

Development in Air Pollution Data Collection in Europe



Hans Eerens

- Introduction
- Establishment European Environmental Agency (EEA) and its Topic Centres
- A common European Environmental Information system (EIONET): Air Quality (and Emission) database through AIRBASE
- Presentation of data: Air Pollution Indicators & Urban Air Pollution
- Integrated Assessment of Air Pollution & Climate Change: the next steps

Introduction: Development European Community Legislation



- Around 1975: EC establish an air pollution expert working group: Gathering urban air quality data (mostly SO₂), main focus on QA/QC of measurement methods and site selection

1979: Legal structure EoI (Exchange of Information) directive: Member states selects a representative number of measurement stations to EC, EC stores data and yearly report data

80's: Directives for SO₂ and particles, Lead and NO₂

1990: EoI directive ends 10 year period, new EoI needed countries decide to continue on a voluntary basis, development of Girafe (Guide of Air Quality Monitoring Networks in Europe)

Introduction: Development European Community Legislation



- 1992: Ozone directive
- 1996: Air Quality Framework adopted: general principles for pollutant directives set
- 1997 new EoI adopted, all measurement stations that measures a component on the list (.. Components) has to be reported (in 2001 amended)
- 1998 EU provides countries with DEM, a data exchange module to convert national data to Airbase, EEA starts to provide yearly Air pollution reports based on the data provided.



Introduction: Development European Community Legislation

- 1999: First Daughter directive adopted (PM10, SO₂, NO₂, lead)
- 2000: Second daughter directive: CO and Benzene
- 2001: Third Daughter directive: Ozone
- 2001: Emission Directive (NEC): SO₂, NO_x, VOC, NH₃ national emission ceilings for 2010 set
- 2001: CAFE (Clean Air For Europe) is launched: a thematic strategy is foreseen for 2004
- coming up: Daughter directives for PAH's and heavy metals (Ni, Cd, As, Hg)



Introduction: Summary

Monitoring and reporting air emissions and air quality data is required under

- CLRTAP protocols
- EU legislation
(air quality/emission Directives)
- UNFCCC

Background EEA



- A European Union institution
- Established by EU Regulation
- Staff: about 80
- Budget: ca. 20 M Euro
- Seat: Copenhagen



EEA home page: www.eea.eu.int

EUROPEAN TOPIC CENTRE ON AIR AND CLIMATE CHANGE



The EEA mission

"Through the provision of timely, targeted, relevant and reliable information to policy making agents and the public, the EEA aims to help achieve significant and measurable improvement in Europe's environment"



EEA member and partner countries



- EU Member States
- + Norway Iceland
Liechtenstein
- +East Europe, Malta,
Cyprus
(members in 2001)
- NIS



ETC/ACC: general information

- Established April 2001 for three years
- Lead organisation: RIVM, the Netherlands
- Around 10 -15 man year/year
- Successor of two ETCs: Air Emissions and Air Quality
- Focus on Air Pollution and Climate Change

ETC/ACC: A truly European consortium



Lead organisation: National Institute of Public
Health and Environment (RIVM)

12 Partners:

UBA- Berlin, Germany

IIASA, Austria

NILU, Norway

UBA- Vienna, Austria

AEAT, United Kingdom

AUT, Greece

CHMI, Czech Republic

ICCS-NTUA, Greece

DNMI, Norway

SHMU, Slovakia

TNO-MEP, The Netherlands

Öko-Institute, Germany

EUROPEAN TOPIC CENTRE ON AIR AND CLIMATE CHANGE



ETC/ACC: Vision and Priorities

- Partnership with countries and stakeholders
- Consolidate monitoring work
- Support Air Pollution and Climate Change Policies
- Enhance linkages between air emissions and air quality
- Explore cross-benefits between Climate Change and Air Pollution policies

Integrated Assessment (ACC)



Economy & population

D

energy

transport

industry

agriculture

tourism

P

CO₂

GHG

SO₂

NO_x

VOC

NH_x

PM₁₀

Emissions

S

SO₂

NO₂

O₃

PM₁₀

SO₂

NO₂

O₃

PM₁₀

Air quality

regional

urban

I

Health

Ecosystems

Materials

R

ECCP

CAFE

EUROPEAN TOPIC CENTRE ON AIR AND CLIMATE CHANGE



Practical aspects - Air Emissions

- Indicator reports
- Guidebook
- Reporting software:
 - CollectER
 - ReportER
- Internet data service

Practical aspects - Air quality



- Indicator reports
- Guidance documents
- EUROAIRNET monitoring network
- AIRBASE information system
- AQ-DEM reporting software
- Model Documentation System
- Internet data service



Country Support Tools for Air Quality

- Database
 - Airbase
- Web based applications (etc-acc.eionet.eu.int) :
 - AIRVIEW
 - MDS (Model catalogue)
 - (ON LINE OZON WEBSITE)
- PC-application:
 - DEMv5





EIONET

- EEA supports and helps improving and streamlining national reporting
- Assessment and reporting is carried out in close contact with national coordination centers and expertise centers
(meetings, workshops, informal contacts)

European Topic Centre on Air and Climate Change

Topic Centre of European Environment Agency



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Databases on air quality and emissions of air pollutants and greenhouse gases in Europe

AirBase

The database section of [AirBase](#), the European air quality information system, contains air quality data for a selection of stations and a number of components and meta information on air quality monitoring networks and stations. Airbase builds on two preceding EU databases APIS (Air Pollution Information System; air quality data) and GIRAFE (meta information on air quality networks and stations) by extending their information with recent air quality information.

The AirBase Information System further contains elements as:

- [AirView](#), the facility to access all information contained in AirBase using the Web
- [Model Documentation System \(MDS\)](#), set up to provide guidance to model users in the selection of the most appropriate model for his or her application
- [Documented data](#), as used in contributions on air quality aspects to integrated environmental reports, as published by the EU Commission or EEA.

CORINAIR (CORe INventories AIR)

CORINAIR is the ETC/ACC database which covers emission data of EEA member countries and for the EU

CORINAIR (CORe INventories AIR)

CORINAIR is the ETC/ACC database which covers emission data of EEA member countries and for the EU as a whole, and where available also underlying activity data and emission factors, for all source sectors that should be reported under several international and EU obligations:

- Greenhouse gases (CO₂, N₂O, CH₄, Fluorinated gases): UN Framework Convention on Climate Change (FCCC) and its Kyoto Protocol and the EU Greenhouse Gas Monitoring Mechanism;
- Air pollutants (the acidifying pollutants and ozone precursors SO₂, NO_x, NH₃, VOC, CO, CH₄; fine particulates; heavy metals; persistent organic pollutants): UNECE Convention on Long Range Transboundary Air Pollution (CLRTAP) and its Protocols and the (future) EU National Emissions Ceilings Directive.

These data are used in EEA reports and in the annual EU inventory submissions, by the European Commission, to the two conventions FCCC and CLRTAP. The data can be accessed through the EEA data service at [Documented Air Emission Data](#)

DOCUMENTED AIR EMISSION DATA

Climate Change

- [Trends in CO₂ Emissions from Fossil Fuels](#)
- [Trends in emissions of greenhouse gases](#)

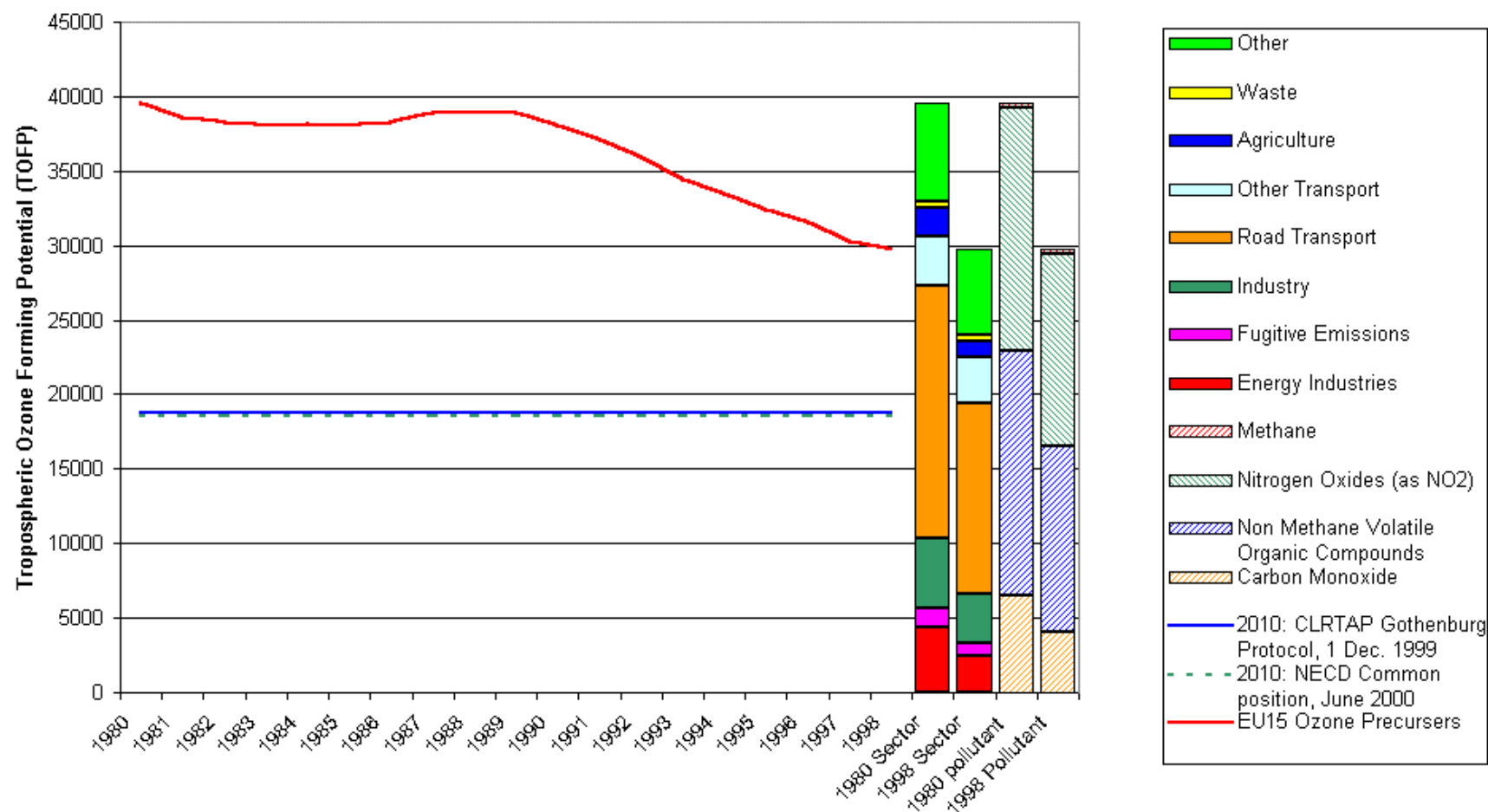
Tropospheric Ozone

- [Trends in emissions of Ozone precursor](#)
- [Trends in emissions of Ozone precursors \(CLRTAP\)](#)

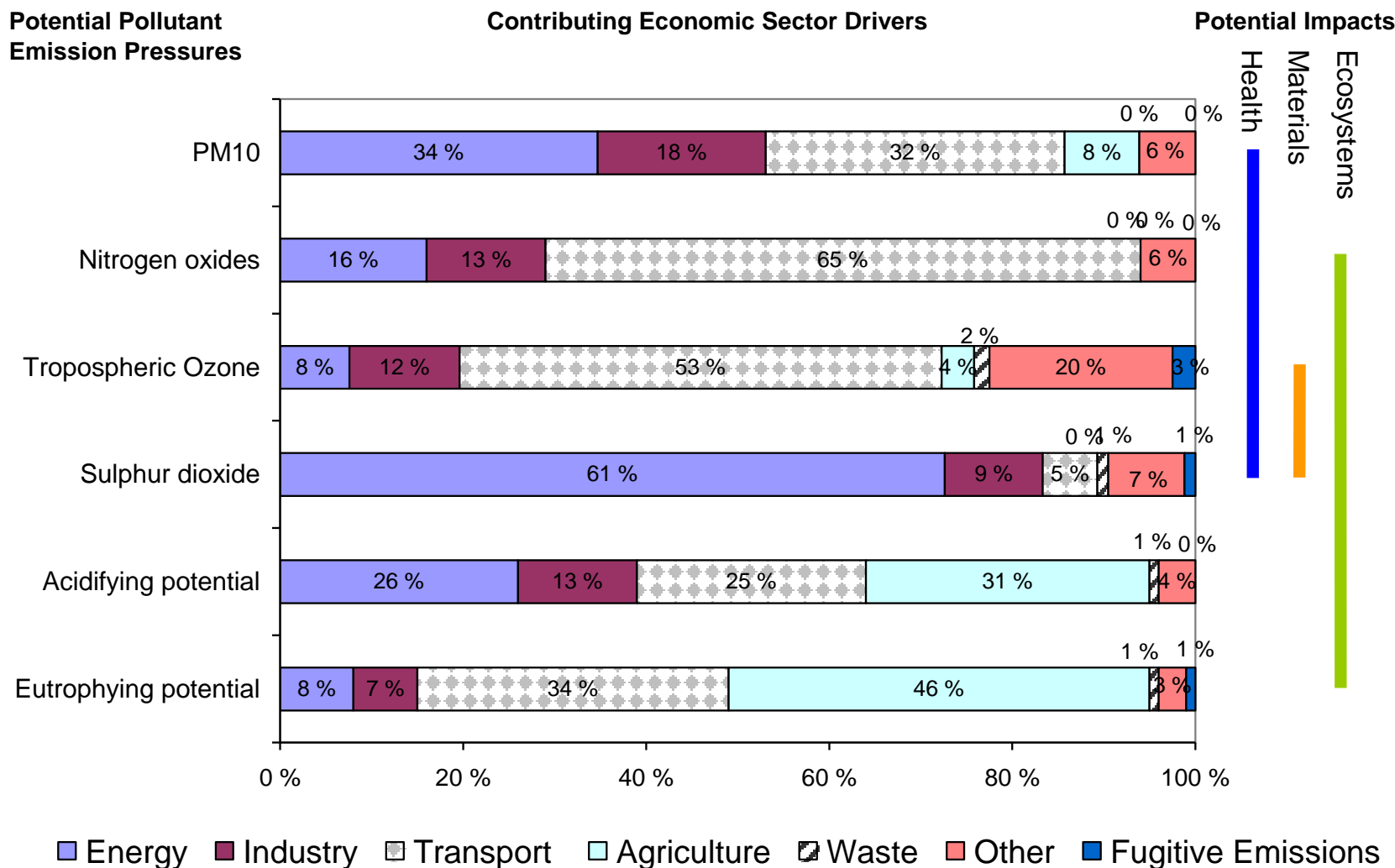


Emissions

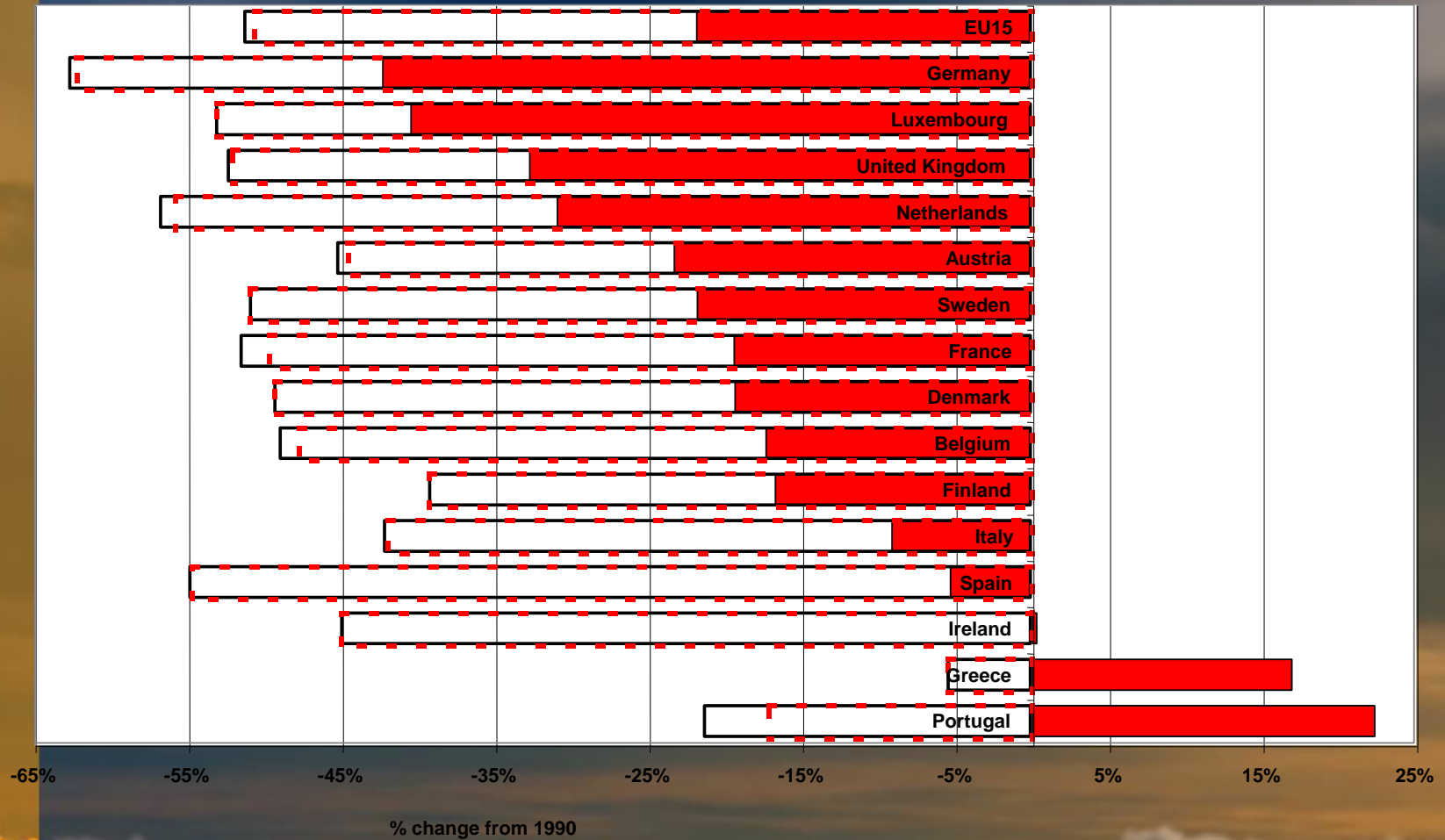
Emissions of Tropospheric Ozone Precursors (CO, NMVOC, NOx and CH4) 1980 -1998



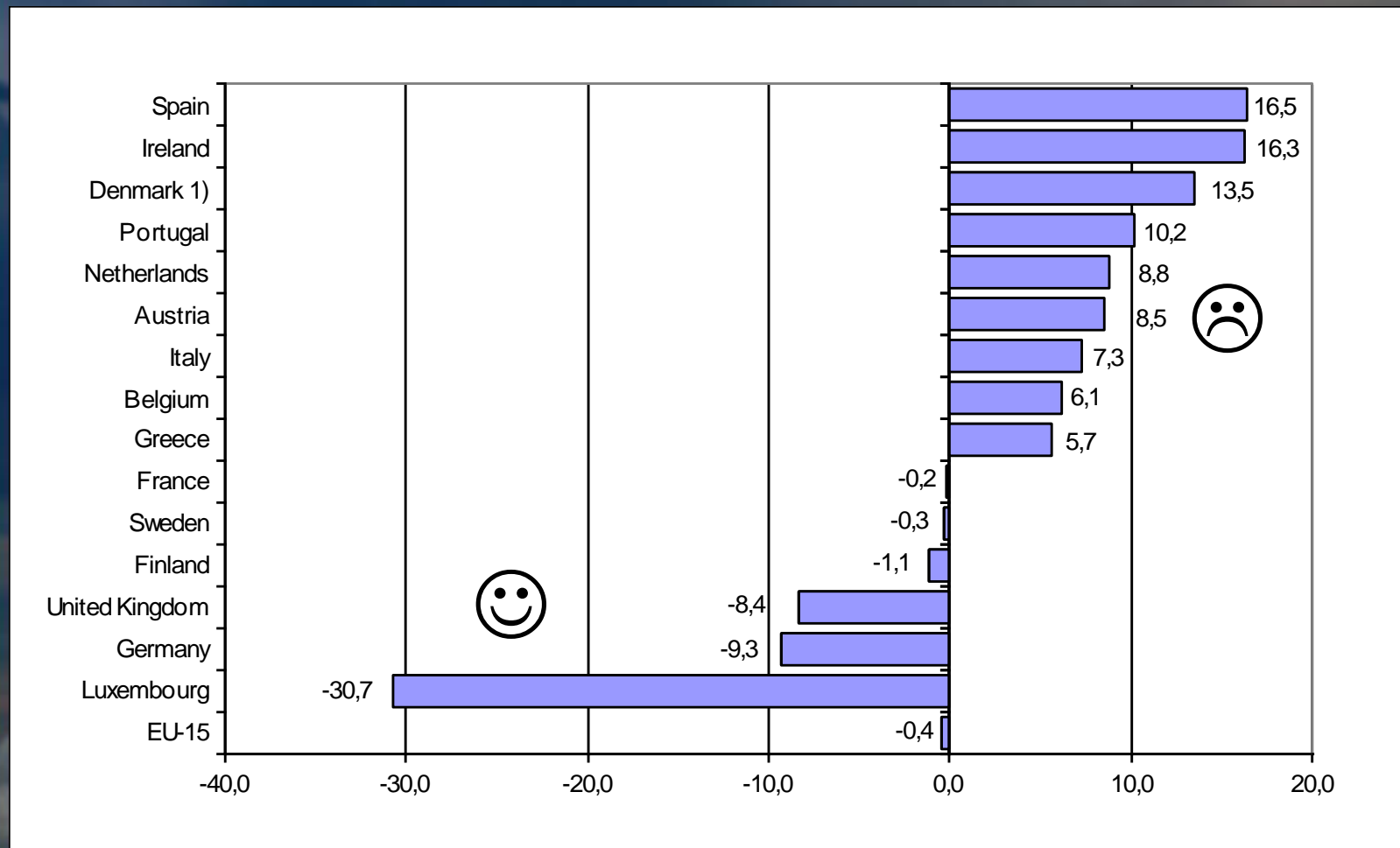
emissions



Emission: obligations



Greenhouse gases: Distance-to-target (1999)



AIRBASE



- AQ Data collection based on "Exchange of Information Decision" (EoI)
- pan-European
- Metadata of air quality measurement stations in Europe (information about networks, stations and measurement configurations)
- Air quality measurement data (raw data, statistics) of more than 30 countries
- available to general public

Access to AIRBASE



FileEditViewFavoritesToolsHelp

Address <http://etc-acc.eionet.eu.int/databases/airview.html>

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AirView

AIR quality Visualisation Instrument for Europe on the Web

GENERAL DESCRIPTION OF APPLET FUNCTIONALITY

Important Notes

This applet version should allow access to AirBase, even from firewall protected intranets. You are invited to report bugs or send comments on the overall functionality to the [AirBase help desk](#).

The applet has been tested with Microsoft Internet Explorer 5. The applet will not run correctly under older versions of this browser. This applet has not yet been fully tested with the Netscape browser. Please keep the Java Console in the browser open and watch for error reports.

AirView v2.0beta
Release date:
17 March 2000

[Using and installing the AirView Certificate](#)

[Accessing Airview through a firewall](#)

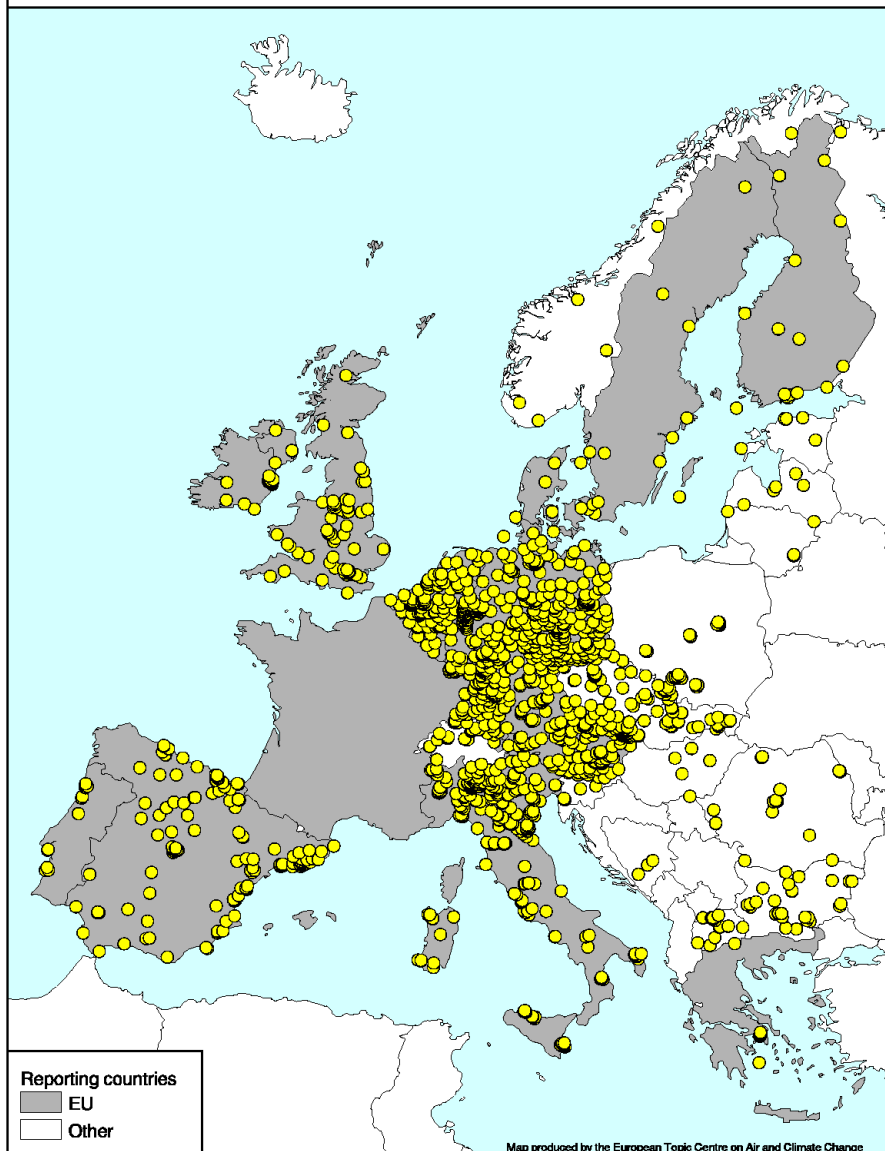
[Help overview](#)

[Goto applet start page](#)

1995-1999

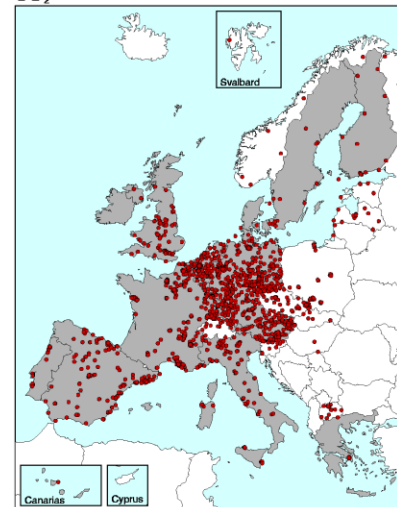
Location of monitoring stations supplying data for SO₂

Reference period: 1995 to present

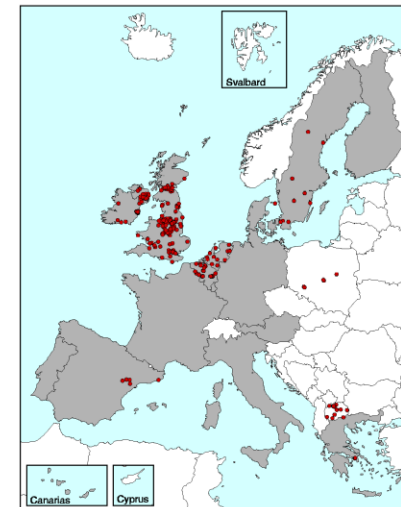


Stations reporting air quality data during 2000 in the framework of Decision 97/101/EC

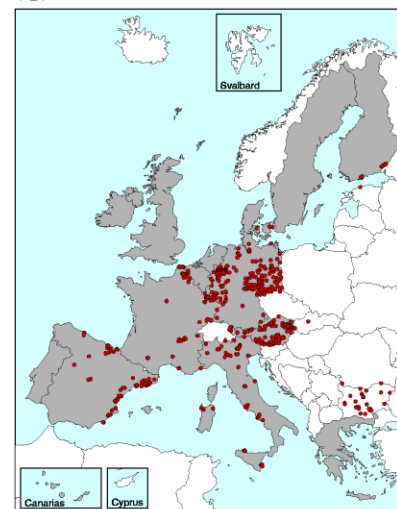
SO₂



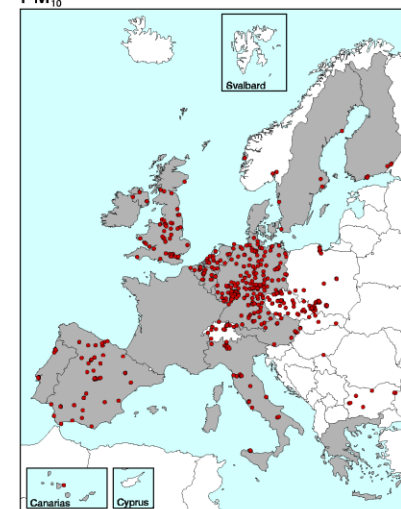
Black smoke



TSP



PM₁₀



Maps produced by the European Topic Centre on Air and Climate Change



AIRVIEW

- Facilitates interactive access to AIRBASE
- Visualisation of data in the form of maps, graphs or tables
- Java based applet application
- <http://www.etcaq.rivm.nl/databases/airview.html>

Airview



European Environment Agency

European Topic Centre on Air Quality



AirView

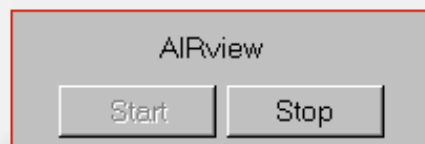
Home

AirView

AIRVIEW v.2.0beta

Release date:

17 March 2000



Airview



AIRview - Meta Data Selection [min] [max] [close]

File Help

Selected criteria

Country

FINLAND

Selection criteria

<p>Component</p> <p>Arsenic</p> <p>Benzene</p> <p>Benzo(a)pyrene</p>	<p>Inhabitants class</p> <p>1000-100.000 inh</p> <p>0.1-0.5 million inh</p> <p>0.5-1 million inh</p>	<p>Type of station</p> <p>Traffic</p> <p>Industrial</p> <p>Background</p>
<p>Type of zone</p> <p>urban</p> <p>suburban</p> <p>rural</p>	<p>Characterisation of zone</p> <p>natural</p> <p>agricultural</p> <p>industrial</p>	

Country Selection Meta Data Results Data Visualisation

Airview



AIRview - Data Visualisation

File Help

Selected criteria

Country: FINLAND

Component: Ozone

Selection criteria

☒ Statistics From: 1993 To: 1999

☐ Raw data

Measurement configurations 15

Country	Component	City	Data available	Station name	Station code	Type of station	Type
FINLAND	Ozone		1995 - 1999	Evo (Lammi)	368	Background	rural
FINLAND	Ozone		1998 - 1999	Ilomantsi	428	Background	rural
FINLAND	Ozone		1993 - 1999	Luukki	208	Background	rural
FINLAND	Ozone		1995 - 1999	Oulanka	352	Background	rural
FINLAND	Ozone		1995 - 1999	Raja-Jooseppi	357	Background	rural
FINLAND	Ozone		1993 - 1999	Sammaltunturi	356	Background	rural
FINLAND	Ozone		1998 - 1999	Sodankylä	426	Background	rural
FINLAND	Ozone		1995 - 1999	Tuusula	354	Background	rural

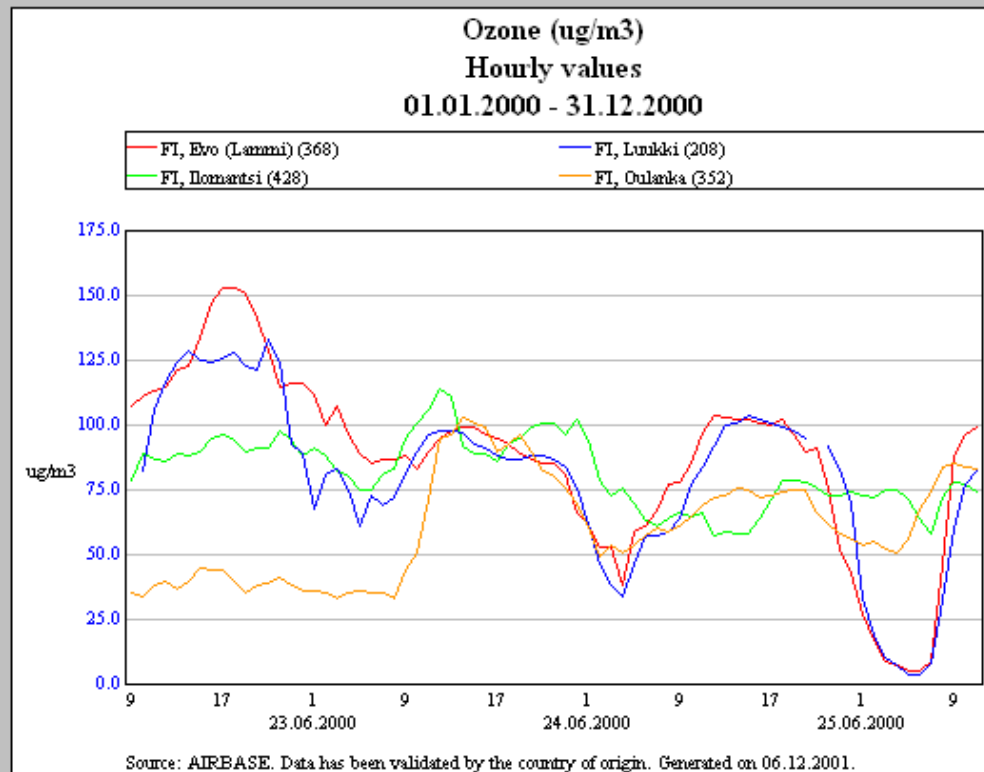
Meta Data Selection Meta Data Results Table Graph Map

Airview



AIRview - Graph

File Help



Use scrollbar to move graph

☐ Daily values
☒ Hourly values



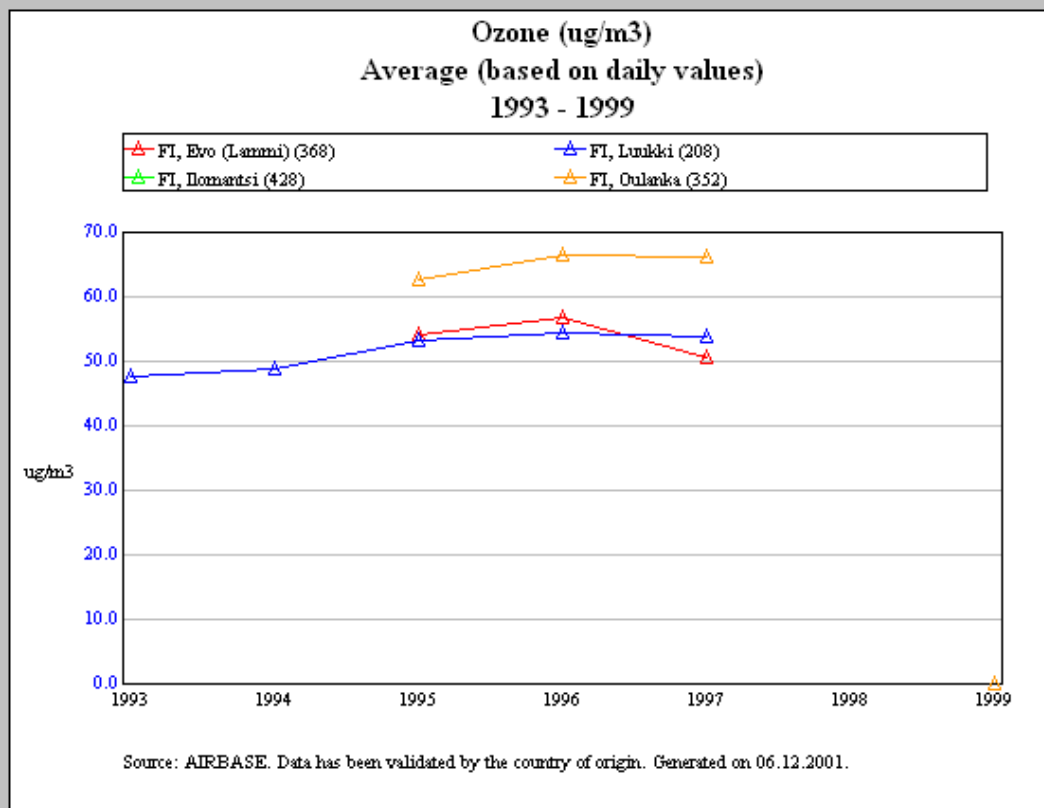
OK

Airview



AIRview - Graph

File Help



☒ Daily values
☐ Hourly values

☒ Average
☐ P50
☐ P95
☐ P98
☐ P99.9
☐ Maximum



OK

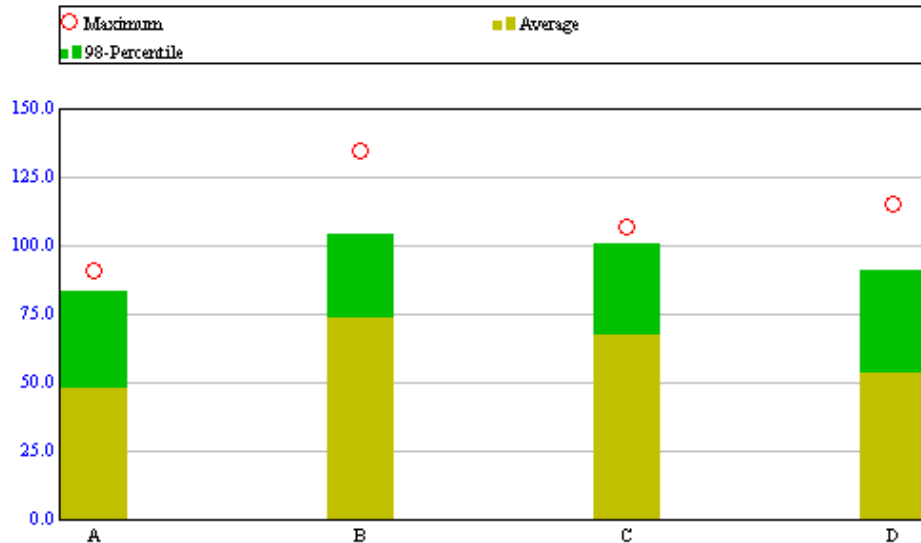
Airview



AIRview - Graph

File Help

Ozone (ug/m3)
Statistics (based on daily values)
1993



A FI, Luukki (208)

C FI, Utö (349)

B FI, Saarnaharjuri (356)

D FI, Ähtäri 1 (350)

Source: AIRBASE. Data has been validated by the country of origin. Generated on 06.12.2001.

☒ Daily values
☐ Hourly values



OK

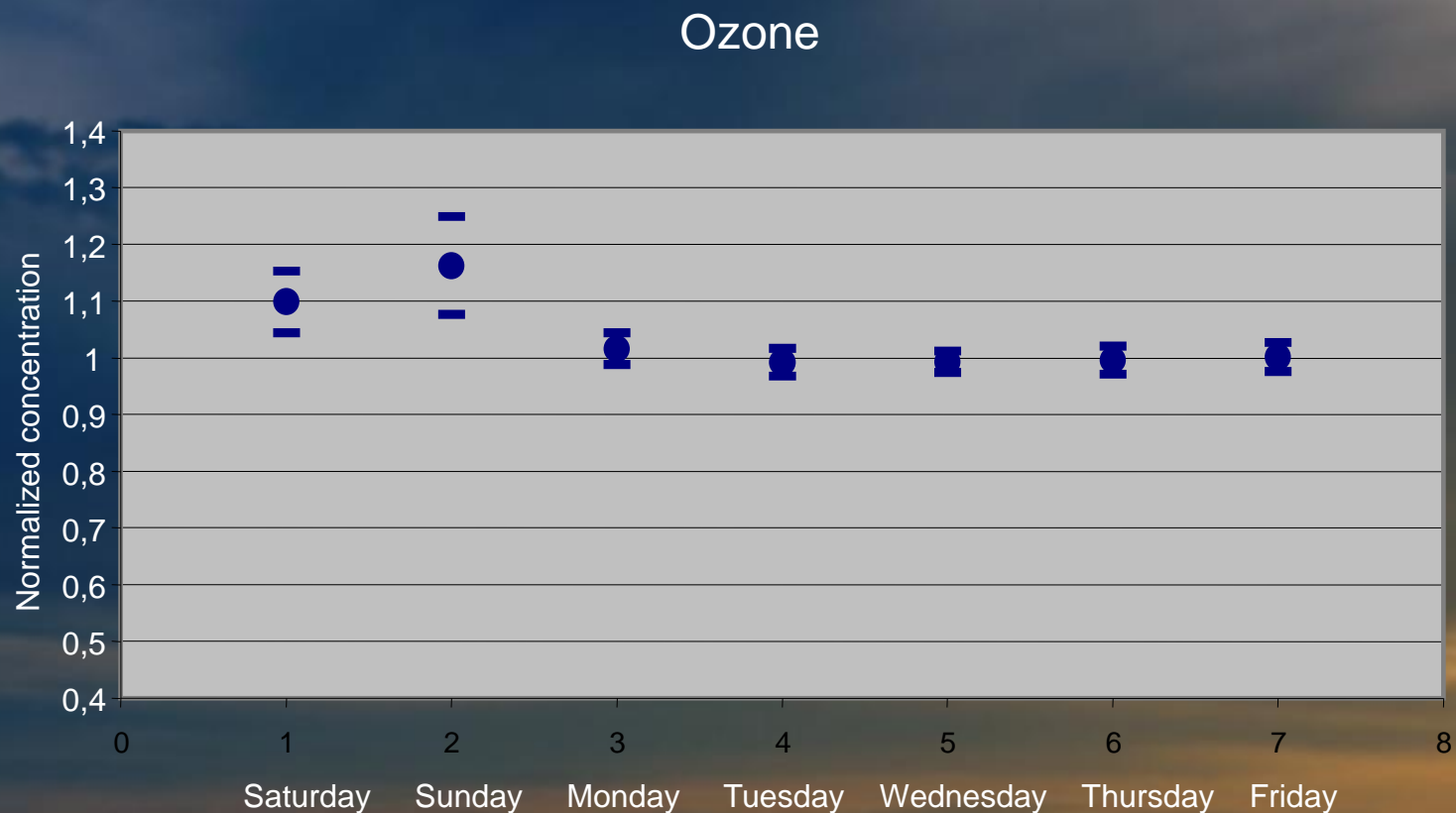


Weekday dependence of ozone concentrations

- ...can provide information concerning the effect of emission reductions on Ozone
- NMVOC and NO_x emissions are ca 30 % lower during weekend days than during working days



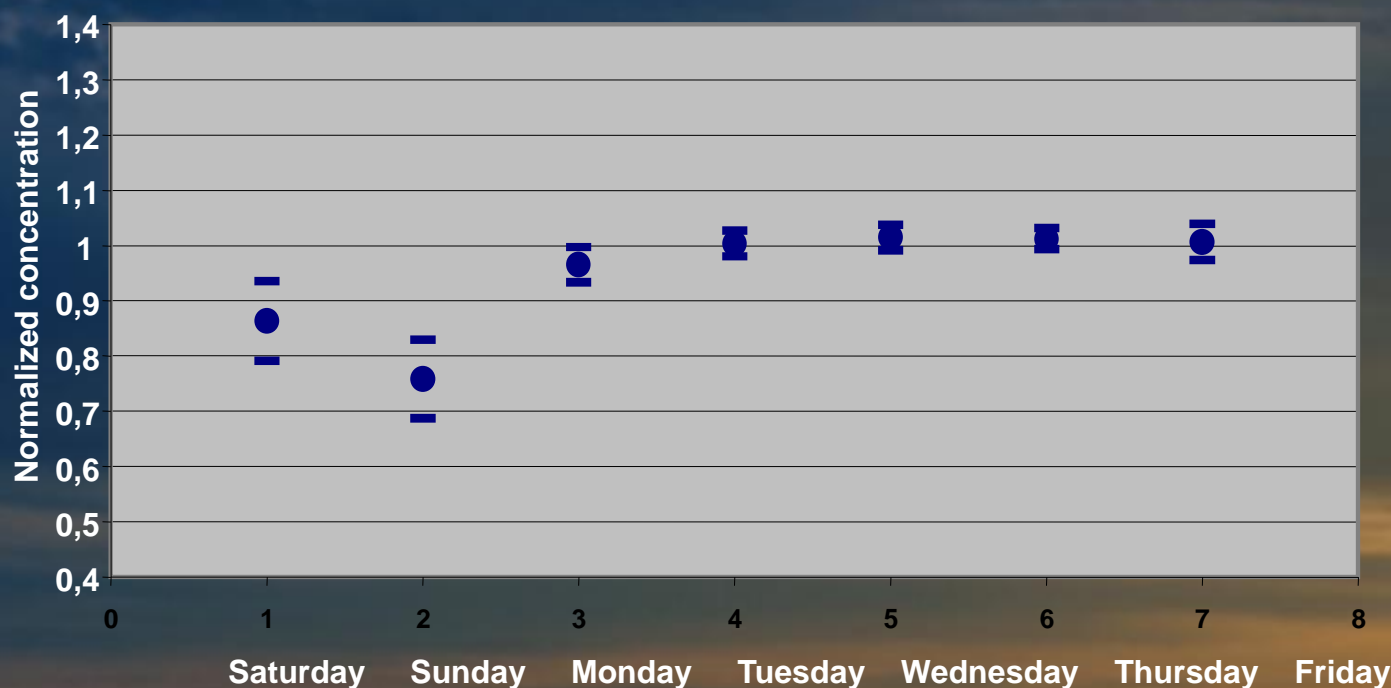
The Ozone weekend effect





The Ozone weekend effect

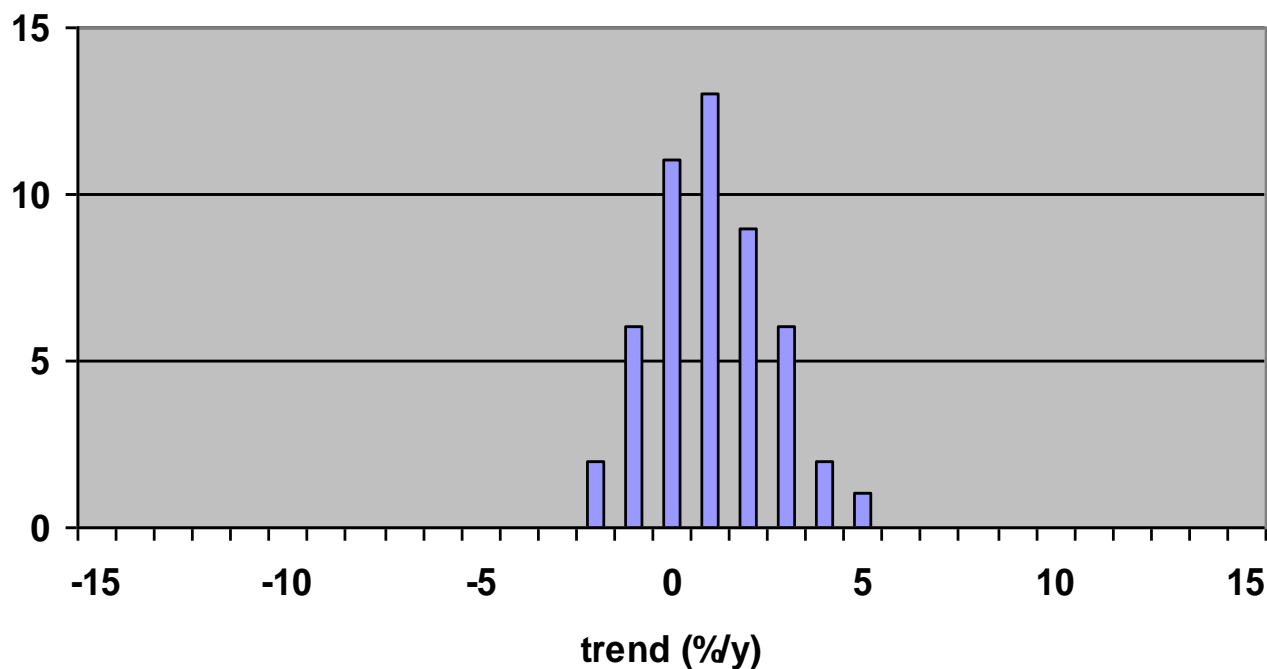
Nitrogen Dioxide



Average rural ozone trends are upward



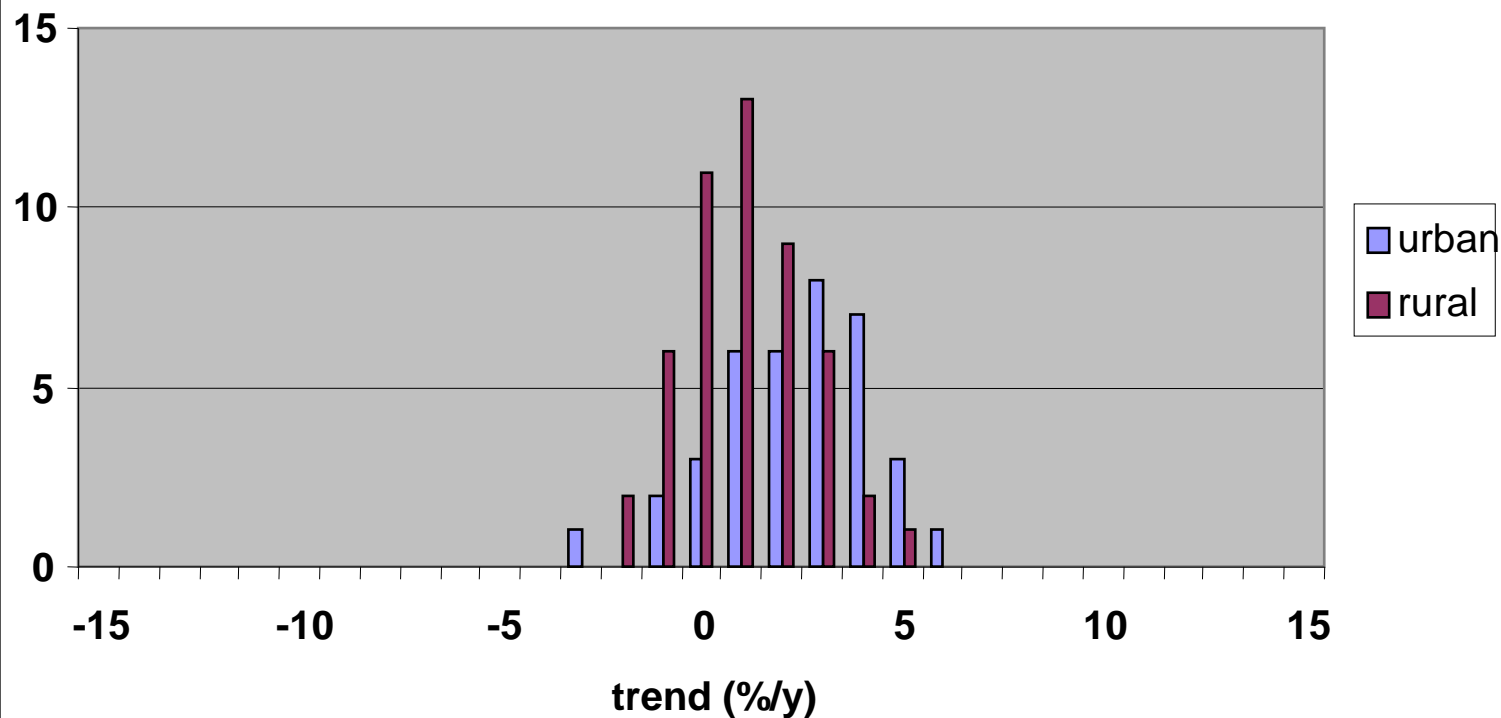
rural background stations > 5 full years



Urban ozone trends are more positive



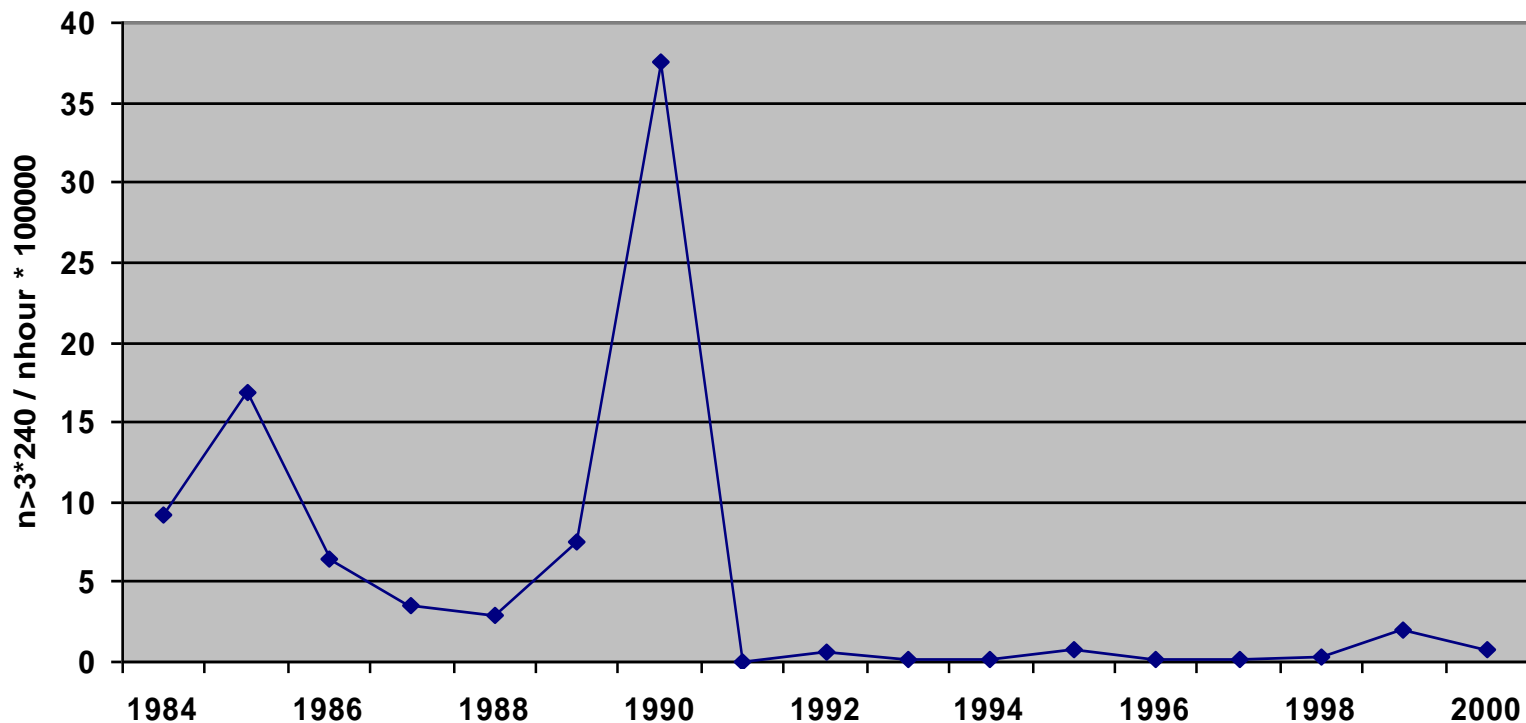
O₃ trends all stations > 5 full years



High exceedances are going down



exceedance 3 times 240 ug/m3; all stations





Ozone summary (1994-2000)

	50 P	98 P
# stations (> 1my)	1787	1788
> 5 monitoring years	645	645
upward trend	127	13
downward trend	11	165



Exceedance days Ozone (1994-2000)

	180(1h)	110(8h)	65(24h)
--	---------	---------	---------

# stations (>1my)	1868	1804	1745
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> 5 mon years	664	586	592
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upward	6	15	53
--------	---	----	----

downward	131	131	83
----------	-----	-----	----

zero	87	3	0
------	----	---	---



DEM (Data Exchange Module)

- Facilitates data transmission from countries to AIRBASE
- PC-application
- Add, modify and delete meta information on AQ networks, stations and measurement configurations
- Visualise imported data
- Generate reports giving an overview contained in application





DEM

- Transmitting the database through Internet (Ftp) for incorporation in Airbase
- Next cycle, next year: The DEM is sent to the countries; the DEM is pre loaded with all actual meta information of AIRBASE. The countries are asked to correct and complete the meta information and to add the data of the last year





DEM

- Exchange of Information Decision
97/101/EC (from 2002: 2002/752/EC)
- Directive 92/72/EC (Ozone)
- EEA-Euroairnet
- EMEP Task Force Measurement and
Modelling

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DEM - Data Exchange Module - version 4 -

DEM is the abbreviation of **D**ata **E**xchange **M**odule. This PC based software can be used to exchange AQ data (raw data, statistics and exceedances) and meta information on operational AQ networks, stations and measurement configurations in the framework of:

- Decision 97/101/EC ('Exchange of Information')
- Directive 92/72/EC (Ozone)
- EEA EUROAIRNET programme

New in DEM v4 (2001 release):

- Deletion of stations is made possible;
- XML-export of data is made possible;



Summary: Country Support Tools for Air Quality Accessible by Website

- URL: etc-acc.eionet.eu.int
- Interactive access to AIRBASE (Airview)
- Download DEM
- Information





ENVIRONMENTAL INDICATORS

- representative
- transparent
- distinctive
- consistent within DPSIR-chain
- target value





Air Pollution Indicators

Building blocks for:

- Environmental Signals report of EEA
- sectoral reports (TERM, EERM)
- Kiev report (ministerial conference)
- Air Quality & Air Pollution reports
-



Air Pollution Indicators

Core set-pressure:

- emissions acidifying pollutants
- emissions ozone precursors
- emissions prim & sec PM10
- emissions SO₂, NO_x, VOC, NH₃





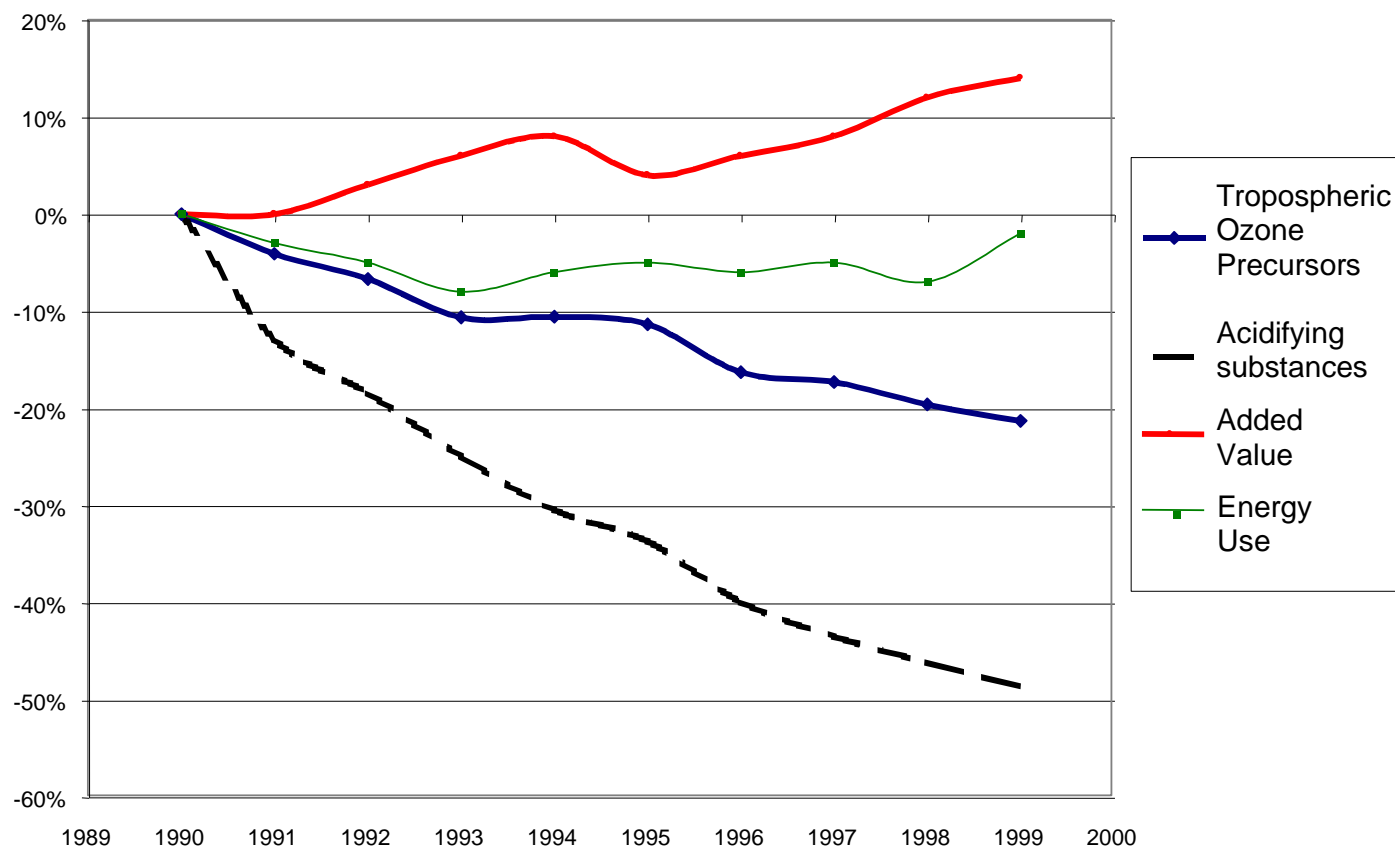
Air Pollution Indicators

Core set-impact & response
(under development):

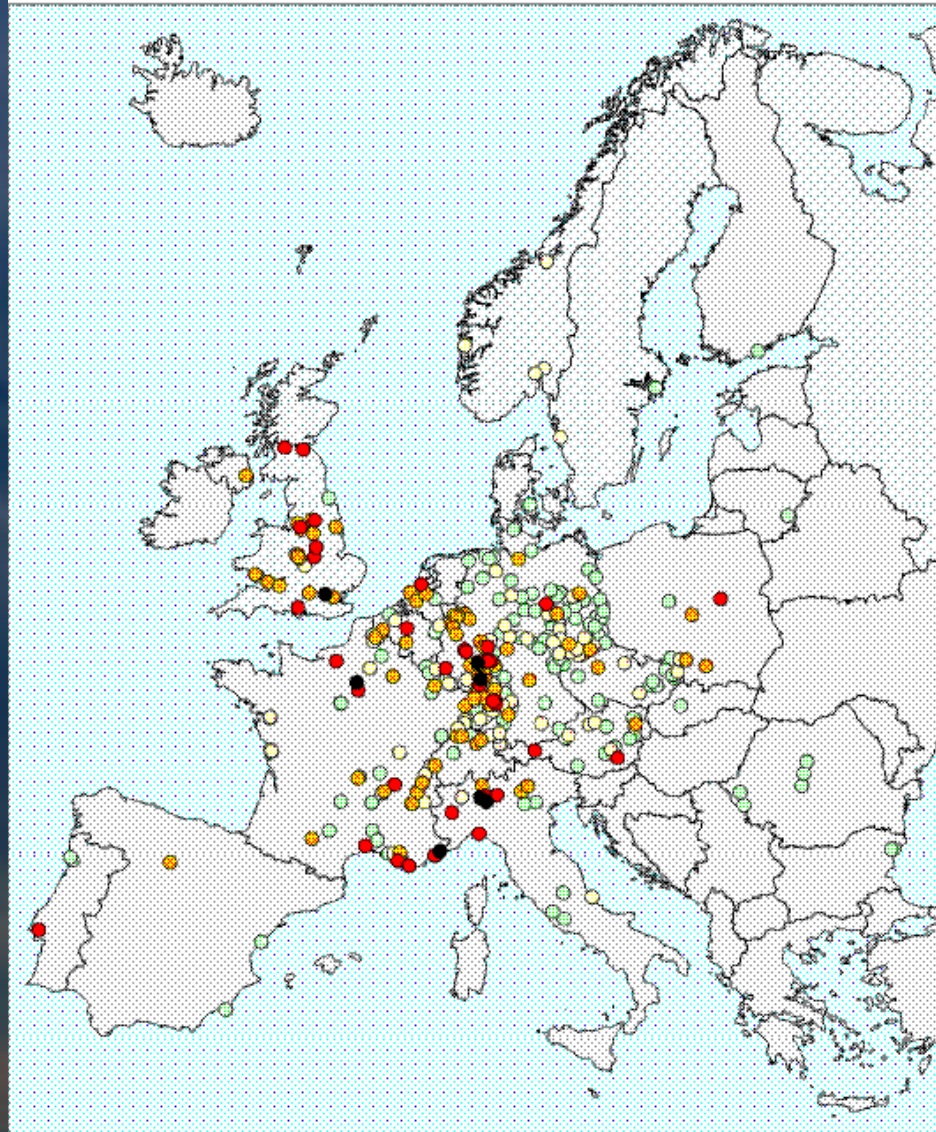
- human health exposure and risk by air pollution
- effectiveness policy response SO₂ and NO_x



Industry sector



Nitrogen Dioxide

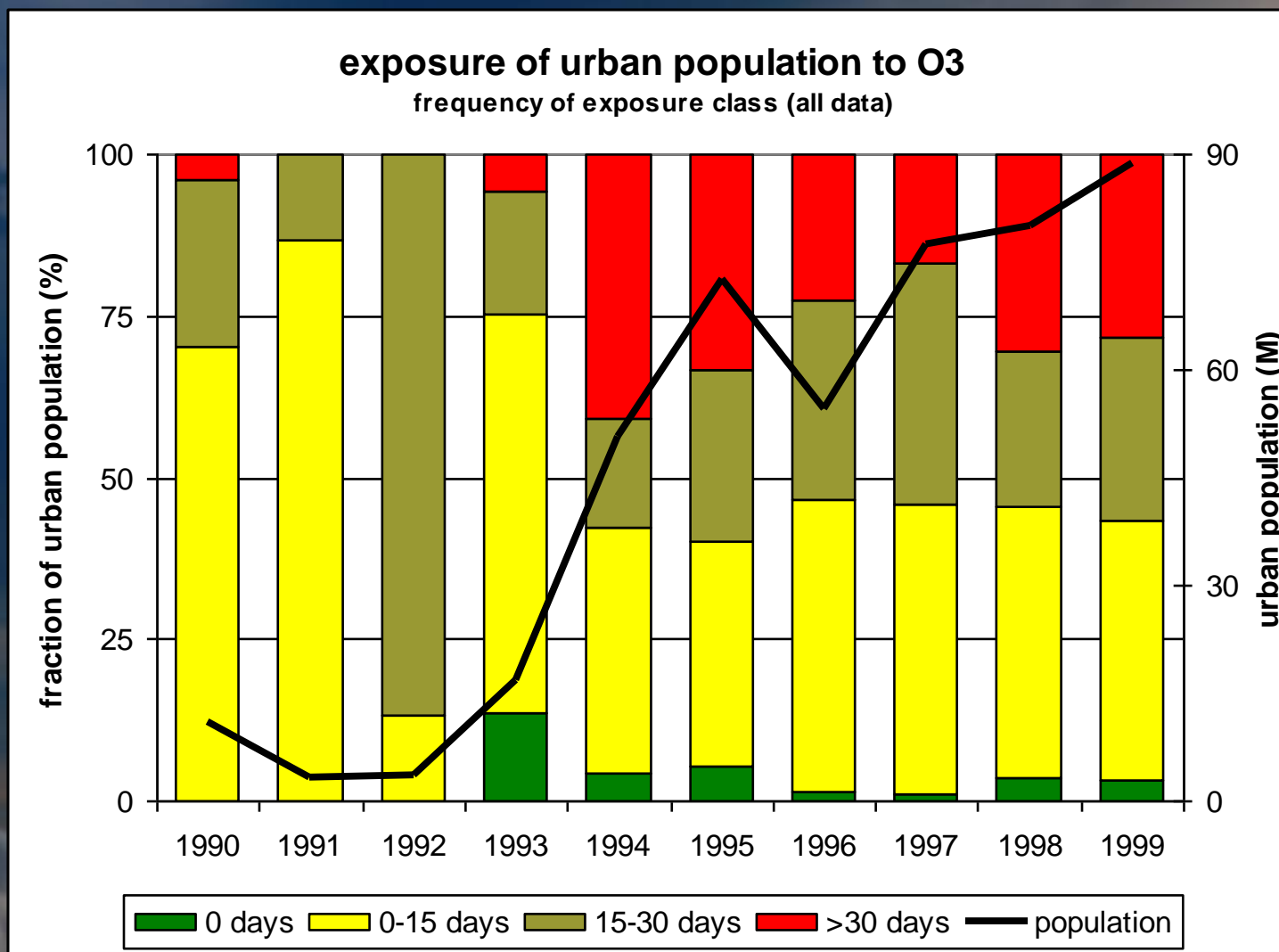


Yearly Average
Urban Background Stations

- \leq LAT
- $>$ LAT and \leq UAT
- $>$ UAT and \leq LV
- $>$ LV and \leq 50 % above LV
- $>$ 50 % above LV

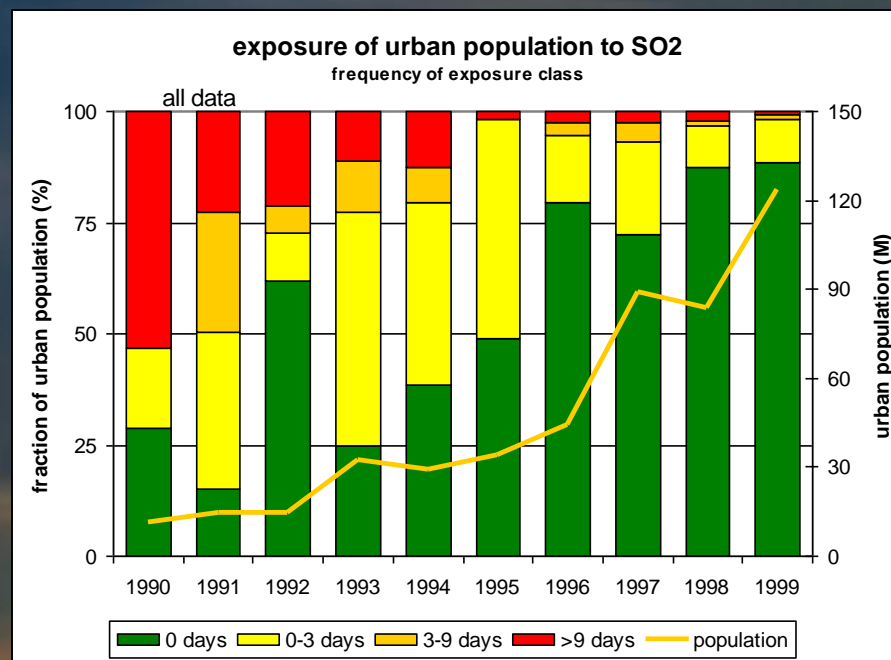
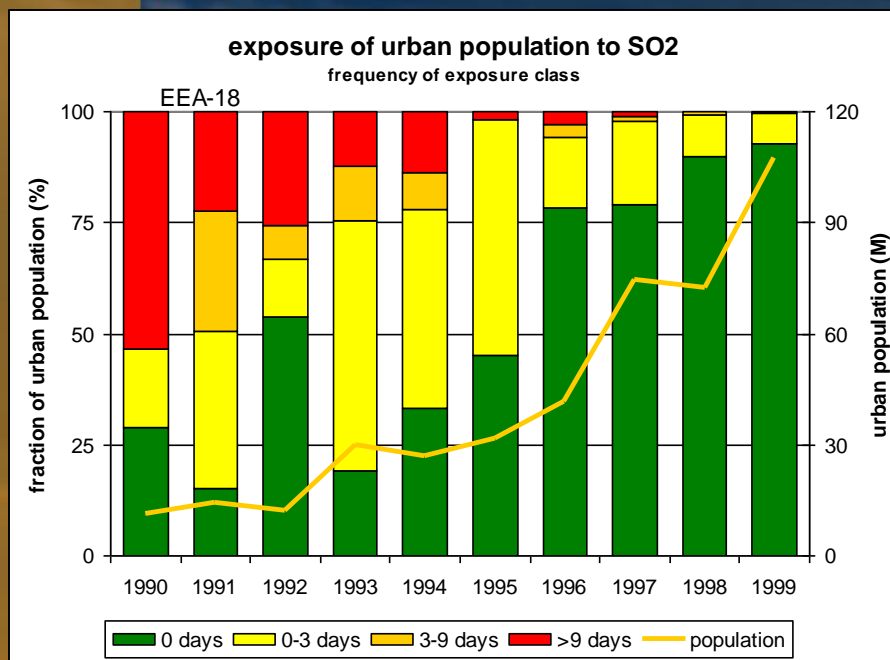


Urban ozone (8h>110 $\mu\text{g}/\text{m}^3$)

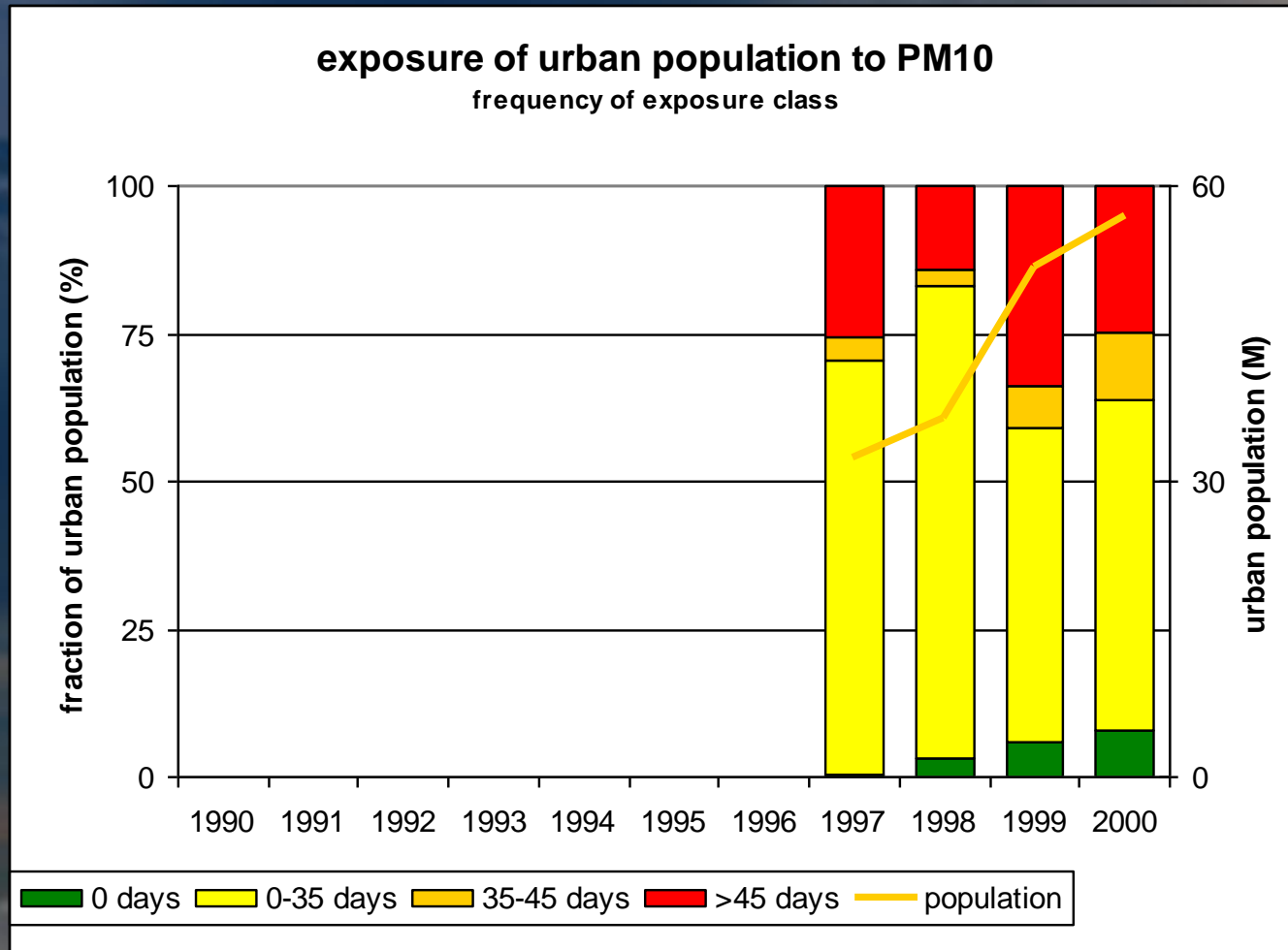




Urban SO₂



Urban PM10





Urban Air Pollution: exceedance of Limit Values (LV)

Number of cities and their population with reported data and with stations above LV.
Total European urban population: 234 millions (in 29 EEA+Phare countries).

		Cities with data		cities > LV		cities >1.5 LV	
		no.	Pop.	no.	Pop.	no.	Pop
PM10 (day)	UB	80	44.3	24	5.2	5	0.51
	Hotspot	65		40		10	
NO ₂ (year)	UB	360	100.0	45	41.5	7	21.3
	Hotspot	320		23		3	
Ozone (8-hour)	UB	406	102.0	114	29.4	0	
SO ₂ (day)	UB	366	94.7	6	0.7	3	0.25
	Hotspot	338		13		5	

UB: Urban background stations

Hotspot: Traffic or industrial stations



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Forward



Stop



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MDS - Model Documentation System

The Model Documentation System was built by the former European Topic Centre on Air Quality (ETC/AQ). It continues under the European Topic Centre on Air and Climate Change (ETC/ACC) with the aim to provide guidance to any model user in the selection of the most appropriate model for his application. Inclusion of a model in the system is by no means associated with any form of endorsement for using the particular model: it helps select the most appropriate using the specifications submitted by the modellers.

The Model Documentation System was developed at the Aristotle University Thessaloniki, Greece, by [Nicolas Moussiopoulos](#) based on ideas originally proposed by Helge Olesen. The necessary programmes were prepared by [Tassos Bassoukos](#). Useful background information was derived from the Model Catalogue compiled in the frame of [COST 615](#).

ETC/ACC would welcome any kind of comments on the Model Documentation System with emphasis on its usefulness and functionality. Such comments should be sent via e-mail to the [database administrator](#) with carbon copies to [Frank de Leeuw](#).

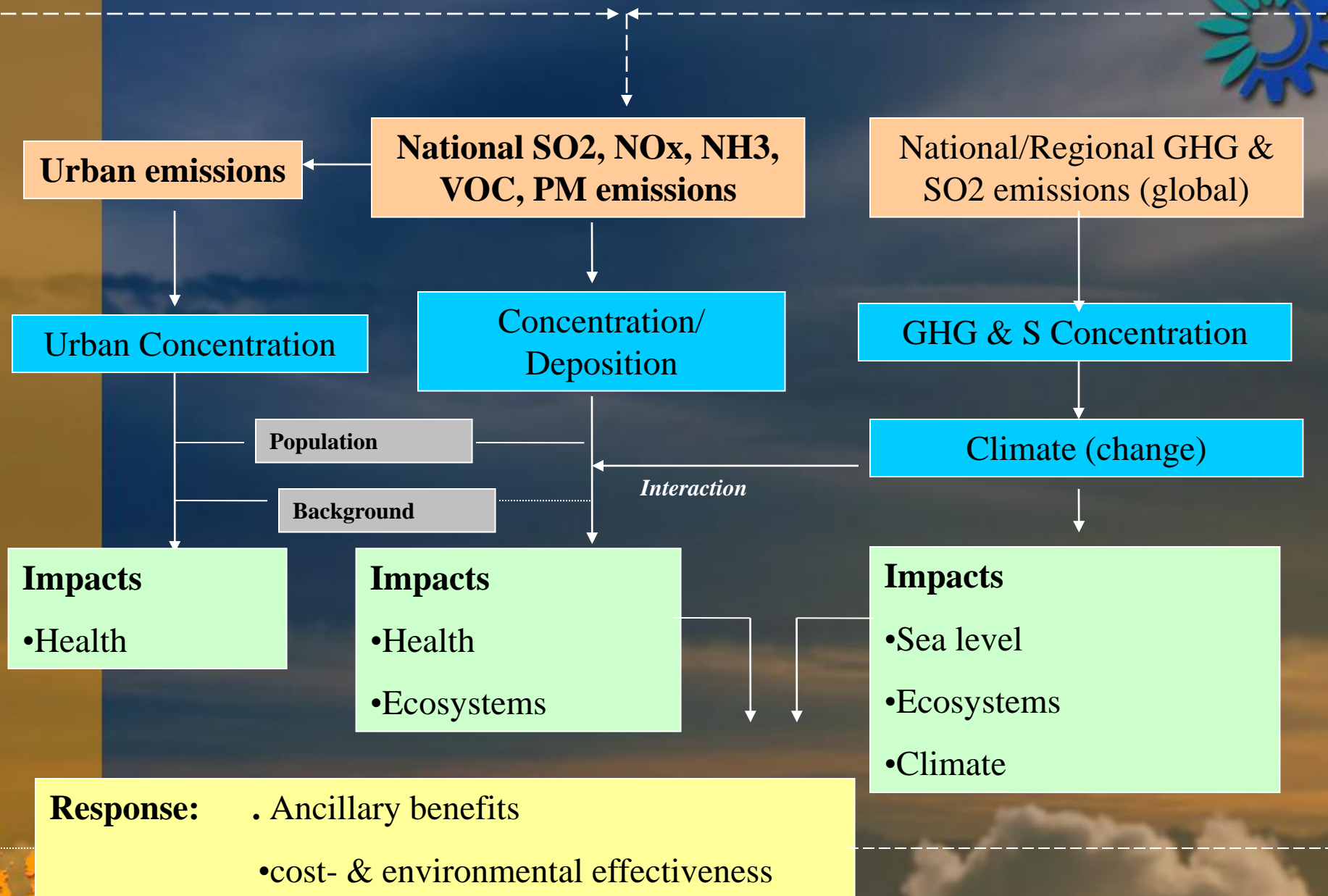
There are several sources of inhomogeneities in the Model Documentation System, each of which may constitute a serious loss in comparability between individual models:

- The submissions by the individual modellers differ significantly regarding the information provided, where concerning model limitations are concerned.
- Remarks related to quality assurance/quality control (QA/QC) of the models and their results are solely based on information provided by the modellers.
- Links to the own WWW pages of the modellers were introduced as an additional information option.

Integrated Environmental Assessment - Framework

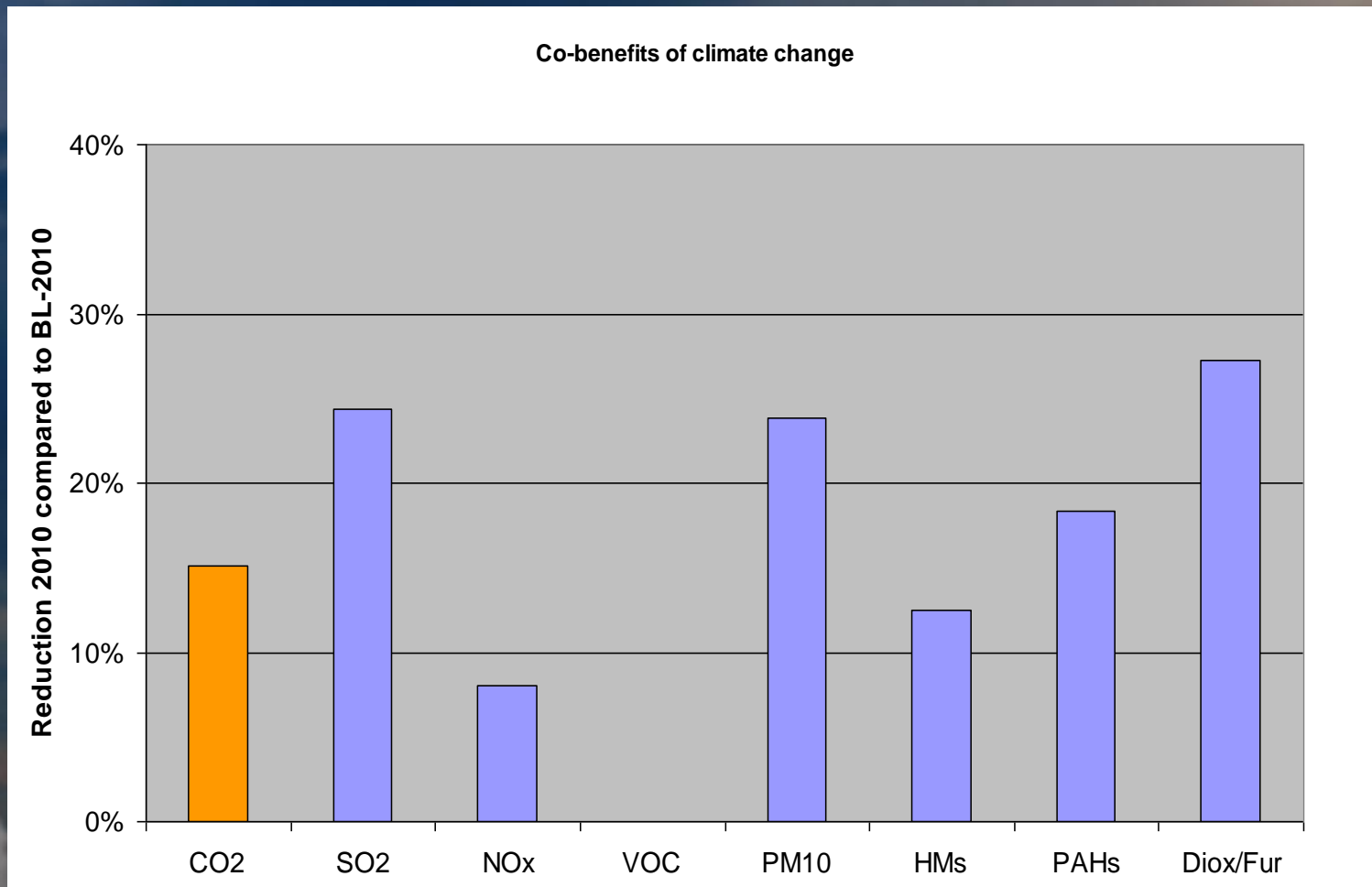


- Driven by policy questions (GHG MM and CAFE)
- Covering full DPSIR causality chain focus on sectors
- Baseline trends: emerging issues and policy effectiveness
- Geogr. scope: EU and ACC
- Time horizon: 2010/2010 (+2050 for CC)



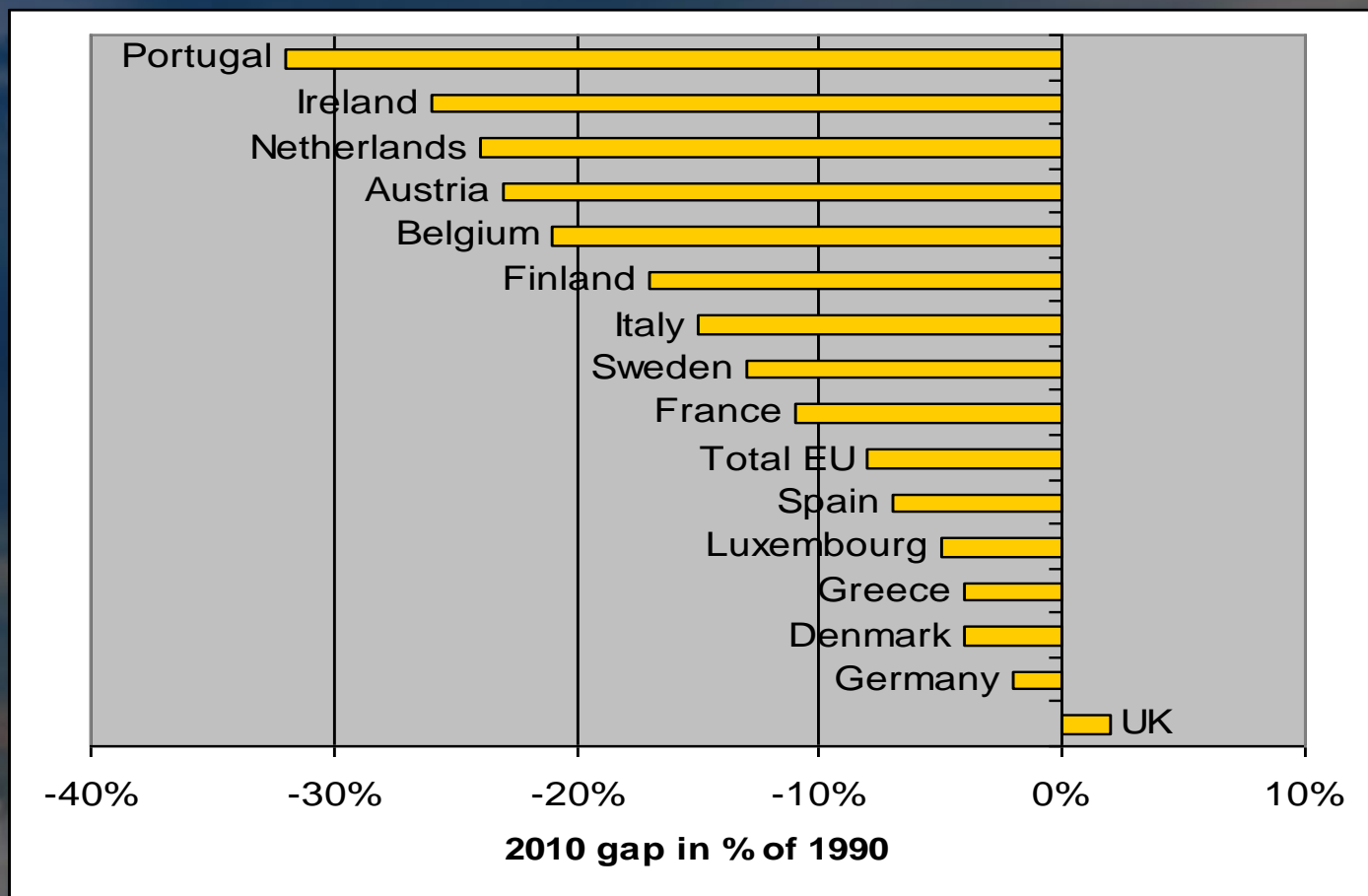


Co-benefits Climate Change



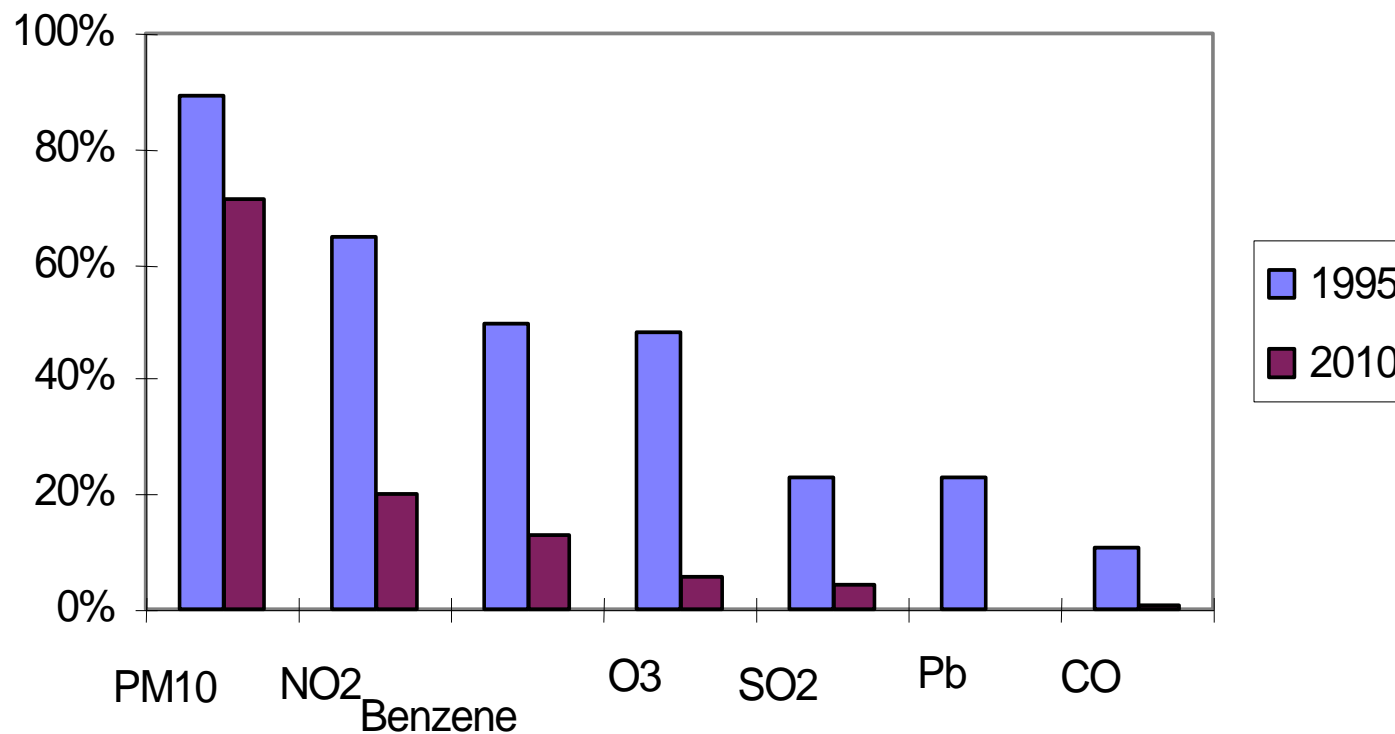


Distance-to-target (2010) without additional measures





EU: % of urban population exposed to exceedances





Visit our website

<http://air-climate.eionet.eu.int>