6 Applicability to Other Regions and Sectors

6.1 Applicability to EU Accession Countries

In accession countries, the demand for environmental improvements is driven by the need to comply with the environmental requirements of the EU environmental legislation. Substantial financial resources are being made available domestically, supplemented by the pre-accession financial instruments (mainly ISPA). 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.

Most accession countries are already allocating a greater share of their national income for environmental expenditures than EU member states and in some cases may be approaching affordability limits for public budgets and households. A rough assessment that was made by the OECD in the paper submitted to the Kyiv conference suggests that, with the exception of Poland and Hungary, the current levels of environmental investments in accession countries would not be sufficient to cover the official estimates of investment needs and according to the schedules contained in transitional agreements. In so far as this is the case, it would require those countries to revise their planned levels of environmental investments, review the realism of the transitional schedules and/or the cost-effectiveness of the approaches they are following to implement EU directives. Eventually additional investment expenditures will need to be mobilised from public and private sources to effectively match revised investment needs. Moreover, the World Bank studies have shown that the challenge of financing recurrent expenditures is an additional challenge that is almost as large as for annual capital expenditures.

In the 2001 communication on “The Challenge of Environmental Financing in the Candidate Countries”, the European Commission has identified 13 environmental directives, which will require heavy investments. Most of them involve large scale extensions of public infrastructure in water, wastewater, solid waste management and air quality control. To prepare for the challenge to implement and finance this infrastructure the Commission has requested the EU accession countries to review their financing opportunities, carefully consider affordability and prepare Directive Specific Implementation and Financing Plans. The FEASIBLE methodology may assist in preparing such implementation and fi-

nancing plans. In fact the FEASIBLE 2 model was specifically adjusted to also serve the needs of EU accession countries for developing strategies to comply with water and waste directives. The Latvia case study presented below shows a first step towards the full application of the FEASIBLE methodology to prepare realistic implementation and financing plans.

One lesson learned from the CEE experience with financing strategies shows that for cost effective implementation and sound financial management, there are benefits in developing implementation and financing plans for bundles of related Directives rather than for specific Directives. Moreover, investment and financing plans for large regions or countries should be strategic, rather than project-specific. This approach is based on the view that the Government can not and should not control the schedules of all individual projects (thousands for single Directives in some countries/regions), except the largest ones. The Government's main role is to establish and apply the policy and legal instruments that create incentives or disincentives to invest, including the provision of financing for priority infrastructure investments. The modelling tools, such as FEASIBLE may be used to periodically monitor the effectiveness of these policy instruments and provide the European Commission transparent integrated reports on progress towards full implementation of the Directives. Should the progress be unsatisfactory the model needs to be able to simulate the effects of modifications of policy instruments to accelerate implementation.

6.1.1 Municipal Solid Waste Management - Latvia Case Study

A case study was carried out in Latvia in association with the development of FEASIBLE Version 2. The Latvian case study focussed on establishing and costing a strategy to meet the requirements of both the EU Landfill Directive and the EU Packaging Waste Directive.

The existing situation in the municipal solid waste sector in Latvia is characterised by:

- Most household waste is collected as a mixed fraction, with only a few pilot schemes in place for the collection of sorted waste and recycling in large towns.

- Most of the waste is disposed of untreated in landfills.

- The closure and remediation of small municipal dump sites with inadequate environmental protection systems are critical environmental issues, as most of these sites did not comply with national environmental protection requirements and pose risks to environment and health.

The EU directives and regulations dealing with solid waste management and related Latvian regulations formed the objectives/targets that governed the waste modelling exercise for Latvia. The targets were, therefore, pre-determined, and the waste modelling exercise focused on alternative combinations of technical measures to achieve the given targets.

EU accession-related targets
The two EU directives that contain quantitative requirements for solid waste management are:

- The Directive on the Landfilling of Waste (Council Directive 99/31/EC), which includes reduction targets for the amount of biodegradable municipal waste going to landfills.

- The Packaging Directive (Council Directive 94/62/EC) and its amendment of 7 December 2001, which include general and material-specific recovery and recycling targets.

A baseline scenario was developed with the following key parameters:

- Increased MSW collection coverage from the present level of 50-90% to 75% in rural areas and 100% in all other areas by 2007.

- Establishment of recycling centres, bring banks, material recycling facilities and separate collection of recyclables from commerce, industry and C&D by 2007.

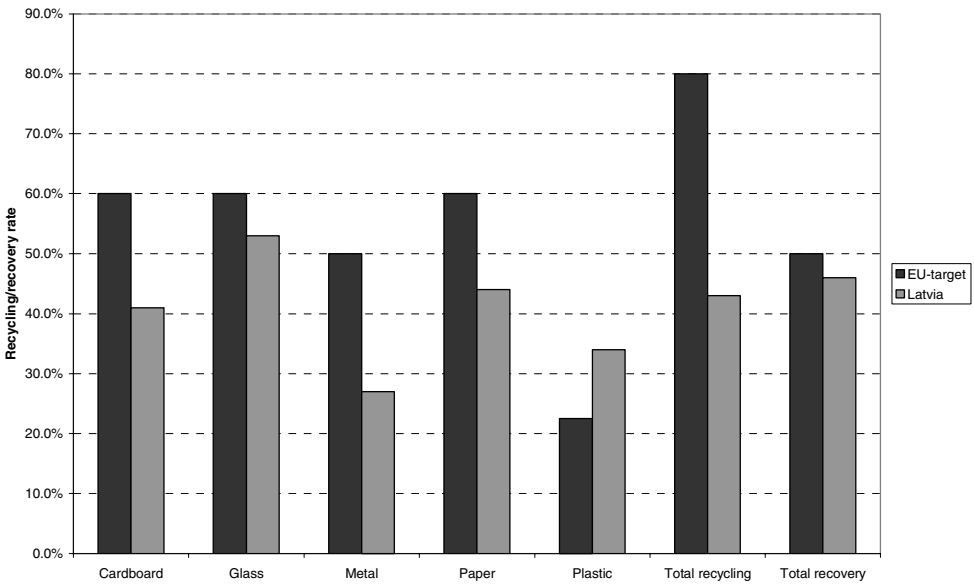
- The establishment of 10 regional landfills according to EU standards.

- Establishment of energy cells at one regional landfill (Riga) enabling 50% recovery of biodegradable waste.

Based on the FEASIBLE model run, the resulting recovery and recycling ratios were then compared to the EU requirements.

The model results on waste flow in the baseline scenario indicated that, with the given model assumptions on the efficiency of recycling centres and bring banks, implementing these collection methods is not sufficient in order to meet the EU directive requirements as to biodegradable waste recovery and packaging waste recycling and recovery (please refer to Figure 6-1 below).

Figure 6-1 Model results for Latvia vs. EU targets for recycling/recovery of packaging waste in 2015, baseline scenario



The baseline scenario hence called for an evaluation of other more ambitious options for the collection and recovery/recycling of biodegradable and packaging waste.

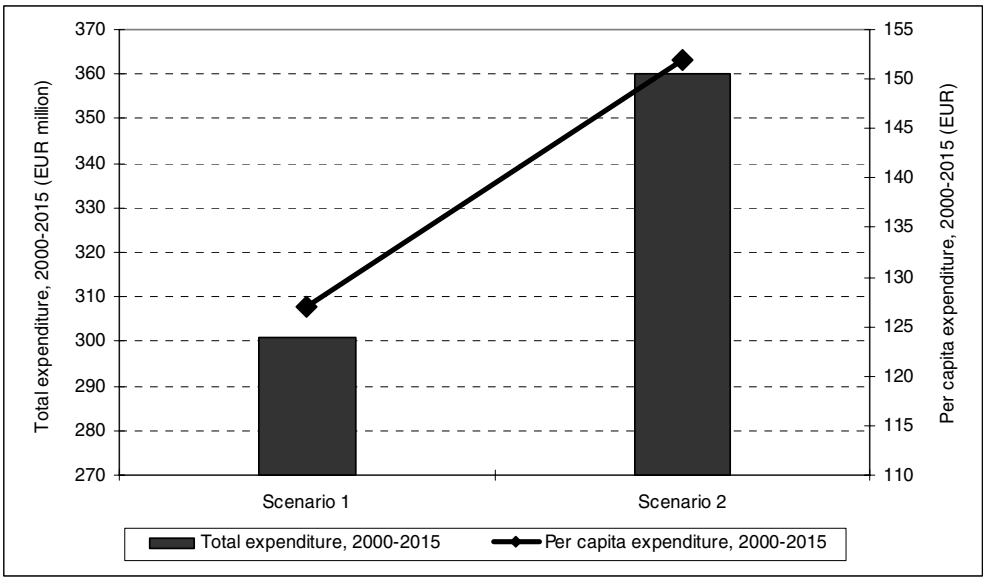
A second scenario was developed comprising the following development measures in addition to those introduced in the baseline scenario:

- Kerbside dual collection (except in Riga) and separate kerbside collection of recyclables and additional material recycling facilities from 2007.

- Establishment of five plants for composting of food waste collected separately (excluding Riga).

It is apparent that due to additional facilities established during the planning period, as well as more advanced collection systems, total expenditure needs for this scenario will be higher. Figure 6-2 demonstrates total and per capita expenditure requirements for both scenarios.

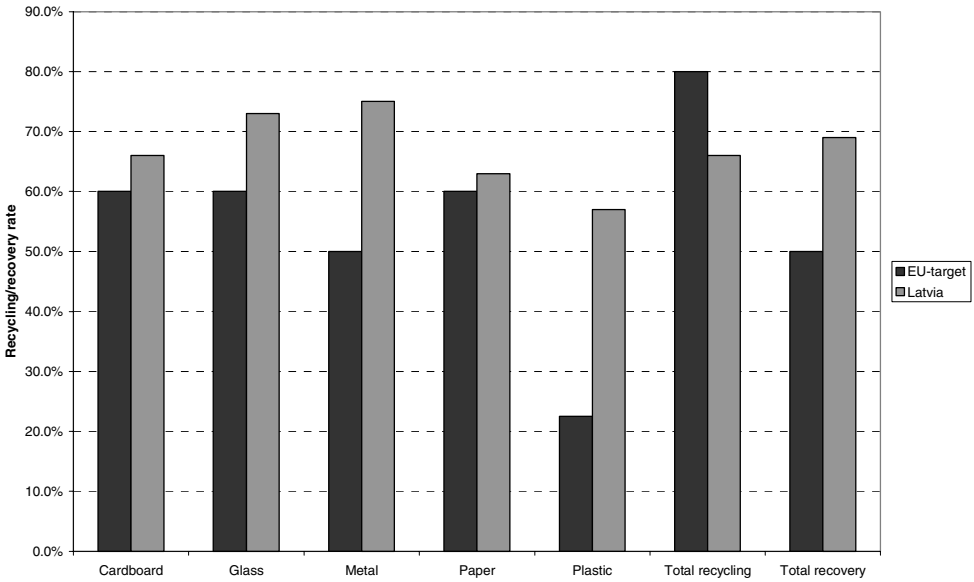
Figure 6-2 Total and per capita expenditure needs for the entire period 2000-2015 for Scenarios 1 and 2



The model results on waste flow now indicated that the development of the waste management system proposed in Scenario 2 brings the sector closer to meeting the EU requirements as to recovery of biodegradable municipal waste and packaging waste than Scenario 1, even though some requirements are still not fully met. However, when assessing these deficits, the many assumptions made in FEASIBLE as to the efficiency of waste collection and recycling systems, etc. and the related level of uncertainty must be considered.

Figure 6-3 shows that dual collection contributes to the recovery of packaging material, thanks to the diversion of the dry waste stream to a materials recycling facility for mixed waste. With regard to the total recycling of packaging waste, all material-specific targets are met in 2015 for the country as a whole, even though a small deficit is displayed for total recycling.

Figure 6-3 Recycling/recovery of packaging waste in 2015, Scenario 2



The case study showed that the modelling approach in FEASIBLE was suitable for the comparing of packages of technical measures that would achieve targets related to the EU directives on landfills and packaging.

6.1.2 Water and Wastewater Sector - Case Study: Lithuania

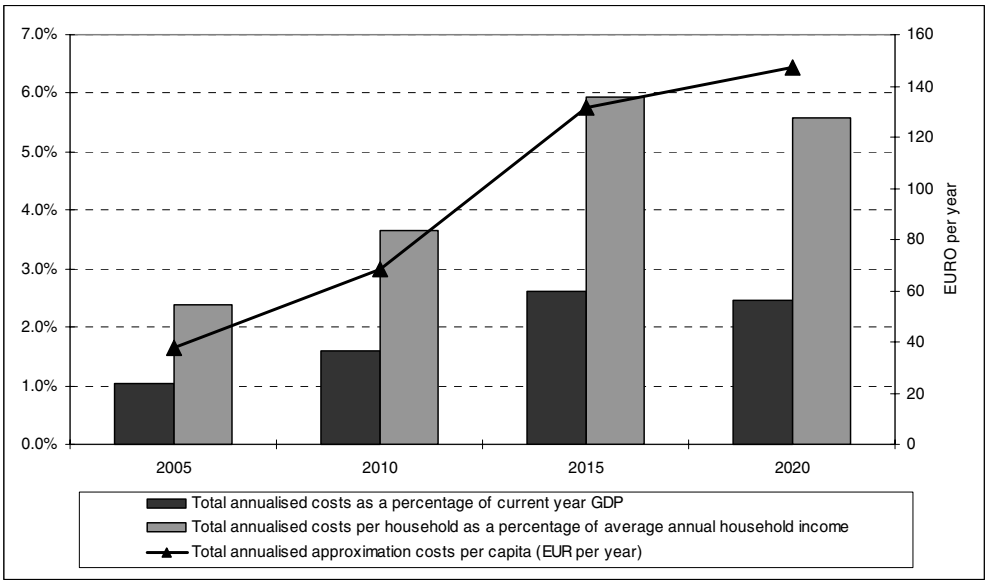
In 1999, an EFS[15] was prepared in Lithuania that was designed to analyse financing issues in the context of the full slate of EU environmental legislation. A major focus of this revised EFS was to develop an investment programme for the heavy-investment water and waste sectors that would enumerate and prioritise the investments needed to meet the requirements of the corresponding EU directives, indicate how they could be financed, and assess affordability issues. This case is an example of an EFS prepared without the use of FEASIBLE.

[15] The EFS, funded by DANCEE, was the outcome of collaboration between the Ministry of Environmental Protection, Milieu Environmental Law Consultancy, Ltd., and the Environmental Policy Centre in Vilnius.

The costs of approximation

According to the costing studies, cumulative investment costs to meet EU environmental requirements for the selected directives would reach EUR 1.7 billion by 2015. The table below presents the results of the national affordability analysis for selected indicators for an assumed 3.5% GDP growth rate (one of four rates used in the EFS). Despite the optimistic growth scenario, the burden of financing approximation costs increases considerably up to 2015. By 2015, the total annualised costs as a percentage of GDP would rise to 2.6%, approximately double the percentage that OECD countries spend on environment.[16]

Figure 6-4 National affordability indicators for the medium growth scenario



The municipal environmental investment programme

Cumulative investment costs for the four directives covering wastewater treatment, drinking water, landfills and packaging waste were expected to account for 65% of total environmental investment costs. As these sectors primarily entail public sector costs, the Ministry of Environmental Protection of Lithuania was interested in the project team carrying out a more detailed analysis of financing

[16] The OECD surveys report on expenditures, not annualised costs. In countries with sustainable environmental investment programs, expenditures should be similar to annualised costs.

issues for water and waste to determine if proposed compliance schedules were realistic, adequate sources of financing could be mobilised, and municipalities and households would be able to cover their share of financing costs.

To initiate the development of the investment programme, the project team compiled a list of specific projects for the major directives requiring investments by municipalities or municipally owned companies, and information was collected and summarised for each identified project. Table 6-1 and 6-2 present summaries of the projects in water/wastewater and waste management.

Table 6-1 Water and wastewater projects in investment programme

Priority	Types of Projects	No. of Projects	Investment Costs (EUR million)	Implementation Period
1st	Large urban WWT rehabilitation projects and urban WWT projects in towns without WWT	16	170	2001-2005
2nd	Other urban WWT projects grouped with sewerage or/and drinking water projects	8	60	2005-2007
3rd	Large drinking water projects and small urban WWT projects	9	50	2008-2011
4th	Regional projects covering drinking water component and sewerage component.	14	110	2011-2013

Table 6-2 Municipal waste projects in investment programme

Priority	Types of Projects	No. of Projects	Investment Costs (EUR million)	Implementation Period
1st	Construction of new regional landfills, closure of problematic landfills and introduction of collection and sorting lines.	12	90	2001-2005
2nd	Closure of old small and medium-sized landfills	11	30	2006-2007
3rd	Closure of the remaining landfills and construction of the first waste incineration and composting facilities.	7	160	2008-2010
4th	Remaining projects in waste sector, including composting systems in certain regions.	7	90	2011-2014

The second stage of the investment programme included initialisation of the investment capital component and gap analysis. For each project, the available domestic and external sources of financing were allocated to specific projects according to the co-financing rules agreed in discussions with the Ministry of the Environment. Three financing scenarios were analysed that differed in terms of the share of capital costs covered by external grants, IFI loans and domestic sources. The three scenarios are summarised in the table below.

Table 6-3 Investment needs for water and waste sector projects in Lithuania for the years 2001-2015 (EUR million)

	Scenario I	Scenario II	Scenario III
Foreign grant share	50%	40%	30%
Total amount needed	380	304	228
Sources needed on average per year	25	20	15
Available sources per year	~45	~35	~35
IFI Loan	30%	50%	60%
Total amount needed	228	380	457
Sources needed on average per year	15	25	33
Available sources per year	As much as needed	As much as needed	As much as needed
Lithuanian share	20%	10%	10%
Total amount needed	152	76	76
Sources needed on average per year	10	5	5
Available sources per year	~20	~10	~10

The analysis suggests that the major requirements arising from EU accession could be fulfilled by 2015, at least from an investment perspective. However, the results in the table do not account for constraints faced by municipalities in the form of borrowing limits and capacity for cost recovery. For municipalities, the amount of loans and annual costs of servicing the loans is related to municipal income to determine if the investment programme is feasible in terms of the legal restrictions on municipal borrowing. Also, the main sources of revenue for repayment of loans are water and waste tariffs. These fees must cover O&M and loan repayments. Thus, in order to assess cost recovery capabilities, assumptions must be made on credit terms and the level of O&M costs. Three scenarios (denoted A, B, and C) were developed to reflect different assumptions about credit terms on loans and O&M costs (4-year grace period specified for all scenarios):

Scenario A: 15 year repayment period, 6% interest rate, O&M costs = 7% of investment costs

Scenario B: 15 year repayment period, 6% interest rate, O&M costs = 5% of investment costs for water, 10% of investment costs for waste, 0% of investment costs for incineration and composting

Scenario C: 10 year repayment period, 10% interest rate, O&M costs = 7% of investment costs

For Scenario A-I with 30% of project costs financed by loans, 50 of 56 municipalities would exceed the 10% limit on borrowing for a single loan, while under Scenario C-III, all municipalities would exceed this limit. It is important to note that these results are only for the largest loan each municipality would take in the investment programme. In fact, each municipality would undertake 3 to 8 loan-financed projects under the investment programme. However, a waiver to exceed these limits can be obtained if the projects are included in the Public Investment Programme. Also, municipal budgets can be expected to increase with increasing GDP.

In terms of the other measure of municipal affordability (ratio of loan repayment amount to municipal budget), the 10% limit would not be exceeded for any municipalities under Scenario A-I, with percentages ranging up to 7.2%. For Scenario C-III, the 10% limit would be exceeded by fifteen municipalities. It should be noted that this assumes municipalities are not servicing other loans in the air sector or loans for non-environmental purposes.

For households, the costs of debt service and O&M are reflected in water and waste tariffs. "Population" affordability is analysed in terms of the percentage of household income that would be spent on these tariffs. The calculation of population affordability involves determination of the tariffs that would be required to cover loan repayments and O&M costs.[17] In addition, information on current household income and assumptions about rates of growth for household income is needed to assess affordability in the later years of the IP.

[17] The main report also examines population affordability in terms of tariffs to cover loan repayment only.

For Scenario A-I, the tariffs required in 2015 would be 1.5-1.8 % if incomes rise at 5% per year and 3.4 to 4.1% for zero growth in incomes. For Scenario C-III, the tariffs required in 2015 would be 1.97 to 2.34% if incomes rise at 5% per year and 4.35 to 5.24% for zero growth in incomes. As long as there is positive income growth, tariffs for water and waste would be below the 5% threshold that is commonly asserted as the maximum acceptable burden for both water and waste. However, these burdens could still be unacceptable to some rate payers in Lithuania.

National affordability to accept obligations related to the implementation of EU environmental requirements needs is analysed for both the water and waste sector costs included in the Municipal Environmental Investment Programme and for the share of annualised costs of covering all expenditures related to the environmental acquis (at least those directives covered in the Strategy). Data on the total sums needed and available for the investment programme have already been presented in the previous chapter. The state's share in the investment programme is assumed to be 20% according to Scenario I, and 10% according to Scenarios II and III. The table below indicates the total amount of State financing for the investment programme for the 20% share and relates these amounts to GDP under two alternative growth assumptions (0% and 3%). The share of state investment needs for the 10% share would be accordingly two times less.

Table 6-4 Share of annualised costs of the investment programme in GDP

Scenario	2003		2006		2009		2012		2015	
	0%*	3%**	0%	3%	0%	3%	0%	3%	0%	3%
A-I	0.12	0.11	0.29	0.24	0.42	0.32	0.54	0.37	0.64	0.40
C-III	0.13	0.12	0.44	0.36	0.67	0.5	0.87	0.6	1.05	0.66

* *GDP annual growth 0% from 1998 level*

** *GDP annual growth 3%** from 1999[18] level*

With at least moderate economic growth and expected financial schemes as well as favourable loan conditions, it has been concluded that the implementation of

[18] See above

water and waste sector projects should not be a significant burden for Lithuania, although the burden could vary by municipality.

Comparison of project and FEASIBLE-based approaches

The Lithuanian study was conducted before the FEASIBLE model was developed. The comparison of the Lithuanian financing strategy (project based) and the strategy developed for Ukraine (using a model such as FEASIBLE) shed some light on the general advantages and disadvantages of these two approaches for conducting expenditure needs estimates, supply of finance and financial gap analysis.

Table 6-5 Comparative characteristics of project and FEASIBLE-based strategy development approaches

	Project based approach	Modelling approach (e.g. FEASIBLE)
Input data requirements on expenditure needs	Extensive – through analysis of the results of individual (pre) feasibility studies or surveying local authorities and local project owners.	Moderate – uses available statistical technical data on present state of infrastructure verified and amended by experts or additional selective data collection. For small towns – aggregated data for groups of towns and expert estimates are sufficient. Exceptionally, for the largest cities or untypical large projects data may be entered project-by-project (option in FEASIBLE 2).
Verification of input data	Difficult – through random checks of the quality of individual feasibility studies and verification of subjective judgments of local authorities and project owners.	Easy – through cross checking objective technical data (e.g. population or existence and physical state of equipment – treatment plants, pumps and pipes).

	Project based approach	Modelling approach (e.g. FEASIBLE)
How expenditure needs are estimated	Expenditure needs estimated by project owners themselves and used as a direct input in analysis.	Expenditure needs estimated by consultants (on the basis of technical input data) using the generic cost functions, local cost correction coefficients and parameters of the model.
Accuracy of expenditure needs estimates	Difficult to asses - depends on the quality of individual (pre) feasibility studies and on the judgments made by local authorities and project owners (some may not know the expenditure needs, some may answer strategically – expecting subsidies and some may state wishes rather than realities).	For individual projects margin of error can be more than 50%. For large groups of cities and towns (over 30) the margin of error is usually in the range of 10-20%. Exceptionally for very large and untypical projects generic cost-functions can be bypassed and estimates entered directly to the model (option in FEASIBLE 2).
Verification of expenditure needs estimates	Difficult – as verification of input data.	Easy if the model is transparent and tested and not a "black box" – when cost functions and parameters are meaningfully exposed.
Supply of finance data	Are entered for individual projects or on aggregated level (for the whole sector).	Are entered by default on aggregated level (for the whole sector), but can also be entered on sub-regional/sub-sectoral level. Exceptionally – can be entered for individual projects.
Scenario analysis	Very difficult – requires recalculations for each project and ad hoc re-aggregations of results.	Easy – the model stores most information in a standardised data base. Selected parameters and input data can be modified, and results are recalculated automatically by the model.

	Project based approach	Modelling approach (e.g. FEASIBLE)
Relevance for analysis of policies	Limited to single test of very small number of policies and measures.	Open to many policies and measures, can compare effects of various policies and conduct tests for multiple assumptions.
Periodic monitoring of implementation of the strategy	Very difficult.	Easy.
Costs	Generally expensive, no economy of scale. Depends strongly on the scale of the programme and expected accuracy – very costly for large programmes and robust estimates. Periodical repetition (e.g. for progress monitoring purposes or if external conditions change) or analysing addition scenarios do not reduce costs significantly.	Development of the model is very costly (for water, wastewater and municipal solid waste already exists as public domain). Once the model is developed country studies are relatively cheap and there is strong economy of scale (costs do not increase proportionally to the number of cities/projects analysed). Accuracy is standard and does not affect costs. Costs of repetition, additional scenario analysis is very low.
Preferred applicability	Comparative advantage for small investment programmes and project pipelines (up to 30 projects) where robust feasibility studies are readily available.	Comparative advantage for large investment programmes (over 30 projects) where robust feasibility studies are not available, difficult to obtain or incomplete.
Sectoral applicability	Unlimited – can be applied to any sector, public and private.	Limited to the sectors for which the model was developed (e.g. FEASIBLE exists for municipal water, wastewater and solid waste sectors).

	Project based approach	Modelling approach (e.g. FEASIBLE)
Preferred owners	Comparative advantage for owners of specific project pipelines (e.g. financial institution or managers of specific expenditure programme).	Comparative advantage for public authorities responsible for supervision of implementation of large programmes of managing infrastructure and responsible for creating enabling conditions for owners of projects and owners of project pipelines.

6.2 Applicability to Developing Countries

Although the environmental financing strategy methodology was originally developed primarily in a CEE/EECCA context, the methodology is equally applicable in developing countries.

The same is true for the latest version of FEASIBLE, which includes a number of simple technologies for rural water supply (hand pumps) and wastewater treatment (septic tanks, reed bed, biological sand filters and stabilisation ponds).

Obviously, the difference in policy context implies that local sources of finance, local institutional capacity for analysis of model results and the range of affordable technology choices will be more limited in some - but not all - groups of developing countries.

Middle-income countries
The policy context and available technology choices in the middle-income countries in South East Asia and some of the more developed countries in Latin America are not significantly different from those of CEE/EECCA countries.

The situation in these countries is typically one where very rapid urbanisation has taken place with major cities increasing dramatically in size over a relatively short period of time. Very often, the development in the environmental infrastructure has not been able to keep pace. The result is that, in cities with centralised systems, the coverage of these systems is generally not very high. In other cities, local solutions that are not well suited for densely populated urban areas

are still used. Therefore, there is a huge need for investment in large-scale municipal environmental infrastructure in many of these countries. Environmental financing strategies could prove to be a very useful tool for the authorities responsible for the comprehensive investment programmes helping to ensure that public funds are spent in the best way and that policies for user charges are defined appropriately.

In particular, environmental infrastructure investments have, in the past, often not been accompanied by a strategy for sustainable long-term financing of the necessary operations and, in particular, maintenance costs.

In these countries, environmental financing strategies may provide the relevant authorities with important policy guidance and practical results on:

- The affordability and sustainability of the current infrastructure.
- The cost of achieving specified service level targets and possible needs for revision of regional/national/local targets, policies and service levels.
- Tariff-setting principles and the affordability of full cost recovery user charges.
- Investment planning and policies to close a financing gap.

Furthermore, environmental financing strategies may be used by ministries of environment and ministries responsible for municipal services in negotiations concerning scarce public budget funds and by national governments to support requests for IFI financing.

The analysis conducted by means of FEASIBLE in China and described below has demonstrated the applicability of the model for policy making in this region, as it precisely demonstrated when modification of present investment and financing plans will be needed, and what institutional reforms would facilitate successful implementation and realistic financing of the infrastructure development programme envisaged by the local authorities.

Low-income countries

In low-income countries, e.g. in Africa, most major environmental infrastructure investments are driven by donor financing. Furthermore, basic needs, such as

access to clean water, are often the overriding priority and affordability may significantly limit the potential technology choices and the room for user charges.

The ongoing shift in donor funding from individual donors funding individual projects to basket funding where multiple donors fund larger programmes has underpinned the need for analytical tools that can justify the long-term financial sustainability of the sector development and support the prioritisation of the limited financial and administrative resources available locally. In this context, environmental financing strategies can be an important basis for the dialogue between recipient countries and donors.

Securing basic needs requires limiting the contamination of scarce natural resources, which, in turn, is often caused by lack of wastewater treatment and inadequate management of municipal solid waste. Hence, fulfilling the basic needs objective will often not be possible without addressing priority environmental problems. Environmental financing strategies provide governments with quantifiable input on the costs of alternative investment strategies and the long-term financial sustainability of the infrastructure in these sectors, thereby highlighting the trade-offs between the sectors and facilitating informed prioritisation.

In the low-income countries, the most high-end technical solutions are often not affordable and even limited increases in general user charges may have a negative impact on already disenfranchised groups if they are not accompanied by targeted subsidies. Hence, if the environmental financing strategies developed presume increases in user charges, they should be complemented with more detailed willingness-to-pay and affordability analyses prior to their implementation.

Finally, it should be noted that environmental financing strategies can be an important tool for donor countries and IFIs to co-ordinate different donor and IFI programmes and to provide an additional dimension (regional/national and cross-sectoral) for appraisal of the financial viability of individual investment projects and programmes.

6.3 Experience from China

The Chinese study was conducted in the framework of co-operation between the OECD and China. The Chinese authorities decided to test the methodological

approach on a smaller scale, in a pilot region. The Sichuan Province was identified as a candidate for a pilot study. All together, 14 cities and counties (urban zones) were examined. All of them are located in the tributary of the Yangtze River upstream of the Three Gorges dam, which has already begun to be filled up**.** The analysis was limited to wastewater collection and treatment systems.

The existing situation for urban wastewater collection and treatment in the Sichuan province differs from that in EECCA countries in a few aspects. In short, the existing wastewater infrastructure is much less developed in Sichuan, but the level of investments in its expansion and government financial support are much higher.

In the cities studied, only 40-70% of population was connected to a centralised wastewater collection system. Moreover, most of these systems are old-fashioned open ditches along the streets. No wastewater treatment plants existed when the study was conducted. However, the large-scale investments in treatment capacity were ongoing in seven out of 14 cities, with substantial financial support from the central and provincial governments.

The utilities responsible for water supply are institutionally separated from wastewater utilities. This separation made it possible to conduct financing strategy analysis for wastewater collection and treatment systems, only.

The baseline scenario was based on the following assumptions:

- Rapid population growth (urbanisation).

- Seven municipalities will complete ongoing construction of wastewater treatment plants by 2004, all 14 municipalities will rehabilitate the existing sewerage system by 2010, and all 14 municipalities will extend the sewerage system by 2010 proportionally to the expected growth of population and urban zones.

- Municipal budget expenditure on wastewater infrastructure will grow in proportion to the growth of the local GDP, while remaining at the same ratio (3.2%) of total expenditure from local budgets and maintaining the same proportions between operational and investment subsidies (38% and 62%, respectively).

- Subsidies from the central and provincial governments allocated already to the municipalities and earmarked mainly for the construction wastewater treatment plants will be spent until 2004, when these plants will be completed.

- All committed loans will be disbursed and paid back according to known schedules.

- Wastewater fees (collected by water supply companies from all users connected to centralised water supply) and collection rates will remained unchanged. The volumes of user fees collected will grow pari passu with the growth in population and in the share of population connected to water supply.

- 90% of the urban population will be connected to centralised water supply by 2015 (and will pay charges).

- The average water consumption will increase to reach 60 m^3/capita/year in 2015 (government target).

- No additional finance that is not committed already will be provided.

All data and assumptions were introduced into FEASIBLE. By the time this book went to print only preliminary results for the baseline scenario were available. However, even these calculations gave very policy relevant results:

- The investment expenditure needs of the wastewater collection systems (sewerage) are several times higher than the investment needs of the wastewater treatment plants (Figure 6-5).

- If present trends continue, there will be enough funds available to complete the ongoing construction of 7 wastewater treatment plants, but the development of the necessary wastewater collection system will be significantly under-funded.

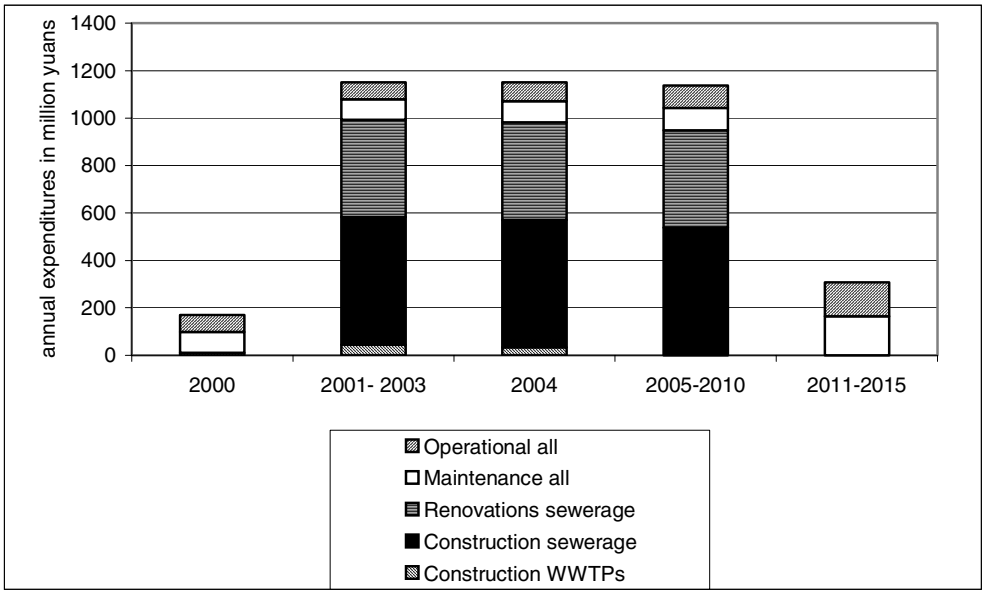
- If present trends continue, the development of the sewers systems will lag behind the construction of wastewater treatment plants, and in 2004, the new treatment plants will not have enough wastewater.

- The structure of the sources of financing relies very heavily on the public budgets as opposed to user fees.

- Wastewater fees cover only about 30% of the operational costs of the baseline infrastructure, and less than 20% of the costs of operation and necessary maintenance taken together.

- All domestic sources of finance (user fees and public budgets) would be enough to cover the costs of operation and necessary maintenance of the baseline infrastructure. However, if public budgets continue to subsidise O&M costs on such a scale, there will be not enough funds to finance investment expenditure.

Figure 6-5. Preliminary results of the baseline expenditure needs to complete the planned investment programme for the wastewater collection and treatment in 14 cities in Sichuan Province (in millions 2002 Yuans per year)



Although there seems to be some room for an increase of tariffs within the average affordability limits, mobilising additional finance to cover the expected expenditure needs will be a challenging task. Preliminary simulations show that a

combination of doubling central government transfers, attracting soft loans of a corresponding amount and phasing in a fivefold increase in user fees would fall short of covering all baseline financing needs. Hence, a more fundamental reform of the system of financing wastewater infrastructure would be required. Representatives of the various departments of the Sichuan Province Government have observed that the results of the study may be used to conduct some reforms of the institutional system of planning and financing wastewater infrastructure.

The state of urban wastewater collection and treatment infrastructure in the Sichuan province is different than in EECCA countries. Financing challenges also differ. In short, the existing wastewater infrastructure is much less developed in Sichuan, but the levels of investments and government financial support are much higher.

Nevertheless, the analysis conducted demonstrated the useful role that the FEASIBLE model can play in supporting policy making. It showed that the present investment and financing plans would need to be revised, and that institutional reforms would facilitate successful implementation and realistic financing of the infrastructure development programme envisaged by the Chinese authorities.

6.4 Introducing the Financing Strategy Concept in Other Environmental Sectors

The conceptual idea of establishing a financing strategy that balances long-term service level and environmental targets with the available supply of finance is generic and equally useful in other environmental sectors requiring intermediate or long-term public financial support.[19]

An obvious area for further development of the concept is the energy sector. This sector, in transition as well as developing countries, faces a major challenge in balancing the cost of technical measures (such as change in fuel mix, efficiency improvements, cleaner technologies, pollution control equipment) for key infrastructure (such as power and heat generation, transmission and distribution) needed to meet service requirements, while complying with stated pollution reduction targets of both regional (NOx, SOx) and global (CO2) nature, on the one

[19] The same is true for non-environmental sectors such as public transport and healthcare.

hand, with available funding (from traditional sources and flexible mechanisms under the Kyoto Protocol), on the other. The modelling-based approach with generic cost functions for standardised technology modules and iterative scenario building could greatly facilitate this process.

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Introductory Statement

by Mr. Hans Christian Schmidt,
Minister of the Environment, Denmark

During the 1990's National Environmental Action Plans (NEAPs) and strategies were developed in most Eastern European countries to address the challenges of reforming the environmental sector along with the transition from planned to market economies. While providing good overviews of the environmental problems and needs in the region, the first generation NEAPs did not reflect the limitations of scarce resources and the need for structural reforms of the environmental sectors. As a response to the limitations of the NEAPs, Denmark and other donor countries have during the last four years supported work in the OECD to develop Environmental Financing Strategies (EFSs), to help countries plan better for environmental improvements and secure long term sustainability of the planned infrastructure investments. The environmental financing strategy is a methodology used to organise information and to balance environmental policies and targets with available resources.

It is well documented today that the municipal infrastructure sector, not least in the water sector, is in a very critical state. This is especially true in countries of the former Soviet Union, the EECCA countries (Eastern Europe Caucasus and Central Asia), where accession to and support from the EU have so far not been driving forces. The current status of public infrastructure in the EECCA region is one of severe under-investment, huge losses of water and energy and a high accident rate. Preventive maintenance has given way to accident management and damage repair, costing several times more than that of regular maintenance. The needs by far exceed the available financial resources, and therefore, governments and service providers must prioritise and seek ways of increasing the financial flow to the sector as well as reducing the costs of providing the services.

The environmental financing strategy is, thus, a methodology to organise information and to balance environmental policies and targets with available resources. Up to now, Denmark has financed the development of a computerised decision support tool, the so-called FEASIBLE model, which facilitates the balancing of needs with available financing. The tool has been tested on a number of country and regional studies in the water sector (Georgia, Moldova, Kazakhstan, Ukraine and three regions in Russia, viz. Novgorod, Pskov and Kaliningrad), and lately it has been extended to include the waste sector. The waste model has been tested in Novgorod and in Latvia. The first reports (Georgia,

Moldova and Novgorod) were submitted to the Almaty Conference in the year 2000. In response to the "Guiding Principles for Reform of the Urban Water Supply and Sanitation Sector in the NIS" adopted by Ministers in Almaty, additional studies have now been completed, and the FEASIBLE model has been reprogrammed in a more user-friendly second version. This model is available for free to subscribers.

I am pleased to learn that recently other donors, such as the EU TACIS and Germany, have used the methodology and model developed to support EFSs in other regions in Russia and in Armenia. Furthermore, the methodology has been applied without the use of the FEASIBLE model but as a project based prioritisation tool that is particularly relevant in smaller countries and as a next step when overall policies and targets are set.

This report presents an overview of the EFS methodology and, in particular, the FEASIBLE model, and it provides a synthesis of the results achieved so far by applying the methodology. I will not give a summary of the report here but just point to a few key conclusions:

- The studies show that in the EECCA region the financial resources available today are hardly sufficient to cover operating costs of the existing deteriorating water infrastructure.

- User charges have reached affordability levels in some countries like Kazakhstan and Moldova. There is, however, still room for increasing tariffs in other regions, such as Russia and the Ukraine.

- There is scope for reducing operating costs through energy and water saving measures that should also be taken into account when dimensioning and designing new infrastructure or upgrading existing facilities.

- There is no doubt that public budgets as well as international financial support and partnerships will still have to play a substantial role in the future financing of strongly needed capital investments in improved environmental infrastructure. And this support must be linked with continued institutional and economic reforms.

The FEASIBLE model has proven its applicability, not only in EECCA countries but also in accession countries, and I believe that the cost-effectiveness of

Danish environmental investments could also be improved by applying the methodology more actively in Denmark. Lately, the OECD has demonstrated the applicability of the FEASIBLE model in developing countries by developing a financing strategy for the wastewater sector in the Chinese province of Sichuan.

We see the EFS methodology and the FEASIBLE model as important building blocks for the Strategic Partnership on Water for Sustainable Development, which was launched at the World Summit on Sustainable Development in Johannesburg in September 2002. It is my hope that this publication and the EFS methodology including the FEASIBLE model will be of interest to many new user groups (municipal investment planners, regional and national administrations, international financing institutions, consultants, etc.). I wish to thank those institutions, regions and countries, which have actively participated in developing the EFS methodology and the FEASIBLE tool and made valuable information available for the environmental financing strategies in general and for this publication in particular.

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List of Abbreviations and Acronyms

C&D	Construction and demolition
CIS	Commonwealth of Independent States (of the former Soviet Union)
DANCEE	Danish Cooperation for Environment in Eastern Europe
DEPA	Danish Environmental Protection Agency
EAP	Environmental Action Programme
EECCA	Eastern Europe, Caucasus and Central Asia, comprises countries of the former Soviet Union except the EU accession countries (Estonia, Latvia and Lithuania)
EFS	Environmental financing strategy
EU	European Union
EUR	Euro
FDI	Foreign Direct Investments
FEASIBLE	Financing for Environmental, Affordable and Strategic Investments that Bring on Large-scale Expenditure
GDP	Gross domestic product
GEL	Georgian lari
HH	Household
HHW	Hazardous household waste
IFI	International financing institution

ISPA	Instruments for Structural Policy Adjustment
LCD	Litre per capita per day
MRF	Materials recycling facility
MSW	Municipal solid waste
NEAP	National environmental action programme
NIS	Newly Independent States (of the former Soviet Union)
O&M	Operation and maintenance
OECD	Organisation for Economic Co-operation and Development
SMART	Specific, measurable, agreed, realistic and time-bound (targets)
USD	United States dollar
WEEE	Waste electrical and electronic equipment
WS	Water supply
WW	Wastewater
WWT	Wastewater treatment

Executive Summary

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 environmental goals; how those costs could be minimised; and the challenge of matching costs with available resources. This volume presents an approach for addressing these issues, particularly for investment-heavy environmental infrastructure, such as urban water supply, wastewater collection and treatment and municipal solid waste. Its main message is that a systematic modelling approach to investment and financial management can improve decision-making and ensure a better use of scarce resources. The main ideas underlying this approach are the importance of realism, affordability and cost-effective use of resources in achieving environmental goals.

A computerised decision support tool – FEASIBLE – was developed by OECD and Denmark to help develop financing strategies, mostly in the countries of Eastern Europe, Caucasus and Central Asia (EECCA), but also in EU accession countries and China. It currently may be applied in the water supply, waste water and solid waste management sectors, and the goal is to extend it to energy-related infrastructure. FEASIBLE is freely available and can be obtained through the web pages of OECD, the Danish Environmental Protection Agency and COWI, the Danish consulting firm that developed the model.

The basic approach underlying FEASIBLE is to take public policy targets in areas like water supply and sanitation, determine the costs and timetables of achieving them, and to compare the schedule of these expenditure needs with available sources of finance. This analysis generally reveals “finance gaps” during planned implementation. FEASIBLE can then develop various scenarios to determine how these gaps could be closed. This could be by: identifying policy reforms that could help achieve the targets at lower cost; identifying ways of mobilising additional finance; adjusting the ambition level of the targets; or extending the time period for achieving the targets.

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 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. By focussing on these issues, the application of FEASIBLE is more than a tech-

nical exercise: it also supports a process of dialogue and consensus building among the key stakeholders involved in financing environmentally-related infrastructure. In this way it can build a bridge between policy development and implementation.

The analyses prepared to date for EECCA countries have shown that the percentage of the urban population with access to water supply, wastewater treatment and solid waste management services is higher than in countries at a similar income level, but that these services are inefficiently designed and very costly to operate and maintain. At the same time, the existing arrangements for providing these services are financially unsustainable. Thus, in most EECCA countries there is a chronic shortage of funds for proper operation and maintenance of infrastructure, such as small repairs, replacement of worn-out parts, small capital repairs and essential rehabilitation. This has resulted in the rapid loss of the economic and technical value of assets. If corrective action is not taken, it may eventually lead to the physical collapse of the infrastructure, with severe consequences for human health, the environment and economic activity.

The grave situation in EECCA calls for a fundamental reform in the approach to financing environmentally-related infrastructure and the associated policy and institutional arrangements. Overly ambitious plans to extend the coverage and level of infrastructure services need to be replaced by more realistic, modest capital improvement programmes, tailored at providing 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.

Even achieving these more modest objectives represents a major challenge for EECCA countries. *User charges* will be the most important long-term source of finance for operation and maintenance expenditure, though the low income in many EECCA countries represents an important affordability constraint. *Public budgets* will have an essential role in the short and medium term in financing rehabilitation and capital investments, in providing social protection and in facilitating access to credit. However, infrastructure programmes have to compete with other pressing social priorities. Thus, scarce *public funds and donor grants* need to be strategically prioritised; they will need to be increased in many

EECCA if the Millennium Development Goals are to be achieved[1]. The importance of *domestic financial and capital markets* will grow over time. *International financial institutions (IFI)* will continue to have an important role in 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 finance.

Even though the development of environmental financing strategies (EFS) has only been undertaken in the last few years, it has already triggered some significant policy changes in EECCA countries. *In Novgorod Oblast (Russia)*, the EFS for the water sector was officially adopted by Regional Government and used to identify a portfolio of projects co-financed by the Oblast and international donors. The municipal waste EFS for *the Novgorod and Yaroslavl Oblasts* led to a revision of the waste management plans that involved the identification of more cost-effective regional solutions. *In Moldova*, the EFS was adopted as an official policy document and supported a draft government resolution relaxing unrealistically stringent wastewater effluent standards. *In Kaliningrad (Russia)*, the EFS was used to identify a portfolio of projects co-financed by the Oblast and international donors. *In Ukraine*, the EFS was used to support a comprehensive water sector strategy. *In Pskov (Russia)*, the EFS stimulated a policy debate about infrastructure development targets that were revealed as being financially unsustainable and unrealistic. *In Georgia and Kazakhstan*, the EFS has provided a revealing "reality check" on possible co-financing arrangements with IFIs and donors.

The experience accumulated to date suggests that the environmental financing strategy methodology can be useful tool for governments in developing realistic plans to achieve nationally or internationally agreed targets. The underlying assumption is that governments should not finance all or most expenditure, or sponsor all or most projects. Relying on the public budget to finance operational and maintenance costs of collective infrastructure, for example, is not a sustainable solution. The main role of government in relation to finance is to establish the policy, regulatory and institutional framework within which resources from users, financial markets, capital markets, local budgets and enterprises can be

[1] As one of the Millennium Development Goals, by 2015 all United Nations Member States have pledged to reduce by half the proportion of people without sustainable access to safe drinking water. At the Johannesburg Earth Summit it was further agreed, by 2015 to reduce by half the proportion of people without access to basic sanitation

mobilised in a complementary way, and applied as cost-effectively as possible to achieve agreed goals. Hence, the financing strategies can be useful not only to help plan the government budget, but also in suggesting how policy instruments that affect the capacities and decisions of other public and private financial agents might be reformed.