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CENTRE FOR CO-OPERATION WITH NON-MEMBERS
ENVIRONMENT DIRECTORATE

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

Overview of Environmental Expenditure in the NIS

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FOREWORD

Financing environmental projects and activities is a difficult challenge in the New Independent States of the former Soviet Union (NIS). Good information on environmental expenditure provides an important basis for ensuring that existing resources are allocated cost-effectively and for further developing environmental financing strategies. It also provides important information to donors and International Financial Institutions. The Task Force for the Implementation of the Environmental Action Programme (EAP Task Force), whose co-secretariat is based at OECD, has worked to improve the collection of this information based on a methodology developed by OECD in this region. This report, carried out under the auspices of the OECD's Centre for Co-operation with Non-Members, analyses environmentally related expenditure in two regions of the Russian Federation and in the Republic of Georgia. The analysis is based on official statistics as well as independent surveys and case studies.

The Danish Co-operation for Environment in Eastern Europe and the Danish Ministry of Environment and Energy supported this study as well as other Task Force work on environmental finance in the NIS. The Task Force - whose members include high officials from Central and Eastern European countries, NIS, OECD Member countries, and international organisations as well as representatives from business, trade unions and non-governmental organisations - reviewed the report at its meeting in Almaty, Kazakhstan, in October 2000.

This report is published on the responsibility of the Secretary-General of the OECD. The conclusions and opinions presented are those of the authors, and do not necessarily reflect the views of the EAP Task Force, the Danish government, OECD, or other Member countries. Further information on the work of the Task Force may be found on the website <http://www.oecd.org/env/eap>.

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Mr. Jørgen Jordal-Jørgensen, Ms. Zsuzsa Lehoczki and Mr. Jesper Karup Pedersen of COWI Consulting Engineers and Planners AS (Lyngby, Denmark) prepared this report, in association with experts at COWI Moscow. At the OECD, within the framework of the EAP Task Force programme area on environmental finance managed by Mr. Grzegorz Peszko, Ms. Carla Bertuzzi was project manager and oversaw the preparation of this publication. The report was edited by Mr. Tony Zamparutti.

Many agencies, officials and experts aided data collection, processing and analysing. In particular, several institutions in Russia and Georgia provided invaluable co-operation and assistance for the study: the regional Environment Committees, Statistical Committees and Administrations in Novgorod and Pskov Oblasts; the enterprises and utilities surveyed in these two regions; the former Federal Environment Committee (*Goskomekologiya RF*) and the Federal Statistical Committee (*Goskomstat RF*) in Moscow; and in Georgia, the national Statistical Department, which carried out data collection for the study, and the Ministry of Environment, which helped prepare the national questionnaire and train interviewers.

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EXECUTIVE SUMMARY

Environmental expenditure statistics are commonly poor in quality in the New Independent States of the former Soviet Union (NIS); in some countries, they are not even collected. These problems reflect the severe budget shortfalls, weak institutions, poor regulatory frameworks and low level of political support that impair environmental protection in this region. However, to build more effective environmental policies, NIS officials need better data to track investments and current expenditure made by enterprises, local and regional governments, and other actors. Officials in international financial institutions and donor countries need this information to target their assistance and loans more effectively. Moreover, environmental expenditure information can raise public awareness of environmental issues and help members of the public in the NIS participate more effectively in policy decisions.

This report describes *environmentally related expenditure* in two oblasts (regions) of Russia – Novgorod and Pskov – and in the Republic of Georgia. It is based on surveys of major polluting enterprises, together with data from government budget reports and other sources, to improve and supplement official expenditure data.

Four categories of environmentally related expenditure are covered:

- Pollution abatement and control (PAC). Expenditure for deliberate investments and actions to reduce pollution levels were calculated using OECD's internationally accepted methodology. This category only can be compared with equivalent expenditure estimates for OECD countries and Central and Eastern European countries (CEEC).
- Technological improvements. This category refers to enterprise investments and actions taken for commercial reasons that nonetheless have environmental benefits.
- Nature protection activities.
- Drinking water supply and other natural resources management investments and activities. This category, though not classified as an environmental expenditure in most OECD countries or in current NIS statistics, refers to a priority issue: crumbling drinking water supply systems are an important health concern in many NIS; and in a few countries, large shares of the population lack access to piped drinking water.

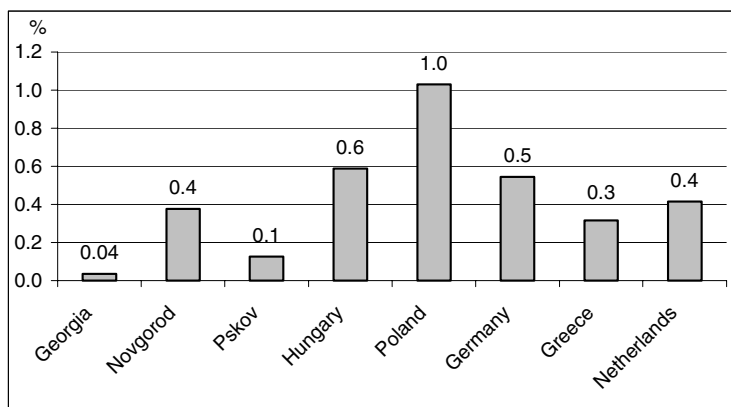
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Main findings

Environmentally related investments

Pollution abatement and control investments in Novgorod Oblast, one of few Russian regions to undertake effective reform efforts and experience economic growth in the 1990s, were comparable with those in OECD countries such as Greece and Netherlands when measured as a percentage of economic output (Figure 1). In US dollars per capita, however, expenditure in Novgorod was far lower. PAC investments, measured both as a percentage of output and in dollar terms, were significantly lower in Pskov Oblast, which experienced significant economic difficulties over the past decade. In Georgia, estimated PAC investments were almost negligible.

Figure 1. **PAC investment expenditure as a share of GDP in the three study areas and in selected OECD countries**¹

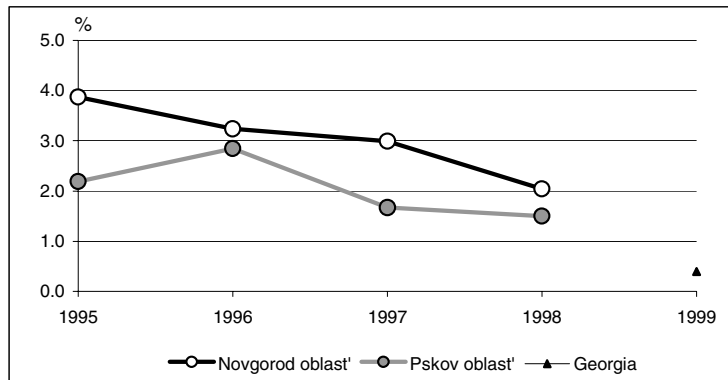


Note: 1) Based on latest available data: 1995 data for the OECD countries, 1998 survey data for Novgorod and Pskov Oblasts and 1999 survey data for Georgia.
Source: Annex III, Table 3.3.

In Novgorod Oblast and in Georgia, PAC investments represented by far the largest share of total environmentally related investments (that is, investments in all four categories described above). In Pskov Oblast, however, technological improvements accounted for over one-third of the total: in this region, a large, federally funded investment programme converted many coal-fired boilers and power plants to natural gas combustion.

Over the period studied – 1995 to 1998 – total environmentally related investments declined in both Russian oblasts. Moreover, the share PAC investment in total capital investment declined in these two regions. In Georgia, time series data were not available, but PAC investments represented a tiny portion of total capital investment (Figure 2). These data suggest that *environmental investments have been insufficient to maintain existing pollution control and drinking water infrastructure.*

Figure 2. Share of PAC investment in total capital investment, 1995-1999



Source: Annex III, Table 3.3 and Table 3.4.

Environmental financing

In Russia, many enterprises used non-monetary transactions such as barter to pay taxes to government bodies and debts to suppliers. The study found that *non-monetary transactions were common for environmental expenditure in the two Russian oblasts*, in particular in the water sector: in surveys of water utilities in Novgorod and Pskov Oblasts, they accounted for over 70 per cent of receipts in 1998. In Georgia, non-monetary transactions were commonly accepted by water utilities in the 1990s. The government, however, declared these transactions illegal in 1999.

The *business and household sectors provided the lion's share of environmentally related financing* in all three study areas, in large part via tariffs they paid to public utilities.

International financing sources played a minor role in Novgorod and Pskov Oblasts, but in Georgia these provided a significant share of total financing.

Environmental funds, which have had a major role in financing environmental investments in Central and Eastern European countries such as Poland, have been at best minor players in the three study areas. Funds financed at most 10% of PAC investments in Novgorod and Pskov Oblasts (counting both direct expenditures as well as waivers granted to polluters for environmental investments made in lieu of charge payments). Georgia did not have a fund system in 1999, the year studied.

Data and methodology

In Novgorod and Pskov, the quality of officially collected expenditure data was poor, and compiled results were neither fed into decision-making processes nor made available for public release. In Georgia, collection of these statistics has largely collapsed – indeed, the study's data were almost entirely obtained through surveys and must be treated with particular caution.

In Russia, official environmental expenditure statistics have continued to use methodologies developed in the last years of the Soviet Union. Thus, they are not compatible with international approaches, in particular with the Pollution Abatement and Control (PAC) expenditure approach.

In Novgorod and Pskov oblasts, the study estimated that the level of environmentally related investments was significantly higher than that reported with official data, even after correcting for the over-valuation of non-monetary transactions: estimated investments in Novgorod Oblast were over four times those reported in official statistics, and approximately twice the official level in Pskov Oblast (it should be noted, however, that the study and the official statistics used different definitions for environmentally related investment).

Recommendations

NIS methodologies and administrative systems for environmental expenditure statistics need strengthening. In some countries and regions, as in Georgia, administrative systems need to be rebuilt. International approaches, such as OECD's PAC methodologies, should be used in reforming NIS methods. Throughout the region, government agencies in charge of statistics, finance and environmental protection need to establish better co-operation.

ABBREVIATIONS

CEE	Central and Eastern Europe
CEEC	Central and Eastern European countries
EAP	Environmental Action Programme
EBRD	European Bank for Reconstruction and Development
EU	European Union
GDP	Gross Domestic Product
GEL	Georgian Lari
GRP	Gross Regional Product
IMF	International Monetary Fund
NIS	New Independent States of the former Soviet Union
OECD	Organisation for Economic Co-operation and Development
PAC	Pollution Abatement and Control
PPP	Purchasing Power Parity
RF	Russian Federation
RUR	Russian Rouble
USD	US Dollars

1. INTRODUCTION

This report presents the main findings of a study of *environmentally related expenditure* carried out in Russia's Novgorod and Pskov Oblasts (regions) and in the Republic of Georgia. The study used official statistics and documents, independent surveys, and valuations of non-monetary transactions to estimate expenditure levels and trends in the two Russian regions for the period from 1995 to 1998, and expenditure levels in Georgia in 1999.

The study employed OECD's methodology to estimate *pollution abatement and control* (PAC) expenditure in the three study areas. OECD regularly collects data on PAC investment and current expenditure from its Member countries. A previous EAP Task Force study estimated PAC investment expenditure in six economies in transition, including Georgia and Russia (OECD, 1998). The current study presents expenditure estimates for *three additional categories*: technological improvements, nature protection efforts, and water supply and other natural resource management activities.

1.1 *The role of environmental expenditure information*

Environmental expenditure information is necessary for the development of effective environmental policies and regulations, including decisions on national, regional and local governments budgets and the design of administrative and economic instruments to support environmental protection. Moreover, this information can help to highlight interrelationships and trade-offs between environmental policies and fiscal, labour market, energy and other government policies. In most NIS, however, expenditure information – whether for environment or other sectors – has rarely been used in policy development. The current study provides the groundwork for a larger project that addresses these issues: the EAP Task Force secretariat, working with officials in the two Russian oblasts and the Republic of Georgia, have used these results to develop pilot environmental financing strategies.

Information on environmental conditions, trends and actions – including expenditure data – can also help to raise public awareness and encourage public participation. At the 1998 Aarhus *Environment for Europe* Conference, Ministers from OECD countries and CEEC/NIS underlined the importance of public access to environmental information and signed the Aarhus convention to safeguard and promote this access.

Cross-country comparisons of environmental expenditure information can provide insights into national policies and trends. In addition, reports on expenditure across CEEC/NIS can help track the implementation of the EAP and the "Environment for Europe" process in these countries. However, international comparisons and reports should be made with caution, as countries can differ greatly in terms of data classifications, definitions, and quality. (This report only compares PAC expenditure estimates in the three study areas, calculated using OECD's methodology, with PAC data from OECD countries.)

1.2 Data collection in the transition

The transition towards market economies has proven far more difficult in the NIS than anticipated, and has brought drastic declines in GDP: from 1989 to 1999, real GDP in Russia fell over 40%, and in Georgia, about 66% (EBRD, 2000). As a result, public budgets have been drastically cut, reducing spending for environmental protection as well as that for efforts to collect environmental data.

Moreover, the NIS have experienced a series of institutional difficulties. Three issues are of particular relevance to the collection of environmental expenditure data: inadequate legal and regulatory frameworks; limited institutional capacities; and regional disparities.

NIS legal and regulatory frameworks need reform and reconstruction. Problems that affect the collection and analysis of environmental expenditure data include: legal regulations for data collection are either unclear or absent; enforcement is weak; government bodies in different sectors and at different levels (national, regional and local) collecting expenditure data do not co-operate with each other; and there is a profound lack of transparency.

Limited institutional capacities affect both public and business sectors. As noted, public sector agencies suffer from severe budget cuts and their ability to collect, manage and analyse environmental expenditure data is at best modest. Within the business sector, many companies – and in particular small and medium sized enterprises – lack resources to calculate and report their environmental expenditure and other data requested by government.

Russia and some other NIS, have undergone a chaotic process of decentralisation. In Russia, the division of powers between national and regional governments remains uncertain. Moreover, there are significant differences in economic, environmental and social conditions among Russia's regions. Some regional administrations have devoted attention to environmental policy, others have largely ignored this sector. As a result, the methods and resources for data collection differ greatly among regions.

Table 3.1. Key indicators for the three study areas, 1998

	Georgia	Russia		
		National total	Novgorod Oblast	Pskov Oblast
GDP/GRP per capita (USD)	642.0	1 690.0	1 480.0	880.0
Fixed capital investment per capita (USD)	64.0	280.0	250.0	170.0
Official unemployment rate (%)	14.7	2.9	3.9	5.8
Share of population below minimum subsistence income (%)	11.1 ²	29.2 ¹	15.6 ¹	41.0 ¹
Share of non-monetary transactions in industrial revenue (%)	..	>50.0 ³	22.0 ³	68.0 ³
Share of non-monetary transactions in regional government budget revenue (%)	-	-	27.0 ⁴	50.0 ⁴
Population (millions)	5.4	146.7	0.7	0.8
Area (1000 km ²)	70.0	17 075.0	55.0	55.0

Notes: 1) Russian Ministry of Economy estimate. 2) IMF estimate. 3) 1999 data. Goskomstat estimate. 4) 1999 data. Russian Ministry of Finance estimate.

Sources: *Ekonomika i zizn'*, No. 19, 2000; EBRD, 2000; Goskomstat RF, 1999; State Department of Statistics of Georgia; IMF.

1.3 *The three study areas*

The study focused on two oblasts (regions) in Russia, Novgorod and Pskov, and the Republic of Georgia. As a result, this report frequently compares data from the two regions with national data from Georgia and selected comparison countries. Given Russia's immense size and diversity, regional-level studies are often necessary to understand trends and issues in depth. Indeed, some Russian regions have populations and land areas equivalent to those of some NIS. Moreover, environmental expenditure statistics are collected at regional level in Russia and are easier to review and study at this level. In addition, given the weakness of federal environmental bodies in the 1990s, Russia's regions have had significant independence in terms of environmental management. Budgetary and other financial transfers for environmental activities between federal and regional levels were quite limited.

Nevertheless, there are important economic differences among the three areas studied. Novgorod Oblast is the most developed area of the three in terms of output (GRP, gross regional product) per capita estimated in US dollars (Table 3.1). Moreover, Novgorod Oblast experienced positive economic growth in the second half of the 1990s, in contrast to Russia as a whole. The Republic of Georgia has the lowest output per capita, less than half that of Novgorod.

1.4 *Environmental expenditure statistics in Russia*

In *Russia*, environmental expenditure statistics are regularly collected using three reporting forms¹ sent to major owners of fixed assets. These forms, developed in the last years of the Soviet Union, have not been substantially revised since the early 90s. The underlying approach differs significantly from the OECD PAC methodology in terms of coverage, breakdowns and definitions, so expenditure levels can not be directly compared with those in other countries. Moreover, there are serious data quality problems.

The first problem for data quality is that enterprises and public utilities have no incentive to report accurate information. Some enterprises – in particular, those wholly or partially foreign-owned – are exempt from reporting. Second, government agencies collecting data do not check its accuracy: regional offices of Goskomstat, the national government's Statistical Committee, which are responsible for data collection, do not ensure effective quality control of the data: for example, they do not compare responses with statistics from other relevant sources, such as investment data collected by the tax authorities. As a consequence, the environmental investment data presented by Goskomstat may not be comparable with overall investment data presented by the federal Ministries of Finance or Economy. Nor do Goskomstat offices compare data provided by environmental funds – on pollution charge payments, pollution charge exemptions and environmental fund disbursements – with the corresponding expenditure data reported by recipients such as enterprises and public utilities. In addition, budget spending is often reported inaccurately, and the federal Ministry of Finance, which collects budgetary data, often does not share these with Goskomstat or other government bodies.

A further problem is that non-monetary transactions, which are common in Russia, are recorded at their book values in enterprise accounts and in environmental expenditure reporting forms (OECD, 2000). In most cases, however, these book values are higher than equivalent cash-based transactions.

Expenditure data for waste management and wastewater treatment are often underreported. Public administrations commonly finance the construction of fixed assets for waste management, such as new landfills, but these are operated by enterprises. In most cases, neither party reports investments for the construction of new landfills. Moreover, current expenditure for waste transport and disposal is often not

¹ Forms 18-KS, 4-OS and 1-EKOFOND

reported. There are similar problems for data on wastewater treatment investment: water utilities rarely report new equipment financed by federal and regional budgets.

1.5 Environmental expenditure statistics in Georgia

In *Georgia*, the State Department of Statistics collected environmental expenditure data until 1997 using the Soviet methodology. Since 1997, however, environmental expenditure data have not been collected on a regular basis. Reporting forms have not been sent out to enterprises and public utilities. Consequently, the study assisted Georgia's State Department of Statistics re-establish environmental expenditure data collection in the country.

2. STUDY METHODOLOGY: AN OVERVIEW

2.1 The PAC approach

The definition of environmental expenditure can vary greatly from one country to another, depending on issues such as national environmental priorities and statistical procedures. Therefore, common definitions and methodologies must be specified for cross-country comparisons. At the same time, international data collection and comparison efforts can be useful in improving national data.

OECD and its Member countries have developed a common methodology for calculating *pollution abatement and control* (PAC) expenditure. Since 1980, OECD has used a standard questionnaire to collect PAC data from Member countries (OECD, 1996; OECD, 1998). OECD has worked closely with Eurostat, the European Union's statistical agency, on the further development of the PAC methodology and questionnaire.² The joint OECD/Eurostat questionnaire is currently being revised. (Annex I presents an overview of the PAC concept and methodology.)

2.2 Study methodology: classifications

This study used the PAC approach as its starting point and as the source of internationally comparable data. Overall, the study collected data on four *categories* of environmentally related expenditure, including PAC.

Expenditure categories

PAC expenditure refers to expenditure for "purposeful activities directly aimed at the prevention, reduction and elimination of pollution or nuisances resulting from production processes or from the consumption of goods and services" (Annex I). This includes public sector spending for administrative, monitoring and enforcement activities. PAC investments can include both "end-of-pipe" pollution abatement equipment as well as improvements in production processes that result in pollution reductions.

Technological improvements refer to enterprise investment expenditure carried out primarily for commercial or technical reasons, such as investments in newer and cleaner technologies, which have a substantial and beneficial impact on their environmental performance. As the primary aim of these expenses is not environmental protection, they are not included in PAC expenditure. However, the 1993 Environmental Action Programme (EAP) emphasised that such improvements were important for transition countries: it noted that many factories in CEEC/NIS used out-of-date and highly polluting production methods and argued that economic reforms would encourage enterprises to make process and

² For EU countries, data collection is now undertaken jointly by OECD and Eurostat. In addition, Eurostat has developed SERIEE, the European System for the Collection of Economic Data on the Environment (Eurostat, 1994).

technological improvements, and these would play at least as large a role as PAC investments in reducing environmental impacts. For this reason, technological improvements are included here.

The *motive* of the investor or polluter – that is, the primary purpose of the investment – is the key in distinguishing between PAC expenditure and technological improvements. Investments and activities are classified as pollution abatement and control when environmental protection is the primary motive. However, this can be difficult to determine: different investors may indicate different motives for similar investments; and an enterprise may categorise the same investment differently, depending on who is inquiring and how the question is asked. In this study, investors initially made the assessment themselves in response to a written questionnaire. Subsequently, the project team reviewed and discussed these responses with selected investors, in particular those in Novgorod and Pskov oblasts.

In addition, the PAC methodology emphasises that only the environmental part of technology improvements should be counted. In the study, enterprises and public utilities estimated the environmental portions of both PAC investments and technological improvements with the assistance of the project team.

The study used two other expenditure categories:

- *Nature protection*. This refers to expenditure for the protection and rehabilitation of species, landscapes and habitats. It includes outlays for national parks and nature reserves, forest fire protection, as well as related monitoring, management and administration.
- *Drinking water supply and other natural resources management*. This category refers mainly to the mobilisation of water resources and in particular the treatment and supply of drinking water, although it can include other domains of natural resources management. In the NIS, the deterioration of urban drinking water infrastructure has been a major social and health concern.

Other classifications

The study distinguished between two *types* of expenditure: *investment* and *current* expenditure. Investment expenditure includes disbursements for the construction of new capital equipment and the refurbishment of existing equipment. Current expenditure includes operating and administrative costs.

The study classified expenditure – and in particular PAC and technological improvement expenditure – according to three *environmental media*: air, water and waste (these are also referred to, in Annex I, as “domains”). In addition, expenditure that covers more than one medium, or for which none is specified, is classified as “other”.

The study identified four main *economic sectors* undertaking environmentally related expenditure: public sector, public utilities, business sector, and households.³ In Russia, the public sector comprises three levels: national (federal), regional and local government. Public utilities may be public owned or privately owned. They include electricity, district heat and water companies; all can be major sources of pollution, and water companies are also agents for the treatment and distribution of drinking water. The study identified public utilities as a separate sector – they are classified either under the public or the business sector in OECD’s PAC questionnaire. The business sector comprises all other enterprises independent of their ownership, including state owned enterprises. Households are discussed only briefly, in Chapter 6, in relation to the user charges and fees they pay, in particular for water supply.

³ For Georgia, only two economic sectors were used: public sector and business sector. Water utilities were included in the public sector, whereas power plants were included in the business sector.

Under the PAC methodology, expenditure levels can be assessed according to the *abater principle* or to the *financing principle*. When presented according to the abater principle, the data refer to the economic sectors that actually implement the environmental investment or activity. Under the financing principle, they describe the sectors that finance the expenditure. For example, an investment in “end-of-pipe” pollution abatement and control equipment to reduce air emissions from a power plant would be classified under public utilities by the abater principle. If the regional government provided a grant that paid for the investment, it would be classified under the public sector by the financing principle. Total expenditure for a country or region should be same for both principles, and the differences in sector expenditure between the two approaches should reflect financial transfers between the economic sectors. In this study, the abater and financing principle are used for both PAC and for total environmentally related expenditure. Chapters 3, 4 and 5 follow the abater principle and Chapter 6, the financing principle (Figure 6.1 presents both). Table 2.1 provides a summary of the main classifications used in the study.

Table 2.1. Environmentally related expenditure: main classifications used in the study

Expenditure Category:	Pollution abatement and control Technological improvements Nature protection Drinking water supply and other natural resources management
Expenditure Type:	Current expenditure Investment expenditure
Environmental Medium:	Air Water Waste Other
Economic Sector:	Public sector Public utilities Business sector Households

2.3 Conversions to US dollars

For data presented in currency, US dollars have been used. (In contrast, expenditure data presented as a percentage of total output have been calculated in local currency.) Conversions to US dollars have been made using annual average exchange rates. In contrast, most OECD studies use exchange rates corrected for purchasing power parities (PPP). Unfortunately, PPP rates were not available for Georgia. As a result, international comparisons presented in the report tend to underestimate the real resources used for environmental protection in Russia and Georgia, as incomes and expenditures calculated in purchasing power parity terms are higher than those calculated using nominal exchange rates for the two countries. Furthermore, data on trends in Novgorod and Pskov Oblasts have been calculated by first converting expenditure data in terms of 1998 Russian rouble prices and then converting these fixed prices into US dollars using the annual average exchange rate for 1998 (the construction materials price index was used as the deflator for calculating the 1998 rouble prices). As a result, declines in environmental expenditure

appear smaller than would have been the case if the conversion into US dollars had been made directly, using each year's annual average exchange rate.⁴ Annex III presents the data used in the figures and tables.

⁴ The construction materials price index increased 65% from 1995 to 1998, whereas the annual average rouble/dollar exchange rate increased approximately 110%. Consequently, the method used gives lower USD values for the environmental expenditure in the early part of the period than would have been the case if each year's expenditure had been converted by that year's annual average exchange rate.

3. PAC INVESTMENT EXPENDITURE: LEVELS, TRENDS AND INTERNATIONAL COMPARISONS

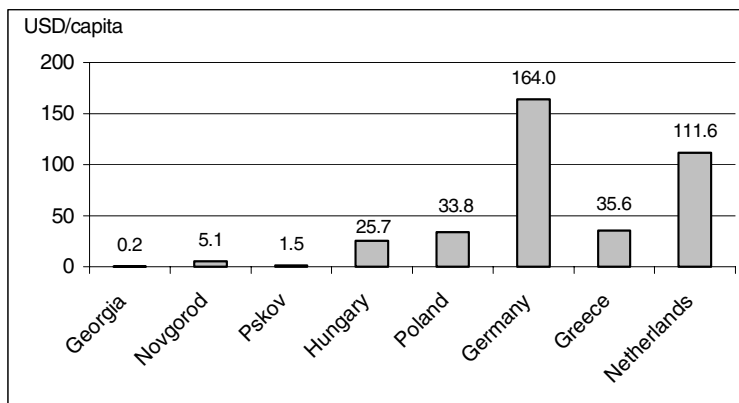
In this chapter, PAC investment expenditure in Novgorod and Pskov Oblasts and Georgia are compared to levels in selected OECD countries. The comparisons use three measures: expenditure per capita, relating environmental spending to population; expenditure per output (gross domestic product or gross regional product), comparing expenditure with production levels; and expenditure as a share of total capital investment. The data are presented using the abater principle.

These comparisons should be interpreted with caution. First, despite the use of the common PAC methodology, definitions and classifications may still differ. Second, data accuracy may vary considerably. Third, the use of annual average exchange rates makes national efforts in CEEC/NIS appear smaller, relative to those in western Europe, than they would using exchange rates corrected for purchasing power parities.

3.1 PAC investment: comparisons with selected OECD countries

PAC investment expenditure in Novgorod and Pskov Oblasts, when calculated on a per capita basis in US dollars, was significantly lower than in the five OECD comparison countries – Germany, Greece, Hungary, Netherlands and Poland (Figure 3.1). In Novgorod and Pskov, PAC investment expenditure in 1998 was USD 5.1 and 1.5 per capita, respectively. In Georgia, it was even lower USD 0.2 per capita. For the lower-income OECD countries – Poland, Greece and Hungary – PAC investment expenditure ranged from USD 26 to 36 per capita. In the two higher-income countries – Netherlands and Germany – it exceeded USD 100 per capita.

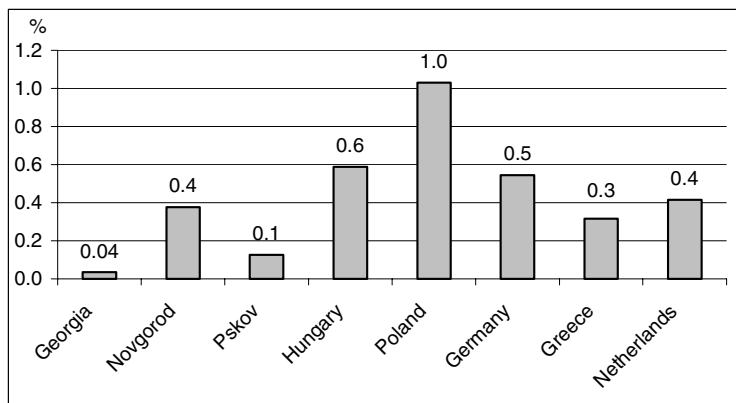
Figure 3.1. PAC investment expenditure per capita (USD; current prices and exchange rates)¹



Note: 1) 1995 data for OECD countries, 1998 data for Novgorod and Pskov Oblasts and 1999 data for Georgia.
Source: Annex III, Table 3.3.

On the other hand, when measured relative to economic output (GDP or GRP), PAC investment expenditure in Novgorod Oblast reached a level (0.4%) similar to that in OECD countries such as Greece and Netherlands. PAC investments in Pskov remained lower, and those in Georgia lower still, by an order of magnitude.

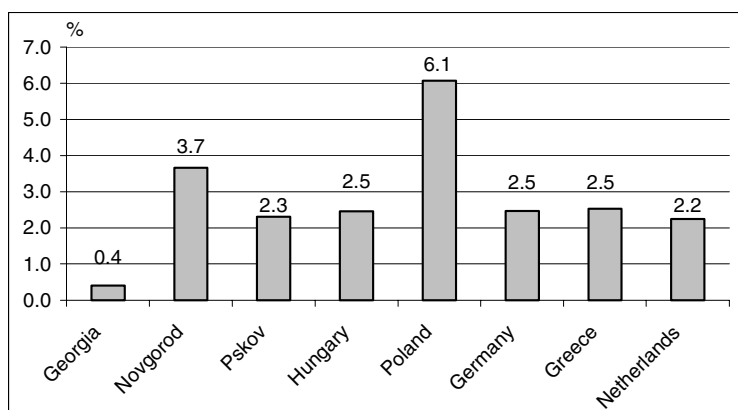
Figure 3.2. Ratio of PAC investment expenditure to GDP



Note: 1) 1995 data for OECD countries, 1998 data for Novgorod and Pskov Oblasts and 1999 data for Georgia.
Source: Annex III, Table 3.3.

PAC investment expenditure shares of total fixed capital investments in various countries are illustrated in Figure 3.3 below. The data refers to 1995 with the exception of Georgia for which 1999 data are used. As can be seen the share in Novgorod Oblast is comparatively high, whereas the share in Georgia is low.

Figure 3.3. Ratio of PAC investment expenditure to total fixed capital investments, 1995¹

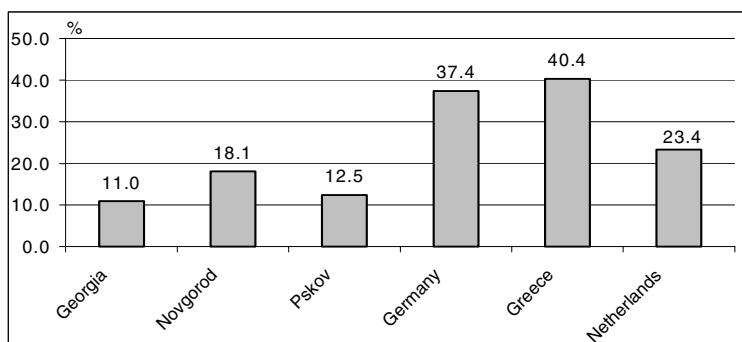


Note: 1) Data for Georgia refer to 1999.
Source: Annex III, Table 3.3.

3.2 Investments compared to total PAC expenditure

A comparison of Novgorod and Pskov Oblasts and Georgia with selected OECD countries shows a relatively small share of investment within total PAC expenditure in the NIS (Figure 3.4).

Figure 3.4. Ratio of PAC investment expenditure to total PAC expenditure

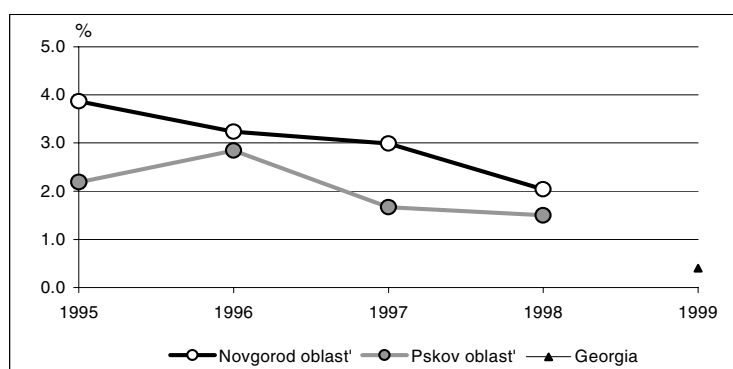


Source: Annex III, Table 3.12.

3.3 Novgorod and Pskov Oblasts: PAC investment trends

In Novgorod Oblast, the ratio of PAC investment expenditure to total fixed capital investments declined throughout the period 1995-1998 (Figure 3.5). In Pskov Oblast, there has been a decline in the period as a whole after an increase from 1995 to 1996, due to the implementation of a large investment project within the water sector. The ratios of PAC investment expenditure to total capital fixed investments were higher in Novgorod and Pskov Oblasts than in Georgia (where only 1999 data were available).

Figure 3.5. Ratio of PAC investment expenditure to total fixed capital investments, 1995-1999

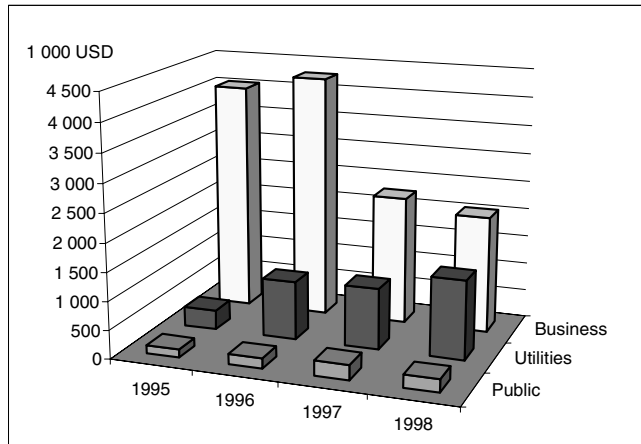


Source: Annex III, Table 3.3 and Table 3.4.

3.4 Novgorod and Pskov Oblasts: PAC investment by economic sector

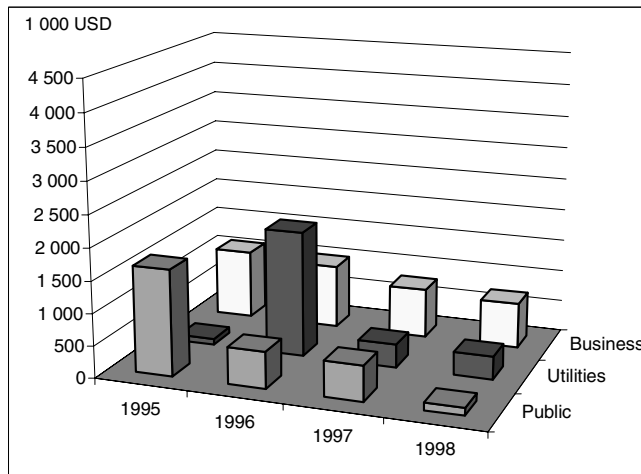
In Novgorod Oblast, business PAC investment declined sharply between 1995 and 1998, while utility investment rose. In Pskov Oblast, public PAC investment fell precipitously, while business expenditure fell more slowly. Utility investments peaked in 1996 (Figures 3.6 and 3.7).

Figure 3.6. PAC investment expenditure in Novgorod Oblast by economic sector, 1995-1998 (USD 1 000; 1998 prices)



Source: Annex III, Table 3.5.

Figure 3.7. PAC investment expenditure in Pskov Oblast by economic sector, 1995-1998 (USD 1 000; 1998 prices)



Source: Annex III, Table 3.6.

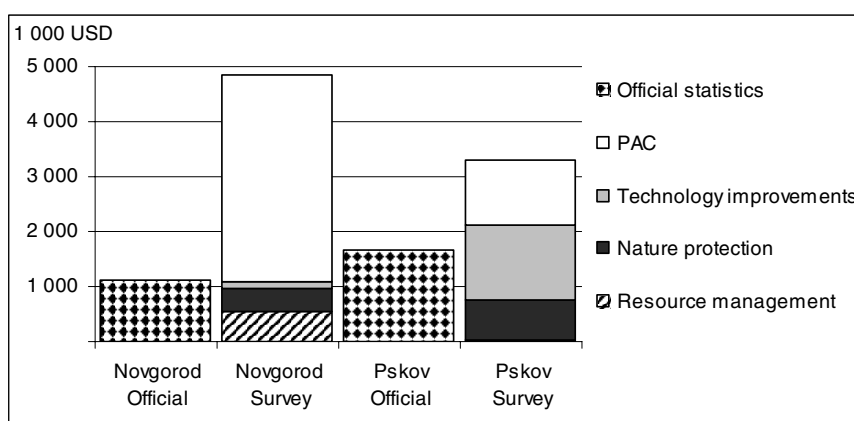
4. TOTAL ENVIRONMENTALLY RELATED EXPENDITURE: OVERVIEW OF MAIN TRENDS IN NOVGOROD AND PSKOV OBLASTS

This chapter provides an overview of all environmentally related expenditure – summing expenditure for PAC with expenditure in the other three study categories (technological improvements, nature protection and drinking water and other natural resources management). Trends are shown for investment and for current expenditure. The chapter only presents data for Novgorod and Pskov Oblasts, as trend data for Georgia are not available.

4.1 Comparing official data and study results

The study, using survey questionnaires and reviewing official budget and other statistics, concluded that the actual level of total environmentally related investment expenditure in Novgorod and Pskov Oblasts is higher than that reported in official statistics. Figure 4.1 compares official and survey data for these two Russian regions. In Pskov, the study concluded that total investments were about twice the official figure; in Novgorod, about four times higher. There are two main reasons for these differences.

Figure 4.1 **Environmentally related investment expenditure in Novgorod and Pskov Oblasts: official statistics and survey estimates, 1998**
(USD 1 000; 1998 prices)



Source: Annex III, Table 3.7.

First, the study used a broader definition of environmentally related expenditure. In particular, in Pskov Oblast, the survey identified technological improvements undertaken by the business sector and not included in official statistics. This category accounts for the lion's share of the additional expenditure in Pskov recorded by the study. Technological improvements identified in Pskov Oblast included municipal

boiler conversion from coal to natural gas: these improvements received substantial financing from the federal budget.

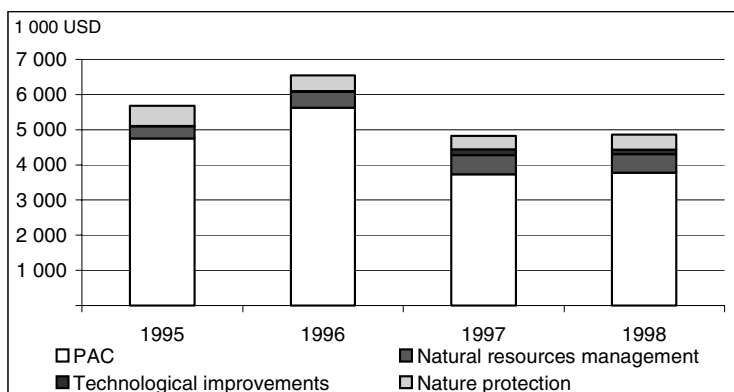
Second, official statistics miss an important share of investment expenditure for municipal wastewater treatment and solid waste management. This issue is described in Chapter 2. These differences were important in particular for wastewater treatment investments in Novgorod Oblast.

4.2 Trends in environmentally related investments in Novgorod and Pskov Oblasts

In both Novgorod and Pskov Oblasts, environmentally related investment expenditure, measured in constant USD, increased from 1995 to 1996 and decreased from 1996 to 1998. This decrease is mainly explained by significant declines in PAC investment expenditure, while other expenditure elements were stable or increased.

Since 1996, PAC investment expenditure in Novgorod Oblast decreased, while other environmental investments were almost constant (Figure 4.2). The trend of environmentally related investments in Novgorod Oblast mirrored the general economic performance of the region: growth until 1996 and recession from 1996 to 1998.

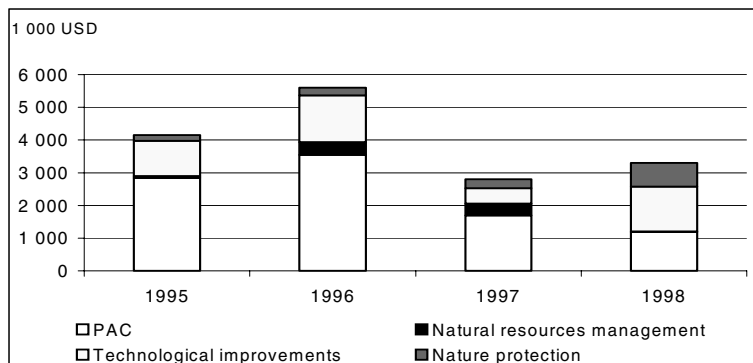
Figure 4.2. **Environmentally related investment expenditure in Novgorod Oblast, 1995-1998 (USD 1 000; 1998 prices)¹**



Source: Annex III, Table 3.8.

Since 1996, PAC investment expenditure in Pskov Oblast also decreased, while investments in technological improvements and nature protection increased (Figure 4.3). These increases were, however, too small to compensate for the decrease in PAC investment.

Figure 4.3. **Environmentally related investment expenditure in Pskov Oblast, 1995-1998**
(USD 1 000; 1998 prices)



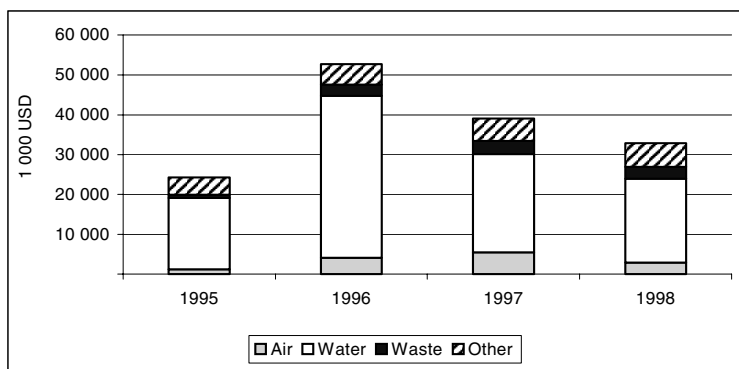
Source: Annex III, Table 3.9.

The significant amount of technological improvements in Pskov Oblast was mainly due to a large investment programme converting energy production from coal to natural gas. The investment expenditure in question was, however, insignificant compared to the total energy production investment expenditure in the region.

4.3 Current expenditure in Novgorod and Pskov Oblasts

Trends in current expenditure were different. In Novgorod Oblast, there was a significant increase in current expenditure, especially in wastewater expenditure from 1995 to 1996 (Figure 4.4). However, since 1996 the level of current expenditure decreased to a level close to that of 1995. In Pskov Oblast, current expenditure was very stable (Figure 4.5).

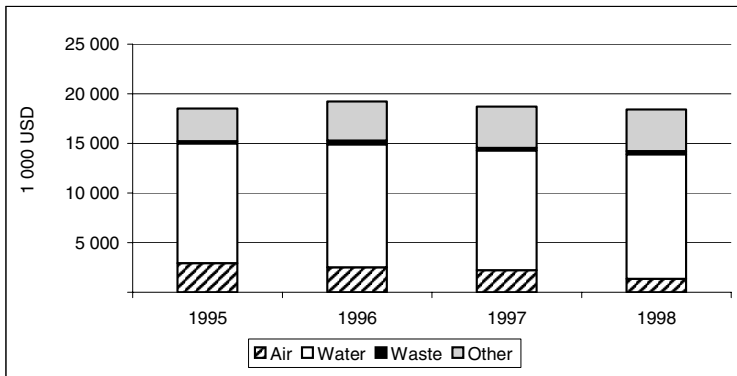
Figure 4.4. **Environmentally related current expenditure in Novgorod Oblast**
(USD 1 000; 1998 prices)



Source: Annex III, Table 3.10.

Notes: Construction materials and average annual exchange rate for 1998 have been used in calculations; see Table 3.1 and Table 3.2. Data for water include water supply.

Figure 4.5. **Environmentally related current expenditure in Pskov Oblast (USD 1 000; 1998 prices)**



Source: Annex III, Table 3.11.

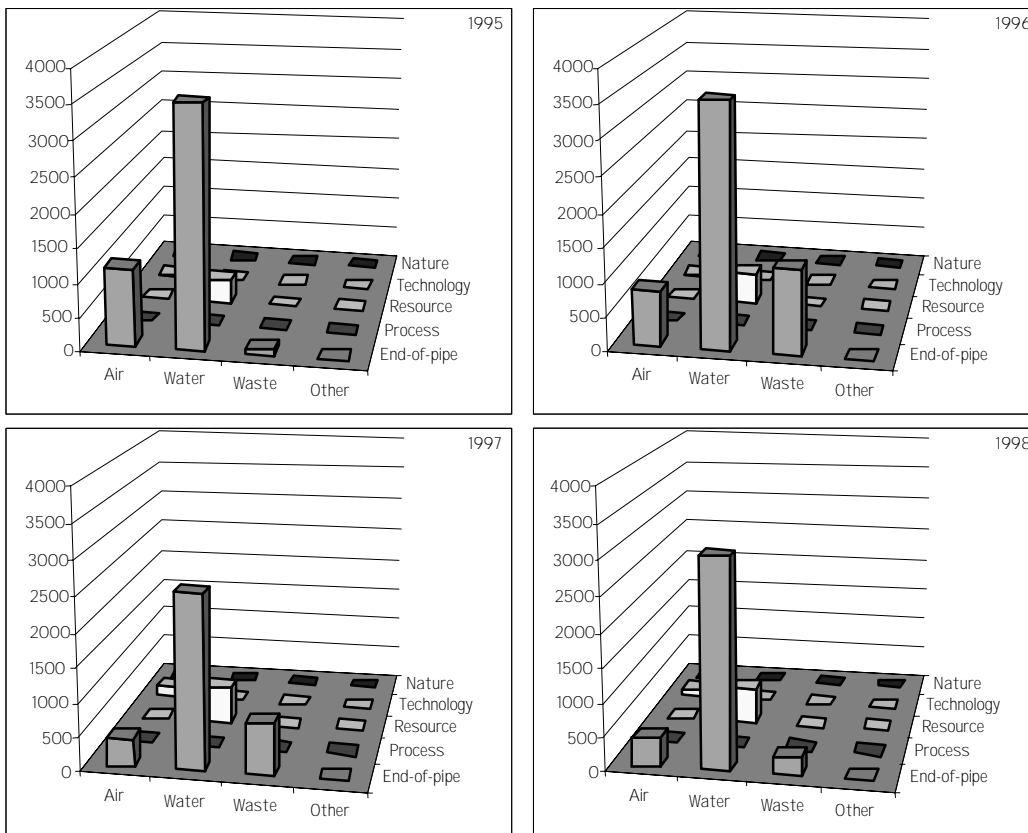
Notes: Construction materials and average annual exchange rate for 1998 have been used in calculations; see Table 3.1 and Table 3.2. Data for water include water supply.

Thus, in the period 1995 to 1998, both regions saw relatively stable environmental current expenditure and decreasing environmental investment expenditure, resulting in a decreasing share of investment expenditure. This is an alarming signal. It indicates that necessary replacement of environmental protection equipment and upgrading of technology was not undertaken at the desired speed.

5. ENVIRONMENTALLY RELATED EXPENDITURE: MAIN COMPONENTS

This chapter provides an overview of the structure of environmentally related expenditure in the two Russian regions, Novgorod and Pskov, and in Georgia by type of expenditure (investment or current) and by environmental medium. As in Chapter 4, the abater principle is followed throughout the chapter.

Figure 5.1. Structure of environmentally related investment expenditure in Novgorod Oblast, 1995-1998 (USD 1000; 1998 prices)



Note: 1) "End-of-pipe" refers to end-of pipe investments, "process" to process integrated investments. These two categories comprise PAC investment expenditure. "Resource" refers to drinking water supply and other natural resources management, "technology" to technological improvements, and "nature" to nature protection.

Source: Annex III, Table 3.13.

5.1 Novgorod Oblast: structure of environmentally related investment expenditure

Figure 5.1 shows the investment expenditure structure in Novgorod Oblast by environmental medium and expenditure category for 1995 to 1998.

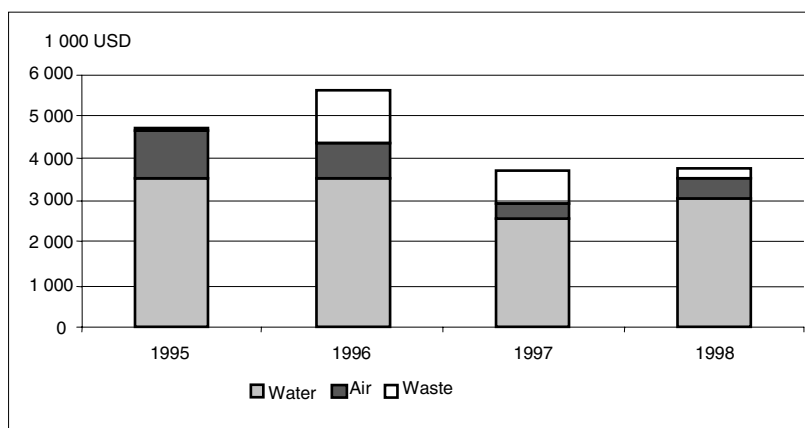
The figure shows that end-of-pipe investments in the water media were a significant contributor to total environmentally related investments for all years covered. End-of-pipe investments within the water sector comprise investments in sewerage, wastewater treatment and also water recycling.

Among the other expenditure elements, only drinking water supply and natural resources management contributed significantly to investment expenditure, mainly in the water sector (investments in water supply).

Two other expenditure elements contributed to environmental investment expenditure, namely end-of-pipe investments in the air sector and end-of-pipe investments in the waste sector. These elements, however, showed greater fluctuations than the others did.

The trend in PAC investment expenditure by media is shown in Figure 5.2.

Figure 5.2. **PAC investment expenditure in Novgorod Oblast by media, 1995-1998 (USD 1000; 1998 prices)**



Source: Annex III, Table 3.14

PAC investment expenditure for water was relatively stable, while investments for air decreased⁵. Investments for waste increased significantly from 1995 to 1996, then decreased from 1996 to 1998. Most investments in the water sector were related to household sewerage and wastewater treatment, while investments for air and waste were more closely related to industrial production.⁶

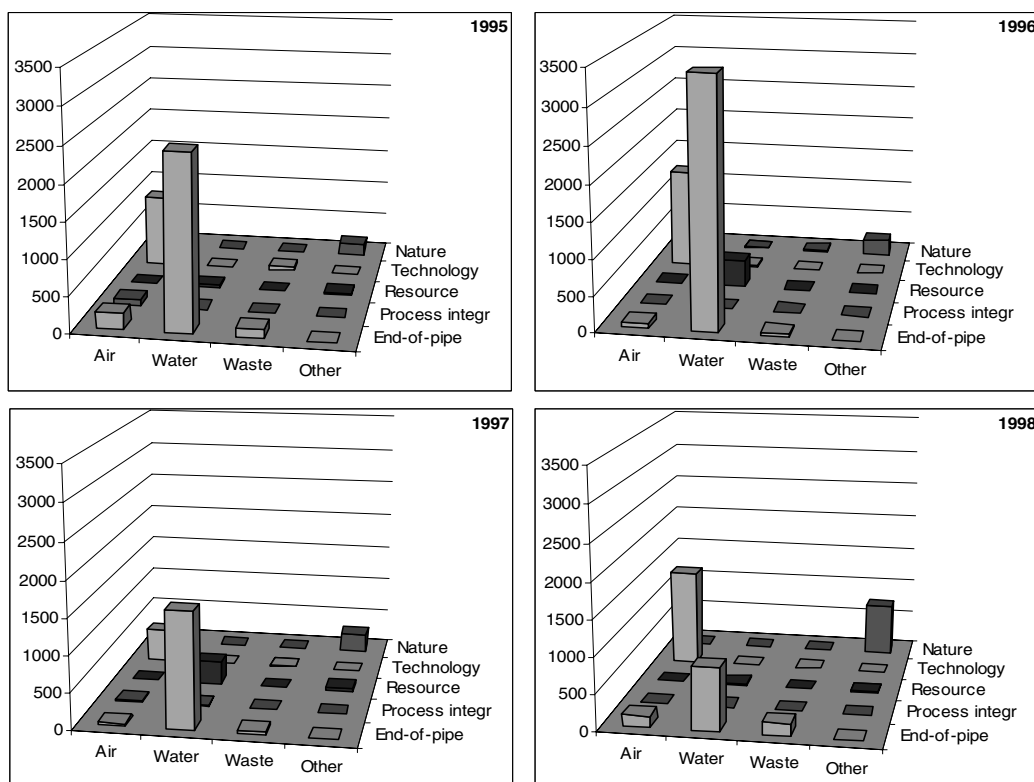
⁵ The number of investment projects within the air media in Novgorod Oblast has, however, been very limited. In fact, one project has been predominant.

⁶ Since investments for transportation and disposal of household waste are underestimated, PAC investment expenditure for waste, in both official statistics and the survey, mainly refers to industrial waste. See Chapter 2.

5.2 Pskov Oblast: structure of environmentally related investment expenditure

In Pskov Oblast, as well, end-of-pipe investments in the water sector were the major expenditure element within investment expenditure (Figure 5.3). End-of-pipe investments in the water sector decreased, however, throughout the entire period. In the period 1995-1997, wastewater investments provided the lion's share of PAC investment expenditure (88-97%). In 1998, wastewater's share of PAC investment expenditure was 69%. The residual PAC investment expenditure was allocated between air and solid waste treatment investment expenditure, with 12% to air and 19% to solid waste treatment investment expenditure.

Figure 5.3. Structure of environmentally related investment expenditure in Pskov Oblast, 1995-1998 (USD 1000; 1998 prices)



Note: 1) "End-of-pipe" refers to end-of pipe investments, "process" to process integrated investments. These two categories comprise PAC investment expenditure. "Resource" refers to drinking water supply and other natural resources management, "technology" to technological improvements, and "nature" to nature protection.

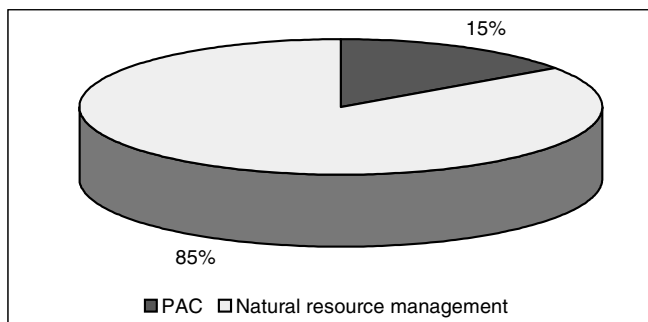
Source: Annex III, Table 3.15.

Furthermore, it should be noted that nature protection investment expenditure increased throughout the period and provided a significant share of total environmentally related investment expenditure in 1998. The notable increase in 1998 was mainly due to two projects, for Sebez National Park and Polistov Protected Area, implemented with financing from the federal budget.

5.3 Georgia: PAC and other environmentally related investments

In Georgia, environmentally related expenditure fell into only two categories, PAC investment expenditure and investment expenditure related to drinking water supply and other natural resources management (Figure 5.4). PAC investment provided 15% of the total in 1999; drinking water supply and other natural resources management the remainder.

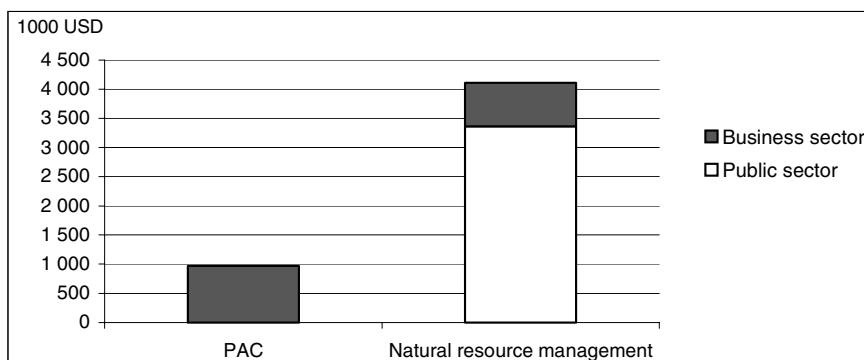
Figure 5.4. Environmentally related investment in Georgia by expenditure category, 1999



Source: Annex III, Table 3.16.

It follows from Figure 5.5 that PAC investment was executed by the business sector solely, whereas drinking water supply and natural resource management investment was undertaken mainly by the public sector, which in the case of Georgia includes water utilities⁷.

Figure 5.5. Environmentally related investment expenditure in Georgia by economic sector, 1999 (USD 1 000)

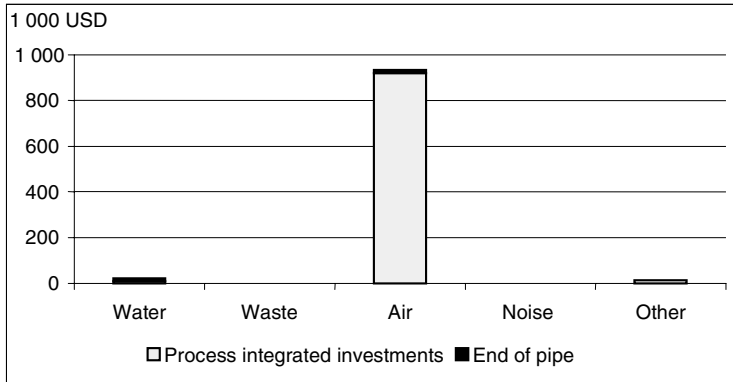


Source: Annex III, Table 3.17.

⁷ For Georgia, only two economic sectors were used: public sector and business sector. Water utilities were included in the public sector, whereas power plants were included in the business sector.

Remarkably, PAC investment expenditure in the water sector was negligible (Figure 5.6). In 1999, essentially all PAC investment expenditure was directed for air: this was due to a single project, the large scale reconstruction of a power plant, carried out in part for environmental reasons.

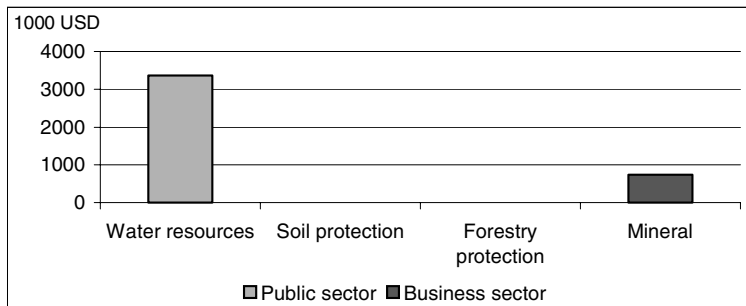
Figure 5.6. PAC investment expenditure in Georgia, 1999 (USD 1 000)



Source: Annex III, Tables 3.18 and 3.19.

Investments in water supply accounted for 82% of investment expenditure related to drinking water supply and natural resource management in Georgia (Figure 5.7).

Figure 5.7. Drinking water supply and other natural resource management investment in Georgia, 1999 (USD 1 000)

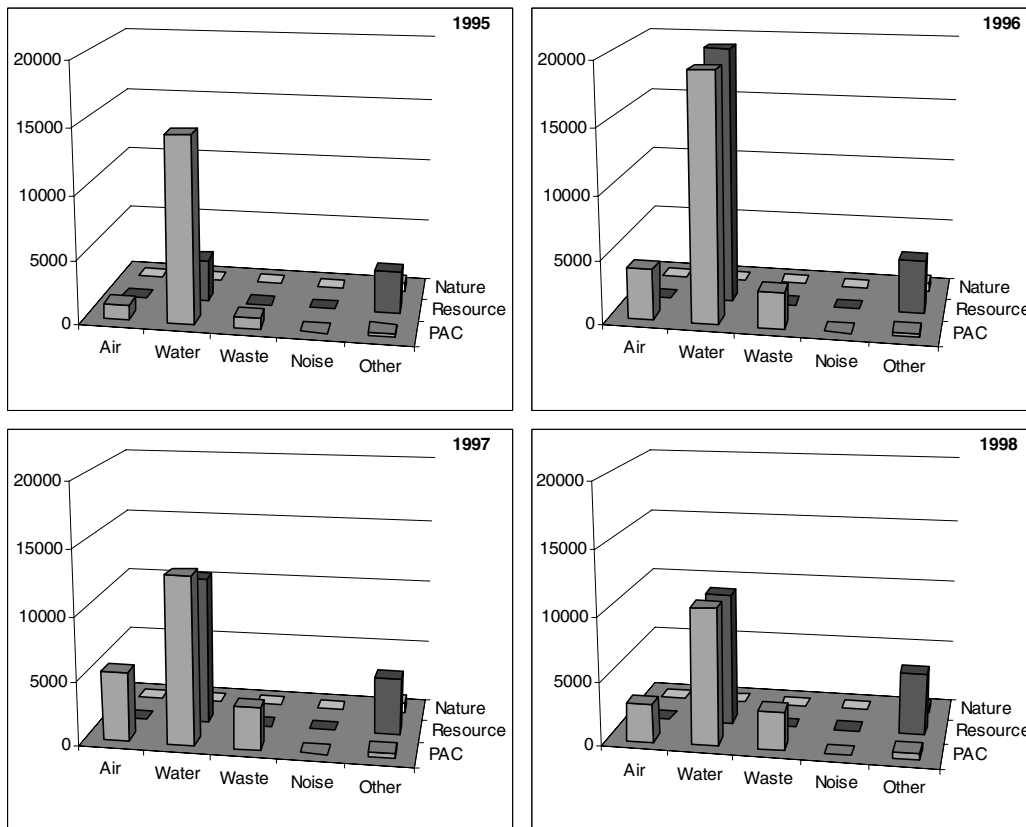


Source: Annex III, Table 3.20.

5.4 Current environmentally related expenditure in the three study areas

As already mentioned, current expenditure constitutes the major share of total environmentally related expenditure in the three study areas.

Figure.5.8. Structure of current expenditure in Novgorod Oblast, 1995-1998 (USD 1 000; 1998 prices)¹

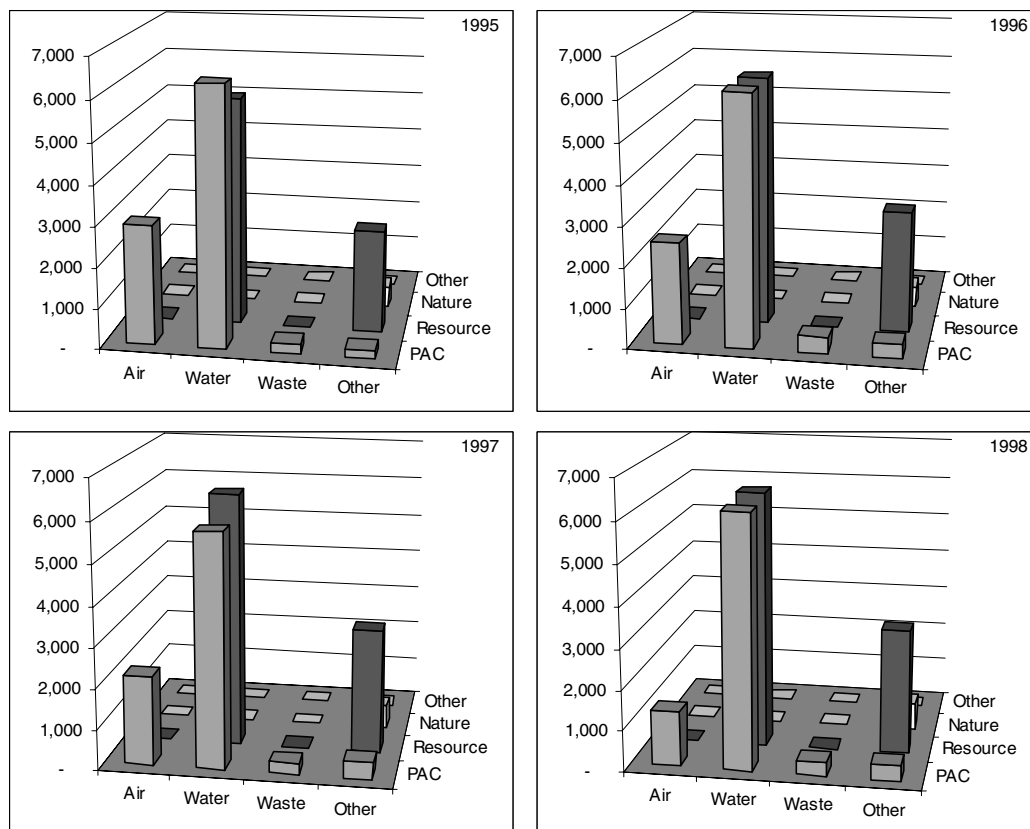


Notes: "Resource" comprises drinking water supply and other natural resources management as well as technological improvements. "Nature" refers to nature conservation. Furthermore, it has to be emphasised that 1995 data for water are unreliable due to serious data collection problems: in particular, PAC data are overestimated due to poor accounting of expenditure in the largest enterprises and public utilities.

1) Average annual exchange rates for 1999 were used in the calculations; see Annex III, Table 3.2.
Source: Annex III, Table 3.21.

The structure of environmental current expenditure is strikingly stable in both Novgorod and Pskov Oblasts. In Novgorod and Pskov Oblasts, the water sector's share of current expenditure is high (Figures 5.8 and 5.9). The two most important expenditure elements within the water sector – PAC, mainly waste water treatment activities, and drinking water supply (under "resource") – each account for around one third of total environmental current expenditure.

Figure 5.9. Structure of current expenditure in Pskov Oblast
(USD 1 000; 1998 prices)

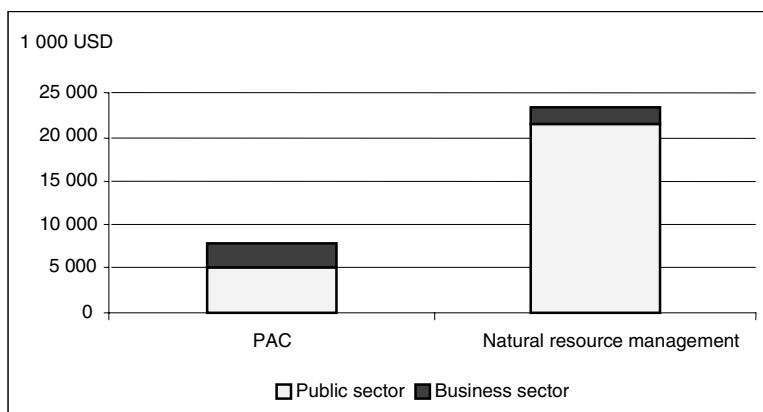


Note: "Resource" comprises drinking water supply and other natural resources management as well as technological improvements. "Nature" refers to nature protection.
Source: Annex III, Table 3.22.

In Georgia, PAC current expenditure accounted for 25% of total environmentally related current expenditure; current expenditure related to drinking water supply and other natural resources management (mainly operations and management costs linked for water supply activities) accounted for the remaining 75% (Figure 5.10).

The public sector accounted for 85% of total environmentally related current expenditure.

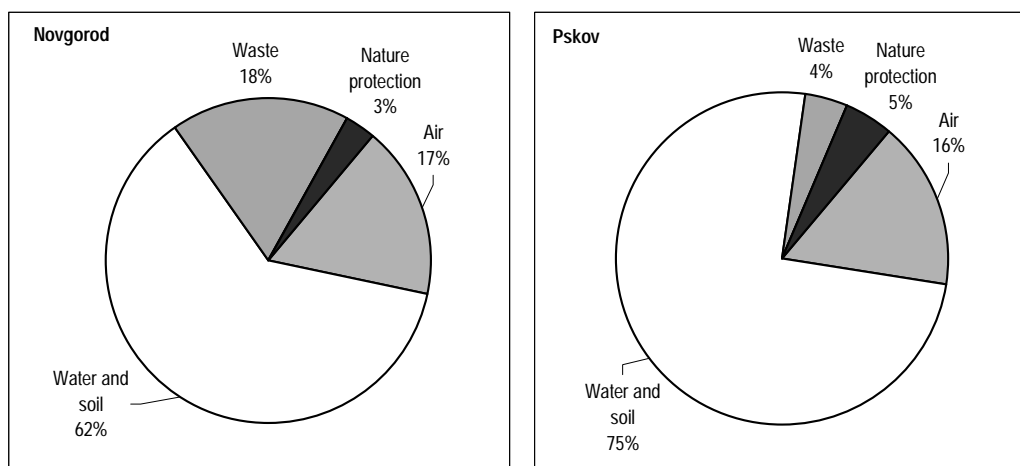
Figure 5.10. **Current expenditure in Georgia, 1999**
(USD 1 000)



Source: Annex III, Table 3.23.

In 1998, the water sector – wastewater treatment activities – accounted for 62% of PAC current expenditure in Novgorod Oblast and 75% in Pskov Oblast (Figure 5.11).

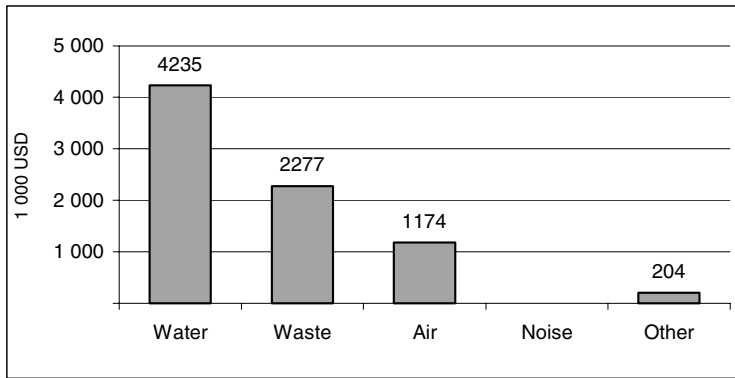
Figure 5.11. **PAC current expenditure in Novgorod and Pskov Oblasts, 1998**



Source: Annex III, Table 3.22.

In Georgia too, the water sector was again predominant: it accounted for 54% of PAC current expenditure; waste accounted for 29%, air 15% and others 3% (Figure 5.12).

Figure 5.12. PAC current expenditure in Georgia by media 1999 (USD 1 000)



Source: Annex III, Table 3.25.

6. SOURCES OF ENVIRONMENTAL FINANCE

This chapter focuses on economic sectors that finance environmentally related expenditure. When expenditure data is presented using both the abater principle (based on which entities undertakes the activity) and the financing principle (which entities pay for the activity), comparisons should provide insight into financial flows between sectors. Moreover, it helps to check for double counting, as the totals for each approach should be equal.

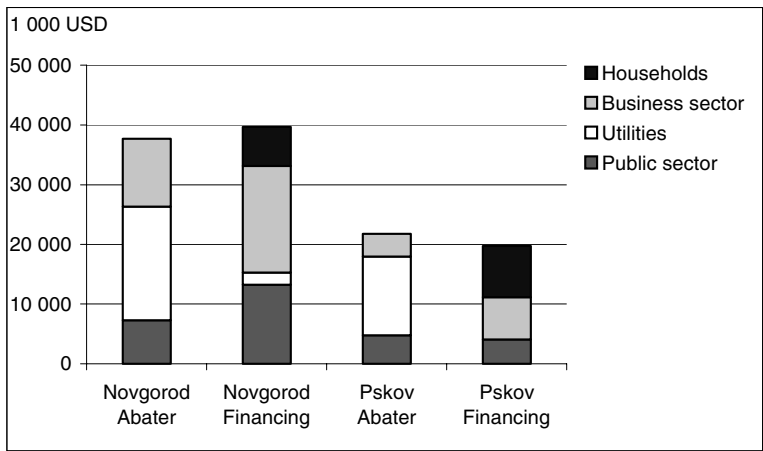
The utility sector in particular should show major differences between the two approaches. This sector includes energy and power generation (often a highly polluting activity that requires significant PAC expenditure), as well as wastewater treatment plants and, in this study, drinking water supply (in Russia and Georgia, as in many OECD and other countries, municipal water companies provide both these water services). Under the financing principle, sectors paying tariffs for utility services – in particular households and the business sector – finance an important share of environmentally related expenditure undertaken by utilities.

6.1 Domestic financing sources

In Novgorod and Pskov Oblasts, business and household shares of total expenditure are significantly higher under the financing principle approach than under the abater principle (see Figure 6.1). The public utilities' share decreases correspondingly. In Novgorod, the public sector's share increases under the financing principle, but remains relatively constant in Pskov.

Total expenditure is slightly different under the two approaches. The main reason for the discrepancy relates to the accounting of resource taxes (levied on activities such as water abstraction, soil use, and forest and mineral resource extraction). These are paid into the federal budget. Part of these taxes are earmarked for environmental expenditure – however, the study was not able to identify this share. In particular, the federal government does not allocate the revenues to the regions in direct proportion to taxes paid.

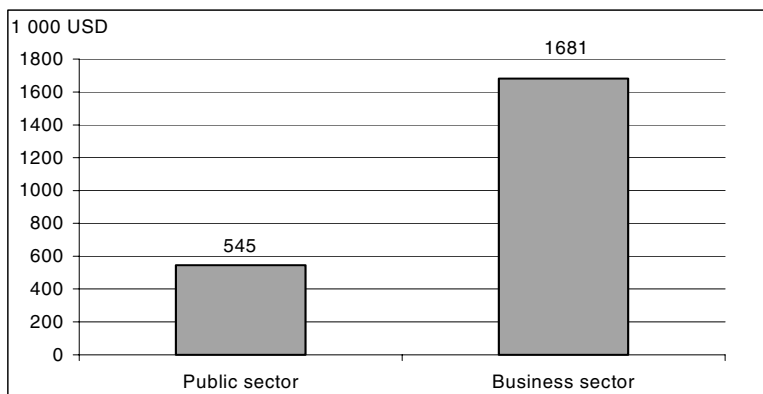
Figure 6.1. Total environmentally related expenditure in Novgorod and Pskov Oblasts: comparing the abater and financing approaches, 1998 (USD 1 000)¹



Source: Annex III, Table 3.26.

In Georgia, environmentally related expenditure was calculated by the financing principle only for the investment expenditure data obtained from the sample survey. Figure 6.2 provides a breakdown of environmentally related investment financing by public sector and business sector: the business sector accounted for a little more than 75% of environmentally related financing. Manufacturing and electricity and gas were the only two sectors within the business sector that did finance environmental activities in 1998 (In Georgia, unlike the two Russian regions, the study did not use a separate category for public utilities).

Figure 6.2. Financing environmentally related investment expenditure in Georgia breakdown by economic sector, 1999 (USD 1 000)¹

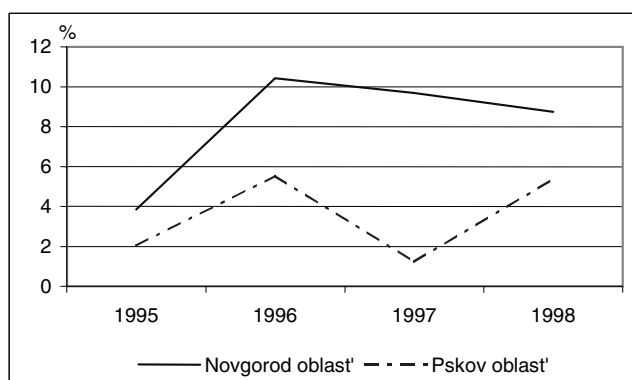


Note: 1) Data only for entities surveyed.
Source: COWI.

6.2 The role of international financing sources

International financing constitutes a minor share of total environmental financing in Novgorod and Pskov Oblasts. Domestic financial sources play a much bigger role. Figure 6.3 provides information on the trend in foreign financial sources' share of total environmentally investment expenditure in the two regions according to the financing principle. (International financing is not included in the totals reported elsewhere in this report.)

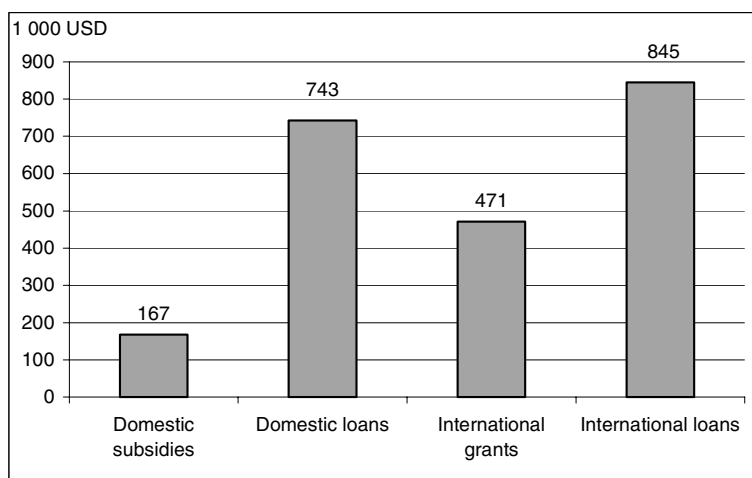
Figure 6.3. **Share of international financing sources in total environmentally related investment, Novgorod and Pskov Oblasts, 1995-1998 (%)**



Source: Annex III, Table 3.29.

In Georgia, however, foreign financing plays a much larger role. As can be seen from Figure 6.4, the share of foreign financial sources in environmentally related investment expenditure carried out by the entities included in the sample amounted to approximately 60% in 1999. Only actually disbursements made are included. Among the domestic sources the far most important financial source was domestic loans. Domestic subsidies from the public budget played a minor role.

Figure 6.4. Comparing international and domestic financing for environmentally related investment expenditure in Georgia, 1999 (USD 1 000)¹

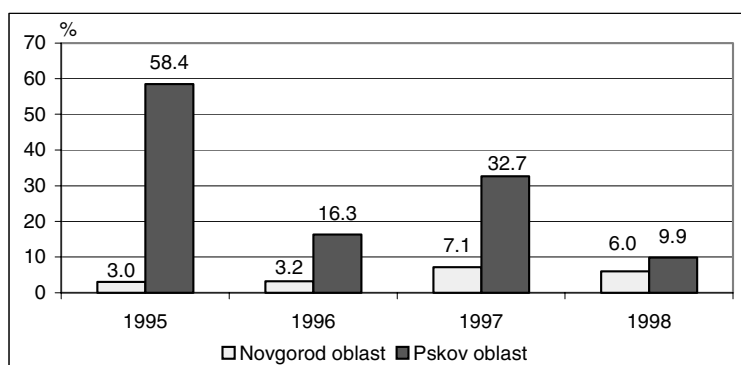


Note: 1) Data only for entities surveyed.
Source: Annex III, Table 3.27.

6.3 The public sector and PAC investments

In 1995, the public sector financed over half of PAC investment expenditure in Pskov Oblast, but its share fell to under 10% in 1998. In Novgorod Oblast, in contrast, public sector financing rose from 3% in 1995 to 7% in 1997, then fell slightly in 1998.

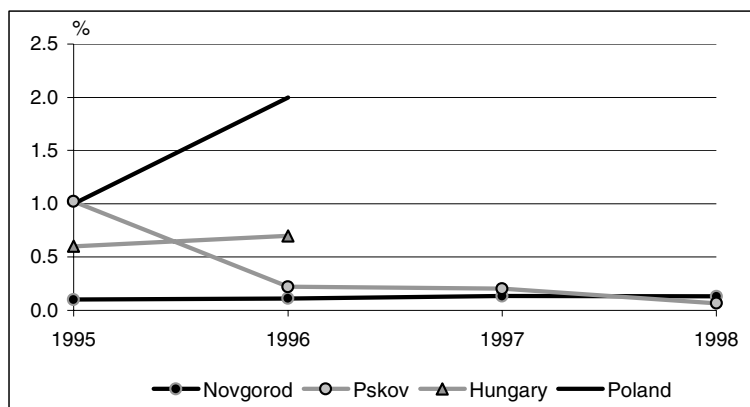
Figure 6.5. Public sector share of total PAC investment expenditure, Novgorod and Pskov Oblasts (%)¹



Note: 1) Does not include environmental fund expenditure.
Sources: Annex III, Table 3.30 and Table 3.31.

PAC investments represented a minuscule share of total public budget expenditure: in Novgorod Oblast, the share remained about 0.1% throughout the period studied; in Pskov Oblast the share fell from 1.0% in 1995 to about 0.1%. In contrast, PAC investments represented over 0.5% of public budget expenditure in Hungary and over 1.0% in Poland (Figure 6.6).

Figure 6.6. **Public sector PAC investments as a share of total public budget spending in Novgorod and Pskov Oblasts, 1995-1998¹**



Note: 1) Does not include environmental fund expenditure.
Source: Annex III, Table 3.30; OECD, 1998.

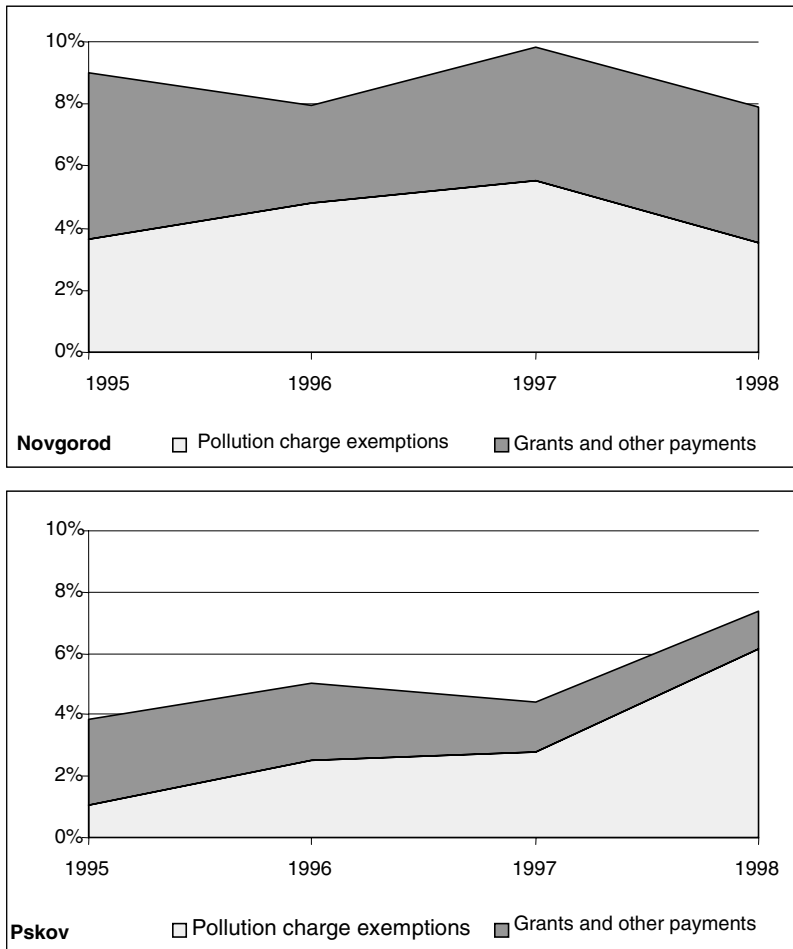
6.4 Environmental funds and PAC investments

Russia has a system of environmental funds, comprised of a federal fund, regional funds, and, in most parts of the country, local funds. Novgorod Oblast had one regional and 21 local environmental funds. In Pskov Oblast, there was only a regional environmental fund. In contrast, Georgia did not have a system of environmental funds: environmental charges were not earmarked for the environment, and instead go to the general budget.

In Novgorod Oblast, environmental funds financed between 8% and 10% of PAC investment expenditure (Figure 6.7). Pollution charge exemptions exceeded fund grants and other payments, and their role in financing total PAC investment increased from 4% 1995 to 6% in 1997. In 1998, however, the share decreased.

In Pskov Oblast, the environmental fund financed a smaller share of PAC investment expenditure than in Novgorod Oblast. The share of pollution charge exemptions share increased dramatically from 1997 to 1998. In generally, non-monetary transactions – of which pollution charge exemptions are one form – are more common in Pskov Oblast than in Novgorod Oblast (see Chapter 7).

Figure 6.7. **The role of environmental funds in financing PAC investment expenditure, Novgorod and Pskov Oblasts (% of total)**



Source: Annex III, Table 3.31.

7. NON-MONETARY TRANSACTIONS

An important share of transactions in the NIS are made using barter, offsets and other non-monetary forms of payment. These transactions are most common in Russia: their use rose steadily until the country's August 1998 financial crisis; despite a decrease after the crisis, they accounted for approximately 40% of industrial transactions and regional budgetary operations in Russia in the first half of 1999 (OECD, 2000). Non-monetary transactions are less common in other NIS – in only a few countries, notably Ukraine, their use approaches Russian levels.

The study estimated the impact of non-monetary transactions on environmental expenditure in Novgorod and Pskov oblasts. In particular, the study investigated whether or not enterprises and government agencies over-estimated the values of their non-monetary transactions. In Georgia, non-monetary transactions appeared to play a relatively small role in environmentally related expenditure – the study survey revealed only two cases of non-monetary transactions – and thus were not studied in detail.

7.1 Main instruments and mechanisms

Russian banks, enterprises and governments have used a variety of instruments and mechanisms for their non-monetary transactions. The study defined five major types of non-monetary instruments and mechanisms:⁸

- Barter is a bilateral or multilateral exchange of goods and services. That is, enterprises and individuals swap goods or services without any monetary payment. In Russia in the 1990s, intermediaries have helped set up complicated barter transactions involving dozens of exchanges.
- Offsets are non-monetary forms of mutual settlement of outstanding debt. Lacking cash to pay bills, enterprises agree with each other – or with regional governments, earmarked funds and public utilities to cancel their mutual debts. Offset arrangements may be very complex, involving many actors. The expenditure study distinguished two types of offsets:
 - a) Enterprise offsets (*zachet or vzaimozachet*) are debt cancellation arrangement between two (or more) enterprises. Generally, they do not involve public budgets or taxes.
 - b) Tax offsets (*vzaimozachet s byudzhetom*) involve governments that owe payments to legal entities for goods and services, and legal entities that have outstanding tax debts.
- Veksels (*vekselya*) are promissory notes or IOUs issued by enterprises to suppliers or to government bodies in lieu of payment, including tax payments. Thus, veksels represent monetary and non-monetary claims on their issuers. They are often traded among enterprises and financial institutions, usually on

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⁸ Many descriptions of Russian non-monetary transactions refer to *debt swaps*. For the purposes of this study, debt swaps, usually defined as cross-cancellations of bilateral or multilateral arrears or debts, were considered as offsets (some observers also include pollution charge exemptions under debt swaps).

regional bases, although some veksel are traded across Russia through commercial banks, investment funds and other financial or quasi-financial institutions.

- Pollution charge exemptions (*zachet platezhei*) are used within the environmental fund system and are similar to tax offsets, except that they represent only a one-way, not a mutual, settlement of debt. These exemptions deserve special attention because of their important role in Russia's environmental fund system. Serious concerns have been raised about the role of this instrument in environmental financing (Francis et al, 1999).

Other mechanisms used in non-monetary transactions include federal, regional and local government securities, transferable tax allowances (*nalogovye osvobozhdeniya*) and non-transferable tax allowances exchanged for environmental investments (*nalogovyye l'goty* or *nalogovye osvobozhdeniya*).⁹

7.2 Questionnaire responses

Of the 21 entities in Novgorod oblast and 36 entities in Pskov oblast that received and filled out the questionnaire on environmental expenditure, 6 in Novgorod and 9 in Pskov completed the section on non-monetary transactions. This section asked about the main forms of non-monetary transactions used (barter, offsets etc.), the type of expenditure (investment or current), the share of non-monetary transactions in total expenditure, and the differences between monetary and non-monetary prices.

Table 7.1 provides an overview of the responses, most of which were provided by water companies (*vodokanals*). The following section provides detailed information from two water companies, in Borovichi, Novgorod Oblast, and Velikie Luki, Pskov Oblast.

⁹ Note that tax allowance arrangements are not necessarily non-monetary transactions.

Table 7.1. **Non-monetary transactions in the environmental sector:
Novgorod and Pskov Oblasts, 1995-1998**

	Barter	Enterprise offsets	Tax offsets	Veksels	Non-transf. tax allowances	Pollution charge exemptions
<i>Novgorod oblast</i>						
Novgorod Vodokanal					C	
Borovichy Vodokanal		I,C	I,C		C	
St. Russa Vodonakal	I,C	I,C		I,C		I,C
Chudovo Vodokanal	I,C	I,C				
Pestovo Timber		C				C
Novgorod Housing and Municipal Services	I,C	I,C		I,C	I,C	C
<i>Pskov oblast</i>						
Pskov Vodokanal			I	I		
Velikie Luki Vodokanal	I,C	I,C	I,C	I,C		I,C
Porchovsky Vodokanal				I		
Nevelsky Vodokanal	C					
Sebezh Vodokanal				C		
Plussky Housing and Municipal Services	I,C	I,C				
Enterprise "Izborsk"1		C				
Enterprise "Pskovavto"2	C					
Enterprise "Micron"2	C					

Note: I = used in investment transactions; C = used in current expenditure.

7.3 Non-monetary transactions in the water sector¹⁰

Table 7.2 provides information on the magnitude of non-monetary transactions at the Borovichy Vodokanal. As can be seen, the share of non-monetary transactions in revenues was high in 1998, foremost with regard to budgetary organisations and communal sector. This indicates that the public budget through the budgetary organisations and the municipal services has made use of non-monetary transactions to a larger extent than the business sector (households, though included in the same category, provided a minor share of payments).

¹⁰ A forthcoming working paper will provide further analysis of these two water companies and their use of non-monetary transactions.

Table 7.2. **Payments, non-payment, and non-monetary payments, Borovichi Vodokanal, 1998**

		Unit	Households, budgetary organisations and municipal services	Industry	Total
Total Payments ¹ Due		RUR 1 000	16 034	8 121	24 156
Total Tariffs collected		RUR 1 000	8 157	9 493	17 650
Collection rate		%	50.9	116.9	73.1
Non-monetary payments (% of total tariffs collected)	Offsets	%	57.3	54.1	55.6
	Tax offsets	%	23.3	4.1	13.0
	Medical insurance offsets	%	2.0	0.5	1.2
Total		%	82.6	58.7	69.7
Receivables	January 1, 1997	RUR 1 000	3 865	3 035	6 900
	January 1, 1998	RUR 1 000	7 311	2 378	9 689
	January 1, 1999	RUR 1 000	13 687	3 026	16 713

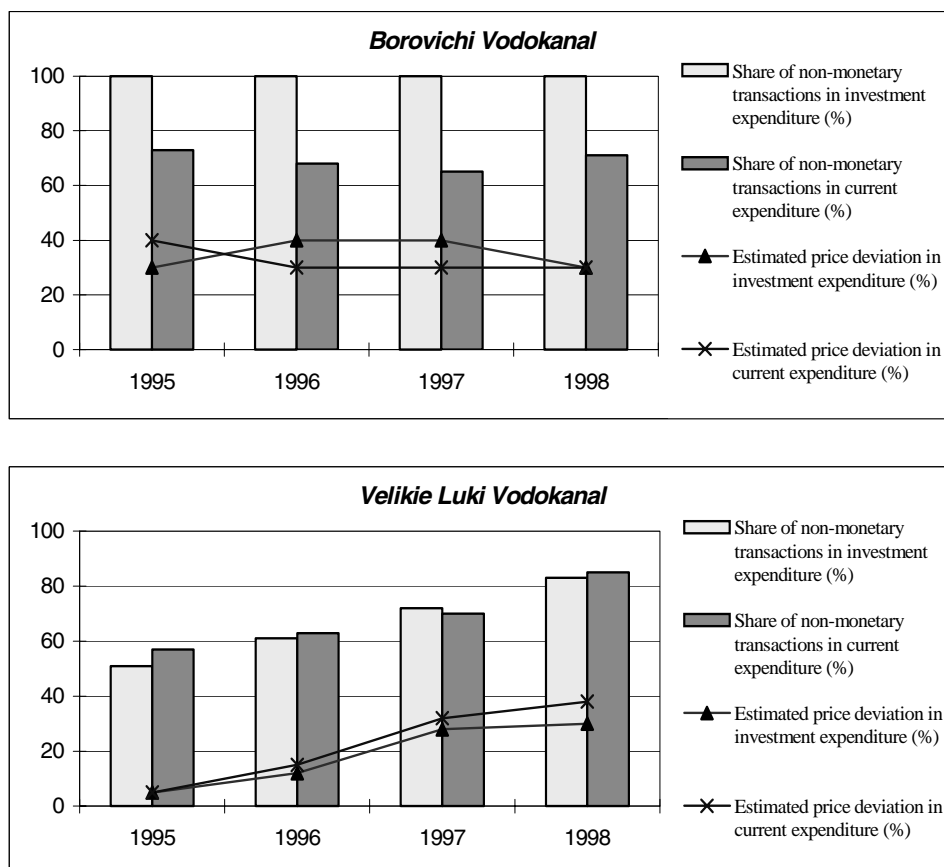
Notes: 1) Volume of payment due has been estimated under the assumption that there are no water tariff exemptions, though for households these actually take place.

Sources: Borovichi Vodokanal.

Price deviation

Figure 7.1 provides estimates on the deviation between valuations of non-monetary transactions and market prices. Overestimation was fairly stable at Borovichi Vodokanal, but it increased over time at Velikie Luki Vodokanal.

Figure 7.1. Estimates of price deviations



Note: 1) Estimates have been made by representatives of the water utilities.
 Source: Borovichi Vodokanal; Velikie Luki Vodokanal.

7.4 Overestimation in survey

The study used these survey results to estimate the overall distortions from non-monetary transactions: for each oblast, the survey results were extrapolated across the water sector. The extrapolated results were then compared to total environmentally related investment and current expenditure, as shown in Table 7.3. Note that this estimate only considers non-monetary transactions in the water sector: that is, it assumes that *no* non-monetary transactions were undertaken in other areas, such as air pollution control or nature protection. As a result, the study most likely underestimates total price distortions.

Table 7.3. **Correcting for price distortions in non-monetary transactions
Novgorod and Pskov Oblasts, 1998 (1 000 RUR)**

	Novgorod Oblast		Pskov Oblast	
	Investment expenditure	Current expenditure	Investment expenditure	Current expenditure
Total reported transactions ¹	47 584	321 410	35 683	180 380
Estimated price distortions ²	4 221	34 152	1 028	39 568
Corrected total transactions ³	43 363	287 258	34 655	140 812
Percentage share ⁴	10%	12%	3%	28%

Notes:

- 1) Total book value of all transactions for environmentally related expenditure, as reported by all entities in the sample. (Not corrected for distorted valuation of non-monetary transactions).
- 2) Price deviations for sample water utilities, extrapolated to the book value of all water utility transactions. In Novgorod Oblast, the percentages stated by Vorovichi Vodokanal have been used; in Pskov Oblast, the percentages stated by Velikie Luki Vodokanal have been used.
- 3) Total transactions minus price distortions estimated for water utilities.
- 4) Share of estimated price distortions in corrected total.

Source: COWI

8. RECOMMENDATIONS FOR IMPROVING ENVIRONMENTAL EXPENDITURE DATA IN THE NIS

This report highlights two major lessons regarding institutions and methods for environmental expenditure data in the NIS:

- Data quality needs to be improved. In Russia, data is regularly collected, but serious weaknesses hamper its credibility. In Georgia, data are no longer collected.
- Existing government agencies have the potential to produce high-quality data and information in this field, but need institutional strengthening. In the two Russian oblasts studied, environmental and statistical agencies still have many skilled employees collecting, processing and analysing environmental expenditure data – however, they need better methodologies for their work. In many cases, training and international exchange of information can be useful. In Georgia, agencies involved in collecting these and other environmental data need funding and personnel as well as computers and other basic equipment if they are to collect adequate data.

Government agencies in Russia and Georgia can take a number of concrete steps to improve their environmental expenditure information. In *Russia*, these steps could include:

- *Improving co-operation between federal environmental authorities, Goskomstat and the Ministry of Finance.* Better working relations are needed. As a starting point, these bodies could work together to prepare a new framework and methodology for environmental expenditure statistics. Furthermore, they could develop joint proposals to revise the Budget Code so that regional and local administrations report environmentally relevant budget data using the same classifications as environmental expenditure statistics.
- *Developing a new statistical framework.* Current reporting forms need to be revised or replaced. The new framework should be comparable with the OECD PAC expenditure methodology, should not require the collection of excessive data and should address weaknesses in existing official environmental statistics. Particular attention should be devoted to collecting investment expenditure in the waste sector and ensuring that user fees and charges are properly counted. Given the importance of drinking water supply problems, the framework should also collect information on expenditure in this sector.
- *Improving quality control.* Regional branch offices of Goskomstat should check data quality more closely and ensure greater consistency.
- *Increasing transparency.* The general public should have access to environmental expenditure data collected and processed.

In *Georgia*, the following steps could be taken:

- *Improving co-operation between the Ministry of Environment and the Department of Statistics.* The Department of Statistics is responsible for collecting and processing environmental expenditure data, and it holds the necessary expertise. However, the Ministry of Environment should provide guidance for the proper definition of terms and for the structure of information to be collected as well as feedback as one of the main users of the information. Co-operation between the two bodies is particularly important in the initial design phase, and it should also become part of regular operations. In addition, the Ministry of Finance should be involved in the preparation of a new framework for environmental expenditure statistics.
- *Developing a new framework.* The framework developed for this study, built upon the OECD PAC methodology, as well as the reporting form developed for survey work, were well received in Georgia and could provide starting points for implementing a system for regular collection of environmentally related expenditure.
- *Allocating sufficient human resources.* The Department of Statistics and the Ministry of Environment need to allocate sufficient human and budgetary resources to the collection and processing of environmental expenditure data.

These recommendations could be implemented at reasonable cost in Russia and Georgia; similar reforms could be undertaken in other NIS. Indeed, improving procedures, practices and methodologies, as well as the reallocation of human resources within the existing institutions, could bring significant improvements. These steps will be valuable if the resulting expenditure information is used to develop stronger environmental policies. Most important, however, is the political will to support these goals.

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"

In this study, 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 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).

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. Figure 1 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.

Figure 1: **Abater and Financing Principles**

PUBLIC SECTOR		PRIVATE SECTOR	
	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)

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.

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 (Summary Tables 1 and 2).

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).

Environmental domain 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). In Summary Tables 1-3 expenditure is allocated to the various sectors according to the abater principle and does not include financial transfers. 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 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 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).

The remainder of this report presents the main results from the 1996 survey of PAC expenditure in OECD Member and Observer Countries. Since the previous survey in 1994, country coverage and the international comparability of data have improved. In many instances, however, definitions and methodologies remain diverse across Member countries. International comparisons should, therefore, be limited to orders of magnitude.

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ANNEX III: DATA TABLES

Table 3.1. **Basic data, latest year available**¹

	Population (1 000 inhabit.)	GDP (mln national currency)	GFCF (mln national currency)	Exchange rates ²
Georgia	5 402	5 534	481	2.02
Novgorod	734	9 813	1810	9.78
Pskov	811	9 147	773	9.78
Hungary	10 229	5 614 042	1 125 389	125.72
Poland	38 588	306 318	57 405	2.43
Germany	81 661	3 523 000	790 570	1.43
Greece	10 454	27 232 309	5 065 971	231.58
Netherlands	15 459	666 031	135 192	1.61

Notes: 1) 1995 data for the OECD countries, 1998 data for Novgorod and Pskov oblasts and 1999 data for Georgia.
2) National currency/USD.

Sources: Central Bank of Russia, 2000; COWI; EBRD, 2000 Goskomstat RF, 1999; OECD.

Table 3.2. **Construction materials price index in Russia, 1995-1998 (1998 = 100)**

	Price index (1998 = 100)
1995	60.59
1996	81.19
1997	88.50
1998	100.00

Source: IMF, 1999, p. 53.

Table 3.3. **PAC investment expenditure: study areas and selected OECD countries**¹

	PAC investments (mln national currency)	USD per capita	% of GDP	% of GFCF
Georgia	2	0.2	0.04%	0.4%
Novgorod	37	5.1	0.4%	2.0%
Pskov	12	1.5	0.1%	1.5%
Hungary	32 998	25.7	0.6%	2.5%
Poland	3 158	33.7	1.0%	6.1%
Germany	19 190	164.0	0.5%	2.5%
Greece	86 135	35.6	0.3%	2.5%
Netherlands	2 768	111.6	0.4%	2.2%

Notes: 1) 1995 data for the OECD countries, 1998 data for Novgorod and Pskov oblasts and 1999 data for Georgia.
Sources: COWI; Goskomstat RF, 1999; OECD; World Bank, 1999.

Table 3.4. Ratio of PAC investment expenditure to total fixed capital investment in Novgorod and Pskov oblasts, 1995-1998, (national currencies 1 000; current prices)

	Novgorod oblast			Pskov oblast		
	PAC investment	GFCF	PAC inv. share of GFCF	PAC investment	GFCF	PAC inv. share of GFCF
1995	28 161	727 700	3.9%	16 817	767 500	2.2%
1996	44 708	1 381 700	3.2%	28 103	989 400	2.8%
1997	32 263	1 079 400	3.0%	14 662	878 900	1.7%
1998	36 905	1 809 900	2.0%	11 583	773 200	1.5%

Source: COWI.

Table 3.5. PAC investment in Novgorod oblast by economic sector, 1995-1998 (USD 1 000; 1998 prices)¹

	Public sector	Public utilities	Business	Total
1995	141	343	4 030	4 514
1996	182	1 028	4 279	5 489
1997	264	1 074	2 259	3 596
1998	225	1 388	2 054	3 666

Notes: 1) Construction materials index and average annual exchange rates for 1998 have been used in the calculations; see Table 3.1 and Table 3.2. Excludes water recycling.

Source: COWI.

Table 3.6. PAC investment in Pskov oblast by economic sector, 1995 - 1998 (USD 1 000; 1998 prices)¹

	Public sector	Public utilities	Business	Total
1995	1 659	93	1 087	2 838
1996	577	1 962	1 000	3 539
1997	554	366	775	1 694
1998	117	357	710	1 184

Notes: 1) Construction materials index and average annual exchange rates for 1998 have been used in the calculations; see Table 3.1 and Table 3.2.

Source: COWI.

Table 3.7. Investment expenditure: official statistics and survey estimates for Novgorod and Pskov obasts, 1998 (USD 1 000; 1998 prices)

	Novgorod oblast		Pskov oblast	
	Official	Survey	Official	Survey
PAC	905	3 546	1 643	1 172
Nature protection	..	433	..	725
Technological improvements	..	121	..	1 363
Drinking water supply and other natural resources management	223	759	26	33

Source: COWI.

Table 3.8. Trends in investment expenditure in Novgorod oblast, 1995 - 1998 (USD 1 000; 1998 prices)¹

	PAC	Drinking water supply and other natural resources management	Technological improvements	Nature protection
1995	4 752	341	15	571
1996	5 631	448	23	445
1997	3 728	547	173	378
1998	3 774	531	121	432

Notes: 1) Construction materials index and average annual exchange rates for 1998 have been used in the calculations; see Table 3.1 and Table 3.2.

Source: COWI.

Table 3.9. Trends in investment expenditure in Pskov Oblast, 1995 - 1998 (USD 1 000; 1998 prices)¹

	PAC	Drinking water supply and other natural resources management	Technological improvements	Nature protection
1995	2 838	55	1 081	177
1996	3 539	394	1 432	234
1997	1 694	364	470	270
1998	1 184	26	1 363	725

Notes: 1) Construction materials index and average annual exchange rates for 1998 have been used in the calculations; see Table 3.1 and Table 3.2.

**Table 3.10. Trends in current expenditure in Novgorod Oblast, 1995 - 1998
(USD 1 000; 1998 prices)¹**

	Air	Water	Waste	Other
1995	1 171	17 937	808	4 297
1996	4 051	40 722	2 807	5 189
1997	5 460	24 675	3 271	5 672
1998	2 929	20 993	3 035	5 906

Notes: 1) Construction materials index and average annual exchange rates for 1998 have been used in the calculations; see Table 3.1 and Table 3.2.

Source: COWI.

**Table 3.11. Trends in current expenditure in Pskov Oblast, 1995 - 1998
(USD 1 000; 1998 prices)¹**

	Air	Water	Waste	Other
1995	2 955	12 049	231	3 285
1996	2 520	12 361	419	3 917
1997	2 226	12 066	279	4 127
1998	1 367	12 535	340	4 168

Notes: 1) Construction materials index and average annual exchange rates for 1998 have been used in the calculations; see Table 3.1 and Table 3.2.

Source: COWI.

Table 3.12. PAC investments share of total PAC expenditure, latest year available¹

	% of total PAC	PAC Investment	PAC Current	PAC Total
		(national currency; 1000)		
Georgia	11	1 961	15 935	11 584
Novgorod	18	36 905	167 335	204 240
Pskov	12	11 583	81 300	92 883
Germany	37	19 190	32 100	51 290
Greece	40	86 135	127 174	213 309
Netherlands	23	2 768	9 081	11 849

Notes: 1) 1995 data for the OECD countries, 1998 data for Novgorod and Pskov Oblasts and 1999 data for Georgia.

Sources: COWI; OECD.

Table 3.13. **Structure of total environmentally related investment expenditure in Novgorod Oblast, 1995 - 1998 (USD 1 000; 1998 prices)**

1995	End-of-pipe	Process integrated technologies	Drinking water supply and other natural resources management	Technological improvements	Nature protection
Air	1 145	..	..	15	..
Water	3 530	..	341	..	..
Waste	77	..	..	..	..
Other	..	..	..	..	..
Total	4 752	..	341	15	..
1996					
Air	826	..	..	23	..
Water	3 556	..	448	..	..
Waste	1 249	..	..	..	..
Other	..	..	..	..	..
Total	5 631	..	448	23	..
1997					
Air	411	..	..	173	..
Water	2 555	..	547	..	..
Waste	762	..	..	..	..
Other	..	..	..	..	..
Total	3 728	..	547	173	..
1998					
Air	425	..	..	121	..
Water	3 071	..	531	..	..
Waste	278	..	..	..	..
Other	..	..	..	..	..
Total	3 774	..	531	121	..

Notes: 1) Construction materials index and average annual exchange rates for 1998 have been used in the calculations; see Table 3.1 and Table 3.2.

Source: COWI.

Table 3.14. **Structure of PAC investment expenditure in Novgorod, 1995 - 1998**
(USD 1 000; 1998 prices)

	1995	1996	1997	1998
Wastewater	3 530	3 556	2 555	3 071
Air	1 145	826	411	425
Solid waste	77	1 249	762	278

Notes: 1) Construction materials index and average annual exchange rates for 1998 have been used in the calculations; see Table 3.1 and Table 3.2.

Source: COWI.

Table 3.15. **Structure of total environmentally related investment expenditure in Pskov Oblast, 1995 - 1998 (USD 1 000; 1998 prices)**

1995	End-of-pipe	Process integrated technologies	Drinking water supply and other natural resources management	Technological improvements	Nature protection
Air	219	74	..	1009	..
Water	2 425	..	34	9	..
Waste	118	2	..	64	..
Other	..	..	21	..	177
Total	2 762	76	55	1081	177
1996					
Air	73	..	..	1402	..
Water	3 427	..	383	23	3
Waste	38	1	..	6	10
Other	..	..	10	..	222
Total	3 538	2	394	1432	234
1997					
Air	25	21	0	457	..
Water	1 600	3	322	10	..
Waste	35	10	0	3	..
Other	..	..	42	..	270
Total	1 660	34	364	470	270
1998					
Air	148	..	..	1356	..
Water	864	..	15	7	..
Waste	166	6	..	..	..
Other	..	..	11	..	725
Total	1179	6	26	1363	725

Notes: 1) Construction materials index and average annual exchange rates for 1998 have been used in the calculations; see Table 3.1 and Table 3.2.

Source: COWI.

Table 3.16. Composition of environmentally related investment expenditure in Georgia 1999 (GEL 1 000)

	Environmental investment expenditure
PAC	1 961
Nature protection	..
Drinking water supply and other natural resources management	10 944

Source: COWI.

Table 3.17. Environmentally related investment expenditure in Georgia, 1999 (USD 1 000)

	PAC	Drinking water supply and other natural resources management
Public sector	..	3 365
Business sector	971	744

Notes: 1) Average annual exchange rates for 1999 have been used in the calculations; see Table 3.2.
Source: COWI.

Table 3.18. PAC investment expenditure in Georgia by media and economic sector, 1999 (USD 1 000)

	Water	Waste	Air	Noise	Other
Public sector	..	..	..	..	..
Business sector	22	..	935	..	14

Notes: 1) Average annual exchange rates for 1999 have been used in the calculations; see Table 3.2.
Source: COWI.

Table 3.19. PAC investment expenditure in Georgia by media and expenditure element, 1999 (USD 1 000)

	Water	Waste	Air	Noise	Other
Process integrated investments	9.2	..	920.1	..	14.3
End of pipe	12.7	..	14.5	..	..

Notes: 1) Average annual exchange rates for 1999 have been used in the calculations; see Table 3.2.
Source: COWI.

Table 3.20. **Drinking water supply and other natural resources management investment expenditure in Georgia by media and economic sector, 1999 (USD 1 000)**

	Water resources	Soil protection	Forestry protection	Mineral
Public sector	3 365	..	..	..
Business sector	..	2	..	743

Notes: 1) Average annual exchange rates for 1999 have been used in the calculations; see Table 3.2.
Source: COWI.

Table 3.21. **Structure of current expenditure in Novgorod Oblast, 1995 - 1998 (1 000 USD, 1998 prices)**

1995	PAC	Resource, technology	Nature protection
Air	1 171	..	..
Water	14 550	3 386	..
Waste	808	..	..
Noise	..	..	..
Other	309	3 301	671
1996			
Air	4 051	..	..
Water	19 255	21 467	..
Waste	2 807	..	..
Noise	..	1	..
Other	320	4 167	687
1997			
Air	5 460	..	..
Water	13 106	11 569	..
Waste	3 271	..	..
Noise	..	5	..
Other	454	4 430	772
1998			
Air	2 929	..	..
Water	10 639	10 354	..
Waste	3 035	..	..
Noise	..	1	..
Other	506	4 899	482

Notes: 1) Construction materials index and average annual exchange rates for 1998 have been used in the calculations; see Table 3.1 and Table 3.2.
Source: COWI.

Table 3.22. **Structure of current expenditure in Pskov Oblast, 1995 - 1998**
(USD 1 000 USD; 1998 prices)

1995	PAC	Resource, technology	Nature protection
Air	2 955	..	..
Water	6 377	5 673	..
Waste	231	..	..
Other	213	2 543	529
1996			
Air	2 520	..	..
Water	6 180	6 181	..
Waste	419	..	..
Other	358	3 028	531
1997			
Air	2 226	..	..
Water	5 765	6 301	..
Waste	279	..	..
Other	412	3 104	597
1998			
Air	1 367	..	..
Water	6 212	6 323	..
Waste	340	..	..
Other	395	3 091	675

Notes: 1) Construction materials index and average annual exchange rates for 1998 have been used in the calculations; see see Table 3.1 and Table 3.2.
Source: COWI.

Table 3.23. **Current environmentally related expenditure by expenditure element and economic sector in Georgia, 1999 (USD 1 000)**

	PAC	Drinking water supply and other natural resources management
Public sector	5 166	21 379
Business sector	2 724	2 001

Notes: 1) Average annual exchange rates for 1999 have been used in the calculations; see Table 3.2.
Source: COWI.

Table 3.24. **PAC current expenditure in Novgorod and Pskov Oblasts by media, 1998 (RUR 1 000)**

	Novgorod Oblast	Pskov Oblast
Air	28 650	13 370
Water and soil	104 051	60 750
Waste	29 680	3 320
Noise	10	..
Nature protection	4 944	3 860
Total	167 335	81 300

Sources: COWI.

Table 3.25. **PAC current expenditure by media in Georgia, 1999 (USD 1 000)**

	Water	Waste	Air	Noise	Other
PAC and nature protection	4 235	2 277	1 174	..	210

Notes: 1) Average annual exchange rates for 1999 have been used in the calculations; see Table 3.2.

Source: COWI.

Table 3.26. **Total environmentally related expenditure by abater and financing principles, 1998 (USD 1 000; 1998 prices)**

	Novgorod		Pskov	
	Abater	Financing	Abater	Financing
Public sector	7 285	13 230	4 771	4 075
Public utilities	19 046	2 039	13 211	-128
Business sector	11 395	17 882	4 069	7 298
Households	..	6 538	..	8 655
Total	37 726	39 689	22 050	19 900

Notes: 1) Average annual exchange rates for 1998 have been used in the calculations; see Table 3.1.

Source: COWI.

Table 3.27. Domestic vs. international financial sources for environmentally related investment expenditure in Georgia, 1999 (USD 1 000)

Domestic subsidies	Domestic loans	International grants	International loans
167	743	471	845

Notes: 1) Average annual exchange rates for 1999 have been used in the calculations; see Table 3.1.
Source: COWI.

Table 3.28. Financial sources for environmentally related investment expenditure by economic sectors in Georgia, 1999 (GEL 1 000)

	Financing
Public	1 100
Business	3 396
Agriculture, hunting, fishing, forestry	..
Mining	..
Manufacturing	1 689
Electricity and gas	1 707
Other	..
Total	4 496

Source: COWI.

Table 3.29. Foreign financial sources' share of environmentally related investment expenditure in Novgorod and Pskov Oblasts, 1995-1998 (RUR 1 000; current prices)

	1995	1996	1997	1998
<i>Novgorod Oblast</i>				
Foreign environmental financing ¹	1 166.2	5 050.9	3 731.9	3 781.8
Total environmental investment expenditure	30 265.5	48 444.6	38 489.7	43 281.0
Percentage share (%)	3.9	10.4	9.7	8.7
<i>Pskov Oblast</i>				
Foreign environmental financing ²	478.4	2361.5	267.8	1 359.6
Total environmental investment expenditure	23 552.5	42 595.4	21 881.8	25 164.5
Percentage share (%)	2.0	5.5	1.2	5.4

Notes: 1) Foreign direct investments. 2) Grants.
Source: COWI.

**Table 3.30. Public PAC investment and public budget expenditure, 1995 - 1998
(RUR 1 000; current prices)**

	Novgorod Oblast		Pskov Oblast	
	Public expenditure	Public PAC investment	Public expenditure	Public PAC investment
1995	830 117	836	962 005	9 829
1996	1 314 412	1 444	2 071 555	4 585
1997	1 731 670	2 282	2 364 636	4 792
1998	1 672 581	2 198	1 755 920	1 146

Source: COWI.

Table 3.31. Funding of PAC investments from environmental funds in Novgorod and Pskov Oblasts, 1995 - 1998 (RUR 1 000; current prices)¹

	Novgorod Oblast			Pskov Oblast		
	Total PAC investments	Pollution charge exemptions	Grants and other payments	Total PAC investments	Pollution charge exemptions	Grants and other payments
1995	28 161	1 021	1 515	16 817	174.9	468.7
1996	44 708	2 142	1 414	28 103	713.3	704.1
1997	32 263	1 788	1 381	14 662	407.7	240.9
1998	36 905	1 306	1 609	11 583	712.1	139.2

Note: 1) In Novgorod Oblast, there are environmental funds at regional and local levels, whereas in Pskov Oblast, there is only the Pskov Oblast Environmental Fund.

Source: COWI.

Table 3.32. Novgorod Oblast Environmental Fund revenue and expenditure by mode of payment (RUR 1 000; current prices)

	1997	1998	1999
Total revenues, of which:	2 088.5	2 027.5	3 195.7
- cash	1 696.8	1 771.5	2 236.8
- veksels	..	..	..
- pollution charge exemptions	391.7	256.0	958.9
- barter	..	..	..
- firms' shares	..	..	..
- other	..	..	..
Total expenditures, of which:	1 798.4	1 860.4	2 671.0
- cash	1 406.7	1 604.4	1 712.1
- barter	..	..	..
- veksels	..	..	..
- pollution charge exemptions	391.7	256.0	958.9
- other	..	..	..
End of year balance	290.1	167.1	524.7

Source: Novgorod Oblast Environmental Fund.

Table 3.33. **Pskov Oblast Environmental Fund revenue and expenditure by mode of payment (1 000 denominated RUR; current prices)**

	1997	1998	1999
Total revenues, of which:	4 140	3 899	5 815
- cash	1 819	2 105	3 718
- veksels	308	..	..
- pollution charge exemptions	408	712	578
- barter	1 605	1 082	1 519
- firms' shares	..	..	..
- other	..	..	..
Total expenditures, of which:	4 087	3 850	5 332
- cash	1 766	2 056	3 235
- barter	1 605	1 082	1 519
- veksels	308	..	..
- pollution charge exemptions	408	712	578
- other	..	..	..
End of year balance	53	49	483

Source: Pskov Oblast Environmental Fund.