



Organisation de Coopération et de Développement Economiques  
Organisation for Economic Co-operation and Development

OLIS : 11-Jan-1999  
Dist. : 13-Jan-1999

Bil.

CENTRE POUR LA COOPERATION AVEC LES NON-MEMBRES  
DIRECTION DE L'ENVIRONNEMENT  
CENTRE FOR CO-OPERATION WITH NON-MEMBERS  
ENVIRONMENT DIRECTORATE

Annule & remplace le même document/ Cancels & replaces the same document :  
envoyé sur OLIS le / sent on OLIS 08-Jan-1999

**Groupe d'étude chargé de la mise en oeuvre du Programme d'action écologique pour l'Europe centrale et orientale (PAE)**

**Task Force for the Implementation of the Environmental Action Programmes for Central and Eastern Europe (EAP)**

**LES DEPENSES DE LUTTE CONTRE LA POLLUTION EN EUROPE CENTRALE ET ORIENTALE  
POLLUTION ABATEMENT AND CONTROL EXPENDITURE IN CENTRAL AND EASTERN  
EUROPE**

73360

Document complet disponible sur OLIS dans son format d'origine  
Complete document available on OLIS in its original format

Applications for permission to reproduce or translate all or part of this material should be made to:  
Head of Publications Service, OECD, 2 rue André Pascal - 75775 Paris cedex 16, France  
Copyright OECD/OCDE 1998

## FOREWORD

In June 1998, Environment ministers at the “Environment for Europe” conference in Aarhus, Denmark, endorsed the findings of the EAP Task Force report “Environmental Financing in CEEC/NIS: Conclusions and Recommendations”. The report analysed environmental financing in Central and Eastern Europe and the New Independent States of the former Soviet Union, and provided key policy recommendations for improving financing strategies and mechanisms in the region.

During the preparation of the Task Force report, an associated project entitled “Environmental Expenditure in Central and Eastern Europe” was launched to provide empirical support. The report sought to identify trends in pollution control and abatement investment expenditure in Georgia, Hungary, Lithuania, Poland, Russia and Slovenia during the 1990s - a period of major economic and political reform. In the course of the project, three working papers, including one on methodological issues, and six country case studies were prepared. The report brings together the major findings of the study and provides an empirical baseline for deepening ongoing work on environmental financing in the region. It builds on a similar study carried out for the Task Force for the 1995 “Environment for Europe” conference in Sophia, and on related work carried out by the OECD. It is based on information and data available through January 1998.

The study was conducted by COWI, a Danish consulting group, with the financial assistance of the Danish Environmental Protection Agency. National experts and government officials in the six case study countries provided invaluable input and support. Implementation of the study and preparation of the report were carried out under the guidance of the EAP Task Force Secretariat, which is supported by OECD through its Centre for Co-operation with Non-Members. The contributions of several independent experts who reviewed the draft report are also gratefully acknowledged. The analysis and conclusions presented in the report are those of the authors and do not necessarily reflect the views of the EAP Task Force, the OECD or their members.

The report is published on the responsibility of the Secretary-General of the OECD.

## AVANT-PROPOS

En juin 1998, les Ministres de l'environnement réunis à Aarhus, Danemark, à la Conférence "Un environnement pour l'Europe", ont entériné les conclusions du "Rapport sur le financement des dépenses d'environnement dans les pays d'Europe centrale et orientale et les nouveaux Etats indépendants" du Groupe d'étude du PAE. Ce Rapport analyse le financement des dépenses d'environnement dans les pays d'Europe centrale et orientale et dans les nouveaux Etats indépendants de l'ex-Union soviétique, et contient des recommandations de base pour améliorer les stratégies et mécanismes de financement dans cette région.

Pendant que le Groupe d'étude préparait ce rapport, un projet associé, intitulé "les dépenses d'environnement en Europe centrale et orientale" a été lancé pour obtenir des données concrètes dans ce domaine. Il s'agissait de mettre en évidence l'évolution des investissements de lutte contre la pollution en Géorgie, en Hongrie, en Lituanie, en Pologne, en Russie et en Slovénie au cours des années 90, c'est-à-dire pendant la période de grandes réformes économiques et politiques. Dans le cadre de ce projet, trois documents de travail, dont un plus particulièrement consacré à la méthodologie, et six études de cas ont été préparés. Le présent rapport réunit les principales conclusions de ces recherches et fournit des données concrètes utiles pour approfondir les travaux en cours sur le financement des dépenses d'environnement dans cette région. Il s'appuie sur une étude analogue réalisée pour le Groupe d'étude en vue de la Conférence "Un environnement pour l'Europe" de 1995, tenue à Sofia, et sur des travaux connexes effectués par l'OCDE. Il se fonde sur les informations et données disponibles en janvier 1998.

L'étude a été réalisée par COWI, groupe danois d'experts-conseils, avec l'aide financière de l'Agence danoise de protection de l'environnement. Des experts et fonctionnaires nationaux des six pays ayant fait l'objet d'une étude de cas ont fourni des apports et un appui des plus précieux. L'étude a été menée et le rapport établi sous la direction du Secrétariat du Groupe de travail du PAE, qui bénéficie du soutien de l'OCDE par l'intermédiaire de son Centre pour la coopération avec les non-membres. Les contributions de plusieurs experts indépendants qui ont procédé à un examen critique du projet de rapport ont également été très appréciées. L'analyse et les conclusions présentées dans le rapport sont celles des auteurs et ne reflètent pas nécessairement les vues du Groupe d'étude du PAE, de l'OCDE ou de leurs membres.

Le rapport est publié sous la responsabilité du Secrétaire général de l'OCDE.

## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	8
RESUME .....	13
<i>Chapter 1: INTRODUCTION</i> .....	20
1.1 Background .....	20
1.2 Scope of the report .....	21
1.2.1 Definition of PAC expenditures .....	21
1.2.2 Limitations of PAC investment data .....	22
1.3 Structure of the report .....	22
<i>Chapter 2: COUNTRIES IN TRANSITION</i> .....	23
2.1 Level of development .....	23
2.2 Progress in transition .....	24
2.3 Economic recovery .....	26
2.3.1 Other economic indicators .....	26
2.3.2 Industrial restructuring .....	30
<i>Chapter 3: ENVIRONMENTAL INVESTMENT EXPENDITURE</i> .....	33
3.1 Overall trends and shares .....	33
3.1.1 PAC investment share of GDP .....	34
3.1.2 PAC investments per capita .....	36
3.1.3 Correlation between GDP and PAC investments .....	37
3.2 Structure of PAC investments by environmental media .....	38
3.3 Public sector PAC investments .....	40
3.3.1 Local government shares .....	42
<i>Chapter 4: SOURCES OF FINANCING</i> .....	44
4.1 Overall trends and shares .....	44
4.2 The role of environmental funds .....	44
4.2.1 Pollution charge exemption schemes .....	45
REFERENCES .....	46
ANNEX I: PAC EXPENDITURE -- CONCEPT AND METHODOLOGY (OECD) .....	48
ANNEX II: STATISTICAL DATA .....	55
ANNEX III: CONTACT ADDRESSES .....	70

**LIST OF TABLES**

Table 0.1: PAC investment share of GDP, 1990-96 .....	9
Table 2.1: Basic country information.....	25
Table 2.2: Selected transition indicators .....	25
Table 2.3: Lending interest rates .....	28
Table 2.4: Total primary energy supply, 1995 .....	29
Table 2.5: FDI inflows, 1989-96 .....	32
Table 3.1: PAC investments' share of GDP, 1990-96 .....	35
Table 3.2: Public sector PAC investment percentage share of total consolidated public budget expenditures, 1990-96.....	41
Table 3.3: Central and local government budgets' percentage share of total public sector PAC investments, 1990-1996.....	43

**ANNEX II: Statistical Data**

Table II.1: Basic data, 1990-96 .....	55
Table II.2: PAC investments, in national currency, constant prices, 1990-96.....	56
Table II.3: PAC investments, in current US\$, 1990-96 .....	57
Table II.4: PAC investments as percentage of gross fixed capital formation, 1990-96 .....	58
Table II.5: PAC investments per capita, 1990-96 .....	59
Table II.6: PAC investments in the public and business sectors, 1990-96 .....	58
Table II.7: PAC investments by environmental media, 1990-96 .....	60
Table II.8: PAC investments by environmental media, in per cent, 1990-96.....	62
Table II.9: PAC investments by environmental media and by sector, 1990-96 .....	63
Table II.10: Public sector PAC investments and total public budget expenditure, 1990-96 .....	64
Table II.11: Environmental funds' total investment subsidies compared to total PAC investments 1990-96 .....	65
Table II.12: Total environmental revenues (taxes/fees/charges) and consolidated public budgets' total revenues, 1990-96.....	66
Table II.13: Central and local government budget PAC investments, 1990-96 .....	68

## LIST OF FIGURES

Figure 0.1: PAC investments and GDP per capita, 1996 .....	10
Figure 0.2: Environmental funds share of total PAC investments, 1990-96 .....	12
Figure 2.1: Real GDP, 1990-97 .....	26
Figure 2.2: Consumer price index, 1990-97 .....	27
Figure 2.3: Electricity prices, 1989, 1991 and 1996 .....	30
Figure 2.4: Industry share of GDP, 1990 and 1995 .....	31
Figure 2.5: Gross fixed capital formation, 1990-96 .....	31
Figure 2.6: FDI stock by industry as of January 1, 1996 .....	32
Figure 3.1: PAC investments, 1990-96 .....	36
Figure 3.2: PAC investments per capita, 1996 .....	37
Figure 3.3: PAC investments' percentage share of GDP compared to GDP per capita, 1995 .....	38
Figure 3.4: PAC investments by media in Hungary, 1991-1996 .....	39
Figure 3.5: PAC investments by media in Lithuania, 1992-1995 .....	39
Figure 3.6: PAC investments by media in Poland, 1991-1996 .....	39
Figure 3.7: PAC investments by media in Russia, 1992-1996 .....	40
Figure 3.8: PAC investments by media in Slovenia, 1992-1996 .....	40
Figure 3.9: Public sector PAC investments, 1990-96 .....	41
Figure 3.10: General government balance, 1990-97 .....	42
Figure 4.1: Environmental funds share of total PAC investments, 1990-96 .....	45

## EXECUTIVE SUMMARY

Since 1990, Central and Eastern Europe countries (CEEC) and the New Independent States of the former Soviet Union (NIS) have taken many important steps to address the severe environmental problems inherited from the previous centrally-planned economies. However, CEEC and NIS still face daunting challenges in improving their environmental performance. While there are large variations from country to country, overall pollution and energy intensities remain high and national environmental policies possess many weaknesses.

In 1993, the *Environmental Action Programme for Central and Eastern Europe* (EAP) argued that finding lasting solutions will require considerable policy reform, institutional strengthening and increased investments for pollution abatement and control. In an economic atmosphere frequently characterised by tight government budgets, extreme financial constraints on enterprises and households, high inflation and poorly-developed capital markets, finding the financial resources for environmental investments in the CEEC/NIS has emerged as one of the most difficult tasks. In many CEECs, domestic financing accounts for over 90 per cent of all environmental expenditures<sup>1</sup>, although external finance has played a more significant role in some countries in some periods. As the transition process gains momentum, domestic financing is envisaged to play an even larger role in the region.

However, for several reasons, it remains difficult to form a clear picture of the volume and structure of environmental investment expenditure across the region and within countries. At present, most CEECs and NIS lack a reliable, common methodology to estimate these expenditures. This study provides an overview of environmental investment expenditure in six countries -- Georgia, Hungary, Lithuania, Poland, Russia and Slovenia -- during 1990-1996. In an attempt to overcome the difficulties to analysis posed by the diversity and fragmentary character of the information systems currently in use in these countries, a new data review was carried out expressly for the study. The study focused on environmental investment expenditure specifically targeted at pollution abatement and control (PAC) activities, using the OECD methodology on PAC expenditure<sup>2</sup>. Thus, the study allows reasonably reliable comparisons within the case study countries and between them and selected European Union (EU) countries, and identifies several trends in PAC investment expenditures. Preliminary results from this study were presented to the Aarhus "Environment for Europe" Ministerial Conference, to aid ministers in considering priorities for international co-operation.

It should be emphasised that estimates of PAC investment expenditures must be interpreted carefully. Although the data in this report provide indicators of national efforts to protect the environment, the EAP emphasised that important environmental improvements will result from investments to renew industrial capital, as these will introduce modern, less-polluting, more efficient industrial production methods. These types of investments are not taken into consideration in this report. In addition, this study

---

<sup>1</sup> COWI, 1995.

<sup>2</sup> The OECD methodology for defining pollution abatement and control (PAC) expenditure is given in an annex at the end of this report.



does not consider the effectiveness of the PAC investment expenditure reported -- as yet, there is no internationally accepted methodology for this.

### Major trends in PAC expenditures

Table 0.1 summarises the figures which make up the core of the present analysis: the share of GDP directed to PAC investments in each of the countries under study, along with the same indicators for three EU countries.

Table 0.1: **PAC investment share of GDP, 1990-96**  
(per cent)<sup>1</sup>

	1990	1991	1992	1993	1994	1995	1996
Georgia	..	..	..	..	..	-	-
Hungary	0.5	0.4	0.7	0.6	0.9	0.6	0.6
Lithuania	..	..	..	1.0	1.4	1.0	0.6
Poland <sup>2</sup>	0.7	1.0	1.0	1.0	1.0	1.1	..
Russia <sup>3</sup>	..	..	0.3	0.3	0.4	0.4	0.4
Slovenia	..	..	0.2	0.3	0.6	0.4	0.4 <sup>4</sup>
Netherlands	0.6	0.6	0.6	..	..	0.4	..
Portugal	0.5	0.4	..	..	0.4	..	..
Germany <sup>5</sup>	0.7	0.7	0.7	0.6	0.5	0.5	..

Source: Table II.1 in Annex II.

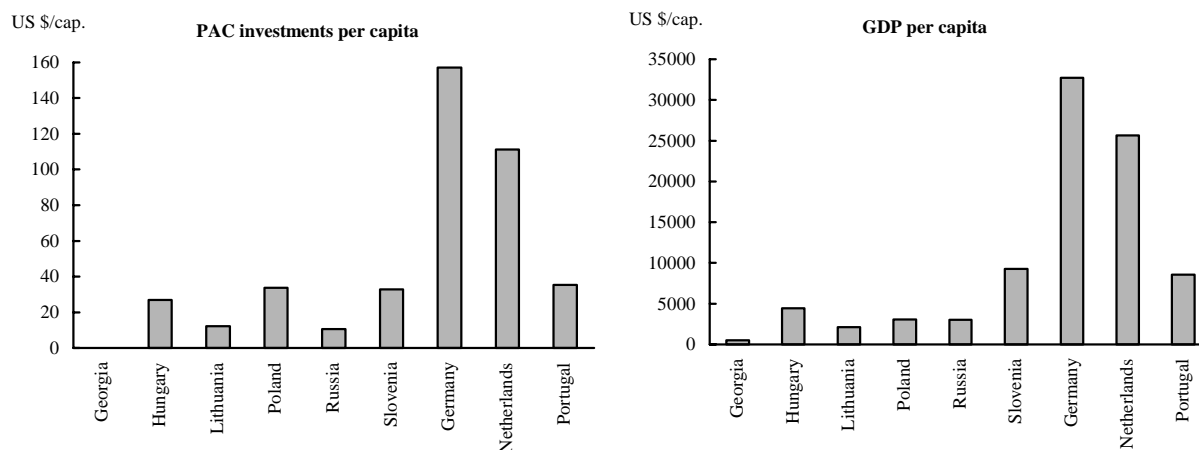
Notes: 1. Based on the abater principle. 2. Due to a change in government data collection methodology in Poland, 1996 data (which indicate a value of 1.7% of GDP for PAC investments) are not compatible with those from previous years. By one estimate, the old methodology would indicate 1.2% for 1996. 3. Russian data are based on official national statistics from a variety of sources. Some researchers (e.g. Golub in OECD, 1998) contend that these statistics overestimate PAC investment expenditure. 4. Only business sector PAC investments. 5. Data refer to western Germany only; 1993, 1994 and 1995 figures are preliminary.

The table above indicates that GDP shares of pollution abatement and control investment for Hungary, Lithuania, Russia and Slovenia are comparable to those of the European Union countries. One notable exception is Poland, whose PAC investments command a far higher share of GDP than any of the other countries studied, whether measured in per cent of GDP, per capita or per cent of gross fixed capital formation (GFCF). A partial explanation may be the strong performance of the Polish environmental fund system, the high environmental charges which generate its revenues, and the fact that these charges were early on indexed against inflation.

PAC investment expenditure generally increased during the beginning of the 1990s. Measured in constant prices, the surge in such expenditure in most of the countries studied seems to have peaked in 1994, except for in Poland, where PAC expenditure has grown more steadily throughout the 1990s. After 1994, in Hungary and Lithuania, and possibly also in Slovenia, environmental investment expenditure declined. In 1995 and 1996, PAC investments in Georgia have been close to zero. This may be a

reflection of political instability and low GDP per capita. In fact, as Figure 0.1 shows, there is a positive correlation in most cases between PAC investments and GDP per capita.

Figure 0.1: **PAC investments and GDP per capita, 1996**  
(US\$, current prices and exchange rates <sup>1,2</sup>)



Source: Table II.1 in Annex II.

Note: 1. Based on the abater principle. The 1995 figure has been used for Poland (see Table 0.1, note 2). Furthermore, note that the underlying data suffer from uncertainty connected with the transfer of national currencies into US\$; however, this foremost concerns Georgia, Lithuania and Russia. In the case of Russia, see also note 3 to Table 0.1. Data for Germany refer to western Germany only. 2. Data for Portugal are from 1994; data for Georgia, Germany and the Netherlands are from 1995.

### ***Structure of PAC investment spending***

#### *Public and private sector shares*

The study could not make accurate breakdowns of the public and private shares of PAC investments, since with the exception of Hungary, current practices in the countries under study make it extremely difficult to distinguish expenditures by public utilities from environmental investments by the private sector. In spite of these difficulties, in three countries -- Hungary, Lithuania and Poland, it appears possible to conclude that the public sector share of PAC spending has increased during 1990-1996.

#### *Breakdown of PAC investments by environmental media*

PAC investments destined to protect air and water quality make up the lion's share of overall environmental investment expenditure. Investment expenditure for air pollution abatement dominate in Poland and Slovenia, while in the four other countries the largest share of PAC investments goes towards

wastewater purification and other water-related projects. PAC investments in solid waste management are insignificant in the six countries under study, with the exception of Hungary.

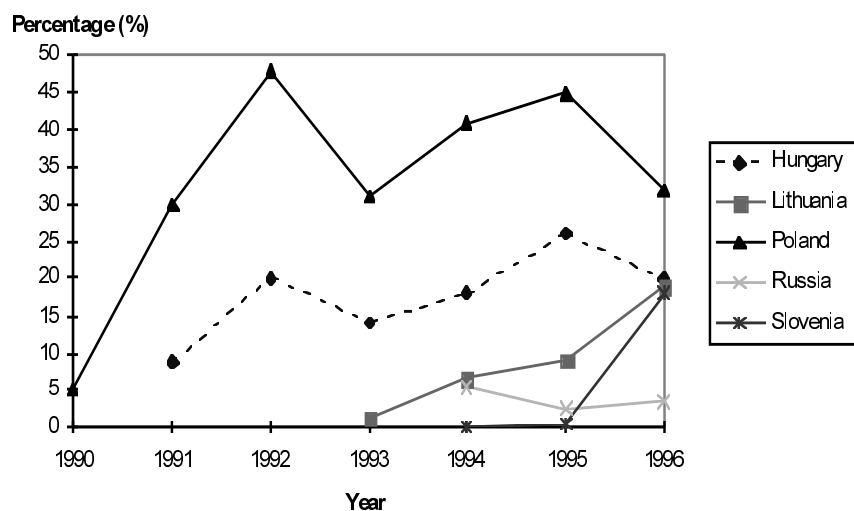
#### *Central and local government shares of PAC investments*

Accounting practices in the case study countries make it difficult to track financial transfers from the national level to the lower levels of government, and from the municipal budgets to public utilities. With the exception of Slovenia, no publicly available statistical publications concerning transfers within the public sector were found. Nevertheless, in Hungary, Lithuania and Poland, it is possible to identify some major trends with a fair degree of accuracy, notably: during the 1990s, local governments have shouldered an increasing share of PAC investments. This trend is particularly pronounced in Hungary and Poland.

#### *The role of environmental funds*

Extra-budgetary environmental funds, which collect and distribute revenues earmarked for environmental protection activities, have been a common means of financing environmental improvements in CEE and NIS countries. Environmental funds play an important role as financiers of PAC investments in Lithuania, Hungary, Poland and Slovenia. In Poland, they provide as much as one-third of PAC finance; in Hungary, Lithuania and Slovenia, they provide 20 per cent of finance. In Russia, environmental funds provide less than 5 per cent of financing, while in Georgia, there are no environmental funds.

Figure 0.2: **Environmental funds share of total PAC investments, 1990-96**  
(percentage)<sup>1,2</sup>



Source: Table II.11 in Annex II.

Notes: 1. The nominator is based on the financing principle since environmental funds are only financiers, not abaters. The denominator is based on the abater principle; thus, environmental funds' spending is not included in the denominator. Note that environmental funds' spending does not include pollution charge exemption schemes; this mainly affects the figures for Russia.

2. In Slovenia, the Ecological Development Fund (EDF) was established in 1993, but did not exhibit its full financing potentials until 1996. Its share in 1996 has been calculated on the basis of the assumption that total PAC investments in Slovenia were the same in 1995 and 1996.

### Improving environment expenditure statistics

The work carried out for this report revealed numerous weaknesses in the methodological, statistical and accounting systems in the countries under study, some of which have been mentioned above. Indeed, certain of these weaknesses determined the approach used in this study. Many of these problems have their roots in current institutional structures, and arise from the lack of a clear division of powers and responsibilities among government agencies or levels of government. Divisions in government also often lack sufficiently formalised lines of communication. This results in the dispersion of related data across different government bodies, as well as the proliferation of different methodologies and statistical sets within the same country, seriously complicating data collection and evaluation.

Improvements in two other areas, in particular, could greatly facilitate analyses and help focus information more clearly on the needs and work of policymakers:

### *Methodology*

At present, none of the six countries under study have a coherent method for clearly defining which environmental expenditures are directly and purposefully related to reducing the environmental impacts of economic activities or the consumption of goods and services. In other words, there is no clear means of identifying environmental investments as PAC expenditures under the OECD definition. Under the guidance of national environment ministries, national PAC methodologies, adapted to existing

environmental expenditure statistics, should be elaborated and gradually implemented. Such a methodology should be developed in concert with national statistical agencies, finance ministries and other relevant governmental agencies, with a view to developing a “common language” for discussing expenditure issues and sharing experiences with other countries. The OECD PAC methodology used in this study could serve as a model in this regard.

As a fundamental part of this effort, reporting forms should be considerably improved to provide more detailed information regarding: expenditure by sector and environmental media; investment share and ownership of public utilities; specific sources of finance (i.e. different levels of government, environmental funds, enterprises’ own resources, foreign sources, etc.) and financing mechanisms. In particular, reporting forms should be expanded to include much more detailed information on current expenditure. Ideally, the reporting process should be automated, and a user-friendly database developed to enhance and simplify reporting.

At the international level, further consideration should be given to methods assessing the environmental component of investments to renew capital. Such investments are likely to be more effective in integrating environmental considerations into economic development and promote sustainable development. In principle such investments are included in PAC expenditure but, in practise, they are difficult to estimate.

### ***Improving transparency and accounting procedures***

A lack of comprehensiveness in current accounting procedures and the resulting opacity regarding fund transfers between different levels of government, environmental funds and the private sector constitutes a major obstacle to compiling accurate and detailed environmental expenditure statistics. This is particularly true regarding financial flows in the public sector and from municipalities to utilities. To remedy this, one solution might be to introduce separate budget lines for public sector financial transfers destined for environmental purposes. This and other measures should ultimately be reflected in an enhanced publication or disclosure programme, which ideally would make expenditure statistics, public budget fulfilment reports and environmental fund accounts available to the public in printed and/or electronic form.

By filling in the gaps in current statistics and rendering existing statistics more comparable, these improvements can greatly aid policymakers in priority-setting and in the assessment of current environmental activities and policy instruments. In the meantime, the empirical baseline provided by this study provides a basis for deepening ongoing work in a number of areas, including the development of environmental financing strategies at the national and sub-national level and the establishment or strengthening of individual financing mechanisms such as environmental funds. In the future, it is likely that this study will be replicated in other countries in the CEE/NIS regions.

## RESUME

Depuis 1990, les pays d'Europe centrale et orientale (PECO) et les nouveaux Etats indépendants de l'ex-Union soviétique (NEI) ont pris d'importantes mesures pour faire face aux graves problèmes d'environnement hérités du système de planification centralisée. Cependant, les PECO et les NEI devront encore déployer bien des efforts pour améliorer leurs performances environnementales. Bien que les situations varient sensiblement selon les pays, d'une façon générale, la pollution et la consommation d'énergie demeurent des problèmes importants et les politiques nationales de protection de l'environnement se révèlent encore très insuffisantes.

En 1993, le *Programme d'action écologique pour l'Europe centrale et orientale (PAE)* a souligné que la recherche de solutions durables passait par une refonte des politiques, un renforcement institutionnel et un accroissement des investissements pour soutenir l'élaboration des politiques et la lutte contre la pollution. Compte tenu de la situation économique des PECO/NEI, souvent caractérisée par des conditions d'austérité budgétaire, des contraintes financières très lourdes au niveau des entreprises et des ménages, de forts taux d'inflation et l'absence de marchés des capitaux suffisamment développés, l'un des plus gros problèmes, pour ces pays, a été de trouver des ressources pour financer leurs investissements environnementaux. Dans de nombreux PECO, les dépenses d'environnement sont assumées à plus de 90 pour cent par le pays, bien que les financements extérieurs aient joué un rôle plus important dans quelques pays à certaines périodes<sup>3</sup>. A mesure que la transition progressera, les financements nationaux pourraient jouer un rôle encore plus important dans la région.

Toutefois, il est toujours difficile, pour plusieurs raisons, d'avoir une vision claire du volume et de la structure des dépenses d'environnement dans la région et à l'intérieur des pays étudiés. Actuellement, la plupart des PECO et des NEI ne disposent pas de méthodologie commune fiable pour estimer ces coûts. Cette étude présente un aperçu général des dépenses d'investissements environnementaux dans six pays de l'Est, la Géorgie, la Hongrie, la Lituanie, la Pologne, la Russie et la Slovaquie, pendant la période 1990-1996. Pour résoudre les difficultés d'analyse dues à la diversité et au caractère fragmentaire des systèmes d'information actuellement utilisés dans ces pays, un nouvel examen des données a été effectué pour les besoins spécifiques de l'étude. L'examen a porté plus particulièrement sur les investissements environnementaux spécialement affectés aux activités de lutte contre la pollution (LCP), en utilisant la méthodologie mise au point par l'OCDE pour évaluer les dépenses de LCP<sup>4</sup>. Il a été ainsi possible d'établir des comparaisons relativement fiables et de repérer plusieurs tendances dans les investissements de LCP des différents pays couverts par l'étude, pour les comparer à l'évolution observée dans les pays voisins et dans plusieurs pays de l'Union européenne. Les résultats préliminaires de l'étude ont été présentés à la Conférence ministérielle d'Aarhus "Un environnement pour l'Europe", pour aider les Ministres à établir les axes prioritaires de la coopération internationale.

---

<sup>3</sup> COWI, 1995.

<sup>4</sup> La méthodologie utilisée par l'OCDE pour définir les dépenses de LCP figure en annexe à la fin du présent rapport.

Les estimations de ces investissements, il faut le souligner, doivent être interprétées avec beaucoup de prudence. En effet, bien que les données de ce rapport donnent une idée des efforts déployés par les pays pour protéger l'environnement, le Groupe du PAE a fait remarquer que les progrès environnementaux les plus importants résulteraient des investissements réalisés pour renouveler les équipements industriels, qui permettront d'introduire des méthodes de production modernes et moins polluantes. Or ce type d'investissement n'est pas inclus dans le rapport. De plus, l'étude ne tient pas compte de l'efficacité des dépenses d'investissements de LCP notifiées, car aucune méthodologie acceptée au plan international ne permet encore de le faire.

### Principales tendances des dépenses de LCP

Le Tableau 0.1 récapitule les chiffres qui sont au centre de la présente analyse, à savoir la part du PIB affectée aux investissements de LCP dans chacun des six pays étudiés, et les chiffres correspondants concernant trois pays d'Europe occidentale.

Tableau 0.1: **Part des investissements DE LCP dans le PIB, 1990-96**  
(%)<sup>1</sup>

	1990	1991	1992	1993	1994	1995	1996
Géorgie	..	..	..	..	..	-	-
Hongrie	0.5	0.4	0.7	0.6	0.9	0.6	0.6
Lituanie	..	..	..	1.0	1.4	1.0	0.6
Pologne <sup>2</sup>	0.7	1.0	1.0	1.0	1.0	1.1	..
Russie <sup>3</sup>	..	..	0.3	0.3	0.4	0.4	0.4
Slovénie	..	..	0.2	0.3	0.6	0.4	0.4 <sup>4</sup>
Pays-Bas	0.6	0.6	0.6	..	..	0.4	..
Portugal	0.5	0.4	..	..	0.4	..	..
Allemagne <sup>5</sup>	0.7	0.7	0.7	0.6	0.5	0.5	..

Source: Tableau II.1, Annexe II.

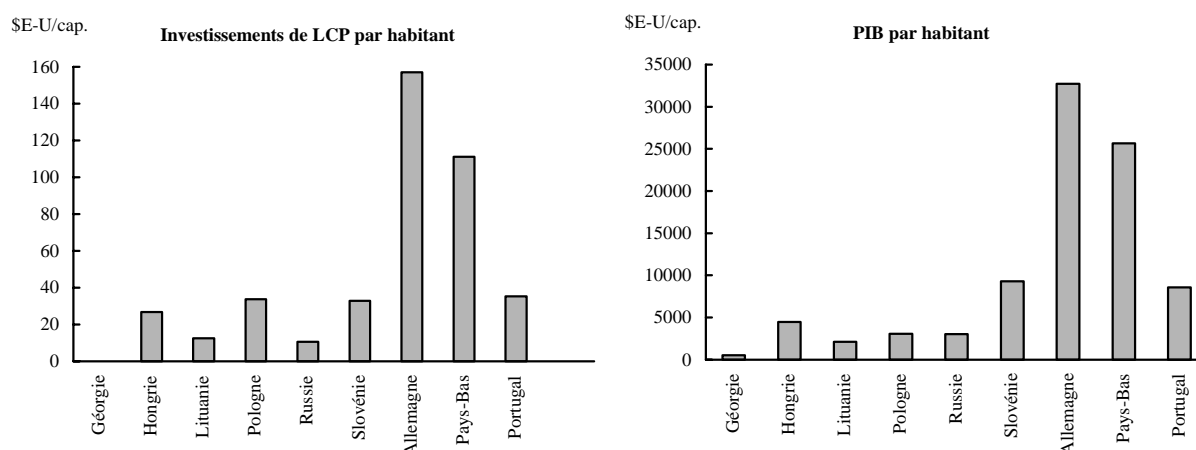
Notes: 1. Selon le principe d'exécution. 2. La méthodologie utilisée par le gouvernement pour recueillir les données ayant été modifiée en Pologne, les données de 1996 (qui évaluent à 1.7% du PIB les investissements de LCP) ne peuvent être comparées à celles des années précédentes. Le chiffre obtenu avec l'ancienne méthodologie ne serait en fait que 1.2% pour 1996. 3. Les données de la Russie s'appuient sur les statistiques officielles nationales de sources diverses. Selon certains chercheurs (ex. Golub in OCDE, 1998) ces statistiques surestiment les investissements de LCP. 4. Investissements de LCP du secteur des entreprises uniquement. 5. Les données ne concernent que l'ancienne République Fédérale d'Allemagne. Les chiffres pour 1993, 1994 et 1995 sont préliminaires.

Comme on le voit dans le tableau ci-dessus, en Hongrie, en Lituanie, en Russie et en Slovénie, la part des investissements de LCP dans le PIB était comparable à celle des pays de l'Union européenne. La Pologne fait quant à elle figure d'exception : la part du PIB correspondant aux investissements de LCP y est en effet bien plus élevée que dans tous les autres pays étudiés, qu'elle soit mesurée en pourcentage du PIB, par habitant ou en pourcentage de la formation brute de capital fixe (FBCF). Cette situation tient probablement aux bonnes performances du fonds polonais pour l'environnement, au niveau élevé des

redevances d'environnement qui l'alimentent et au fait que ces redevances ont été dès le début ajustées pour tenir compte de l'inflation.

Les investissements de LCP ont d'une façon générale augmenté au début des années 90. Mesurés en prix constants, les investissements de LCP semblent avoir culminé en 1994 dans la plupart des pays étudiés, sauf en Pologne où les investissements environnementaux ont connu une forte augmentation dans les années 90. Après 1994, les investissements environnementaux se sont infléchis en Hongrie et en Lituanie, et peut-être aussi en Slovénie. A l'autre extrémité du spectre, les investissements de LCP ont été proches du niveau zéro en Géorgie. Ces résultats s'expliquent sans doute par l'instabilité politique et le faible PIB par habitant. En tout état de cause, la Figure 0.1 montre qu'il existe dans la plupart des cas une corrélation positive entre le PIB et les investissements de LCP par habitant.

Figure 0.1: **Investissements de LCP et PIB par habitant, 1996**  
(\$E-U, prix et taux de change courants)<sup>1,2</sup>



Source: Tableau II.1 de l'Annexe II.

Note: 1. Selon le principe d'exécution. Pour la Pologne, les chiffres de 1995 ont été utilisés (voir Tableau 0.1, note 2). Les données utilisées sont entachées d'incertitudes en raison de la conversion en dollars des monnaies nationales ; cette remarque concerne plus particulièrement la Géorgie, la Lituanie et la Russie. Dans le cas de la Russie, voir également la note 3 du Tableau 0.1. 2. Les données concernant le Portugal sont de 1994, les données concernant l'Allemagne, la Géorgie et les Pays-Bas sont de 1995.

### **Structure des dépenses d'investissement de LCP** *Parts des secteurs public et privé*

Il n'a pas été possible, dans le cadre de cette étude, d'établir une distinction claire entre les dépenses de LCP du secteur public et celles du secteur privé, les pratiques actuelles des pays étudiés, à l'exception de la Hongrie, permettant difficilement de séparer les dépenses des entreprises de services publics des investissements du secteur privé. En dépit de ces difficultés, dans trois pays, la Hongrie, la Lituanie et la Pologne, la part des dépenses de LCP financée par le secteur public semble avoir augmenté entre 1990 et 1996.



*Ventilation des investissements de LCP entre les différents milieux de l'environnement*

Les investissements de LCP destinés à préserver la qualité de l'air et de l'eau représentent la part du lion dans l'ensemble des dépenses d'investissement en faveur de l'environnement. Les investissements de lutte contre la pollution atmosphérique arrivent en tête en Pologne et en Slovaquie, tandis que dans les quatre autres pays, les principales dépenses sont consacrées à l'épuration de l'eau et au financement de projets dans le domaine de l'eau. Les investissements visant la gestion des déchets solides sont insignifiants dans les six pays étudiés, à l'exception de la Hongrie.

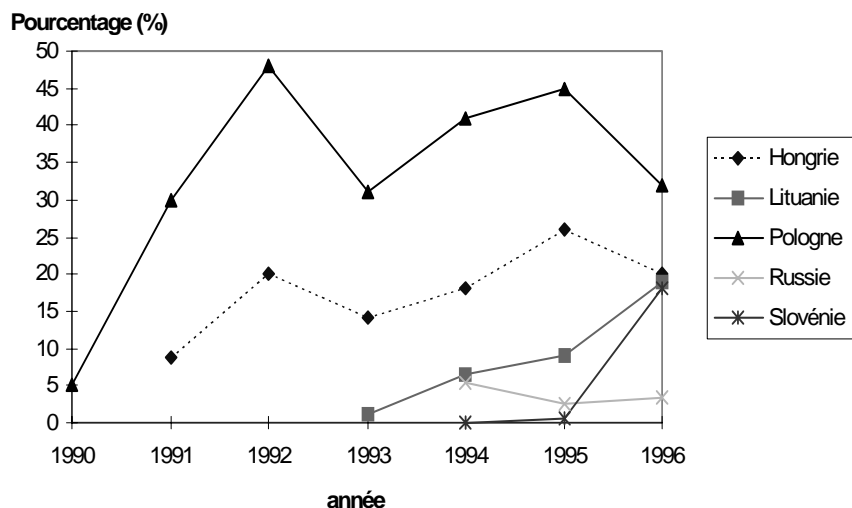
*Répartition des investissements de LCP entre les administrations centrale et locales*

Les pratiques comptables des PECO font qu'il est difficile de suivre le cheminement des transferts financiers du niveau national à des niveaux d'administration moins élevés, et des budgets municipaux, aux entreprises de services publics. Si l'on excepte la Slovaquie, il n'existe pas de publications statistiques concernant les transferts à l'intérieur du secteur public. Toutefois, en Hongrie, en Lituanie et en Pologne, on arrive à mettre en évidence certaines grandes tendances de façon suffisamment précise, selon lesquelles, au cours des années 90 les administrations locales auraient pris en charge une part croissante des investissements de LCP. Cette évolution est particulièrement marquée en Hongrie et en Pologne.

*Le rôle des fonds pour l'environnement*

Les fonds extrabudgétaires pour l'environnement, qui collectent et distribuent des revenus spécialement destinés à la protection de l'environnement, ont souvent été utilisés pour financer les dépenses d'amélioration de la qualité de l'environnement dans les PECO et les NEI. Les fonds pour l'environnement jouent un rôle important dans le financement des investissements de LCP en Lituanie, en Hongrie, en Pologne et en Slovaquie. Leur contribution va jusqu'à 30 pour cent en Pologne, et représente 20 pour cent en Hongrie, en Lituanie et en Slovaquie. En Russie, ces fonds financent moins 5 pour cent des dépenses ; la Géorgie quant à elle ne possède pas de fonds pour l'environnement.

Figure 0.2: **Part des fonds pour l'environnement dans l'ensemble des investissements de LCP, 1990-96 (pourcentage)<sup>1,2</sup>**



Source: Tableau II.11 de l'Annexe II.

Notes: 1. Le numérateur repose sur le principe de financement puisque les fonds pour l'environnement assurent le financement, pas l'exécution. Le dénominateur repose sur le principe d'exécution ; les dépenses des fonds environnementaux ne sont donc pas prises en compte dans le dénominateur. Il est à noter que les dépenses des fonds environnementaux ne tiennent pas compte des dispositifs d'exemption des redevances de pollution ; cette dernière remarque concerne essentiellement les chiffres de la Russie. 2. En Slovaquie, le Fonds de développement écologique créé en 1993 n'a pleinement exploité ses capacités financières qu'en 1996. Sa contribution de 1996 a été calculée en supposant que les investissements totaux de LCP en Slovaquie ont été les mêmes en 1995 et en 1996.

### Améliorer les statistiques relatives aux dépenses environnementales

Les travaux effectués aux fins du présent rapport ont permis de mettre en évidence de nombreuses lacunes dans les systèmes méthodologiques, statistiques et comptables des pays étudiés, dont certaines ont été déjà évoquées ci-dessus. L'approche utilisée ici a en fait été déterminée en fonction de certaines de ces lacunes. Bon nombre des problèmes observés sont dus aux structures institutionnelles actuelles et à l'absence de séparation claire entre les pouvoirs et responsabilités des différents organismes gouvernementaux ou niveaux d'administration. Par ailleurs, les procédures de communication entre les différentes branches de l'administration ne sont généralement pas suffisamment institutionnalisées, d'où une dispersion des données entre les différents organes gouvernementaux et la prolifération, dans un même pays, de méthodologies et d'ensembles statistiques différents, ce qui complique sérieusement la collecte et l'évaluation des données.

Deux autres types de démarches pourraient permettre de simplifier considérablement l'analyse et d'orienter plus précisément l'information sur les besoins et activités des responsables des politiques.

### Méthodologie

A l'heure actuelle, aucun des six NEI étudiés ne possède de méthode homogène permettant de déterminer clairement les dépenses environnementales directement et délibérément consacrées à la réduction de l'impact sur l'environnement des activités économiques ou de la consommation de biens et

services. En d'autres termes, il n'est pas vraiment possible de repérer les investissements environnementaux correspondant à la définition de l'OCDE des dépenses de LCP. Sous la direction des ministères nationaux de l'environnement, des méthodologies nationales de LCP, adaptées aux statistiques existantes sur les dépenses d'environnement, devraient être élaborées et progressivement mises en oeuvre. Ce type de méthodologie pourrait être élaboré de concert avec les agences statistiques nationales, les ministères des finances et d'autres organes gouvernementaux compétents en vue d'établir à un "langage commun" pour l'examen des questions liées aux dépenses et de mettre en commun l'expérience acquise par les autres pays. La méthodologie de l'OCDE utilisée dans cette étude pour évaluer la LCP pourrait servir de modèle à cet égard.

Dans ce cadre, il importera d'améliorer sensiblement les formulaires de notification de façon à obtenir des informations plus détaillées sur : les dépenses pas secteur et par milieu de l'environnement ; la part des investissements et l'origine des capitaux des entreprises de services publics ; les sources spécifiques de financement (différents niveaux de gouvernement, fonds pour l'environnement, ressources des entreprises, sources étrangères, etc.) et les mécanismes de financement. En particulier, ces formulaires devront être développés pour inclure des informations plus détaillées sur les dépenses actuelles. Idéalement, le processus de notification devrait être automatisé et une base de données facile à utiliser devrait être constituée pour améliorer et simplifier les procédures de réponse.

Au niveau international, il convient d'accorder une plus grande attention aux méthodes permettant d'évaluer la composante environnementale des investissements de renouvellement des équipements. Selon toute vraisemblance, les investissements de ce type seront mieux à même d'intégrer des considérations d'environnement dans le développement économique et de promouvoir un développement durable. Ils sont en principe pris en compte dans les dépenses de LCP, mais ils sont en pratique difficiles à estimer.

### *Amélioration de la transparence et des procédures comptables*

En raison du caractère incomplet des procédures actuelles de comptabilité et de l'opacité qui en résulte en ce qui concerne les transferts de fonds entre les différents niveaux de gouvernement, les fonds environnementaux et le secteur privé, il est extrêmement difficile de compiler des statistiques exactes et détaillées sur les dépenses d'environnement. Cela est particulièrement vrai en ce qui concerne les flux financiers à l'intérieur du secteur public, et des municipalités vers les entreprises de services publics. Pour remédier à cette situation, on pourrait envisager d'introduire des lignes budgétaires séparées pour les transferts financiers du secteur public destinés à l'environnement. Cette mesure, ainsi que d'autres, pourrait déboucher à terme sur un programme de publication ou d'information qui, idéalement, présenterait au public, sur support papier ou électronique, les statistiques concernant les dépenses, les rapports sur l'exécution du budget public et les comptes des fonds pour l'environnement.

L'élimination des lacunes actuelles et l'amélioration de la comparabilité statistique pourraient grandement faciliter la tâche des responsables des politiques chargés d'établir les priorités et d'évaluer les activités et moyens d'action dans le domaine de l'environnement. Dans le même temps, les données concrètes obtenues dans le cadre de cette étude fourniront des points de repère solides pour approfondir les travaux en cours dans plusieurs domaines, notamment le développement de stratégies environnementales au niveau national et infranational et la mise en place ou le renforcement de mécanismes de financement tels que les fonds pour l'environnement. Cette étude sera probablement reproduite ultérieurement dans d'autres pays de la région des PECO/NEI.

*Chapter 1:***INTRODUCTION****1.1 Background**

Improving environmental performance poses a particular challenge for Central and Eastern Europe countries (CEEC) and the New Independent States of the former Soviet Union (NIS). In addition to facing severe environmental problems inherited from previous centrally-planned economies, the transition period has brought various other difficulties, including financial and economic hardship. Considerable efforts have been made to improve policies and enforcement systems whose flaws contributed to poor environmental conditions. In many countries, however, governments lack the financial resources to effectively implement reforms. Even with resumed economic growth in some countries, the scale of the problems and uncertainties of the transition period leave environmental protection as a great challenge in the region.

Early in the transition, all CEECs and NIS experienced a decline in industrial production. In 1994, emissions of most pollutants were still below -- often significantly -- pre-1990 levels in the region. A better picture of environmental performance in the area can be formed, however, by considering emissions and energy use in relation to GDP. Emission rates of major air pollutants vary by country and by pollutant, but are considerably higher than the OECD average. For example, in comparison to the OECD countries, 1994 emissions of sulphur dioxide (SO<sub>2</sub>) per unit of GDP were over four times higher in Russia, six times higher in Poland, and as much as 15 times higher in Bulgaria<sup>5</sup>. Energy efficiency also varies greatly from country to country, but remains poor overall. While in 1995, countries like Slovenia or Georgia approached the OECD Europe average, most other CEE and NIS countries used twice as much or more energy per unit of GDP than countries in western Europe. In Russia, 1995 energy intensities were four times higher than in OECD Europe. Water pollution also remains a serious problem. With a few exceptions, in 1994, the amount of the population in CEEC and NIS connected to wastewater treatment plants was significantly lower than in western countries, sometimes as little as 50% (e.g. Hungary)<sup>6</sup>.

As the transition progresses and more CEEC and NIS resume economic growth, pollution levels may return to or surpass high pre-1990 levels unless concerted action is taken to more effectively enforce environmental policies and reduce pollution and energy intensities. Unfortunately, environmental efforts

---

<sup>5</sup> The 1994 figures presented in this section are based on data from Bulgaria, the Czech Republic, the Slovak Republic, Hungary, Poland and the Russian Federation collected in OECD/CCET, 1996.

<sup>6</sup> OECD/CCET, 1996. It should be noted that the figures mentioned concern OECD-Europe prior to the accession of the Czech Republic, Hungary and Poland to the OECD.

in most countries in the region face the twin obstacle of severe budgetary constraints and a legacy of poor practice in investment programming and project management. In this context, innovative and effective financing strategies for environmental protection need to be developed or strengthened, and steps must be taken to ensure that scarce financial resources are allocated efficiently to address priority issues.

## 1.2 Scope of the report

Developing a clear and reliable picture of recent environmental investment trends in CEE/NIS countries is one prerequisite to these objectives. This report has attempted to answer this need by providing an overview of domestic environmental investment trends in six countries -- Georgia, Hungary, Lithuania, Poland, Russia and Slovenia -- in the 1990s<sup>7</sup>. However, this picture must be based on a commonly understood terminology and method if it is to serve as a solid basis for information exchange among CEEC/NIS or for discussion between environmental authorities and potential donors or financial institutions. In compiling environmental expenditure statistics, CEE and NIS countries presently use different national definitions of environmental investment. This seriously impedes cross country comparisons and more general analysis of environmental financing in the region.

For this reason, this report, which was prepared as a part of the background documentation for the fourth "Environment for Europe" Ministerial Conference (Aarhus, Denmark, June 1998), is based on a separate, specially-designed data review carried out in the six countries mentioned above. Data were compiled during the second half of 1997 using the OECD methodology on pollution abatement and control (henceforth: PAC) expenditure as far as possible<sup>8</sup>. Thus, for the purposes of this study: "PAC expenditures are defined as purposeful activities aimed directly at the prevention, reduction and elimination of pollution or nuisances arising as a residual of production processes or the consumption of goods and services."<sup>9</sup>

### 1.2.1 Definition of PAC expenditures

Furthermore, this report concentrates on **PAC investments**, since investment data are more reliable than available data on current expenditures. Current environmental expenditures includes PAC outlays for own production of environmental services (wages, rents, energy, maintenance and intermediate inputs) and for purchases of environmental services and specific goods (when, for instance, a chemical firm has its waste site cleaned up by a specialised enterprise). Although current expenditures are included in the OECD definition of PAC expenditures, due to insufficient data, this study does not include them.

It should be noted that, in line with the OECD methodology, the definition of PAC investment expenditure used here refers to expenditures whose direct objective is environmental protection, and not commercial, technical or economic improvements (see Annex I). Thus, even when they entail environmental benefits, expenditures undertaken to improve the economic efficiency of processes or

---

<sup>7</sup> The following national experts provided substantial input to the project: Nina Korobova, Russia; Arunas Kundrotas, Lithuania; Zsuzsa Lehoczki, Hungary; Bojan Radej, Slovenia; Jerzy Sleszynski, Poland; and Pavel Tsagareishvili, Georgia; see also Annex III.

<sup>8</sup> OECD, 1993; OECD, 1996. OECD developed the PAC methodology in the 1980s; it later adjusted the methodology to conform with Eurostat's so-called European System for the Collection of Economic Data on the Environment (SERIEE). See also Annex I.

<sup>9</sup> See Annex I.

worker safety have not been counted. For the purposes of this report, PAC investment expenditure do *not* include the following items:

- depreciation for environmental protection assets (such as waste water treatment plants etc.);
- expenditures for nature conservation, landscape protection and biodiversity protection (such as national parks);
- expenditures for the mobilisation of natural resources, including drinking water supply;
- expenditures on forestry or agriculture;
- expenditures which are not directly aimed at environmental protection even when they have environmental benefits (such as investments in energy-saving equipment carried out for commercial reasons);
- expenditures for research and development; and,
- expenditures for administrative activities.

The report provides information on PAC investment expenditures for both the public sector and enterprises. Household spending is not included; nor are expenditures originating from foreign sources of finance distinguished, though these are recognized as playing an important role in some CEE/NIS. The public sector includes national, regional and local government bodies. "Enterprises" include both private and state-owned enterprises, as well as utilities such as municipal water companies, with the exception of Hungary, where utilities are listed under the public sector. While this division is not always exact -- sometimes certain utilities in other CEE/NIS are actually parts of regional or local governments -- there has been no double counting where this is the case.

### **1.2.2 Limitations of PAC investment data**

The level of PAC investments provides one indicator of national efforts to address environmental problems. However, this indicator has a number of limitations. *The Environmental Action Programme for Central and Eastern Europe* (EAP) emphasised that enterprises in the region could achieve significant pollution reductions through low-cost efforts such as cleaner production, waste minimisation and energy efficiency, and that these efforts would often yield a net reduction in enterprise production costs. The EAP further emphasised that most enterprises in the region used obsolete production methods, and that investment in new production technologies could significantly reduce pollution levels. Data on PAC investments presented here do not reflect efforts in these two areas, where there are as yet no internationally accepted indicators. In addition, this report has only gathered information on the level of PAC investments -- not on their efficiency, another area where international indicators are still under development. For these reasons, comparisons of PAC investment levels should be treated with caution.

### **1.3 Structure of the report**

The report is organised as follows: Chapter 2 gives selected background information on the six CEE/NIS countries, focusing on economic issues which affect the availability of domestic finance for environmental protection. Chapter 3 puts forward the bulk of the study's findings in the form of a core set of data on PAC investment expenditure in the six case study countries. Chapter 4 deals with the sources of finance for PAC investments, highlighting the role of earmarked environmental funds. Finally, a series of annexes presents 1) the OECD PAC expenditure methodology, 2) the statistical data used for the report and 3) the contact addresses of the COWI associates, and OECD representatives who participated in this analysis.

*Chapter 2:*

## COUNTRIES IN TRANSITION

This chapter provides background information on the six countries under study, recapitulating economic and development data from other sources. The CEE and NIS countries are distributed over a very large geographical area, and differ considerably in many respects, including population density, industrial development and progress in the transition process. The six countries selected for this study are no exception, and thus an appreciation of the particular conditions applying in each country is helpful to understanding the significance of the PAC investment trends that are the main focus of this study.

The background material presented here focuses on those economic issues with an important impact on the ability of governments and enterprises in the respective countries to carry out environmental investments. All six countries examined have undertaken major economic reforms as part of their transition to market-based economies. *The Environmental Action Programme for Central and Eastern Europe* emphasised that these economic reforms should encourage changes in industrial structure as well as improved industrial efficiencies; both these trends may in turn reduce pollution levels<sup>10</sup>. In addition, the level and growth rate of GDP should influence the ability of governments and enterprises to invest in pollution abatement and control equipment (as well as in new production technologies that could reduce pollution levels). Thus, economic reforms and the subsequent changes in economic performance could improve the environment through an increase in environmental investment expenditure.

### 2.1 Level of development

Table 2.1 provides basic information on total surface area, population and level of development of each of the case study countries and three European Union countries. Development indicators such as GDP by sector, GDP per capita and life expectancy at birth have been assembled below to provide a broad basis for comparison. Based on these statistics, one can observe that:

- In 1995, with the exception of Georgia, the sectoral distribution of GDP in the case study countries was quite similar to that in the EU countries selected for comparison. The service sector's share was slightly lower in the CEE/NIS countries, whereas the agriculture sector's share was higher. However, these differences are considerably less marked today<sup>11</sup>.

---

<sup>10</sup> This process is not, however, fully captured by PAC expenditure data.

<sup>11</sup> See also Annex II.

- GDP per capita is lower in the CEE/NIS countries than in the EU countries. However, the CEE/NIS countries cannot (and should not) be treated as one homogeneous group. As can be seen, income per capita varies widely. Among the countries studied, Georgia has the lowest GDP per capita, Hungary, Lithuania, Poland and Russia occupy a roughly similar intermediate position, while in Slovenia income per capita is markedly higher<sup>12</sup>.
- Life expectancy at birth also varies considerably among the case study countries. The most striking variation is between Slovenia's high rate and Russia's comparatively low figure. In fact, the Russian figure has declined dramatically since the late 1980s.

## 2.2 Progress in transition

The six countries studied differ from each other also with respect to progress in the transition process towards a market economy. This follows from Table 2.2, in which progress in transition is indicated by the transition index, private sector share of GDP and cumulative foreign direct investment (FDI) inflows per capita in the period 1989-96. The striking features with respect to progress in transition are that:

- The highest average "transition" scores are held by Hungary and Poland, whereas Georgia has the lowest average score. The average scores for Lithuania, Russia and Slovenia are relatively similar. (The transition index refers to an average of numerical scores given by EBRD for nine dimensions of progress in transition: large-scale privatisation; small-scale privatisation; governance and restructuring; price liberalisation; trade and foreign exchange system; competition policy; banking reform and interest rate liberalisation; securities markets and non-bank financial institutions; and overall legal transition.)
- Private sector share of GDP, as defined and estimated by EBRD, is highest in Hungary, Lithuania and Russia. It is lowest in Georgia and Slovenia. It should be emphasised that the underlying concept of the private sector used here includes the shadow economy, which is why Russia's private sector share is an estimated 70 per cent.
- The six case study countries differ widely with respect to FDI inflows per capita. This difference may be interpreted as reflecting foreign investors' evaluation of the progress in market-oriented transition in the countries. As can be seen, Hungary enjoys a particularly high level of foreign direct investment. However, at the time this study was made, Poland and Russia were both experiencing a substantial increase in FDI inflows<sup>13</sup>.

---

<sup>12</sup> According to the World Bank, "middle income" countries are those in which in 1995 GDP per capita was between US\$ 765 and US\$ 9 386, calculated using the World Bank Atlas method (World Bank, 1997).

<sup>13</sup> See also Annex II.



Table 2.1: Basic country information

	Total area, 1994 (1000 km <sup>2</sup> )	Population, 1996 (million)	Share of GDP by sector, 1995 (per cent)			GDP per capita, 1995 (US\$; PPP based <sup>2</sup> )	Life expectancy at birth, 1995 (years)
			Agriculture	Industry	Services		
<b>Georgia</b>	70	5.4	66.8	21.8	11.4	1 813	73.3
<b>Hungary</b>	92	10.0	7.5	33.3	59.2	6 410	70.1
<b>Lithuania</b>	65	3.7	11.0	35.7	53.3	4 471	69.2
<b>Poland</b>	304	38.7	6.5	39.4	54.1	5 400	70.2
<b>Russia</b>	16 889	147.5	7.0 <sup>1</sup>	38.4 <sup>1</sup>	54.6 <sup>1</sup>	4 480	64.8
<b>Slovenia</b>	20	1.9	4.8	38.5	56.7	10 594	73.9
<b>Portugal</b>	92	9.9	3.7	33.4	62.9	12 457	75.0
<b>Netherlands</b>	34	15.5	3.1	27.1	69.8	19 874	77.8
<b>Germany</b>	349	81.9	1.0 <sup>3</sup>	36.1 <sup>3</sup>	62.9 <sup>3</sup>	20 510	76.2

Source: EBRD, 1997, pp. 224, 225 229, 231, 233, 235; World Bank, 1997; OECD, 1997.

Notes: 1. 1994. 2. PPP = Purchasing Power Parity, defined as the number of units of a given country's currency required to buy the same amount of goods and services in the domestic market as one US\$ would buy in the United States. 3. Western Germany only.

Table 2.2: Selected transition indicators

	Transition Index, 1997 <sup>1</sup>	Private Sector Share of GDP, 1997 (per cent) <sup>2</sup>	Cumulative FDI inflows 1989-96 per capita (US\$) <sup>3</sup>
Georgia	2.6	55	7
Hungary	3.6	75	1 300
Lithuania <sup>4</sup>	3.0	70	76
Poland	3.3	65	140
Russia	2.9	70	40
Slovenia	3.1	50	372

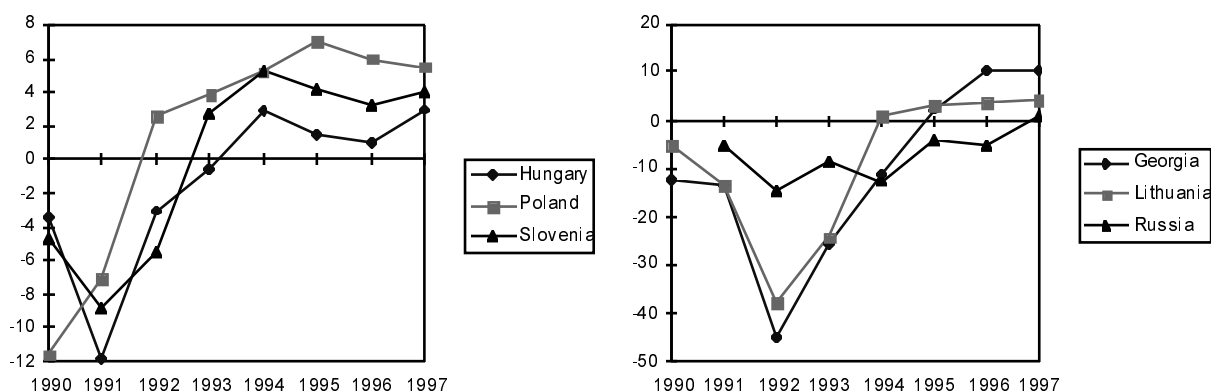
Source: EBRD, 1997, pp. 14, 17, 126.

Notes: 1. Since 1994, in an effort to analyse and compare progress in the transition process, the EBRD has presented an annual appraisal of certain dimensions of the state of transition. This appraisal provides a snapshot of the cumulative progress in transition. Each dimension is given a numerical score 1 through 4; the score 1 is used to indicate no progress in the corresponding area, whereas the score 4 is used to indicate standards and performance typical of advanced industrial economies. The numbers shown in the table show the average score of eight economic transition indicators and one overall legal transition indicator. 2. The private sector shares of GDP represent rough EBRD estimates, based on available statistics from both official and unofficial sources. The underlying concept of private sector value-added includes income generated by private entities engaged in informal activity. 3. FDI = Foreign Direct Investments. 4. FDI figures for Lithuania are only available from 1993.

## 2.3 Economic recovery

Though economic difficulties are still substantial, recovery has been achieved or is in the process of being achieved in all six countries under study. At the time this study was carried out, annual real GDP growth rates had become positive in all the countries, even in Russia. This is shown in Figure 2.1. As can be seen the decline in GDP growth rates has been deeper and longer in the former Soviet republics.

Figure 2.1: **Real GDP, 1990-97**  
(annual percentage change)



Source: EBRD, 1997, pp. 224, 225, 229, 231, 233, 235.

### 2.3.1 Other economic indicators

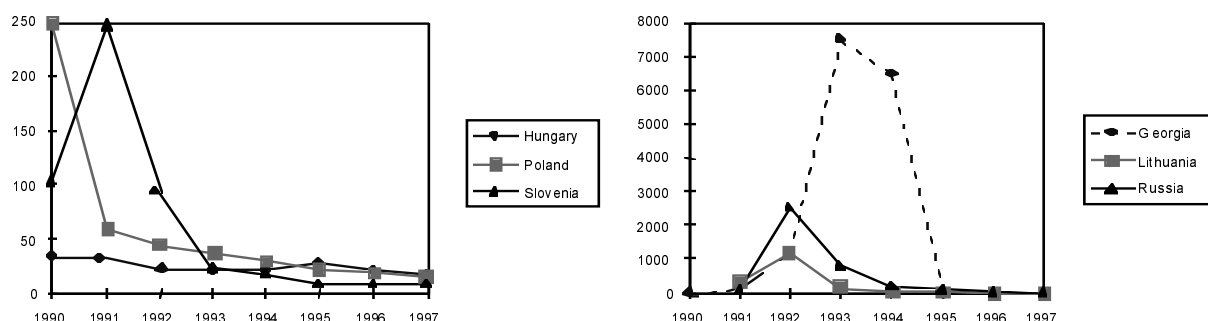
In addition to the aforementioned trends, trends in three other areas -- inflation, lending interest rates and energy intensity -- deserve attention due to their impact on the ability and will of governments and enterprises to make environmental investment expenditure<sup>14</sup>. With some important exceptions, developments in these areas in recent years have been encouraging, and tend to suggest a broad normalisation of economic conditions in line with the prevailing transition.

#### *Inflation*

Inflation seems to have come under control during 1995-1997. As can be seen from Figure 2.2, inflation in the six CEE/NIS countries amounted to only 10-20 per cent in 1997. This trend contributes to an improvement of the functioning of the capital markets in the region. There is, however, a difference between the developments in Hungary, Poland and Slovenia on the one hand, and Georgia, Lithuania and Russia on the other, if one looks at the period as a whole. This difference is mainly due to marked variations in the real value of national currencies prior to price liberalisation.

<sup>14</sup> See also Annex II.

Figure 2.2: **Consumer price index, 1990-97**  
(annual percentage change)



Source: EBRD, 1997, pp. 224, 225, 229, 231, 233, 235.

### *Lending interest rates*

Nominal lending interest rates have decreased in the six case study countries throughout the 1990s (Table 2.3). Real lending interest rates were once negative in all the countries; however, they have now become positive<sup>15</sup>. In Hungary, Poland and Lithuania, real lending interest rates are low. This suggests that in these three countries, it is not primarily high interest rates that are limiting domestic borrowing. In fact, there are many other reasons why commercial financing on attractive terms has generally not been available for PAC investments to enterprises and organisations in the CEE/NIS countries. Most important are the following factors:

- *Undeveloped banking sector.* There are numerous areas where the banking sector is undeveloped, including collateral requirements, availability and sharing of credit reports, as well as development of creditworthiness criteria. In general, banks have had difficulties in operating in economies with high inflation rates and overall uncertainty about the future. They have, to a large extent, focused on currency transactions to take advantage of exchange rate fluctuations. Furthermore, they have financed budget deficits, tempering interest in all commercial lending activities.
- *Lack of awareness and experience.* Often, commercial banks are unaware of potentially profitable investments in the environmental sector and do not have experience with environmental projects.
- *Short maturities.* In Poland, where capital markets are well developed in comparison with some other CEE/NIS countries, maximum maturities for commercial loans for environmental projects are 5-7 years<sup>16</sup>. In Russia, where capital markets are still underdeveloped, maximum maturities on commercial loans, irrespective of their purpose, are 2-3 years. In general, maturities for loans for environmental purposes are longer than for other loans.
- *Maximum participation rules.* In Poland, maximum participation of commercial banks in total project costs is usually 50-70 per cent; in other CEE/NIS countries, such as Russia, it is much lower. Hence, the borrower has to find other sources of financing, which is not always possible.
- *Special conditions.* Certain special, transition-specific conditions which must be met by the borrower (e.g. bank representation in the company's board) are severely limiting domestic borrowing.

<sup>15</sup> This is mainly explained by the fact that under central planning, commercial banks in CEE countries were closely linked with certain enterprises or industry complexes and used for channelling state subsidies to the enterprise sector, only under another heading, thereby postponing the introduction of hard budget constraints.

<sup>16</sup> C4EP, 1997, pp. 16-19.

Table 2.3: **Lending interest rates**  
(per cent)<sup>1</sup>

	1990	1991	1992	1993	1994	1995	1996
Georgia	..	..	..	..	..	..	..
Hungary <sup>2</sup>	32 (-1)	36 (3)	29 (7)	26 (5)	30 (9)	32 (4)	24 (4)
Lithuania <sup>3</sup>	..	..	..	88 (-101)	30 (-15)	24 (-12)	16 (3)
Poland <sup>4</sup>	61 (-188)	40 (-21)	39 (-5)	35 (-3)	31 (2)	24 (2)	23 (5)
Russia <sup>5</sup>	..	8 (-137)	117 (-2384)	593 (-244)	435 218	347 (215)	60 (38)
Slovenia <sup>6</sup>	..	..	72 (-21)	43 (20)	39 (20)	28 (19)	18 (10)
Portugal	22 (8)	25 (14)	20 (11)	17 (9)	15 (10)	14 (9)	..
Netherlands	12 (9)	12 (9)	13 (10)	10 (8)	8 (6)	7 (5)	..
Germany	12 (9)	13 (10)	14 (9)	13 (9)	12 (9)	11 (9)	..

Source: EBRD, 1997, pp. 225, 229, 231, 233, 235; World Bank, 1997; own calculations of real lending rates.

Notes: 1. In short, lending interest rates are the rates charged by commercial banks on loans to prime borrowers. The figures in parentheses are real interest rates defined as lending interest rate minus annual percentage change in consumer prices. 2. One year loans. 3. Weighted average rate charged by commercial banks. 4. Beginning in 1995, weighted average rate charged by commercial banks on lowest risk loans. Prior to 1995, lowest rate charged by commercial banks to prime borrowers. 5. Central bank refinance rate. 6. Short term working capital.

### *Energy intensity*

In general, energy use, measured as total primary energy supply per capita, is high in CEEC/NIS in comparison with EU countries with similar levels of development, whereas energy efficiency, measured as total primary energy supply per unit of GDP, is extremely low. This is illustrated by Table 2.4 below. The following major trends in energy use and energy efficiency in the six countries studied can be observed:

- With respect to energy use, Russia is the biggest consumer; Georgia the least. In all the countries except Georgia, energy use is higher than in Portugal, which has a GDP per capita only slightly higher than Slovenia's (see Table 2.1). In the Netherlands, however, energy use is higher than in Russia.
- With respect to energy efficiency, Slovenia is most efficient; Russia the least. In all the countries but Slovenia, energy efficiency is lower than in Portugal and the Netherlands.

Table 2.4: Total primary energy supply<sup>1</sup>, 1995

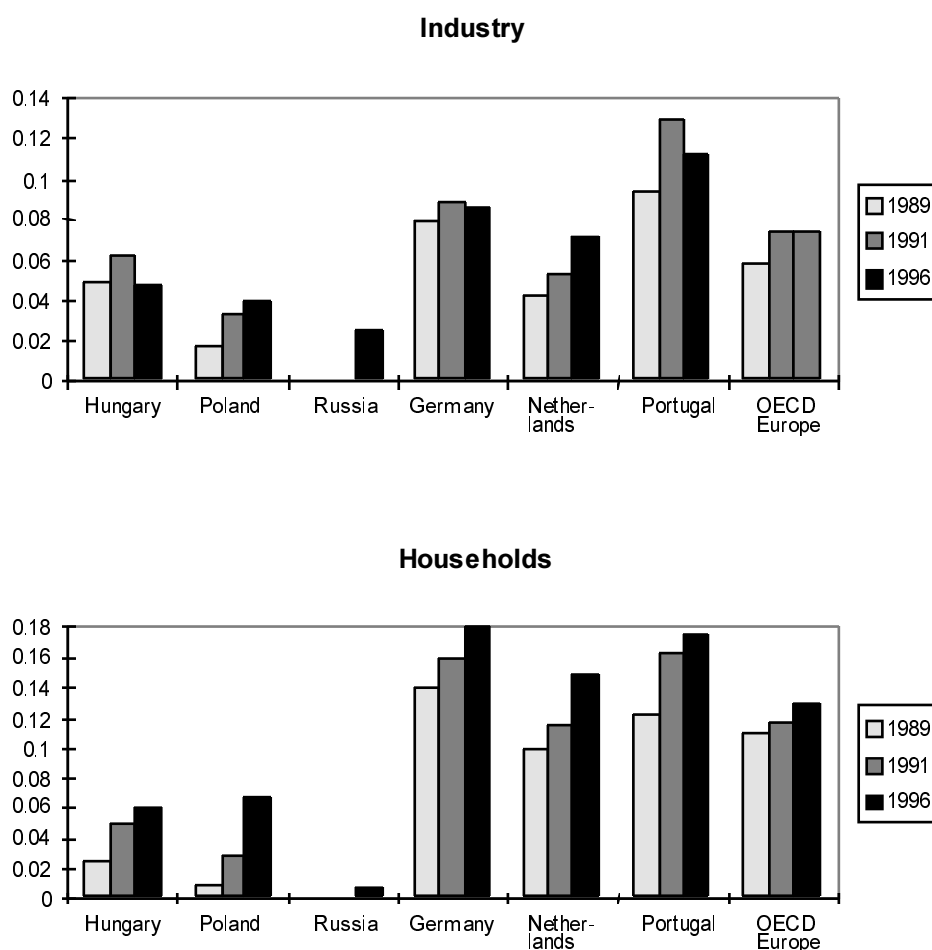
	MTOE <sup>2</sup> , 1995	TOE <sup>3</sup> per capita, 1995	TOE <sup>3</sup> per Unit GDP <sup>4</sup>
Georgia	1.85	0.34	0.32
Hungary	25.10	2.44	0.41
Lithuania	8.50	2.29	0.69
Poland	94.47	2.45	0.44
Russia	604.46	4.08	0.88
Slovenia	5.58	2.80	0.26
Portugal	19.20	1.94	0.17
Netherlands	73.30	4.74	0.27
OECD Europe <sup>5</sup>	1 554.32	3.34	0.22

Source: IEA-OECD; EBRD, 1997.

Notes: 1. Domestic production + imports - exports - international marine bunkers +/- stock changes. Data for Portugal, Netherlands and OECD Europe include combustible renewables and waste. 2. MTOE stands for million tons of oil equivalent. 3. TOE stands for tons of oil equivalent. 4. TOE per 1 000 US\$ (1990 prices and PPPs). 5. Data exclude Poland.

Electricity, energy and natural resource prices may provide incentives to businesses and households for carrying out energy and/or resource saving technological changes. Thus, the level of electricity prices can serve as an indicator of anticipated industrial restructuring in the near future. This indicator is presented in Figure 2.3 below for three of the case study countries (Hungary, Russia and Poland). The relatively low level of electricity prices in Russia may suggest that there is little incentive for Russian business and households to invest in energy or resource saving improvements. It should be noted, however, that there is an upward trend in energy prices in all three countries.

Figure 2.3: **Electricity prices, 1989, 1991 and 1996**  
(US\$/kWh)<sup>1</sup>



Source: IEA-OECD.

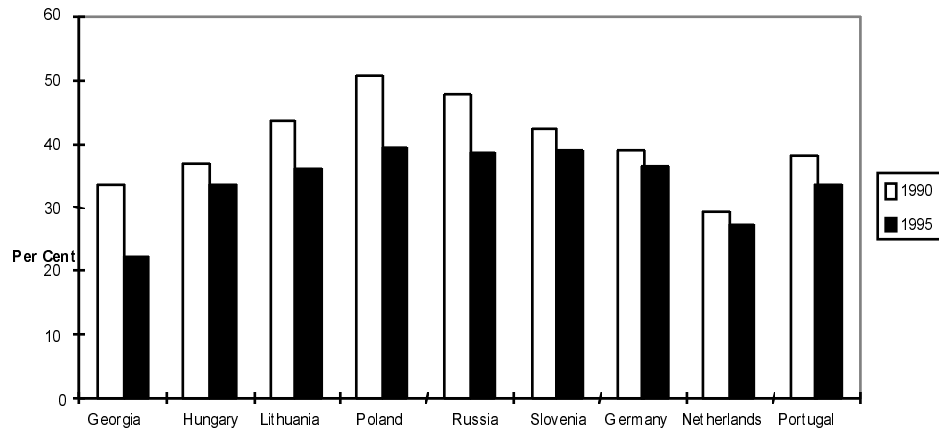
Note: 1. At current prices and exchange rates. Data for Russia refer to 1994.

### 2.3.2 Industrial restructuring

As mentioned earlier, in the short to medium term, there is a substantial potential for reducing pollution in CEE/NIS countries through process-integrated investments and technological improvements as industrial restructuring gains momentum. An attempt is made below to trace the process of industrial restructuring in the six countries studied. Three indicators are dealt with: industry sector share of GDP, gross fixed capital formation and FDI inflows.

#### *Industry share of GDP*

Between 1990 and 1995, the service sector share of GDP has increased in the six countries, except Georgia. This increase has been accompanied by decreases in the agriculture and industry shares of GDP. Excluding Georgia, the industrial sector's share of GDP in the case study countries is comparable to levels in Germany, the Netherlands and Portugal (see Figure 2.4).

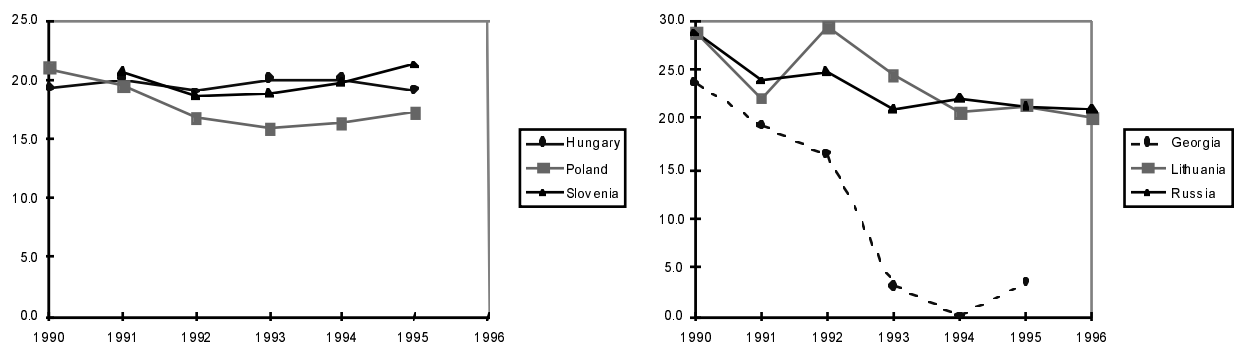
Figure 2.4: Industry share of GDP, 1990 and 1995<sup>1</sup>

Source: World Bank, 1997; OECD, 1996b; OECD, 1997.

Note: 1) For Germany, data refer to western Germany only.

### Gross fixed capital formation

Gross fixed capital formation in per cent of GDP may serve as an indicator of the degree of capital renewal and in turn, of industrial restructuring. This indicator is presented in Figure 2.5. As may be observed, the former Soviet republics have experienced a much deeper decline in investment ratio than Hungary, Poland and Slovenia.

Figure 2.5: Gross fixed capital formation, 1990-96 (per cent of GDP)<sup>1</sup>

Source: World Bank; 1997; OECD, 1997 (b).

Note: 1. In Hungary, GFCF data include assets acquired as capital transfers in kind and under financial leasing, capital repairs and non-deductible VAT on capital goods.

*FDI inflows*

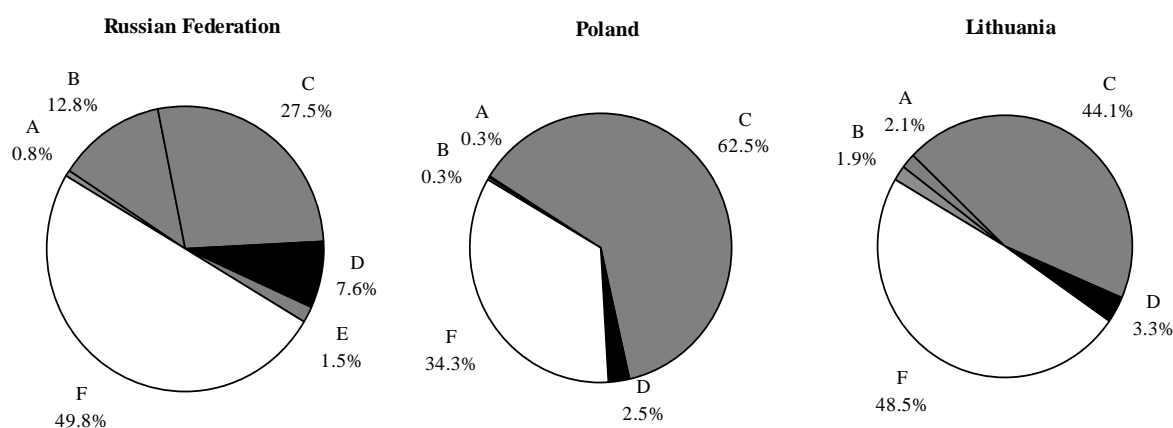
Unsurprisingly, FDI has tended to be relatively high on both an absolute and per capita basis in those countries at an advanced stage of transition and where the investment risk is perceived to be low. FDI may be viewed as another indicator on industrial restructuring. As Table 2.5 illustrates, FDI inflows are presently increasing in all six case study countries except Hungary. Poland and Russia in particular, have seen a substantial increase in FDI inflows in recent years. However, as Figure 2.6 makes clear, the majority of FDI in Russia has been directed at the service sector, and thus does not yet play an important role in industrial restructuring.

Table 2.5: **FDI inflows, 1989-96**

	Cumulative FDI inflows, 1989-96 (US\$ millions)	Cumulative FDI inflows 1989-96 per capita (US\$)	FDI inflows 1996 (US\$ millions)	FDI inflows per capita, 1996 (US\$)
<b>Georgia</b>	39	7	25	5
<b>Hungary</b>	13 260	1 300	1 986	195
<b>Lithuania<sup>1</sup></b>	285	76	152	41
<b>Poland</b>	5 398	140	2 741	71
<b>Russia</b>	5 843	40	2 040	14
<b>Slovenia</b>	743	372	180	90

Source: EBRD, 1997, p. 126.

Notes: 1. FDI figures for Lithuania are only available from 1993.

Figure 2.6: **FDI stock by industry as of January 1, 1996**  
(per cent)

**A** = Agriculture and Fishing; **B** = Mining and Quarrying; **C** = Manufacturing; **D** = Construction; **E** = Electricity, Gas, Water Supply; **F** = Services.

Source: UNECE.



*Chapter 3:***ENVIRONMENTAL INVESTMENT EXPENDITURE**

The broader economic and demographic data presented in the previous chapter provide a background for the environmental investment trends this study specifically sought to identify. For many reasons, reliable, comparable data on PAC investments has previously been very difficult to obtain, posing a serious obstacle to cross-country comparisons. As described in Chapter 1, this study attempted to overcome this problem by basing its analysis on the OECD methodology for determining PAC expenditures<sup>17</sup>. The main results of the analysis, in the form of reasonably reliable and comparable core data on environmental investment expenditures in the countries under study, are presented in this chapter.

When making cross-country comparisons, particularly in the CEE and NIS countries, it is advisable to concentrate on trends and shares, not actual levels. Actual levels may provide the reader with a misleading picture due to methodological difficulties in transferring national currencies into a single currency, differences in pollution levels and unavoidable differences regarding the methodology and the estimation of PAC investments. Thus, this chapter focuses mainly on indexes and percentages, and concentrates on trends over time. Moreover, it should be noted that the PAC investment data in this chapter have been determined according to the so-called “abater principle”. This means that the costs of the entity *carrying out* the environmental activities are taken into account, and not those of the entity *financing* the improvements, as would be the case in calculations made according to the “financing principle”<sup>18</sup>.

**3.1 Overall trends and shares**

While it is not borne out by every country under study, at the broadest level, the analysis shows an overall increase in PAC investments in the first half of the 1990s, levelling off more or less abruptly around 1994. These expenditures are very largely directed at reducing or preventing air and water pollution. Finally, in those countries where it was possible to obtain the data, there appears to be an

---

<sup>17</sup> As explained in Chapter 1, due to a lack of data, only PAC *investments* have been estimated in this analysis; current expenditures (as defined by the OECD PAC methodology), have not been counted. The OECD definition of PAC investments is discussed in Chapter 1 and detailed in the OECD’s published methodology for determining PAC expenditure, which has been reproduced in Annex I.

<sup>18</sup> See Annex I for a definition of the abater and financing principles.

increasing involvement of local governments in PAC investment expenditure. However, a closer look at these trends shows considerable variation among some the countries under study.

### **3.1.1 PAC investment share of GDP**

On the whole, PAC investment as shares of GDP in the countries studied appears to be not very different from those common in EU member countries. As Table 3.1 shows, PAC investment shares in Hungary and Poland are close to those of the Netherlands and Germany, while shares in Lithuania, Russia and Slovenia are similar to those in Portugal. In Georgia, however, PAC investments are marginal. To some extent, Georgia's case may be explained by the country's political instability during the 1990s.

In Hungary, Lithuania, Russia and Slovenia, PAC investments as a share of GDP peaked in 1994, while Poland's share increased throughout the period. With the exceptions of Georgia and Lithuania, therefore, there is thus an overall upward trend in PAC investment share of GDP in the region. It should be emphasised that this development has taken place during a period of tremendous economic difficulty. The same upward trend appears if one looks at PAC investments' share of gross fixed capital formation (GFCF) (see Figure 2.5)<sup>19</sup>. This share has increased in Hungary, Russia, Poland and Slovenia.

#### *Fluctuations in Hungary*

The fluctuations in Hungary with respect to PAC investment share of GDP merit special comment. They reflect changes in the disbursed subsidies for PAC investments and a momentary hike in PAC spending -- to a large extent for wastewater treatment -- in 1994, an election year.

#### *High figures for Poland*

The figures for Poland are markedly higher than the figures for the other countries. In 1995, PAC investment share of GDP was 1.1 per cent in Poland, 1.0 per cent in Lithuania and 0.6 per cent in Hungary. In contrast to the overall picture, where PAC spending generally decreased after 1994, PAC investment shares of GDP and GFCF in Poland have shown a steady upward trend throughout the 1990s. This is likely due, at least in part, to the strong performance of the Polish environmental fund system. Earmarked environmental funds (EFs) in Poland have generated substantial revenues for PAC investments through the successful enforcement of pollution charges (some of which are set at very high levels), and also because these charges were indexed against inflation early in the transition, thus protecting their real value.

---

<sup>19</sup> See Table II.4 in Annex II.

Table 3.1: PAC investments' share of GDP, 1990-96  
(per cent)<sup>1</sup>

	1990	1991	1992	1993	1994	1995	1996
Georgia	..	..	..	..	..	-	-
Hungary	0.5	0.4	0.7	0.6	0.9	0.6	0.6
Lithuania	..	..	..	1.0	1.4	1.0	0.6
Poland <sup>2</sup>	0.7	1.0	1.0	1.0	1.0	1.1	..
Russia <sup>3</sup>	..	..	0.3	0.3	0.4	0.4	0.4
Slovenia	..	..	0.2	0.3	0.6	0.4	0.4 <sup>4</sup>
Netherlands	0.6	0.6	0.6	..	..	0.4	..
Portugal	0.5	0.4	..	..	0.4	..	..
Germany <sup>5</sup>	0.7	0.7	0.7	0.6	0.5	0.5	..

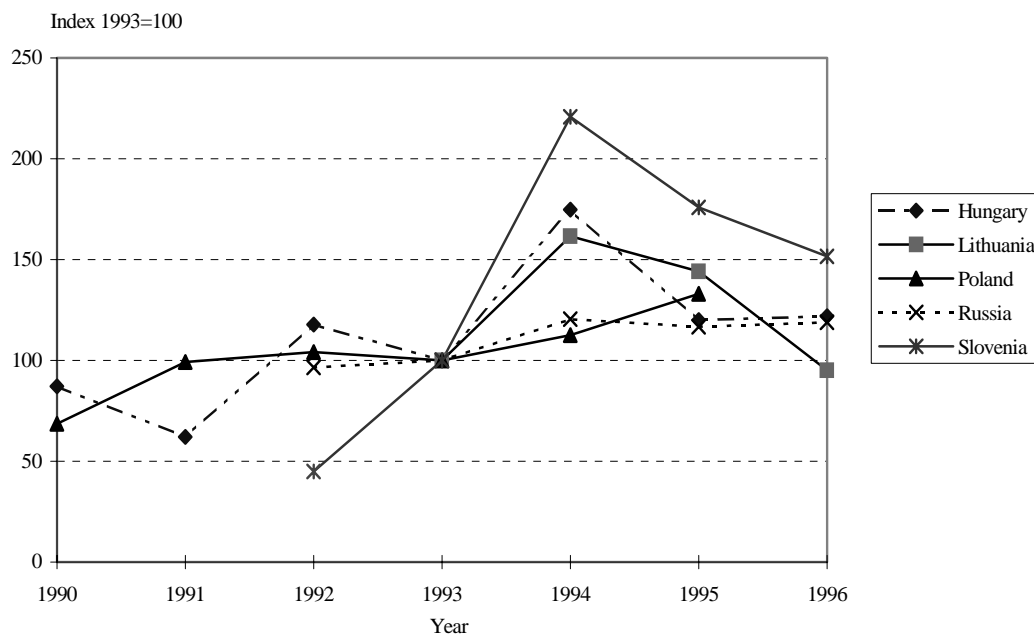
Source: Table II.1 in Annex II.

Notes: 1. Based on the abater principle. 2. Due to a change in government data collection methodology in Poland, 1996 data (which indicate a value of 1.7% of GDP for PAC expenditures) are not compatible with those from previous years. By one estimate, the old methodology would indicate only 1.2% for 1996. 3. Russian data are based on official statistics. Some researchers (e.g. Golub in OECD, 1998) contend that these statistics overestimate PAC spending. 4. Only business sector PAC investments. 5. Data refer to western Germany only; 1993, 1994 and 1995 figures are preliminary.

There has been a substantial increase in PAC investment expenditure, measured in current prices, in the six countries studied in the 1990s, with the exception of Georgia<sup>20</sup>. The increase can only be partly explained by inflation. This follows from Figure 3.1, which shows the development of PAC investments in constant prices. As can be seen, the increase was particularly pronounced in 1994. However, with the exception of Poland, the increase in PAC investments in constant prices has levelled off. In Lithuania, they declined in 1995 and 1996. In Hungary and Slovenia, they declined to a significant degree in 1995. In Russia, PAC investment has remained fairly constant, though this may be seen as an achievement when the country's decline in GDP is taken into account.

<sup>20</sup> See Table II.1 in Annex II.

Figure 3.1: **PAC investments, 1990-96**  
(constant 1993 prices)<sup>1</sup>



Source: Table II.2 in Annex II.

Note: 1. Based on the abater principle. The producer price index has been used as the deflator.

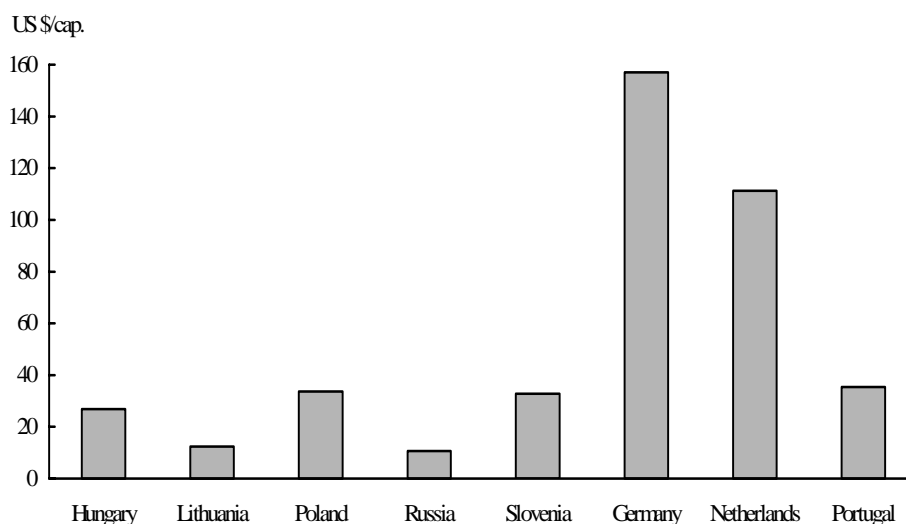
### 3.1.2 *PAC investments per capita*

The level of PAC investments per capita varies widely among the six countries studied, ranging from zero to more than \$30 per capita in 1996 (Figure 3.2). PAC investments per capita are far higher in Hungary, Poland and Slovenia than in Lithuania and Russia. Indeed, PAC investments per capita in the former countries are on par with PAC investments per capita in Portugal<sup>21</sup>. It should be noted, however, that the scale of environmental investment *needs* also varies among the countries. For example, it is likely that investment needs in sparsely populated Lithuania are less than in Poland, which has a number of highly industrialised, urban areas. With regard to Russia, one reason for the low figure is likely the ongoing economic crisis the country has been subject to during the 1990s. Some researchers have suggested that PAC investments in Russia are even lower than official statistics indicate (Golub, 1998). Nevertheless, in all the countries studied except Georgia, PAC investments per capita have increased during the 1990s<sup>22</sup>.

<sup>21</sup> See Table II.5 in Annex II.

<sup>22</sup> See Table II.5 in Annex II.

Figure 3.2: **PAC investments per capita, 1996**  
(US\$; current prices and exchange rates)<sup>1,2</sup>



*Source:* Table II.1 in Annex II.

Note: 1. Based on the abater principle. The 1995 figure has been used for Poland (see Table 0.1, note 2). Furthermore, note that the underlying data suffer from uncertainty connected with the conversion of national currencies into US\$; however, this mostly concerns Georgia, Lithuania and Russia. In the case of Russia, see also note 3 to Table 0.1. 2. Data for Portugal are from 1994. Data for Georgia, Germany and the Netherlands are from 1995. For Germany, data refer to western Germany only.

### 3.1.3 *Correlation between GDP and PAC investments*

#### *Investments*

Irrespective of how they are measured, one reason why PAC investments are higher in Hungary, Poland and Slovenia than in Georgia, Lithuania and Russia may be that the level of development, measured as GDP per capita, is higher in the first three countries. In fact, there seems to be a positive correlation between GDP per capita and PAC investments' percentage share of GDP. In other words, it appears that countries with higher GDP per capita have higher PAC investments. This follows from Figure 3.3, which concerns 1995. The only exception is Slovenia; it has the highest level of GDP per capita, but only the fourth highest level of PAC investments in per cent of GDP.

Figure 3.3: PAC investments' percentage share of GDP compared to GDP per capita, 1995 <sup>1</sup>

Source: Table 3.1 above.

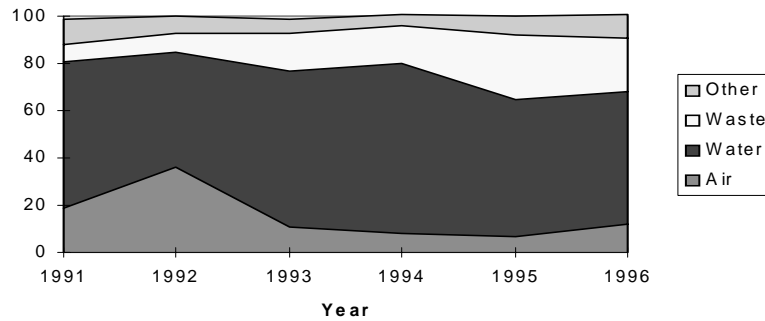
Note: 1. Based on the abater principle.

### 3.2 Structure of PAC investments by environmental media

While caution should be used in comparing the figures given for the different countries, the data presented show that two environmental media account for the vast majority of PAC investments in the six countries studied: water and air (see Figures 3.4 through 3.7). Investments in solid waste management are relatively minor in all countries except Hungary. In recent years, air has been the main focus of investment in Poland and Slovenia. In Poland, it accounted for 59 per cent of PAC investments in 1996. In Slovenia, where the breakdown is based upon business sector PAC investments only, it accounted for 69 per cent in 1995, the most recent year for which data are available.

Water has been the main focus for the other four countries. In Georgia, it accounted for 100 per cent of PAC investments in 1995; in Hungary, it accounted for 56 per cent in 1996; and in Lithuania, 63 per cent in 1995. In Russia, where the breakdown is based upon business sector PAC investments only, it accounted for 69 per cent in 1996. In Hungary, waste has gradually become the second most important focus for PAC investment. In 1991, it accounted for 7 per cent of PAC investments; in 1996, it accounted for 23 per cent. This upward trend has been contributed to by an increase in investments in waste treatment facilities by private enterprises responsible for industrial waste collection and treatment, as well as an expansion of the subsidy system for municipal waste management.

Figure 3.4: PAC investments by media in Hungary, 1991-1996  
(per cent)<sup>1</sup>



Source: Table II.8 in Annex II.

Note: 1. Based on the abater principle. See also note 3 to Table II.8.

Figure 3.5: PAC investments by media in Lithuania, 1992-1995  
(per cent)<sup>1</sup>



Source: Table II.8 in Annex II.

Note: 1. Based on the abater principle.

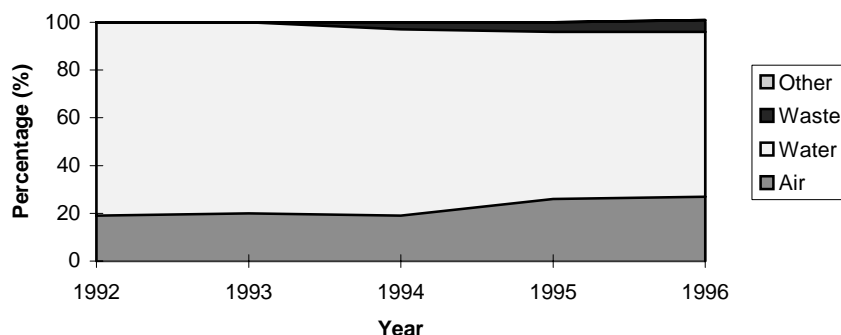
Figure 3.6: PAC investments by media in Poland, 1991-1996  
(per cent)<sup>1</sup>



Source: Table II.8 in Annex II.

Note: 1. Based on the abater principle.

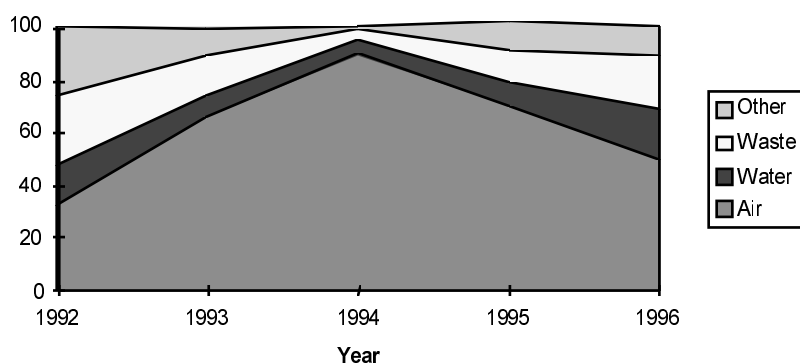
Figure 3.7: PAC investments by media in Russia, 1992-1996  
(per cent)<sup>1</sup>



Source: Table II.8 in Annex II.

Note: 1. Based on the abater principle. Only business sector PAC investments.

Figure 3.8: PAC investments by media in Slovenia, 1992-1996  
(per cent)<sup>1</sup>



Source: Table II.8 in Annex II.

Note: 1. Based on the abater principle. Only business sector PAC investments.

### 3.3 Public sector PAC investments

PAC investment share of total consolidated public budget expenditures has increased during the 1990s in Hungary and Poland. In Lithuania this share peaked in 1994 and decreased thereafter (Table 3.2). However, as Table 3.2 also shows, public sector PAC investments play a minor role in overall budget expenses. However, during the same period, budget deficits have been sharply reduced throughout the region (see Box 1), making the concurrent increase in public sector PAC investments more significant.



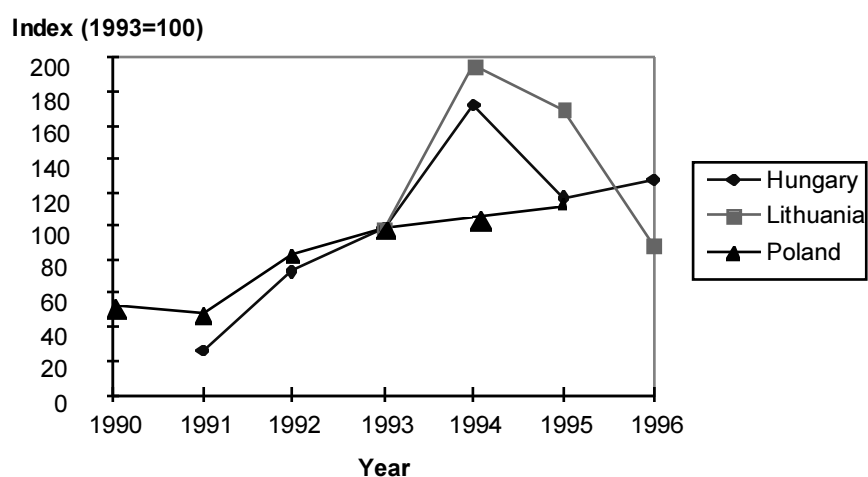
**Table 3.2: Public sector PAC investment percentage share of total consolidated public budget expenditures, 1990-96 (per cent)<sup>1</sup>**

	1990	1991	1992	1993	1994	1995	1996
Georgia	..	..	..	..	..	-	-
Hungary	..	0.2	0.4	0.5	0.7	0.6	0.7
Lithuania	..	..	..	1.5	2.2	1.6	0.8
Poland	0.6	0.5	0.9	1.1	1.0	1.0	2.0
Russia	..	..	..	..	..	..	..
Slovenia	..	..	-	-	-	-	..

Source: Table II.6 in Annex II.

Note: 1. Based on the abater principle. Environmental funds' spending is excluded.

**Figure 3.9: Public sector PAC investments, 1990-96<sup>1</sup>**



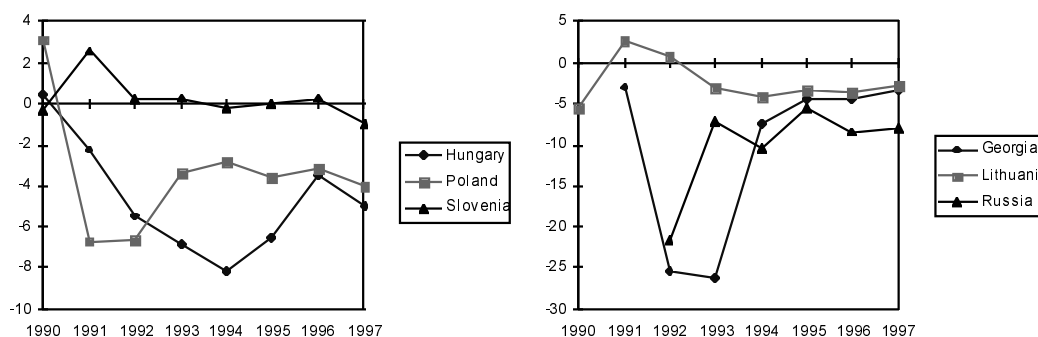
Source: Table II.1 and Table II.3 in Annex II.

Note: 1. Based on the abater principle. The producer price index has been used as a deflator. Environmental funds spending is excluded.

### Box 1: Budget deficits in the case study countries

In the six countries studied, budget deficits in per cent of GDP have been quite stable from 1994-1997. The recent levels of 0-8 per cent are relatively close to those of, for example, member states of the European Union (see Figure 3.10). This achievement is to a large extent the result of rigorous stabilisation policies, which while contributing to improved overall economic stability in the case study countries, have also placed severe constraints on public sector expenditures as a whole. Already tight budgets have also come under strain from poor tax collection in some of the six countries, particularly Georgia and Russia.

Figure 3.10: Government budget balances, 1990-97  
(as a per cent of GDP)



Source: EBRD, 1997, pp. 224, 225, 229, 231, 233, 235.

In Hungary, Lithuania and Poland, where it is possible to make a fairly accurate distinction between public sector and enterprise PAC investments, public sector environmental investment expenditure has increased, in current prices, in the 1990s. However, from 1993 the public sector share of PAC investments has generally remained constant. When comparing the public sector share of total environmental investment expenditure across countries, Hungary stands out due to its high level of public spending on PAC investment. About two-thirds of PAC investments in Hungary are public sector expenditures. The public sector share of environmental investment expenditure in Lithuania and Poland is about one third<sup>23</sup>. (It should be noted, however, that Hungary's apparently high public sector share may in part be due to methodological differences in defining "public sector" and accounting practices<sup>24</sup>).

#### 3.3.1 Local government shares

The role of local government spending on PAC investments was examined in three of the case study countries: Hungary, Lithuania and Poland. While uncertainties in interpreting the data must be acknowledged, it appears that local government has been taking more responsibility for environmental spending. Local authorities' shares of public sector PAC investment expenditure has increased throughout

<sup>23</sup> See Table II.6 in Annex II.

<sup>24</sup> In Hungary, public utilities are considered to be in the public sector, while in Lithuania and Poland, they are included in the private sector.

the period in each of the countries, while the shares of central governments have decreased. In Poland, the growing role of local authorities' spending appears to have peaked in 1994 (Table 3.3).

When comparing these shares across countries, both Hungary and Poland have a high local government share of about 75 to 90 per cent of public sector environmental investment expenditure. In contrast, the local government share in Lithuania is very low, amounting to a mere three per cent in 1996. As noted above, however, these figures should be read cautiously. Chapter 4 mentions the difficulties encountered in the study in identifying financial transfers from local authorities to public enterprises. Similar problems were encountered in identifying transfers from state authorities to the local level, and vice-versa.

**Table 3.3: Central and local government budgets' percentage share of total public sector PAC investments, 1990-1996**  
(per cent)<sup>1</sup>

		1990	1991	1992	1993	1994	1995	1996
Hungary <sup>2</sup>	Central	..	44	25	25	21	..	..
	Local	..	56	75	75	79	..	..
Lithuania	Central	..	..	..	100	100	99	97
	Local	..	..	..	..	..	1	3
Poland	Central	28	36	18	19	10	12	16
	Local	72	64	82	81	90	88	84

Source: Table II.13 in Annex II.

Notes: 1. Based on the abater principle. Environmental funds' spending is excluded.

2. Breakdown across central and local investments is based on investments made by investors with more than 50 employees only.

*Chapter 4:***SOURCES OF FINANCING****4.1 Overall trends and shares**

According to the financing principle, where the costs of the entities financing PAC activities are in focus, public budgets in the six countries studied account for from 21 to 72 per cent of financing for PAC investments. The contribution of earmarked environmental funds accounts for from 3 to 32 per cent, while enterprises financed 15 to 62 per cent of the activities. However, there are a number of uncertainties connected with the application of the financing principle in each country, and it is almost certain that this estimation of the contribution of enterprises to financing PAC activities is substantially exaggerated.

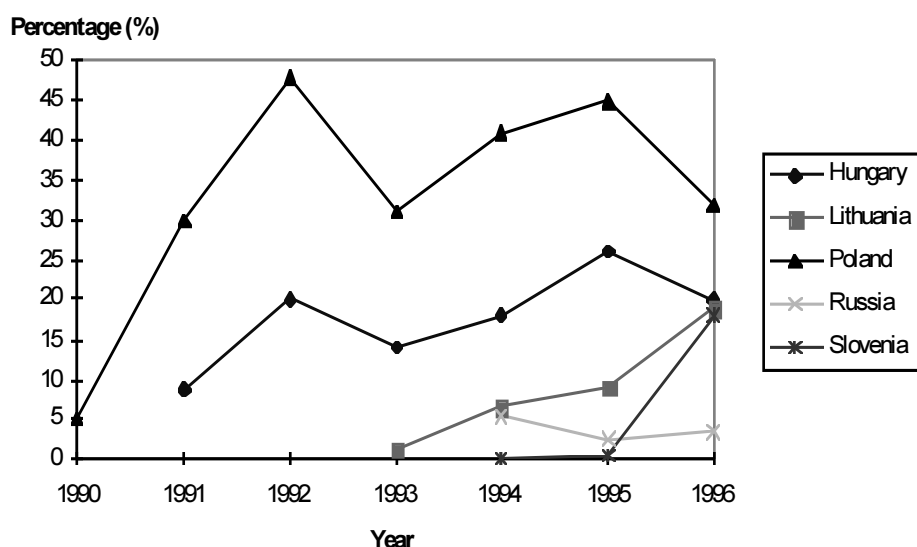
The reason for this overestimation of the enterprise share is twofold: *First*, in all of the countries studied, except Hungary, public utilities are included under the business sector in environmental expenditure statistics. Under current accounting practices, the business sector comprises all enterprises, both public and privately owned. *Second*, it is extremely difficult, if not impossible, to trace financial flows from municipal budgets to public utilities. Because it is impossible to identify municipal budget transfers to public utilities when they are treated as businesses, the public utilities' role in financing PAC investments -- and thus the enterprise share -- will inevitably be overestimated.

**4.2 The role of environmental funds**

Environmental fund transfers to and from enterprises do not entail the same uncertainties mentioned above. On the contrary, all six countries studied have fairly reliable data for financing of investments by environmental funds. (Keeping in mind that Georgia does not have such funds.) Figure 4.1 shows environmental funds investment subsidies as a percentage of total environmental investments during the period 1990-96. It gives an indication of environmental funds' role in financing. The striking features are:

- Environmental funds are major financiers in Poland, where in 1992 they financed up to nearly 1/2 of total environmental investments; the 1996 share is about 1/3.
- Among the remaining five countries, environmental funds have played the most important role in Hungary. In 1996, however, the role played by funds in Lithuania and Slovenia reached the same level as in Hungary, which is about 20 per cent. In Russia, environmental funds provide less than five per cent of finance.

Figure 4.1: **Environmental funds share of total PAC investments, 1990-96**  
(percentage)<sup>1,2</sup>



Source: Table II.11 in Annex II.

Notes: 1. The nominator is based on the financing principle since environmental funds are only financiers, not abaters. The denominator is based on the abater principle; thus, environmental fund spending is not included in the denominator. Note that environmental fund spending does not include pollution charge exemption schemes, which are commonly used in Russia.

2. In Slovenia, the Environmental Development Fund was established in 1993, but did not exhibit its full financing potential until 1996. Its share in 1996 has been calculated on the basis of the assumption that total PAC investments in Slovenia in 1996 were equal to those in 1995.

#### 4.2.1 *Pollution charge exemption schemes*

In Figure 4.1, the data concerning environmental funds in Russia **do not include** expenditures which might have been made under pollution charge exemption schemes. Such exemptions allow enterprises and organisations to deduct the amount of their own PAC investments from the pollution charges imposed on them by governmental authorities.<sup>25</sup> If officially registered pollution charge exemptions were included in the calculation of the environmental fund share of financing, the percentage shares for Russia would be 5.4 per cent in 1994, 23.6 per cent in 1995 and 17.9 per cent in 1996 (instead of 5.3 per cent, 2.6 per cent and 3.5 per cent, respectively, as in Figure 4.1). Furthermore, environmental funds in Russia often engage in barter exchanges (in lieu of monetary transfers) which are not reflected here.

<sup>25</sup> Enterprises and organisations can, subject to approval by relevant authorities, retain pollution charges to fund internal environmental investment projects. In practice, however, the system is not well-regulated. Enterprises and organisations often make the decision to withhold pollution charges themselves, without prior approval by relevant authorities. Furthermore, the control of the projects financed through pollution charge exemptions is very limited; that is, there is no guarantee that pollution charge exemptions are actually used for financing environmental investment projects. Consequently, it is impossible to assess whether the system serves as an incentive to enterprises and organisations to increase environmental expenditure or if it is merely a hidden subsidy.

## REFERENCES

- BARTHOLDY, K. (1997), "Old and New Problems in the Estimation of National Accounts in Transition Economies", *Economics of Transition*, Volume 5 (1), pp. 131-146.
- COWI (1995), *Case Study of Environmental Expenditure and Investments in Six Selected CEE Countries*, COWI, Lyngby.
- DÖHRN, R. and HEILMANN, U. (1996), "The Chenery Hypothesis and Structural Change in Eastern Europe", *Economics of Transition*, Volume 4 (2), 411-425.
- EAPS/C4EP (1997), *The Market for Financing of Environmental Investment Projects in Poland*, Warsaw. ("EAPS" and "C4EP" are projects sponsored by the US Agency for International Development.)
- Eurostat (1994), *SERIEE - 1994 Version*, Eurostat, Luxembourg.
- GOLUB, A. A. (1998), "Environmental Financing in the Russian Federation", in *Environmental Financing in the Russian Federation*, OECD, Paris.
- KLARER, J. and MOLDAN, B. (eds.) (1997), *The Environmental Challenge for Central European Economies in Transition*, Wiley & Sons, Chichester.
- LANKES, H-P. and VENABLES, A. J. (1996), "Foreign direct investment in economic transition: the changing pattern of investments", *Economics of Transition*, Volume 4 (2), 331-347.
- OECD (1990), "Pollution Control and Abatement Expenditure in OECD Countries -- A statistical Compendium", Environment Monograph No. 38, OECD, Paris.
- OECD (1993), "Pollution Abatement and Control Expenditure in OECD Countries", Environment Monograph No. 75, OECD, Paris.
- OECD (1996a), *1996 OECD QUESTIONNAIRE - Pollution Abatement and Control Expenditure*, OECD Environment Directorate, Paris.
- OECD (1996b), *National Accounts in Central and Eastern Europe*, OECD, Paris.
- OECD (1996c), "Pollution Abatement and Control Expenditure in OECD Countries", Environment Monograph, OECD/GD(96)50, Paris.
- OECD (1997a), *Main Economic Indicators*, OECD, Paris.
- OECD (1997b), *Short Term Economic Indicators*, OECD, Paris.

OECD/CCET (1996), "Environmental Indicators: a Review of Selected Central and Eastern European Countries", OECD/GD(96)156, OECD, Paris.

UNECE (1995), *Integrated Report on Environmental Financing*, UNECE, Sofia.

World Bank (1997), *World Development Indicators 1997*, CD-ROM, World Bank, Washington, D.C.

World Bank and OECD (1993), *Executive Summary, Environmental Action Program for Central and Eastern Europe*, World Bank, New York.

## ANNEX I: PAC EXPENDITURE -- CONCEPT AND METHODOLOGY

Extract from: "Pollution Abatement and Control Expenditure in OECD Countries", Environment Monograph, Paris, 1996"

### PART 1

#### PAC EXPENDITURE: CONCEPT AND METHODOLOGY

#### **Definition of "Pollution Abatement and Control"**

Pollution abatement and control (PAC) activities are defined as purposeful activities aimed directly at the prevention, reduction and elimination of pollution or nuisances arising as a residual of production processes or the consumption of goods and services. This definition specifically excludes expenditure on natural resource management and activities such as the protection of endangered species (fauna and flora), the establishment of natural parks and green belts and activities to exploit natural resources (such as the supply of drinking water). Other exclusions are expenditure intended either for workplace protection or for the improvement of production process for commercial or technical reasons, even when they have environmental benefits. In total, PAC expenditure comprises the flow of investment and current expenditure that is directly aimed at pollution abatement and control, and which is incurred by the public sector, the business sector and households.

The three conceptual issues associated with the statistical treatment of PAC expenditure are:

- definition of a baseline for PAC expenditure;
- treatment of integrated pollution control technologies;
- avoidance of double counting.

These issues are important for the correct compilation, use and interpretation of PAC expenditure data. The following sections consider each of them in turn.

#### **Defining the baseline**

Investment and current expenditure can have positive environmental effects without being directly motivated by environmental concerns. One example is investment in energy-saving equipment that is carried out because of increases in energy prices. Thus, investment in environmentally friendly equipment by firms may be part of normal, profit-maximising business behaviour. This type of expenditure can be distinguished from other expenditure that is directly incurred for PAC purposes (*e.g.* as a consequence of government environmental policies and regulations).

The question arises whether PAC expenditure data should include only expenditure directly incurred for PAC purposes or all expenditure with positive environmental effects. The answer depends on the use of PAC expenditure data:



- If PAC expenditure data are used **to identify the financial consequences of government environmental policy**, then only expenditures incurred directly for PAC purposes should be included.
- If the objective of collecting PAC expenditure data is to assess the overall links between capital formation and pollution burden or to identify the share of overall expenditure which has positive effects for the environment, then all expenditure with positive environmental effects should be included in PAC expenditure.

Most OECD Member countries, in their statistical approaches, include only expenditure that is directly aimed at environmental protection. This approach was also adopted in the OECD questionnaire <sup>1</sup> agreed upon by Member countries. In statistical practice, the identification of such expenditure is difficult, particularly in the business sector, where firms may be unable to distinguish between the different investment motives. It is difficult to identify when pollution abatement is the actual motivation behind less wasteful use of raw materials; therefore, the measurement of air and water pollution abatement expenditure may differ from this baseline. For solid waste, for example, some countries employ simple, pragmatic solutions: the United States routinely attributes a fixed proportion (70 per cent) of expenditure for collection and disposal of municipal waste to pollution abatement and control (30 per cent is assumed to be ordinary expenditure not attributable to government environmental policies and regulations).

*End-of-pipe and  
integrated  
technologies*

The abatement and control of residuals from production processes can be done either by **end-of-pipe technology** attached to a given production process, or by **changing the process** itself. Investments in end-of-pipe technologies do not change the production process and the entire outlay is for pollution control. The difficulty associated with investments in integrated technologies is establishing what proportion of the total investment expenditure should be allocated to pollution abatement and control. In principle, the cost difference between the integrated plant and what would have been paid for a cheaper, viable, but less environmentally benign plant, should be recorded as PAC expenditure. There is, however, no easy way to handle this problem in statistical practice. One possibility is to pose this question explicitly in business surveys. Experience from a number of OECD countries shows that respondents often find it difficult to deliver accurate replies.

It is likely that the problem of accounting for investments in integrated technology will become more important in the future. Government environmental policies and business strategies are moving from curative to preventive approaches, thus increasing the relevance of integrated technologies as opposed to end-of-pipe solutions. In Finland, for instance, process integrated investments accounted for 32 per cent of industrial PAC investments in 1992 and 45 per cent in 1993 (Statistics Finland, 1995).

---

<sup>1</sup> Since 1996, this questionnaire is a joint OECD/Eurostat questionnaire for European Union and EFTA countries

**Avoiding double counting**

As economic agents interact, the same pollution control activity can be recorded by several agents, thus making double counting a possibility. One example is private sector PAC expenditure that is subsidised by the government. Unless a clear distinction is made between the execution and the financing of PAC activity, both the public sector and the firm will report the expenditure for PAC purposes, resulting in double counting. It is, therefore, important to distinguish between the execution of an environmental service (*abater principle*) and the financing of the environmental service (*financing principle*).

The OECD questionnaire follows a structure that links these two approaches. The figure below presents the basic case with financial flows only between the public and the private sector. Investment plus current expenditure minus receipts from by-products of PAC activity make up the expenditure according to the abater principle. Purely financial transfers in the form of subsidies, fees or charges account for the transition to the financing principle. In theory, this approach could cover the various financial flows within the private sector (*i.e.* an input-output table for PAC market transactions) and within the public sector (flows of funds between different levels of government). At present, however, the availability of data limits the possibility of taking such a comprehensive approach.

Only a few OECD Member countries (*e.g.* the Netherlands) evaluate expenditure according to both principles. Their work shows a significant difference between expenditure calculated according to the abater principle and that based on the financing principle: public sector expenditure is nearly 75 per cent higher, if subsidies and fees are taken into account, meaning a significant difference in the sectoral structure of PAC expenditure.

**Abater and Financing Principles**

<b>PUBLIC SECTOR</b>		<b>PRIVATE SECTOR</b>	
	Investment expenditure		Investment expenditure
+	Current expenditure	+	Current expenditure
-	Receipts from by-products of PAC activity	-	Receipts from by-products of PAC activity
=	PAC expenditure according to the <i>Abater Principle</i> (Expenditure 1)	=	PAC expenditure according to the <i>Abater Principle</i> (Expenditure 1)
+	Subsidies to the private sector	-	Subsidies from the public sector
-	Fees/charges from the private sector	+	Fees/charges to the public sector
=	PAC expenditure according to the <i>Financing Principle</i> (Expenditure 2)	=	PAC expenditure according to the <i>Financing Principle</i> (Expenditure 2)

## PART 2

### PAC EXPENDITURE DATA: INTERPRETATION, USE AND LIMITS

PAC expenditure is the first-order, out-of-pocket expenditure of those economic entities that implement control measures and undertake compliance activities. As such, PAC expenditure does not provide any more, or any less information than, for example, health or education expenditure.

Total PAC expenditure provides a **general indication of a country's financial efforts directed at pollution abatement and control**. However, as absolute figures, the relevance of these data for policy purposes is limited; PAC expenditure has to be related to other variables. A common way of comparing PAC expenditure data across countries is to relate them to GDP or total gross fixed capital formation.

#### Dimensions of PAC expenditure

PAC expenditure has several dimensions, each with a particular interpretation. Here, PAC expenditure is disaggregated by:

- environmental media (air, water, waste, noise);
- economic sector (public sector, business sector, households);
- type of expenditure (investment, current expenditure).

#### *Environmental domain*

Disaggregation of PAC expenditure by environmental domain indicates whether pollution control efforts are directed towards waste management, noise reduction, or protection of air or water.

Here, waste includes municipal as well as industrial waste, which in turn includes hazardous waste, ordinary waste and inert or heavy waste (waste from the extractive industries and power stations, demolition waste). It includes sewage sludge but excludes waste water. For waste, PAC activities comprise: preventive measures to limit the amounts and harmful effects of waste generated from the final consumption of goods and to limit the production of industrial waste or lessen its harmful effects: collection and transport; treatment and disposal; exploitation of waste; and regulation and monitoring.

PAC activities for soil and water comprise collection and purification of waste water, combating of pollution in the marine environment, prevention, control and monitoring of surface water pollution, combating of pollution of inland surface waters, prevention and combating of thermal pollution of water, abatement of groundwater and soil pollution, and regulation and monitoring.

PAC activities for air comprise monitoring and regulation of atmospheric pollution, prevention of air pollution linked to the production process, installation of non-polluting technologies (clean technologies and clean products used in the production process) and elimination of emissions at the source (dust removal equipment and filters).

PAC activities for noise include regulation and monitoring, preventive action at the source and construction of anti-noise installations. Measures aimed at reducing industrial noise for workplace protection are excluded.

PAC activities related to other types of pollution control include abatement and control of non-radioactive radiation, multifunctional PAC activity and general administration of the environment.

#### *Economic sectors*

Disaggregation of PAC expenditure by economic sector indicates, first of all, the sector where the PAC activity occurs (abater principle). When financial transfers between different sectors are taken into account, disaggregation of PAC expenditure by economic sector points to the sector paying for the PAC activity (financing principle). Any conclusions about the sharing of the financial burden among sectors must therefore be drawn with great caution. The economic sectors distinguished are the public sector, the business sector and households.

The public sector comprises federal and local governments and communities.

The business sector covers agriculture, hunting and fishing (ISIC<sup>2</sup> 11 and 13); forestry (ISIC 12); mining and quarrying (ISIC 2); manufacturing (ISIC 3); electricity, gas and water (ISIC 4); construction (ISIC 5); transport, storage and communications (ISIC 7); and other services (ISIC 6, 8 and 9 except government).

Household PAC expenditure according to the abater principle includes sewage treatment by households (*e.g.* septic tanks) and purchase, operation and maintenance of air pollution control devices for motor vehicles. Operation and maintenance expenditure includes items such as price differentials for unleaded gasoline or service costs for proper adjustment of engines. Fees paid to communities for services such as waste collection are included in household PAC expenditure evaluated under the financing principle.

The business sector and households comprise the private sector.

#### *Type of expenditure*

The distinction between investment and current expenditure helps in identifying patterns of abatement and control efforts over time. Typically, when PAC measures are first implemented, investment expenditure accounts for a large share of total PAC expenditure. Over time, current expenditure becomes increasingly important.

Investment expenditure is defined as outlays (purchases and own-account production) on land and on additions of new durable goods to the stock of fixed

---

<sup>2</sup> International Standard Industrial Classification of all Economic Activities.

assets for pollution abatement and control.

Current expenditure includes PAC outlays for own production of environmental services (wages, rents, energy, maintenance and intermediate inputs) and for environmental services and specific goods bought in from the market (when, for instance, a chemical firm has its waste site cleaned up by a specialised enterprise).

### Measuring economic effects

PAC **expenditure** is not the same as the **cost** of pollution abatement and control, but the cost can be calculated from PAC expenditure data. Capital goods are used over a number of years and their cost is spread over their service life. Expenditure data, on the other hand, shows the total value of the capital goods in the year of acquisition and does not, therefore, reflect accurately the economic effects over time. The calculation of the PAC cost requires appropriate assumptions about service lives, interest rates and several other parameters. For current expenditure, the notions of cost and expenditure coincide. For the purposes of assessing the economic impact of environmental policies, it would be preferable to look at cost rather than expenditure.

A different use of PAC expenditure data is to calculate PAC shares in total cost or total turnover for particular industries. **Cost shares** are a useful indicator for assessing **the effects of environmental regulation on industry competitiveness**. In industries where PAC cost shares are small, the impact of environmental policies will be felt less than in industry branches where these shares are high.

PAC expenditure data are also an important aid in identifying the positive economic effects of environmental policies. Measures to protect the environment create demand for abatement and clean production technologies and environmental consulting services, and spur environment-related R&D. National and international statistics on PAC expenditure provide the basic information needed to estimate the size and evolution of markets and potential for the environment industry.

**Caveats**

The relationship between PAC expenditure and the state of the environment can be explored only as part of the overall context of a country, and with the aid of supplementary information. Out of context, high PAC expenditure can be associated both with low environmental quality (indicating that such levels of expenditure are necessary) and with high environmental quality (indicating improvement as a result of high PAC expenditure).

PAC expenditure measures the economic effort to control pollution; it does not measure the cost of environmental damage. As such, PAC data should not be generalised to wider cost-benefit analysis, or used to decide whether abatement is justified. In deciding whether to undertake abatement, damage costs should be used. These are often very different from control costs.

All significant changes in a country's PAC expenditure must be reviewed with care. PAC expenditure may increase because of improved sectoral coverage (*e.g.* local government expenditure was not included before) or the inclusion of investments in integrated technology (*e.g.* only investments in end-of-pipe technology were reported earlier).

## ANNEX II: STATISTICAL DATA

Table II.1: Basic data, 1990-96

	1990	1991	1992	1993	1994	1995	1996
<b>Georgia</b>							
- Total PAC inv. (thousand lari)	..	..	..	..	..	136	-
- GFCF <sup>1</sup> (million lari)	..	..	..	..	..	104	..
- GDP (million lari)	..	..	..	..	..	3 694	5 724
- Exchange rate (lari/US\$)	..	..	..	..	..	1.29	1.26
- Producer price index (index 1993=100)	..	..	..	..	..	..	..
- Pop. (1 000)	5 400	5 400	5 400	5 400	5 400	5 400	5 400
<b>Hungary</b>							
- Total PAC inv. (million HUF)	10 460	9 752	20 839	19 661	37 795	33 015	41 235
- GFCF <sup>1</sup> (billion HUF)	402	523	585	670	879	1 059.6	..
- GDP (billion HUF)	2 089	2 498	2 943	3 548	4 365	5 613	6 843
- Exchange rate (HUF/US\$)	..	74.77	78.99	91.91	105.12	125.72	152.61
- Producer price index (index 1993=100)	61	80	90	100	110	140	172
- Pop. (1 000)	10 365	10 346	10 324	10 294	10 245	10 106	10 049
<b>Lithuania</b>							
- Total PAC inv. (thousand litas)	..	..	..	105 981	229 448	246 034	183 528
- GFCF <sup>1</sup> (billion litas)	-	0.1	1.0	2.7	3.5	4.0	..
- GDP (million litas)	..	..	3 387	11 108	16 981	23 829	31 449
- Exchange rate (litas/US\$)	..	..	..	4.34	3.98	4.00	4.00
- Producer price index (index 1993=100)	..	..	..	100	134	161	182
- Pop. (1 000)	3 720	3 740	3 740	3 730	3 720	3 710	3 710
<b>Poland</b>							
- Total PAC inv. (million PLZ) <sup>2</sup>	415	840	1 196	1 511	2 127	3 158	6 122
- GFCF <sup>1</sup> (million PLZ)	11 800	15 800	19 300	24 700	40 400	57 400	80 400
- GDP (million PLZ)	56 030	80 880	114 940	155 780	210 410	306 320	385 450
- Exchange rate (PLZ/US\$)	0.95	1.06	1.36	1.81	2.27	2.43	2.70
- Producer price index (index 1993=100)	40	56	76	100	125	157	..
- Pop. (1 000)	38 200	38 300	38 400	38 500	38 600	38 600	38 600

(...)

	1990	1991	1992	1993	1994	1995	1996
<b>Russia</b>							
- Total PAC inv. (billion roubles)	..	..	49	564	2 276	6 217	7 979
- GFCF <sup>1</sup> (billion roubles)	185	327	3 548	38 651	151 222	386 945	..
- GDP (billion roubles)	640	1 400	19 000	171 500	610 600	1 631 000	2 256 000
- Exchange rate (roubles/US\$)	0.8	41	222	933	2205	4565	5057
- Producer price index (index 1993=100)	..	..	9	100	335	945	1 190
- Pop. (1 000)	148 292	148 500	148 902	148 878	148 713	148 460	148 126
<b>Slovenia</b>							
- Total PAC inv. (million SIT)	..	..	1 639	4 345	11 318	9 777	8 889 <sup>3</sup>
- GFCF <sup>1</sup> (billion SIT)	35	66	177	269	362	465	..
- GDP (billion SIT)	..	349	1 018	1 435	1 853	2 221	2 512
- Exchange rate (SIT/US\$)	..	27.60	81.29	113.24	128.81	118.52	135.37
- Producer price index (index 1993=100)	..	..	84	100	118	128	135
- Pop. (1 000)	2 000	2 000	2 000	2 000	2 000	2 000	2 000
<b>Netherlands</b>							
- Total PAC inv. (million guilders)	3 011	3 008	3 533	..	..	2 768	..
- GFCF <sup>1</sup> (billion guilders)	108	111	113	112	117	125	..
- GDP (billion guilders)	517	543	566	581	614	638	668
- Exchange rate (HUF/US\$)	1.82	1.87	1.76	1.86	1.82	1.61	1.69
- Producer price index (index 1993=100)	95	97	99	100	101	102	103
- Pop. (1 000)	14 951	15 070	15 184	15 290	15 381	15 460	15 523
<b>Portugal</b>							
- Total PAC inv. (million escudos)	46 410	43 781	..	..	58 193	..	..
- GFCF <sup>1</sup> (billion escudos)	2 612	2 988	3 427	3 414	3 708	4 094	..
- GDP (billion escudos)	9 621	11 032	12 427	13 210	14 083	15 073	15 875
- Exchange rate (escudos/US\$)	142.31	144.35	134.79	160.65	166.04	149.93	154.21
- Producer price index (index 1993=100)	88	93	95	100	105	111	112
- Pop. (1 000)	9 873	9 860	9 860	9 888	9 902	9 916	9 935
<b>Germany<sup>4</sup></b>							
- Total PAC inv. (million DM)	17 620	18 390	19 770	16 960	15 100	14 832	..
- GFCF <sup>1</sup> (billion DM)	571	564	583	538	534	555	..
- GDP (billion DM)	2 426	2 648	2 813	2 846	2 973	3 091	3 164
- Exchange rate (DM/US\$)	1.62	1.66	1.56	1.65	1.62	1.43	1.50
- Producer price index (index 1993=100)	..	98	99	100	100	101	101
- Pop. (1 000)	63 253	64 074	64 865	65 532	65 859	66 052	66 241

Note: 1. Gross fixed capital formation (OECD, World Bank). 2. 1990 and 1991 data include nature protection and R&D. Due to a change in government data collection methodology, 1996 data are not comparable with those from previous years. 3. Only business sector PAC investments. 4. Data refer to western Germany only. Data for 1993, 1994 and 1995 are preliminary.



**Table II.2: PAC investments, constant prices, 1990-96**  
(million 1993 national currency; index 1993=100)

	1990	1991	1992	1993	1994	1995	1996
<b>Hungary</b>							
Real PAC inv. <sup>1</sup>	17 148	12 190	23 154	19 661	34 359	23 582	23 974
Index 1993=100	87	62	118	100	175	120	122
<b>Lithuania</b>							
Real PAC inv. <sup>1</sup>	..	..	..	106	171	153	101
Index 1993=100	..	..	..	100	162	144	95
<b>Poland</b>							
Real PAC inv. <sup>1</sup>	1 038	1 500	1 574	1 511	1 702	2 012	..
Index 1993=100	69	99	104	100	113	133	..
<b>Russia</b>							
Real PAC inv. <sup>1</sup>	..	..	544	564	679	658	671
Index 1993=100	..	..	97	100	120	117	119
<b>Slovenia</b>							
Real PAC inv. <sup>1</sup>	..	..	1 951	4 345	9 592	7 638	6 584 <sup>3</sup>
Index 1993=100	..	..	45	100	221	176	152

Notes: 1. Real PAC inv. = Nominal PAC inv. / (producer price index/100). 2. 1990 and 1991 data include nature protection and R&D. 3. Only business sector PAC investments.

**Table II.3: PAC investments, 1990-96**  
(million US\$<sup>1</sup>)

	1990	1991	1992	1993	1994	1995	1996
Georgia	..	..	..	..	..	-	-
Hungary	..	130	264	214	360	263	270
Lithuania	..	..	..	24	58	62	46
Poland <sup>2</sup>	437	794	878	833	936	1 302	2 271
Russia	..	..	221	605	1 032	1 362	1 578
Slovenia	..	..	20	38	88	82	66 <sup>3</sup>
Netherlands	1 654	1 609	2 009	..	..	1 724	..
Portugal	326	303	..	..	350	..	..
Germany <sup>3</sup>	10 904	11 086	12 657	10 258	9 304	10 350	..

Notes: 1. At current prices and exchange rates. Based on Table II.1 above. 2. Break in time series in 1996. 3. Only business sector PAC investments. 4. Western Germany only.

**Table II.4: PAC investments as percentage of gross fixed capital formation, 1990-96**  
(current prices; per cent)<sup>1</sup>

	1990	1991	1992	1993	1994	1995	1996
Georgia	..	..	..	..	..	0.1	-
Hungary	2.6	1.9	3.6	2.9	4.3	2.9	2.8
Lithuania	..	..	..	3.9	6.6	6.2	..
Poland	3.5	5.3	6.2	6.1	6.2	6.5	9.1
Russia	..	..	1.1	1.6	1.7	1.9	1.7
Slovenia	..	..	0.9	1.6	3.1	2.1	..
Netherlands	1.8	1.5	..	..	1.8	..	..
Portugal	1.8	1.5	..	..	1.8	..	..
Germany <sup>2</sup>	3.5	3.3	3.4	3.2	2.8	2.7	..

Note: 1. Based on Table II.1 above. 2. Data refer to western Germany only.

Table II.5: PAC investments per capita, 1990-96  
(US\$)<sup>1</sup>

	1990	1991	1992	1993	1994	1995	1996
Georgia	..	..	..	..	..	-	-
Hungary	..	13	26	21	35	26	27
Lithuania	..	..	..	7	15	17	12
Poland <sup>2</sup>	11	21	23	22	24	34	59
Russia	..	..	1	4	7	9	11
Slovenia	..	..	10	19	44	41	33 <sup>3</sup>
Netherlands	111	107	132	..	..	112	..
Portugal	33	31	..	..	35	..	..
Germany <sup>4</sup>	172	173	195	157	141	157	..

Notes: 1. At current prices and exchange rates. Based on Table II.1 above. 2. 1990 and 1991 data include nature protection and R&D. Break in time series in 1996. 3. Only business sector PAC investments. 4. Western Germany only.

Table II.6: PAC investments in the public and business sectors, 1990-96  
(million national currency; current prices)

		1990	1991	1992	1993	1994	1995	1996
Georgia <sup>1</sup>	Public <sup>2</sup>	-	-	-	50	-	-	-
	Business	52 518	23 976	410 864	265 097	4 051 000	136	-
Hungary <sup>3</sup>	Public	2 193	2 502	7 878	11 873	22 504	19 503	25 997
	Business	8 267	7 250	11 474	6 535	12 280	10 969	15 214
Lithuania <sup>4</sup>	Public	..	42	1 444	36	95	99	59
	Business	742	181	2 086	70	134	147	124
Poland <sup>5</sup>	Public	116	148	346	548	725	970	2 233
	Business	299	691	850	963	1 402	2 189	3 889
Russia	Public	..	..	..	..	..	..	..
	Business	..	..	49	564	2 276	6 217	7 979
Slovenia	Public	..	..	-	-	28	36	..
	Business	..	..	1 639	4 345	11 290	9 741	8 889
Netherlands	Public	1 001	1 242	1 613	..	..	..	..
	Business	2 010	1 766	1 920	..	..	..	..
Portugal	Public	42 307	34096	50 499	53 141	40 549	..	..
	Business	4 102	9686	..	..	17 644	..	..
Germany <sup>6</sup>	Public	10 380	11 850	13 480	11 440	10 470	..	..
	Business	7 240	6 540	6 290	5 520	4 630	..	..

Notes: 1. Thousands. 2. Only state budget PAC investments. 3. Breakdown on public and business sector investments is based on total environmental investments. 4. 1990 and 1991 data are in roubles, 1992 data in talonas and 1993-1996 data in litas. 5. 1990 and 1991 data include nature protection and R&D. 6. Data refer to western Germany only.

Table II.7: **PAC investments by environmental media, 1990-96**  
(million national currency; current prices)

	1990	1991	1992	1993	1994	1995	1996
<b>Georgia<sup>1</sup></b>							
- Air	1 471	1 694	4 679	9 965	-	-	-
- Water	30 485	11 880	321 993	207 375	4 051 000	136	-
- Waste	272	82	1 748	-	-	-	-
- Others <sup>2</sup>	20 290	10 320	82 444	47 757	-	-	-
- Total	52 518	23 976	410 864	265 097	4 051 000	136	-
<b>Hungary<sup>3</sup></b>							
- Air	..	1 887	5 379	1 356	1 376	1 196	3 277
- Water	..	6 082	7 415	7 929	13 063	10 165	15 569
- Waste	..	700	1 221	1 974	2 898	4 668	6 351
- Others	..	1084	1 080	718	906	1 437	2 682
- Total	..	9 752	15 094	11 976	18 244	17 466	27 879
<b>Lithuania<sup>4</sup></b>							
- Air	..	..	69	9	3	7	..
- Water	..	..	2 812	68	183	154	..
- Waste	..	..	59	3	4	6	..
- Others	..	..	590	26	40	79	..
- Total	..	..	3 530	106	229	246	..
<b>Poland</b>							
- Air	127	336	430	589	938	1 688	3 592
- Water	201	378	563	781	999	1 169	2 175
- Waste	86	125	203	141	190	291	339
- Others	..	..	..	..	..	10	14
- Total	415	839	1 196	1 511	2 127	3 159	6 122
<b>Russia<sup>5</sup></b>							
- Air	..	..	9	114	423	1 644	2 127
- Water	..	..	40	450	1 782	4 343	5 741
- Waste	..	..	-	-	71	230	381
- Others	..	..	-	-	-	-	-
- Total	..	..	49	564	2 276	6 217	7 979

(...)

	1990	1991	1992	1993	1994	1995	1996
<b>Slovenia</b>							
- Air	..	..	534	2 881	9 993	6691 <sup>6</sup>	4 360 <sup>7</sup>
- Water	..	..	250	357	540	974 <sup>6</sup>	1 691 <sup>7</sup>
- Waste	..	..	425	672	598	1 126 <sup>6</sup>	1 875 <sup>7</sup>
- Others	..	..	430	435	159	950 <sup>6</sup>	963 <sup>7</sup>
- Total	..	..	1 639	4 345	11 290	9 741 <sup>6</sup>	8 889 <sup>7</sup>
<b>Netherlands</b>							
- Air	779	798	820	..	..	..	..
- Water	1 535	1 363	1 600	..	..	..	..
- Waste	502	643	894	..	..	..	..
- Others	195	204	219	..	..	..	..
- Total	3 011	3 008	3 533	..	..	..	..
<b>Portugal</b>							
- Air	1 611	3 153	..	..	11 573	..	..
- Water	36 187	34 137	..	..	34 494	..	..
- Waste	5 147	5 176	..	..	8 811	..	..
- Others	3 465	1 316	..	..	3 317	..	..
- Total	46 410	43 781	..	..	58 193	..	..
<b>Germany<sup>8</sup></b>							
- Air	4 160	3 460	3 140	2 700	..	..	..
- Water	10 460	11 560	12 620	11 210	..	..	..
- Waste	2 310	2 680	3 370	2 460	..	..	..
- Others	690	690	640	590	..	..	..
- Total	17 620	18 390	19 770	16 960	15 100	..	..

Note: 1. Enterprise environmental investments only. All figures in thousands. Please note that 1990, 1991 and 1992 figures are in roubles, 1993 and 1994 figures are in coupons and 1995 and 1996 figures are in lari. 2. Especially soil. 3. For 1991, the breakdown of environmental sectors is based on total environmental investments. For 1992-1995 the breakdown of environmental sectors is based on environmental investments made by enterprises with more than 50 employees. For 1996, the breakdown of environmental sectors is based on data from enterprises undertaking investments of more than 10 million HUF. 4. 1992 figures are in talonas whereas 1993-1995 figures are in litas. 5. All figures in billions. 6. Only enterprise PAC investments, which accounted for more than 95 per cent of PAC investments in Slovenia in 1995. 7. Enterprise PAC investments only. 8. Data refer to western Germany only.

Table II.8: PAC investments by environmental media, 1990-96  
(per cent)<sup>1</sup>

	1990	1991	1992	1993	1994	1995	1996
<b>Georgia<sup>2</sup></b>							
- Air	3	7	1	4	-	-	-
- Water	58	50	78	78	100	100	-
- Waste	-	-	-	-	-	-	-
- Others	39	43	20	18	-	-	-
<b>Hungary<sup>3</sup></b>							
- Air	..	19	36	11	8	7	12
- Water	..	62	49	66	72	58	56
- Waste	..	7	8	16	16	27	23
- Others	..	11	7	6	5	8	10
<b>Lithuania</b>							
- Air	..	..	2	8	1	3	..
- Water	..	..	80	64	80	63	..
- Waste	..	..	2	3	2	3	..
- Others	..	..	17	25	17	32	..
<b>Poland</b>							
- Air	31	40	36	39	44	53	59
- Water	48	45	47	52	47	37	36
- Waste	21	15	17	9	9	9	6
- Others	..	..	..	..	..	-	-
<b>Russia<sup>2</sup></b>							
- Air	..	..	19	20	19	26	27
- Water	..	..	81	80	78	70	69
- Waste	..	..	-	-	3	4	5
- Others	..	..	-	-	-	-	-
<b>Slovenia<sup>2</sup></b>							
- Air	..	..	33	66	89	69	49
- Water	..	..	15	8	5	10	19
- Waste	..	..	26	15	5	12	21
- Others	..	..	26	10	1	10	11
<b>Netherlands</b>							
- Air	26	27	23	..	..	..	..
- Water	51	45	45	..	..	..	..
- Waste	17	21	25	..	..	..	..
- Others	6	7	6	..	..	..	..

(...)

	1990	1991	1992	1993	1994	1995	1996
<b>Portugal</b>							
- Air	3	7	..	..	20	..	..
- Water	78	78	..	..	59	..	..
- Waste	11	12	..	..	15	..	..
- Others	7	3	..	..	6	..	..
<b>Germany<sup>4</sup></b>							
- Air	24	19	16	16	..	..	..
- Water	59	63	64	66	..	..	..
- Waste	13	15	17	15	..	..	..
- Others	4	4	3	3	..	..	..

Notes: 1. Based on Table II.7 above. 2. Breakdown by environmental sector is based on enterprise PAC investments only. 3. For 1991, the breakdown by environmental sector is based on total environmental investments. For 1992-1995, the breakdown by environmental sectors is based on environmental investments made by enterprises with more than 50 employees. For 1996, the breakdown by environmental sector is based on enterprises undertaking investments of more than 10 million HUF. 4. Data refer to western Germany only.

Table II.9: **PAC investments by environmental media and by sector, 1990-96**  
(million national currency; current prices)

	1990	1991	1992	1993	1994	1995	1996
<b>Georgia<sup>1</sup></b>							
- Air public	..	..	..	..	..	..	..
- Air business	1 471	1 694	4 679	9 965	-	-	-
- Water public	..	..	..	..	..	..	..
- Water business	30 485	11 880	321 993	207 375	4 051 000	136	-
- Waste public	..	..	..	..	..	..	..
- Waste business	272	82	1 748	-	-	-	-
- Other public	..	..	..	..	..	..	..
- Other business <sup>2</sup>	20 290	10 320	82 444	47 757	-	-	-
<b>Hungary<sup>3</sup></b>							
- Air public	..	140	115	106	72	..	..
- Air business	..	1 746	5 264	1 249	1 304	..	..
- Water public	..	1 821	3 742	5 034	8 521	..	..
- Water business	..	4 262	3 672	2 895	4 542	..	..
- Waste public	..	87	224	134	233	..	..
- Waste business	..	613	997	1 840	2 665	..	..
- Other public	..	454	658	445	445	..	..
- Other business	..	630	422	273	462	..	..
<b>Lithuania</b>							
- Air public	..	..	..	-	-	-	..
- Air business	..	..	..	9	3	7	..
- Water public	..	..	..	36	95	99	..
- Water business	..	..	..	32	89	55	..
- Waste public	..	..	..	0.2	1	-	..
- Waste business	..	..	..	3	3	6	..
- Other public	..	..	..	-	-	-	..
- Other business	..	..	..	26	40	79	..
<b>Poland</b>							
- Air public	..	8	8	214	322	96	271
- Air business	..	329	422	375	616	1 592	3 320
- Water public	..	115	287	281	341	756	1 786
- Water business	..	262	276	500	658	414	392
- Waste public	..	25	52	53	62	118	174
- Waste business	..	100	152	88	128	173	165
- Other public	..	..	..	..	..	-	2
- Other business	..	..	..	..	..	10	12
<b>Russia<sup>4</sup></b>							
- Air public	..	..	-	-	-	-	-
- Air business	..	..	9	114	423	1 644	2 127
- Water public	..	..	-	-	-	-	-
- Water business	..	..	40	450	1 782	4 343	5 471
- Waste public	..	..	-	-	-	-	-
- Waste business	..	..	-	-	71	230	381
- Other public	..	..	-	-	-	-	-
- Other business	..	..	..	..	..	..	..

(...)



	1990	1991	1992	1993	1994	1995	1996
<b>Slovenia</b>							
- Air public	..	..	-	-	-	-	..
- Air business	..	..	534	2 881	9 993	6 691	4 360
- Water public	..	..	-	-	-	-	..
- Water business	..	..	250	357	540	974	1 691
- Waste public	..	..	-	-	-	-	..
- Waste business	..	..	425	672	598	1 126	1 875
- Other public	..	..	-	-	-	-	..
- Other business	..	..	430	436	159	950	963

Notes: 1. See note 1 in Table II.7. 2. See note 2 in Table II.7. 3. See note 3 in Table II.7. 4. Billions.

Table II.10: **Public sector PAC investments and total public budget expenditures, 1990-96**  
(million national currency; current prices)

	1990	1991	1992	1993	1994	1995	1996
<b>Georgia<sup>1</sup></b>							
- Public PAC <sup>2</sup>	..	..	..	49.8	..	-	-
- Public total exp.	4 607	5 938	45 453	1 332 791	91 759 703	469	771
<b>Hungary</b>							
- Public PAC <sup>3</sup>	..	3	8	12	23	20	26
- Public total exp.	..	1 642	2 071	2 598	3 229	3 545	3 931
<b>Lithuania</b>							
- Public PAC	..	..	..	36	95	99	59
- Public total exp.	..	..	..	2 466	4 355	6 197	7 510
<b>Poland</b>							
- Public PAC <sup>3</sup>	116	148	346	548	725	970	2 233
- Public total exp.	19 786	30 064	39 158	51 946	70 425	92 632	112 161
<b>Russia<sup>4</sup></b>							
- Public PAC	..	..	..	..	..	..	..
- Public total exp.	151	348	5 970	57 674	235 840	487 421	..
<b>Slovenia</b>							
- Public PAC	..	..	..	..	28	36	..
- Public total exp.	..	..	278 369	108 479	513 295	607 675	..

Note: 1. Thousands. 2. Only state budget PAC investments. See also note 1 in Table II.7. 3. 1990 and 1991 data include nature protection and R&D. 4. Billions.

Table II.11: **Environmental funds' total investment subsidies compared to total PAC investments (abater principle), 1990-96**  
(million national currency; current prices)

	1990	1991	1992	1993	1994	1995	1996
<b>Hungary</b>							
- EFs total subsidies/financing	..	857	3 877	2 526	6 111	7 899	8 221
- Total PAC inv.	..	9 752	20 839	19 661	37 795	33 015	41 235
- Percentage share	..	9	19	13	16	24	20
<b>Lithuania</b>							
- EFs total subsidies/financing	..	..	..	1	15	22	35
- Total PAC inv.	..	..	..	106	229	246	184
- Percentage share	..	..	..	1	7	9	19
<b>Poland</b>							
- EFs total subsidies/financing	22	248	569	472	870	1 423	1 935
- Total PAC inv.	415	840	1 196	1 511	2 127	3 158	6 122
- Percentage share	5	30	48	31	41	45	32
<b>Russia<sup>2</sup></b>							
- EFs total subsidies/financing	..	..	..	..	125	164	291
- Total PAC inv.	..	..	53	593	2 368	6 376	8 219
- Percentage share	..	..	..	..	5	3	4
<b>Slovenia</b>							
- EFs total subsidies/financing	..	..	..	..	-	71	1 719
- Total PAC inv.	..	..	1 639	4 345	11 318	9 777	9 550 <sup>3</sup>
- Percentage share	..	..	..	..	-	1	19

Note: 1. 1990 and 1991 data include nature protection and R&D. Break in time series in 1996. 2 Billions. 3. Estimate.

**Table II.12: Total environmental revenues (taxes/fees/charges)  
and consolidated public budgets' total revenues, 1990-96**  
(million national currency; current prices)

	1990	1991	1992	1993	1994	1995	1996	1997
<b>Georgia</b>								
- Env. rev. <sup>1</sup>	7	8	16	1 350	695 257	2	5	..
- EF rev.	-	-	-	-	-	-	-	..
- Env. rev. total	7	8	16	1 350	695 257	2	5	..
- Other public rev. <sup>1</sup>	4 041	6 352	47 742	1 758 101	98 895 875	200	442	..
- Total public rev.	4 048	6 360	47 757	1 759 451	99 591 132	202	447	..
<b>Hungary</b>								
- Env. rev. <sup>2</sup>	..	23 675	25 443	29 580	26 501	29 506	35 696	36 560
- EF rev.	..	..	..	..	..	..	..	..
- Env. rev. total	..	23 675	25 443	29 580	26 501	29 506	35 696	36 560
- Other public rev.	..	1 565 025	1 868 957	2 419 420	3 033 999	3 323 075	3 949 679	4 238 580
- Total public rev. <sup>3</sup>	..	1 588 700	1 894 400	2 449 000	3 060 500	3 352 581	3 985 375	4 275 140
<b>Lithuania</b>								
- Env. rev. <sup>4</sup>	..	..	..	12	24	28	46	..
- EF rev.	..	..	..	6	17	27	41	..
- Env. rev. total	..	..	..	18	41	56	88	..
- Other public rev.	..	..	..	2 733	4 355	5 758	6 720	..
- Total public rev. <sup>3</sup>	..	..	..	2 751	4 396	5 814	6 808	..
<b>Poland</b>								
- Env. rev.	..	..	..	..	..	..	..	..
- EF rev.	29	429	652	768	1 104	1 337	1 450	..
- Env. rev. total	29	429	652	768	1 104	1 337	1 450	..
- Other public rev.	19 617	28 916	30656	43350	61 301	82 687	100 171	..
- Total public rev. <sup>3,5</sup>	19 667	29 394	31404	44301	62 759	84 695	102 625	..

(...)

	1990	1991	1992	1993	1994	1995	1996	1997
<b>Russia</b>								
- Env. rev. <sup>6</sup>	0	0	105	1 157	3 057	12 460	..	..
- EF rev.	..	..	..	..	1 345	1 765	1949	..
- Env. rev. total	..	..	..	..	4 402	14 225	..	..
- Other public rev.	160	310	5 223	48 573	174 363	420 289	..	..
- Total public rev. <sup>3</sup>	..	..	..	..	178 765	434 514	..	..
<b>Slovenia</b>								
- Env. rev.'s share of total public revenues (per cent) <sup>7</sup>	..	..	..	..	..	0.53	0.66	1.51

Notes: 1. State and regional budget revenues. 2. Environmental revenues of the state budget, municipal budgets and environmental fund. 3. Total public revenues include total consolidated public budget revenues plus total EF revenues. 4. Environmental revenues of the state budget. 5. Not only are EF environmental revenues added to other public revenues; other EF revenues (domestic loan repayments, revenues from financial operations, etc.) are added as well. 6. Especially resource taxes, which have increased substantially during the period, and which are mainly used for non-environmental purposes. 7. Estimate.

Table II.13 **Central and local government budget PAC investments, 1990-96**  
(million national currency; current prices)

	1990	1991	1992	1993	1994	1995	1996
<b>Hungary<sup>1</sup></b>							
- Central	..	1 106	1 207	1 410	1 933	..	..
- Local	..	1 397	3 532	4 309	7 337	..	..
- Total	..	2 502	4 739	5 719	9 271	..	..
<b>Lithuania</b>							
- Central	..	..	..	36	95	99	57
- Local	..	..	..	-	-	1	2
- Total	..	..	..	36	95	99	59
<b>Poland</b>							
- Central	33	54	63	104	76	113	360
- Local	83	94	283	444	649	853	1 873
- Total	116	148	346	548	725	966	2 233

Note: 1. For 1992-1994 total public sector environmental investments do not match the figures in Table II.9 above. The reason hereof is that public sector investments in Table II.9 include all investments whereas the breakdown on central and local government investments is only possible for investments made by investors with more than 50 employees.

### ANNEX III: CONTACT ADDRESSES

This Annex contains the addresses of persons variously involved in, and/or responsible for, the preparation of the report. The reader is welcome to contact these people for further information.

#### *Danish Environmental Protection Agency*

<b>Name</b>	<b>Position</b>	<b>Address</b>	<b>Fax</b>	<b>E-mail</b>
Ulla Blatt Bendtsen	Desk Officer	29, Strandgade 1401 Copenhagen K Denmark	+45 32 66 04 79	ubb@mst.dk

#### *OECD*

##### • *EAP Task Force Secretariat*

<b>Name</b>	<b>Position</b>	<b>Address</b>	<b>Fax</b>	<b>E-mail</b>
Brendan Gillespie	Head, Non-Member Countries Branch	Environment Directorate OECD 2, rue Andre-Pascal 75775 PARIS Cedex 16 France	+33-1 45 24 96 71	brendan.gillespie@oecd.org
Tony Zamparutti	Administrator	(c/o: same as above)	+33-1 45 24 96 71	anthony.zamparutti@oecd.org
Patrick Francis	Environmental Finance Specialist	(same as above)	+33-1 45 24 96 71	patrick.francis@oecd.org
Carla Bertuzzi	Statistician	(same as above)	+33-1 45 24 96 71	carla.bertuzzi@oecd.org
<b>• <i>State of the Environment Division</i></b>				
Myriam Linster	Administrator	(same as above)	+33-1 45 24 97 44	myriam.linster@oecd.org
Frédérique Zegel	Statistician	(same as above)	+33-1 45 24 85 53	frederique.zegel@oecd.org

#### *In-Country Experts*

<b>Name</b>	<b>Position</b>	<b>Address</b>	<b>Fax</b>	<b>E-mail</b>
Nina Korobova	Consultant	Moscow Representative Office of COWI 14, Krzhizhanovskogo st., block 3 117218 Moscow Russia	+7-095 719 74 10	office@cowi.msk.ru
Arunas Kundrotas	Director	Center for Environmental Policy 6/2, Juozapaviciaus 2005 Vilnius Lithuania	+370-2 728 961	arunas.kundroas@nt.gamta.lt

<b>Name</b>	<b>Position</b>	<b>Address</b>	<b>Fax</b>	<b>E-mail</b>
Zsuzsa Lehoczki	Senior Lecturer	Budapest University of Economic Sciences Depart. of Microeconomics 8, Fovám tér 1093 Budapest Hungary	+36-1 217 4539	lzs@ursus.bke.hu
Jerzy Sleszynski	Senior Lecturer	Warsaw University Economics Department 44/50, ul. Długa 00-241 Warsaw Poland	+48-22 831 2846	sleszynski@wne.uw.edu.pl
Pavel Tsagareishvili	Consultant	Centre for Environmental Information and Sustainable Development "RIO" 29/12 Kazakbekskaia 383040 Rustavi Georgia	..	pavlet@rocketmail.com

*COWI, Consulting Engineers and Planners AS*

<b>Name</b>	<b>Position</b>	<b>Address</b>	<b>Fax</b>	<b>E-mail</b>
Claus H. Jørgensen	Head of Department	15, Parallelvej 2800 Lyngby Denmark	+45 45 97 22 12	chj@cowi.dk
Jesper Karup Pedersen	Consultant	15, Parallelvej 2800 Lyngby Denmark	+45 45 97 22 12	jkp@cowi.dk