUELVA (c)	–6 933	37 250	141	1
Spain	ALBACETE	–1 867	39 000	136	1
Spain	SANTA COLOMA DE GRAMENET (c)	2 140	41 280	123	1
Spain	JAEN (c)	–3 800	37 767	105	1
Spain	MATARO (c)	2 450	41 533	102	1
Spain	COSLADA (a)	–3 567	40 433	100	1
Spain	AVILES (c)	–5 917	43 550	85	1
Spain	PALENCIA (c)	–4 542	42 031	79	1
Spain	GUADALAJARA	–3 167	40 617	68	2
Spain	ALCOI (c)	–0 483	38 700	66	2
Spain	ZAMORA (c)	–5 750	41 500	66	1
Spain	TOLEDO	–4 033	39 867	64	1
Spain	PONFERADA (c)	–6 583	42 550	61	1
Spain	ALTO NERVION (a)			60	1
Spain	DEBA			60	1
Spain	LINEA DE LA CONCEPCION (c)	–5 350	36 167	59	1
Spain	SAGUNTO (c)	–0 283	39 667	56	2
Spain	SEGOVIA (c)	–4 123	40 966	55	1
Spain	GANDIA (c)	–0 183	38 983	52	1
Spain	GRANOLLERS (c)	2 300	41 617	51	1
Spain	LANGREO (c)	–2 008	43 292	50	1

Country	City (c)/Agglomeration (a)	Longitude	Latitude	Population (x 10^3)	No of sites
Spain	ORIA	–2 170	37 300	50	1
Spain	IBAIZABAL			50	1
Spain	AVILA (c)	–4 700	40 650	50	1
Spain	HUESCA (c)	–0 417	42 133	40	1
Spain	MIRANDA DE EBRO (c)	–2 950	42 683	36	1
Spain	MANRESA (c)	1 833	41 717	34	1
Spain	MAJADAHONDA (c)			34	1
Spain	SANT ADRIA DE BESOS ©			33	1
Spain	ARANDA DE DUERO ©	–3 683	41 667	30	1
Spain	TERUEL ©	–1 100	40 350	29	1
				16 449	95
Sweden	Stockholm(a)	18 078	59 258	1 570	3
Sweden	Göteborg(a)	11 950	57 700	770	3
Sweden	Malmoe	13 00	55 35	500	1
Sweden	Uppsala	17 650	59 850	120	1
Sweden	Karlstad	13 500	59 400	79	1
Sweden	Östersund	14 700	63 200	60	1
Sweden	Vaestervik	16 40	57 45	38	1
Sweden	Lycksele	18 40	64 34	13	1
				3 150	12
Switzerland	Zürich (a)	8 550	47 383	929	6
Switzerland	Basel (a)	7 600	47 550	404	7
Switzerland	Bern (a)	7 433	46 950	320	3
Switzerland	Lausanne (a)	6 650	46 533	285	4
Switzerland	Luzern (a)	8 283	47 050	181	2
Switzerland	St. Gallen (a)	9 357	47 435	134	2
Switzerland	Winterthur (a)	8 750	47 500	117	1
Switzerland	Lugano (a)	8 960	46 010	114	2
				2 484	27
United Kingdom	Greater London Urban Area (a)	–0 083	51 500	7 603	26
United Kingdom	West Midlands Urban Area (a)	–1 917	52 500	2 296	6
United Kingdom	Greater Manchester Urban Area (a)	–2 250	53 500	2 272	9
United Kingdom	West Yorkshire Urban Area (a)	–1 567	53 800	1 441	3
United Kingdom	Glasgow ©	–4 233	55 867	1 316	6
United Kingdom	Tyneside (a)	–1 583	54 983	885	2
United Kingdom	Liverpool Urban Area (a)	–3 000	53 417	835	2
United Kingdom	Sheffield Urban Area (a)	–1 467	53 383	632	2
United Kingdom	Nottingham Urban Area (a)	–1 167	52 950	611	1
United Kingdom	Bristol Urban Area (a)	–2 583	51 433	521	3
United Kingdom	Belfast (a)	–5 917	54 583	476	5
United Kingdom	Brighton/Worthing/ Littlehampton (a)	–0 167	50 833	438	2
United Kingdom	Edinburgh ©	–3 200	55 950	421	2
United Kingdom	Leicester Urban Area (a)	–1 167	52 667	416	1
United Kingdom	Teesside Urban Area (a)	–1 217	54 617	369	2
United Kingdom	The Potteries (a)	–2 183	53 017	367	1

Country	City (c)/Agglomeration (a)	Longitude	Latitude	Population (x 10^3)	No of sites
United Kingdom	Reading/Wokingham Urban Area (a)	–0 950	51 450	334	1
United Kingdom	Coventry/Bedworth (a)	–1 517	52 417	330	1
United Kingdom	Kingston upon Hull (c)	–0 333	53 750	310	1
United Kingdom	Cardiff Urban Area (a)	–3 183	51 467	307	2
United Kingdom	Southampton Urban Area (a)	–1 383	50 900	276	1
United Kingdom	Swansea Urban Area (a)	–3 957	51 623	272	2
United Kingdom	Plymouth (c)	–4 167	50 383	242	1
United Kingdom	Barnsley (c)	–1 467	53 567	211	2
United Kingdom	Sunderland Urban Area (a)	–1 411	54 927	189	1
United Kingdom	Aberdeen (c)	–2 067	57 167	185	1
United Kingdom	Norwich Urban Area (a)	1 273	52 651	184	2
United Kingdom	Oxford (c)	–1 250	51 750	117	1
United Kingdom	Cambridge (c)	–0 117	52 200	110	1
United Kingdom	Lincoln Urban Area (a)	–0 533	53 233	98	1
United Kingdom	Lincoln (c)	–0 550	53 233	97	1
United Kingdom	Derry (c)	–7 327	55 006	95	1
United Kingdom	Exeter (c)	–3 517	50 717	93	1
United Kingdom	Bath (c)	–2 367	51 367	84	1
United Kingdom	Warwick/Leamington Spa (a)	–1 600	52 283	78	1
United Kingdom	Grays/Tilbury (a)	–0 383	51 467	62	1
				24 573	97

Annex 3
List 2 of areas — industrial areas selected for EuroAirnet monitoring

Industrial Areas Table A3.1

Country	Industrial area [1)]	Population (x 10^3)	No of sites	Station name
Austria			1	Leoben Donawitz
Austria			1	Strassengel Kirche
Austria			1	Brixlegg Innweg
Belgium	Antwerpen–havengebied (a)		1	42R822 – ANTWERPEN
Belgium	Industriegebied Gentse kanaalzone (a)		1	44R731 – EVERGEM
Belgium	Industriegebied Gentse kanaalzone (a)		1	44R740 – ST.KRUIS–WI
Belgium	Industriegebied Gentse kanaalzone (a)		1	44R741 – ERTVELDE
Belgium	Industriegebied Gentse kanaalzone (a)		1	44R750 – ZELZATE
Belgium	Doel (c)		1	42R830 – DOEL
Belgium	Tessenderlo (c)		1	42N025 –TESSENDERLO
Belgium	Ham (c)		1	42N026 – HAM
Belgium	Beerse		1	0BEE01 – BEERSE
Belgium	Beerse		1	0BEE02 – BEERSE
Belgium	Beerse		1	0BEE04 – BEERSE
Belgium	Desteldonk		1	0DES01 – DESTELDONK
Belgium	Genk		1	0GNK02 – GENK
Belgium	Wezel		1	0WEZ01 – WEZEL
Belgium	St.Jozef Olen		1	0OLE01 – OLEN
Belgium	Neerpelt		1	0OVP01 – NEERPELT
Belgium	Tienen		1	0TIE01 – TIENEN
Belgium	Ruisbroek		1	0WIL01 – RUISBROEK
Belgium	Zelzate		1	0ZEL02 – ZELZATE
Belgium	Hoboken		1	0HOB00 – HOBOKEN
Belgium	Hoboken		1	0HOB01 – HOBOKEN
Belgium	Hoboken		1	0HOB03 – KUIBEKE
Belgium	Hoboken		1	0HOB04 – HOBOKEN
Belgium	Hoboken		1	0HOB12 – HEMIKSEM
Belgium	Hoboken		1	0HOB14 – HOBOKEN
Belgium	Hoboken		1	0HOB16 – HOBOKEN
Belgium	Hoboken		1	0HOB17 – HOBOKEN
Belgium	Hoboken		1	0HOB18 – HOBOKEN
Belgium	Hoboken		1	0HOB19 – HOBOKEN
Belgium	Tessenderlo (c)		1	0TES05 – TESSENDERLO
Belgium	Mol–Wezel		1	0WEZ02 – MOL–WEZEL
Belgium	Reppel		1	0REP01 – REPPEL
Belgium	Reppel		1	0REP02 – REPPEL
Belgium	Engis		1	43R240 – Engis
Belgium	Engis		1	0ENG02 – St.Georges

Country	Industrial area [1)]	Population (x 10^3)	No of sites	Station name
The Czech Republic	North–western Bohemia	1 009	1	VŠECHLAPY
The Czech Republic	North–western Bohemia	1 032	1	SOKOLOV
The Czech Republic	Northern Moravia	1 188	1	TRINEC–KOSMOS
The Czech Republic	Northern Moravia	1 063	1	OSTRAVA–RADVANICE
The Czech Republic	Northern Moravia	1 072	1	VERNOVICE
The Czech Republic	Middle Bohemia	790	1	KRALUPY
Finland	Imatra	32	1	Rautionkylä
Finland	Imatra		1	Pelokolan tulliasema/Raja
Finland	Imatra		1	Imatrankoski
Finland	Imatra		1	Mansikkala
Finland	Joutseno	12	1	Pulpin K–lähikauppa
Germany/ Bavaria	Burghausen		1	L1.2
Germany/ Bavaria			1	L1.15
Germany/ Bavaria	Ingolstadt–Neustadt–Kelheim		1	L1.1
Germany/ Bavaria			1	L1.6
Germany/ Bavaria			1	L1.7
Germany/ Bavaria			1	L1.8
Germany/ Bavaria			1	L2.1
Germany/ Bavaria			1	L2.2
Germany/ Bavaria			1	L2.5
Germany/ Bavaria			1	L2.6
Germany/ Bavaria			1	L2.9
Germany/ Bavaria	Nordostober–franken		1	L4.1
Germany/ Bavaria			1	L4.4
Germany/ Bavaria			1	L4.5
Germany/ Bavaria			1	L4.6
Germany/ Nieder–Sachsen	Nordenham		1	NMCC
Germany/ Nieder–Sachsen	Oker		1	OGCC
Germany/ Nieder–Sachsen	Wolfsburg		1	WGCC

Country	Industrial area [1])	Population (x 10^3)	No of sites	Station name
Germany Schleswig/ Holstein	Brunsbüttel		1	Brunsbüttel.
Germany/ Sachsen–Anhalt	Bitterfeld/Wolfen (a)		1	Greppin
Germany/ Sachsen–Anhalt	Merseburg (a)		1	Schkopau
Iceland	Akranes		1	Stjórnsýsluhús
Iceland	Grundartangi		1	Vatnstankshús
Iceland	Hafnarfjörður		1	Hvaleyrarholt
Ireland	Shannon Estuary		1	Foynes
Italy	ANCONA	98.6	1	Ancona Porto
Italy	ASSEMINI	23.1	1	CENAS8
Italy	AUGUSTA	34.0	1	AUGUSTA
Italy	BRANDIZZO	7.2	1	BRANDIZZO
Italy	BRINDISI	94.0	1	CERANO
Italy	BRINDISI	94.0	1	SURBO – Provincia di Lecce
Italy	BRINDISI	94.0	1	TUTURANO NORD
Italy	BRINDISI	94.0	1	TUTURANO SUD
Italy	CARBONARA DI PO	1.3	1	CARBONARA DI PO
Italy	CASTAGNETO PO	1.4	1	CASTAGNETO PO
Italy	CHIVASSO	24.1	1	CHIVASSO
Italy	CIVITAVECCHIA	51.0	1	ALLUMIERE
Italy	CIVITAVECCHIA	51.0	1	AURELIA
Italy	CIVITAVECCHIA	51.0	1	C.DELL ORO
Italy	CIVITAVECCHIA	51.0	1	FARO
Italy	CIVITAVECCHIA	51.0	1	FIUMARETTA
Italy	CIVITAVECCHIA	51.0	1	MONTE ROMANO
Italy	CIVITAVECCHIA	51.0	1	S.AGOSTINO
Italy	CIVITAVECCHIA	51.0	1	S.GORDIANO
Italy	CIVITAVECCHIA	51.0	1	S.MARINELLA
Italy	CIVITAVECCHIA	51.0	1	TARQUINIA
Italy	CIVITAVECCHIA	51.0	1	TOLFA
Italy	CUGGIONO	7.3	1	CUGGIONO
Italy	FALCONARA MARITTIMA	28.7	1	Falconara acquedotto
Italy	FALCONARA MARITTIMA	28.7	1	Falconara Alta
Italy	FALCONARA MARITTIMA	28.7	1	Falconara scuola
Italy	GELA	77.7	1	AGIP MINERARIA
Italy	GENOVA	641.4	1	RIMESSA A.M.T.
Italy	GENOVA	641.4	1	SOPRAELEVATA
Italy	GENOVA	641.4	1	VIA PACINOTTI
Italy	LA SPEZIA	96.3	1	BOLANO
Italy	LA SPEZIA	96.3	1	CARROZZO
Italy	LA SPEZIA	96.3	1	FOLLO
Italy	LA SPEZIA	96.3	1	LE GRAZIE
Italy	LA SPEZIA	96.3	1	PITELLI
Italy	LA SPEZIA	96.3	1	S.VENERIO

Country	Industrial area [1)]	Population (x 10^3)	No of sites	Station name
Italy	LAVELLO	13.6	1	LAVELLO
Italy	LIVORNO	162.3	1	COTONE
Italy	MELFI	16.6	1	MELFI
Italy	MELILLI	12.3	1	MELILLI
Italy	MESSINA	261.1	1	PACE DEL MELA
Italy	MESSINA	261.1	1	S.FILIPPO DEL MELA
Italy	MESSINA	261.1	1	S.PIETRO CINETO
Italy	MESSINA	261.1	1	VALDINA
Italy	MILAZZO	32.3	1	MILAZZO
Italy	MONTOPOLI IN VAL D'ARNO	9.4	1	S.Romano
Italy	NAPOLI	1 020.1	1	BARRA
Italy	NAPOLI	1 020.1	1	DOGANELLA
Italy	NAPOLI	1 020.1	1	G. FERRARIS
Italy	NAPOLI	1 020.1	1	SNIA
Italy	OSTIGLIA	7.1	1	OSTIGLIA
Italy	OTTANA	2.6	1	CENOT3
Italy	PADOVA	211.0	1	Via Niccodemi
Italy	PORTO TOLLE	10.9	1	CA CAPPELLO
Italy	PORTO TOLLE	10.9	1	CA TIEPOLO
Italy	PORTO TOLLE	10.9	1	CASE RAGAZZI
Italy	PORTO TOLLE	10.9	1	MASSENZATICA
Italy	PORTO TOLLE	10.9	1	P.TO LEVANTE
Italy	PORTO TOLLE	10.9	1	SCARDOVARI
Italy	PORTO TOLLE	10.9	1	TAGLIO DI PO
Italy	PORTO TORRES	21.9	1	CENS15
Italy	PORTO TORRES	21.9	1	CENSS4
Italy	PORTO TORRES	21.9	1	CENSS5
Italy	PORTOSCUSO	5.6	1	CENPS2
Italy	PORTOSCUSO	5.6	1	CENPS3
Italy	PORTOSCUSO	5.6	1	CENPS4
Italy	PORTOSCUSO	5.6	1	CENPS5
Italy	POTENZA	69.5	1	POTENZA – C.DA ROSSELLINO
Italy	PRIOLO GARGALLO	11.6	1	CIAPI
Italy	PRIOLO GARGALLO	11.6	1	PRIOLO
Italy	ROBECCHETTO CON INDUNO	4.2	1	ROBECCHETTO
Italy	ROSSANO	34.9	1	CORIGLIANO
Italy	ROSSANO	34.9	1	OSPEDALE
Italy	ROSSANO	34.9	1	S.CHIARA
Italy	ROSSANO	34.9	1	SCHIAVONEA
Italy	ROSSANO	34.9	1	SUPERSTRADA
Italy	SAN PIETRO VERNOTICO	15.1	1	S. PIETRO VERNOTICO
Italy	SAN SALVO	16.9	1	San Salvo
Italy	SANTA CROCE SULL'ARNO	12.5	1	S.Croce CERRI
Italy	SARROCH	5.4	1	CENSA2
Italy	SIRACUSA	126.7	1	FLORIDIA
Italy	SIRACUSA	126.7	1	SIRACUSA
Italy	SIRACUSA	126.7	1	SORTINO
Italy	SIRACUSA	126.7	1	VILLASMUNDO
Italy	TERMINI IMERESE	28.0	1	BELVEDERE
Italy	TERMINI IMERESE	28.0	1	PIAZZA BURRAFATO

Country	Industrial area [1)]	Population (x 10^3)	No of sites	Station name
Italy	TERMINI IMERESE	28.0	1	S.S. 120
Italy	TERMINI IMERESE	28.0	1	VIA LIBERTA
Italy	TERMINI IMERESE	28.0	1	VILLAGGIO IMERIA
Italy	TORCHIAROLO	5.4	1	LENDINUSO
Italy	TORCHIAROLO	5.4	1	TORCHIAROLO
Italy	TRIESTE	217.9	1	via Carpineto
Italy	TURBIGO	7.3	1	TURBIGO
Italy	VADO LIGURE	8.2	1	ACQUEDOTTO
Italy	VADO LIGURE	8.2	1	BOCCA DI ORSO
Italy	VADO LIGURE	8.2	1	CAPO VADO 2
Italy	VADO LIGURE	8.2	1	CIADE
Italy	VADO LIGURE	8.2	1	MONTE CIUTO
Italy	VADO LIGURE	8.2	1	MONTE S.GIORGIO
Italy	VADO LIGURE	8.2	1	TERMINE
Italy	VIGGIANO	3.1	1	VAL D'AGRI – VIGGIANO C.DA CIANCIARULO
Italy	VIGGIANO	3.1	1	VAL D'AGRI – VIGGIANO ZONA INDUSTRIALE
Luxembourg	Esch/Alzette (c)		1	Esch/Alzette
Norway	South Varanger		1	Svanvik
Portugal	Sines		1	Monte Chaos
Portugal	Sines		1	Santiago
Portugal	Estarreja		1	Teixugueira
Spain	AVILES		1	MATADERO
Spain	LANGREO		1	MERIÑAN
Spain	TARRAGONA		1	TARRAGONA–UNIVERSITAT LABORAL
Spain	CONSTANTI		1	CONSTANTI
Spain	MONTCADA		1	MONTCADA
Spain	SANT CELONI		1	SANT CELONI
Spain	TARRAGONA		1	NUCLI URBA
Spain	PLANA DE CASTELLON		1	GRAU
Spain	PLANA DE CASTELLON		1	ERMITA
Spain	PLANA DE CASTELLON		1	PENYETA
Spain	ONDA		1	ONDA
Spain	PUERTOLLANO		1	BARRIADA–630
Spain	PUERTOLLANO		1	CALLE ANCHA
Spain	ESCOMBRERAS		1	ALUMBRES
Spain	TORRELAVEGA		1	ZAPATON
Spain	REINOSA		1	REINOSA
United Kingdom	Teeside Urban Area	369	1	Billingham
United Kingdom	Teeside Urban Area	369	1	Middlesbrough
United Kingdom	Sheffield Urban Area	632	1	Sheffield Tinsley

Country	Industrial area [1])	Population (x 10^3)	No of sites	Station name
United Kingdom	Greater Manchester Urban Area	2 272	1	Salford Eccles
United Kingdom	Scunthorpe	76	1	Scunthorpe
United Kingdom	Tyneside	885	1	Elswick 1
United Kingdom	Tyneside	885	1	Elswick 2
United Kingdom	Tyneside	885	1	Elswick 3
United Kingdom	West Midlands Urban Area	2 296	1	IMI 1
United Kingdom	West Midlands Urban Area	2 296	1	IMI 2
United Kingdom	West Midlands Urban Area	2 296	1	IMI 3
United Kingdom	West Midlands Urban Area	2 296	1	Brookside 1
United Kingdom	West Midlands Urban Area	2 296	1	Brookside 2
United Kingdom	Holyhead		1	Holyhead
United Kingdom	Kinlochleven		1	Kinlochleven
United Kingdom	Newport	115	1	Newport
United Kingdom	Swansea Urban Area	272	1	Port Talbot
United Kingdom	Ashington	28	1	Ashington
United Kingdom	Bolsover		1	Bolsover

Annex 4
List 3 of areas — rural areas selected for EuroAirnet monitoring

Rural Areas Table A4.1

Country	Rural area/region [1])	Population (x 10^3)	No of sites (all)	Station name	EMEP
Austria	Oberwart		1		
Austria	Illmitz		1		EMEP
Austria	St. Georgen		1		
Austria	Gerlitzen		1		
Austria	Vorhegg		1		EMEP
Austria	Obervellach		1		
Austria	Gänserndorf		1		
Austria	Stockerau		1		
Austria	Kollmitzberg		1		
Austria	Hainburg		1		
Austria	Payerbach		1		
Austria	Dunkelsteinerwald		1		
Austria	Pillersdorf		1		
Austria	Vösendorf		1		
Austria	Grünbach		1		
Austria	Hochburg–Ach/ Enzenkirchen		1		
Austria	St. Johann i.P.		1		
Austria	Tamsweg Untere Postgasse		1		
Austria	Tamsweg BH		1		
Austria	Klöch		1		
Austria	Stolzalpe		1		
Austria	Deutschlandsberg		1		
Austria	Höfen		1		
Austria	Lienz Amlacherkreuzung		1		
Austria	Lienz Sportzentrum		1		
Austria	Vomp		1		
Austria	Bludenz		1		
Austria	Dornbirn		1		
Austria	Lustenau		1		
Austria	Sulzberg		1		
Austria	Zöbelboden		1		
Austria	Haunsberg		1		
Austria	St. Koloman		1		EMEP
Austria	Masenberg		1		
Austria	Grundlsee		1		
Austria	Karwendel West		1		
Belgium	Schilde (c)	19	1	42N015 – Schilde	
Belgium	Bree (c)	14	1	42N027 – Bree	

Country	Rural area/region [1])	Population (x 10^3)	No of sites (all)	Station name	EMEP
Belgium	Veurne (c)	11	1	44N029 – Houtem	
Belgium	Dessel (c)	8	1	42N016 – Dessel	
Belgium	Aarschot (c)	27	1	42N035 – Aarschot	
Belgium	Hasselt (c)	67	1	42N045 – Hasselt	
Belgium	Lanaken (c)	23	1	42N046 – Gellik	
Belgium	Landen (c)	14	1	42N054 – Walshoutem	
Belgium	Geraardsbergen (c)	31	1	44N051 – Idegem	
Belgium	Knokke		1	OKNO01	
Belgium	Eksel		1	OEKS01	
Belgium	Corroy–le–Grand	< 10	1	43N063	
Belgium	Eupen	< 10	1	43N066	
Belgium	Mons		1	43N070	
Belgium	Vezin	< 10	1	43N073	
Belgium	Vielsalm	< 10	1	43N085	
Belgium	Sinsin	< 10	1	43N093	
Belgium	Dourbes	< 10	1	43N100	
Belgium	Saint–Ode	< 10	1	43N113	
Belgium	Offagne		1	43N121	
Belgium	Offagne	< 10	1	MLNT01	
Belgium	Habbay–la–Neuve	< 10	1	43N132	
Belgium	Jalhay (C)	< 10	1	MLNT03	
Belgium	Bovigny (C)	< 10	1	MLNT02	
Belgium	Arlon (C)	22.jul	1	MLPT01	
Bulgaria	Rojen		1	Rojen	
The Czech Republic	Middle Bohemia	1 110	1	DUBLOVICE	
The Czech Republic	Middle Bohemia		1	ONDREJOV	
The Czech Republic	North–western Bohemia	2 030	1	NADLESÍ	
The Czech Republic	North–western Bohemia		1	RUDOLICE v HORACH	
The Czech Republic	North–western Bohemia		1	BLÍZEVEDLY	
The Czech Republic	North–western Bohemia		1	SOUŠ	
The Czech Republic	Southern Bohemia	700	1	KOŠETICE	EMEP
The Czech Republic	Southern Bohemia		1	HOJNÁ VODA	
The Czech Republic	Southern Bohemia		1	CHURÁNOV	
The Czech Republic	Eastern Bohemia	1 230	1	KRKONOŠE–RÝCHORY	
The Czech Republic	Eastern Bohemia		1	ŠERLICH	
The Czech Republic	Eastern Bohemia		1	SVRATOUCH	EMEP
The Czech Republic	Southern Moravia	2 050	1	KOSTELNÍ MYSLOVÁ	
The Czech Republic	Southern Moravia		1	ŠTÍTNÁ NAD VLÁRÍ	
The Czech Republic	Northern Moravia	1 960	1	BRODEK U PREROVA	
The Czech Republic	Northern Moravia		1	STUDÉNKA	
The Czech Republic	Northern Moravia		1	JESENÍK	
The Czech Republic	Northern Moravia		1	BÍLÝ KRÍZ	

Country	Rural area/region [1)]	Population (x 10^3)	No of sites (all)	Station name	EMEP
Denmark	Jylland	5	1	Tange/6003	EMEP
Denmark	Fyn		1	Keldsnor/9005	EMEP
Denmark	Anholt		1	Anholt/6001	EMEP
Estonia	VILSANDI		1	VILSANDI	EMEP
Estonia	LAHEMA		1	LAHEMA	EMEP
Estonia	SAARAJAVE		1	SAARAJAVE	
Finland			1	Utö	EMEP
Finland			1	Oulanka	EMEP
Finland			1	Virolahti	EMEP
Finland			1	Ähtari 1	EMEP
Finland			1	Ähtari 2	EMEP
Finland			1	Matorova	
Finland			1	Sammaltunturi	
Finland			1	Sodankylä	
Finland			1	Raja–Jooseppi	
Finland			1	Evo	
Finland			1	Ilomantsi	
Germany/ Baden–Württemberg			1	Schwaebische Alb (Erpfingen)	
Germany/ Baden–Württemberg			1	Schwarzwald Sued	
Germany/Baden–Württemberg			1	Welzheimer Wald	
Germany/Hessen	Nidda	17	1	Nidda	
Germany / Mecklenburg–Vorpommern	Gülzow	1	1	Gülzow	
Germany / Mecklenburg–Vorpommern	Löcknitz	0.3	1	Löcknitz	
Germany/ Niedersachsen	Braunlage		1	BRNN	
Germany/ Niedersachsen	Solling		1	DLSW	
Germany/North–rhine–Westphalia	Nettetal	40	1	Nettetal	
Germany/North–rhine–Westphalia	Soest	48	1	Soest	
Germany/North–rhine–Westphalia	Finnentrop	18	1	Finnentrop	
Germany/North–rhine–Westphalia	Ladbergen	6	1	Ladbergen	
Germany/North–rhine–Westphalia	Horn–Bad Meinberg		1	Eggegebirge	
Germany/North–rhine–Westphalia	Simmerath–Lammersdorf		1	Eifel	

Country	Rural area/region [1)]	Population (x 10^3)	No of sites (all)	Station name	EMEP
Germany/North–rhine–Westphalia	Hilchenbach		1	Rothaargebirge	
Germany// Rheinland–Pfalz	Westpfalz		1	Westpfalz	
Germany// Rheinland–Pfalz	Saargebiet		1	Dunzweiler	
Germany// Rheinland–Pfalz	Hunsrück		1	Hunsrück	
Germany// Rheinland–Pfalz	Saargebiet–Lothringen		1	Leisel	
Germany// Rheinland–Pfalz	Westeifel		1	Westeifel	
Germany// Rheinland–Pfalz	Aachener		1	Warscheid	
Germany// Rheinland–Pfalz	Revier/ Belgien		1	(Prüm)	
Germany// Rheinland–Pfalz	Westerwald (Gießener Industriegebiet)		1	Westerwald–Herdorf	
Germany// Rheinland–Pfalz	Pfälzer Wald Südpfälzer–französ. Grenzgebiet		1	Pfälzer Wald–Hortenkopf/ Weissenberg	
Germany Schleswig/Holstein	Bornhöved	10	1	Bornhöved	
Germany Bundesland Sachsen	Erzgebirge		1	Carlsfeld	
Germany Bundesland Sachsen	Sächsische Schweiz		1	Mittelndorf	
Germany/ Sachsen–Anhalt	Unterharz		1	Harzgerode	
Germany/ Sachsen–Anhalt	Oberharz		1	Brocken	
Germany/ Thüringen	Possen		1	Possen	
Germany/ Umwelt–bundesamt	Westerland/ Sylt	10	1	Westerland	EMEP
Germany/ Umwelt–bundesamt	Zingst/Ostsee	3	1	Zingst	EMEP
Germany/ Umwelt–bundesamt	Neuglobsow/ Stechlinsee	< 1	1	Neuglobsow	EMEP
Germany/ Umwelt–bundesamt	Langen–brügge	< 1	1	Waldhof	EMEP
Germany/ Umwelt–bundesamt	Schmücke/ Thüringer Wald	0	1	Schmücke	EMEP
Germany/ Umwelt–bundesamt	Deuselbach	< 1	1	Deuselbach	EMEP
Germany/ Umwelt–bundesamt	Riggerding/ Bayerischer Wald	0	1	Brotjacklriegel	EMEP
Germany/ Umwelt–bundesamt	Schauinsland/ Schwarzwald	0	1	Schauinsland	EMEP
Germany/ Umwelt–bundesamt	Ansbach		1	Ansbach	EMEP

Country	Rural area/region [1])	Population (x 10^3)	No of sites (all)	Station name	EMEP
Germany/ Umwelt–bundesamt	Bassum		1	Bassum	EMEP
Germany/ Umwelt–bundesamt	Gittrup (near Münster)		1	Gittrup	
Germany/ Umwelt–bundesamt	Helgoland	< 1	1	Helgoland	
Germany/ Umwelt–bundesamt	Leinefelde	?	1	Leinefelde	
Germany/ Umwelt–bundesamt	Lehnmühle	?	1	Lehnmühle	
Germany/ Umwelt–bundesamt	Lückendorf	?	1	Lückendorf	EMEP
Germany/ Umwelt–bundesamt	Melpitz	?	1	Melpitz	
Germany/ Umwelt–bundesamt	Murnauer Moos	< 1	1	Murnauer Moos	
Germany/ Umwelt–bundesamt	Regnitzlosau	?	1	Regnitzlosau	
Germany/ Umwelt–bundesamt	Ueckermünde	12	1	Ueckermünde	EMEP
Hungary			1	Nyrijes	
Hungary			1	Farkasta	
Hungary			1	Hortobagy	
Hungary			1	K–puszta	
Iceland	Dreifbýli	108	1	Alviðra	
Iceland	Dreifbýli		1	Írafoss	EMEP
Ireland	National (ozone)		1	Avondale	
Ireland	National (ozone)		1	Killkitt	
Ireland	National (ozone)		1	Mace Head	
Ireland	National		1	Valentia	EMEP
Ireland	National		1	Turlough Hill	EMEP
Italy	ARCONATE	5.2	1	ARCONATE	
Italy	BORMIO	4.2	1	BORMIO	
Italy	CALTANISETTA	62.7	1	FARELLO	
Italy	CHIARAVALLE	13.8	1	Chiaravalle2	
Italy	CHIAVENNA	7.4	1	CHIAVENNA	
Italy	DECORTESI CON	1.0	1	CORTESI	
Italy	DONNAS	2.6	1	Donnas	
Italy	DRUENTO	8.0	1	RIA	
Italy	FROSINONE	47.7	1	Fontechiari	
Italy	SAVOIA	3.5	1	GHERARDI	
Italy	LA THUILE	0.8	1	La Thuile	
Italy	LACCHIARELLA	7.4	1	LACCHIARELLA	
Italy	LIVORNO	162.3	1	Gabbro	
Italy	MARMIROLO	7.1	1	BOSCO FONTANA	
Italy	MOTTA VISCONTI	5.9	1	MOTTA VISCONTI	
Italy	PIEVE DI TECO	1.4	1	Pieve di Teco	
Italy	RENON	6.8	1	Renon	
Italy	RIETI	46.0	1	Leonessa	

Country	Rural area/region [1)]	Population (x 10^3)	No of sites (all)	Station name	EMEP
Italy	ROMA	2 646.4	1	Castel. di Guido	
Latvia			1	Rucava	EMEP
Latvia			1	Zoseni	
Lithuania	Preila	0.05	1	Preila	EMEP
Lithuania	Aukstaitija	0.002	1	Aukstaitija	
Luxembourg	Elvange	1	1	Elvange	
Luxembourg	Vianden	2	1	Mont St. Nicolas (Vianden)	
the Netherlands			1	Beek–Vliegveldweg	
the Netherlands			1	Wijnandsrade–Opfergelstraat	
the Netherlands			1	Posterholt–Vlodropperweg	
the Netherlands			1	Budel–Toom	
the Netherlands			1	Vredepel–Vredeweg	EMEP
the Netherlands			1	Volkel–Heikantsepad	
the Netherlands			1	Biest Houtakker–Biestsestraat	
the Netherlands			1	Gilze–Rijen–Rijksweg	
the Netherlands			1	Huijbergen–Vennekenstraat	
the Netherlands			1	Philippine–Stellweg	
the Netherlands			1	Zierikzee-Lange Silkweg	
the Netherlands			1	Westmaas–Groeneweg	
the Netherlands			1	Maassluis–Vlaardingsedijk	
the Netherlands			1	Schipluiden–Groeneveld	
the Netherlands			1	Wieringerwerf–Medemblikkerweg	
the Netherlands			1	Cabauw–Zijdeweg	
the Netherlands			1	Zegveld–Oude Meije	
the Netherlands			1	Bilthoven–Van Leeuwenhoeklaan	
the Netherlands			1	Wageningen–Binnenhaven	
the Netherlands			1	Wekerom–Riemterdijk	
the Netherlands			1	Loenen–Eerbeeksedijk	
the Netherlands			1	Eibergen–Lintveldseweg	
the Netherlands			1	Hellendoorn–Luttenbergerweg	
the Netherlands			1	Barsbeek–De Veenen	
the Netherlands			1	Biddinghuizen–Hoekwantweg	
the Netherlands			1	Witteveen–Talmaweg	
the Netherlands			1	Balk–Trophornsterweg	
the Netherlands			1	Kollumerwaard–Hooge Zuidwal	EMEP
the Netherlands			1	De Zilk	
the Netherlands			1	Sappemeer–Borgercompagnie	
Norway	SouthEast Norway		1	Birkenes	EMEP

Country	Rural area/region [1])	Population (x 10^3)	No of sites (all)	Station name	EMEP
Norway	SouthEast Norway		1	Skreådalen	EMEP
Norway	SouthEast Norway		1	Prestebakke	EMEP
Norway	SouthEast Norway		1	Jeløya	EMEP
Norway	SouthEast Norway		1	Hurdalen	EMEP
Norway	West Norway		1	Osen	EMEP
Norway	West Norway		1	Sandve	EMEP
Norway	West Norway		1	Kårvatn	EMEP
Norway	North Norway		1	Tustervatn	EMEP
Norway	North Norway		1	Karasjok	EMEP
Norway	Spitzbergen		1	Zeppelin	EMEP
Poland			1	Kuznia	
Poland			1	Sniezka	EMEP
Poland			1	Leba	EMEP
Poland			1	Jarczew	EMEP
Poland			1	Belsk	
Poland			1	Diabla Gora	EMEP
Poland			1	Czerniawa	
Poland			1	Jeleniow	
Poland			1	Urad	
Poland			1	Zbereze	
Portugal	Alentejo (Sines)		1	Monte Velho	
Portugal	Centre (Estarreja)		1	Avanca	
Romania	Copsa Mica	6.5	1	Tarnava Scoala	
Slovakia			1	Chopok	EMEP
Slovakia			1	Topolniky	
Slovakia			1	Starina	EMEP
Slovakia			1	Stara Lesna	EMEP
Slovakia			1	Liesek	EMEP
Slovenia			1	Krkavec	EMEP
Slovenia			1	Iskrba	EMEP
Spain	BELLVER DE CERDANYA	1.5	1	BELLVER DE CERDANYA	
Spain	LA SENIA	5	1	LA SENIA	
Spain	SANTA MARIA DE PALAUTORDERA	5.4	1	SANTA MARIA DE PALAUTORDERA	
Spain	SARRIA DE TER	3	1	SARRIA DE TER	
Spain	ELS PORTS	6	1	CORATXAR	
Spain	ELS PORTS	6	1	MORELLA	
Spain	ELS PORTS	6	1	VALLIBONA	
Spain	ELS PORTS	6	1	VILAFRANCA	
Spain	EL BAJO VINALOPÓ	3	1	LA FOIA	
Spain	BUJARALOZ	1	1	BUJARALOZ	
Spain	CAMARENA DE LA SIERRA		1	JAVALAMBRE	
Spain	ALAGON	5.6	1	ALAGON	

Country	Rural area/region [1)]	Population (x 10^3)	No of sites (all)	Station name	EMEP
Spain	TOLEDO MERIDIONAL		1	SAN PABLO DE LOS MONTES	
Spain	ASTURIAS ORIENTAL		1	NIEMBRO	
Spain	GUADALAJARA SEPTENTRIONAL/ SORIA MERIDIONAL		1	CAMPISABALOS	
Spain	VALENCIA OCCIDENTAL/ ALBACETE ORIENTAL		1	ZARRA	
Spain	BADAJOZ		1	BARCARROTA	
Spain	GERONA ORIENTAL		1	CREUS	
Spain	GRANADA		1	VIZNAR	EMEP
Spain	LOS TOJOS	0.1	1	LOS TOJO	
Spain	MEDINA DEL CAMPO (c)	20	1	ESTACION DE AUTOBUSES	
Spain	VELILLA DEL RIO CARRION (c)	2	1	CASA DE LA JUVENTUD	
Spain	VENTA DE BAÑOS (c)	2	1	AV 1° DE JUNIO	
Sweden			1	Bredkalen	
Sweden			1	Esrange	
Sweden			1	Hoburg	
Sweden			1	Rorvik	
Sweden			1	Vavihill	
Switzerland	Jura mountains		1	Chaumont	EMEP
Switzerland	South Alpine Valley		1	Magadino	
Switzerland	Swiss Plateau West		1	Payerne	EMEP
Switzerland	Prealpine Mountains		1	Rigi	EMEP
Switzerland	Inner Alpine Valley		1	Saxon	
Switzerland	Swiss Plateau East		1	Tänikon	EMEP
United Kingdom			1	Sibton	EMEP
United Kingdom			1	Aston Hill	EMEP
United Kingdom			1	Lullington Heath	EMEP
United Kingdom			1	Strath Vaich	EMEP
United Kingdom	North Yorkshire		1	High Muffles	EMEP
United Kingdom			1	Lough Navar	EMEP
United Kingdom			1	Yarner Wood	EMEP
United Kingdom			1	Ladybower	EMEP
United Kingdom			1	Harwell	EMEP
United Kingdom			1	Bottesford	EMEP
United Kingdom			1	Bush Estate	EMEP
United Kingdom	Dunfries and Galloway		1	Eskdalemuir	EMEP
United Kingdom			1	Great Dun Fell	EMEP
United Kingdom			1	Glazebury	EMEP
United Kingdom			1	Rochester	
United Kingdom			1	Somerton	EMEP
United Kingdom			1	Narberth	EMEP
United Kingdom			1	London Teddington	
United Kingdom			1	Wicken Fen	EMEP

Country	Rural area/region [1])	Population (x 10^3)	No of sites (all)	Station name	EMEP
United Kingdom	Hertfordshire		1	Cottered	
United Kingdom	Oxfordshire		1	Chilton	
United Kingdom	Northe Nottingham/ South Yorkshire		1	Styrrup	
United Kingdom	Cumbria		1	Wraymires	
United Kingdom	Aberdeenshire		1	Banchory	
United Kingdom	North Norfolk		1	East Ruston	
United Kingdom	Lancashire		1	Hazelrigg	
United Kingdom	Norfolk		1	Stoke Ferry	

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