



**CENTRE FOR CO-OPERATION WITH NON-MEMBERS  
ENVIRONMENT DIRECTORATE**

Cancels & replaces the same document of 05 February 2003

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

**THE USE OF ECONOMIC INSTRUMENTS FOR POLLUTION CONTROL AND NATURAL  
RESOURCE MANAGEMENT IN EECCA**

**FOURTEENTH EAP TASK FORCE MEETING**

**10-11 February, Tbilisi, Georgia**

*This document presents the results of a survey of the use of economic instruments for pollution control and natural resource management in Eastern Europe, Caucasus and Central Asia (EECCA).*

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**ECONOMIC INSTRUMENTS FOR  
POLLUTION CONTROL AND NATURAL RESOURCE MANAGEMENT:  
REVIEW OF THEIR USE IN EASTERN EUROPE, CAUCASUS AND CENTRAL ASIA**

**EXECUTIVE SUMMARY**

**Background**

1. Traditional regulatory instruments applied to implement environmental policies, despite some successes, failed to address many environmental challenges and imposed high costs on the society to achieve environmental quality objectives. As a result, economic instruments started to be recognized for their flexibility and cost-effectiveness. Economic instruments have been introduced in environmental policies as one way to implement the Polluter Pays Principle (adopted by the OECD Council in 1972). In the 1990s, economic instruments have also begun to play an important role in environmental policies of countries with economies in transition, as well as many developing countries.

2. This document summarises the results of a survey carried out as part of the work programme of the EAP Task Force in the period 2000-2002. The results of the survey were discussed by experts from EECCA, OECD and Central and Eastern European (CEE) countries at workshops in 2000 and 2001.

**The system and types of economic instruments**

3. The use of economic instruments in EECCA dates back to the period of the Soviet Union. In the 1980's various forms of payments for natural resource use were introduced, e.g. for logging, extraction of subsurface mineral resources, and for water abstraction. In 1990, a system of pollution charges was experimentally introduced in selected regions of the Soviet Union.

4. After the break-up of the Soviet Union in 1991, its regulatory framework served as a model for the subsequent design and introduction of economic instruments for environmental protection and natural resource management in all former Soviet republics. Although timing and detailed design varied across the countries, the system of pollution charges has remained practically unchanged since its introduction except for limited changes in the rates. Ukraine was the only country which attempted to simplify the system by reducing the number of pollutants on which individual rates are established. In Kazakhstan charge rates have been increased to reflect inflation. In all the countries the basic system of pollution charges exists for a very large number of air and water pollutants and solid waste. They are still closely integrated with systems of physical emission limits which are laid down in environmental permits. Standard pollution charge applies only for emissions within these limits whereas much higher non-compliance fees apply for emissions in excess of the limits.

5. Fairly similar charges for utilisation and extraction of natural resources, such as water abstraction, logging, mineral extraction as well as hunting and fishing are in use in all EECCA countries. The instruments which were introduced before 1991 in natural resource management have been expanded and adjusted. Some of the countries that had not introduced the full range of instruments and only

gradually expanded the coverage of natural resource payments. For example, water charges were introduced in Kazakhstan in 1995 and in Georgia in 1996. Several countries have introduced new payments for the use of wildlife resources.

6. All EECCA countries have systems of environmental liability, or damage compensation, which operate partly complementary and partly in parallel to the system of pollution charges and natural resource payments. Polluters and users of natural resource can become liable for damages to the environment, in cases where the provisions in the licence or permit are not complied with. In case of environmental liability, the rules for determining the size of the damage compensation payments are not officially approved and are usually challenged in the courts.

7. Only few experiments have been launched in EECCA with other types of economic instruments. For example, Armenia introduced in 1999 a set of product charges on a large number of environmentally harmful products. In Georgia, a tax differentiation on fuel oil dependent on the sulphur content was applied. Various EECCA countries have introduced taxes on certain waste products. However, these attempts were in most cases unsuccessful due to resistance from industry. Some of the types of economic instruments which were applied in the Soviet Union have not survived in the new economic situation, and the deposit-refund system presents a case in point. Instead, informal market-based systems which rely on the commercial interest of individuals have emerged.

8. The revenue from taxes and charges differs among the countries. Only in a few countries, such as Belarus, Kazakhstan, Russia and Ukraine, pollution charges generate relatively significant revenue. The revenue generated by product charges and natural resource payments are of much greater importance. In early 1990's the revenue was earmarked for financing specific environmental protection and natural resource management programmes and projects, through environmental funds. Most recently earmarking has been discontinued due to various reasons, such as pressures to consolidate public budgets, high administrative costs combined with insignificant revenues, or challenges to the legal status of the system. These extra-budgetary funds have been consolidated into the general budgets. In many cases, transport and natural resources related taxes accrue to specialised funds, which finance road maintenance and construction, afforestation or geological exploration.

### **Main recommendations for reform**

9. The present system of pollution charges is clearly not functioning properly, and its comprehensive reform is needed. However, the pollution charge system cannot be reformed effectively without placing such reforms in the context of environmental priority problems that need to be addressed and of the choice and design of various environmental policy instruments targeted to the specific conditions. The reform needs also to take account of the costs and benefits of applying individual instruments, reducing the scope for discretion and broader reforms promoting compliance and establishment of well-functioning markets.

#### ***1. Economic instruments should be designed and implemented to address specific environmental problems according to clear and realistic targets***

10. The use of economic instruments is not an aim in itself and should be considered as one of possible options to promote positive changes in environmental performance or natural resource management. The starting point for the discussion of the appropriate mix of policy instruments should be an underlying environmental problem that needs to be addressed and the levels to which the pollution should be reduced.

11. The policy response will, inter alia, depend on the type and toxicity of the pollution, the type of sources responsible for pollution, the industry structure, the costs of and options for addressing the problem, as well as the level of uncertainty regarding factors such as risks and compliance costs. The present approach in EECCA where one type of pollution charge is applicable for all types of pollution and all sectors is not the optimal strategy. Based on analyses of the sources of pollution, options for addressing the problem and considerations of how the actors may be induced to change behaviour, an adequate mix of policy instruments needs to be determined, using economic instruments along with regulatory, information-based tools.

***2. Individual instruments should be designed and assessed based on costs and benefits***

12. Financial resources for environmental protection in EECCA are extremely limited. It is then of utmost importance that the available resources are allocated in a way to achieve as much environmental improvement as possible. The selection and design of environmental policy instruments must therefore be based on consideration of the costs they impose versus the expected environmental improvements they are expected to result in. Therefore, more systematic analysis of rates and costs of compliance should be undertaken by environmental authorities in the region along with gathering more detailed information on compliance rates and revenues. Ex-ante and ex-post assessments of the economic instruments should be carried out more systematically.

***3. Measures to improve compliance should be strengthened along with reducing the scope for discretion***

13. The ultimate effect of economic instruments - both in regard to providing incentives for reducing pollution and with regard to revenue generation - hinges crucially on effective enforcement, including the levels of collection of levied environmental taxes and charges. The compliance by enterprises is inter alia dependent on proper compliance control and monitoring as well as on credible and consistent sanctions for non-compliance. Acceptance by enterprises of economic instruments may be promoted through better involvement of industry in establishing realistic targets and the design of the instruments as well as regular and transparent reporting during implementation.

14. Environmental authorities have today in many cases wide discretionary powers to waive charges to accept non-monetary settlements including offsets, and to abstain from enforcing payment claims. Apart from the undermining of the effectiveness of the economic instruments, such practices may induce enterprises to engage in rent-seeking behaviour and promote corruption.

15. On the other hand, the present system of too strict environmental performance requirements practically necessitates that environmental authorities grant discretionary exemptions. The first requirement for reducing discretion in implementation is therefore the establishment of realistically achievable environmental targets and policy instruments developed in accordance herewith. The reduction of discretion in implementation does not imply that all polluters must be treated identically. There may be legitimate reasons for differentiation in the use of economic instruments, e.g. to avoid negative impact on competitiveness. This is often done in the OECD countries. However, such differentiations should be transparent and determined at the time of designing the policy instruments rather than during the implementation and control by the executive agencies.

***4. The effectiveness of economic instruments will be enhanced by broader co-ordinated reform promoting well-functioning markets and enterprises***

16. The effectiveness of economic instruments for environmental protection and natural resource management depends on the overall functioning of the market. Environmental authorities need to work with economic and sectoral government agencies and other stakeholders on the following key actions:

- Removal of environmentally harmful subsidies. Before or parallel to implementing economic instruments, it will often be advisable to reform or phase out subsidies that have negative environmental impacts, e.g. subsidised prices on energy and agro-chemicals. This will help to reveal the real prices of goods and services and will help to increase the incentive effect of the instruments.
- Liberalisation of markets, hardening of budget constraints and removal of trade barriers is likely to increase competition thus responsiveness to economic signals by enterprises.

#### ***5. Experience and knowledge sharing***

17. In the process of moving towards more effective design of economic instruments for environmental protection, EECCA countries will benefit from a continued exchange of experience and knowledge between the countries. They share many similarities in institutional framework and can benefit from sharing mutual experiences. The effects from this effort can be further enhanced through the involvement of representatives not only from the environmental bodies, but also from bodies dealing with economy, finance and taxation.

18. The OECD and Central European countries have experience of the actual use of the instruments in market-based economies. Such experience should continue to be used as a source of inspiration and guidance for EECCA countries in their future efforts, albeit with respect for the different conditions that they have. Maintaining forums that facilitate such experience sharing within EECCA and with OECD and CEE countries, can assist in this process.

## 1. BACKGROUND INFORMATION

### 1.1 Background information

19. The EAP Task Force<sup>1</sup>, which was established at the 1993 Ministerial Conference “Environment for Europe”, facilitates the implementation of environmental policy and institutional reform in Eastern Europe, Caucasus and Central Asia by:

- Promoting the integration of environmental considerations into the processes of economic and political reform.
- Upgrading institutional and human capacities for environmental management.
- Broadening political support for environmental improvement.
- Promoting the mobilisation and cost-effective use of financial resources.

20. Following June 1998 Ministerial Conference in Aarhus the EAP Task Force adopted a work programme which called for an examination of how administrative and economic instruments could be applied most effectively in implementing environmental policies in EECCA (Eastern Europe, Caucasus and Central Asia)<sup>2</sup> at national and sub-national level.

21. At its meeting in October 1998, the EAP Task Force agreed that a survey on the use of economic instruments should be carried out with the aim of providing a comprehensive overview of various forms of market-based instruments for pollution control and natural resources management currently in use in all the EECCA countries.

### 1.2 Objectives and purpose of the review

22. This report has the following objectives:

- To present details of the existing economic instruments for pollution control and natural resources management in EECCA.
- To identify achievements in, and obstacles to, applying economic instruments in the region.
- To share experience from the use of economic instruments in OECD and Central European countries which can serve as guidance for reform in the EECCA region.

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<sup>1</sup> The Task Force for the Implementation of the Environmental Action Plan for Eastern Europe.

2. These include: Armenia, Azerbaijan, Belarus, Georgia, Moldova, Kazakhstan, Kyrgyzstan, the Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan. This group of countries has also been termed the New Independent States (NIS) of the former Soviet Union.

- To put forward recommendations for increasing the efficiency of existing, and elaborating more effective, economic instruments in EECCA.

23. The review's main function is to present an inventory of economic instruments which are in use in EECCA. By doing so the review, which is the first of this kind for the entire EECCA region, provides an opportunity for cross-country comparison and facilitates the exchange of experience among EECCA countries and between EECCA and other countries in the context of the EAP Task Force. The review is not only intended to highlight progress EECCA countries have made in applying environmental policy instruments but also it analyses direct and indirect constraints to their better effectiveness. The review should help to guide further efforts on the environmental regulatory reform and can serve as a baseline that future studies can use to assess progress in the development and implementation of economic instruments in environmental policies in the region.

24. The review covers economic instruments for protection and management of air, water, waste, soil, land, natural resources, biodiversity and nature protection, applied in EECCA. Although the main focus is placed on emission/user/product taxes, charges and fees, non-compliance fees, and deposit-refund systems, other instruments are also analysed, where feasible.

25. The following instruments are not the subject to the review as their analysis has been carried out under separate projects:

- Grants/soft loans and other forms of support provided by environmental funds.
- Other financial assistance schemes from the state budget or other sources of funds for both pollution control and natural resources management.
- Energy and water pricing.

26. The definitions and background information on economic instruments, as adopted by OECD in its latest review of economic instruments in OECD countries, are provided in Chapter 2. The survey covers information on economic instruments in force in the period 1994-2002 or as recent years as possible.

### **1.3 Process of the review development**

27. The preparation of the review of the use of economic instruments in EECCA countries was initiated by the EAP Task Force Secretariat in March 1999 by the development of a questionnaire, identification of the EECCA country experts and mobilisation of the funding for the project. The draft questionnaire was presented and discussed at the first workshop on the Use of Economic Instruments for Pollution Control and Natural Resource Management in EECCA, which was held on 28<sup>th</sup> April, 1999 in Moscow, Russian Federation. At the workshop, experts and officials from the EECCA environmental authorities as well as experts from OECD and Central and Eastern European (CEE) countries and international organisations discussed the theory and practice of the use of economic instruments in environmental policies and provided extensive comments to the questionnaire.

28. Subsequently, the questionnaire was sent to twelve New Independent States in June 1999 and responses were received from all but one country. At the two subsequent expert meetings organised on 20-21 January, 2000 in Moscow and on 22-24 March, 2000 in Tashkent, Uzbekistan authors of the country responses carried out an extensive discussion on comparability of the information and also on the structure of the report. Subsequently the conclusions were presented at the EAP Task Force meeting in Almaty in June 2000. In the spring of 2002 additional resources made it possible to carry out an additional data gathering in EECCA.

29. In addition to country reports prepared by the representatives of EECCA countries, existing information from various sources in EECCA and studies which have recently been carried out in the region, including those with international assistance, have been used.

30. The current draft contains:

- This Chapter 1, which contains background information.
- Chapter 2, which presents the rationale for using economic instruments in environmental policies and international experience.
- Chapter 3 with a general description of the use economic instruments applied in EECCA.
- Chapters 4 to 7 where analysis of specific instruments is presented, including pollution charges in Chapter 4, product charges and taxes in Chapter 5, other instruments in Chapter 6 and charges/taxes for natural resource use/extraction in Chapter 7.
- Chapter 8, which suggests directions for reform of the use of economic instruments in EECCA.
- Appendix 1 contains basic demographic and economic data for EECCA countries, 1998 and 2001.
- Appendix 2 presents revenues from pollution charges and natural resources payments in EECCA in 1998 and 2001.
- Appendix 3 shows pollution charge rates in EECCA in the years 1998 and 2002.
- Appendix 4 shows user charges in EECCA capitals for the years 1998 and 2001.
- Appendix 5 contains summary tables on taxes/charges for natural resource use/extraction.
- Appendix 6 describes briefly macroeconomic and social developments in EECCA over the last decade.

#### **1.4 Acknowledgements**

31. The preparation of the review benefited from inputs of a number of individuals and institutions. EECCA country reports were prepared by the following experts: Mr. Ashot Haratunyan from Armenia, Mr. Talat Kangarly from Azerbaijan, Mr. Leonid Gribko from Belarus, Mr. Malkhaz Adeishvili from Georgia, Mr. Marat Balgareev and Mr. Zhan Muradbekov from Kazakhstan, Ms. Djipara Bekkulova from Kyrgystan, Mr. Victor Zubarev from Moldova, Mr. Pavel Kasyanov from the Russian Federation, Mr. Begmurod Mahmataliev from Tadjikistan, Ms. Oksana Demkiv, Mr. Mykola Phylpchuk and Vladimir Morozov from Ukraine and Mr. Khussula Lutpullaev from Uzbekistan. Their efforts and active participation in the discussions is highly appreciated.

32. The principal authors of the report were Mr. Lars Gronvald, Economic Instruments Component Leader, COWI Consult, Denmark and Mr. Krzysztof Michalak from the EAP Task Force Secretariat. Mr. Eugene Mazur from the EAP Task Force Secretariat, and Mr. Michael Kozeltsev from the Russian Federation provided additional support in preparing the report.

33. The project benefited from significant support from the Danish Ministry of Energy and Environment (DANCEE) through a Danish consultancy firm COWI Consult. The DANCEE/COWI project, which was launched in August 1999, provided assistance to the EAP Task Force and selected Ministries of Environment in EECCA in preparing for the Ministerial Consultation in October 2000, in Almaty, Kazakhstan. In addition to the support in the development of the selected country reports, the project assisted in the elaboration of national environmental financing strategies in five selected EECCA countries and in conducting a study of the suitability of the OECD methodology for the assessment of environmental expenditure in selected EECCA countries.

34. The funding for the workshops was provided by the European Commission. The USAID EPIC<sup>3</sup> programme supported the preparation of the country report from Kazakhstan.

35. This review builds on previous reports on economic instruments, including a survey of economic instruments in OECD countries published by the OECD in 1989, 1994 and in 1999; and the Sourcebook on Economic Instruments in CEE published by the Regional Environmental Centre for CEE in 1994 and in 1999. The EECCA review also draws from information contained in Environmental Performance Reviews carried out by the United Nations Economic Commission for Europe (UNECE), as well as small scale analyses of economic instruments carried out in EECCA, including those conducted with external assistance.

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<sup>3</sup> United States Aid for International Development, Energy Pollution Prevention Information Clearinghouse.

## 2. RATIONALE FOR THE USE OF ECONOMIC INSTRUMENTS AND INTERNATIONAL EXPERIENCE

### 2.1 Advantages of using economic instruments

36. Ever since environmental quality and sustainable resource use became areas of political concern (in the late 1960s), policy makers have been searching for appropriate tools for achieving their objectives. Traditionally, the instruments employed in most industrialized countries were so-called “command-and-control” regulations, such as standards, bans, permits and sanctions. The command-and-control approach is aimed at directly influencing the environmental performance of polluters by regulating processes or products used, by abandoning or limiting the discharge of certain pollutants, and/or by restricting activities to certain times, areas, etc. (OECD, 1989). Under such a scenario, a specific level of pollution is prescribed, leaving the polluter with a choice between compliance and administrative or criminal sanctions.

37. In contrast, economic (or market-based) instruments rely on making environmental improvements more rewarding for the polluter in financial and economic terms. Allowing polluters to respond to incentives in a way that is more beneficial to them makes, at least in theory, achieving environmental targets more cost-efficient than under a command-and-control regulations.

38. Economic instruments can in principle contribute to improving the efficiency and effectiveness of environmental policy in at least three main ways<sup>4</sup>:

- They may reduce the economic cost of achieving a given level of environmental protection by allowing polluters greater flexibility in how they comply with a required reduction in pollution levels, or permit further environmental improvements without increasing the economic costs involved (the so-called *static efficiency*). Firms have the flexibility either to abate another unit of pollution, if the cost of this abatement activity is less than the emission tax, or pay the tax, if the marginal abatement cost<sup>5</sup> is high. Therefore, those firms that have the lowest abatement costs undertake the most pollution abatement, and those firms that find it costly to reduce emissions, opt to pay the tax. The result should be that abatement is achieved at a minimum total cost.
- They may stimulate more rapid innovation in pollution prevention and control technologies, because they provide an incentive for polluters to seek ways to reduce pollution by more than required for compliance with current regulatory standards. The specificity of a tax requires polluters to pay for residual emissions on top of abatement costs. This provides a continuous incentive to lower pollution abatement costs and reduce polluting emissions further to avoid paying the tax (*dynamic efficiency*).

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4. *Managing the Environment: The Role of Economic Instruments*, OECD, Paris, 1994.

5. The marginal abatement cost is the cost of reducing one unit of pollution from its current level.

- Some economic instruments (such as taxes and charges) raise revenues that can be used in several ways. Revenue from environment or environmentally related taxes can be paid into the general government budget, and its use determined by wider policy issues, or may allow other taxes to be reduced. Alternatively, the revenue might be earmarked to specific spending purposes, mostly environmentally motivated. In theory, earmarking runs contrary to the “Polluter Pays” principle (by reducing the net burden of polluters who benefit from earmarked expenditures), and may lead to inefficient use of government revenue. On the other hand, earmarking may improve the political acceptability of environmental taxes and guarantees (which has been the case particularly in Central Europe and EECCA) by providing a minimum level of targeted public expenditure on the environment. In addition, prudent and limited allocation of subsidies can catalyse the development of a market based environmental financing market.

## 2.2 Types of economic instruments

39. The economic instruments that may be used for environmental protection and for promoting better management of natural resources have many similarities but are often addressing different underlying issues. However, both for environmental protection and natural resource management, a large number of different types of instruments may be used to create incentives for better behaviour, be it reducing the level of pollution or improving the management of specific natural resources.

### *Box 1 Environmentally related taxes and charges*

#### *Taxes*

The OECD classification (Publication *Revenue Statistics*) defines taxes as “compulsory, unrequited payments to general government. Taxes are unrequited in the sense that benefits provided by government to taxpayers are not normally in proportion to their payments.”

The term “general government” is defined as “supra-national authorities, the central administration and the agencies whose operations are under its effective control, state and local governments and their administrations, social security schemes and autonomous governmental entities, excluding public enterprises”.

Note that a tax (unrequited) *can* be earmarked if it is decided that a certain percentage of the revenue will be affected to a specific purpose (e.g. when part of the gasoline tax is earmarked to building roads).

#### *Charges/fees*

The OECD classification also uses the terms “fees” and “user charges” (as opposed to “taxes”) and “levies” without giving a precise definition of these terms. In practice, the terms charges and fees are often used interchangeably. Therefore, charges and fees will be defined as compulsory requited payments to either general government or to bodies outside general government, such as for instance an environmental fund or a water management board.

The general term “levy” could be construed as covering all types of compulsory payments. Note that, according to the OECD classification there are “borderline-cases” where a levy could be considered as “unrequited”, i.e. as a “tax” (if the payment is made to “general government” as opposed to a charge or fee):

- Where the levy greatly exceeds the cost of providing the service.
- Where the payer of the levy is not the receiver of the benefit (*e.g.*, a fee collected from slaughterhouses to finance a service which is provided to farmers).
- Where government is not providing a specific service in return for the levy which it receives even though a license may be issued to the payer (*e.g.*, where the government grants a hunting, fishing or shooting license which is not accompanied by the right to use a specific area of government land).
- Where the benefits are only received by those paying the levy but the benefits received by each individual are not necessarily in proportion to his payments (*e.g.*, a milk marketing levy paid by dairy farmers and used to promote the consumption of milk).

40.

41. Charges/taxes (see Box 1 for definitions) may be considered as a “price” to be paid for pollution. They may have an incentive and a revenue raising impact. The incentive impact of charges depends on their influence on the cost-benefit analysis of individual polluters (i.e., whether it becomes more expensive to pay charges than to reduce pollution). For example, the charge on NO<sub>x</sub> emissions by heat and power producers in Sweden led to a 40% reduction in emissions while having a zero revenue impact (revenues were recycled to less polluting installations). In most cases, charges mainly have a revenue raising impact. They are too low to have an incentive impact, and the revenues are intended for collective treatment, research on new abatement technologies, or subsidizing new investment. For instance, the rate of the Dutch water pollution charge is determined by revenue required for sewage treatment and measures for maintaining and improving ambient water quality.

- **Pollution charges/taxes** are based on the quantity and/or quality of discharged pollutants and can increase dramatically in case of violation of a polluter’s discharge limits (in which case they are considered as non-compliance fees). Pollution charges are particularly appropriate in cases of a restricted number of stationary sources where monitoring of discharges is feasible.
- Pollution charges may take the form of **user charges**, which are payments for the costs of a common environmental service (e.g., sewerage and wastewater treatment; solid waste collection and disposal). User charges may be uniform (flat rate tariffs) or may differ based on the volume of pollutants treated. User charges represent important parts of financing systems in wastewater and waste management. Sewage and solid waste fees paid by households and firms (usually as part of utility bills) are examples of user charges.
- **Product charges** (or taxes) are levied on products that are polluting in the manufacturing or consumption phase or for which a disposal system has been organised. Product charges can be based on some product characteristic (e.g., on sulphur content in mineral oil) or on the product itself (mineral oil charge). Product charges may take a form of tax differentiation leading to more favourable prices for “environmentally friendly” products and vice versa. Product charges are best applicable to products that pollute in the consumption phase. Such products should be identifiable and be consumed in large quantities and diffuse patterns. Product charges can also be used as a proxy for pollution charges if discharge monitoring is unfeasible.
- **Tradable permits** are based on the principle that any increase in emissions from a given source (in a specific area) must be offset by a decrease in emissions of an equivalent, and sometimes greater, quantity. Under a tradable permit system, polluters operate within a multi-source emission limit, and trade is allowed in permits adding up to that limit. If a discharger releases less pollution than its permit allows, the firm can sell the difference between its actual discharges and the permit to another firm, which may then release more than its initial permit allowed. Trades can take place within a plant, within a firm, or among different firms within an industrial sector or in a specified geographic area. Tradable permits offer advantages when marginal abatement costs differ among polluters, and when it is necessary to establish a maximum ceiling for total pollution.
- In **deposit-refund systems**, a surcharge is added to the price of potentially polluting products. When pollution is avoided by returning these products or any residuals to a collection system, the surcharge is refunded. Deposit-refund systems can be considered for products or substances that can be reused, recycled, or which must be returned for destruction after use (e.g., beverage containers, packaging, etc.).
- **Environmental subsidies**, when used appropriately, represent incentives for polluters to invest in environmental improvements. Environmental subsidy schemes are employed in

many countries and include: grants (non-repayable forms of financial assistance), soft loans (loans with interest rates below market rates), loan guarantees, and tax allowances (including tax exemptions, rebates, and accelerated depreciation). Some non-environmental subsidies in such sectors as transportation (for vehicle use), energy (for fuels), and agriculture (for irrigation and fertilizer use) have a distortionary effect from an environmental policy point of view. For example, subsidies to specific, often more polluting, fuels (e.g., coal and oil) lead to an economically inefficient energy supply level and mix, and discourage technological developments that could reduce negative environmental impacts.

- **Performance bonds** are payments (or guarantees) to the government that shall serve as compensation in case of non-compliance with existing regulations. They are refunded when compliance is achieved and verified. One example are security deposits for resource exploration and land reclamation in Canada, which are based on the land area disturbed and the estimated cost of rehabilitation.
- **Liability payments** are made to compensate physical or juridical persons or the government for the damage caused by a polluting activity. Liability for environmental damage or cleanup costs may lead to the creation of a market for *environmental insurance*. In a well-functioning market, insurance premiums would be expected to reflect the probable damage or cleanup costs and the likelihood that the damage will occur. This would create an incentive for polluters, as they would enjoy lower premiums for industrial processes that have a lower risk of pollution or accidents.
- **Non-compliance fees** are considered to be economic instruments only when they are more or less proportional to the degree of non-compliance (or to the damage inflicted). This is the case in most Central and East European countries, where a base pollution charge rate is applied to all pollution within the permitted level, and a penalty rate is added for pollution exceeding that level. Such non-compliance fees may provide an economic incentive for compliance. Fines, on the other hand, are usually not proportional to the extent of exceedance of the pollution limit, and are commonly regarded not as an economic but as a regulatory tool.

42. **Economic instruments for natural resource management** are almost as widely applied as economic instruments for pollution control. Natural resource taxes and fees are common in OECD and CEE countries and serve as an important source of budget revenues. Many countries apply water abstraction fees, payments for extraction of minerals (particularly oil), forestry management charges (stumpage fees) and subsidies (for protection and reforestation), and charges and fees for hunting and fishing. Water abstraction fees (with added costs of water treatment) are usually passed on to end users in a form of water tariffs.

### 2.3 Trends in the use of economic instruments in OECD and Central and Eastern European Countries

*The growing role of economic instruments.*

43. During the 1970s and 1980s, environmental policies in OECD countries were based primarily on a system of direct command-and-control regulations. However, it was becoming increasingly clear that traditional regulatory environmental policy, despite some successes, failed to address many environmental challenges and imposed very high costs on the society to achieve environmental quality objectives. Economic instruments started to be recognized for their flexibility and cost-effectiveness. Economic instruments have been introduced as one way to implement the Polluter Pays Principle (adopted by the

OECD Council in 1972), which has become widely accepted as the general framework for internalizing the costs of environmental protection.

44. In the 1990s, the number of applications of market-based instruments in OECD member countries increased, and the variety of instruments being used and experimented with grew. Economic instruments have also begun to play an important role in environmental policies of countries with economies in transition, as well as many developing countries.

*Trends in using individual instruments*

45. With the overall role of economic instruments growing around the world, the emphasis is placed on environmental charges and taxes (pollution and product charges and natural resource taxes). The vast majority of such charges and taxes are still designed mainly as revenue raising devices. In 1995, the revenues from environmental charges and taxes accounted for about 7% of total tax revenues in OECD countries<sup>6</sup>.

46. Water effluent (Box 2) and air emission charges are major examples of pollution charges applied in OECD countries, but they are also sometimes used in waste management and policies to reduce aircraft noise. Pollution charges are used very extensively in CEE countries and cover a great multitude of pollutants.

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6. *Environmentally Related Taxes in OECD Countries: Issues and Strategies*, OECD, Paris, 2001.

**Box 2. Water pollution charge in the Netherlands**

The Dutch water pollution charge was introduced in 1970. The revenues are earmarked for wastewater treatment and policies for maintaining and improving water quality generally. The charge is based on BOD and (in most cases) heavy metals, with the rate determined by revenue required. The charge is levied on all direct and indirect discharges. Charged quantities of pollution are measured for large wastewater dischargers. Table-based or fixed rates apply to smaller firms and industry. The charge is implemented by Water Boards, self-governing bodies or surface water users responsible for quantitative and qualitative water management.

Dutch water quality policy has resulted in substantial reductions of pollution in terms of BOD and heavy metals despite healthy economic growth. It has been argued that this was due to the incentive effects of the water pollution charge system.

Source: *Evaluating Economic Instruments for Environmental Policy*, OECD, Paris, 1997.

47. While subsidy schemes have been employed in conjunction with some pollution charges in OECD countries, the trend there has been toward introducing environmental taxes, which are not considered sources of finance for environmental investments, but are clearly designed to provide incentives for reducing pollution. In contrast, earmarked revenues providing subsidised finance for environmental investments have been considered necessary in the transitional economies of Central and Eastern Europe. The main form of such revenue reallocation has been environmental funds, which were established in most countries of the region in the 1990s.

48. Product charges are applied in OECD countries to a range of products, including energy products, packaging, fertilizers, pesticides, batteries, cars and car tires, light bulbs, and plastic bags. Tax differentiation is used with respect to leaded and unleaded gasoline as well as other energy products (e.g., on carbon and sulphur). The use of product charges (e.g., packaging, batteries, CFCs, gasoline, tires, electricity produced in nuclear power plants) is also growing in CEE countries. Tax differentiation on leaded/unleaded gasoline is in place in most of them.

49. The actual application of emissions trading is still limited, although important cases of tradable permit schemes are found in the field of air pollution control in the United States with respect to sulphur dioxide, VOCs, and ozone. Tradable permits have also been applied, as an experiment, in water quality policy. Many countries are now looking to introduce emissions trading schemes for carbon dioxide as a cost-efficient way of meeting their national commitments to reduce emissions of greenhouse gases.

50. In OECD countries, deposit-refund schemes are used both for short-cycle goods (beverage containers, batteries, light bulbs, and paint cans) and for durables (cars) (Box 3). Deposit-refund systems on glass bottles have been in force in most CEE countries for decades. There are plans to introduce this scheme also on other products, often in combination with proposed new product charges.

**Box 3. Deposit-refund schemes in Sweden**

Sweden operates two principal deposit-refund systems (DRS):

- a) The DRS for car hulks aims at preventing the abandonment of motor vehicles. A deposit of SEK 700 and a refund of SEK 1,500 have resulted in a 80-90% return of old vehicles to authorized disposal facilities.
- b) Deposits and refunds for glass and plastic beverage bottles (SEK 4) and for aluminium cans (SEK 5) provide an incentive to increase recycling. The system for aluminium cans is operated by a private company. The system has been very successful, with return rates between 85% and 90%.

Source: *Economic Instruments for Pollution Control and Natural Resources Management in OECD Countries: A Survey*, OECD publication ENV/EPOC/GEEI(98)35/REV1/FINAL, Paris, 1999.

51. Liability-related environmental insurance and performance bonds are increasingly being used in OECD countries where enforcement is stringent and credible (the U.S., the U.K., and several others).

*Policy packages.*

52. In OECD countries, an increasing emphasis is placed on working out effective mixes of environmental policy instruments. The so-called “policy packages” involve designing a coherent mix of policy tools that exploits synergies for achieving environmental policy objectives in a cost-effective manner and avoids policy conflicts. Policy packages are developed on a case-by-case basis to solve specific environmental problems and involve different combinations of environmental policy instruments: regulatory instruments, economic instruments, voluntary approaches, information and education, and other tools. For instance, in practically all cases, emission and product charges are adjuncts to direct regulation – standards, permits, monitoring, and enforcement.

53. Where it is possible to apply them, the economic instruments will often be the recommended option as they can be both efficient and effective in the right circumstances. However, in some cases the administrative costs associated with their use may be excessive or political barriers to their use may exist, such as concerns that these instruments may be socially regressive or may affect the competitiveness of particular sectors. In addition, their apparent advantages depend upon the precise nature of the environmental problem. One of the main advantages of economic instruments – ensuring the efficient distribution of abatement efforts – generally does not apply to site-specific environmental impacts (e.g., localised soil contamination or health impacts from toxic air emissions). Site specific issues would require more complex instruments, and some form of direct regulation is often preferred.

54. For pollutants that can not be monitored directly or only at prohibitive costs, e.g. runoff of agrochemicals from farms, pollution charges cannot be used, as the actual emissions cannot be established. In some cases, an indirect economic instrument, such as a tax on chemical fertilizer or pesticide purchases, may be a reasonable proxy for an emission charge and thus provide appropriate incentives for improved environmental behaviour. In the Netherlands, the difference between the input and the export in farm products of nitrogen and phosphorus are used as a basis for levying charges on losses of nitrogen and phosphorus.

55. Even though this publication deals with economic instruments, it should be noted that direct regulation is still the predominant environmental policy instrument in OECD countries.

## 2.4 Evaluation criteria for economic instruments

56. Systematic analysis (evaluation) of practical experience with economic instruments serves a number of important purposes:

- Evaluation evidence on the performance of policy instruments can help improve the administration of current policy.
- Evaluation of practical experience can improve the choice of instruments in future policy, by showing the advantages and disadvantages of particular instruments in their actual application.
- Evaluation can provide evidence on the functioning of the environmental policy process and increase the effectiveness of translating policy goals into practice.
- Evaluation may also contribute to better data management and communication with stakeholders on the objectives and effects of the government's environmental policy.

57. The evaluation of economic instruments of environmental policy can be done by different types of analysis. Economic theory may be used to evaluate the costs and benefits of individual instruments, but it can only indicate the range of conditions in which one set of policy would be preferable to another. A second form of analysis is *ex ante* quantification of the potential benefits of different policy options on the basis of data about the relevant environmental problems and economic context. Such forecasting and simulation studies may be able to assess the likely strength of polluter responses to policy measures from evidence about polluter behaviour in similar economic circumstances. Finally, *ex post* evidence of the performance of instruments in practice can be analysed. Such analysis can show the pattern of actual responses to economic instruments, and can provide data on a number of criteria, which are not easily evaluated on the basis of theoretical arguments and forecasting.

58. The following are the principal criteria commonly recommended in OECD literature to evaluate economic instruments<sup>7</sup>:

- ***Environmental effectiveness*** relates to the environmental impact and performance of the instrument studied, i.e., how much the instrument contributes to the achievement of the policy objective. The environmental effectiveness of an economic instrument may be considered through the impact on polluting discharges, improvement in ambient environmental quality, or the economic value of reduced damage to the environment.
- ***Economic efficiency*** refers to the extent to which the instrument has enabled a more cost-effective achievement of policy objectives, compared to some alternative instrument (in this case, command-and-control regulations). Assessing the extent to which economic instruments have, in practice, achieved a cost-minimizing pattern of pollution abatement and prevention is key to an assessment of the relative costs and benefits of these instruments.
- ***Administration and compliance costs*** have to do with the administrative and managerial cost burden (including monitoring costs) imposed on the administrative bodies responsible for applying the instrument, and the economic agents (i.e., polluters) subject to the instrument. The characteristics and relative complexity of policy instruments have a significant influence on administration costs.

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7. *Evaluating Economic Instruments for Environmental Policy*, OECD, Paris, 1997.

- **Revenue impact.** Many economic instruments, particularly charges and taxes, are important sources of government revenue. The size of this revenue is a key feature of the operation of a policy instrument. The allocation of revenues raised from environmental charges and taxes (they may be channelled to the general budget or earmarked for environmental purposes) may have a significant impact on their overall effectiveness.
- **Wider economic effects** include, among others, impacts on the price level, income distribution, competitiveness, employment, and trade. These costs include some that are to be predominantly short-term costs of adjustment, and others which may be more durable, or experienced over a longer time horizon.
- **Impact on innovation:** economic instruments are generally expected, due to their flexibility, to be more effective than other instruments at stimulating innovation in cleaner technologies. However, measuring this innovation effect is likely to be difficult, because the pace of innovation is affected by a large number of factors, and environmental policy is only one of them.
- **“Soft effects”** refer to various possible impacts of economic instruments in terms of changes in attitudes and awareness, capacity building, generation and dissemination of information. These impacts are very difficult to quantify, but they are also quite important measures of the instrument’s effectiveness.

59. Despite wide ranging and increasing experience with the use of economic instruments, evidence concerning their performance and impact is still limited, and there is little experience with *ex post* evaluation. In the late 1990s, a number of evaluation studies were conducted in Western Europe, including a comprehensive review of economic instruments in Sweden and an evaluation of the Danish system of environmental taxes. The overall conclusion from the reports on environmental effectiveness of economic instruments is positive. Success stories include effluent charges in Germany, the Netherlands, and Poland; the sulphur tax and NO<sub>x</sub> charge in Sweden, carbon dioxide taxes in Norway, and solid waste taxes in Denmark. There is also growing evidence about the effectiveness and cost savings of tradable permit systems (in the U.S., Canada, and Australia).

60. On other evaluation criteria, a number of studies have demonstrated that economic instruments may have negative impacts on income distribution and that complementary policy tools may be used to offset these. At the same time, there is little or no evidence that environmental policy in the past has had a negative impact on competitiveness, and that countries with higher environmental standards demonstrate lower economic performance.

61. Detailed evaluation studies will be more and more important to understand the practical impact of economic instruments in the medium and long term. However, in view of the expanding use of integrated environmental management programs, i.e., policy packages, there is more sense to talk about the impact of the entire package than of each individual instrument.

### 3. USE OF ECONOMIC INSTRUMENTS IN EECCA

#### 3.1 Introduction

62. The present chapter seeks to provide an overview of the use of economic instruments for environmental protection and natural resource management in EECCA, and the major types of economic instruments are briefly presented on the basis of terminology and experience from OECD countries. The defining feature of economic instruments is that they provide incentives for improved environmental behaviour. In the context of EECCA, the exact boundaries for what instruments should be included as economic instruments are not always clear. Firstly, certain instruments which are labelled as economic are used mainly for the purpose of raising revenue, in many cases to finance environmental activities, without providing incentives for reducing levels of environmental impacts. At the same time there are other instruments which are used for raising revenue but which may, depending on their actual design, have important incentives for improved environmental behaviour.

63. The approach applied in the review has been to seek to cover major instruments, mostly charges and taxes, related to environmental issues or natural resource extraction/use. Even though many EECCA countries provide subsidies for environmental investments through environmental funds, which are mainly funded out of the revenues from the pollution charge system, the survey does not cover these subsidies. The operations of the environmental funds in EECCA and CEE and their expenditures have been the subject of a previous OECD publication<sup>8</sup>. The survey does also not contain information about marketable permits, as no such systems have been introduced in EECCA.

#### 3.2 Main types of economic instruments

64. Systems of payments for emission of polluting substances and for the use of natural resources exist in all New Independent States of the former Soviet Union. Their origins can be tracked to the late 1980s when the majority of these instruments were implemented in the Soviet Union. These systems have to a large extent survived and are still in use in the independent states that emerged from the Soviet Union. Although originating from a planned economy, the systems of charges and payments in EECCA show many features similar to the economic instruments used - or recommended for use - in mature market economies in the EU or OECD. However, there are also important differences between the economic instruments that are used in EECCA and those used in OECD/EU countries - differences that have an important impact on the effectiveness of such instruments.

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8. *Sourcebook on Environmental Funds in Economies in Transition - A regional overview and survey of selected environmental funds in Central and Easter Europe and the New Independent States*, OECD 1999.

Table 1 provides an overview of the reported use of economic instruments in individual EECCA countries in the field of environmental protection and natural resource use. The instruments are presented in four groups:

### **1. *Pollution charges***

These are the most elaborate and commonly used instruments in the region. All EECCA countries apply comprehensive systems of pollution charges. The charges are levied on a large number of air pollutants and water discharges as well as on solid waste. The number of substances covered, the level of charges, the revenue generated and its destination, as well as the way the systems are administered differ among countries but the basic design and implementation procedures are similar.

### **2. *Product charges***

Product charges/taxes levied on environmentally harmful products are less commonly used in EECCA, and the use of product charges shows more diversity among EECCA countries. Armenia for example, has introduced charges on a number of products that contain environmentally harmful substances. There are several examples of tax differentiation for gasoline between leaded and unleaded. In Georgia high-sulphur fuel oil is taxed at a higher rate than low-sulphur.

### **3. *Other economic instruments for environmental protection***

A number of other economic instruments are in use in EECCA, which may have an impact on the environmental behaviour of persons and enterprises. This group contains:

- User charges on water supply, wastewater and waste collection services. These are used principally for financing the infrastructure.
- Deposit and refund systems were applied in the Soviet Union for numerous products, but after the break up of the centrally planned system they nearly disappeared. Only Belarus reports that an official system of deposits is in place for glass bottles. In other countries, systems have emerged, which are run by privately owned organisations/companies
- Rules for environmental liability exist in all EECCA countries. The existence of a well functioning system of environmental liability creates incentives for improved environmental behaviour, as polluters would be expected to seek to reduce the risk of becoming liable for environmental damages.

### **4. *Natural resource taxes and charges***

Payments for resource use/extraction for water, forest, mineral resources and hydrocarbons, as well as various fees and charges for hunting and fishing are in use in practically all EECCA countries.

**Table 1: Overview of the use of economic instruments for environmental protection and natural resource management (as of July 2002)**

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
<b>Pollution charges</b>												
Air emissions	X	X	X	X	X	X	X	X	X	X	X	X
Water effluents	X	X	X	X	X	X	X	X	X	X	X	X
Solid waste	X	X	X		X	X	X	X	X	X	X	X
Non-compliance fees	X	X	X	X <sup>1)</sup>	X	X	X	X	X	X	X	X
<b>Product charges/taxes</b>												
Products with various harmful substances	X <sup>2)</sup>											
Charges on pesticides/fertilizers						X						
Tax diff. for unleaded gasoline <sup>3)</sup>				X	X		X					
Charge on sulphur content in fuels				X <sup>4)</sup>								
<b>Other instruments for environmental protection</b>												
Deposit-refund system , glass bottles <sup>5)</sup>			X									
User charges water supply/wastewater	X	X	X	X	X	X	X	X	X	X <sup>6)</sup>	X	X
User charges municipal solid waste	X	X	X	X	X	X	X	X	X	X	X	X
Other waste disposal charges			X <sup>7)</sup>		X <sup>8)9)</sup>						X <sup>10)</sup>	
Environmental liability payments	X	X	X	X	X	X	X	X	X	X	X	X
<b>Payments for natural resource use</b>												
Water abstraction fees	X	X	X	X	X	X	X	X		X	X	X
Fees for non-consumptive use of water	X			X	X	X	X	X			X	X
Forest fees and charges	X	X	X	X	X	X	X	X	X	X	X	<sup>11)</sup>
Taxes/charges for subsoil resource	X	X	X	X	X	X	X	X	X	X	X	X
Payments for use of biological resources	X	X		X	X	X	X	X	X	X	X	X

1) The non-compliance fee is a fixed penalty

2) Charges on a large number of environmentally harmful products, e.g. Zinc white, batteries for cars, detergents, Freon containing equipment, glass fibre, naphthalene, welding electrodes, tyres, films

3) Countries with differentiated taxes/charges on gasoline between leaded and non-leaded gasoline

4) Tax differentiation between heavy fuel oil with less than and more than 2% Sulphur content

5) Only deposit-refund systems are included which are operated by the state

6) No payments for household water consumption in publicly owned apartments

7) Charge for packaging waste

8) Charge for disposal of certain kinds of radioactive waste in specific sites

9) Charge for disposal of mercury containing lamps

10) Charge for disposal of mercury containing waste

11) Only damage compensation

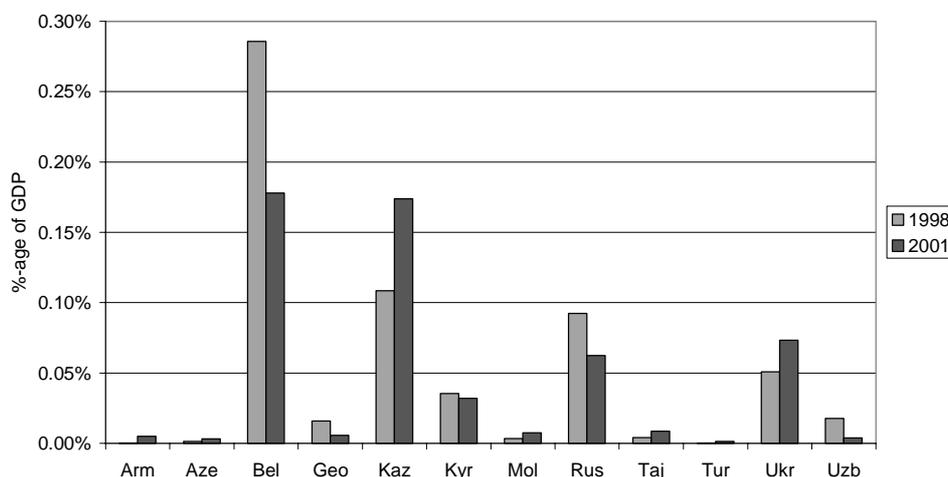
### 3.3 Revenue from economic instruments

65. In addition to their incentive function, economic instruments may generate revenue. In many EECCA countries revenue raising is the key purpose in the use of economic instruments, and the revenue is designed, in theory, to be used for financing of specific environmental activities. The amount of collected revenue gives some indications of the relative importance of economic instruments in the various EECCA countries. However, for all countries it was possible to gather data only for revenues from the pollution charges, as the information on revenues from natural resource taxes and charges was difficult to obtain. Data on revenue from environmentally related product charges is often not available, as public budgets contain information only on the total revenue from all excise taxes, and Environmental Authorities in EECCA do not collect information on the share of environmentally related instruments. Appendix 2 presents revenues from pollution charges and natural resources payments in EECCA in 1998 and 2001.

#### 3.3.1 Revenue from pollution charges

66. Figure 1 shows the revenue generated from the pollution charge system in the various EECCA countries in 1998 and 2001, expressed as percentage of GDP. It can be seen that there are large difference in the importance of pollution charges in revenue terms among the countries, and only in Belarus, Kazakhstan, Russia and Ukraine pollution charges generate relatively significant revenues. In half of the countries the revenues dropped, in some cases, as in Belarus, significantly. In Armenia, Azerbaijan, Kazakhstan, Moldova Tajikistan and Ukraine revenues seem to increase.

**Figure 1: Revenue from pollution charges as percentage of GDP, EECCA countries 1998 and 2001**

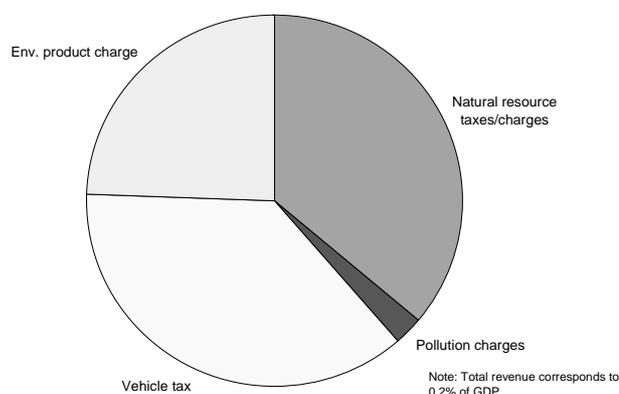


#### 3.3.2 Revenue from product charges

67. There are only few product charges introduced for environmental purposes in EECCA, and the data on revenue from general excise taxes on environmentally harmful products was not readily available. Figure 2, which illustrates the revenue from economic instruments in Armenia, provides an example of the relative importance of the revenue from different types of economic instruments. In addition to natural

resource taxes and charges, major revenue comes from charges on emissions from mobile sources, which are implemented as a tax on vehicles.

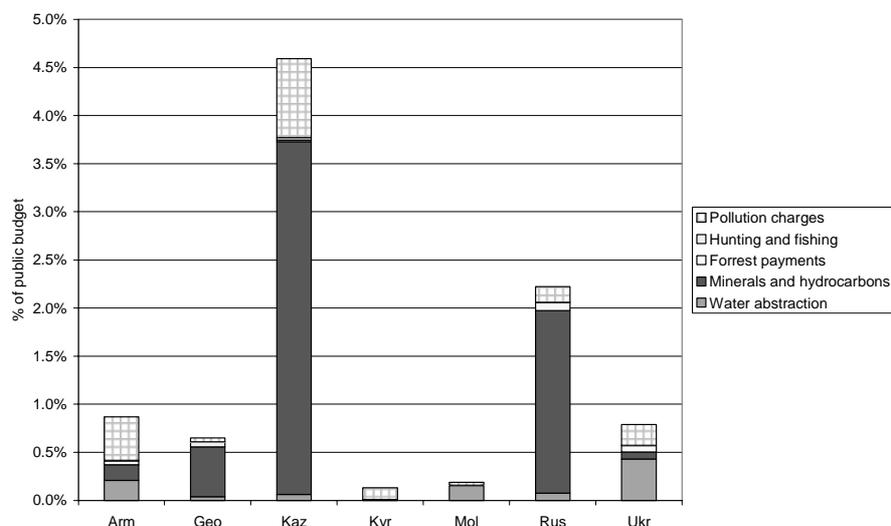
**Figure 2: Relative revenue contribution from selected economic instruments, Armenia 2001**



### 3.3.3 Revenue natural resource taxes and charges

68. In most EECCA countries, the revenue generated by the product charges and natural resource payments are of much greater importance than the revenue from the pollution charges. Figure 3 compares the revenue generated from pollution charges with that generated from natural resource taxes and charges (water, subsurface resources, forest and biological resources for selected countries). In Kazakhstan and Russia the payments for extraction of particularly oil and gas is the most important source whereas in Ukraine and Moldova, water abstraction charge is the most important source of revenue.

**Figure 3. Revenue from pollution charges and natural resource payments as percentage of overall public budgets in selected EECCA countries, 2001**



#### 4. POLLUTION CHARGES

69. The current system of pollution charges in EECCA originated from the Soviet Union, which introduced them in 1990. Initially, the system was introduced in 50 major cities. After the break-up of the Soviet Union, this system has served as a model for the introduction of fairly identical systems of pollution charges in all EECCA countries. The present chapter presents the main features of the pollution charge systems in EECCA. Selected technical information on charge rates and revenue is presented in Appendix 3.

70. The system of pollution charges was grafted onto a comprehensive command-and-control direct regulation on allowable levels of discharges of the Soviet Union. The system was maintained in all EECCA countries where pollution charges are levied on a large number of air and water pollutants as well as on the generation of solid waste. A central feature of the pollution charge system is that a set of variable rates apply to discharges within established limits, whereas a much higher rate (a non-compliance fee) applies to discharges above allowed limits. The manner in which the pollution charges function cannot be assessed independently from the system of pollution permits.

71. The systems in the individual EECCA countries have many similarities, and the following description is based on the regulations in Russia<sup>9</sup>.

##### 4.1 The principal features of the pollution charge system

72. The system of pollution permits sets rules for defining enterprise-specific emission limit values, or so-called Maximum Permissible Levels of pollution (MPLs). Individual enterprises must annually enter into an agreement with the authorities that defines the permissible levels of discharges for all regulated pollutants. The MPLs are determined based on ambient environmental quality standards, so-called Maximum Allowable Concentrations (MACs), which have been defined for each individual pollutant. The MACs are defined at levels that supposedly should cause neither immediate harm nor long-term negative effects on human health. Through the use of computerised dispersion models, the maximum levels of discharges that are compatible with the MACs are determined in iterative calculations. The calculation of the MPLs for individual sources of pollutants is a complex procedure requiring detailed enterprise-specific information on the equipment and technology employed.

73. As the MAC were set at levels that should pose no harm to humans or nature, the resulting MPLs are typically very stringent limits, far lower than the level of actual emissions from the enterprises. To ease the requirements imposed by such strict limits, which often would not be realistically achievable, so-called Temporary Compliance Levels (TCLs) were introduced as a transitory measure. These temporary levels

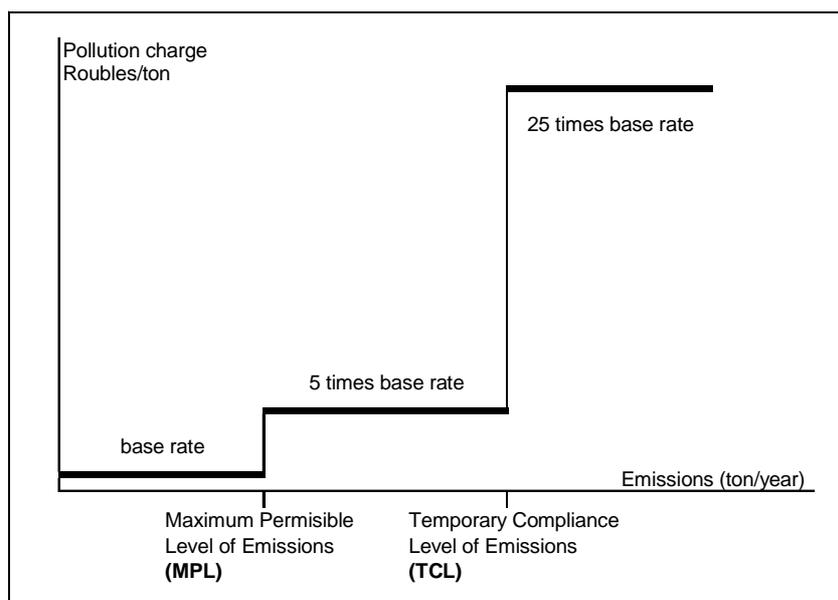
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9. The existing system of pollution charges in Russia was declared invalid by the Supreme Court in 2002, as it was not in accordance with the tax code. A new system of pollution charges had been proposed though not introduced. Apart from simplifications in the charging procedures, the most important changes would be that the existing system with non-compliance fees would be replaced by a flat pollution charge rate at higher levels.

are set above the MPL. It was assumed that the TCL would be gradually reduced and reach the MPL within 5 to 10 years.

74. The level of pollution charges depends on whether discharges are within or above allowable limits. In Russia, for example, the applicable rate of pollution charges is five times the basic rate for quantities discharged in excess of the MPL but within the TCL. For discharges in excess of the TCL, the applicable rate is 25 times the basic rate. This is graphically illustrated in Figure 4.

**Figure 4:** *Connection between permissible levels of discharges and pollution charges in Russia*



75. In all the EECCA countries, non-compliance fees form a part of the pollution charges system, although the actual level and design of these fees varies. The non-compliance fee is calculated by multiplying the base rate by a given factor. With this approach non-compliance fees are in effect just a higher level of pollution charges. In countries like Georgia fines are also applied for non-compliance. The table below summarises the size of the non-compliance fees for the EECCA countries.

76. The systems for defining the Maximum Permissible Levels differ among the countries. In Kazakhstan, for example, it is reported that the MPL routinely is set far above existing levels of emissions. The effect is that the non-compliance fees are mainly used for polluters that do not have a pollution permit.

**Table 2: Level of non-compliance fees in various EECCA countries**

	Applicable rates as compared with the base rate		
	Within MPL (max permissible levels)	Within TCL (tem. Compliance level)	Above MPL/TCL (Non-compliance fee)
<b>Armenia</b>	base rate	-	3-fold
<b>Azerbaijan</b>	base rate	-	5-fold (10-fold for accidents)
<b>Belarus</b>	base rate	10-fold	15-fold
<b>Georgia</b>	base rate	Base rate <sup>1)</sup>	5-fold + administrative fines <sup>2)</sup>
<b>Kazakhstan</b>	base rate	-	10-fold
<b>Kyrgyzstan</b>	base rate	-	10-fold
<b>Moldova</b>	base rate	-	5-fold
<b>Russia</b>	base rate	5-fold	25-fold
<b>Tajikistan</b>	base rate	5-fold for wastewater discharges	2-fold for air emission; 10 fold for wastewater discharges
<b>Turkmenistan</b>	budget org: 10% commercial 50% foreign co's 100%	-	4 fold
<b>Ukraine</b>	base rate	-	5-fold
<b>Uzbekistan</b>	Base rate	-	20% higher than base rate (1.2fold)

1) Temporary compliance levels exist only for air emissions, and the tax rates within the limits are equal to base rate.

2) Since year 2000, companies have to pay a non-compliance fee for emissions above the MPL in addition to the existing system of administrative fines that are determined based on the violator's salary.

77. It should be noted that in Russia, emission charges are levied on emission from mobile sources, whereas in, for example, Armenia and Georgia such emissions are not subject to pollution charges.

#### 4.2 Pollution charge rates

78. The pollution charge system has been comprehensively designed to cover all major types of pollutants. All the EECCA countries apply pollution charges, and all the EECCA countries except for Georgia have pollution charges for a number of different categories of solid waste. In Russia, for example, charges have been defined for 214 different air pollutants and 197 water pollutants. In Kazakhstan there are over 1,000 pollutants subject to the charge system. Solid waste is in most countries categorised into different classes of toxicity. Table 3 provides an overview of the number of substances that have been defined in the various EECCA countries.

79. In the Ukraine, the system was simplified in 1999, so individual rates were only determined for the major pollutants. For less common pollutants, rates were defined for a number of general hazard classes. These hazard classes were determined based on the ambient quality standards (the Maximum Allowable Concentrations), which have been defined for most types of pollutants. Similar simplifications have de facto been implemented in other countries. In Georgia, for example, pollution charges are reported only to be calculated for the most common pollutants (21 air pollutants and 18 water pollutants).

**Table 3: Number of pollutants covered by the pollution charge system in EECCA (July 2002)**

	No. of pollutants charged		Categories of waste
	Air	Water	
<b>Armenia</b>	10	19	5
<b>Azerbaijan</b>	195	90	5
<b>Belarus</b>	25	60	4
<b>Georgia</b>	222	142	n.a.
<b>Kazakhstan</b>	1217	1345	5
<b>Kyrgyzstan</b>	160	60	6
<b>Moldova</b>	110	27	4
<b>Russia</b>	214	197	5
<b>Tajikistan</b>	23	11	4
<b>Turkmenistan</b>	81	43	4
<b>Ukraine</b>	25 <sup>1)</sup>	9	4
<b>Uzbekistan</b>	169	87	7

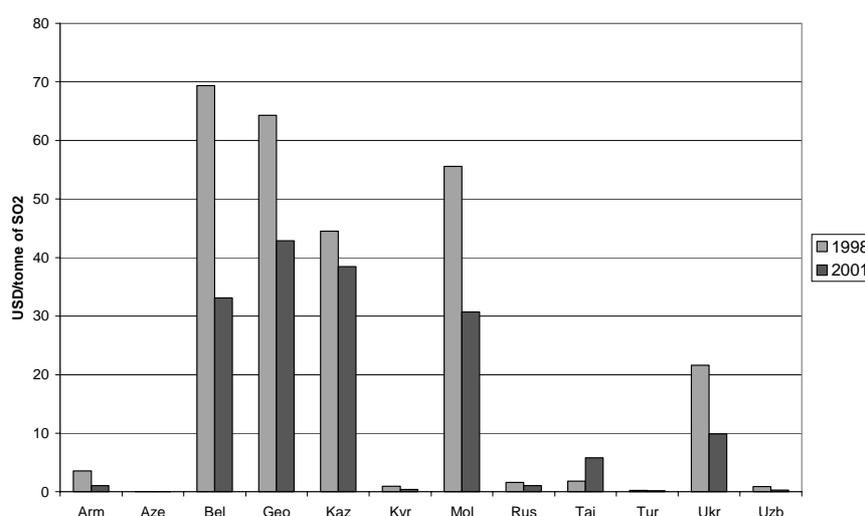
1) Individual charges are levied on 25 key air pollutants and 9 water effluents. For other pollutants the charges have been defined for groups of pollutants based on the class of hazardous potential.

#### Base rates

80. Charges for individual pollutants are differentiated with regard to the human toxicity of the pollutant. The toxicity of various pollutants is reflected in the determination of the maximum allowable ambient concentrations of the pollutants. Typically, the individual rates were set as a rate for a standard tonne of pollutants multiplied by a hazard coefficient that was proportional with the inverse value of the maximum allowable contraction. Consequently, the rates differ substantially among different pollutants. In Georgia, for example, the rates range from approximately 0.01 USD per tonne of carbon dioxide to 3.2 million USD per tonne of benzo(a)pyrene.

#### Air emission charges

81. Figure 5 shows the level of charges for one air pollutant (SO<sub>2</sub>) for various EECCA countries.

**Figure 5: Pollution charges for SO<sub>2</sub> emission in EECCA (1998 and 2002)**

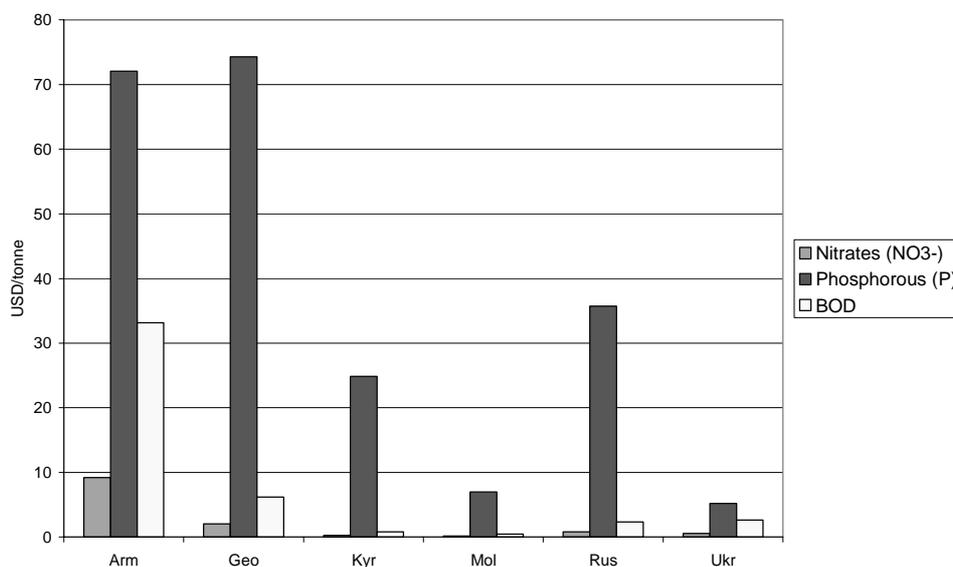
82. The rates vary widely among EECCA countries. In many countries, such as Azerbaijan, Kyrgyzstan and Turkmenistan, the base rates are close to nil. For comparison, the rate in Denmark and Sweden for SO<sub>2</sub> emissions amounted to about 1,250 USD/tonne in 2001. The general tendency of the charge rates to decline between 1998 and 2001 is linked to an overall appreciation of the dollar against most of the EECCA currencies in that period.

#### *Water effluent charges*

83. The system of water effluent charges is very similar to that for air emissions. A number of the EECCA countries, such as Belarus, Azerbaijan and Turkmenistan, have adopted more simplified systems where the charge is calculated based on the amount of wastewater discharged instead of calculations based on a discharge of each individual water pollutant. As a result, not all the countries apply pollution charges for individual water pollutants. Figure 6 illustrates the applicable base rates for three water pollutants for selected EECCA countries. The same pattern with differentiation of rates based on maximum allowable concentrations (MAC) can be observed in all the countries but the level differs significantly among the countries.

84. In Belarus, charges are determined for three main categories of wastewater, i.e. treated according to standards, insufficiently treated and untreated. These charges are then differentiated depending on whether the wastewater is discharged to surface water bodies or assumed to end up in aquifers<sup>10</sup>.

**Figure 6: Pollution charges for nitrate, phosphorous and BOD effluents in selected EECCA countries, year 2001**



#### *Charges for solid waste*

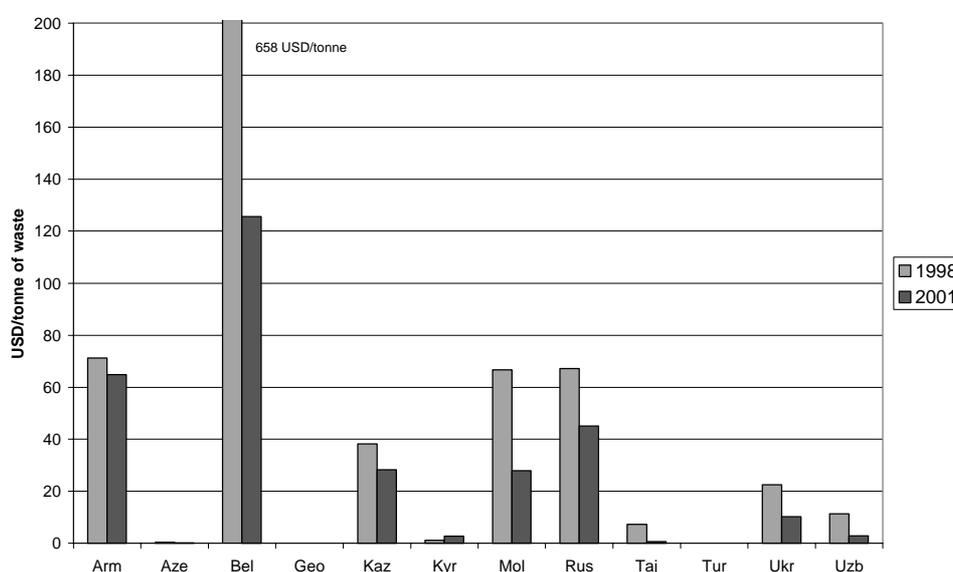
85. All countries but Georgia have charges for generation of solid waste. These charges are of a different character than user charges to recover costs of collection and disposal of municipal solid waste. While user charges for waste are expected to cover actual costs of collection and proper disposal, the

10. Analytical review of the system of charges for water use and pollution of water bodies in the Republic of Belarus, O.S. Shimova.

charges for solid waste included in the pollution charge system are related to the production of waste, and the level of the charges was originally intended to reflect the toxicity of the waste. Charges are determined for different hazard categories of waste - typically with 4-5 different categories of hazardous waste and 1-2 categories of non-hazardous waste. Rates for the most hazardous class of waste for various EECCA countries are shown in Figure 7.

86. As with the charges for air and water pollutants, the rates for waste generation are set at very low levels in several countries. The base rate for production of one tonne of waste of the least toxic category ranges from 0.01 USD in Azerbaijan and Kyrgyzstan to more than 6 USD per tonne in Russia and Belarus. Appendix 3, Tables 7 and 8 present selected examples of pollution charge rates for the various EECCA countries.

Figure 7 Pollution charges for solid waste, most toxic class, EECCA countries, 1998 and 2001



### Coefficients

87. The applicable rates are dependent on the where and how the pollutants are released into the environment, i.e. the characteristics of the receiving media are taken into account. This is particularly the case in Russia and Ukraine where a number of coefficients are used to adjust the pollution charge base rates.

88. In Ukraine, for example, the following systems of coefficients are used:

- Base rates are multiplied by a coefficient from 1 to 1.8 depending on the size of the population in the area where the emissions take place and by a coefficient from 1 to 1.65 depending on the economic importance of the settlement.
- For water effluents, the coefficient determined for each river basin is applied, taking a value of up to 2.8.

- For solid waste rates, two coefficients are in force. Depending on the landfill location, a coefficient ranging from 1 to 3 applies and depending on the landfill conditions, a further coefficient ranging from 1 to 3 applies.

*Impact of inflation*

89. One reason for the low level of rates and the variation among the countries is the extremely high inflation that occurred in the first half of the 1990s. Some countries have made little or no adjustment to the rates to compensate for the inflation, while others, for example Russia, Belarus and Kazakhstan, have partly adjusted the rates and introduced automatic indexation of rates. The impact of inflation on the real level of pollution charges in Russia and Azerbaijan is illustrated in Box 4.

**Box 4 : Inflation and real levels of pollution charge**

All EECCA countries experienced very high levels of inflation during most of the first half of the 1990s, with annual rates up to more than 1,000%. Due to no, or limited, increases in the nominal pollution charge rates in most of the EECCA countries, the real value of pollution charges has been seriously eroded.

For example, in Azerbaijan, the pollution charge rates were introduced in the beginning of 1992. In response to the high levels of inflation, pollution charge rates were increased by a factor of 10 in May 1993, but since then the rates have remained constant in nominal terms. Consumer prices have increased since 1993 by a factor of around 1000 in Azerbaijan and, as a result, the pollution charges have been reduced to a level of practically zero.

In Russia, pollution charges were introduced in 1990 and in the face of high inflation, all rates were increased by a factor of 5 in 1993. Also in 1993, an annual inflation correction factor was introduced to automatically compensate for future inflation. In spite of these measures, the real value of the pollution charges in Russia has not been maintained. In 1999, the real value of the pollution charge rates amounted to less than 2% of the value of the rates at the time of their introduction in the start of the 1990s.

*Development in the real value of the pollution charges in Russia and Azerbaijan*

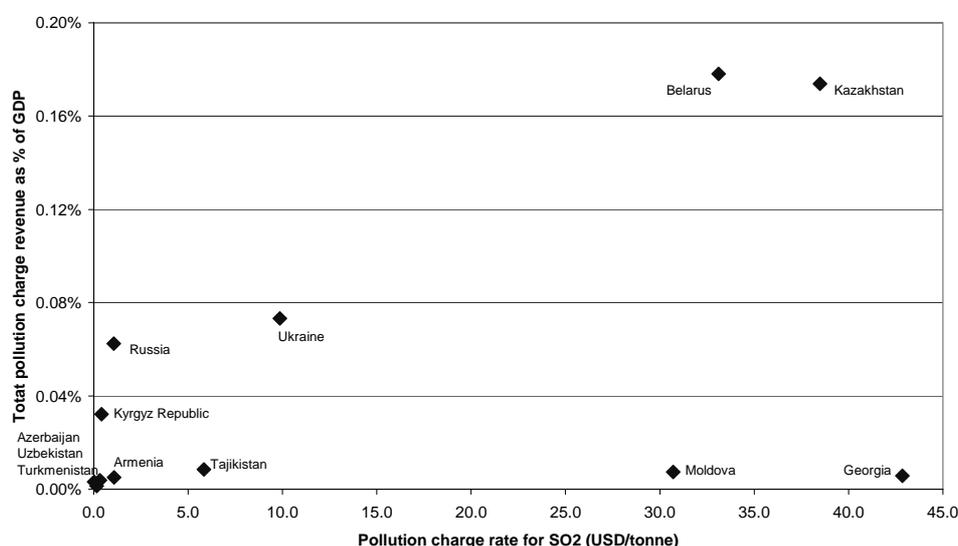
Year	Russia (Dec 1990 = 100)	Azerbaijan (Jan 1992 = 100)
1991	70	-
1992	40	100
1993	5	10
1994	2	5
1995	1	2
1996	1	1
1997	1	1
1998	1	1
1999	1	1

Note: Pollution charges have been deflated by the consumer price index as published in the EBRD Transition Report 1999. The base years for the index values for two countries are not the same as pollution charges were introduced in different years.

### 4.3 Revenue from pollution charges

90. As illustrated in Figure 1 the revenue generated by pollution charges varies among the EECCA countries. Figure 8 plots the rate levels (expressed as the base rate for emission of one tonne of SO<sub>2</sub>) against the total revenue generated from the pollution charges as percentage of GDP. The figure shows that Belarus and Kazakhstan both have relatively high rates and pollution charges which generate relative high revenue. In Moldova and Georgia, the rates are of a similar magnitude but very little revenue is generated, which reflects relatively small share of industry, but also poor collection rates. Countries like Azerbaijan, Uzbekistan, Armenia and Turkmenistan show very low rates and the system generates virtually no revenue. Compared to the level of the base rate, it appears that Russia collects a relatively high level of revenues. This, however, reflects a wider use of non-compliance fees.

**Figure 8: Charge levels and generation of revenue from pollution charges in EECCA, 2001**



#### *Destination of the revenue*

91. In most EECCA countries, the revenue from pollution charges is earmarked for environmental purposes. Belarus, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan and Ukraine all have various forms of environmental funds that mainly are financed out pollution charge revenues. In other countries, the revenues go to state and/or local budgets but the law often states that the revenues should be used for financing of environmental protection activities. To what extent the collected revenues are actually used for environmental protection activities is not reported, but there are indications that local budget authorities have used the revenue for other priority purposes. In Georgia, the law on pollution charges includes no provisions on earmarking of revenues. The table below provides an overview of the destination of the revenues collected from the pollution charges in selected EECCA countries. It shows that only in Kazakhstan the revenues constitute a significant portion of the public revenue. In Armenia, Georgia, Turkmenistan, the revenue from the charges is negligible. It would appear as if the administrative costs of the fairly complex pollution charge system would be significant compared to the revenue generated in the EECCA countries where the system generates very limited revenue.

**Table 7: Destination of revenues from pollution charges in selected EECCA countries**

	Total revenues 2001		Destination and earmarking of revenues
	Actual revenue	% of public revenue	
<b>Armenia</b>	0.1 mill USD	0.01%	100% of all charges goes to the State (public) budget of the Republic of Armenia. Examples exist where specific regional environmental programmes are funded from the pollution charge revenue.
<b>Azerbaijan</b>	0.2 mill USD	0.015%	All revenues go to the State's (public) budget.
<b>Belarus</b>	19.5 mill USD	0.4%	Environmental funds (10% national and 90% local).
<b>Georgia</b>	0.2 mill USD	0.04%	100% of the revenues accrue to local budget. There is no earmarking of revenues.
<b>Kazakhstan</b>	38.7 mill USD	0.8%	Revenue goes to public budget and was in 2001 divided 50%/50% between republican and local budgets. From 2002, 100% go to local budgets.
<b>Kyrgyzstan</b>	0.5 mill USD	0.12%	Revenue goes to environmental funds.
<b>Moldova</b>	0.1 mill USD	0.03%	Total revenue goes to local environmental funds.
<b>Russia</b>	193 mill USD	0.16%	Regional budgets – 81% (sometimes earmarked), federal budget – 19%.
<b>Tajikistan</b>	0.1 mill USD	0.06%	Republican and local funds for environmental protection.
<b>Turkmenistan</b>	0.05 mill USD	0.005%	Revenues go to the State Environmental Fund of Turkmenistan.
<b>Ukraine</b>	28.1 mill USD	0.2%	Revenues from environmental charges are distributed among Eco-funds as follows: - 20 % to local Eco-funds consolidated into countries', villages', towns' budgets. - 50 % to regional Eco-funds consolidated into budget of Autonomous Republic of Crimea and oblasts' budgets. - 30 % to State's Eco-fund consolidated into public budget of Ukraine.
<b>Uzbekistan</b>	0.2 million USD	0.012 %	80% to local budgets and 20% local extra-budgetary funds.

#### 4.4 Key issues related to the effectiveness of pollution charges

92. A key requirement for an economic instrument is to promote changes in environmental behaviour of an operator by providing incentives that reward improvements in environmental performance. Pollution charges aim to increase the costs of discharging polluting substances into the environment and, if set at the appropriate level, should provide a direct incentive for polluters to reduce such discharges. Whether such incentives actually lead to an improvement in environmental performance and how well the instrument works is a question that can only be answered empirically on a case by case basis. However, by looking at the general features of the design and the implementation of economic instrument in practice, some key issues in relation to the actual incentives provided by the pollution charge system in EECCA may be identified:

- The level of the pollution charge rates: the rates are, in many cases, so low that the system provides no incentives for reducing the level of pollution.
- The method for determining the level of emissions: The fact that emissions are usually estimated, as opposed to measured, will in many cases seriously affect the incentives created by the instrument.

- The ways the pollution charges are implemented in practice: loose enforcement and loopholes in the implementation of the instruments will reduce the actual incentives provided by the instrument.

93. These issues are discussed in more detail below.

#### ***4.4.1 Low rates of pollution charges***

94. The idea behind an emission tax/charge is that the polluter will seek to minimise the total costs of pollution reduction/prevention and payment of pollution charges. This implies that the polluter will continue to reduce the level of emissions as long as this can be done at costs which are lower than the pollution charge that otherwise would have to pay. The costs of reducing the level of emissions will typically increase as emissions are reduced further and further, as the least costly measures are introduced first. When it becomes cheaper to pay the pollution charge than to reduce the level of emissions further, the polluter will no longer benefit from reducing pollution.

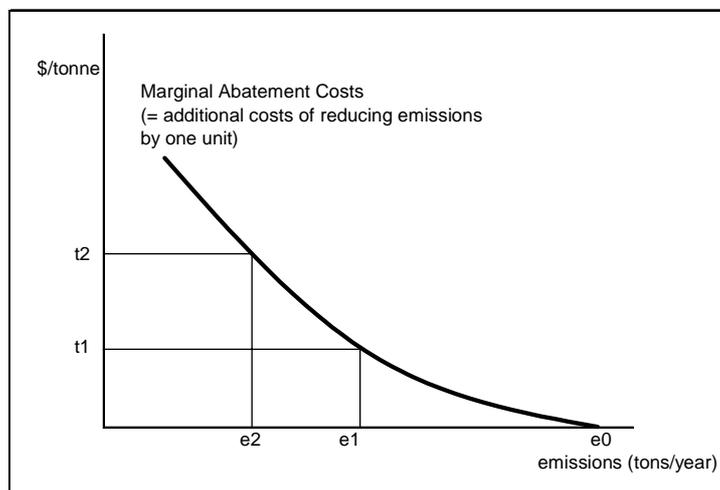
95. For pollution charges to provide adequate incentives for reducing the level of pollution, the rate of pollution charges must be set at a level, which at least corresponds to the costs of reducing the level of pollution. The costs of reducing the level of pollution will, among other factors, depend on the scale of reduction of pollution. The costs of reducing pollution will increase with more and more ambitious targets for improvements in environmental quality. Box 5 presents the principal correlation between the level of pollution charges and the resulting effect on emissions.

96. As presented in Box 4, inflation in EECCA countries has eroded the real value of the pollution charges, and the rates are so low that the instrument creates little incentive to change behaviour. Box 6 provides explanation that the base charges that apply for emissions of SO<sub>2</sub> in Russia are far too low to have a noticeable impact on pollution.

**Box 5: The principal functioning of a pollution charge**

Pollution charges, for example charges on the emission of sulphur dioxide, put a price on emitting polluting substances. An enterprise that seeks to maximise profits will take this cost into account when optimising production. However, the level of the charge will have an impact on to what extent the enterprise could be expected to reduce the level of emissions.

Conceptually, the functioning of a pollution charge can be illustrated by means of what is called a marginal abatement cost curve. Such a curve shows the costs of reducing emission by one additional unit, for example, tonnes of SO<sub>2</sub> per year. The costs of reducing emissions will increase as higher and higher levels of emission reductions are sought to be achieved, as the cheapest solutions will be implemented first. For SO<sub>2</sub>, initial reductions in emissions may be brought about at low costs, e.g. by changing to low-sulphur coal in certain power plants; but if all power plants have to have flue gas cleaning with scrubber installed, the costs per additional unit of emission reduction will increase significantly. This is illustrated by the marginal abatement costs curve that slopes upwards as the level of emissions is reduced towards zero.

**Principal correlation between emissions and levels of pollution charges**

When faced with a pollution charge, the profit maximising enterprise will be expected to undertake efforts to reduce the level of emission as long as the marginal costs of doing so are lower than the pollution charge the enterprise otherwise would have to pay. For example, in the table above a pollution charge of t1 would, based on the illustrated marginal abatement cost curve, be expected to lead to a level of emission of e1 but if the charge was increased to t2, the level of emissions would be expected to fall to e2.

The impact of a pollution charge will thus depend on the level of the rates and the costs of reducing emissions in the individual enterprises. To determine the appropriate level of a pollution charge, the social benefits of reducing the level of pollution must also be taken into account.

**Box 6: Considerations on the level of emissions charges for SO<sub>2</sub> in Russia**

The base rate in Russia for emissions of sulphur dioxide in 2001 amounted to 1.1 USD/tonne. Few studies exist on environmental damage measured in monetary terms from pollution in EECCA. One recent estimate for the damage of SO<sub>2</sub> emissions in Russia was prepared based on the conversion of results from USA and Western Europe to Russian conditions by correcting for difference in GDP per capita. The resulting values of environmental damage were found to be in the range from 142 USD/tonne of SO<sub>2</sub> to 2,200 USD/tonne (Markandya, 2000).

In comparison, the tax on sulphur dioxide in Sweden amounted to around 1,800 USD/tonnes in 2001<sup>11</sup>. This is not to indicate that the level in Russia should be the same as in Sweden, as the appropriate level of pollution charges, among other factors, will depend on the level of per capita income. As illustrated in Box 5, setting the level of pollution charges should depend on the costs of pollution abatement as well as on the social benefits of lower levels of pollution.

In connection with the Swedish sulphur tax it was estimated that the average costs of desulphurisation of flue gases would be on the order of 600 USD per tonne of SO<sub>2</sub> (SEPA, 1997). To induce polluters in Sweden to invest in flue gas desulphurisation, the charges would thus have to be at least at this level.

A recent World Bank study from the Chinese city of Zhengzhou found that a tax of 90 USD per tonne of SO<sub>2</sub> would provide an appropriate incentive to polluters to reduce emissions to a socially desirable level. A key issue in this estimate was the quantification of the benefits that would result from lower emissions. (World Bank, 1999).

97. Although the base rates for pollution charges applied in most of the EECCA countries are low (thus create few incentives to reduce pollution), the non-compliance fees are, depending on the country, up to 10 or 25 times higher than the base rate. In Russia, pollution charges are also corrected based on regional coefficients, having values between 1 and 2, depending on the severity of the pollution in the area. The applicable rate may thus be 50 times higher than the base rate. Box 7 presents an example of a Russian enterprise where the high non-compliance fees contributed to provide the incentives for the enterprise to reduce the level of pollution to the permitted levels of discharges.

**Box 7: Non-compliance fees and incentives to reduce pollution in Russia**

The Russian enterprise Akron, a major producer of fertiliser and ammonia, rehabilitated its wastewater treatment plant in 1997-1998. Akron's total amount of water effluent charges amounted to 734 thousand roubles (127 thousand USD) in 1997. 85% of this payment was for effluents in excess of the permitted levels. The rehabilitation of the wastewater plant enabled Akron to reduce its discharges of various water pollutants substantially; especially emissions of various nitrogen compounds, formaldehyde and mineral oils. After the rehabilitation, Akron no longer had to pay charges for emissions above allowable limits, and the annual pollution charges amounted to 168 thousand roubles (7 thousand USD) in 1999, thus a reduction by 120,000 USD compared with the level in 1997.

The pollution charges as such would have had little financial impact on the enterprise, whereas the possibility for reducing the payment of the much more substantial non-compliance fees appears to have contributed to the decision to rehabilitate the wastewater treatment facility.

98. Even though non-compliance fees may provide stronger incentives than just the base rates, the non-compliance fee will only provide an incentive to reduce pollution to the permissible level. The

11. The charge is 30 SEK per kg sulphur which is equivalent to 15 SEK per kg SO<sub>2</sub>.

permissible levels of discharges are in many cases set at levels that the enterprises can conform with, for example:

- Although the intention was that the Temporary Compliance Levels in Russia should be based on the application of best available technology, factors such as the financial situation of the enterprise and employment considerations have typically been dominant. The practice has often been to set the TCLs equal to the present level of emissions (Kozeltsev, 1997).
- In some EECCA countries, it has been reported that the MPLs are determined based on installed production capacity rather than actual production levels. The general decline in industrial production has resulted in many enterprises now conforming with the limits without having improved their relative environmental performance.

#### ***4.4.2 The method for determining the due pollution charges***

99. The way in which discharges of polluting substances are determined for the purpose of calculating the pollution charges may also have an important impact on the incentives provided by the economic instrument.

100. The pollution charge systems cover, as mentioned, a great number of pollutants. Monitoring of actual emission is undertaken only in case of the key polluting substances, and in many countries, including OECD and EU, the actual discharges are estimated as this approach can in many cases be cost-effective. These estimates may be prepared in various ways and with varying precision. Often emissions will be estimated on how the technology employed functions, input of materials, levels of production or similar parameters.

101. However, basing pollution charges on estimated rather than actual discharges weakens the incentives provided by the economic instruments. When discharges are estimated based on inputs and use of technology, there is no direct link between the actual reduction in discharges and reduction in liable pollution charges. The instruments will, therefore, provide less certain financial rewards (or none at all) for improving environmental management.

102. It is not argued here however that all pollution charges should be based on actually measured discharges. For many discharges, actual measurement is not a feasible option, and for many pollutants the costs of monitoring would by far outweigh the benefits. The point is rather that pollution charges will only be well suited to provide incentives for improving environmental performance for a rather limited number of pollutants. In OECD countries, it can also be observed that air emission charges are only applied in few instances and to a very limited number of air pollutants only which can actually be measured at reasonable cost, for example SO<sub>2</sub>. Most pollutants in OECD countries are regulated through various forms of standards and permits.

#### ***4.4.3 Implementation and enforcement issues***

103. The actual incentives provided by the pollution charges are not only determined by the design of the system but also by the way in which the charges are implemented and enforced in practice. Lenient enforcement leaves space for polluters to avoid paying due charges, which would substantially reduce the incentive for enterprises to implement pollution control measures. In addition, since polluters are responsible for reporting their own discharges, the environmental authorities have limited resources for controlling these figures.

104. In general the collection rate provides an indication of whether polluters in fact face the full financial penalty of their polluting activities. However, data on the collection rates for pollution charges in EECCA, i.e. the share of the levied pollution charges that are actually collected, is sparse. There appears to be great differences in collection rates among the countries. For example, Armenia reports that only 1% of the levied effluent charges were paid in 1998, whereas Russia reports the overall collection rate at around 60% (including non-monetary settlements), in the same year.

105. It should also be mentioned that during the second half of the 1990's, part of the pollution charges were settled in various non-monetary forms, e.g. barter, veksels and offsets in many of the EECCA countries. One common form of non-monetary settlement was (and in some cases still is) the so-called "pollution charge offsets" where enterprises were allowed to "exchange" due pollution charges for their promise that equivalent funds would be spent on an approved environmental improvement programme.

106. On the one hand, the possibility of offsetting due payments against investments in an enterprise may have a positive effect, as ideally it can induce enterprises to undertake environmental investments where the alternative might be no action and non-payment of the charges. On the other hand, there are several problems which arise when actual pollution charges offsets are applied. Firstly, the "offsets" tie investments to the enterprise that pay the pollution charges. Such environmental protection activities may not correspond to the broader societal aims, as it may not represent the most cost-effective way to address a specific environmental problem. The charge offset system reduces the degree of freedom the environmental authorities have in using the available resources for the most environmental and cost-effective projects.

107. In addition, the review of the pollution charge system has indicated a number of areas where environmental authorities have often substantial discretionary powers with regard to how the pollution charges are assessed, levied and enforced. These powers include, inter alia:

- Setting the Temporary Compliance Levels, which in turn determine how much enterprise will be liable to pay in non-compliance fees.
- Waiving pollution charges, e.g. based on the perceived ability of enterprises to pay the charges.
- Granting pollution charge offsets in exchange for investment.
- Lenient enforcement, which is usually reflected in the low collection rates.

108. The mere existence of the option to negotiate a "better deal" with environmental authorities implies that enterprises may shift focus from reducing the level of pollution into an attempt to gain exemptions or other privileges - often termed "rent-seeking" activities. In addition to the poorer environmental performance, the resources enterprises spend on rent-seeking activities generate no social benefits and are thus largely wasted from a broader social point of view. Furthermore, the discretionary powers delegated to the environmental authorities may open a window for corruption.

## 5. PRODUCT CHARGES AND TAXES

109. Product charges/taxes are payments levied on products that may have a negative effect on environment during their production, consumption or disposal (Box 8). Even though the product charges in certain circumstances appear to provide an effective contribution to environmental management, there are only few examples of such instruments being used in EECCA. There are, however, several examples of taxes/charges that are levied for fiscal purposes, but on a number of potentially environmentally harmful products. Irrespective of the motives for the introduction of the product charge/tax, the instrument may create incentives for an improved environmental performance and when considering policy instruments for environmental protection. Thus, it is necessary to look at all forms of taxes/charges on products, which may lower environmentally harmful effects.

110. In the present review product taxes/charges that are in use in EECCA, have been divided into two main groups:

- Environmental product taxes/charges, i.e. payments levied for the purpose of protecting the environment; and
- Environmentally related product taxes/charge, i.e. fiscal product taxes/charges on environmentally harmful product, which mainly concerns taxes/charges on energy products and payments related to the use and disposal of motor vehicles.

### **Box 8: Product charges versus pollution (emission) charges**

Product charges are levied on products that have a negative environmental impact during the production, consumption or disposal process. While pollution charges are levied directly on the level of discharges, product charges work in an indirect way by affecting the demand for the products that are supposed to cause environmental damage. Product charges are, therefore, often labelled "indirect instruments" as compared to direct instrument such as pollution/emission charges.

The effect of a product charge will, among other factors, depend on the price responsiveness of the product, i.e. how much the demand will change in response to a price change. Furthermore, the availability of environmentally less harmful substitutes is also a key determinant that affects effectiveness.

Product charges do not provide any incentives for enterprises to undertake abatement measures to reduce emissions as the payment of the charge depends on the quantity of the taxed product that is used rather than on the actual discharge of polluting substances. A key factor for the environmental effectiveness of a product charge is, therefore, that there is a direct relation between the use of the product and resulting pollution. Emissions of CO<sub>2</sub> would be an example of a situation with very close connection between the amount of carbon in fossil fuels and the resulting emissions. Consequently, carbon dioxide taxes in the OECD are levied as product charges on fossil fuels based on their carbon content, and no measurement of actual emission is required.

### **5.1 Environmental product charges/taxes**

111. There are only few examples where environmentally harmful products are subject to a tax. Armenia is the only country where such charges are placed on a number of products. In some countries, tax differentiation has been introduced among similar products but with different environmental impact. Tax differentiation between leaded and unleaded gasoline is a case in point. Table 8 summarises the reported use of product charges reported by the EECCA countries in year 2001, and some examples are subsequently presented.

**Table 8: Reported use of environmental product charge in EECCA, 2001**

Armenia	A product tax on a broad range of environmentally harmful products including lead containing paint, asbestos, freon containing equipment, detergents and luminescent lamps. Rates vary from 0.5% to 3% of the price of the products.
Georgia	A product tax is levied on fuel oil where the tax level is dependent on the sulphur content of the fuel oil: 5 USD/tonne of fuel oil with less than 2% sulphur and 10 USD/tonne of fuel oil with more than 2% of sulphur.
Tajikistan	A tax of 5% is levied on a number of environmentally harmful products, including pesticides and fertilisers.
Georgia, Kazakhstan, Moldova, Russia	Several EECCA countries have introduced differentiated taxes between leaded and unleaded gasoline. In Moldova the tax differences amounted to 0.25 US cents/litre and in Kazakhstan the difference could be up to 4.4 US cents/litre (maximum value in Almaty).

### 5.1.1 Environmentally harmful products

112. In Armenia, product charges were introduced in 1999 on a large number of environmentally harmful products. This included products containing asbestos, lead and freon as well as various plastics and detergents. The tax rates are in the range of 0.5% to 3% of the price. A rate of this size will, in most instances, have a minor effect on the demand and substitution by other products. The environmental effect is thus, most likely, limited. In Tajikistan, a tax of 5% of the costs is levied on a number of environmentally harmful products. This included pesticides and fertilisers.

#### *Sulphur content in fuel oil*

113. In Georgia, there is substantial tax differentiation between low and high sulphur oil in favour of the former. This differentiation should provide an economic incentive to use oil with lower sulphur content. The environmental effect is, however, reduced by the fact that the same rate applies to all types of fuel oil as long as the sulphur content is lower than 2%. This means that there is no incentive to reduce the sulphur content further below 2%. A product charge based on the actual sulphur content in the fuel oil would much better mimic an emission charge on SO<sub>2</sub>. Similar taxes on Sulphur content of fuels is used in the EU, for example Denmark. However, there the tax is proportional to the actual amount of sulphur.

#### *Tax differentiation for unleaded gasoline*

114. Georgia, Kazakhstan, and Moldova are reported to have introduced tax differentiation for leaded and unleaded gasoline in favour of the latter. The tax difference between leaded and unleaded gasoline in Moldova amounted to around 0.25 US cents per litre in year 2001. In Almaty, the former capital of Kazakhstan, tax difference between leaded and unleaded gasoline was as much as 4.4. US cents per litre in 2001

115. In some EECCA countries, e.g Russia and Belarus, the pollution charge system applies also for mobile sources. As a result, there would be a small difference in the applicable pollution charge for leaded and unleaded gasoline. The resulting tax difference in Russia amounts to less than 0.1 US cent per litre.

### 5.1.2 Fiscal product charges/taxes

116. Taxes or charges levied on products for fiscal purposes may have a potential environmental effect, since the payment is often levied on products with environmentally harmful effects. In the OECD, taxes on transport vehicles and energy are often included in the statistics on economic instruments taking

account that such taxes have potential for promoting environmental objectives. In EECCA, this concerns in particular transport-related taxes and taxes on energy products.

#### *Transport-related taxes and charges*

117. All EECCA countries have a broad range of transport-related taxes/charges. These include taxes/charges on vehicle purchase, import, ownership and use, as well as excise taxes on transport fuels. These payments are used for fiscal purposes and are transferred to the general budget or, in some cases, to special Road Funds that finance road maintenance and construction. The transport-related taxes/charges that typically are in place in each of the EECCA countries are described below. These taxes/charges are mostly of fiscal character and their environmental impact is limited:

- Excise taxes for imported cars - typically depending on the volume or power of the engine or as a percentage of the costs.
- Excise duties levied on the sale of vehicles - typically based on the volume or power of the engine.
- Annual charges for car ownership - charges depend typically on the volume or power of the engine and may be differentiated based on the age of the car. For example in Kazakhstan, the charge for old cars is lower, which could give financial incentives for keeping older, more polluting cars.
- Excise taxes levied on gasoline as well as VAT - a few countries have differentiated taxes for leaded and unleaded gasoline as mentioned above.
- System of pollution charges which apply for mobile sources - based on the charges for emission of the relevant pollutants; charges are determined and levied on fuel use or car ownership.
- Road taxes - these road taxes are sometimes determined as a percentage of general revenue and thus not related to the actual transport work. For imported vehicles, these road taxes reflect the mileage and the size of the vehicle's engine.

118. In addition to the general revenue raising purposes, these transport-related taxes have the effect of increasing the costs of transport by vehicles. In general, however, the design of the charges and taxes does not appear to reflect environmental consideration, e.g. by having higher annual taxes/charges for the vehicles that pollute more. It would require a more detailed analysis to understand possible environmental effects of such charges and taxes.

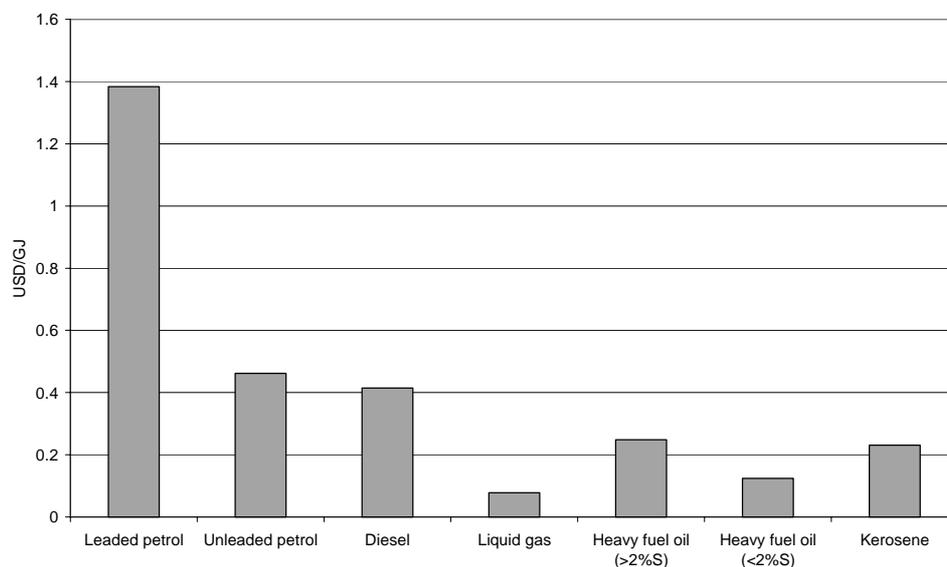
#### *Taxes on energy products*

119. Combustion of fossil fuels can result in negative environmental effects, and the costs of energy may have an important impact on the incentives to reduce energy consumption. More importantly, the relative prices of different energy forms may have a strong impact on the choice among different energy forms, which give rise to different levels of environmental effects when used.

120. The form and design of energy taxes differ markedly among various EECCA countries. Excise taxes on transport fuels are commonly used but less so for other energy carriers. This review did not attempt to collect enough data to present a full picture of energy taxation in EECCA.

121. Georgia introduced taxes on energy products in 1993 as a part of the resolution on introduction of taxes on pollution of the environment with harmful substances (Figure 9). Originally, only gasoline and diesel were taxed, but taxes on heavy fuel oil, natural gas and kerosene were later added.

**Figure 9 : Environmental taxes on fossil fuels, Georgia 1999**



122. In addition to the above described environmental taxes on fossil fuels, VAT and excise taxes are levied on petrol, diesel, heavy fuel oil and various other oil products. In general, the revenues from these taxes are much higher than from environmental taxes. In 1999, revenues from excise taxes amounted to 52 million GEL (8.0% of the budget revenue), VAT 30 million GEL (4.6% of budget revenue) and environmental fuel taxes 15.6 million GEL (2.3% of budget revenue)<sup>12</sup>.

## 5.2 Administrative issues related to product charges/taxes

123. One of the important factors in assessing the effectiveness of instruments is the collection rate. The sparsely reported data indicates that higher collection rates have, in general, been achieved from product charges than from the pollution charges. For example, the collection rates for taxes on vehicles and taxes on environmentally harmful products in Armenia have been reported to be near 100%. One explanation for this high rate is the fact that the taxes are levied at the import level, which means that monitoring, control and collection is limited to a few entrance points where these can be undertaken as part of the customs control. For vehicles, control and monitoring is facilitated by the easy identification of the taxable object.

124. The administrative efficiency of product charges depends, inter alia, on where in the distribution chain the charges are introduced and on how they are introduced. Generally, the collection of tax in an early stage of distribution will reduce the administrative burden of the charge (see also Box 9).

12. Energy Related Environmental Taxes Applied in Georgia, 2000.

**Box 9: Georgian experience on collection of energy taxes**

Georgia introduced a set of product charges on energy products in 1993 as a part of the system of environmental charges. The revenue from these product charges on energy products rose significantly in 1998 and 1999. The total revenue from environmental charges amounted to 2.6 million GEL in 1997, 6.9 million in 1998 and 16.6 million GEL in 1999. The energy taxes represented around 95% of the total revenue from environmental charges in 1999.

The main reasons for the increased revenue was due to higher collection rates for the environmental energy charges, as the point of imposition was changed from the retail level to the level of importer/producer. In 1997, the energy charges were levied on the retail level, but from mid 1998, the charges were levied on the importer/producer level, and collection has since increased markedly. It is easier to control and monitor a few importers and producers than thousands of retail outlets.

## 6. OTHER ECONOMIC INSTRUMENTS IN USE IN EECCA

125. In addition to the system of pollution charges and various product charges, a number of specific individual economic instruments are in use in EECCA. They may provide incentives for an improved environmental behaviour and/or generate revenue. In this section the following instruments are presented:

- Deposit-refund systems.
- User charges.
- Environmental liability schemes.

### 6.1 Deposit-refund systems

126. Deposit-refund systems operate on the basis of a surcharge which is added to the price of a potentially polluting product. If and when the product is returned to an established collection point, the surcharge is refunded. Such schemes aim to promote recycling/reuse of the product or to promote the collection of specific environmentally harmful products in order to ensure that they are safely disposed.

127. Belarus is the only EECCA country that has reported the use of a deposit-refund system operated by the public authorities with a defined surcharge that is refunded upon return of the empty bottles.

128. Often markets for recyclable or reusable products tend to form on their own if the profit in recycling is high enough. Profitable markets for recycled material are common in most EECCA countries. They exist, for example, for waste paper, scrap metals and used glass bottles. These markets cannot, however, be regarded as a deposit refund scheme as such (Box 10).

**Box 10: System of recycling of bottles in Moscow**

Moscow, like most other major cities in Russia and other EECCA countries, has a system for collection and re-use of glass bottles. However, the present system is not a formal deposit-refund system where an explicit deposit is paid upon purchase and refunded upon return of the bottle. Rather, it is a “market-based” system for collection and trade in glass bottles based on commercial interests of the involved parties; similar to a market in scrap metal.

In the time of the Soviet Union, an official deposit-refund system for glass bottles was in place where the deposit/refund amounted to about 40% of the sales price of a bottle of beer. There was a formalised system of collection points and delivery of bottles to the breweries.

Today, a more complex collection system has sprung up. A large number of collection points for bottles such as kiosks and similar shops purchase used bottles and earn a profit by selling these bottles on to wholesale bottle traders or directly to the breweries. The price received for returning a used bottle differs among collection points but on average it is around 1 Rouble (below 10% of the price) where breweries maybe pay around 1.5 Roubles per bottle.

The market-based system for collection of bottles appears to be quite successful in collecting bottles for re-use and thus reducing pressure on the environment as well as reducing the use of primary resources. The fact that it is an unregulated market system also implies that there will be an incentive to minimise the overall administration costs of the collection system and find efficient ways of organising the activity. This is a task a formal deposit-refund presumably would have much greater difficulties in solving in a cost-efficient way.

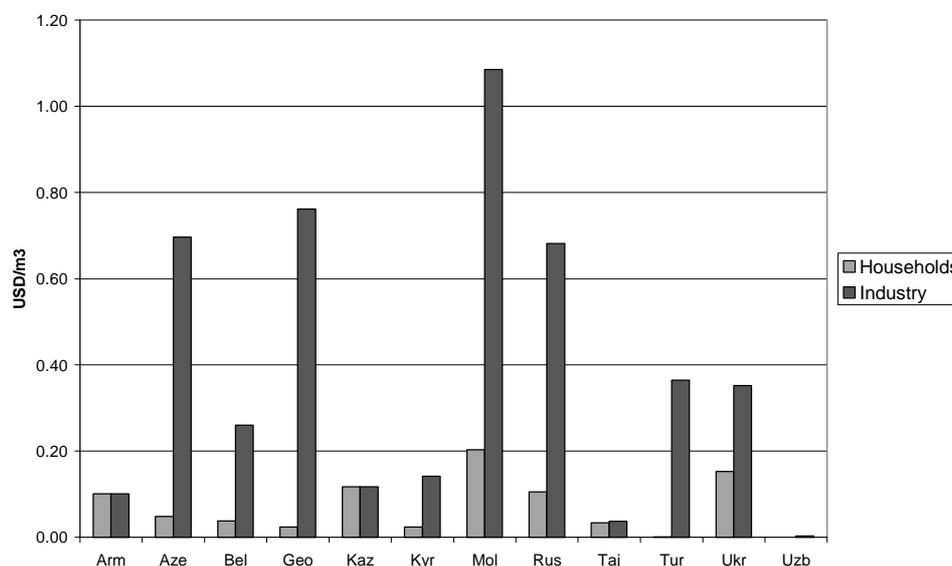
**6.2 User charges**

129. A user charge is, by definition, an instrument aimed at recovering the costs of providing services, typically for water supply and sewerage or municipal solid waste collection, treatment and disposal.

**6.2.1. Water supply and wastewater collection/treatment**

130. User charges are applied to water supply and wastewater services in all EECCA countries, though the level and degree of cost recovery varies greatly among and within the countries. Figure 10 below shows the typical user charge for households and industrial consumers for water supply and wastewater collection in the capitals of the EECCA countries. It clearly shows that water prices for industry are in nearly all EECCA countries higher than the price for households. An extreme situation can be observed in Georgia and Azerbaijan where the price for industry in the capital are reported to be almost 20 times higher than the price for households. In Armenia, Kazakhstan and Tajikistan the prices are the same for industry and individual users. The data collected shows that in Turkmenistan and Uzbekistan water for the population is provided at practically no cost. Appendix 4 shows user charges in the EECCA capitals for the years 1998 and 2001.

**Figure 10: User charges for municipal water supply and wastewater services in the capitals of selected EECCA countries, 2001**



131. If well designed, the user charges may also provide economic incentives for better environmental performance. For example, if user charges for water supply are based on actual, metered water consumption, this can provide an incentive for water saving, as the metering shows to a consumer the real amount of water used and its costs, which can stimulate reduction of water use to lower the water bill. In addition to the reduced pressure on water resources, such behaviour can also reduce the amount of discharged wastewater.

132. Some key issues in the evaluation of user charges for municipal water and wastewater services in EECCA include the following:

- **Degree of cost coverage**

The key purpose of user charges is to recover costs. Costs of service in EECCA have typically meant operating and maintenance costs, as new investments often have been financed from directly from the budget.

- **Metering of consumption**

In all the EECCA countries, payments are based on a combination of norm-based and actual consumption. The economic incentive to reduce water use is only provided in cases where the base is the actual and metered water use.

- **Cross-subsidisation between customer groups**

The extent to which cross-subsidisation occurs differs significantly among EECCA countries. Kazakhstan and Armenia have reported that user charges for households and industrial enterprises are the same. However, in most other countries the charges per m<sup>3</sup> levied on households are much lower than the industrial charges. Household charges are often subsidised out social concerns, although part of the households may well pay the full costs of service.

### 6.2 2. Solid waste charges

133. The reported systems for charges for municipal solid waste collection for households typically consist of a monthly charge per person or household where the charge forms part of a larger total payment for several municipal services. User charges for solid waste serve mainly to finance the costs of waste collection and disposal.

134. In addition the user charge is often determined as a fixed payment per month. With such an approach, there is no incentive for the households to reduce the amount of solid waste and the instrument serves only to raise revenue/cost coverage.

135. In addition to user charges, various countries introduced charges on disposal of specific types of waste. These charges are levied on specific waste products and collected from the industries producing these types of waste. The charges aim to contribute to the costs of disposal/treatment of such specific types of waste. The Table 9 shows reported specific charges for waste disposal.

**Table 9: Selected specific charges for waste products in EECCA**

Kazakhstan	Charge for disposal of mercury containing lamps
Kazakhstan	Charges for disposal of liquid and solid radioactive waste in special sites
Ukraine	Charge for disposal of mercury containing waste
Belarus	Charge on disposal of packaging waste

### 6.3 Environmental liability

136. Environmental liability systems represent an alternative approach to environmental regulation. In considering incentive-based and revenue-based instruments, environmental liability systems could serve at different time both goals. A system of strict environmental liability where a polluter is financially responsible for damages will provide important incentives for the polluter to undertake measures to reduce the risks of causing damage. The imposition of liability effectively places an "expected" price on polluting activities. In case of actual damage, the responsible party would be liable for paying compensation.

137. All the EECCA countries report having environmental liability systems where the legal and physical person may be liable to pay compensation for environmental damages, either to the state or to individuals. The compensation for environmental damages in EECCA countries is typically determined based on complex methodological guidelines for determination of the value per unit of the natural resources that may have been damaged, e.g. fish resources, land or forests. These standard values are then multiplied by the physical amount of damage for which the violator is deemed responsible, to obtain the monetary value of the liability. It is usually the public administration that determines the size of the compensation for damage according to such methodological guidelines. Any disputes on the amounts assessed are settled in the court.

138. In Russia, the environmental liability is defined in the Civil Code of the Russian Federation. The size of compensation is determined by administrative bodies based on actual expenses for rehabilitation of polluted/damaged environment plus losses, including loss of profit. Alternatively, a number of standard methodologies are applied for determining the damages; such methodologies exist for example for:

- Methodology for damage assessment and penalty calculation for damage from extermination of animals and disturbance of their biotopes, approved by Goskomekologia of RF, DD 28 April, 2000.
- Methodological recommendations on assessment and compensation of environmental damage caused by violation of the environmental legislation, approved by Goskomekologia of the RF, September 6, 1999
- Methodology of assessment the damage caused by ground water contamination, approved by Goskomekologia of the RF, MNR RF, Ministry of Finance, DD 11 February 1998, 31 May and 1 June, 1999.

## **7. CHARGES/TAXES FOR NATURAL RESOURCE USE/EXTRACTION**

139. The introduction of taxes/charges for use/extraction of natural resources in the Soviet Union dates back to the early 1980s when payments for the abstraction of water (different payments than water user charges) were introduced. Later, payments for use of forest product, as well as extraction of minerals and hydrocarbons were also put in place. Today, all the EECCA countries have more or less similar systems for payments for use a variety of natural resources.

140. The present chapter reviews the main types of payment and charges for the use of natural resources. It is organised according to the types of natural resource, i.e., water resources, mineral resources, forestry, and nature/biodiversity. Appendix 5 contains summary tables on taxes/charges for natural resource use/extraction;

141. It should be noted that the aim of this review is not to provide a comprehensive overview of all the applicable payments for extraction and exploitation of natural resources, as the countries have various forms for licence payments and fees and in many cases these have minimal impact on natural resource management. The key aim is to review the types of charges, taxes and fees that may have an impact in a sense that they present economic incentives to change the management/rate of exploitation of the natural resource.

### **7.1 Incentives and payments for natural resource use/extraction**

142. Most of the taxes and charges applied in the field of natural resource use and extraction in EECCA countries serve in practice, first and foremost, to collect rent. The concept of natural resource rent and taxation is briefly discussed in Box 11. Although it is often a stated goal in laws on natural resources in various EECCA countries, the taxes and charges on natural resource use and extraction only in few instances provide real incentives to improved management of natural resources.

143. Natural resources in EECCA are predominantly managed through quantitative measures, for example, through granting licences to utilise certain natural resources. These licences typically specify the permissible rate of use or extraction. Similarly to the system of pollution charges, natural resource payments are levied on the use or extraction within certain specified limits. For resource use or extraction above these limits, non-compliance fees apply.

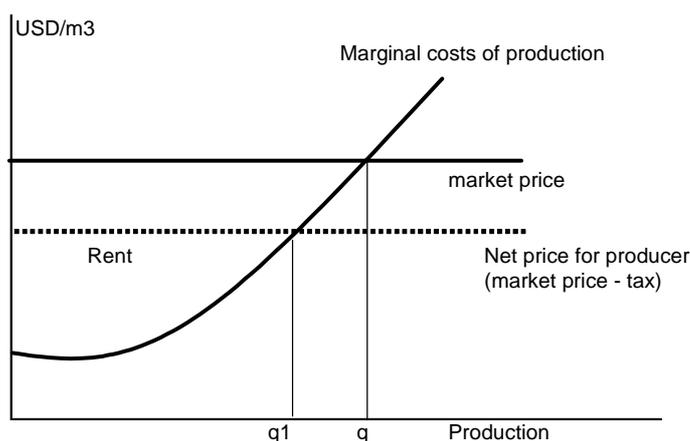
144. Part of the revenue from some of the natural resource charges is intended to be used for financing some form of restoration of natural resources. Forest charges are used for reforestation, part of the revenues from land taxes is intended for land restoration, and a specific charge on mineral extraction is, in some cases, intended to finance the exploration for new reserves. To the extent that revenues from such charges are used to finance natural resource management activities, the economic instrument would of course have an impact on natural resource management, but as a financing device rather than an incentive.

**Box 11: Natural resource rents and taxation**

Exploitation of natural resources typically gives rise to so-called “economic rent” where the rent is the excess profit derived from exploitation of such natural resources over and above the costs of the inputs required to exploit the natural resource, including a normal level of profits. The rent can thus be seen as a form of extraordinary profit accruing to the resource not because of good management but solely due to the intrinsic qualities of the resource. An oil deposit on shore with low production costs will, for example, generate a higher rent than an offshore deposit with high production costs.

The charges and taxes aimed at collected resource rents are fundamentally different from, for example, pollution charges. Where one of the aims of pollution charges would be to provide incentives to reduce emissions, the capture of rents is ideally purely fiscal and should not affect decisions on how to optimally utilise the resource. The ways rents are collected in practise will, however, often have an impact on resource utilisation.

For a natural resources deposit where the market price is given, production based taxes (or royalties) will depress the price the producer receives. Such a tax will not provide incentives to an improved management of the resource and may result only in the most valuable part of the deposit being exploited (high-grading). This is, in a simplified way, illustrated in a figure below. The production based tax would move the optimal level of production from  $q$  to  $q_1$ , as the producer will only produce as long as the net sales price is higher than the marginal costs of production.

*Production based taxes and natural resource use*

The natural resource rent may be collected through taxes that are dependent on the actual or expected rents. Such forms of rent collection would be expected to have less impact on the optimal level of production, but are typically administratively and institutionally more complex.

**7.1.1 Economic instruments related to use of water resources**

145. The major groups of economic instruments for water use are abstraction charges, charges for water use for hydro-electric production, and transportation. Table 12 in Appendix 5 provides an overview of the economic instruments used in connection with quantitative aspects of water resources in the individual EECCA countries.

*Abstraction charges*

146. All EECCA countries have tariffs or taxes that require economic entities to pay for the abstraction of surface or groundwater. The rates vary greatly among EECCA countries and, for example in Azerbaijan, the rates are practically nil while in Ukraine, the charge reaches the level of more than 20 USD for 1,000 cubic meters depending on the source.

147. Table 9 provides an overview of the basic rates for water abstraction for surface and ground water. Charges are differentiated in most countries depending on the watershed or region in which the water is abstracted, principally reflecting water availability.

**Table 9: Reported charges for water abstraction in EECCA, 1998-99**

Country	Charges Surface water USD/1000m <sup>3</sup>	Charges for ground water USD/1000m <sup>3</sup>	Comments
Armenia	0.1 - 2.9	0.1-1.9	Irrigation free of charge except for water from lake Sevan.
Azerbaijan	0.2	no	Irrigation pays per ha of irrigated land.
Belarus	1.4	2.2	50% of rates for irrigation and public water supply.
Georgia	3.5-10% of market price	2-8% of market price	The rate for irrigation is 1% of the normal rate.
Kazakhstan	0.6 - 0.8	Royalty payments	Rates differ by river basin. Rates irrigation and public water supply is about one third of normal rates for surface water.
Kyrgyzstan	0.001	5 % of price	
Moldova	14	14	50% of rate for irrigation.
Russia	2.0-12.7	2.0-12.7	Agriculture exempted. Russia has special rates for use of territorial and inland seas: up to 0.3 USD/1,000 m <sup>3</sup> .
Tajikistan	n.a	n.a.	
Turkmenistan	0.006	0.006	Charge is only applicable for commercial organisations.
Ukraine	3.8-22.5	7.5 - 23.5	Various coefficients are used for special water use, e.g. municipal water supply rates are 10% of normal rates.
Uzbekistan	2.9	3.8	Municipal water supply: 50% of rates, irrigation about 5% of rates.

148. In EECCA water users must typically have a licence, and the charges listed above apply for water abstraction allowed within the limits of the licence. For abstraction of water in excess of the licence, non-compliance fees are typically applied, and in Russia, for example, non-compliance fees are equal to five times the basic rate.

149. The incentives to reduce water use will depend on the level of charges and how these are levied on the users. In several countries, irrigation and municipal water supply enjoy exemptions or reduced water abstraction charges. A more important point with regard to promotion of efficient water use is how the costs of water supply to various users are covered, i.e. whether users pay the full costs of water supply.

150. Certain forms of water resources use do not relate to the water quantity or quality, but are paid for using water courses for various purposes. Several EECCA countries have introduced payments for such forms of water use as the use of water bodies for transport or the production of hydroelectricity.

151. It is common that a charge is imposed for water used for hydro-electric production. Such taxes are either based on the water that runs through the turbines or on the amount of electricity produced. In Armenia, the tax for water for electricity production is 3 USD/1,000 m<sup>3</sup>, in Ukraine 0.04 USD/1,000 m<sup>3</sup> and in Georgia it is 0.07 USD/1,000 m<sup>3</sup>. In Russia, the tax in 1999 varied between 0.05 and 0.5 USD/MWh electricity produced.

152. Taxes for water used for transportation are also in force in some countries. In Russia, payments are charged for transport of timber on rivers according to distance and quantity.

153. In Russia, a charge is paid for discharging wastewater into water bodies. This charge is an additional to the pollution charges and does not depend on the quality of water (which is regulated through the pollution permitting and charge system), but reflects only physical discharge of water. A payment of 7 to 55 Roubles (0.2-1.8 USD) per 1000 m<sup>3</sup> applies depending on the river basin.

### ***7.1.2 Mineral resources and hydrocarbons extraction***

154. Table 13 in Appendix 5 includes information on the economic instruments used in connection with extraction of minerals and hydrocarbons in the individual EECCA countries.

155. The table shows that all EECCA countries apply production-based taxes and charges for the extraction of sub-surface minerals and hydrocarbons, but the main purpose of these taxes is to collect the natural resource rent.

156. Extraction taxes and charges are typically levied as a percentage of the market value of the extracted product and vary among types of natural resources. For example, in Armenia, charges are imposed on 63 different types of subsurface resource, including gold, silver and platinum (1.5% of market price), coal, peat and shale (3-5% of market price), and various raw materials for metallurgy, chemical and other industries (3-6% of market value).

157. The charges are typically much higher on hydrocarbons and, in Azerbaijan for example, extraction taxes amount to 26% of the market price for crude oil and 20% for natural gas. For noble metals, the tax amounts to 8% of the market price and for ferrous metals 3%.

158. There is, however, no common level of such charges across EECCA. In Kyrgyzstan, for example, the extraction tax for oil and natural gas amounts to only 2% of the market price.

159. In some EECCA countries, as in Belarus and Ukraine, the extraction taxes have been determined as fixed sums per tonne of extracted material. These rates are then revised based on inflation and market conditions.

160. The level of the tax on extraction of minerals should, among other factors, reflect the value of the deposit, so minerals with low production costs could be taxed higher than deposits with high production costs, as the level of profit would be higher for the former. This is reflected in the resource extraction taxes applicable in Russia, which has a system comprising more types of payments than most of the other EECCA countries. In Russia, there are three different types of extraction charges:

- Payments for the rights to use mineral resources. The rates are determined for each deposit and differentiated based on the costs of the extracted raw material. Rates amount to 1-16% of the estimated costs of extraction.
- Payment for "regeneration of mineral and raw material stocks," which is also based on the costs of production and may amount to between 1.7 and 10% depending on the type of resource. The payments should, in principle, be used for "replenishment" of the extracted resource by financing new exploration.
- Excise taxes levied on the produced quantity of oil or gas. These taxes are differentiated by the quality of the deposit, i.e. partly reflecting the costs of extraction.

### 7.1.3 Payments for forest use

161. Table 14 in Appendix 5 provide an overview of instruments for water use of forest resources in the individual EECCA countries.

162. All EECCA countries have fairly identical systems for payments/charges for the use of forest resources. The most common payment is for cutting trees (so called "stumpage" fee). The payment is determined for each tree that is cut and is based on a number of parameters, such as the tree species, the quality of the timber, the diameter of the trunk, and the necessary hauling distance. These parameters are all related to the net value of the timber. Similarly to the charges/taxes for subsurface extraction, the prime aim of the forest charges is to collect the rent. Table 10 presents an example of the how the charges for the stumpage fee are structured in Armenia.

163. The revenue from the forest charges is often according to the law intended to be used to finance reforestation schemes. This may be important in securing funds for such activities, but it is mainly a financing issue and thus not a question of incentives for improved natural resource management.

**Table 10: Example of structure of stumpage fees, Armenia (charges in dram/m3)**

Species of trees	Distance from the border of forest (km)	building timber (stem diameter),			
		>25 cm	13-24 cm	3-12 cm	firewood
Beech	up to 10	3640	3220	2800	700
	10-25	2800	2520	2240	630
	25-40	2520	2240	1680	560
	above 40	2240	1960	1680	420
Oak, ash-tree	up to 10	3920	3640	2800	700
	10-25	3080	2800	2240	630
	25-40	2520	2240	1680	560
	above 40	1960	1680	1400	420

## 7.2 Nature and biodiversity

164. Table 15 in Appendix 5 shows an overview of economic instruments used for conservation of nature and biodiversity in individual EECCA countries. There are a large number of different forms of payments for the use of nature, as well as hunting and fishing rights. Such payments increase the costs of utilising these natural resources and should be expected to have an impact on the intensity of nature use.

165. In 1999, Armenia introduced charges on collection of fruits and berries (30 dram/kg or 0.06 USD/kg) and nuts (60 dram/kg or 0.12 USD/kg) in the nature. Similar payments apply for collection of plants for medicinal, consumption or ornamental use.

166. In Russia, any person or legal entity involved in hunting must pay a tax per animal or per day of hunting. Penalty payments apply for hunting in excess of limits or for damaging the nature. Charges are determined as a factor multiplied with the minimal wage and the payment for e.g. a bear is 3-6 times the minimal wage whereas the tax on a beaver is only 0.2-0.6 times. For smaller animals and birds, payments are determined per day of hunting.

167. In Azerbaijan, all legal and natural persons who want to carry on non-commercial hunting must pay a charge. The charge level depends on the type of game and includes an upper limit for the number of game that may be killed during one season. The charge for e.g. brown bear is 165,000 manat (43 USD) per animal (max 1 bear per year). For most other game, the rate is about 10,000 manats/killed game and the maximum allowable number varies between 2 and 20 per year.

## 8. DIRECTIONS FOR REFORM OF THE USE OF ECONOMIC INSTRUMENTS IN EECCA

168. The review of the use of economic instruments in EECCA for environmental protection points to a need for reform of such instruments to enhance their effectiveness and efficiency. Today, a number of factors in the design and implementation of economic instruments limit their effectiveness. A reform in the use of economic instruments should, however, not be seen as an isolated activity, but must be designed as one element among others measures that would lead to a creation of a coherent and effective mix of policy instruments, which address specific priority environmental problems. Such policies and programmes must be developed in the broader context of the economic and social situation in individual countries, as well as state of the environment. The present chapter outlines possible directions for reforms in the use of economic instruments for environmental protection and the key issues that will have to be addressed in this process.

### 8.1 Key findings from the survey

#### *8.1.1 Pollution, product and user charges*

169. Today, more than a decade after the break-up of the Soviet Union, all EECCA countries still apply comprehensive systems of pollution charges based on the Soviet system introduced in 1990. A defining feature is that the pollution charges and payments for natural resource use are closely linked with the enterprise-specific physical emission/utilisation limits that are laid down in environmental permits. The pollution charges are applied to a large number of air pollutants and water discharges and waste. Calculation of pollution charges is typically based on estimated rather than actual emissions. Standard pollution charges apply only to emissions within the limits set in the permits, whereas much higher non-compliance fees apply if the emissions exceed the limits. A similar system is used for the use of natural resources.

170. There are a number of fundamental features that limits the effectiveness of the pollution charge system in EECCA. In the majority of cases, charges in EECCA are far too low to provide adequate incentives to improved environmental behaviour. The non-compliance fees, which are much higher than the pollution charges, may provide some incentives, but in practice weak enforcement and problems with the execution of payments limit this. The fact that the authorities responsible for the administration of the systems often have rights to adjust emission limits, waive charges and enter into various forms of non-monetary settlements substantially reduces the effects from the instruments and the whole system, opens a window to corruption and encourages enterprises to engage in rent-seeking behaviour.

171. The fact that a large number of pollutants is subject to charges puts high demands on the related systems for monitoring and control. These demands cannot be met in the current situation due to a limited monitoring capacity and resources available for sampling analysis and data collection. In addition, for some pollutants the charges are estimated on the basis of indirect indicators, such as employed technology, production plans and various standard emission factors. This in principle can be a cost-effective approach

but it is not the case in EECCA, as the charges are calculated according to designed capacities of installations, which are usually far from reality. This may lead to the situation that some enterprises are required to pay for the pollution they do not release or alternatively, enterprises may improve their environmental management and reduce emissions, but with no guarantee that this will be reflected in reduced payments of pollution charges.

172. Only a few experiments have been launched in EECCA with other types of economic instruments for pollution control, such as product charges. Many countries report that new instruments are being considered, but face general opposition to such environmental measures from sectoral government agencies and industry. The major exception to this observation is a large number of transport-related product charges on vehicles and transport fuels. These charges, however, have typically been introduced for fiscal purposes rather than environmental ones.

173. User charges for municipal services exist in all EECCA countries and cover water supply, wastewater collection and treatment, as well as collection and disposal of municipal solid waste. While they aim at covering the costs of providing respective services, the rates are in many cases well below the level of full cost recovery. This is mainly due to social concerns inherited from the Soviet Union but also generated by growing poverty and widening gaps between different groups in societies.

### ***8.1.2 Natural resources taxes and charges***

174. In principle, the use of natural resources in EECCA is managed through granting the licences to a user. The licences typically specify the permissible rates of the use or extraction of a resource. The total use or extraction of a given resource is then managed through the overall policy of licence granting. In addition, however, all EECCA countries apply a comprehensive system of payments for extraction and use of practically all types of natural resources. Most of these taxes and charges serve, first and foremost, the purpose of collecting part of the resource rent. Only in a very few instances do they provide real incentives for improved natural resources management. While water abstraction fees could be a major exception from this, the fact that agriculture is often either exempted or given reduced rates substantially weakens the possible overall effect as it reduces incentives for this sector to save on water use.

### ***8.1.3. Revenue and earmarking***

175. Although the incentive effect is often stated as the principal objective of the instrument, the real effect is that many of the economic instruments in use in EECCA serve as fiscal instruments to raise revenue.

176. The revenues generated by various instruments are directed to the state budget but in a number of cases the revenue is earmarked for specific purposes, and it is channelled through environmental funds. In any case, though, the revenue raised by these instruments is quite limited. Over the last few years a trend of decline in earmarking has been observed in EECCA. In many EECCA countries, such as Russia, extra-budgetary funds have been consolidated into the general budget. At the same time specific natural resource payments earmarked for resource restoration have been merged, in most EECCA countries, with general natural resource payments.

## **8.2 Specific issues related to use of economic instruments in transition economies**

177. While EECCA countries have moved a long way towards the transition to a market economy, they are still characterised by many transitional features from a centrally planned system. This may have

implications for the effectiveness of economic instruments and for how they are designed, compared to those applied in OECD countries. Three main issues that have an important impact on the effectiveness of economic instruments in transition economies are:

- *Policy framework.* There is a general lack of operational environmental priorities and targets that can guide the framing of policies, regulations and policy instruments.
- *The administrative framework and capacity.* There is a widely acknowledged lack of sufficient capacity for the implementation and enforcement of current environmental requirements and application of economic instruments.
- *The functioning and organisation of markets.* The countries do still not have well functioning markets. The shortcomings in this regard relate, for example, to the underdeveloped financial markets, enterprises with monopoly positions, and “soft budget” constraints.

178. The next sections discuss these factors and their impact on reforming existing, or selecting and designing new environmental policy instruments.

### **8.2.1 Policy framework**

179. The use of economic instrument in environmental policy should not be regarded as an aim in itself but should rather be a means for achieving well defined, realistic and time-bound environmental targets. Under certain circumstances, economic instruments should be able to achieve such targets in the most efficient way, i.e. they should lead to the minimisation of compliance costs from a societal point of view. Although many EECCA countries have developed environmental strategies and National Action Programmes, the policy framework in which the economic instruments function is often poorly defined in EECCA, reflecting that clear environmental priorities and objectives have seldom been formulated.

180. The selection of instruments in EECCA and the discussions of reform options have not been linked to specific environmental targets. For the pollution charge system, the approach in EECCA was to design one general instrument that would be applicable for all pollutants and for all polluters. This approach was based on the “command and control” provisions of the Soviet system in which the enterprises had to follow governmental orders and the compliance costs were not factored in decision-making.

181. This approach differs strongly from the way environmental policy instruments have been selected and designed in OECD countries where the starting point has typically been a specific environmental problem that needed to be addressed. After having defined environmental targets for addressing a specific environmental problem, a suitable set of environmental policy instruments are usually selected and then designed in details. Economic instruments have seldom been used alone; they have been introduced within or together with a set of direct regulatory instruments and other supporting policies aiming to address a given problem. Different types and combinations of environmental policy instruments should be used for different types of environmental problems and towards different types of polluters.

182. If economic instruments are expected to work effectively in EECCA, the process of their selection and design must be seen as part of the overall environmental policy process. Box 12 and the following text present the principal steps for devising effective economic instruments in conjunction with other elements of the policy cycle, such as setting priorities and targets, design and selection of instruments and evaluation of results.

**Box 12: Principal Steps in selecting and designing effective environmental policy instruments**

The selection and design of economic instruments should be seen in the context of the overall environmental policy framework. A simplified policy process for the design and selection of environmental policy instruments could comprise the following steps:

- Stage 1: Defining the specific environmental problem that needs to be addressed. The starting point for the development of a set of policy instruments must be to clarify which environmental problem they are supposed to address. This will include establishing the causal relationship between the emissions and the resulting environmental degradation. Without such a clarification it will not be possible to justify actions and identify the benefits of reducing the level of pollution.
- Stage 2: Discussion of the need for policy intervention and setting objectives/targets. This stage would include an analysis of the sources of pollution as well identification of required targets for preventing/reducing the level of pollution. To set realistically achievable targets, it will be required to estimate the costs of reaching the targets.
- Stage 3: Identification and assessment of applicable policy instruments. When the sources and the possible targets for addressing the pollution have been determined, the basis for selecting a set of appropriate policy instruments to induce the desired change in behaviour.
- Stage 4: Selection and design of the appropriate mix of policy instruments (policy packages). The mix should include legal and regulatory instruments, economic instruments, compliance promotion, as well as information and education tools. The next step would be a detailed design of individual instruments. This could for example concern questions such the level of charges on specific pollutants, point of imposition and target polluters. This stage should also contain an assessment of approximate compliance costs, possible fiscal, distribution and competition effects, and look at the appropriate timing of interventions, as well as the assessment of the administrative costs of proposed solutions.
- Stage 5: Implementation, control and enforcement of instruments. The proper implementation of the instruments is also of key importance for effectiveness. Polluters should be thoroughly informed about the functioning and rationale of new instruments. Appropriate “phase in” periods may also contribute to a better response from regulated community, as the operators would have the necessary time for implementing required changes.
- Stage 6: Evaluation of results and possible modification to the instruments. After some years of operation, the effect of the instruments should be analysed, and adaptations to the instruments may have to be implanted.

*Priorities and targets*

183. Clear environmental priorities, as well as specific, measurable, achievable, realistic and time-bound environmental targets are essential to the successful design and selection of any type of regulatory or incentive-based instrument.

184. Setting of priorities and targets forces policy makers and bureaucrats to formulate and promote priorities rather than just drawing up long lists of desired interventions. Properly defined environmental targets may guide the selection and design of appropriate measures to attain these targets. In the absence of priorities and targets, policymakers lack visible and concrete benchmarks against which the policy instruments may be assessed.

185. In setting priorities and targets, attention must be paid to the issue of policy integration. Policy integration aims to improve the link between the environment and the economy. Policy integration thus enables the identification of “win-win” policy options in which the reaching environmental objectives do not inhibit achieving economic goals, and the balancing of costs and benefits of alternative options where “win-win” opportunities cannot be identified. Policy integration assumes, among others, good information systems and well established procedures for inter-ministerial collaboration. Economic instruments can play a vital role in the promotion of policy integration by attaching a price to the use of environmental and natural resources.

#### *Selection and design of instruments*

186. Based on a set of environmental targets, the appropriate mix of environmental policy instruments to achieve these targets may be selected and designed. The selection of instruments should be based on a careful review and analysis that identifies key emission sources, considers the possible abatement and compliance costs, assesses the market structures that govern the economic sector under consideration, and looks at the appropriate timing of interventions. Costs may in this case relate to a variety of items, such as administrative costs of managing the instrument and compliance cost for industry. Other aspects to be taken into account may involve impact on the state budget and fiscal burdens, income distribution effects and distorting effects on competition.

187. Typically, a combination of environmental policy instruments will be needed to achieve the environmental targets in an effective way. Such a combination is also called ***policy packages or policy mixes***. Economic instruments are seldom applied as the sole instruments, and in all OECD countries direct regulation is the predominant policy instrument. Such policy packaging benefits from the mutual synergy that a co-ordinated launching of several instruments can often provide, and draws advantage from different merits of several types of instruments. For example, command-and-control measures can be used to ensure that certain minimum requirements are complied with at the industry level. This may be combined with a related product tax, which induces consumers to choose alternative products that are not taxed. Consequently, the tax will provide industry with an economic incentive to further improve its performance. The effect from these measures may be further reinforced by the use of awareness building measures that enhances the knowledge about the environmental issue at hand and/or options available to industry.

188. Subsidies are also an important instrument in considering the selection and design of an appropriate policy package. First, subsidies can be used together with taxes and charges in pursuit of the same objective, for example by earmarking tax/charge revenues for co-financing priority investments related to the reduction of taxed pollution. Second, it is essential to consider whether there may be subsidy schemes in place already that counteract the intended effects of the instruments included in the implementation plan. If so, there may often be substantial gains involved in their removal or reduction. Subsidised prices on energy and agro-chemicals are examples of subsidies that undermine the efficiency of economic instruments in the same fields.

189. If certain areas or sectors are to benefit from reduced rates or exemptions from payments, this should be established and motivated at the stage of instrument design and backed up by prior comprehensive analysis, rather than leave that to the implementing authorities. Thereby, the lack of transparency that is caused by discretionary implementation will be reduced.

#### *Evaluations*

190. The use of economic instruments should be supported by evaluation of the effectiveness of the chosen set of instruments. A distinction is made between *ex-ante* evaluations, which are made before the introduction of the instruments, and *ex-post* evaluations after gathering experience from the practical

application of an instrument. The aim of the ex-ante assessment is to evaluate the likely effect of the instruments and assist in the proper design and selection of instruments. The aim of the ex-post evaluations is to assess the actual impact of the instrument to improve future interventions.

191. The design and selection of instruments would be based on some form of *ex-ante* evaluation that assesses the expected effects from the instrument and the policy package. Such evaluation should include an environmental impact as well as other possible aspects, such as expected revenue, administrative costs, and effects on industry. The ex-ante evaluation provides a benchmark to measure the performance of the instrument once it is in place and, consequently, also a means by which to identify possible needs for modifications and changes. It also helps to assess whether the instrument and the policy package in question provides the expected results.

192. *Ex-post* evaluations should be done at regular intervals to monitor performance of the instrument against the ex-ante evaluation and the established targets. *Ex-post* evaluations should also take account of macro-economic developments or technology changes.

### **8.2.2 Administrative framework and capacity**

193. Economic instruments need to be backed up by an adequate administrative framework and capacity for implementation, monitoring and enforcement. These are crucial not only to ensure compliance with the regulation or incentive at hand, but also to support the overall credibility of rules, regulations and instruments. Furthermore, efficiency at the implementation level is key to provide information that is necessary for the ex-post evaluations and to minimise administrative costs.

194. In EECCA, there is a widely recognised limited availability of resources for securing an effective implementation and enforcement of the existing environmental legislation, including economic instruments. This relates both to the capabilities and experience of the staff, the number of staff, and measurement equipment.

195. National and local governments in many EECCA countries suffer from insufficient inter-ministerial and intra-ministerial coordination and collaboration. This causes operational delays and inefficiencies, as well as constraints the opportunities to develop priorities and targets in an integrated and coordinated way.

196. In view of the above, it becomes vital in the short term to focus on simple environmental policy instruments that involve limited requirements to the administrative system and address important environmental issues, e.g. priority pollutants or sources, where the use of economic instruments is relevant and superior to using only command-and-control instruments. Instruments such as product charges have comparably lower institutional and administrative requirements and would present a much more suitable option for complementing other policy instruments. At the same time, a careful review of the current system of regulations and incentives can help assess whether reforms or changes could improve the way that the limited available instruments are used.

197. More complex economic instruments, such as tradable permit systems, may have too high requirements for the institutional framework to be a feasible option in EECCA at the present stage.

### **8.2.3 Market features**

198. Economic instruments are designed and intended to work in market-based economies. Economic instruments rely on enterprises and individuals to react to price signals and other financial incentives. If

such incentives are blunted or distorted, due to the fact that the market is not functioning properly, then the effectiveness of the economic instrument is also limited. Economic instruments change price structures in these markets, for example, by means of rendering a high polluting input more expensive than a less polluting input through the imposition of a tax on the former. The resulting changes in prices and costs provide an incentive for consumers and producers to change their demand and supply patterns, leading to a more environmentally friendly outcome. The EECCA economies do not yet fully have a well-functioning market-based economy. A number of features affect the reform process, such as under-developed financial markets, soft budget constraints, weak governance and fragmented regulatory system which cannot well support the functioning of market-based economies. The main problems are related to:

- *Financial markets*

Well functioning financial markets are needed for industry to adapt to changed market conditions brought about by changes in price structures due to environmental taxes. Adapting may necessitate certain investments in more efficient (usually also cleaner) technologies. The ability to finance such investments (which, in turn, depends on the functioning of the financial market) will often be a determining parameter for the ability of a specific industry to change its behaviour and react to the environmental tax.

Targeted subsidies, e.g. from environmental funds, may, if appropriately designed and implemented, present one option for alleviating the problems related to the absence of well-functioning financial markets. Such subsidies may, in a transition period, be used to support and catalyse environmental lending or directly to support the environmental investments when companies do not have own resources.

- *Access to technology options*

Economic instruments in many cases aim to promote a change in production patterns through selection of more modern thus cleaner technologies, improved management, or replaced inputs. Industries need to be aware of the options that are available to them to adapt to the changed price structures, if they are not to consider the tax as a fixed payment. A lack of access to appropriate technology options or to information about them is, therefore, a potential constraint that may weaken the effect from economic instruments.

- *Industry structure*

Monopolistic market structures are still a core feature of many industries in EECCA. In such market conditions, economic instruments are less effective as instruments to promote behavioural changes. Instead of efforts to reduce the charge/tax payments, the enterprises may tend to simply add these costs to the price, and consumers will have no alternatives to the polluting products. In such cases, regulatory schemes may have a much higher potential.

Similarly, if the environmental problem at hand is caused by only few large polluters, it is often simpler to regulate them directly rather than to engage in the use of economic instruments. In such cases, however, there is a risk that the ties between the government and industry will become quite close. This risk can be further accentuated if the industry is of vital importance to the national, regional or local economy. Such close ties may make it difficult for regulators to introduce new policy instruments.

*Soft budget constraints*

Another issue that has an impact on the incentives provided by taxes and charges is the fact that many large industries in EECCA operate under so called “soft-budget constraints” inherited from the system existing in the Soviet Union. Soft budget constraints mean that enterprises are shielded from bankruptcy, as their economic losses are subsidised from the state budget. They continue to operate without incentives for improvement of the management and production methods. The occurrence, importance and frequency of soft budget constraints are diminishing in EECCA, but it is still an issue that must be taken into consideration in the EECCA context. The mere existence of opportunities for special exemptions and privileges from the authorities may encourage enterprise managers to direct their attention to securing such preferential treatment rather than focusing on adjusting the enterprise to the actual market conditions. The implication is that the effect of the environmental tax or charge is reduced.

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**APPENDIX 1: BASIC DEMOGRAPHIC AND ECONOMIC DATA FOR EECCA COUNTRIES, 1998 AND 2001**

**Appendix 1, Table 1 Demographic and economic indicators, EECCA countries 2001**

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
Population (millions)	3.0	8.1	10.0	5.4	14.8	4.8	4.3	144.8	6.5	5.5	49.1	25.4
GDP in million USD	2,106	5,638	10,960	3,137	22,274	1,478	1,608	309,438	1,047	3,531	38,347	6,020
GDP per capita (USD/capita)	702	696	1,096	581	1,505	308	374	2,137	161	642	781	237
Share of industry in GDP (%)	22.1%	32.0%	34.0%	13.0%	23.5%	23.6%	16.2%	33.6%	18.7%	37.0%	40.3%	21.0%
Share of agriculture in GDP (%)	23.1%	18.1%	6.5%	28.0%	11.0%	34.6%	22.3%	6.8%	22.1%	23.0%	12.3%	27.0%
Exchange rate, average 2001	555	4,664	1,386	2.1	147.1	48.3	12.9	29.2	2.4	8,505	5.4	775
General government balance (% of GDP)	-4.3%	1.5%	-1.8%	-4.1%	-1.1%	-6.0%	-3.9%	2.9%	-0.1%	0.8%	-1.6%	-1.0%
General government expenditure (% of GDP)	21.3%	20.1%	44.4%	19.4%	22.4%	32.3%	29.9%	35.8%	15.3%	24.4%	35.9%	33.0%
General government revenues (million USD)	358	1,218	4,669	480	4,744	389	418	119,752	159	890	13,153	1,926

**Source:** Transition Report Update, May 2002, European Bank for Reconstruction and Development

**Notes:** Data on industry and agriculture share of GDP: Armenia, Azerbaijan, Kyrgyz Republic: year 2000; Georgia and Kazakhstan: year 1999 Data on government sector: Georgia: year 2000

**Appendix 1, Table 2: Demographic and economic indicators, EECCA countries 1998**

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
Population (millions)	3.8	8.0	10.2	5.4	15.2	4.7	4.3	146.4	6.1	5.0	50.1	24.0
GDP in million USD	1,893	4,472	15,137	4,163	22,070	1,646	1,931	275,086	1,319	2,550	41,834	10,745
GDP per capita (USD/capita)	498	559	1,484	771	1,452	350	449	1,879	216	510	835	448
Share of industry in GDP (%)	19.8%	22.0%	33.4%	11.9%	23.9%	16.3%	16.7%	29.1%	18.1%	27.6%	38.9%	21.0%
Share of agriculture in GDP (%)	30.8%	17.9%	13.9%	30.9%	9.4%	36.1%	25.8%	6.0%	19.8%	25.2%	13.0%	26.0%
Exchange rate, average 2001	505	3,869	46.4	1.4	78.6	20.8	5.4	10.0	0.8	5,500	2.5	132
General government balance (% of GDP)	-4.9%	-3.9%	-0.5%	-5.4%	-8.0%	-11.2%	-5.7%	-7.9%	-3.8%	-2.6%	-2.8%	-3.0%
General government expenditure (% of GDP)	25.6%	23.7%	43.8%	19.1%	26.1%	35.6%	38.7%	40.7%	15.8%	24.6%	38.7%	33.1%
General government revenues (million USD)	392	885	6,554	570	3,995	402	637	90,228	158	561	15,018	3,234

**Source:** Transition Report Update, May 2002, European Bank for Reconstruction and Development

## APPENDIX 2: REVENUES FROM POLLUTION CHARGES AND NATURAL RESOURCES PAYMENTS, EECCA COUNTRIES 1998 AND 2001

### Appendix 2, Table 3: Reported revenue from pollution charges, EECCA countries 2001

#### Revenues from pollution charges, 2001 (millions in local)

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
	million dram	million manat	million roubles	thousand lari	million tenge	million som	thousand lei	million roubles	thousand somoni	million manat	million grivna	million sum
Air pollution	11	103		228		16.1	796	1,047	0.4	170.3	95.1	42.8
Water pollution charge	44	376		144		2.3	688	1,910	6.3	87.6	12.7	36.5
Charges for solid waste	5	24				2.3	43	2,686	67.6	54.9	35.8	31.0
Non-compliance fee		350		5		2.3	16		140.9	94.3	7.4	67.0
<b>Total revenue, pollution charges</b>	<b>60</b>	<b>852</b>	<b>27,048</b>	<b>377</b>	<b>5,698</b>	<b>23.0</b>	<b>1,542</b>	<b>5,642</b>	<b>215.2</b>	<b>407.1</b>	<b>150.9</b>	<b>177.3</b>

#### Revenues from pollution charges, 2001 (million USD)

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
Air pollution charges	0.0	0.02		0.11		0.3	0.06	35.9	0.0002	0.02	17.7	0.06
Water pollution charge	0.1	0.08		0.07		0.05	0.05	65.4	0.003	0.01	2.4	0.05
Charges for solid waste	0.01	0.01				0.05	0.003	92.0	0.03	0.01	6.7	0.04
Non-compliance fee		0.08		0.002		0.05	0.001		0.1	0.01	1.4	0.09
<b>Total revenue, pollution charges</b>	<b>0.1</b>	<b>0.2</b>	<b>19.5</b>	<b>0.2</b>	<b>38.7</b>	<b>0.5</b>	<b>0.1</b>	<b>193.2</b>	<b>0.1</b>	<b>0.05</b>	<b>28.1</b>	<b>0.2</b>

#### Revenue from pollution charges, 2001

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
Revenue as percentage of GDP	0.0%	0.003%	0.2%	0.01%	0.2%	0.03%	0.01%	0.06%	0.01%	0.001%	0.1%	0.004%
Revenue as percentage of public revenue	0.0%	0.015%	0.4%	0.04%	0.8%	0.12%	0.03%	0.16%	0.06%	0.005%	0.2%	0.012%
Revenue per capita (USD/cap/year)	0.04	0.02	1.95	0.03	2.62	0.10	0.03	1.33	0.01	0.01	0.57	0.01

#### Notes:

- Armenia: Non-compliance fees included in the ordinary revenue from pollution charges
- Belarus: No specification of pollution charges, except that waste accounts for about 8% of the total revenue from pollution charges
- Georgia: The revenue from pollution charges is recorded together with revenues from fuel taxes - the above figures are based on expert estimates
- Kazakhstan: Approximate allocation among media: Air pollution charges (30-35%), water pollution charges (15-30%), waste charges (25-40%), and non-compliance fees (10%)
- Moldova: Revenue from air pollution charges includes revenue from mobile sources (13.6 thousand lei)
- Russia: The revenue indicated for the various media includes revenue from non-compliance fees
- Ukraine: Revenue from air pollution charges includes 11.7 million UAH from mobile sources

**Appendix 2, Table 4: Reported revenue from taxes and charges on natural resource use/extraction, EECCA countries 2001****Revenues from natural resource payments, 2001 (local currency)**

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
	million dram	million manat	million roubles	thousand lari	million tenge	million som	thousand lei	million roubles	thousand somoni	million manat	million grivna	million sum
Water abstraction	413	4,600		380	431	0.5	8,218	2,574			304	
Extraction of minerals and hydrocarbon	322			5,235	25,591		338	66,499			52	
Forestry related payments	77		12,611	1	132	0.6	25	2,925	33		47	
Hunting and fishing charges	11			531	185	0.8		98	213		2	
<b>Total natural resources payments</b>	<b>823</b>	<b>4,600</b>	<b>12,611</b>	<b>6,147</b>	<b>26,339</b>	<b>1.8</b>	<b>8,581</b>	<b>72,096</b>	<b>246</b>		<b>405</b>	

**Revenues from natural resource payments, 2001 (million USD)**

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
Water abstraction	0.7	1.0		0.2	2.9	0.01	0.6	88			56.7	
Extraction of minerals and hydrocarbon	0.6			2.5	174.0		0.03	2,277			9.7	
Forestry related payments	0.1		9.1	0.001	0.9	0.01	0.002	100	0.01		8.8	
Hunting and fishing charges	0.02			0.3	1.3	0.02		3	0.1		0.3	
<b>Total natural resources payments</b>	<b>1.5</b>	<b>1.0</b>	<b>9.1</b>	<b>2.9</b>	<b>179.1</b>	<b>0.04</b>	<b>0.7</b>	<b>2,469</b>	<b>0.1</b>		<b>75.4</b>	

**Notes:**

Kazakhstan: The revenue from extraction of minerals and hydrocarbons comprise royalty: 22,888 million tenge, bonuses: 1,330 million tenge, and production sharing agreements: 1,373 million tenge

## Appendix 2, Table 5: Reported revenues from pollution charges, EECCA countries 1998

### Revenues from pollution charges, 1998 (millions in local currency)

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
	million dram	million manat	million roubles	thousand lari	million tenge	million som	thousand lei	million roubles	thousand somoni	million manat	million grivna	million sum
Air pollution	2.4	78		300	1134	8.7	183	1,112			36.3	98.2
Water pollution charge	1.3	194		400		0.9	111	697			1.9	33.0
Charges for solid waste	0.4	17			590	1.3	5	1,047			9.5	10.0
Non-compliance fee					173							
<b>Total revenue, pollution charges</b>	<b>4.1</b>	<b>290</b>	<b>1,453</b>	<b>700</b>	<b>1,897</b>	<b>10.9</b>	<b>299</b>	<b>2,856</b>	<b>33.0</b>	<b>76.6</b>	<b>47.7</b>	<b>141.2</b>

### Revenues from pollution charges, 1998 (million USD)

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
Air pollution charges	0.005	0.02		0.21	14.4	0.4	0.03	111.2			14.8	0.75
Water pollution charge	0.003	0.05		0.29		0.04	0.02	69.7			0.8	0.25
Charges for solid waste	0.001	0.004			7.5	0.06	0.0009	104.7			3.9	0.08
Non-compliance fee					2.2							
<b>Total revenue, pollution charges</b>	<b>0.008</b>	<b>0.1</b>	<b>31.3</b>	<b>0.5</b>	<b>24.1</b>	<b>0.5</b>	<b>0.1</b>	<b>285.6</b>	<b>0.04</b>	<b>0.01</b>	<b>19.5</b>	<b>1.1</b>

### Revenues from pollution charges, 1998 (million USD)

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
Revenue as percentage of GDP	0.0004%	0.001%	0.29%	0.02%	0.1%	0.04%	0.003%	0.09%	0.004%	0.0004%	0.05%	0.018%
Revenue as percentage of public revenue	0.0023%	0.006%	0.67%	0.10%	0.5%	0.13%	0.013%	0.24%	0.027%	0.0016%	0.15%	0.056%
Revenue per capita (USD/cap/year)	0.002	0.01	3.07	0.09	1.59	0.11	0.01	1.95	0.01	0.003	0.39	0.04

#### Notes:

Belarus: Waste charges amount to 73 billion roubles

Georgia: Expert estimates

**Appendix 2, Table 6: Reported revenue from taxes and charges on natural resource use/extraction, EECCA countries 1998****Revenues from natural resource payments, 1998 (local currency)**

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
	million dram	million manat	million roubles	thousand lari	million tenge	million som	thousand lei	million roubles	thousand somoni	million manat	million grivna	million sum
Water abstraction	5			500	437	0.3	7,642	376			136	3,200
Extraction of minerals and hydrocarbons	270	171,100	548	1,200	9,832		283	23,146		43,100	39	11,500
Forestry related payments	0	965	578	300	30	0.4	53	954			43	
Hunting and fishing charges		7		200	141	0.7		3				
<b>Total natural resources payments</b>	<b>275</b>	<b>172,072</b>	<b>1,126</b>	<b>2,200</b>	<b>10,440</b>	<b>1.4</b>	<b>7,978</b>	<b>24,479</b>	<b>0</b>	<b>43,100</b>	<b>217</b>	<b>14,700</b>

**Revenues from natural resource payments, 1998 (million USD)**

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
Water abstraction	0.0			0.4	5.6	0.01	1.4	38			55.3	24.3
Extraction of minerals and hydrocarbons	0.5	44.2	11.8	0.9	125.1		0.05	2,315		7.8	15.9	87.3
Forestry related payments	0.0	0.2	12.5	0.214	0.4	0.02	0.010	95			17.4	
Hunting and fishing charges		0.0		0.1	1.8	0.03		0				
<b>Total natural resources payments</b>	<b>0.5</b>	<b>44.5</b>	<b>24.3</b>	<b>1.6</b>	<b>132.8</b>	<b>0.07</b>	<b>1.5</b>	<b>2,448</b>	<b>0.0</b>	<b>7.8</b>	<b>88.7</b>	<b>111.5</b>

## APPENDIX 3: POLLUTION CHARGE RATES, EECCA COUNTRIES 1998 AND 2002

Appendix 3, Table 7: Reported rates for pollution charges for selected pollutants, EECCA countries 2001

## Selected Pollution charges in local currency per tonnes - 2001

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
	dram	manat	roubles	lari	tenge	som	lei	roubles	somoni	manat	grivna	sum
Air emission: Sulphur dioxide (SO <sub>2</sub> )	600	132	45,885	90	5,660	20	396	31	14	1,400	53	252
Air emission: charges for NO <sub>x</sub>	7,400	268	138,795	112.5	2,500	37	405	39	2	1,800	53	315
Water effluents: Nitrates (NO <sub>3</sub> )	5,100			4.3	239	12	2	24	140		3	3,867
Water effluents: Phosphorus (kg of P)	40,000			156	2,500,000	1,200	90	1,042			28	193,793
Water effluent charge for BOD	18,400			13	3,588	40	6	69	4		14	11,535
Solid waste (least toxic class)	600	50	8,664		126	0.4	18	188	0.8		0.2	225
Solid waste (most toxic class)	36,000	750	174,135		4,154	133	360	1,316	1.6		55	2,250

## Selected Pollution Charges in USD per tonnes - 2001

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
Air emission: Sulphur dioxide (SO <sub>2</sub> )	1.1	0.03	33.1	42.9	38.5	0.4	30.7	1.1	5.8	0.2	9.9	0.3
Air emission: charges for NO <sub>x</sub>	13.3	0.06	100.1	53.6	17.0	0.8	31.4	1.4	0.8	0.2	9.9	0.4
Water effluents: Nitrates (NO <sub>3</sub> )	9.2			2.0	1.6	0.2	0.1	0.8	58.3		0.6	5.0
Water effluents: Phosphorus (kg of P)	72.1			74.3	16995.2	24.8	7.0	35.7			5.2	250.1
Water effluent charge for BOD	33.2			6.2	24.4	0.8	0.5	2.4	1.7		2.6	14.9
Solid waste (least toxic class)	1.1	0.01	6.3		0.9	0.01	1.4	6.4	0.3		0.04	0.3
Solid waste (most toxic class)	64.9	0.16	125.6		28.2	2.8	27.9	45.1	0.7		10.2	2.9

## Notes:

- Azerbaijan: Water effluent charges for BOD are based on the m<sup>3</sup> of fresh water required to reduce concentration to allowable levels
- Belarus: Rates for air emission for the second half of year 2001. For the first half rates were only one third of the above rates
- Belarus: Rates are given for classes of pollutants and not for individual pollutants.
- Georgia: There are no pollution charges for waste generation
- Kazakhstan: The level of rates differ among regions. The rate for SO<sub>2</sub> emissions range from 3,000 to 9,380 per tonne, with the highest level in Almaty. The given figures are average levels
- Kazakhstan: For Almaty City, the rates for NO is 7,817 tenge/tonne and for NO<sub>2</sub> 1,725 tenge/ton. Average for NO<sub>x</sub> for the country is assessed to be around 2,500 tenge/tonne
- Moldova: Level of rates depends on the location. Rates are given for Kishinau which has the highest rates.
- Moldova: Rates for NO<sub>2</sub> is 450 and NO 360 Lei/tonne (in Kishinau). The arithmetic average is taken as the rate for NO<sub>x</sub>.
- Russia: Base rates will be multiplied with an ecological coefficient taking a value between 1 and 2 depending on the region
- Turkmenistan: Rates for wastewater effluents are based on the discharge of cubic metres of contaminated water
- Ukraine: The base rates are multiplied by various coefficients. For air pollution coefficients based on population density and on the economic importance of the area (both coefficients take values from 1 to 1.8)
- Ukraine: For water effluents: a coefficient taking values from 1.8 to 2.8 depending on the river basin and for waste: two coefficients are used, one depending on landfill location and one depending on landfill equipment (both coefficients taking values from 1-3)

**Appendix 3, Table 8: Reported rates for pollution charges for selected pollutants, EECCA countries 1998****Selected Pollution charges in local currency per tonnes - 1998**

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
	dram	manat	roubles	lari	tenge	som	lei	roubles	somoni	manat	grivna	sum
Air emission: Sulphur dioxide (SO <sub>2</sub> )	1,800	132	3,220	90	3,500	20	316	16	1.42	1,400	53	120
Air emission: charges for NO <sub>x</sub>	2,250	299	9,740	112.5	3,500	37.3	288	21	1.48	1,800	53	175
Water effluents: Nitrates (NO <sub>3</sub> )	5,120			390.0	3.9	12	16	344	140.00			3
Water effluents: Phosphorus (kg of P)				156		1,200	810	687	63.00			28
Water effluent charge for BOD	18,418			13	63	40	54	45	4.15			14
Solid waste (least toxic class)	600	50	60	0	300	6.2	1	0	0.05		0.02	8
Solid waste (most toxic class)	36,000	1,500	30,550	0	3,000	23	360	672	5.60		55	1,500

**Selected Pollution Charges in USD per tonnes - 1998**

	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
Air emission: Sulphur dioxide (SO <sub>2</sub> )	3.6	0.03	69.4	64.3	44.5	1.0	58.5	1.6	1.8	0.3	21.6	0.9
Air emission: charges for NO <sub>x</sub>	4.5	0.08	209.9	80.4	44.5	1.8	53.3	2.1	1.9	0.3	21.6	1.3
Water effluents: Nitrates (NO <sub>3</sub> )	10.1			278.6	0.0	0.6	3.0	34.4	180.2		1.2	
Water effluents: Phosphorus (kg of P)				111.4		57.7	150.0	68.7	81.1		11.4	39.5
Water effluent charge for BOD	36.5			9.3	0.8	1.9	9.9	4.5	5.3		5.7	60.4
Solid waste (least toxic class)	1.2	0.01	1.3	0.0	3.8	0.30	0.2	0.0	0.1		0.01	0.1
Solid waste (most toxic class)	71.3	0.39	658.4	0.0	38.2	1.1	66.7	67.2	7.2		22.4	11.4

**Notes:**

Kazakhstan: Charges vary among regions - the arithmetic average of max and min values are indicated. For SO<sub>2</sub>, min and max were 600 and 6400 tenge/ton.

Kyrgyzstan: The arithmetic average of the charge for NO and NO<sub>2</sub> is indicated as the charge for NO<sub>x</sub>

Moldova: Charges vary among regions - the arithmetic average of max and min values are indicated. For SO<sub>2</sub>, min and max were 238 and 396 Lei/ton

## APPENDIX 4: USER CHARGES, EECCA CAPITALS, 1998 AND 2001

Appendix 4, Table 9: Reported level of user charges for water supply and sewerage, EECCA capitals 2001

## User charges for water supply/sewerage in the NIS (the capitals), year 2001 (National Currency)

Water supply and sewerage	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
<b>Households (per m3)</b>	<b>56.00</b>	<b>225.00</b>	<b>52.20</b>	<b>0.05</b>	<b>17.20</b>	<b>1.15</b>	<b>2.62</b>	<b>3.08</b>	<b>0.08</b>	<b>9.00</b>	<b>0.82</b>	<b>0.00</b>
Water supply per m3	46	185	29.3	0.04	10.82	0.79	1.9	1.54	0.05		0.82	
Sewerage, per m3	10	40	22.9	0.01	6.38	0.36	0.72	1.54	0.03	9		
<b>Households, monthly norm payments</b>	<b>420</b>	<b>2760</b>	<b>0</b>	<b>1.2</b>	<b>208.31</b>	<b>15.36</b>	<b>6.5</b>	<b>44.84</b>	<b>0.141</b>	<b>9</b>	<b>0</b>	<b>261.31</b>
Water supply, per month	420	2280		0.96	208.31	10.37	6.5	44.84	0.078	0		261.31
Sewerage, per month		480		0.24		4.99			0.063	9		
<b>Industry</b>	<b>56.00</b>	<b>3250.00</b>	<b>360.00</b>	<b>1.60</b>	<b>17.20</b>	<b>6.85</b>	<b>14.00</b>	<b>19.90</b>	<b>0.09</b>	<b>3100.00</b>	<b>1.89</b>	<b>2.27</b>
Water supply, per m3	46	2500	260	1.28	10.82	3.95	14	10.2	0.06	2500	1.33	2.27
Sewerage, per m3	10	750	100	0.32	6.38	2.9		9.7	0.03	600	0.56	

## User charges for water supply/sewerage in the NIS (the capitals), year 2001, USD

Water supply and sewerage	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
<b>Households (per m3)</b>	<b>0.10</b>	<b>0.05</b>	<b>0.04</b>	<b>0.02</b>	<b>0.12</b>	<b>0.02</b>	<b>0.20</b>	<b>0.11</b>	<b>0.03</b>	<b>0.00</b>	<b>0.15</b>	<b>0.00</b>
Water supply per m3	0.08	0.04	0.02	0.02	0.07	0.02	0.15	0.05	0.02		0.15	
Sewerage, per m3	0.02	0.01	0.02	0.00	0.04	0.01	0.06	0.05	0.01	0.00		
<b>Households, monthly norm payments</b>	<b>0.76</b>	<b>0.59</b>	<b>0.00</b>	<b>0.57</b>	<b>1.42</b>	<b>0.32</b>	<b>0.50</b>	<b>1.54</b>	<b>0.06</b>	<b>0.00</b>	<b>0.00</b>	<b>0.34</b>
Water supply, per month	0.76	0.49		0.46	1.42	0.21	0.50	1.54	0.03	0.00		0.34
Sewerage, per month		0.10		0.11		0.10			0.03	0.00		
<b>Industry</b>	<b>0.10</b>	<b>0.70</b>	<b>0.26</b>	<b>0.76</b>	<b>0.12</b>	<b>0.14</b>	<b>1.09</b>	<b>0.68</b>	<b>0.04</b>	<b>0.36</b>	<b>0.35</b>	<b>0.00</b>
Water supply, per m3	0.08	0.54	0.19	0.61	0.07	0.08	1.09	0.35	0.03	0.29	0.25	0.00
Sewerage, per m3	0.02	0.16	0.07	0.15	0.04	0.06		0.33	0.01	0.07	0.10	

Moldova, Ukraine and Uzbekistan: unified tariff for water supply and sewerage

Russia: tariffs for water supply and sewerage are given for industrial enterprises (3rd category of users)

**Appendix 4, Table 10: Reported levels of user charges for water supply and sewerage, EECCA capitals 1998****User charges for water supply/sewerage in the EECCA (the capitals), year 1998 (National Currency)**

Water supply and sewerage	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
<b>Households (per m3)</b>	<b>56.00</b>	<b>40.00</b>	<b>7.67</b>	<b>0.08</b>	<b>11.29</b>	<b>0.87</b>	<b>0.87</b>	<b>1.26</b>	<b>0.009</b>	<b>0.00</b>	<b>0.82</b>	<b>1.36</b>
Water supply per m3	46	40	7.671	0.08	6.93	0.6	0.62	0.63	0.009		0.52	0.85
Sewerage, per m3	10				4.36	0.27	0.25	0.63			0.3	0.51
<b>Industry</b>	<b>0.00</b>	<b>2000.00</b>	<b>68.59</b>	<b>0.45</b>	<b>11.29</b>	<b>3.04</b>	<b>6.75</b>	<b>16.58</b>	<b>0.07</b>	<b>1000.00</b>	<b>0.00</b>	<b>0.00</b>
Water supply, per m3		2000	68.59	0.45	6.93	1.65	4.98	8.48	0.04	500		
Sewerage, per m3					4.36	1.39	1.77	8.1	0.03	500		

**User charges for water supply/sewerage EECCA (the capitals), year 1998, USD**

Water supply and sewerage	Arm	Aze	Bel	Geo	Kaz	Kyr	Mol	Rus	Taj	Tur	Ukr	Uzb
<b>Households (per m3)</b>	<b>0.11</b>	<b>0.01</b>	<b>0.17</b>	<b>0.06</b>	<b>0.14</b>	<b>0.04</b>	<b>0.16</b>	<b>0.13</b>	<b>0.01</b>	<b>0.00</b>	<b>0.33</b>	<b>0.01</b>
Water supply per m3	0.09	0.01	0.17	0.06	0.09	0.03	0.11	0.06	0.01		0.21	0.01
Sewerage, per m3	0.02				0.06	0.01	0.05	0.06			0.12	0.00
<b>Industry</b>	<b>0.00</b>	<b>0.52</b>	<b>1.48</b>	<b>0.32</b>	<b>0.14</b>	<b>0.15</b>	<b>1.25</b>	<b>1.66</b>	<b>0.09</b>	<b>0.18</b>	<b>0.00</b>	<b>0.00</b>
Water supply, per m3		0.52	1.48	0.32	0.09	0.08	0.92	0.85	0.05	0.09		
Sewerage, per m3					0.06	0.07	0.33	0.81	0.04	0.09		

**Appendix 4, Table 11: Reported levels of user charges for municipal solid waste collection and disposal, EECCA capitals 2001**

<b>Municipal solid waste (local currency)</b>	<b>Arm</b>	<b>Aze</b>	<b>Bel</b>	<b>Geo</b>	<b>Kaz</b>	<b>Kyr</b>	<b>Mol</b>	<b>Rus</b>	<b>Taj</b>	<b>Tur</b>	<b>Ukr</b>	<b>Uzb</b>
Households (per capita/month)	100	700.00	118.7	0.4	34.89	10.00	1.50	6.2	0.035	1000.00	2.50	
Commercial/industry (per tonne)	600	72000	10130		2326	3.7		70	1.2	8000	15.6	

<b>Municipal solid waste (USD)</b>	<b>Arm</b>	<b>Aze</b>	<b>Bel</b>	<b>Geo</b>	<b>Kaz</b>	<b>Kyr</b>	<b>Mol</b>	<b>Rus</b>	<b>Taj</b>	<b>Tur</b>	<b>Ukr</b>	<b>Uzb</b>
Households (per capita/month)	0.18	0.15	0.09	0.19	0.24	0.21	0.12	0.21	0.01	0.12	0.47	
Industry (per tonne)	1.08	15.44	7.31		15.81	0.08		2.40	0.50	0.94	2.91	

**APPENDIX 5: SUMMARY TABLES ON TAXES/CHARGES FOR NATURAL RESOURCE USE/EXTRACTION, EECCA COUNTRIES**

**Appendix 5, Table 12: Reported use of taxes and charges for use of water resources, EECCA countries 1999**

Country	Instruments	Tax/charge base	Charge rate	Remarks (privileges, destination and allocation of revenues)
Armenia	Payment for water.	Functional purpose of water use. The type of the water source (surface, underground, potable, not potable).	The rate per cubic meter in Drams varies from 0 (on-land water for irrigation purposes) to 1.5 – water from the Sevan Lake for generation of electricity and for industry.	In addition to irrigation, the hydraulic energy generating sector is also exempted from payment for water. Payment is collected in reality not from water users but from two large organisations responsible for water supply, i.e., the Yerevan water-supply enterprises and the water-supply enterprise of Armenia.
Azerbaijan	Payment for the abstraction of surface water resources.	Quality class of surface water resources in different water sources. Average standards on use and the cadaster cost of water resources are taken into account.	The Kura river from 2.17 to 3.43 Manats/thousand cubic meters. Other rivers – from 1.69 to 2.63 Manats/ thousand cubic meters.	Revenues are transferred to local and national budgets. Payment is not collected from the Water Supply and Sewerage Administration, enterprises of the Committee on Land reclamation and Water resources, agricultural enterprises and farmers taking water for irrigation.
	Payment for the abstraction of groundwater resources.	Territorial connection of the water intake station with the administrative region and the cadaster cost of water.	Nakhichevan Autonomous Republic – 2.64 Manats/thousand cubic meters of groundwater used. Other administrative regions – 7.15.	

Country	Instruments	Tax/charge base	Charge rate	Remarks (privileges, destination and allocation of revenues)
Belarus	Payment (tax) for the abstraction of groundwater, surface and mineral water.	Rates for groundwater are higher than for surface water.	From surface sources – 330 Roubles/cubic meter. From underground sources – 530 Roubles/cubic meter. Mineral water – 1540.	The tax on taking of water is transferred to local budgets. Preferential rates are established for water taken for economic, potable and fire water supply of population, for water taken by fishery farms and water for production of products of animal farming and plant growing.
Georgia	The tax on the abstraction of surface water and groundwater.	Cost recovery.	Surface water sources are divided into 3 groups: the Mthvari river and its tributaries, water from the Black Sea and other surface water. The rates per cubic meter are 0.01; 0.005; and 0.003 Laries, respectively. Large water users such as hydro power and heat plants, as well as irrigation systems pay very little. Rates for groundwater abstraction constitute 2-8 % of its “price” determined by the Georgian Ministry of Nature Protection.	Payers are all physical and juridical persons whose economic activities require a license for taking of water in compliance with the Water Code.
Kazakhstan	Payment (tax) for surface water abstraction.	Payment is based on the volume of used water with corrections for water quality and water use conditions.	Rates of payment differ according to river basins and vary from 0.48 tiyn/cubic meter to 77.24 tiyn/cubic meter.	

Country	Instruments	Tax/charge base	Charge rate	Remarks (privileges, destination and allocation of revenues)
Kyrgyzstan	License for the right to use water resources.	The rates are determined on the basis of administrative expenses of licensing body.	817 Soms per license.	Revenues are transferred to special accounts of the Department of Water Resources and used for covering direct expenses, and for restoring and reconstructing water facilities and installations.
	Payment for the use of water resources.	Functional purpose of water.	The rate for groundwater is 5% of revenues of enterprises. The rate for irrigation is 0.03 Soms per cubic meter. The rate for overuse is 5-fold.	Privileges are accorded to reserves, special reserves, national and other parks, organisations and institutions financed from the state budget. Resources are transferred for financing protected and special items of the budget.
Moldova	Payment for the use of water (water tax).	The rates per cubic meter of used water.	The uniform rate per cubic meter for surface water is 10% of the minimum wages. For overuse the full rate is multiplied by 3. for irrigation and fishery – 50% of the rate, for electricity generation – 30% of the rate.	Payment for water is transferred to the local budget.
Russia	Payment for water abstraction.	The rating base is cubic meters of water used.	Rates are differentiated by locality. The rates are established according to categories of payers depending on the type of use of water resources, the conditions of water facilities and with due account of local conditions of water supply to population and economic subjects. The minimum and maximum payment rates are established at the federal level.	Charges are transferred to the federal budget of the subjects of the Russian Federation in the following ratio: - the federal budget – 40 %. - the budgets of the subjects of the RF- 60%.

Country	Instruments	Tax/charge base	Charge rate	Remarks (privileges, destination and allocation of revenues)
Tajikistan	Payment for surface and groundwater abstraction.	n.a.	n.a.	n.a.
Turkmenistan	Payment for surface and groundwater abstraction.	The type of water use.	State enterprises – 800 Manats/cubic meter, firms - 150-300 Manats, foreign firms - 2000 Manats.	Water for household use is provided free of charge; farms use water free of charge. Payment was introduced for irrigation use in excess of the limits.
Ukraine	Charges (tax) on water use.	The type of water use.	<p>Payment for water use is established for each oblast depending on the water reserves. Differentiated rates are established depending on the type of water (groundwater, surface water, basin) and purpose of use (potable, for hydraulic power stations, water transport, irrigation in agriculture or for fishery).</p> <p>Surface water:  from 0.0144 Grivens/m<sup>3</sup> – for the Danube basin  to 0.08674 Grivens/m<sup>3</sup> – for rivers flowing into the Azov Sea.</p> <p>Groundwater:  From 0.0288 Grivens/m<sup>3</sup> – in the Kiev Oblast  to 0.009 Grivens/m<sup>3</sup> in the Ivanovo-Frankovsk Oblast.</p>	<p>Revenues from tax collection for the use of water from resources of “national importance” are allocated among the state budget (80%) and oblast budgets (20%).</p> <p>The tax on other water resources is transferred to local town budgets.</p> <p>No earmarked use of these charges is stipulated in the budget.</p>

Country	Instruments	Tax/charge base	Charge rate	Remarks (privileges, destination and allocation of revenues)
Uzbekistan	The tax on the use of water resources.	The tax is collected from water users for the use of surface and groundwater for production and technical needs. It is differentiated according to economic branches and water sources (surface or groundwater).	The tax rate for the use of water resources: From industrial enterprises: 0.95 Sums per cubic meter of water from surface sources and 1.22 per cubic meter from subterranean sources. From electrical power plants: 0.27 and 0.41, etc.	Payment for water used for irrigation will be introduced from 2001. There is a system of privileges according to the character of water use, type of activities and accountability.

Appendix 5, Table 13 Reported use of taxes and charges for use of subsurface resources (mineral and hydrocarbons), EECCA countries 1999

Country	Name of the charge (tax, fee)	Tax/charge base	Year	Charge rate	Remarks (privileges, destination and allocation of revenues)
Armenia	Payment for extraction of mineral deposits.	Percentage of the average price per tonne on the world market for non-ferrous and precious metals. Percentage of the average quarterly market price for sale of mineral deposit – other types of raw mineral materials.	1998	Gold, silver, platinum – 1.5%. Non-ferrous metals: copper – 1.3 %. Coal, peat, and shale: 3-5 %. Tuff – 4%. Raw material for metallurgy, chemical, light and other industries: 3-6 %. Mineral water: for production purposes: 4.5 %, for medical treatment: 3 %, etc. Charges are imposed on 63 different products, only some of which raise significant revenues.	The impact of payment on the rate of extraction and degree of depletion of deposits was not estimated.
	Fines for extra-limit use.	The limit is specified in the contract on use.	1998	The fine factor of 3 is applied.	The state budget. Non-earmarked.
Azerbaijan	The tax on extraction of mineral deposits (royalty).	The type of mineral deposit and the wholesale price of the product sold. The tax rate is differentiated; i.e., for each type of mineral deposit the rate is established depending on the real cost, type and quality of the resource, mining conditions and profitability of extraction.	1999	Royalty rates (as percentage of the wholesale price of the product) Crude oil – 26 Natural gas – 20 Ferrous metals – 3 Non-ferrous metals – 4 Noble metals – 8 Lining stones – 8 Mineral water – 8	Transferred to the budget of the Republic.
	The license for extraction of mineral resources.	Type of activities of the nature user.	1999	4 million Manats.	Transferred to the state budget without earmarked use.

Country	Name of the charge (tax, fee)	Tax/charge base	Year	Charge rate	Remarks (privileges, destination and allocation of revenues)
Belarus	The tax on the use of natural resources.	The tax is imposed on resources extracted from the environment.	1999	The tax rate per tonne extracted: oil – 79,280 Roubles. peat – 2,795 Roubles, potassium salt – 121,000 Roubles, per cubic meter of mineral water – 1,540 Roubles, construction sand – 4,420 Roubles, per gram of gold – 7,6860 Roubles.	The tax on extraction of natural resources is transferred to local budgets.
Georgia	The tax on the use of mineral resources.	The percentage of the price of the natural resource. The Expert Council on licensing the use of mineral resources determines the specific charge rate (within the admissible range). The decision depends on the quality and accessibility of the resource.	1998	Oil and gas: 5-10 %; coal -2-5 %; iron 1-7 %; precious stones: 4-6 %; Fresh water: 1-15 %. Mining waste: 1-5 % etc.	The Ministry of Economics and the Ministry of Environment of Georgia worked out a methodology for determining the price of the resource.
Kazakhstan	Special charges and taxes on users of mineral resources, including bonuses and royalties	A bonus is a fixed payment for the volume of extracted mineral resources to be paid in money. Royalty is the payment for the right to use subterranean resources in the process of extraction of mineral resources.	1998	Bonuses: The commercial finding bonus – at least 0.05 % of the cost of extracted resources to be paid by the user of subterranean resources for each commercial finding. Bonus of extraction is paid according to contractual conditions once or several times during the term of the contract on the use of subterranean resources.  2. Royalties. For widespread mineral resources the rates vary from 1 to 10% of the average sale price of the merchandise products. For other types of mineral	Resources to the Republic's budget.

Country	Name of the charge (tax, fee)	Tax/charge base	Year	Charge rate	Remarks (privileges, destination and allocation of revenues)
				resources, the rates vary from 12 to 20 %.	
Kyrgyzstan	The license for exploitation of mineral deposits	The type and the conditions of use of mineral resources.	1998	The rate for the license is established in the amount of 1,500 Soms.	Part of the revenues goes to the budget for financing protected and earmarked items of the budget. The other part is left at the State Committee on Geology and is used for covering direct expenses.
	Payment for extraction of mineral resources.	Payment is differentiated according to types of mineral resources.	1998	As regards generally spread mineral resources and subterraneous water the rates vary from 5% of the average sale price for merchandise products.	Resources go to the budget and are allocated for financing earmarked items of the budget.
	Deductions to the fund for the restoration of mineral and raw material stocks.	Percentage of the production costs.	1998	Coal – 2% from a tonne, oil –2% from a tonne, natural gas – 4% from 1000 m <sup>3</sup> Gold and silver – 5% from a gram, lining stones – 12 from a cubic meter of the unit stone.	Resources go to the budget and are allocated for financing the development and reproduction of the mineral and raw material stocks.
Moldova	Payment for the license to use mineral resources.	Payment for the right to explore, survey and develop mineral resources.	1999	The limit levels of regular payment are established in percentage of the cost of the unit of extracted raw material: 2-5 % for mining raw material 2-4 % for non-ore construction materials.	Resources go to local budgets and are allocated in compliance with the Law on the Budget.
Russia	1) payment for the right to use mineral resources, 2) deductions for regeneration of mineral and	and 2) The cost of extracted mineral raw material, 3) one tonne of oil (other resource or product) (extracted or exported).	1992	The rates are differentiated from 1% to 16% of the cost of extracted mineral raw material and losses from the extraction in excess of the standards, depending on the type of the mineral raw material and are determined for each specific deposit. The rates are differentiated from 1.7% to 10	Payments are allocated among budgets of three levels in various proportions depending on the type of mineral resources; Transferred to the fund for regeneration of the mineral and

Country	Name of the charge (tax, fee)	Tax/charge base	Year	Charge rate	Remarks (privileges, destination and allocation of revenues)
	raw material stocks, 3) excise.			% of the cost of extracted raw material, depending on its type. The rates are differentiated by deposit.	raw materials; Transferred to the federal budget;
Tajikistan	Taxes and charges for extraction of mineral resources and taxes on raw materials	n.a.	n.a.	n.a.	n.a.
Turkmenistan	The tax on the use of mineral resources.	Percentage of the cost of production.	1999	“Turkmengas” – 22%, “Turkmenneft” – 10%, “Turkmenmineral” – 10%.	State and local budgets.
Ukraine	The tax for extraction of mineral resources.	Based on the volume of extracted mineral resources. The tax rate is established separately for each type of mineral resources.	1998	Oil and condensate – 1.64 Grivnas/t (extraction). Natural gas – 0.67 Grivnas/thousand cubic meter (extraction). Mineral underground water – 1.5 Grivnas/m <sup>3</sup> (extraction). For losses of mineral resources in excess of the standard during their extraction as well as for extraction in excess of the limits, the tax is doubled.	For the period till 2002 the 0.3 factor is to be applied to the basic standards of payment for the use of mineral resources (except for oil, condensate, natural gas, stone coal and brown coal); and 0.2 factor for rich iron ore, enrichment ore, dolomite, flux limestone, and limestone for sugar industry. Revenues from the tax on extraction of mineral resources are allocated between the state (60%) and regional (40%) budgets. The tax on extraction

Country	Name of the charge (tax, fee)	Tax/charge base	Year	Charge rate	Remarks (privileges, destination and allocation of revenues)
					of mineral resources of local significance is transferred fully to the regional budgets.
Uzbekistan	For extraction of mineral resources.	The tax rate in % of the extracted volume.		The tax rates vary from 1 to 26 %.	

**Appendix 5, Table 14: Reported use of taxes and charges for forestry management (charges, taxes, fees for the felling of trees and reforestation), EECCA countries 1999**

Country	Name of the charge (tax, fee)	Tax/charge base	Year	Charge/tax/fee rate	Remarks (privileges, destination and allocation of revenues)
Armenia	Charge for tree cutting	Per cubic meter of cut trees depending on the type of use (construction timber or firewood); type of trees; distance from the wood edge.	1998	Firewood: from 210 Drams/m <sup>3</sup> to 700 Drams/m <sup>3</sup> ; construction timber: from 280 to 3920 Drams/m <sup>3</sup> .	State budget, non-earmarked.
Azerbaijan	Charge for tree cutting.	Composition of sold timber. The charge rate is differentiated by tree categories and their diameter.	1998	Firewood with bark – from 666 to 2,590 Manats/cubic meter. For precious types of trees: 165,322 Manats/cubic meter; middle-diameter timber: 144,038 Manats/ cubic meter; large-diameter timber: 108028 Manats/cubic meter.	Discounts used when timber is sold to budgetary organisations (20%) and to the population (30%). Transferred to the forest protection and regeneration funds and used for operational needs. Transfers to this fund allow the coverage of up to 40% of annual expenses related to forest regeneration and planting.
	Fines for unauthorised cutting of and damage to trees.	Multiple of the minimum wage (5,500 Manats).	1998	Rates depend on the cut tree diameter and the type of the wooded area.	Transferred to the forest protection and regeneration funds.
Belarus	Charge for tree cutting.	Per cubic meter of timber depending on the tree type, the size of the timber and the nature of felling (main or interim use).	1998	The rates vary from 4 to 17,090 Belarusian Roubles per cubic meter.	The Ministry of Forestry of the RB annually sets rates for the logging of trees that are not included on the main list.

Country	Name of the charge (tax, fee)	Tax/charge base	Year	Charge/tax/fee rate	Remarks (privileges, destination and allocation of revenues)
Georgia	Charge for tree cutting.	Per cubic meter of timber as a percentage of the market price depending on the value of trees and thickness of cutting. Forests are divided into 5 groups with 5 subgroups in each group, depending on their commercial value.	1998	Firewood – 2-5%, for the rest – 3-34% depending on the type of use.	The market price for each group of forest resources is regularly determined by the Ministry of Economics of Georgia on the basis of recommendations of the Council on licensing the use of forest resources.
Kazakhstan	Charge for tree cutting.	Per cubic meter of wood depending on the type of harvested timber, its technical properties, and the distance between the felling area and the places of its use.	1994	Charge rate is differentiated for the merchandise timber (small, middle and large) and firewood (timber with bark) and for the types of timber. The rates vary from 12.8 Tenges/cubic meter to 403.2 Tenges/cubic meter.	The resources are transferred to the Republic's budget.
Kyrgyzstan	Charge for tree cutting.	Based on the amount of annual expenses of the forestry organisation per cubic meter of the growing forest, the factor of rate variation depending on the quality, the size of timber and the distance of haulage.	1998	Charge rates are from 1.7 to 408 Soms/cubic meter.	Revenues are transferred to the budget (70%) and special accounts of the State Forestry Agency (30%) and cover direct expenses, forestry protection and regeneration.
	Charge rates for the damage caused to forestry by unauthorised tree felling and damage to trees.	The age of the tree (bush), and the stump diameter at the root.	1996	The charges vary: from 36 Soms minimum to 180 Soms maximum.	

Country	Name of the charge (tax, fee)	Tax/charge base	Year	Charge/tax/fee rate	Remarks (privileges, destination and allocation of revenues)
Moldova	Charge for tree cutting.	Differentiated depending on the tree type, the quality of timber and the size of material.	1999	Varies from 0.84 Leus per cubic meter for willow to 25.80 Leus per cubic meter of large-size nut-trees. For firewood it varies from 0.84 to 1.50 Leus/cubic meter.	Industrial felling of woods in the Republic is not allowed. Only care and regeneration felling is allowed. Revenues are transferred to local budgets.
Russia	Charge for tree cutting.	Payment for timber is set per cubic meter. The current rates are set by regional authorities as agreed with the territorial authorities of the federal forestry management body.	1998	The minimum charge rates for timber of the main forest-making trees (pine, spruce, fir, beech, oak, birch, etc.) are differentiated depending on the distance of haulage.	Revenues are distributed as follows: 40 percent to the federal budget and 60 percent of the budgets of the subjects of the Russian Federation.
Tajikistan	Charge for tree cutting.		1996	From 1,000 to 16,000 Roubles	n.a.
Turkmenistan	Charge for tree cutting.	The value of the timber and its dimensions are taken into account.	1998	80,000 – 800,000 Manats	n.a.
Ukraine	Charge for tree cutting.	Per cubic meter of timber. Tax rates are established depending on the tree species (primary or secondary), the forest tax region (all woods are divided into 2 regions), the forest tax category (5 categories according to the distance of haulage), and the tree diameter.	1997	The rate –Grivnas/cubic meter Primary wood species <i>Pine</i> for the first region, 1st category large – 19.70; middle – 16.80; small – 12.60; firewood – 1.30 <i>Pine</i> for the first region, 5th category large – 5.60; middle – 4.80; small – 3.60; firewood – 0.40.	n.a.
Uzbekistan	/	/	/	/	Felling of woods is strictly prohibited and is punishable with serious fines.

**Appendix 5, Table 15: Reported principal economic instruments for the conservation of biodiversity and wildlife; EECCA countries 1999**

Country	Instrument	Tax/charge base	Charge rate	Revenue allocation
Armenia	Hunting license fee.	Type of the animal or the bird.	From 100 to 800 Drams per head.	State budget, Non-earmarked.
	Fine for unlawful hunting and fishing.	For violation, destruction, etc.	For citizens from 10% to 100% of the minimum wages. For officials from 30 to 300% of the minimum wage.	
Azerbaijan	Hunting license fee.	Species of hunted animal or game.	Up to 165 000 Manats.	Transferred to the Reserve Fund for Nature Protection.
	Fine for unlawful hunting and fishing.	The rate depends on the species of wild animal or fish.	Up to 825 000 Manats.	
Belarus	Hunting license fee.	Species of animal and duration of hunting.		
Georgia	Hunting license fee.	The group of animals (animals are divided into 24 groups).	Per head or tonne of live weight represented by percentage of the market price (1-55%).	
Kazakhstan	Hunting license fee.	Collected as the state duty for each owner of the hunting rifle.	10% of the established monthly rated indicator (for the 4th quarter of 1999 equals to 725 Tenges).	Collected revenues are transferred to special accounts for protected areas.
Kyrgyzstan	Hunting license fee.	Species of animals.	The rates vary from 6 Soms to 1,645 Soms. For foreigners 3 times the rate, for CIS countries – 2 times.	Payment is transferred to special accounts of the Hunting Supervising Agency and the Ministry of Nature and (30%) to the budget.
	Fishing license fee.	Species.	The rate varies, depending on each separate species of fish, from 0.05 Soms to 4.0 Soms	

Country	Instrument	Tax/charge base	Charge rate	Revenue allocation
	Claims for damage to wildlife and vegetation.	The size of penalties for damage to wildlife is determined as a multiple of the minimum wage per animal head. For vegetation – a function of the price of confiscated product.	Rates for wildlife vary depending on the species from 10 Soms to 15,000 Soms. Rates for vegetation vary depending on the type of violation, with the minimum rate of 5 times the purchase price per kg of medicinal plants.	Resources are transferred to the Nature Protection Fund and used for environmental purposes.
Moldova	Hunting license fee.		Payment for shooting feather game is 15 Leus.	Resources are transferred to the State Forestry Service.
	Fishing license fee.	Duration of fishing.	1.8 Leus per day; the annual license costs 18 Leus.	Resources are transferred to the account of the fish protection authorities.
Russia	Hunting license fee.	For one animal or a group of animals (determined on the basis of limits established on the killing of animal species).	The rates are multiples of the minimum monthly wage (MMW): from 10% to 10 times the minimum wage.	Payment for the use of wildlife is transferred to the federal budget (40%) and regional budgets (60%).
	Fines for illegal hunting and fishing.	Per animal/fish.	Rates are established separately for species included in the Red Book (1) and others (2). For fish – from 5 to 25 MMW; for mammals – from 50 MMW for a bison to 200 MMW for a tiger to 2500 MMW for a whale.	Revenues from fines are transferred to the budget of the subjects of the Russian Federation.
	Fines for illegal harvesting or destruction of vegetation (plants and mushrooms) registered in the Red Book of the RF as well as for destruction of their habitat.	The number of vegetation objects, or their mass, or the area of their growth.	From 0.2 MMW for an individual plant to 50 MMW for a tree, to 300 MMW for the destruction of one hectare of vegetation.	

Country	Instrument	Tax/charge base	Charge rate	Revenue allocation
Tajikistan	Hunting license fee.	Species and number of animals and birds.	From 7,000 to 10,000 Roubles per animal, and from 500 to 1,000 Roubles per bird.	
Turkmenistan	Hunting license fee.	For one common or rare animal.	Up to 300,000 Manats.	Revenues go to the State Environment Protection Fund.
	Fines and suit claims for illegal hunting and fishing.	Depending on the amount of the damage.	A suit for each specific object of wildlife and vegetation; the fine may not exceed 20 minimum wages.	
Ukraine	Hunting license fee.	Provisional payment rates are established in foreign currency per animal (payments are to be made in the national currency).	The payment rates are established depending on the species and group of animals.	Payment for “special use of wildlife” is transferred to the budget for general needs.
	Fishing tax.	The rate of payment is established in US Dollars per tonne of caught fish and other water animals (payment is made in the national currency)	The rates of payment are established for 25 fresh water fish from \$1.69/t to \$39.50/t; 36 sea fish from \$1.69/t to \$118.40/t; as well as three species of algae (\$0.70/t \$3.10/t and \$3.90/t)	
Uzbekistan	Hunting license fee.	A multiple of the minimum wage (MW).		75% of the revenues are transferred to the national budget and 25% to the special account of the State Committee on Nature.
	Payment for collection of wild plants.	A multiple of the minimum wage (MW).		

Country	Instrument	Tax/charge base	Charge rate	Revenue allocation
	Fines for damage to vegetation.	Rates for illegal felling of or damage to trees and other vegetation, unauthorised haymaking and pasture of animals.	Up to 12.6 times the minimum monthly wage.	If the violation is detected by the State Committee on Nature, revenues are transferred to local funds for nature protection. If it is detected by forest guards, revenues go to the national budget. If it is detected on the territory of a reserve or national park, revenues are transferred to their accounts.

## APPENDIX 6. MACROECONOMIC DEVELOPMENT, ENVIRONMENTAL PROBLEMS AND POLICIES IN EECCA

### Macroeconomic development

Although countries across the region started the transition with varying initial economic and social conditions, all of them carried a significant burden of heavy distortions which characterised centrally planned economies. Trade and industrial production among the countries of the former Soviet Union were largely geared towards extreme patterns of regional specialisation and almost complete isolation from the forces of the global market place. Economic transactions were regulated; they were based on soft budget constraints and artificial values; inflationary pressures were repressed; the structure and the location of industry were inefficient. Production efficiency and productivity was low in spite of the reported full employment.

The political changes in Europe in late 1980s have led to the break-up of the Soviet Union in 1991 and the emergence of twelve Soviet republics as independent states<sup>13</sup>. Since then a process of building new political, economic and social systems has started. In early years of transition, however, all the countries faced significant negative effects of the transition. Rapid inflation and falling output were signs of a deep recession. Cumulatively, an index of GDP in EECCA nearly halved between 1989 and 1996. The output has continuously declined with slight upturn in 1997. The level of price rises in EECCA was enormous reaching the level of above 1,000 per cent per year at the start of the transition, esp. in 1992 and 1993. However, many EECCA countries established price stability after 1993 and in eight of 12 countries, 1997 inflation was under 30%. In some countries, inflation rates have varied from year to year as a result of erratic economic policies. In 1998 Russia's financial crisis sparked inflation again across the region. The weak foundations for macroeconomic stability, combined with strong external pressures from the crises in East Asia and in Russia, have contributed to a recent reversal in several EECCA countries, where inflation has more than doubled in 1998. Over the last years the economies in EECCA recovered, inflation was lowered and industrial production increased, though still not reaching the levels from before 1991.

High inflation, the fall in output and GDP were due to a combination of factors: the monetary overhang from central planning, the erosion on the old (notional) tax base, difficulties in asserting monetary and fiscal control in new economic circumstances, and disorganisation arising from the collapse of a rigid system.

Another important source of inflationary pressures has been the emergence of significant fiscal imbalances. As for other transition economies, the major challenge for EECCA has been to create a new tax system that balances the decline in profit and turnover taxes from contracting state sector with increased revenues from other sources, such as VAT and personal income taxes. In EECCA though such reform was slow and tax revenues have been limited by poor administration, erosion of the tax base,

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13. The three other countries which proclaimed independency from the Soviet Union: Estonia, Latvia and Lithuania are not included in the term EECCA. They have been covered by the term Central and Eastern Europe.

development of barter and tax evasion. Governments in many EECCA countries have also allowed large tax arrears to become accumulated as a form of implicit subsidisation of inefficient enterprises. The persistence of soft budget constraints is therefore partly responsible for the poor fiscal performance of these countries over the past decade.

To cope with the negative effects of the disintegration of the Soviet Union, stabilisation programmes and institutional and policy reform have been introduced in a number of EECCA countries, such as Armenia, Georgia, Moldova, Kazakhstan, Kyrgyzstan and the Russian Federation. The main elements of these programmes were price liberalisation, current account convertibility, trade and foreign exchange liberalisation and small-scale privatisation. As a result, some of them gained monetary and fiscal control, and growth was noted. Some countries, such as Azerbaijan, Belarus, Tajikistan, Turkmenistan, Ukraine and Uzbekistan, have been pursuing either very slow or no liberalisation policies. In all countries stabilisation has been jeopardised by the existence of soft budget constraints and influenced by unfavourable legacies of central planning. Overall, depression and decline in living standards is visible throughout the region.

Privatisation was regarded as an important complement to liberalisation and stabilisation and a way of: increasing the efficiency of production by removing the state from the ownership thus limiting influence on the decision making within enterprises; introducing private ownership which would introduce profit-oriented incentives within the firm; generating of receipts for the government; the promotion of competition; and the fair distribution of the national wealth. Over the last decade only in Georgia and Russia more than 50 per cent of state-owned medium and large-size enterprises have been privatised, up to 50 per cent in Armenia, Kazakhstan, Kyrgyzstan, Moldova and Uzbekistan and less than 25 per cent of state-owned assets have been privatised in Azerbaijan, Belarus and Turkmenistan.

The disintegration of Council for Mutual Economic Assistance (CMEA) trading area and the break-up of the Soviet Union erased many of the old system's gains from specialisation. Large vertically integrated industrial complexes lost their captive markets as trade with the rest of the world was freed. A capital stock originally aimed at large-scale production of heavy machinery and transport equipment become obsolete. Drastic changes in demand structures led to rapid industrial downsizing. At the same time economic activities moved away from large scale industry and towards the service sector.

In most countries, firms have been slow to introduce "deep" restructuring measures, such as the development of new products and processes and the identification of new markets. Instead most firms responded by engaging in "reactive" restructuring, reducing output, employment and capacities. Many EECCA countries remain heavily dependent on resource-intensive industries. Many industrial enterprises were left in severe financial difficulties as financial sector reforms reduced the allocation of soft credits to industry. At the same time the financial sector was weak which hampered domestic borrowing possibility. Macroeconomic risks reduced the scope for external borrowing, and soft budget constraints, such as ineffective bankruptcy laws, payments arrears and barter, were distorting profit incentives and inhibiting innovation.

In many EECCA countries, however, privatisation has significantly benefited insiders either through voucher privatisation with significant concessions to insiders or through management-employee buy-out. It also proved that government interference in privatised enterprises remains extensive. The channels of influence also run from enterprises to the state. Representatives of the old regimes retained much of their power in terms of control over the political system. Line ministries, enterprises and natural resources following the break-up of the communist regimes did not encourage trust by the population in the government, the rule of law or belief in the new beginning. It gave those groups most resistant to fundamental economic and political reforms the power to block measures that would have weakened their economic and political positions. Even in privatised forms, the state often retains the ability - through a

variety of channels, including residual ownership, control over crucial inputs, or tax claims - to intervene in corporate strategy and restructuring. The power is used to persuade firms to maintain employment or to sell their products cheaply to other firms.

The decline in output in early years was accompanied by falls in employment and labour force participation, sharp increases in unemployment, and declining productivity. Many countries still lack effective social support for workers that might be laid off as a result of restructuring. Corresponding to the decline in productivity, real wages fell sharply in the early years of transition. It was observed that the transition has been accompanied by an increase in the number of poor people. The increase has been the largest in countries where real income has fallen most and taking into account an international poverty line of 4 USD per day, measured at purchasing power parity (PPP), around 140 million people could be considered to be poor in 1995 in CEE and EECCA, with 83 per cent of which were living in EECCA. In addition, an income inequality has increased dramatically showing a similar pattern as in the developing countries.

## **Environmental situation and environmental policy developments in EECCA**

### *Overview of the state of the environment*

The wide range of environmental problems in EECCA stems from the development patterns of the 12 republics of the Soviet Union and from the variations in geography, geology, and climate in the region. Western areas (Belarus, Moldova, the European part of the Russian Federation, and Ukraine) and the Caucasian states (Armenia, Azerbaijan, and Georgia) exhibit a pattern of development, which is characterised by highly urbanized populations, heavy localised ambient air pollution from stationary and mobile sources, and water pollution problems resulting from large volumes of municipal and industrial waste. Central Asia (Kazakhstan, Kyrgyz Republic, the Asian part of the Russian Federation, Tajikistan, Turkmenistan, and Uzbekistan) is less densely populated, with economies driven by natural resource extraction, related industries, and irrigated agriculture. In these countries scarce water supplies (especially in rural areas), deteriorating municipal infrastructure, and heavy industrial pollution make water-related environmental problems a top priority.

#### *Water quality*

EECCA countries have extensive surface and groundwater resources, however, the spatial and seasonal distribution of these resources is uneven. Water is plentiful in the European and Caucasus regions and in the Russian Far East but in Central Asia only the Kyrgyz Republic has an abundance of fresh water. Access to safe drinking water in EECCA is limited by the poor quality of sources of potable water, shortages of treatment chemicals, and lack of financing to maintain and refurbish distribution systems. The damage to human health resulting from poor water quality has been documented throughout the region, and the costs of water pollution go beyond the risks to human health, as water pollution can damage commercial fisheries and other aquatic animals and plants. Water pollution can also affect irrigated agriculture - irrigation waters that are saline and laden with minerals can lower agricultural yields and soil quality. And water contamination resulting from high concentrations of mineral salts can damage pipes and other equipment used in industry and in drinking water distribution networks.

The problems with drinking water have two main causes: deteriorating distribution systems and high surface and groundwater pollution. The studies estimate that unless investments are made in maintaining and rehabilitating distribution systems, water utilities throughout EECCA could collapse in 10 years. At the same time, a significant amount of untreated industrial wastewater is discharged directly into water bodies. Some untreated industrial wastewater is discharged to municipal treatment plants and subsequently discharged untreated because municipal facilities lack the capacity to treat industrial

pollutants. Where municipal wastewater treatment exists, it is generally limited to primary treatment. Secondary treatment is more common in facilities in the European areas of EECCA. But even when systems provide secondary treatment, poor maintenance, high electricity costs, and limited financing reduce system effectiveness and increase the volume of untreated and poorly treated municipal wastewater discharged.

Mining operations, oil and chemical spills, and agricultural activities also affect negatively water quality. And serious groundwater contamination results from improperly designed solid and hazardous waste landfills and onsite waste dumps. The scope of the potential water pollution resulting from the storage and disposal of hazardous waste is largely unknown because of limited data on past disposal practices and limited monitoring capabilities.

Ill-conceived development policies and distorted incentives for water use have caused desiccation of the Aral Sea. Poorly defined property rights, lack of commitment to reducing water pollution, and poor coordination among littoral states have resulted in significant pollution in the Black and Caspian Seas, threatening fishing resources (especially the Caspian sturgeon) and the tourist industry (mostly along the Black Sea coastline).

#### *Air quality*

Air pollutant emissions from stationary and mobile sources are a major contributor to the incidence of respiratory illness, cancer, and premature death. Despite a marked decline in stationary source emissions in EECCA - a result of the economic downturn in the 1990s - ambient air pollutant concentrations often exceed World Health Organization guidelines and comparable standards in industrial and urban areas. In many areas an increase in traffic emissions is offsetting the drop in industrial emissions.

Most air pollution hot spots in EECCA are due to emissions from large industrial sources: power generators, chemical and petrochemical plants, and ferrous and nonferrous metallurgy enterprises. Industries producing ferrous and nonferrous metals, chemicals and petrochemicals, and cement, as well as other manufacturers and power plants, emit a wide array of air pollutants. The most common are particulates, nitrogen oxides, carbon monoxide, and sulphur dioxide - all associated with the combustion of fossil fuels. Chemical plants also emit organic chemicals such as formaldehyde, benzo(a)pyrene, and phenols. Metal plants emit heavy metals, particulates, benzene, hydrogen sulphide, and hydrogen cyanide. Slow restructuring of the region's economies and lax enforcement of environmental regulations have allowed large industrial complexes to continue production with outdated, energy-intensive technologies. Many environmental hot spots in EECCA involve a single or a few sources near an urban centre. But facilities in the EECCA states are often much larger (for example, metal enterprises in Magnitogorsk, Russia, and Krivoy Rog, Ukraine, a nickel smelter in Norilsk, Russia) and concentrated in a single urban area or region (Sverdlovskaya oblast and Volgograd in Russia, Sumgayit in Azerbaijan, Mariupol in Ukraine).

Pollution from mobile sources is a serious problem in some urban areas and will become more serious as the number of vehicles increases. Mobile source emissions are concentrated in urban areas and transportation corridors. Gasoline-fuelled engines emit hydrocarbons, nitrogen oxides, carbon dioxide, carbon monoxide, and lead (where leaded gasoline is used). Diesel-fuelled engines emit hydrocarbons, nitrogen oxides, sulphur dioxide, and particulates. Although estimates of mobile source emissions are not available for most countries in the region, the 37 percent drop in diesel consumption and 27 drop in gasoline consumption between 1992 and 1994 suggest that emissions fell. With economic growth, however, fuel consumption should recover, and the observed increase in the number of passenger cars - by up to 50 percent in Russia between 1991 and 1995 - should continue. In some countries (Armenia,

Georgia, Moldova) mobile sources account for the largest share of air pollutant emissions or the largest share of specific pollutants (for example, nitrogen oxides, carbon monoxide, and volatile organic compounds in Belarus, and lead in most countries of the region).

#### *Hazardous waste*

Hazardous waste is a common byproduct of mining, metal processing, and chemical and petrochemical production. Policymakers in EECCA lack comprehensive data on the amounts and types produced, as well as locations of hazardous waste, the condition of storage containers, lagoons, and other impoundments, and the current and potential effects on soil and surface and groundwater. Several hazardous waste hot spots have been identified in EECCA, and some pose a current or imminent health and environmental hazard. Most hazardous waste problems result from land and disposal management practices that fail to keep contaminants from infiltrating groundwater or leaching to surface water. Few EECCA countries have communal disposal capacity dedicated to hazardous waste. Most hazardous waste is stored and disposed of at onsite facilities or discharged with other industrial waste in industrial or municipal landfills.

#### *Municipal solid waste*

Before transition most major municipalities in EECCA had extensive solid waste collection systems. But in many areas collection systems have deteriorated as a result of capital shortages that led to reduced vehicle maintenance and slower replacement of depreciated equipment. Separation of municipal waste for resource recovery and recycling is rare, partly because of limited markets for recovered materials. Most waste disposal facilities are poorly designed, maintained, and managed. As in many other countries, landfill capacity is being exhausted, requiring the siting of new municipal solid waste facilities. Many landfills are located outside cities, waste haulers have dumped their loads in informal sites to shorten haul distances and counter rising fuel costs.

#### *Biodiversity*

Many EECCA countries are rich in natural resources, including forest, inland water, and coastal marine biodiversity. Ecosystems in the Caucasus and the West Tien Shan (Kazakhstan, Kyrgyz Republic, Uzbekistan) are especially rich in biodiversity. Russia's forests account for two-thirds of the world's temperate forests, yet an estimated 1 million hectares of Russian forest have been destroyed by emissions of sulphur dioxide and soil acidification in areas near smelters. In addition to their global conservation values, biodiversity resources are a crucial component of the region's renewable resources, providing the basis for subsistence and development.

Since the beginning of transition the region's natural and productive landscapes have come under intense pressure, mainly from overuse. Many national environmental action plans and biodiversity strategy or action plans identified several common problems - including unsustainable patterns of resource use, extensive pollution damage, weak institutions and insufficient financial resources, and uncertain land tenure. Many of the region's forests, range-lands, and fisheries suffer from over-exploitation, conversion, over-hunting, and illegal harvesting. Agricultural practices have exacerbated the situation by draining wetlands and converting forests and shrublands to croplands. Bad sectoral policies and inadequate enforcement of laws and regulations contribute to these problems.

Contaminated inland water ecosystems - such as the Black Sea, Caspian Sea, Aral Sea, and Lake Baikal - have reduced biodiversity and lowered the revenues from commercial fishing. In the most dramatic case, saline water and chemical use have destroyed the Aral Sea. Discharges of agro-chemicals

and of untreated industrial and municipal waste-water are the leading cause of water ecosystem degradation. Atmospheric emissions from industry have damaged terrestrial ecosystems, especially forests.

#### *Natural Resource Use*

Many EECCA countries are rich in renewable and non-renewable natural resources. This includes water, forests, as well as oil, gas and minerals. For example, Russian forests constitute one-fifth of world timber resources, and Russia is the world's largest producer of natural gas and third largest producer of oil and coal. The Caspian Sea region has the potential to become one of the world's largest suppliers of oil and gas. Other EECCA countries also have large reserves of fossil fuel, oil and gas. In addition, in many countries large deposits of iron, copper, gold, silver, diamonds, uranium and other resources exist.

Central planning has pursued the patterns of economic development where industrial activities have accumulated around deposits of natural resources. Ineffective management of natural resources has resulted in over- or cost-ineffective exploitation of some of them. At the same time obsolete technologies and bad environmental management has led to the creation of the hot spots with huge deposits of industrial and other waste, including extremely hazardous waste.

#### ***Environmental policies and institutional framework***

##### *Historical background for the use of market based instruments in EECCA*

Prior to 1987 the former Soviet Union government policies were relying on command-and-control environmental policy instruments, though a small number of indirect instruments such as water use tariffs, stumpage fees, land taxes, payments for mineral resource reproduction (for geological prospecting/exploration), production excise taxes and export duties have been in place.

The ineffectiveness of the command-and control policies, which became apparent in late 1980s, promoted stronger interest in market-based instruments. In late 1980s, a radical re-organisation of environmental management of the Soviet Union took place. The main element of the reform was the creation of a pollution charge system, including both fees on emissions within the allowable limits and non-compliance fees (fines) on emissions above the limits. The new regulations also proposed to set up a network of earmarked environmental funds to allocate the revenues from the charges. This development was continued after the break-up of the Soviet Union and in 1991-1992, many EECCA countries established a similar national pollution programmes which typically imposed fees on air, water and solid waste discharges and earmarked the revenues for environmental protection.

##### *Environmental Policy Reform in Transition*

Over the last years, however, some efforts have been undertaken in EECCA to improve environmental management in a more comprehensive manner. Since 1991-1993 a variety of different approaches have been applied to solving mounting environmental problems in the transition period depending on the context and needs of countries. In countries which had some environmental management capacity, such as Belarus, the Russian Federation and Ukraine, the process took the form of incremental adjustments and the updates of existing environmental policies and strategies, where some innovative approaches have been introduced into, for example, national and sectoral policies, and regional and local environmental programmes. Many of the countries of the former Soviet Union, however, were required to develop environmental policies for the first time. In countries like Armenia, Azerbaijan, Georgia, Moldova, Kazakhstan, Kyrgyzstan, and Uzbekistan, National Environmental Action Programmes have been developed between in the period between 1995 and 1998. These documents were comprehensive and had to serve a variety of purposes - defining key environmental problems; establishing an information

base; elaborating new policy principles; redesigning environmental institutions; and developing tools and means for the policy implementation. In addition, these programmes identified also short-term investment actions necessary for solving urgent environmental problems. Although starting from a weak position, the environmental authorities were able to open up the communication channels with the Ministry of Finance, Ministry of Economy, State Authorities for Tax and Revenues Collection as well as sectoral agencies for energy, agriculture, forestry on the design and compatibility of economic instruments for environmental policies with sectoral and economic and fiscal policies in EECCA. Creation of a more effective framework for environmental enforcement was also undertaken in some countries.

In most cases, however, the lists of objectives, actions and investments were excessively long, lacking focus and a sense of priority. For the public sector, they were overly ambitious and based on the assumption that finance would be available for whatever capital investments were considered to be needed. In practice, only a limited number of public environmental investments were financed in EECCA, and even operation and maintenance of existing environmental protection equipment and infrastructure was mostly unaffordable. With respect to private sector NEAPs, other environmental programs usually followed the soviet-type central planning approach where bureaucracy mandated enterprises to implement specific projects instead of focusing on creation of the right incentives to achieve specific environmental targets and seek financing for related undertakings (including investments). Furthermore, the proposed actions both in the public and private sectors were not based on economic valuation of environmental impacts in the framework of cost-benefits analysis

In several countries, NEAP development was supported, or in some cases driven, by donors and international financial institutions. This led to the elaboration of comprehensive documents, including lists of investment projects intended primarily for external financing. Although such documents have usually contributed useful analytical material and resulted in a number of investment projects, they did not always promote the "ownership" needed to sustain an in-country process of national policy development. They have also paid inadequate attention to domestic financial resources and institutional arrangements. Many NEAPs were prepared by small groups of experts in scientific institutes and Environment Ministries. There have been cases where over-reliance on individuals has undermined the sustainability of the policy process. Experience has shown that the process of elaborating National EAPs was just as important as the product.

Overall, NEAP preparation helped stimulate the general process of environmental policy reforms in all EECCA countries. The most significant achievements were made by the governments and the parliaments in the legislative area where key environmental legislation has been introduced, including framework laws on environmental protection, regulations for environmental media. Updating national standards and norms for environmental quality aimed at more realistic levels is underway, alongside the development of more specific and detailed framework for the pollution charges, environmental taxes and other economic instruments.

However, the lack of specific, measurable, realistic and time-bound targets did not allow for establishment of a clear framework for actions and specification of resources (both human and financial) needed. On the other hand, no analysis of the affordability was undertaken. In some countries, the development of a regulatory framework has also been delayed by slow legislative processes. This was due to a significant burden on Parliaments to enact a large volume of new legislation in the current period of economic and political reform and due to the fact that environmental legislation was not a priority issue. In some cases, problems arose because of frequent changes of governments, as well as lack of capacity to draft high quality environmental laws, as well as the fact that frequently, consultations with relevant stakeholders were carried out at a late stage. This resulted in lengthy redrafting processes and delays in submitting the proposal for government and parliamentary considerations. The relations with the sectoral agencies were also far from ideal as the environmental purposes of the proposed instruments were giving

ways to the more important ones of fiscal consolidation, closing budget deficits and meeting economic and social needs of the countries.