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**A fresh approach to matching the costs of meeting environmental goals with the available resources**

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## Feasible Financing Strategies for Environmentally Related Infrastructure

**A fresh approach to matching the costs of meeting environmental goals with the available resources**

An important obstacle to achieving environmental goals in many countries has been the failure to adequately address the associated financial issues: the costs of achieving goals; how those costs could be minimised; and the challenge of matching costs with available resources. The need for a fresh approach has become evident as central European countries come to terms with mobilising substantial financial resources to comply with challenging EU environmental requirements, and as the countries of Eastern Europe, Caucasus and Central Asia (EECCA)<sup>1</sup> struggle to maintain even the low levels of services currently delivered by environmentally-related infrastructure.

The Danish government and the OECD have jointly developed an approach to meet these challenges, particularly for investment-intensive environmental infrastructure, such as urban water supply, wastewater collection and treatment, and municipal solid waste. This approach, backed by a special decision-support tool called FEASIBLE, has been applied in several transition economies including EECCA members, EU candidates and China. The main ideas underlying this approach are realism, affordability and cost-effective use of resources.

These applications were more than technical exercises: by engaging all the major stakeholders involved in financing environmentally related infrastructure, they supported constructive dialogue and agreements that facilitated effective programme implementation, improvement of service quality and the achievement of environmental goals.

The work was carried out within the framework of the Task Force for implementation of the Environmental Action Programme in Central and Eastern Europe (EAP Task Force), an inter-governmental body established in 1993 to promote environmental policy and institutional reform in central and eastern Europe. The secretariat for the EAP Task Force is located in the non-member countries division of the OECD's Environment Directorate and forms part of the Organisation's Centre for Cooperation with Non-Member Countries. ■

1. Eastern Europe, Caucasus and Central Asia (EECCA) countries include Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russian Federation, Ukraine, Turkmenistan, Tajikistan, Uzbekistan

**Table 1. Development of environmental financing strategies for environmentally related infrastructure in transition economies (conducted with Danish and OECD assistance)**

Country	Region	Urban water supply	Urban wastewater collection and treatment	Municipal Solid Waste
Georgia	National	x	X	
Moldova	National	x	X	
Russian Federation	Kaliningrad	x	X	
Russian Federation	Novgorod	x	X	x
Russian Federation	Pskov	x	X	
Russian Federation	Rostov on Don	x	X	x
Russian Federation	Yaroslavl			x
Kazakhstan	National	x	X	
Kazakhstan	Eastern Kazakhstan Oblast	x	X	
Ukraine	National	x	X	
Armenia	National		X	
Latvia	Riga			x
China	Sichuan Province		X	

### How does the FEASIBLE approach work?

The basic approach underlying the FEASIBLE method is to collect detailed technical data on the existing state of infrastructure, select public policy targets in areas like water supply and sanitation, determine costs and timetables for achieving them, and compare the schedule and volume of expenditure needs with available sources of finance. This analysis generally reveals financial deficits which would likely arise during the planned implementation. FEASIBLE can then develop various scenarios to determine how the gaps might be closed. This could involve identifying measures to help achieve the targets at lower cost; identifying ways to mobilise additional finance; adjusting the ambition level of the targets; or rescheduling tasks and targets. Figure 1 provides a schematic overview of the FEASIBLE methodology.

An important feature of FEASIBLE is the emphasis on realism and affordability. The model can assess the levels of finance (public, private, domestic, foreign) that might be available under different macro-economic and fiscal conditions. In this way it provides a check on what public budgets might realistically be expected to contribute. It can also help to assess the potential social implications of increasing tariffs by determining the impacts of such price

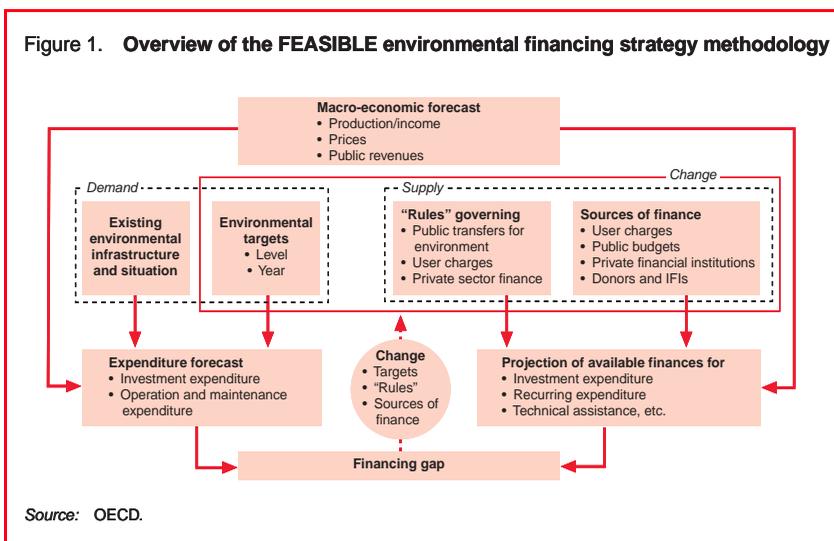
increases on household income. It helps to systematically review the obstacles that would need to be removed in order to mobilise private sector and foreign financing for environmental infrastructure. Thus FEASIBLE can support a process of dialogue and consensus building among stakeholders and build bridges between policy development and implementation.

The assumption underlying the FEASIBLE methodology is that governments should not be expected

### FEASIBLE software

A computerised decision support tool, FEASIBLE helps develop financing strategies for environmentally-related sectors involving costly public infrastructure. It currently may be applied in the water supply, wastewater and solid waste management sectors and the goal is to extend it to energy-related infrastructure. FEASIBLE is available free of charge by registering through the web pages of the OECD Environment Directorate ([www.oecd.org/env/finance](http://www.oecd.org/env/finance)), the Danish Environmental Protection Agency ([www.mst.dk/homepage](http://www.mst.dk/homepage)) or COWI, the Danish consulting firm that developed the model ([www.cowi.dk/publications/div01pub/index.htm](http://www.cowi.dk/publications/div01pub/index.htm)).

Feasible Financing Strategies for Environmentally Related Infrastructure



to finance all or even most of the environmental expenditure required, or sponsor all or even most projects. The main role of government in relation to financing is to establish the policy, regulatory and institutional framework as well as the incentive structure, within which resources from users, financial markets, capital markets, local budgets and enterprises can be mobilised in a complementary way, and be applied as cost-effectively as possible to achieve agreed goals. ■

**What has been learned by applying FEASIBLE in EECCA countries?**

*Extensive urban water and wastewater infrastructure is falling apart*

The analyses of financing strategies prepared to date for EECCA countries have shown that the coverage of the urban population by water supply, wastewater treatment and solid waste management infrastructure is higher than in developing and transition countries with a similar (low and medium) income level. The rates of urban population connected to centralised water supply and wastewater collection systems (75%-95%) are often comparable with those in OECD countries. Most of the large cities have biological wastewater treatment plants, sometimes with significant excess capacity.

Nevertheless, much of this infrastructure was inefficiently designed, is oversized, and hence, is very costly to operate and maintain. This is particularly true of energy, which accounts for up to 60% of total operating costs (compared to 20%-30% in OECD

countries). This affects the quality of services and access to safe water which are much lower than suggested by the connection rates and capacities of treatment plants.

High water production contributes to excessive operating costs. Water utilities in several cities produce up to 500-600 litres per connected inhabitant a day, compared to typical production/consumption of some 120-180 litres per capita per day in OECD cities. Huge losses in the distribution system are a result of badly maintained supply systems, and over-consumption by end-consumers. Tariffs are charged on the basis of norms and cost-plus formu-

**Figure 2. Annual expenditure needs and financing available to operate and maintain the present, low level of water and wastewater services in EECCA countries (EUR per connected inhabitant in the first year of the baseline scenario)**

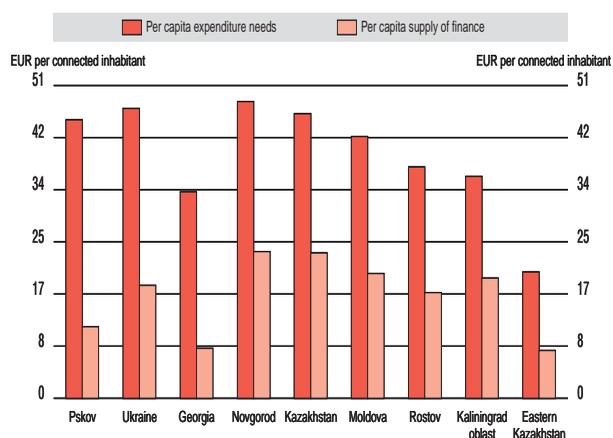
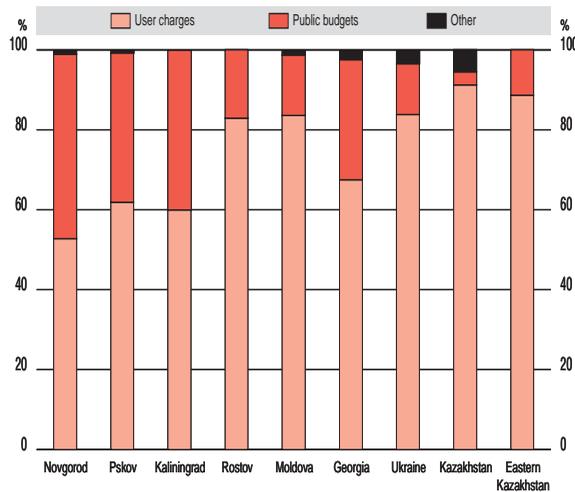


Figure 3. Existing sources of financing water and wastewater utilities



las. They are unrelated to actual consumption, which implies that there is little incentive for the efficient use of water.

Water and wastewater services are often unreliable, with frequent interruptions and low quality. In many cities, water is supplied only a few hours a day, and it is insufficiently treated. Most wastewater treatment plants are bypassed or provide only basic mechanical treatment, if any at all. In several cases, the infrastructure is so run down that there is a serious threat of complete collapse of the entire system, with potentially dramatic consequences to health and economic development.

**The existing financing situation is not sustainable**

Analysis of financing strategies gave quantitative estimates of the scale of under-funding and deterioration of infrastructure. In all the countries studied, significant financing deficits were measured even for the baseline scenarios, which included very modest targets of merely operating and repairing those facilities in operation when the study was undertaken. Usually only around half of the funds required to meet these targets are being provided (figure 2). This chronic under-funding of basic running costs, especially of regular, preventive maintenance was the major reason for a significant decrease in the level and quality of infrastructure services.

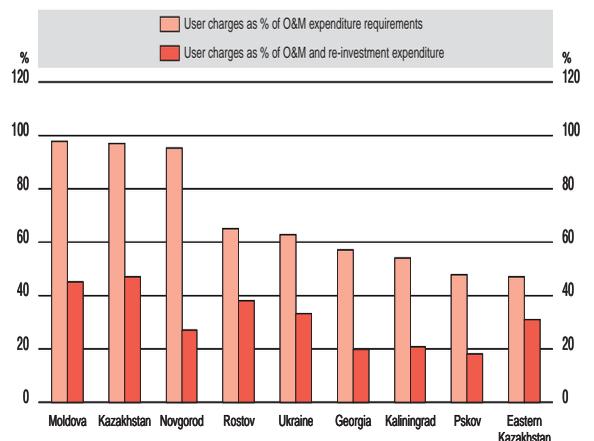
User charges account for the major share of financing. The remaining funds for water utilities come mostly from public budgets. The share of other resources such as bank credits, bonds, environmental funds, foreign grants and loans or private equity is marginal compared to user charges and public funds. (figure 3). ■

**Can users pay for services?**

Among the countries and regions studied, only Moldova (despite extremely low income per capita) and Novgorod, on average, bill users at a level close to full operating costs. However, not all billed fees are actually paid. Collected user charges nowhere cover more than half of the costs of operating and maintaining existing assets (figure 4). Some variation within countries is also present (e.g. in Kazakhstan).

Most households seem able to pay more than they actually do, despite low incomes. There is evidence, in fact that they are often willing to pay more for improved services. In several countries studied, the average fees paid for water and wastewater services as a proportion of average household income (0.5% -2.5%) are well below international benchmarks for countries of similar income levels (typically 3%-5%). On the other hand, Kazakhstan (on the country level) and Moldova are recovering a much higher share of costs from households, with

Figure 4. Collected user charges as % of expenditure needed to properly operate water and wastewater infrastructure and maintain the present service level and quality



charges approaching the limits of what the households on average can probably afford (Figure 5).

Even in countries and regions that impose relatively high charges on users, affordability is a serious problem for a relatively small share of the population (10%-30%). These most affected social groups are also often well defined, e.g. pensioners, disabled. Replacing existing price subsidy schemes with more targeted income support for specific social groups would be more efficient and result in overall savings in public budgets. Furthermore, experience from environmental financing strategies, supported by the experience of OECD countries, demonstrate that as tariffs increase water consumption decreases. As a result, the total water bill to households will not increase in direct proportion to tariff increase. ■

### How to bridge financing deficits?

The grave situation in the EECCA calls for a fundamental reform in the approach to financing environmentally-related infrastructure and the associated policy and institutional arrangements. Analysis of FEASIBLE financing strategies suggests that overly ambitious targets for extending the coverage and level of infrastructure services need to be replaced in the short and medium term by more realistic, modest capital improvement programs. These should be tailored to provide essential repairs and rehabilitation of critical elements of infrastructure in order to maximise efficiency gains (mainly reduction

of energy costs) within the limits of what households and public budgets can afford.

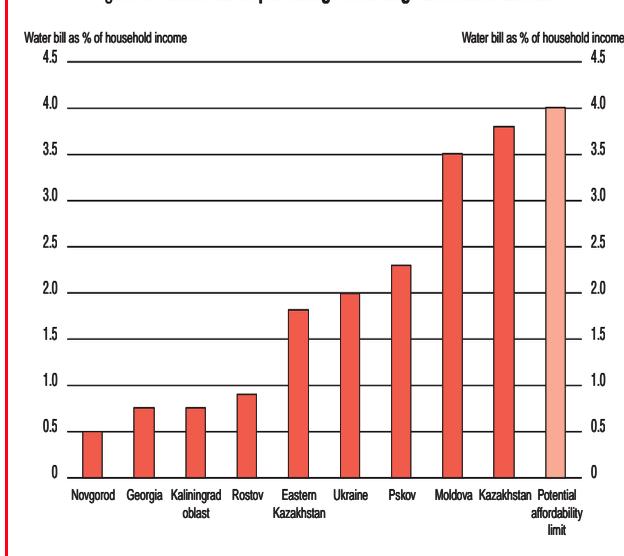
On the financing side, the FEASIBLE analyses have revealed that baseline financing will need to be increased in all EECCA countries if further deterioration is to be prevented. All financing sources and instruments will need to be mobilised in a synergistic fashion. There will be no magic solutions brought about, for example, by earmarked environmental funds or private sector participation. User charges will be the most important long-term source of finance for operation and maintenance expenditure. Public budgets will have an essential role to play in the short and medium term in financing capital investments, providing social protection and facilitating access to credit. Scarce public funds and donor grants need to be strategically prioritised and used more efficiently. The importance of domestic financial and capital markets will grow over time as the framework conditions become more enabling. International financial institutions (IFI) will continue to play an important role in providing long term debt to major capital investments and promoting financial and management discipline. The role of the private sector will for many years be more important in providing managerial know-how than as a source of finance.

Increasing the supply of finance to bridge the deficits could involve significant burdens on some EECCA countries. In order to fully cover the operating and maintenance costs of the current urban water infrastructure alone, Moldova would, for example, need to spend an equivalent of 3.2% of current GDP per year, Georgia 3.0% and Kazakhstan 1.2%. In all cases, this would imply doubling or tripling the current level of expenditure in the water sector. The cost burden on the economy appears heavy when compared with estimates for EU candidate countries in Central and Eastern Europe. For example, Lithuania, Czech Republic and Poland would have to spend an estimated 1.0% - 3.7% of forecast GDP in annualised investment and operating and maintenance (O&M) costs per year to implement all investment-heavy EU environmental directives, not only those affecting drinking water and wastewater infrastructure. ■

### What effect has FEASIBLE had?

Even though the development of environmental financing strategies has only been undertaken in the last few years, it has already triggered some signifi-

Figure 5. Water bill as percentage of average household income



cant policy changes in several EECCA countries. Selected examples are described in the Box below.

### *Pilot development of financing strategies in China*

China is testing an Environmental Financing Strategies approach on wastewater collection and treatment in Sichuan province. The situation in this province is the reverse of that in former Soviet countries. There are low rates of coverage by infrastructure and high rates of investment. In the cities studied, only 40-70% of the population was connected to the centralised wastewater collection system. Most systems were old-fashioned open ditches along the streets. No wastewater treatment plants existed. However, large-scale investments in treatment capacity were ongoing in seven out of fourteen

urban zones, with substantial financial support from the central and provincial government.

The Sichuan project identified areas for improvement in the current investment strategy for the region, which planned to allocate most funds to complete the ongoing construction of seven sewage treatment plants by 2004. FEASIBLE, however, showed a need to match investment in plants with investment in a wastewater collection system. The expenditure needs for rehabilitating and extending the existing sewerage systems were found to be much higher than the construction costs of new waste water treatment plants. Additional financing for this purpose could come from increased user charges, as 80% of the population could afford to pay more. Affordability analysis recommended direct

### **Overview of policy impacts of FEASIBLE environmental financing strategies**

- In Moldova, the authorities used FEASIBLE to verify how difficult it would be to implement stringent wastewater effluent standards stipulated by national post-soviet legislation. The analysis demonstrated that compliance with these standards is so expensive that it would be impossible to finance over the next 20 years, even under the most optimistic assumptions about growth of user fees, income, public sector revenues and financial markets. This triggered the Ministry of Environmental and Natural Resources to prepare a draft government resolution relaxing municipal effluent standards to the less stringent levels of the EU urban wastewater treatment directive.
- In the Pskov Oblast of the Russian Federation, a first round of policy dialogue between different departments of the Oblast Administration, supported by FEASIBLE simulations, did not generate any realistic scenario. Financial authorities and experts could not identify any realistic measures that would increase the supply of financing for water and wastewater infrastructure to levels that would cover the costs of ambitious extension of services targets proposed by the environmental authorities. But simulations revealed very low levels of user fees compared to other Russian regions. This prompted the regional administration to issue recommendations on procedures for calculating and approving municipal services tariffs and for improving many existing weaknesses of the tariff policies applied in the cities. Furthermore, they have insisted more firmly that local administrations follow the schedule for achieving full cost recovery through household tariffs for municipal services. Local debates about service level targets continue.
- In Georgia and Kazakhstan, the FEASIBLE financing strategies for urban water and wastewater infrastructure have provided a revealing "reality check" on possible co-financing arrangements with IFIs and donors.
- In Novgorod Oblast of the Russian Federation, the financing strategy for municipal solid waste facilitated a substantial revision of regional waste management plans and revealed many options for consolidation of planned landfills and waste processing facilities to reduce costs by achieving economies of scale. The analysis also identified a package of policies that can reduce demand for landfills and identified priority capital investment projects, all involving inter-municipal cooperation.
- In Yaroslavl Oblast of the Russian Federation, the financing strategy for municipal solid waste found out that the waste management systems in the large cities of the Yaroslavl region already generated a financial surplus even at current, affordable tariff levels. This financial performance could potentially support private sector participation in providing some waste management services. These findings have stimulated a debate on restructuring the multipurpose waste management company.

income subsidies for the poorest 10-20% of the population. The need for investment in collection of wastewater could require a rescheduling of construction of treatment plants if additional significant funding for sewerage systems is not mobilised.

Representatives of the various government departments regarded the Environmental Financing Strategies method as a possible tool for more coordinated management of long-term investment programs in infrastructure, project selection and priority setting. Currently, these responsibilities are divided among several agencies. ■

### **Can environmental financing strategies work in OECD countries and EU accession countries?**

Most OECD countries do not face financial deficits in the water and environmental infrastructure sectors. However in some OECD countries, for example in those entering the European Union, access to adequate financing is a bottleneck in their efforts to extend environmentally-related infrastructure to meet EU environmental standards in a very short time. The challenges are far from being as dramatic as in the EECCA countries. Substantial financial resources are being made available domestically, supplemented by pre-accession financial instruments. In addition, financial mechanisms in keeping with the Polluter-Pays Principle are emerging; increasingly enterprises and municipalities are financing their own environmental investments and raising funds on financial and capital markets. But according to a recent OECD assessment (Environmental Financing in Transition Economies, 2003), with the exception of Poland and Hungary, the current levels of environmental investments in accession countries may not be sufficient to cover the official estimates of investment needs according to the schedules contained in transitional agreements.

To prepare for the challenge of implementing and financing large scale extensions of environmentally-related infrastructure, the European Commission has asked EU accession countries to review their financing opportunities, carefully consider affordability and prepare implementation and financing plans. The FEASIBLE methodology may assist in preparing such implementation and financing plans to comply with water and waste directives. The Environmental Financing Strategies studies conducted in some accession countries, e.g. Lithuania and Latvia, proved to be useful steps towards the

full application of the FEASIBLE methodology to prepare for EU accession. ■

### **Are financing strategies relevant for developing countries?**

The policy context and range of problems facing developing countries differ greatly from those of EU candidates and the EECCA transition countries. However, there is substantial scope for environmental financing strategies to assist developing countries in planning financially and technically sound infrastructure development. To meet the international development goals of the United Nations Millennium Declaration related to environmental sustainability, particularly water and sanitation, all sources of financing will have to be mobilized and used more efficiently. The World Summit on Sustainable Development in Johannesburg, and the Third World Water Forum in Kyoto have focused global attention on deficits in water and sanitation services in developing countries and high capital needs of infrastructure development.

A recent report by the World Panel on Financing Water Initiative "Financing Water for All" estimated that total global annual expenditure in the water sector would need to roughly double in order to achieve to achieve the water-related Millennium Goals agreed at the World Summit in Johannesburg of halving by 2015 the proportion of people without sustainable access to safe water and to basic sanitation.

Financing strategies are particularly relevant in the poorest developing countries that struggle to secure access to basic infrastructure services under extremely tight resource constraints. The cost database in FEASIBLE already includes a range of simple, affordable water supply and wastewater treatment technologies available to these countries.

Newly developed countries in South East Asia and Latin America are wealthier and face a different set of problems. Rapid urbanisation in these countries has outpaced environmental infrastructure development. The environmental financing strategies approach could assist these in implementing sustainable, long-term infrastructure development programs.

Cooperation and policy dialogue between the OECD and developing countries on environmental finance issues was the focus of the 2002 Conference of the Global Forum for Sustainable Development (GFSD) and will prominently feature in the December 2003 GFSD Conference. ■

## For further reading

- **Financing Strategies for Water and Environmental Infrastructure**, 2003  
ISBN: 92-64-10276-0, €25, 107p.
- **Country background reports on financing strategies for water and environmental infrastructure**, available at: [www.oecd.org/env/finance](http://www.oecd.org/env/finance)
- **Water Management and Investment in the Newly Independent States**, 2001,  
ISBN: 92-64-18701-4, €37, 144p.
- **Improving Water Management – Recent OECD Experience**, 2003  
ISBN: 92-64-09948-4, €24, 132p.
- **Urban Water Sector Reform in EECCA Countries: Progress since the Almaty Ministerial Conference**, 2003  
available at [www.oecd.org/env/eap](http://www.oecd.org/env/eap)
- **Performance of water utilities in the EECCA** (Synthesis report), 2003,  
available at [www.oecd.org/env/eap](http://www.oecd.org/env/eap)
- **OECD Environmental Performance Reviews – Water: Performance and Challenges in OECD Countries**, 2003 - ISBN: 92-64-10132-2
- **Environmental Financing in Transition Economies, Report submitted by the OECD/EAP TF Secretariat to the Kyiv “Environment for Europe” Ministerial Conference**, 2003
- **Financing the Environmental Dimension of Sustainable Development, Proceedings of the OECD Global Forum on Sustainable Development 2002 Conference** (*forthcoming*)
- **“Financing Water for All”, report by the World Panel on Financing Water Initiative, by James Winpenny**, 2003

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