

Air quality in the Phare countries 1997

Prepared by:

Jaroslav Fiala, PTL/AQ Leader, CHMI
Na Šabatce 17, 143 06 Prague 4, Czech Republic

Project Managers:

Stoyan Blagoev and Roel Van Aalst
European Environment Agency



Layout: Brandenburg a/s

This report was prepared with financial assistance from the Phare programme of the European Commission. The views expressed herein are those of the authors and do not represent any official view of the European Commission.

Authors

Jaroslav Fiala, Libor Cernikovský (PTL/AQ, CHMI), Lubor Kozakovic (PTL/AQ, SHMI),
John Stedman, Ken Stevenson (PTL/AQ, AEAT plc)

Contributions

Istvan Kiss, Laszlo Bozo (PTL/AQ, DASY), Iva Hunová (PTL/AQ, CHMI)
Technical assistance and GIS applications: Jana Ostatnická, Hana Livorová,
Václav Novák, Pavel Kurfürst (CHMI), Petr Novotný (IDEA-ENVI, Ltd)

Legal notice

The contents of this report do not necessarily reflect the official opinion of the European Commission or other European Communities institutions. Neither the European Environment Agency nor any person or company acting on behalf of the Agency is responsible for the use that may be made of the information contained in this report.

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

©EEA, Copenhagen, 2002

Reproduction is authorised provided the source is acknowledged.

European Environment Agency
Kongens Nytorv 6
DK-1050 Copenhagen K
Tel.: (45) 33 36 71 00
Fax: (45) 33 36 71 99
E-mail: eea@eea.eu.int
Internet: www.eea.eu.int

Contents

Contents	3
Summary	5
1. Introduction	7
1.1. General	7
1.2. Institutional background for data collection and exchange of information	7
2. Driving forces and pressures	9
2.1. Socioeconomic background in the Phare countries	9
2.2. Atmospheric emissions	10
3. Air quality in the Phare countries	18
3.1. Air quality monitoring results in 1997	18
3.2. Air quality in cities in the Phare countries	30
3.3. Air quality in rural areas	43
3.4. Estimating pollutant concentrations using empirical models	43
4. Impact of air pollution and measures taken in the Phare countries	51
4.1. Impacts of air pollution	51
4.2. Measures taken in the Phare countries	52
5. Conclusions and recommendations	56
Annex A. Air quality networks and data flow	57
A.1. Framework for air quality data exchange	57
A.2. Extension of Euroairnet to the Phare countries	57
A.3. Air quality network meta-information	61
A.4. Air quality data collection overview	63
List of tables	67
List of figures	68
References	70
Electronic (homepage) sources of compilation:	71

Summary

The objective of this report is to provide an overview of the state of air quality in 13 central and east European countries (the Phare countries) involved in the Phare programme of the European Union. The report is based on 1997 air quality data collected from these countries within the framework of Phare topic link on air quality project (PTL/AQ). The contents and structure of the report follow the format of the pilot exchange of information (EoI) reports of the European Topic Centre on Air Quality. However, this report describes not only the data on air quality but also presents these in a broader context embracing consideration of the DPSIR (driving forces, pressure, state, impact and response) assessment framework of the European Environment Agency (EEA).

Through a series of country visits, the PTL/AQ successfully developed links and contacts and facilitated information and expertise exchange with national focal points (NFPs), national reference centres (NRCs) and air quality experts in the Phare countries. This infrastructure created the prerequisites for obtaining the necessary information from the Phare countries on air quality monitoring stations and air quality data for the preparation of this report.

Major political changes in central and eastern Europe during the period 1985-90 affected the general social and economic situation in these countries. In comparison with the situation at the beginning of the 1990s, energy and solid fuel consumption has decreased considerably in most of the Phare countries. The decrease in industrial production connected with the economic transformation and restructuring process has led to a decline in energy intensive production and hence a decrease in energy and solid fuel consumption. In addition, there has been a general change to the use of natural gas rather than solid fuel, particularly in Estonia, the Czech Republic, Hungary and Poland.

The decrease in solid fuel consumption, fuel switching (to natural gas), economic restructuring, renewal of power plants and finally, abatement measures on large point sources (flue gas desulphurisation) are the main reasons for the remarkable decrease in SO₂ emissions in the Phare countries in the last 10 years.

In spite of the considerable decrease in sulphur dioxide emissions, these emissions, calculated per capita, are still much higher in the Phare countries than the average for EU-15 countries. In contrast, NO_x emissions per capita are, on average, higher in EU-15 countries.

By 2000, 11 Phare countries had made the selection of monitoring stations for the Europe-wide air quality monitoring network Euroairnet (Bulgaria, the Czech Republic, Estonia, Former Yugoslav Republic of Macedonia (FYROM), Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia). The main emphasis has been on monitoring in urban areas; in total, 231 stations have been selected in larger cities. In rural areas, the spatial coverage is not well represented and needs further improvement. Partial improvement is expected by incorporation of all the EMEP stations and inclusion of additional rural stations. The selection includes 43 monitoring stations selected in 31 rural areas of seven Phare countries.

The Phare countries submitted meta-information about their air quality networks and stations as well as air quality data to the European Environment Agency air quality database — Airbase, with the assistance of the PTL/AQ. Air quality data for the year 1997 from at least one station are available from all Phare countries except Bosnia and Herzegovina and Romania.

Summary statistics for the Phare region as a whole show that the highest concentrations of SO₂ are associated with industrial and urban background sites. The 98th percentile of daily average SO₂ concentrations is in the range from 139 µg.m⁻³ at industrial stations to 84 µg.m⁻³ at rural stations. The median of SO₂ daily concentrations ranges from 22 µg.m⁻³ at traffic sites

to $8 \mu\text{g.m}^{-3}$ at rural sites. The 98th percentile of daily average PM_{10} is in the range from $187 \mu\text{g.m}^{-3}$ at traffic stations to $85 \mu\text{g.m}^{-3}$ at rural stations. The median of PM_{10} daily concentrations ranges from $48 \mu\text{g.m}^{-3}$ at traffic to $20 \mu\text{g.m}^{-3}$ at rural sites. The 98th percentile of daily average SPM is in the range from $149 \mu\text{g.m}^{-3}$ at traffic stations to $139 \mu\text{g.m}^{-3}$ at urban background stations. The median of SPM daily concentrations ranges from $46 \mu\text{g.m}^{-3}$ at traffic and urban stations to $36 \mu\text{g.m}^{-3}$ at industrial sites. The highest concentrations of NO_2 are associated with traffic and urban background sites. The 98th percentile of daily average NO_2 concentrations is in the range $91 \mu\text{g.m}^{-3}$ at traffic sites to $42 \mu\text{g.m}^{-3}$ at rural stations. The median of NO_2 daily concentrations ranges from $43 \mu\text{g.m}^{-3}$ at traffic to $10 \mu\text{g.m}^{-3}$ at rural sites.

In parallel with the reduction of coal and lignite based pollution sources and the significant decrease in sulphur and dust emissions, the ambient air concentration of sulphur dioxide and particulate matter decreased in most of the largest cities of the Phare region. In Budapest, for example, an intensive campaign and technological investment programme has been undertaken to reduce the sulphur content of diesel oil consumed by public buses, which are the major users of that type of fuel. In addition, individual coal-based heaters are being replaced by centralised natural gas heating systems in several Phare cities. The trend in annual average nitrogen dioxide concentration in large cities in the Phare region in the last few years is consistent with the development that, in general, the dominant source of air pollution in most Phare cities is now traffic.

The assessment of the frequency of exceedance of WHO guidelines and EU limit values indicates that the limit values for the PM_{10} fraction of particulate matter are likely to cause the greatest problem for air quality management. The population affected by air pollution concentrations exceeding limit values represents almost 14 % of total population of those Phare countries, which delivered data in 1997.

The concluding chapter of this report deals with air pollution impacts on the environment together with information on responses and pollution reduction measures taken in the Phare countries.

1. Introduction

1.1. General

This report has been prepared under the Phare topic link on air quality project (PTL/AQ) based on a contract with DG 1A of European Commission (Contract Number 97-0373.00). The goal of this report is to provide an overview of the state of air quality in 13 central and east European countries (the Phare countries) involved in Phare programme of the European Union ⁽¹⁾.

The report is based on air quality data for 1997, collected within the framework of the PTL/AQ project from these countries. Previous reports reviewing air quality in Europe have been mostly focused on the EU region (Jol, A. and Kielland, G. (eds), 1997; Richter, D. A. U. and Williams, P. W., 1998; Sluyter, R. (ed.), 1995).

This report presents and analyses air quality data for 1997 transmitted by the Phare countries in the first reporting cycle following the procedures of the exchange of information (EoI) decision 97/101/EEC. The EoI decision establishes a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within EU Member States. Data reporting, based on EU decisions and directives is obligatory for EU Member States. However, the Phare countries agreed to participate voluntarily in the exchange of air quality data through their involvement in the work programme of the European Environment Agency (EEA).

The contents and structure of this report follow the format of the pilot EoI reports of the European Topic Centre on Air Quality (ETC/AQ). However, the report describes not only the data on air quality but also presents these in a broader context of the entire general framework of the DPSIR (driving forces, pressures, state, impact and responses) assessment framework.

Chapter 2 of the report presents the main socioeconomic activities (driving forces) in the Phare countries, which release pollutant emissions (pressures) into the atmosphere. Chapter 3 of the report describes the air quality monitoring networks, with particular regard to the implementation of the European air quality monitoring network (Euroairnet) in the Phare countries (Chapter 4). The report presents not only the state of air quality based on the 1997 data from the Phare countries but also recent trends in air quality and emissions in major cities in the Phare countries. The concluding chapter deals with the impact of air pollution on the environment and on responses and measures taken in the Phare countries.

1.2. Institutional background for data collection and exchange of information

The overall objective of the EEA is to provide the Community and the Member States with objective, reliable and comparable information at European level, enabling them to take the requisite measures to protect the environment, to assess the results of such measures and to ensure that the public is properly informed about the state of the environment.

(1) Phare (Phare programme) is the financial instrument of the European Union's pre-accession strategy which will lead the partner countries of central and eastern Europe (CEECs), which have signed Europe agreements, to full EU membership. Set up in 1989 to support economic and political transition, Phare had by 1996 been extended to include 13 partner countries from the region: Albania, Bosnia and Herzegovina, Bulgaria, the Czech Republic, Estonia, the former Yugoslavic Republic of Macedonia (FYROM), Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia. Phare provides financial support to the partner countries from the process of economic transformation and strengthening of democracy to the stage where they are ready to perform the obligations of membership of the European Union. The main priorities for Phare funding are common to all countries, and include restructuring of State enterprises including agriculture, private sector development, reform of institutions, legislation and public administration, reform of social services, employment, education and health, development of energy, transport and telecommunications infrastructure, nuclear safety and environment.

To achieve these objectives, the EEA has developed the European environmental information and observation network (EIONET). This consists of the EEA, national focal points (NFPs), European topic centres (ETCs), national reference centres (NRCs) and main component elements (MCEs). To extend the work to the Phare countries, Phare topic links (PTLs) have been set up to work with the ETCs to form extended European topic centres. In close coordination with the European Topic Centre on Air Quality (ETC/AQ), the main objective of the PTL/AQ is to assist the EEA in extending its activities to the Phare countries.

One of the main tasks of the PTL/AQ is to develop and maintain air quality related technical contacts and links and facilitate information and expertise exchange with NFPs, NRCs and air quality experts in the Phare countries. The successful development of these links and contacts, promoted through the country visits, created the prerequisites for providing information from the Phare countries on air quality monitoring stations and air quality data collection as a necessary basis for the preparation of this report. The PTL/AQ established links with NFPs and NRCs in practically all Phare countries. With the exception of some countries, in which technical obstacles were identified, the PTL/AQ succeeded in collecting information on stations and air quality data from most of the Phare countries for inclusion in the European air quality database, Airbase.

The PTL/AQ would particularly like to express its appreciation to the many willing and receptive colleagues in the Phare countries — NFPs, NRCs and particularly, AQ experts who delivered both the necessary data on air quality and the supplementary data on stations and further information used in this report.