Environmental Finance

EAP Task Force

LESSONS LEARNT FROM FINANCING STRATEGIES FOR THE MUNICIPAL WASTE MANAGEMENT SECTOR IN SELECTED EECCA COUNTRIES

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This report is also available in Russian under the title:

Уроки, вынесенные из финансовых стратегий для сектора коммунальных отходов в отдельных странах ВЕКЦА

FOREWORD

This report is published under the auspices of the Task Force for the Implementation of Environmental Action Programme for Eastern Europe, Caucasus and Central Asia (EAP Task Force), for which the OECD Environment Directorate serves as a Secretariat. It forms part of a programme on environmental finance in EECCA countries, which advise governments in the region on policies aiming at strengthening municipal finance and the financial sustainability of the sectors providing environmental services.

Based on the experience gained in the water supply and sanitation sector, a methodology has been developed and implemented in selected EECCA countries (Armenia, Russia and Ukraine) to support policy dialogues aimed at developing sound financing strategies for the municipal waste sector. A series of detailed in-country studies has been undertaken in a variety of contexts, at both national and sub-national levels. The case-studies have been implemented with financial support from the Danish government (DEPA/DANCEE), EU TACIS, as well as from the German government. Most of them have had significant policy implications.

The publication sketches a realist portrait of the municipal waste management sector in EECCA based on field work, presents lessons learnt from the financing strategy case studies, as well as on the methodology (see Annex 1), and proposes recommendations on policies which could be implemented in EECCA countries to promote the financial sustainability of the municipal waste sector.

The recommendations also build on lessons learnt in EU accession and candidate countries (Latvia, Lithuania, Turkey), and on the experience of the OECD.

Alexandre Martoussevitch, Environmental Finance expert at the Environment and Globalisation Division, OECD Environment Directorate has drafted the publication. Nina Korobova, consultant to the Danish Environmental Protection Agency, is the author of Annex 3. Xavier Leflaive, Head of the Finance programme, and Michael Jacobsen, COWI Turkey, have reviewed earlier drafts. Other experts also provided valuable comments: Henrik Harjula, Nils Axel Braathen, Brendan Gillespie and Tatiana Efimova (OECD Environment Directorate), Jonas Byström, Jesper Karup Pedersen and Petr Maksimenko (COWI AS), Tatyana Filkova (UNDP project in Kyrgyzstan). The project has benefited from the inputs of the Environmental Finance Network meetings in Almaty in March 2006 and in Paris in February 2007, as well as from discussions at an expert workshop in Moscow in December 2005 (see Annex 4).

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ABBREVIATIONS AND ACRONYMS

AMD	Armenian dram (national currency)
CEE	Central and Eastern Europe
CO2	Carbon dioxide
DANCEE	Danish Co-operation for Environment in Central and Eastern Europe
DEPA	Danish Environment Protection Agency
DFID	Department for International development (part of the UK Government)
DKK	Danish krone
EAP Task Force	Environmental Action Programme Task Force
EBRD	The European Bank for Reconstruction and Development
EC	European Commission
EECCA	Eastern Europe, Caucasus and Central Asia (region)
ERU	Emission reduction units
EU	European Union
EUR	Euro (currency of the European Monetary Union)
FEASIBLE	Financing for Environmental, Affordable and Strategic Investments that Bring on Large-scale Expenditure (a computer-based decision-support tool)
FS	Financing strategy
GDP	Gross Domestic Product
GRP	Gross Regional Product (similar to GDP, is calculated for provinces in big EECCA countries)
HCS	Housing and communal services (sector of the economy)
MDGs	Millennium Development Goals
MTEF	Medium-Term Expenditure Framework, rolling mid-term (3-5 year) public budget complemented by annual budgets
MSW	Municipal Solid Waste
MW	Municipal waste (includes: solid and liquid, and bulky household waste, as well as the waste of similar composition generated by institutions and enterprises; street sweeps; and construction and demolition waste)
MWM	Municipal waste management
OECD	Organization for Economic Co-operation and Development
O&M	Operation and maintenance
PPP	Purchasing Power Parity
PRSP	Poverty Reduction Strategy Paper
RUR	Russian rouble
SME	small and medium size enterprises
t, t/y	tonne, tonnes per year
th.t., Mt	thousand tonnes, million tonnes
UK	United Kingdom
USD	USA Dollar
VAT	Value added tax
WB	The World Bank
WEEE	Waste of Electric and Electronic Equipment
WWTP	Wastewater treatment plant

EXECUTIVE SUMMARY

Why is municipal waste an issue in EECCA

The risks associated with the management of municipal waste (MW) are considerable. When improperly treated, municipal waste is a source of air and water pollution, including pollution of ground water sources. It can also create health problems, deriving from polluted water sources, or from epidemic diseases disseminated by birds, rats and flies/mosquitoes eating biodegradable waste. Methane emitted from anaerobic degradation of waste, e.g. in landfills, is an important source of greenhouse gases, which contribute to global warming.

The OECD Council has recommended that policy in the municipal waste management sector should achieve the following objectives:

1. sustainable use of natural resources, minimisation of waste and protection of human health and the environment from adverse effects that may result from waste;

2. diversion of waste streams to the extent possible from facilities operating with low-standards to facilities that manage waste in an environmentally sound and economically efficient manner;

3. fair competition between enterprises in the MW sector throughout the OECD area through the implementation of core performance elements by waste management facilities, thus contributing to a level playing field of high environmental standards.

In EECCA countries, sound management of the sector could generate additional benefits:

- *Social benefits* (quality service and improved quality of life, better nature for leisure, etc.);

- *Health benefits* (better health and fewer epidemic and respiratory diseases, safer environment for children);

- *Positive impacts for eco-systems* (e.g. by less ground water pollution from dump sites, less pollution involving heavy metals and dioxins) *and climate* (by reducing methane emissions);

- *Resource benefits* (recycling reduces demand for subsoil and energy resources, thus reducing negative externalities related to natural resource extraction, while proper landfilling reduces demand for land occupied by waste disposal sites);

- *Wider economic benefits* (economic growth and investment, emphasis on efficiency of materials use, employment in utilities and in the tourism and recreational business, etc.).

Status of municipal waste management in EECCA

No progress in municipal waste generation mitigation

Data on actual municipal waste production and composition in EECCA are scarce. Many countries use waste generation norms, inherited from the Soviet era. Some data on municipal waste generation have been produced in the context of case studies in the region.

Municipal waste generation remains low compared to EU accession countries: e.g. in 2003 in two Russian oblasts, it was below 250 kg per capita per year, compare to some 400 kg in the Czech Republic, Estonia and Bulgaria, and more than 300 kg in Romania, Lithuania and Poland.

However, waste generation is likely to increase substantially in the future. Private final consumption will drive MW production, exacerbated by such EECCA specific features as migration from rural to urban settlements (with higher rates of municipal waste generation per capita) and the introduction of modern packaging techniques (in particular in the food industry), which have changed the composition of municipal solid waste.

Weak institutional organisation of the sector

In most areas of the EECCA region, municipal waste management is organised according to the standards of the former Soviet Union. Quality, environmental and sanitary standards are set at a very stringent level by national authorities. Municipalities are responsible for organising the services and often own parts of the infrastructure (trucks, landfills). Service providers (either public or private) contract with customers individually and collect revenues from the users.

The present organisation of the sector generates a number of inconsistencies and high transaction costs. It makes regulation and enforcement complex. It creates incentives for opportunistic behaviours, from households, municipalities and service providers, which are not beneficial for the environment.

Lack of incentives to improve performance

The sector is plagued with a lack of structured, formal relations. Contractual relations between municipalities and service providers (be they public or private) are either non-existent or vague. Responsibilities are opaque. Material flows are usually not measured: landfills often fail to measure the quantity and composition of waste they receive; the volume of recyclables produced by sorting stations is not known precisely.

In this context, there are substantial obstacles to the efficient and effective management of municipal waste. The sector lacks incentive to optimise material flows, infrastructure and services. Service areas are usually too small to benefit from scale effects. Tariffs are not set in reference to operation and maintenance costs and to investment needs.

Opaque financial flows

The sector has been a low priority on the agenda of EECCA governments: budgetary allocations to the sector vary from 0 to 1.4 € per capita per year (usually less than 1% of public expenditure). In addition, there are indications that states are retreating from the sector, as financier and as operator.

Revenues from user charges are low, because tariffs and collection rates are low (below 40% in some locations). In Rostov-on-Don in 2003, the local waste management company earned some 2 € per capita per year. Tariffs are below the affordability limit (bills amount to some 0.2% of households' consumption, compared to 0.75% to 1.5%, sometimes used as an affordability threshold by the World Bank).

The case studies indicate cross-subsidies between user groups (higher tariffs for private firms tend to compensate low tariffs for households) and between activities in the value chain (collection and transportation tend to be subsidised by disposal).

Cash transfers between players are common; this makes the monitoring of financial flows difficult; it is a source of tax evasion; it reduces revenues for utilities who strive to comply with official channels.

Low tariffs can still cover operation costs, when services do not comply with the existing regulation. For this reason, the sector has been able to attract private operators. The question is how profitable the sector will remain, when regulations and standards are defined and enforced.

Lack of sound strategic financial planning

In a context where little reliable data on waste generation and waste composition exist, when revenues are opaque and regulations are not enforced, planning remains a theoretical exercise. The financial sections of strategic plans developed at national, regional or local level are particularly weak.

Policy recommendations

The case studies indicate that policy-packages can be set up at both national and local levels to improve the economic and environmental performance of the sector, while sustaining its profitability:

- Waste prevention policies should be developed. Incentives for recycling and reuse should be implemented; improving and stabilising the quality of recyclables to stimulate demand for recycled materials could be one important step in this direction;

- A comprehensive set of standards should define service delivery, at the local level; no progress will materialise until rigorous enforcement mechanisms are put in place;

- Inter-municipal cooperation should be considered, as it can optimise investments and attract modern technologies (such as waste-to-energy schemes) which are not competitive on smaller scales;

- Strict, unambiguous performance-based contractual arrangements should be defined between municipalities and service providers;

- When service quality arises, tariffs for households can be raised closer to the affordability limit; safety nets can be adapted to mitigate the social consequences for the poor.

Such policy packages can attract private operators and financiers with sustainable business models. Finance strategies, as they have been developed by the OECD/EAP Task Force, can support policy dialogues around these issues, at national and sub-national level. They have helped to increase sector profile in national/regional political agenda. They have provided substantial input to a national/regional Master plan for municipal waste management; in particular, they have been instrumental for assessing the benefits of inter-municipal cooperation. In several cases, they have helped to attract donors' attention and mobilise finance for the MW sector development.

A FRAMEWORK FOR ENVIRONMENTAL POLICIES IN THE MUNICIPAL WASTE MANAGEMENT SECTOR

All EECCA countries face the challenge of developing and implementing a sound policy in the municipal waste sector. With this regard they could use best practices from OECD member states as well as policy recommendations developed by the OECD as a reference.

Recognising the significance of the issue, the OECD Council has issued a *Recommendation on the Environmentally Sound Management of Waste* (OECD, 2004). The Recommendation states that the implementation of environmentally sound and economically efficient management of solid waste should achieve the following objectives:

1. sustainable use of natural resources, minimisation of waste and protection of human health and the environment from adverse effects that may result from waste;

2. diversion of waste streams to the extent possible from facilities operating with low-standards to facilities that manage waste in an environmentally sound and economically efficient manner;

3. fair competition between enterprises in the MW sector throughout the OECD area through the implementation of core performance elements by waste management facilities, thus contributing to a level playing field of high environmental standards.

For the purpose of that Recommendation, taking into account the size of the enterprises, especially the situation of small and medium size enterprises (SMEs), the type and amount of waste, the nature of the operation and their domestic legislation, OECD member countries should:

1. have an adequate regulatory and enforcement infrastructure at an appropriate governmental level, consisting of legal requirements such as authorisations/licences/permits, or standards;

2. develop and implement practices and instruments that facilitate the efforts of competent authorities to monitor the implementation of the core performance elements and control compliance of waste management activities with applicable national and international rules and regulations. In case of non-compliance with existing rules, prompt, adequate and effective actions should be undertaken;

3. ensure that waste management facilities are operating according to best available techniques, while taking into consideration the technical, operational and economic feasibility of doing so, and work towards continually improving environmental performance;

4. encourage, through appropriate measures, information exchange between producers, waste generators, waste managers and authorities, including participation in sectoral trade or industry association activities addressing these issues, in order to foster waste prevention, optimise recycling and recovery operations and minimise quantities as well as potential risk of waste destined for disposal or recovery;

5. integrate into national policies and/or programmes the core performance elements, which constitute the basic requirements to ensure environmentally sound management of waste;

6. consider incentives and/or relief measures for facilities that fulfil the core performance elements;

7. implement the technical guidance for environmentally sound management of waste that has been developed by the OECD and, where appropriate, work towards the implementation of other environment system management guidance;

8. move towards internalisation of environmental and human health costs in waste management, taking into account the differences between hazardous and non-hazardous waste;

9. provide incentives to take part in environmentally sound recycling schemes;

10. encourage the development and implementation of an environmental liability regime for facilities that carry out risky or potentially risky activities to ensure adequate measures upon definite cessation of activities and to prevent environmental damage;

11. ensure that the implementation of the core performance elements does not discourage recycling in Member countries, recognising, in particular, the flexibility appropriate for each Member country to increase the rates of environmentally sound recovery of low risk waste.

The integral text of the recommendation, including the annexes which provide core performance elements for the environmentally sound management of waste, is available at http://webdomino1.oecd.org/horizontal/oecdacts.nsf/linkto/C(2004)100.

For EECCA countries this Recommendation provides guidance on the objectives and the means of municipal solid waste management. Implementing this recommendation taking due account of the state of industry and the peculiarities of the EECCA context, would allow EECCA countries to tap the environmental, economic and social benefits associated with sound municipal waste management.

Benefits from sound municipal waste management

A report prepared for the European Commission (European Commission (DG ENV), 2001) with financial support from DEPA/DANCEE identifies the following benefits from sound municipal waste management:

- *Social benefits* (quality service and improved quality of life, better nature for leisure, etc.);

- *Direct health benefits* (better health and fewer epidemic and respiratory diseases, safer environment for children);

- *Positive impacts for eco-systems* (e.g. by less ground water pollution from dump sites, less pollution involving heavy metals and dioxins) *and climate* (by reducing methane emissions);

- *Resource benefits* (recycling reduces demand for subsoil and energy resources, thus reducing negative externalities related to natural resource extraction, while proper landfilling reduces demand for land occupied by waste disposal sites);

- *Wider economic benefits* (economic growth and investment, emphasis on efficiency of materials use, employment in utilities and in the tourism and recreational business, etc.).

In the case of EECCA, even if the reform of the municipal waste sector is not aimed at meeting EU standards and specific targets set in relevant EU Directives (on recycling different packaging waste and on reducing disposal of bio-degradable waste at landfills), sound municipal waste management brings about environmental and health benefits, as well as many of the aforementioned social and economic benefits.

When improperly treated, municipal waste is a source of air and water pollution, including pollution of ground water sources. It can also create health problems, deriving from polluted water sources, or from epidemic diseases disseminated by birds, rats and flies/mosquitoes eating biodegradable waste. Improperly handled waste also generates unpleasant smell and higher risk of fire (because of the gasses generated in landfills). Finally, methane emitted from anaerobic degradation of waste, e.g. in landfills, is an important source of greenhouse gases, which contribute to global warming.

Resource, economic and social benefits from proper waste management can be especially significant for developing countries and transition economies which usually have excessive labour but lack capital. For instance, recycling is often less capital, natural resource and energy intensive than producing primary materials, like metals, plastic, or paper and cardboard. It helps reduce demand for green field and brown field construction of pulp and paper mills, chemical plants, aluminium smelters and steel mills, etc. At the same time, collecting recyclables and recycling are typically more labour intensive than producing of similar primary materials, thus helping to reduce unemployment and extreme poverty which are still high in many EECCA countries.

Municipal waste management generates a lot of opportunities for small and medium size private businesses, *inter alia* because there are many niches which do not require heavy up-front investment for entry, and because there are plenty of options for *competition in the field* (e.g. in municipal waste transportation and waste recycling, waste reuse, use of recovered materials and energy) as well as *for the field* (leasing and concessions arrangements for municipal waste collection infrastructure, landfills and other facilities).

Sound waste management is also a requisite to develop tourism and recreation business which is or could be a driver of economic growth in a number of EECCA countries and/or areas.

MUNICIPAL WASTE MANAGEMENT IN EECCA COUNTRIES

The data reported in this publication is partial and based on the financing strategy (FS) case studies. They do not intend to represent the situation of all EECCA countries and provinces in full or in all aspects, although they probably indicate trends which are relevant for a vast number of territories.

Recent trends in waste generation in EECCA

What are the drivers for waste generation

The role of drivers is to help explain and forecast waste generation. As part of its work on policies for waste management, the OECD has embarked on an important project to identify possible drivers for the generation of municipal waste (MW) and its components, as well as construction and demolition waste (C&D) and non-hazardous industrial waste[1]. The primary focus was on municipal waste. Candidates for drivers were selected from a number of those factors exogenous to the waste stream, which explain part of change in the waste stream, such as population, GDP, employment, private final consumption, etc.

Based on a careful analyses and evaluations, **population and private final consumption** were found to be most important drivers for generation of the municipal waste and its components. Other candidates, such as the number of households, GDP and components of private final consumption, could be considered appropriate drivers for particular analyses. However, they are either less logically relevant (e.g. GDP versus private final consumption) or less readily measurable due to lack of data in some countries (e.g. components of private final consumption).

The issue of decoupling growth in waste generation from growth in income and consumption has been a key policy issue for a number of years. Analysis of whether the rate of growth in waste generation changes over time relative to the rate of growth in consumption may reveal whether some form of decoupling is taking place. More detailed and policy relevant analysis will require component-specific drivers for the analysis of growth in municipal waste generation by components (e.g. WEEE, hazardous household waste, construction and demolition waste, etc.). For instance, GDP and population are often used as "standard" drivers for construction and demolition waste.

When measuring the drivers in countries with unstable currencies and relatively high inflation, including most EECCA countries, it is advisable to express the related indicator (e.g. production) in real (base year) dollar or euro terms (preferably using PPP-adjusted exchange rates) or in physical units to avoid problems associated with significant changes in the real value of the local currency.

[1] OECD, 2004, Towards Waste Prevention Performance Indicators

Trends in municipal waste generation in EECCA

In addition to the drivers above, several other EECCA-specific factors should be taken into account to explain the trends in municipal waste production in EECCA in the early transition period (1992-1999):

- opening the economy after the breakdown of the former Soviet Union generated a substantial change in both the consumption pattern, and in the food processing industry in EECCA. The latter was very fast in introducing modern package for food and beverage, which substituted for the package used in the former Soviet Union: for instance, traditional glass container for mineral water and soft drinks have been almost totally replaced by PET-bottles, and by TETRA PACK type of package for milk and juice, while plastic vacuum packaging has become much more widespread than it used to be in the former Soviet Union. Those changes together with the abolishment of the deposit-refund system for glass containers, resulted in fast substantial changes in the *composition* of household waste disposed of at MW landfills and dumpsites, as well as in the weight of a cubic meter of the (non-pressed) household waste which has approximately halved: from 400-450 kg/m3 to some 200-250 kg/m3;

- in line with a huge decline in GDP and households incomes in 1992-1999, households had to spent a much bigger share of their income on food, increasing from 30-40% in 1990 to typically 60-75% on average for all income groups. As a result of this shift in composition of private consumption towards food, the waste generated per unit of aggregate private consumption increased. The much larger share of food expenditure in total consumption in EECCA countries compared to most OECD countries (where the expenditure on food is typically below 10% of household expenditure) implies that the ratio of waste to income is higher in EECCA countries;

- not only GDP but also the population was declining in many EECCA. However, substantial part of the rural population moved to cities, including cities in richer neighbouring countries. Per capita household waste generation in urban areas is substantially higher than in rural areas (see Table 1), not only due to differences in incomes, but also due to differences in waste generation behaviour. For example food residuals which are considered waste in an urban setting may be used as animal feed, or compost. This point is illustrated in Table 2, where the food waste in rural areas constitutes a much smaller share of total waste than in urban areas.

So, the significant change in the household consumption structure and in the composition of household waste, as well as migration from rural to urban areas, and from poorer to richer EECCA countries contribute to explain why waste volumes had been largely unchanged over 1992-1999, or reduced much less than GDP and household incomes and consumption.

Finally, the increase in the reported amounts of waste generated in the EECCA partially reflects changes in the data reporting system. Previously mainly large industries were covered by the reporting requirements, while other industries and commercial and budgetary institutions were not. Coverage by the reporting system is now much wider (in many places) and thus more waste generation is reported.

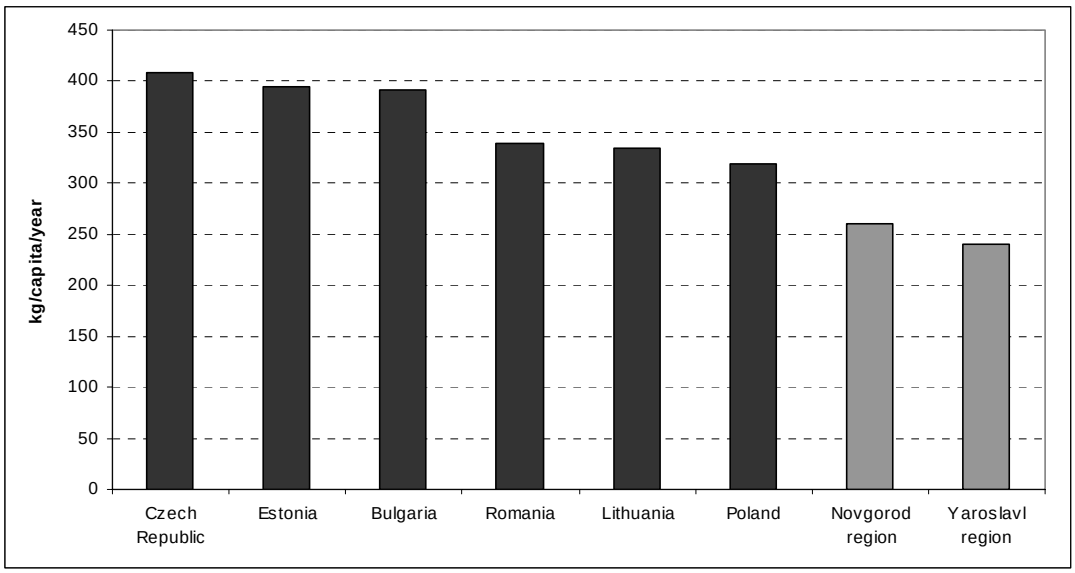
Table 1.Household waste generation in Armenia and some provinces of Russia, in kg per capita per year

Country/province	Year of the FS case-study	Household waste generation by:	
		Urban households (living in apartment blocks)	Rural households
Lori and Shirak marzes, Armenia	2004	235	n.a.
Novgorod oblast, Russia	2001	260	120
Yaroslavl oblast, Russia	2001	240	110
Rostov oblast, Russia	2003	300	150
Leningrad oblast, Russia	2004	190-215*	90-110*

Note: n.a. - data was not available; * - depending on municipality
Source : FS case-studies: see (DANCEE OECD/EAP Task Force, 2003), (EC TACIS OECD/EAP Task Force, 2003), (EC TACIS OECD/EAP Task Force, 2004), (DANCEE, 2004), (DANCEE, 2005), (OECD/EAP Task Force MUD RA, 2006)

Available data indicates that household waste generation per capita in EECCA is still much lower than in many Central and Eastern European (CEE) countries (see Figure 1 which presents data for 2001), but also that the ratio of waste to income is much higher in the EECCA region.

Figure 1. Waste generation in Novgorod and Yaroslavl oblasts (provinces of Russia) compared with selected CEE country



Note: latest available country/province data for 2000-2002
Source: (OECD/EAP Task Force, 2003)

In the future one would expect that in line with the economic recovery followed by the growth which has been observed in most EECCA since 1999, the growth in per capita household waste generation will be driven by the growth in the final consumption. However, for the EECCA region one would expect the income elasticity to be less than 1 in the medium term, as in line with the income growth the composition of consumption rapidly changes (from food to other goods and services), and migration from rural to urban areas has slowed down.

Data availability and quality in EECCA

Figures on municipal solid waste (MSW) generation in EECCA are often based on norms of waste generation (some 1.4 – 2 m3 or 250-400 kg per capita per year in urban areas), as waste disposed of in dump-sites and landfills is usually not weighed in EECCA. Accordingly, expert estimates and "*guesstimates*" often prevail in reporting on the amount of waste accumulated at landfills and dump-sites.

Data on municipal solid waste composition is even less available in EECCA as assessment of waste composition was done only by few waste management companies. Only in few cases such data was available for waste collected by MWM companies (see Tables 2 and 3).

Table 2.Municipal solid waste composition in Leningrad oblast

in per cent

	Urban households (living in apartment blocks)	**Rural households**	**Commerce and institutions**
Total, *of which:*	100.0	100.0	100.0
Food waste	**46.7**	**28.3**	***17.0***
Paper	8.5	14.2	*25.0*
Cardboard (incl. bulk)	6.8	11.8	*15.0*
Plastic	6.4	11.8	*20.0*
Glass	8.5	14.2	*1.0*
Metal (including bulk)	4.3	2.4	*1.0*
Waste of Electric and Electronic Equipment (WEEE)	0.4	0.5	1.0
Hazardous waste	0.2	0.2	0.0
Garden waste	2.1	0.0	5.0
Other non-combustibles (incl. bulk)	6.3	2.4	5.0
Other combustibles (incl. bulk)	9.8	14.2	10.0

Source: DANCEE, 2004

Table 3.Municipal solid waste composition in Novgorod-the-Great, Russia, 2000

Paper	7.1%
Cardboard	5.7%
Plastic	5.6%
Crap metals	3.6%
Wood	25.9%
Glass	5.8%
Textile	2.8%
Hazardous waste	1.7%
Other non-combustibles	38.7%
Other combustibles	3.1%

Source: DANCEE OECD/EAP Task Force, 2003

Institutional set-up and regulation of the MWM sector in EECCA countries

The institutional organisation of municipal waste management

Ownership rights and delegated responsibility for operations

In EECCA countries,

- some core parts of the infrastructure belong to municipalities, including containers for collecting waste, fleet of trucks for waste transportation, sorting and transfer stations (if any), dump sites and landfills, and incinerators;
- landfills for hazardous waste disposal (often organized at an inter-regional level) usually belong to the state;
- recycling facilities are mostly private, but facilities for hazardous waste recycling are often state-owned.

At the municipal level, the publicly-owned infrastructure is usually operated by utilities. Operators are either a specialized municipal waste management companies (often called *Spetsavtokhozajstvo*), or companies responsible for various communal services in the municipality, be they private or public/municipality-owned companies.

It is more and more often that private companies own the fleet of specialised trucks, sorting stations and even landfills, while containers for collecting the mixed waste may belong to housing management companies, or condominiums.

Areas of responsibilities of operators

Operators typically work on the basis of contracts with owners of MW infrastructure or Charters of the operators (for publicly-owned operators), and contracts with their customers. Weaknesses of the present contracts are discussed in the next chapter.

In small and medium-sized municipalities, one operator is usually in charge of waste collection, transportation and disposal, as well as cleansing streets and public gardens. In bigger cities, there tend to be several operators, some of which operate dumpsites and landfills (sometimes on the basis of lease agreements), while others are responsible for waste collection and transportation, or streets sweeping. Sorting stations (if any) and recycling facilities are often operated by other companies.

This information is summarized in the tables 4 and 5 below.

Table 4.Ownership for MW infrastructure in EECCA, by key elements

Elements of the infrastructure	Public (state or municipality-owned enterprise)	Private business	Public-Private Partnerships[2]
Waste collection infra (containers and street bins, trucks)	Prevails	Rare	Growing
Waste transportation fleet	Prevails	Growing	n.a.
Sorting stations, transfer stations (*still rare in EECCA)*	Prevails	Growing	Growing
Recycling facilities	Prevails in recycling hazardous waste	Prevails in recycling glass waste, paper and cardboard waste, crap metals, plastic waste	n.a.
Waste disposal and waste treatment: - Landfills, dumpsites for municipal waste disposal (solid, liquid, hazardous) - WWTPs to treat liquid and biodegradable municipal waste	Prevails: liquid household waste are often treated at municipal WWTPs, methane tanks for producing methane from biodegradable municipal waste are also at municipal WWTPs	Rare	Growing
Compost producing plants from biodegradable municipal waste *(rare in EECCA)*	Typically, compost is produced by WWTPs from sludge	n.a.	Growing
Incineration, incl. waste-for-energy *(rare in EECCA)*	Prevails, e.g. small installations for burning municipal waste could be found in distant rural settlements	n.a.	n.a.

Note: n.a. – data is not available

Source : information collected in the FS case studies and through interviews

Table 5.Responsibilities of operators

Type of activity	Who performs the activity	
	Waste management company owned by municipality, or by the state	Private operator, private industry
Waste collection	Prevails	Growing
Street sweeping	Prevails	Growing
Waste transport	Prevails	Growing
Waste sorting (***rare** in EECCA*)	Equally rare	Equally rare
Waste treatment and waste recycling	Prevails for hazardous and bio-degradable waste	Prevails for, paper and plastic waste, scrap metal
Landfilling waste	Prevails	Growing
Composting biodegradable waste (***rare** in EECCA*)	Prevails	Growing
Incineration, incl. waste-for-energy (***rare** in EECCA*)	Prevails	n.a.

Note: n.a. – data is not available

Source : information collected in the FS case studies and through interviews

[2] Under delegated management contracts, lease, *affirmage*, BOT and other concession-type agreements.

Regulation of the sector

Legislation regulating the MW sector in EECA is quite complex though typically has a lot of gaps and inconsistencies (some of them are discussed in the subsequent chapter). The legislation consists of several elements presented below:

- Legislation defining responsibilities for MW management, including strategic planning: Law on local self-governance, legislation on Government structure, etc.;

- Legislation defining property rights for MW infrastructure: Laws on state and municipal property, Civil code, etc.

- Legislation on natural resource use and environment protection, MWM-related construction, sanitary and environmental norms, rules and standards, and operational standards: Land code, Water code, Law on environment protection; an umbrella Law on waste (adopted in some EECCA countries), City planning and construction code (adopted in some EECCA countries); Construction norms and rules (SNiPs), Sanitary rules and norms (SanPiNs), relevant sub-law regulation (e.g. setting operational standards), etc.;

- Anti-monopoly legislation which allows to control and enforce operators who enjoy local monopoly power, incl. regulating their tariffs and possibility to abolish some provisions in their contracts with customers – if an operator misuses its monopoly power.

- Legislation on MWM-related economic and administrative instruments used for financing and regulating the MW sector, including tariff setting procedure and tariff rates calculation methodologies (if any):

    - *Economic instruments*: tariffs (user charges), product taxes, custom duties, pollution fees and charges, fines for violation of sanitary and environmental rules, etc.;

    - *Administrative instruments*: licensing; SNiPs and SanPiNs, environmental permits; administrative sanctions (e.g. sanitary authority can hold on or even shut down facilities run by the operators which violate respective regulation; while sever violations could be subject to the Criminal Code, etc.).

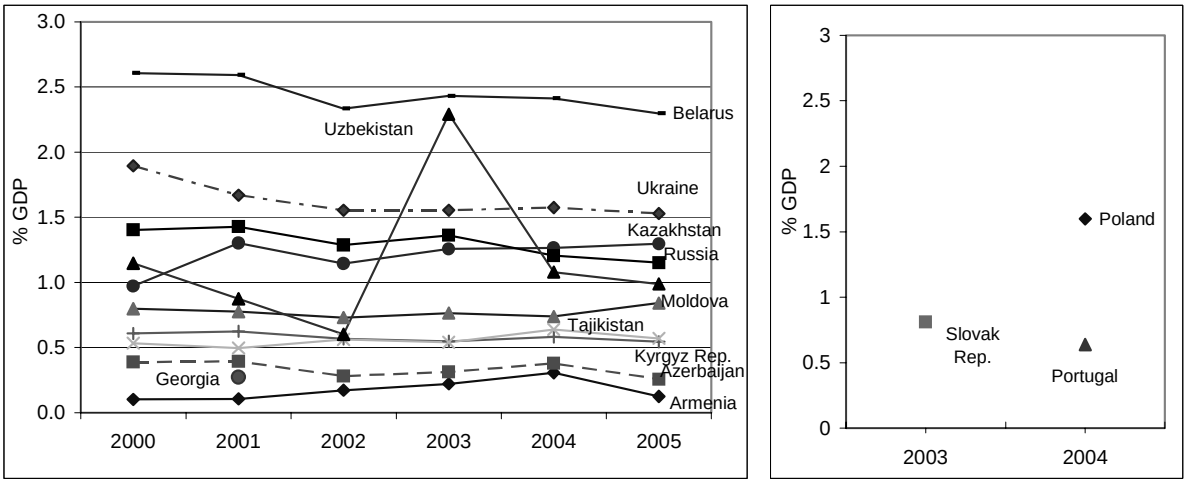
- Legislation on enforcement of the effective regulation (Administrative Code, Criminal Code, etc.) and that defining responsibilities of government bodies responsible for regulation, supervision and monitoring of the MWM sector (including bodies responsible for setting construction, sanitary and environmental norms and standards, methodologies for tariff setting, etc.).

Financing of the MWM sector

Share of the waste sector in environmental expenditure in EECCA countries

In 2000-2005 total environmental expenditure in EECCA countries as share of GDP varied from as low as 0.2-0.4% in Armenia, Georgia and Kyrgyzstan; or 0.5-0.8% in Moldova and Tajikistan, to as high as 2.5% in Belarus, and reasonable 1-1.6% in other EECCA countries (see Figure 2).

Figure 2. Environmental protection expenditure as a share of GDP, 2000-05



Notes: Preliminary data. Comparisons amongst countries should be undertaken with care as definitions and sector coverage vary across countries. Data for Georgia refer to 2001 only.

Source: OECD/EAP task Force (2007).

Only Belarus, Kazakhstan, the Russian Federation and Ukraine spent for environment more than 50 USD per person and per year over 2000-2005. In four countries (Moldova, Azerbaijan, the Kyrgyz Republic, and Armenia), the level of environmental protection expenditure per capita was below 5 USD per year, and remained stable.

Data on the share of the waste sector (both industrial and municipal) in total environmental expenditure confirm that **waste was not high priority in most EECCA**. The share of the sector varied from as low as 3% in Armenia, Azerbaijan and Moldova, to 9-10% in Russia and Uzbekistan and to 12-18% in other EECCA countries), while the MWM sector gained only a fraction of these resources. A notable exception was Georgia where the share of the waste sector was 34%, but still very modest in terms of GDP (some 0.15% of GDP - for more details see OECD/EAP Task Force (2007a, 2007b)).

Who pays for what in the MWM sector in EECCA countries

Typically *public budgets* pay for the following:

- developing and enforcing regulation for the MWM sector; state sanitary-epidemiological and environmental control and supervision and environmental monitoring;

- strategic planning in the sector (master planning and financial planning), designing of specific MWM facilities in public ownership;

- sanitary cleansing of the territory of municipalities;

- removal of municipal waste generated by budgetary organizations;

Public budgets also provide:

- capital subsidies to build or rehabilitate publicly-owned MW infrastructure and often also operational subsidies to operators of landfills, waste incinerators, some recycling facilities (e.g. those recycling hazardous waste), and to WWTPs (e.g. for composting bio-degradable waste or using them in waste-to-energy schemas);

- subsidies to households in the form of discounted tariffs, housing subsidies and allowances, or general income support to the poor.

Industries and commerce pay for, and cover the costs of the following:

- removal and disposal/treatment of municipal waste generated by the business (payable to operators, providing the services, though some businesses prefer to transport their waste themselves, while industries (sometimes) build and operate their own waste disposal facilities, often disposing jointly industrial and domestic waste);

- taxes, levies and duties related to waste management;

- costs of compliance with waste-related regulation (e.g. environmental fees and charges for waste generation and waste disposal, fines for violating relevant environmental and sanitary rules, etc.).

Households pay:

- directly: for the service (user charges) – in many EECCA municipalities households pay only for household waste removal but not for waste disposal (in such a case the latter costs, in theory, should be covered from the public budget);

- indirectly: for recycling of the packaging waste (if this cost is included in the price of packed food and bottled drinks).

Status of municipal waste-related services and infrastructure

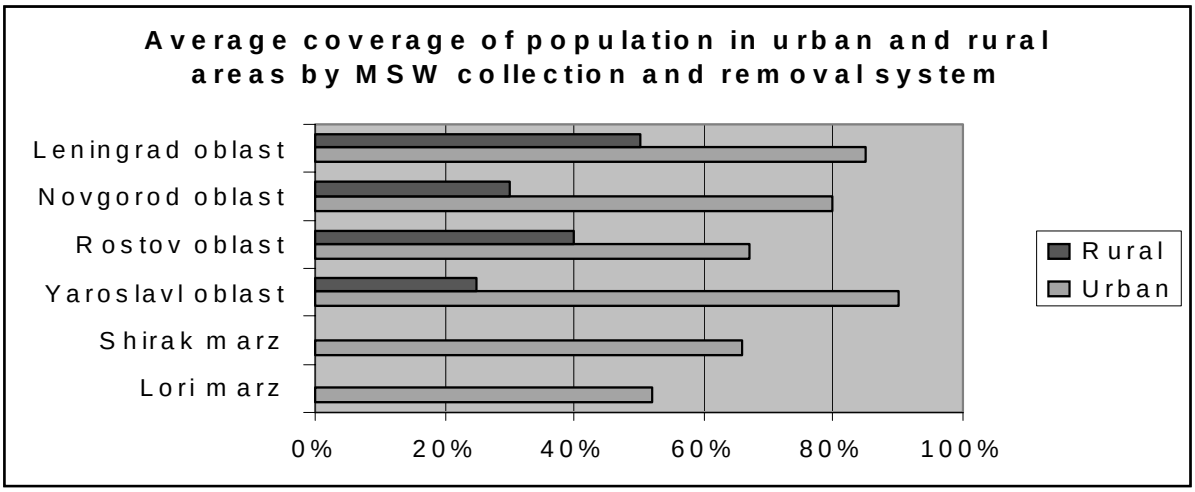
Waste collection

Coverage

Coverage is much lower in rural areas (see Figure 3), but also in those urban areas where private cottages dominate. Low density of rural population is part of the problem as it increases waste transportation cost.

Figure 3. Coverage of population in urban and rural areas by MSW collection and removal system in some provinces in Armenia and Russia

latest available data for 2000-2004



Source : FS case-studies: see (DANCEE OECD/EAP Task Force, 2003), (EC TACIS OECD/EAP Task Force, 2003), (EC TACIS OECD/EAP Task Force, 2004), (DANCEE, 2004), (DANCEE, 2005), (OECD/EAP Task Force MUD RA, 2006)

In urban settlements coverage is often low due to another problem: municipal waste management (MWM) companies often fail to conclude individual agreements with households living in private, single or few family cottages; many such households prefer to behave as free-riders. Households living in private cottages located nearby apartment blocks usually prefer to use containers installed at the apartment blocks free of charge, rather than to sign individual contracts with the local waste management company on waste removal and disposal and pay for that (DANCEE OECD/EAP Task Force, 2003).

Technologies in use

In urban areas, mixed household waste is usually collected in containers set up at special waste collection points located near apartment blocks. In many small and rural municipalities, there are too few waste collection points, and they are not always properly located. This affects both coverage and waste collection rates.

In some cities plastic containers have been installed, but their life-span have been short, as many of them were burnt, either by hooligans or accidentally. For that reason, metal containers are considered a preferred option. Metal containers are usually in use for more than 5 years, whereas the sanitary rules recommend a maximum of 3-5 years. If household waste is not packaged in plastic bag (which is most often the case) the containers become dirty, but are seldom washed, despite recommendations from the sanitary rules.

In rural areas and where private cottages prevail, waste is often delivered in baskets to trucks, tractor or horse-wagons collecting waste at fixed times. People in service areas usually pay for the service, or the service is financed by the municipality from taxes and other public revenues.

Separate waste collection

With few exceptions, there is no separate collection system for different fractions of household waste; neither for food waste, nor for valuable recyclables. Separate collection system for hazardous waste from households are also absent. Consequently, mercury-containing thermometers and lamps, heavy metals-containing batteries and accumulators, expired medicines, lubricants, paints, fertilizers and other hazardous chemicals are typically collected together with non-hazardous household waste.

A few experiments with separate collection of food waste were initiated by the Soviet government in the early 1980s. Then in the 1990s some cities influenced by EU practices, or inspired by western consultants and supported by donors, have implemented pilot projects on separate collection of glass, scrap metal, paper and cardboard, and plastic waste, and other (mixed) waste, including food waste. Following EU practices, plastic containers of different colors (green, yellow, etc.) were installed and public information and public awareness campaigns were launched. But people generally did not respect the waste separation rules suggested by the new system, putting mixed waste in each container, or even preferring to place their waste aside all the containers rather than into them.

The reasons for the failure are manifold: low awareness and indifferent attitude played a role. It is also likely that the early transition period was not a proper time for such experiments. There are, however also some successful source separation recycling systems established, e.g. in Kharkiv, Ukraine.

Waste transportation and logistics

Major parts of the fleet are made of non-specialised trucks. Substantial proportion of the fleet is old and highly deteriorated, so that at any moment as much as 50% of the fleet might not be operational (under repairs). Only a small proportion of the fleet used for waste transportation is represented by modern specialized trucks with pressing, while delivery of non-pressed waste (200-250 kg/m3) highly increases transportation costs. Transfer stations, where waste is transferred from small collection vehicles to larger vehicles for transport to treatment/disposal sites are used to optimize logistics and reduce transportation costs, but they are very rare in EECCA. The limited attention to transportation costs in EECCA may partly reflect the subsidized price of fuel and partly inadequate attention to wear and tear of trucks (as opposed to cash outlays).

In addition, roads and bridges often generate bottlenecks. The first ones are narrow and/or of poor quality, or blocked by snow in the winter, while the second ones are often overloaded (e.g. in Saint Petersburg), or absent.

Waste sorting stations/plants

Generally, sorting stations for mixed waste are rare in EECCA even though they have begun to attract attention. Many existing stations merely press the waste, and fail to generate significant streams of recyclables. It is possible that some sorting stations produce more recyclables than they report/pretend, but this is a “shadow/tax-free business” which is not reflected in the statistics. It is common that the recyclables retrieved in sorting stations receiving mixed municipal waste is of poor quality due to the impact from the wet food waste. As a result, the quality of the recyclables is poor and the prices paid are often low.

Sorting is usually performed by human hands, with little care about occupational safety, often in violation of occupational safety rules.

In some cases, waste sorting plants have been constructed, but they charge prohibitive tariffs, which discourage potential users (see (KhMAO, 2004)). Overall, limited experience with sorting of mixed waste have so far demonstrated disappointing results in EECCA, while source separation of waste might be appropriate at least in more dense urban areas.

Waste reuse and recycling

The FS case studies have revealed that waste sorting facilities, built to extract valuable recyclables, make economic sense only if the price of recyclables (other than scrap metals) taken from the waste stream exceeds USD 80-100/ton, and if recycling facilities are located less than 100-150 km away from the sorting stations (the estimates in 2004 US dollars relate to Russia).

As seen from Table 4, only few recyclables reach such prices in Russia. Furthermore, the costs of transport (even at subsidized fuel prices) imply that recycling rarely pays outside the biggest cities.

Table 6.Prices for some recyclables in Leningrad oblast, Russia, 2004

Recyclables	Price, RUR/ton	Price, USD/ton
Paper and cardboard (average price)	3,100	103
Non-ferrous metals (average price)	40,000	1,333
Ferrous metals	1,500	50
Hard plastic (PET)		
White PET	3,000	100
Green-blue PET	2,500	83
Mixed PET	2,000	67
Glass		
White glass	400	13
Brown glass	600	20
Mixed dark glass	300	10

Note: A snapshot does not illustrate the high price volatility typical for recyclables. In thin markets, like those for recycling in the EECCA this further discourages recycling. Remarkable that since 2001 the price for paper and cardboard waste has almost doubled, while the price for scrap aluminium has increased by some 60%, to USD 1300 per ton. Prices in 2004 were at a very high level and still the table illustrates that only non-ferrous metals, paper and cardboard and (maybe) colour separated PET would meet the requirement stated in the text of fetching 80 - 100 USD per tones.

Source : DANCEE, 2004

Consequently, except scrap metals and aluminium cans, paper and cardboard, and to some extent PET-bottles, a very small proportion of other recyclable fractions of municipal waste is recycled (e.g. plastic waste other than PET-bottles) or re-used (e.g. glass containers). In that respect, EECCA countries performed better under the former Soviet Union (see the box below).

Box 1. Deposit-refund system for glass containers in the former Soviet Union

In the Soviet Union there was a rather effective system of collecting some recyclables, like scrap metals (ferrous and non-ferrous, operated by *Vtorchermet* and *Vtortsvetmet,* respectively), paper and cardboard, textile and leather (operated by *Vtorsyrje*).

There was also a deposit-refund system in place for glass bottles and glass containers, while incentives to bring them back for re-use were rather strong: e.g. with an average salary amounting to some 150-200 soviet roubles, the system refunded 0.12 and then 0.2 roubles for each standard 0.5L beer bottle, that money comprised some 32-45% of the price of bottled beer.

Moreover, during the *perestroika* period (1985-1990) in Russia it was often just not possible to buy a bottle of beer or vodka without bringing back to the shop a clean empty beer or vodka bottle, respectively (that was a kind of specific Soviet-style "administrative instrument" to stimulate reuse of glass containers).

After the break-down of the Soviet Union, the deposit-refund system collapsed, and was later replaced by a network of private companies collecting glass bottles, typically only standard 0.5L beer bottles, made of brown or green glass. The price private collectors offer for clean bottles is too low to be an incentive for people to bring the bottles to the collection points (except for very poor people).

The main reasons for low recycling rates are as follows:

- lack of recycling facilities (especially for batteries, and plastic waste) and composting facilities (for food waste) and/or relatively high recycling cost;

- financially non-viable transportation of recyclables to more distant places where free capacity exist, as prices for some recyclables will not cover transportation costs. For instance, the only cardboard factory in Novgorod oblast can not recycle all the paper and cardboard waste generated and collected in the oblast; another one is located far from the oblast and in 2001 it was not economic to transport the waste to that factory;

- poor quality of recyclables (e.g. paper waste); it discourages demand for such materials and reduces their prices; this situation was experienced by a private sorting station in Belgorod, Russia;

- low demand (and prices) for recovered materials and hence for relevant recyclables. For instance, demand for materials recovered from plastic waste (plastic film for green-houses, PET-bottles, etc.) is still low in EECCA. Though demand for, and price of waste PET-bottles are growing (e.g. in Moscow in 2004, the price amounted to some USD 500 per tonne), it is not always clear whether recyclables are reused by illegal producers of falsified beverage, or recycled, and whether the recycling method is safe[3] and the recovered material is properly used.

[3] Lab analyses (e.g. in North-West Russia) indicate that some recycling methods (e.g. producing plastic granules from PET-bottles collected in the streets and at dump sites, and then producing new PET-bottles from the granules) could be dangerous for human health, as the process in use to produce plastic granules and to extrude new PET-bottles does not ensure that most of pathogen microbes are killed (the temperature and the pressure are not high enough to kill the pathogen microorganisms).

Recyclables from the waste stream are often taken by "scavengers" from containers at collection points. In the 1990s, widespread poverty and large unemployment in EECCA helped to mobilize cheap labour in the shadow business of recyclables. The collected recyclables are sold to intermediaries, often operating illegally. All transfers are made in cash.

This grey business prevents a substantial proportion of valuable recyclables from reaching sorting stations, landfills or dumpsites operated by legal utilities, thus reducing the potential revenue base of legal operators and making legal business on waste sorting less attractive. On the other hand, these private activities reduce the amounts of waste that must be collected and also contribute to saving some landfill space.

Size of the market for recyclables

When implementing the FS case studies, the project teams generally failed to get any official data on the legal and shadow business of recyclables. Our own estimate is that just the aluminium part of this shadow business amounts probably to some USD 250-300 million per annum[4].

Municipal waste treatment and waste disposal infrastructure

For municipal waste which is collected but neither re-used nor recycled, landfilling prevails in EECCA, while incineration and waste-to-energy schemes are very rare. FS case studies have confirmed that, in most cases, incineration was not appropriate from the financial point of view, due to much higher costs (see Figure 4). Indeed, there is still a lot of spare and cheap land in EECCA[5] with hydro-geological conditions suitable for landfills.

This conclusion might not be applicable to mega cities: much land is required to dispose of the municipal waste generated in such cities, while the land in the suburbs is typically very expensive and spare land is scarce. Waste transportation to distant landfills can be very costly and in this situation incineration might be a more economic solution than landfilling.

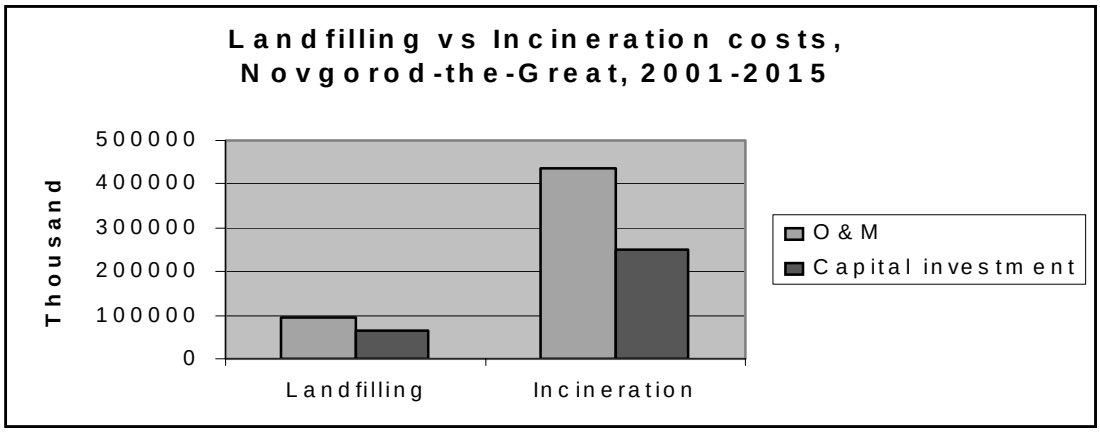
In fact, only a few waste disposal sites in EECCA meet national sanitary, construction or environmental standards. Most of the legal dumpsites were created without any master planning and design documents (often for historical reasons); documents justifying land use were prepared and approved only recently, often decades after the dumpsite appeared *de facto*.

[4] Note that the «grey» business on collecting scrap metals focuses not only on used aluminum cans but often affects negatively other sectors, most notably, the energy sector: in 1990s thousands of kilometres of operational electricity grids and distribution networks in Kazakhstan, Moldova, Russia, Ukraine were stripped of aluminium and copper wires, which were then sold as "scrap" metal.

[5] Though there always are some exceptions: e.g. the so called "normative price" for the land occupied by a second-grade forest which was assigned for a new landfill in Chudovo appeared to be equal to an average price of a non-agricultural land in Denmark. In some districts in Rostov oblast there is not much land with appropriate hydro-geological conditions for building new landfills - see (DANCEE OECD/EAP Task Force, 2003) (EC TACIS OECD/EAP Task Force, 2004).

Figure 4. Landfilling vs Incineration costs in Novgorod-the-Great

assessment for 2001-2015



Source: (DANCEE OECD, 2003)

Typical weaknesses of waste disposal sites in EECCA are:

- Lack of synthetic liners at all dump sites and lack of natural clay lining at many sites;
- Poor monitoring of the status of waste disposal sites, and no leachate control: in Yaroslavl city, leakages of leachate were identified towards the Volga river, and in Borovichi, Novgorod oblast, a municipal dumpsite polluted a groundwater source used for water supply;
- Widespread co-disposal of municipal waste together with industrial, medical and other types of waste;
- Lack of systematic soil coverage of waste;
- Absence of methane/landfill gases collection systems;
- Over-utilisation of many landfills and dump sites beyond their design capacity and lifetime.
- Poor site access control resulting in illegal and uncontrolled waste disposal activities.

The poor condition of waste disposal sites, as well as illegal dumping of waste in the environment result in soil contamination, surface and ground water and ambient air pollution, odours and landscape nuisances.

Besides, uncovered and non-compacted municipal waste at disposal sites is a nutrient medium for pathogenic organisms, such as bacteria, fungi, helminth, as well as their carriers – insects, rodents and some bird species. This generates extra risks for human health, especially for the staff working on the landfills and dumpsites - see OECD/EAP Task Force(2003), EC TACIS and OECD/EAP Task Force (2004).

FINANCING STRATEGIES

Recent experience with strategic planning for municipal waste in EECCA

Facing degradation in service quality level and increasing pressure on environment from inadequate municipal waste management, some EECCA countries and provinces have recognised the need for strategic planning and undertaken attempts to develop and implement strategic capital investment plans for the sector aimed at improving the infrastructure, the coverage and service quality level.

In the 1990s many EECCA countries (and provinces in bigger countries) tried to develop target programmes for municipal solid waste infrastructure rehabilitation and development, but failed to implement them because:

- priorities were not clearly linked to policy, and investment projects were too many ("wish lists");
- targets were not specific, measurable, agreed, realistic and time bound (SMART) and in particular expenditure needs much exceeded available finance;
- the institutional set-up was rather weak and unfavourable, creating barriers for resolving the problems faced by the sector.

As was already discussed, part of the problem was the lack of data for sound decision-making. Often, such a data-base was created and became available for regional or national government only in the course of implementing a FS case-study. In most EECCA, low capacity to prepare sound feasible plans, to finance and to implement the plans were other major reasons of the failures.

Demand for a renewed approach to strategic planning

The critical situation in the municipal waste management sector in EECCA, calls for a fundamental reform in the approach to financing environmental 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 programmes, tailored to provide appropriate operation and maintenance, essential repairs and rehabilitation of critical elements of the MW infrastructure, and building needed new elements in order to ensure cost-effectiveness, within the limits of what households and public budgets can afford.

Tough financial constraints faced by the sector are an incentive to design more efficient policies, which make the best uses of available financial resources.

Developments in the public finance sector

Developments in the public finance sector also calls for a renewed approach: as part of their endeavour to improve the cost-effectiveness of public spending and quality of budgeting, some

EECCA countries have recently opted for Medium Term Expenditure Framework (MTEF, a 3-5-year rolling budget plus related annual budgets) and for result-oriented budgeting. Implementing these approaches requires, for each sector of the economy,

- setting realistic targets for the period (e.g. achieving the MDGs on sanitation by 2015);
- an instrument to assess the expenditure needs related to achieving the targets; such an instrument should produce reliable estimates quickly and at low cost;
- a method to demonstrate the benefits of public funding (in particular for investment) in the sector (contribution to poverty reduction, to social and economic development).

Why an environmental financing strategy for municipal waste management

What is an environmental financing strategy

In the EECCA region, developing an environmental financing strategy is a process aimed to build consensus among key stakeholders on the twin issues of how to 1) achieve, and 2) finance environmental policy targets.

Key stakeholders include budgetary authorities (typically ministries of finance), ministries of economy (responsible for developing sectoral target programmes and/or investment programmes), environmental authorities (ministries of environment, or ministries of water, or agencies responsible for communal services sector: water supply and sanitation, municipal waste management etc.), municipalities, utilities (or associations of municipalities and utilities), and NGOs (environmental, consumer rights protection, etc.). These key stakeholders will have different levels and types of information and different interests in the process.

Environmental financing strategies typically utilise a decision support tool, which integrates the key interests of these stakeholders into one systematic and internally consistent (computerized) model. The decision support tool includes environmental targets, expenditure needs associated with the targets, and finance available as well as the impact on household budgets. The best decision support tools are comprehensive, yet relatively simple to use and understand and have been framed to allow the groups of key stakeholders mentioned above to express their interests when discussing: (1) the targets, (2) scenarios to achieve them, and key variables of the scenarios, and (3) packages of policy measures which need to be implemented to reach the set targets and to balance the expenditure needs with the supply of finance.

How does an environmental financing strategy work?

Environmental financing strategies have recently been developed and tested for investment - heavy environmental infrastructure. Environmental FS have been used in both EECCA countries and in EU accession countries (such as Lithuania) and candidate countries (like Turkey).

The basic approach underlying an environmental FS is to take existing public policy targets in areas like municipal waste management, or water supply and sanitation, to determine the costs and timetables of achieving them, and to compare the schedule of these expenditure needs with available sources of finance over a period of 10 to 20 years, taking into account macroeconomic and population forecasts. For EECCA countries this analysis generally reveals “financing gaps” during planned implementation.

An environmental FS can then develop alternative scenarios to determine how these gaps could be closed. This could be by: identifying policy reforms that could help achieve the targets at a lower cost; identifying ways of mobilising additional finance; adjusting the ambition level of the targets; or extending the time period for achieving the targets. The model can also help assess the potential social implications of increasing tariffs by determining the impacts of such price increases on household expenditure structure.

For EU accession countries, where targets are set by environment-related EU Directives, simulations focus on when they can be achieved.

By focusing on these issues, developing an environmental FS is more than a technical exercise: it also supports a sectoral policy 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 experience accumulated to date suggests that the FS methodology can be a useful tool for governments to develop realistic plans to achieve nationally or internationally agreed targets. Overall, FS case studies:

- Facilitate sectoral policy dialogue on setting priorities and SMART targets; they promote an important shift from discussing "needs" (still popular in EECCA) to discussing "what is technically feasible and financially affordable";

- Provide a missing link between sector policies, investment programmes and feasibility studies;

- Pave the way for external financing by providing clear and transparent data on financing requirements. E.g. the EC explicitly requests accession countries to prepare an environmental FS as a prerequisite for sustained funding of environmental infrastructure investments.

Experience with FS in the municipal waste management sector

Financing strategies for the municipal waste management sector have been recently developed in some EECCA countries and provinces, as well as in some EU accessing countries, usually with international support. Some finance strategies have been developed using the FEASIBLE tool[6], in particular in the following FS case studies:

Version 1 (stand alone Waste Module of the FEASIBLE tool, Access-based software) was applied in Bulgaria (*Vratza/Mezdra* province), Latvia (national level), Poland (*Zachodnipomorskie* province), and three provinces/subjects of the Russian Federation (*Novgorod, Yaroslavl and Rostov oblasts*).

Version 2 (Waste Module in the Delphi-based FEASIBLE tool, integrated with water supply and sanitation modules) supported case studies in Armenia (Lori and Shirak provinces/marzs), Turkey (national), three provinces/subjects of the Russian Federation (St. Petersburg, Leningrad Oblast and the Caucasus Mineral Water Region), and in Ukraine (national).

[6] The computer-based tool FEASIBLE was developed in co-operation between the EAP Task Force and Denmark, by the Danish consultancy firm COWI AS, with the financial support from the Danish government (DEPA/DANCEE) and methodological guidance from the OECD/EAP Task Force Secretariat.

Key lessons learnt from the FS case-studies in the MWM sector on challenges faced by the sector, as well as on the FS methodology and FEASIBLE tool are presented in the subsequent sections, followed by recommendations. The FEASIBLE computer model is further presented in Annex 2.

Selected outcomes of Financing Strategies in municipal waste management in EECCA

The development of environmental financing strategies in the municipal waste management sector has already triggered some significant policy changes in EECCA countries.

In Ukraine, the Financing Strategy was approved as a national sectoral policy document.

In Novgorod Oblast of the Russian Federation (OECD/DANCEE, 2003), the financing strategy for municipal 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 help generate priority capital investment projects, in several cases involving inter-municipal cooperation.

In Yaroslavl Oblast of the Russian Federation (EC TACIS and OECD, 2003), the financing strategy for municipal solid waste revealed 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 waste management services. These findings have stimulated a debate on revising areas of responsibilities of waste management companies operating e.g. in Yaroslavl city.

In Armenia recommendations of the limited FS case-study were used by the Ministry of Urban Development of the Republic of Armenia for preparing "The Concept for MSW Management in Armenia" which was submitted for review and eventual approval to the Government of the Republic of Armenia in January 2007.

In all cases, financing strategies have given rise to a number of valuable by-products, including:

- data-base for decision-making (e.g. FS case studies provided substantial input to creating such a data-base in the Department of Housing and Communal services in the Rostov Oblast regional administration, and in the Ministry of Urban Development in Armenia);

- priority investment projects in the municipal waste infrastructure, described with sufficient details for the first contact with donors and IFIs, and/or for submission for funding to the Ministry of Finance, or the Finance Department of the regional government;

- complementary priority measures, including those which would require technical assistance from donors and IFIs.

SOME CHALLENGES FOR THE MUNICIPAL WASTE SECTOR IN EECCA

The following challenges were identified in the course of the financing strategy case-studies.

The regulatory system

The FS case studies have revealed caveats in the regulatory system for municipal waste management in the EECCA region.

Service quality standards are not fully defined in the regulation adopted at the national level. On one hand, existing construction rules (*SNiPs*) define how to properly build MW landfills, while sanitary rules (*SanPiNs*) define rules for waste collection and removal services, determining regularity and setting requirements for containers and collection points, etc. But at the same time, in many EECCA no regulation defines *proper operation* of landfills. This definitely weakens enforcement capacities of sanitary and environmental inspectorates.

This is consequential for the *tariff policy*, as the tariff should ensure that expected revenues from user charges will cover costs associated with reaching a particular quality, sanitary and/or environmental standards, and with the implementation of the operational plan of an operator.

Indeed, tariff regulation in the sector is either absent or poor, usually with big gaps in the tariff setting methodology. Typically municipality are responsible for tariff setting in the sector but many of them lack capacity to develop and implement a sound methodology and procedures.

Cross subsidisation is still widespread in the sector: between consumer groups (households often enjoy lower tariffs covering only waste collection and transportation costs, while the costs of waste disposal are covered by other customers – by industries and businesses), and between activities. For instance, in Yaroslavl city, tariffs for waste collection and transportation were low compared to O&M costs, while charges for waste disposal were rather high; at the same time, a municipality-owned company was responsible for waste collection and transportation, while a private company operated the municipal landfill; the system made sure that the former was making losses, while the latter was profitable.

Environmental externalities from the sector are not internalised: in most EECCA countries and provinces where environmental FS were developed, specialised providers of environmental services (including the municipal waste management industry) do not pay pollution fees and charges.

The regulatory system definitely lacks *enforcement mechanisms* at all levels, from waste producers to service providers. The case studies have identified a number of situations where quality/environmental standards, even loosely defined, were not enforced. This generates huge opportunities for opportunistic behaviours, which result in free riding and rent seeking strategies. This diverts very significant financial resources from the MWM sector and feed the “shadow” business in the sector.

In addition, the sector lacks a number of policy instruments, such as:

- "polluter pays" principle-based user charges providing incentives for waste minimisation;
- product taxes which could finance collecting and recycling of specific waste, for instance PET-bottles, tires, lubricants, batteries and accumulators;
- ear-marking a portion of the property tax levied on households for municipal waste management, thus avoiding the need to sign contracts with each and every household (in fact, waste management companies often fail to sign such contracts);
- deposit-refund systems; this might be considered for collecting packaging waste, in particular glass, PET and metal containers[7];
- licensing to ensure quality operations.

One topical challenge for the sector in EECCA will be to design a comprehensive and coherent regulatory framework and make sure it is enforced. This concerns both the central and local levels of government. Parts of this framework refer to a wider agenda (e.g. fiscal reform, competition policy, public procurement rules).

The organisation of the sector

The scale issue

FS case studies have revealed that service areas of operators often tend to be too small. For instance, two depressed rural districts in Siberia inhabited by just 56,000 people were serviced by **27** dump sites totally occupying **81.4** ha of land, another district inhabited by 7,800 people in the same province was serviced by **22** (!) dump sites occupying **23** ha of land. Even taking into account distances in Siberia, the number of, and especially the area occupied by the dump sides in both cases look highly oversized for such a small community (some 3 ha of dump site per 1,000 people in the latter case).

Inter-municipal co-operation is usually not considered in EECCA, while the case studies have shown that, in many cases, building and operating inter-communal landfills would be more efficient than individual landfills for each municipality or settlement. The small scale of operations results in low cost-effectiveness of (usually public) both capital and current expenditure in the sector. It restrains technical options as well. On the other hand, transport distance also matters, as typically the fewer is the number of (larger) landfills the longer is the average distance from them to the settlements served by the landfills. This trade-off between the costs of building and operating the landfills and the transportation costs often results in a set of optimal options for the number and size of facilities, and their location and hence for the transport distances.

The lack of inter-municipal co-operation has been and is an issue also in many EU accession countries. In Turkey the financing strategy was instrumental in supporting a legal change which enabled inter-municipal unions to be set-up as legal institutions capable of acquiring responsibilities of municipalities in certain areas. The Ministry of Environment and Forest developed a MSW management Master plan which called for approximately 120 inter-municipal landfills in a county with 3,000 municipalities, while previously each of them had their own landfill/dumpsite. At the same time the ministry encouraged the municipalities to create solid waste management unions providing

[7] Several EU countries have deposit refund system that cover many types of containers (glass, PET, aluminium etc.)

public capital subsidies for improving (inter-municipal) waste management infrastructure to such unions in the first place.

The relationships between key players, reporting and monitoring in the sector

The relationships between local authorities and operators are usually very loose. Contracts between players are not common, and when they exist, they remain vague on the nature of the service, responsibilities and liabilities, performance indicators, sanctions and effective dispute resolution mechanisms. For instance, a FS project team found a municipality in Armenia where a private operator had an *oral* agreement with the Mayor. Needless to say, ensuring public control over oral contracts and enforcing them is a real challenge.

Companies which operate landfills often work under short-term contracts, which do not provide incentives to invest.

In EECCA, operators (be they public or private) provide MWM services in areas and for customers which have contracted them. Typically, an operator signs contracts (a) with the municipality (on street sweeping and cleansing public parks, on emptying bins installed in the streets, on waster transportation to waste recycling or waste disposal facilities, etc.[8]), (b) with other operators and utilities (e.g. a company responsible for water transportation would have a contract with the operator of a sorting station, and/or of a landfill) (c) with customers (on waste removal and/or disposal). The customers are: industries and commerce; budgetary organisations; the owner(s) of apartment buildings (often the municipality, but also condominiums), or companies managing the apartment buildings, as well as with owners of private cottages. Note that the latter is a clear departure from alternative modes of organization which prevail in OECD countries, where the utility contracts with the municipality and services all households living in the area.

The EECCA approach generates unnecessary transaction costs, has a negative impact on the provision of the service and makes regulation and enforcement more difficult (see below). For instance, operators often fail to contract with many owners of single private houses who prefer to behave as free-riders.

The relationship between service providers and final customers (waste producers) is impacted by additional difficulties:

- the public opinion is not aware of the importance of proper municipal waste management. As long as waste is not visible on the streets, and charges are acceptable, people usually do not care much about the environmental performance of the sector. Some households even refuse to contract with utilities and to pay for the service, expecting to get it for free (the free rider dilemma);

- operators sometimes misuse their monopoly power, when engaging into contracts with private businesses, especially small ones (see box 2 below).

Reporting and monitoring of the performance of contractors are poor. This is illustrated by the fact that waste disposed of at dumpsites and landfills is usually not weighed; very few facilities are equipped with weights and computers for automatic registration of trucks, and maintain data-bases on disposed waste.

[8] If the operator uses MW infrastructure owned by the municipality this could be a subject of a separate contract.

Inter alia this creates opportunities for manipulations of figures, and for rent-seeking behaviour: the municipality will not fulfil its financial obligations, while the operator will not perform as appropriate. The FS case studies have helped to reveal instances of such problems. Some examples are provided below.

Major issues to be addressed by monitoring and control are:

- the quality of operations on waste disposal sites;
- leakage control; usually, there are no wells to control groundwater quality at waste disposal sites;
- operational safety at landfills and at waste sorting stations; valuable recyclables are often sorted out by hands of poor people with little respect to sanitary rules and risks to their health;
- emissions from waste burning facilities; small incinerators are operating in some rural areas with no flue gas treatment;
- environmental performance of some recycling facilities, for instance PET-bottles recycling.

In this context, transparency (typically in the recycling business, and the operation of dump sites and landfills) and enforcement of sanitary and environmental rules, and contracts, as well as implementation of tariff policy is a real challenge. This partly explains the present capacity of the sector to attract private operators, who can enter the sector with very limited assets, and extract rent from not complying with service quality, sanitary and environmental standards.

Box 2. Instances of rent seeking behaviour

False reporting to extract rent at the expense of the public budget

Where households do not pay for waste disposal, local budgets should in theory cover related costs. The absence of weighing of waste at landfills and poor accountability in general generate opportunities to manipulate figures and to secure undue revenues from public budgets. In cases where waste is weighed, opportunities still exist to cheat about the origin of the waste: waste of similar composition could be collected from bins installed in the streets (and municipality pays to the operator for emptying them) or from containers in apartment blocks, so the operator can claim he collected and disposed the latter, and request compensation from the public budget.

Extracting rent at the expense of customers

In some cases, legal operators of landfills charge different tariffs (gate fees) to different private customers, depending on their ability and willingness to pay. In the Khanty-Mansijsk autonomous okrug in Russia, one operator refused to disclose information about the gate fee it charged (despite the existence of numerous regulators and supervisors, and of an officially approved uniform tariff), while truck drivers have complained that charges were set individually.

Misusing monopoly power when contracting with private businesses

To ensure proper package waste management the regulation adopted in one province of Russia requires that small private businesses involved in the retail business should get an environmental permit, while the environmental authority does not issue the permit without a contract between the applicant and the local MWM company (who is a local monopolist) on transportation and disposal of waste (mostly cardboard, paper and plastic package waste, but also some food waste) generated by the private business.

For the MWM company it is not economic to serve a private business if it generates too little waste, that is why the company has established certain threshold: so private business have to accept that condition and pay for the threshold while in fact many of them generate much less waste. As a result, many local small businesses in fact overpay, while the local MWM company extracts some rent from its monopoly power.

Source: own interviews with public authorities, 2002-2004

One major challenge for the sector in EECCA countries will be to reorganise the relationships between key players (typically local authorities, service providers, and households) in such a way that would:

- ensure compliance with, and effective enforcement of the sanitary and environmental standards in the municipal waste management sector;
- discourage the opportunistic and rent-seeking behaviour of the municipal waste management companies, and the free-riding behaviour of their customers;
- help mobilise sufficient finance for the sector through appropriate instruments: user charges, product taxes, local taxes (e.g. levied on real estate), etc.

The question then is whether the sector will remain attractive for private operators if compliance is properly enforced, and what policies and incentives will be needed to raise private operators' interest in the field and increase the willingness-to-pay of waste producers.

Strategic planning and management capacity

Data for decision making

The information available for decision-making in the sector is generally poor. Financial accounting and reporting is better than the reporting on the status of waste disposal sites, on waste, and on the environmental performance of waste management companies. Inventory of existing landfills and dumpsites was implemented only recently in some EECCA countries, but the collected data on the amount and composition of the accumulated waste is not precise enough (in fact, only few operators in EECCA have studied composition of the present waste inflow and continue monitoring it), while information about hydro-geological situation is usually missing. In addition, plenty of small illegal dump sites are not registered at all.

Reporting of waste generators on waste in EECCA countries is typically based on the Format 2-TP-waste (*forma 2-TP otkhody*), a legacy from the Soviet Union (with small adjustments made after 1991 in some countries). The problem with it was that initially only big industries had to report, while most of other industries and commercial and budgetary organizations were not covered by the reporting system at all[9]. So, data accumulated based on the reports is far from full and present the picture mostly in the industrial waste rather than in the municipal waste management sector. Moreover, information often remains at the local level, and fails to reach decision-makers at regional and national level.

Financial data, especially on the public expenditure for the MWM sector, often is not easily available: such expenditures are typically hidden under different budget lines and it is a challenge to identify and consolidate the figures. If an operator is a multi-purpose utility providing also other communal services, which is often the case in small municipalities in some EECCA, then collecting correct cost data is often a problem, as soon as accounting might be poor and rules applied for apportioning fixed costs of the utility between different activities can be rather arbitrary.

Strategic planning by public authorities

Many countries and provinces in EECCA have for years prepared so-called "strategic plans". However, these planning exercises were typically driven by wish lists presented by lower levels of governance, and ambitions of top decision-makers, rather than represented a planning approach based on evaluating how policies can be implemented given the "facts on the ground" and the available resources. In particular, the Soviet-style planning showed a disregard for accurate data collection and interpretation. As a result, the quality of such a planning was - and in many places still is - poor.

Lack of reliable data often results in investment errors and in sub-optimal solutions, *e.g.* regarding the number and capacity of landfills. For instance, one municipality in Siberia had planned and then built a new landfill which was assumed to be in use for 20 years; but this facility was eventually overloaded in some 5 years. This resulted from decisions made on the basis of poor data and wrong assumptions on waste generation (KhMAO, 2004).

Financial sections of existing strategic plans were found very weak and declarative: actual financing of capital investments anticipated in the plans seldom exceeded 10% of the planned figure confirming that the targets set in the strategic plans were not realistic.

[9] Recently some EECCA countries extended the reporting system to medium size industries, commercial and budgetary organisations. In some provinces (e.g. in Novgorod oblast of Russia) the number of reporting entities may have increased by the factor of 10.

The potential benefits of inter-municipal co-operation are usually neglected in such plans, thus increasing demand for capital and current expenditure. For instance, the draft investment plan in Novgorod oblast initially anticipated rehabilitation and construction of 21 new landfills, while the financing strategy has established that the construction of 9 new, inter-communal landfills would provide a quality service for a lower cost. Appreciation of the benefits of inter-municipal co-operation will require incentives at the municipal level, and an improved regulatory framework to create them.

Financial planning by utilities

Many MWM companies also perform poorly, as regards financial planning. This in part results from the huge uncertainties on future tariffs, lack of financing from public budgets, and generally poor data-base for decision making.

The poor status of the infrastructure (including deteriorated fleet and sub-optimal logistics) increases costs, while low efficiency of collection of user charges and payables (due to MWM companies) accumulated by local public budgets undermines the revenues of utilities.

Management capacity

Very few universities and colleges in EECCA train engineers, economists and managers for the municipal waste management industry. Moreover, even if there are people with sufficient technical skills, the sector generally lacks experts in institutional, legal and governance issues, and in economics of the sector who know how to properly design contracts, how to implement tariff policy, etc. Capacity building is therefore one of the most important tasks faced by the sector.

The financial issue

Low revenues from user charges

Tariff rates set for households are usually low, covering just operational costs related to waste collection and transportation, but not costs related to waste disposal[10]. For instance, in 2001 in Rostov-on-Don City revenues of the local MWM company from providing service to urban population amounted to just some EUR 2 per capita per year. And that was typical for most EECCA.

Tariff rates are low, not least because local authorities tend to overestimate the affordability problem. Though the FS case studies have established that affordability is not a major issue for municipal waste management in most settlements in EECCA, except in depressed areas (including rural areas) and for certain proportion of the poorest households. The households' ability to pay is much less constraining than, say, in the water supply and sanitation sector.

[10] In 2002 in Leningrad oblast the gate fee amounted to 35-65 RUR/m^3 (1-1.9 EUR/ m^3) depending on landfill/dumpsite, and the cost of disposal household waste was supposed to be covered from the public budget.

Table 7. Average share of expenses for household waste service

as per cent of total household consumer expenditures, Rostov oblast, 2002

	Average value for a household of average size (2.8 people)
consumer expenditures, RUR/year	91 157
in that: payments for household waste services, RUR/year	172
payments for household waste services in percent of consumer expenditures	0,19%

Source: EC TACIS OECD/EAP Task Force, 2004

In 2003, in Lori and Shirak marzes in Armenia, household expenses for the service amounted to some 0.37% of total consumer expenditure, while in Leningrad oblast of Russia it amounted to 0.35% (same year). These average figures should be compared with the affordability limits suggested by the World Bank for low-middle income countries (0.75% - 1.7% of the average household income[11]).

Despite a low burden on households, in some EECCA provinces household tariffs are nevertheless heavily cross-subsidised by higher tariff for other consumers (typically, industry and commerce), or subsidized from the public budget.

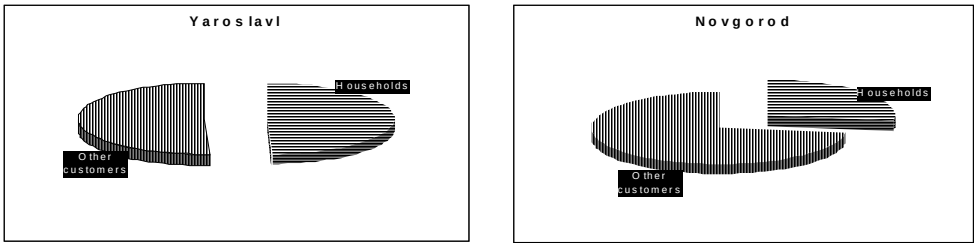
But affordability is an issue also for the public budget and industries and commerce, and a big or an increasing number of illegal waste disposal sites located aside the road(s) to a MW landfill can signal about high, non-affordable tariffs charged by the landfill to industrial and commercial customers, some of which would prefer to pay pollution fines (if they are caught) rather then the tariffs.

In addition to low tariffs, billing and collection mechanisms are also sub-optimal. User charges collection efficiency is often low in EECCA, varying from as low as 41% in Lori *marz* (region) in Armenia to reasonably good 90-96% in Leningrad, Novgorod and Rostov provinces of Russia.

As a result of both subsidised tariffs and poor collection, in some EECCA provinces the population contributed less than 50% of user charges revenues of waste management companies (see Figure 5 below), although it was the major contributor to municipal waste generation (in FS case studies the share of households in MW generation varied from some 53 percent of total in Rostov oblast, to 86-90+ percent in Novgorod oblast of Russia, and in Armenia).

[11] S Cointreau-Levine (1994), Private Sector Participation in Municipal Solid Waste Services in Developing Countries. Volume 1 - The Formal Sector. UMP Technical Paper, No. 13. The World Bank, Washington. ISBN 0-8213-2825-5

Figure 5. Share of total user charges paid by households in Yaroslavl and Novgorod oblasts, 2001

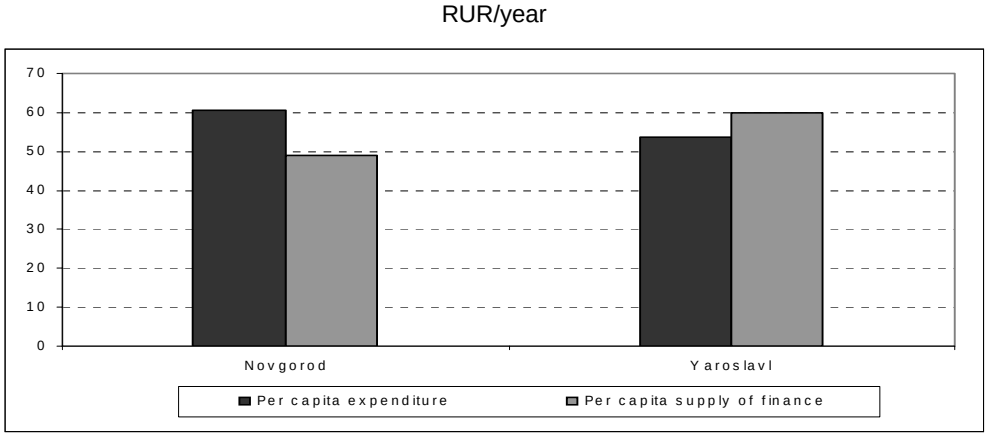


Note: other consumers are: industries, commerce and budgetary organisations

Source : OECD/EAP Task Force, 2003

The FS case-studies in Novgorod and Yaroslavl oblast have indicated that the more tariffs for household are subsidised, the worse the financial position of the MWM sector is (see Figure 6).

Figure 6. Per capita expenditure needs and supply of finance for the baseline scenario



Source: OECD/EAP Task Force, 2003

This charge of 50-60 RUR (some 1.5-2 EUR) per capita per year in Yaroslavl and Novgorod oblasts of Russia needs to be compared to 120-125 EUR (and up to 150-155 EUR) per capita per year which has to be charged in Latvia if to comply with EU Directives on municipal waste.

Low allocations from the public budget for the MWM sector

The budgetary statistics confirms that, as was already stated above, despite all potential benefits from sound MW management, the MWM sector is generally low on the socio-economic policy agenda in EECCA countries and provinces. In absolute terms the budgetary allocations for the MWM sector varies from zero in some provinces, to as low as 0.7 euro per annum per capita covered by the service in Lori marz in Armenia, and 1.4 euro per annum per capita in Leningrad oblast of Russia. Even in richer EECCA provinces public funding for the sector seldom exceeds 1% of the public expenditure budget and 0.1-0.2% of GDP/GRP (see tables 8 and 9).

Table 8. Allocations from the public budget for the MW management sector

in Rostov oblast, 2001

	In million RUR	% of budget expenditures	% of GRP
Public budget revenues, total	19,760	100%	20%
Public budget expenditures, total:	20,188	100%	20%
Current	16,958	84%	16.8%
Capital	3,230	16%	3.2%
Expenses for MW management sector, total:	104.5	0.52%	0.1%
Current	103.3	0.51%	0.1%
Capital	1.2	0.006%	0.0%

Source: Ministry of Finances of Rostov oblast and MW management utilities, 2001

Table 9. Allocations from the public budget for financing of MW management sector

in Leningrad oblast, 2001

	In million RUR	% of public expenditures	% of GRP
GRP	80,500		
Public Budget Expenditures	15,162	100%	19%
Public budget expenditures for MWM sector	166	1.1%	0.2%
Current expenditures	136	0.9%	0.18%

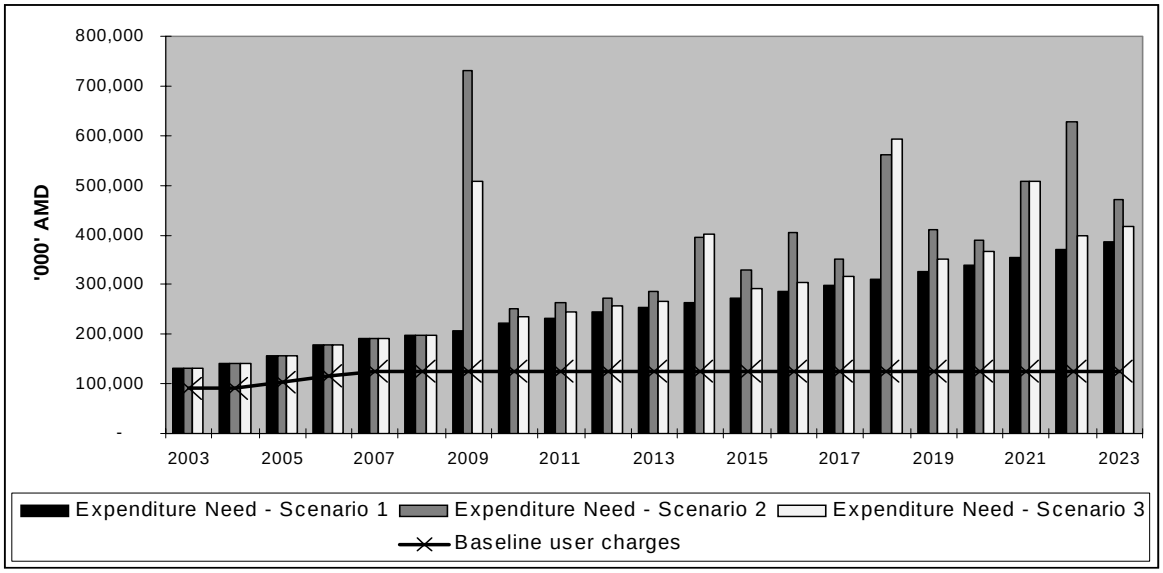
Source: DANCEE, 2004

In addition, as illustrated in the tables, most of the public expenditure is for current expenditure, typically used to subsidize the cost of collection and disposal of household waste. As a result of the lack of capital expenditure, stemming from tariffs and public budgets, needed facilities are not established and existing facilities are not maintained properly, resulting in the weaknesses described above.

Figure 7 below presents a picture typical for many EECCA provinces with the financing gap increasing over time in line with waste generation growth which in turn generates higher transport costs and demand for new waste disposal sites - the “peaks” on the figure indicate the demand for financing capital investment in years when new landfills (or new sections at existing landfills) would have to be constructed.

Figure 7. Comparison of expenditure needs for Scenarios 1,2, 3 with the baseline supply of finance in marz Shirak in Armenia

in 000' AMD



Note: Scenario 1 was a typical "business as usual" scenario anticipating only some increase in coverage by the service to collect more revenues. Scenario 2 anticipated construction of new landfills when the capacity of existing dumpsites is expired, while Scenario 3 anticipates construction of a fewer number of inter-municipal landfills.

Source: (OECD/EAP Task Force and MUD RA, 2006)

Financial status of MWM companies

The revenues of MWM companies - even when enough to cover current cash flow - are not enough to finance: (a) **proper operations** in compliance with the effective sanitary and environmental standards, **and proper maintenance** of existing infrastructure and the fleet of trucks, and (b) **capital investment**, including building new landfills or new sections at existing landfills after the previous ones were fully loaded, for replacing deteriorated trucks, etc.

MWM companies have some flexibility to adjust their cost (and the service level) to the finance available. For instance, they can "save" money not properly operating municipal waste disposal sites. FS case-studies have revealed several cases where disposal sites designed and built as landfills have been so poorly operated afterward (due to the lack of financing and/or enforcement) that they have become ordinary dump sites.

MWM companies also have opportunities to finance one activity, for instance the street sweeping under-funded from the public budget at the expense of revenues earned in another activity, e.g. by charging higher gate fee to private businesses disposing their waste at the municipal landfill. So, aggregated figures in the financial statements often mask a very uneven financing of different activities, compared to the expenditure needs.

That hidden cross-subsidisation between activities makes the sector financing opaque. But it becomes visible when areas of responsibilities of a MWM company (companies) are revised.

Yaroslavl City provides a good example: after limiting the responsibility of the MWM company owned by the city to just cleansing streets, collecting municipal waste and delivering the waste to a waste disposal site, while inviting another company to operate the disposal side and collect related waste disposal charges, the former company (owned by the city) faced substantial cash flow deficit, though before, being a kind of "vertically-integrated MWM company" it had enough revenues to finance its operations.

Options to generate additional revenues in the sector

Governments should not finance all or most expenditure, or sponsor all or most projects in the MWM sector. Relying exclusively or mainly on the public budget (which has been generally weak in most EECCA) to finance operational and maintenance costs of the MW infrastructure is not a sustainable solution. In light of public budget constraints there is a need for users to pay at least the full cost of operations and maintenance, while 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 mobilised in a complementary and cost-effective way.

The FS case studies have established that there is room for increasing tariff rates to the affordability limit, as well as for improving collection efficiency. A requisite will be the adaptation of the appropriate tariff structure and user charges collection mechanisms.

The FS case studies have also confirmed that low quality of services affects the willingness-to-pay and collection efficiency, but they would be improved when the quality of the service improves.

Experience from other sectors (water supply and sanitation) indicates that there is little sense to increase tariffs before the collection efficiency is improved; while good collection efficiency can help improve financial health of the sector very fast.

Revenues from sales of recyclables could also play a bigger role in the picture. This requires that at least part of the "shadow" business is shifted into a legal business. This would help strengthen the financial position of legal waste management companies.

Finally, mechanisms provided by the Kyoto protocol (see Annex 3), as well as other innovative financial instruments should also be considered.

KEY RECOMMENDATIONS

The critical situation of the municipal waste management sector in EECCA calls for a fundamental reform in the approach to financing infrastructure and the associated policy and institutional arrangements. The experience accumulated to date suggests that FS methodology can be a useful tool for governments to develop realistic plans to achieve nationally or internationally agreed targets in the sector. This chapter looks at the recommendations based on the major findings and lessons learnt from the FS case-studies implemented so far in a number of countries and regions.

First, key policy recommendations that are believed to be generic to the EECCA region are presented. Second, key issues which should be addressed in a financing strategy are listed; further suggestions for the adaptation of the methodology are presented in Annex 1. Third, two examples are documented where these generic recommendations have steered concrete financing strategies both of which have received policy level approval (Armenia; Rostov oblast, Russia).

Policy recommendations

Policies for waste avoidance, minimisation and recycling

In all case studies, municipal waste generation is growing at least as fast as the economy. This suggests that EECCA governments have mostly failed to design and implement effective measures to minimise municipal waste generation.

Waste prevention is the preferred option. The OECD is developing tools and analyses that assist member countries in minimising waste. This is being done through two initiatives:

- work on waste prevention to develop international performance indicators, and evaluate economic incentives; in recognition of the multi-faceted and often poorly understood nature of waste prevention, the OECD has published a reference manual on strategic waste prevention (OECD, 2000). The reference manual provides guidance to those public authorities that have chosen to design, implement and improve waste prevention policy programmes;

- undertake an analysis of market failures and barriers in markets for secondary materials and identify ways to improve their efficiency. It is often argued that markets for secondary materials are characterised by widespread failures and inefficiencies, leading to sub-optimal recycling rates. Indeed, in some cases the removal of non-environmental market failures can be a more cost-effective means of meeting environmental objectives than the direct application of targeted environmental policies. For instance, efforts to increased collection rates for recyclable and reusable materials may be ineffective in the presence of important failures in the downstream markets for secondary materials (see box below).

Box 3. OECD programme of work on markets for secondary materials

OECD has launched a programme of work, to suggest means to make the functioning of recycling markets more efficient. The first step has been to identify the sources of market failure and inefficiency in secondary material markets, at domestic as well as international level, and the second step, to find out the best means for their removal. In doing so, it is hoped that complementary environmental and economic objectives will be realised.

A number of barriers that affect the markets for secondary materials, have already been identified:

- Information failures related to uncertainty about the quality of waste which is potentially recyclable or reusable;
- Preference failures related to misunderstandings about the potential applicability of particular secondary materials in downstream uses;
- Policy failures which affect the extent to which secondary materials are able to capture markets (i.e. subsidies for primary materials);
- Uncertainty in secondary material markets due to a lack of clear direction in policy, which can discourage investments in collection, sorting and processing facilities;
- Price volatility of secondary materials;
- Transaction and search costs which all discourage initial investments and hamper market development; and,
- Learning curves concerning both upstream separators and processors, as well as downstream users of secondary materials.

A range of effective policies have been developed to address specific problems. Encouraging ever-higher recycling rates in an imperfect market may impose very high social welfare costs. In such cases, it may be less costly to address the imperfection within the market, than to try and bring about increased recycling rates through increasingly ambitious recycling programmes. Relevant public policies include:

- *Search costs*: To disseminate information to potential market participants (supply and demand), web exchanges to reduce costs of identification of market counterparts;
- *Transaction costs*: To develop standardized contracts, waste quality grading schemes for heterogeneous materials, establish dispute resolution mechanisms;
- *Information failure*: To introduce certification schemes, support for testing equipment, public procurement programmes, liability for product misrepresentation, establish dispute resolution mechanisms;
- *Consumption externalities*: To carry out demonstration projects, put in place public procurement programmes, disseminate information about product characteristics;
- *Technological externalities*: To implement extended producer responsibility, R&D on “design-for-recycling”, to develop product standards which incorporate impacts upon recyclability;
- *Market power*: To introduce and maintain general competition and anti-monopoly policies, market regulation of collecting and processing which ensures competitive demand.

Such policies can effectively complement more traditional recycling policies.

An appropriate legal and regulatory framework

Consider appropriate instrument mixes

As was discussed in previous sections of the report, EECCA countries are still lacking some policy instruments to design and implement policies on municipal waste management. When introducing such new instruments they may use experience from OECD countries which have tested and applied a variety of policy mixes. The instruments, including tariffs and taxes, should help raise sufficient financing for the sector, but even more importantly, should create right incentives.

Tariff policy in particular would benefit from the following considerations:

- transition from waste generation norm to volume/weight-based billing, supported by an appropriate tariff structure;

- preventing operators from rent extraction, including by internalising externalities, both negative (pollution fees and charges) and positive, and by setting uniform tariffs.

Tariff should be based on expenditure needs, taking into account the approved capital investment and/or operational plan(s), and affordability constraints.

Box 4. Tax on landfilling in use in OECD countries

Different models of tax on landfilling are in use in OECD countries:

- On the total amount being landfilled,

- With rate differentiation between types of disposed waste, or according to the environmental standards of the landfill (based on whether the site has a leakage protection system, a gas collection system, etc.).

In addition, there is a diversity of methods used by municipalities to tax households, on the basis of:

- the weight or volume of waste collected,

- the number of persons in the household,

- the size of the house, etc.

The best mixes depend on the policy objectives and, of course, on the capacity of the government and local authorities to enforce them.

Source: OECD, 2005a

Co-ordinate plans and promote inter-municipal co-operation

The status and financial situation of EECCA local authorities urge them to co-ordinate their investment plans with the upper levels of government. At the same time, co-ordination with neighbouring municipalities often brings savings, and can make local authorities less dependent on intergovernmental transfers.

This calls for co-ordination of plans and investment decisions between the municipalities and with upper-level jurisdictions. As was stated in previous sections, inter-municipal co-operation helps utilise the economies of scale and reduce unit costs and tariffs, as well as financial costs of borrowing, thus making the service more affordable for the poor. So, inter-municipal co-operation should be encouraged by national governments. Obstacles for such co-operation are of different nature (institutional, inter-personal relations of decision-makers, etc.), but upper levels of government can create strong incentives (e.g. by setting co-operation of municipalities as a pre-condition for providing them support from the state budget - see the case of Turkey above).

Appropriate business models and contractual relations with service providers

This entails:

- Defining responsibilities of all parties (standard agreements could be helpful);
- Defining appropriate and sufficiently large service areas to ensure profitability of the business and allow initiatives regarding alternative technological and organisational choices;
- Setting up sound regulation (including tariffs) discouraging rent seeking behavior;
- Developing accountability on service provision and performance.

In addition, contracts with service providers should include incentives to perform well and to contribute to the overall environmental objectives.

Considerable work has been undertaken in the OECD and elsewhere on the environmental benefits of providing economic incentives for households, commercial establishments and industrial facilities to reduce their waste generation. Evidence indicates that unit-based waste fees, advance disposal fees and other measures can bring about significant reductions in waste generated. However, due to the growing use of private firms in the collection, treatment, and disposal of municipal waste, it may no longer be sufficient to ensure that only the waste generators themselves face appropriate incentives. Indeed traditional contracts do not tend to support waste reduction efforts.

A new approach to waste management contracts is required for getting environmental benefits of providing economic incentives for waste generators to reduce waste generation. Contracts between the responsible authorities and private service providers should be designed in such a way that reinforces the waste generator's incentives to reduce waste at source[12]. The conceptual framework developed for performance contracting requires local public authorities to outline clear responsibilities and opportunities for waste minimisation, coupled with economic incentives for private companies to participate in performance contracts.

[12] OECD, 2004, Waste Contract Design and Management for Enhanced Waste Minimization

The development and implementation of performance contracting programmes are strongly affected by the availability of reliable data on the baseline waste generation, composition, and recycling rates. Experienced service providers might be invited to offer ideas about the types of incentives that are attractive.

The immediate benefits from performance contracting arise from improved recycling rates and implementation of new recycling schemes covering more materials.

Promote competition in the sector

Granting contracts through properly organized tenders with consistent and transparent criteria would help to put and maintain competition pressure on existing operators and potential new comers. However competition is useless unless services and standards are precisely defined, capital investment plans are taken into account and compliance is thoroughly monitored and enforced.

Enforce contracts and regulations

The FS case studies include many examples of contracts which have been established based on an understanding of one service level, but where the contract is not enforced and another (lower) service level is provided. This has contributed to making parts of the MWM sector attractive for private operators in EECCA countries while not contributing to environmentally sound waste management as much as planned.

Specific local issues

As mentioned above, issues related to optimisation of logistics, servicing of rural areas, local incentives to comply with agreements and local incentives for recycling also need to be addressed. However, these issues are very local and site-specific in nature and no general recommendations will be given here.

Complementary measures

- Assign higher priority to the sector on the socio-economic policy agenda;
- Improve data-base for decision making and create sector development planning system;
- Build administrative and managerial capacity in local governments and operators; developing standard design and operational manuals, providing methodological support (tariff setting methodologies, standard tender documents and contracts, etc.), as well as training of local government staff and company managers;
- Build strong and well-targeted social support system, to support sound tariff policy;
- Develop public information and public awareness campaigns, and public participation, to avoid political resistance and improve willingness-to-pay.

Drawing up a finance strategy for the MWM sector

National and regional plans

Even where municipalities are responsible for municipal waste management and the costs of the sector are mostly local, benefits from sound municipal waste management are often regional or national. For that reason MWM sector planning at national and regional level is critically important. This involves both Master planning and developing a feasible financing strategy for the sector.

Based on the case studies implemented so far, a national financing strategy for municipal waste management should deal with the following issues:

- identification of sector development objectives and priorities. This includes the definition of standards for construction of waste infrastructure, and sanitary norms and rules, as well as environmental standards related to the MWM sector. It should be noted that EECCA countries are not constrained by EU directives, as are EU accessing countries; i*nter alia* this implies that they can set targets that are affordable (but will not get the support of EU structural funds).

- the waste hierarchy (waste avoidance, minimisation, recycling, reuse and proper disposal) and consider a proper policy mix for the entire hierarchy;

- provision of a legal and regulatory framework allowing for an appropriate mix of economic instruments (taxes, fees and charges) and administrative instruments (licensing, contracting, compliance enforcement, etc.), as well as the possibilities and incentives for inter-municipal co-operation and competition within the sector, where appropriate;

- affordability, and financing of the strategy.

At the regional and local level a municipal waste management strategy should explore alternative scenarios with reference to:

- the national waste management plan and the objectives and service level requirements stated herein;

- appropriate business model(s) (definition of service areas, inter-municipal co-operation, technology choices and logistics);

- options for infrastructure and logistics optimisation (location, number and capacity of containers, transfer stations, landfills, optimal routes and regularity of collection, etc.)

- the specific issue of servicing rural areas and affordability in these areas;

- incentives for operators to comply with norms and standards;

- sources and instruments to attract additional finance (tariff policies, intergovernmental transfers, local financial markets[13], proceeds from recyclables, multilateral and bilateral donors, mechanisms under Kyoto protocol (see Annex 3), etc.).

Instances of targets for development scenarios

The following concrete quantitative targets should *inter alia* be considered and assessed when setting SMART targets for a feasible financing strategy (DANCEE OECD/EAP Task Force, 2003):

- Full coverage by waste collection service in urban and semi-urban areas achieved by year XX.

- Coverage by waste collection service in rural areas increased by PP% by year XX.

- All illegal dumpsites properly closed and rehabilitated by year XX.

- All authorised dumpsites either properly closed and rehabilitated, or upgraded to the level of licensed landfills by year XX.

- New inter-municipal landfills with capacity VV, WW … tones located at … are built by year XX, year YY.., respectively.

- Appropriate recycling systems (systems must be specified: e.g. number and types of collection points, use of recycling stations, etc.) established in all urban areas with population exceeding NN inhabitants by year XX).

- Targets for specific waste streams containing recovery/recycling targets and or preferred treatment/disposal options to be achieved for XX% of the waste fraction in question by year YY, e.g. construction & demolition waste, packaging waste (paper, cardboard etc.), batteries, WEEE etc.

- User tariffs providing full recovery of all operational costs of the waste management system introduced by year XX and additional user tariffs providing full recovery of capital costs (by allowing profit making earmarked for investments) introduced by year YY.

- Current organisational set-up evaluated and assessed by year XX and agreed proposals for changes implemented by year YY.

- Investigation of possibilities for inter-municipal cooperation and increased involvement of the private sector performed by year XX together with plan for recommended actions to be taken.

- Information campaigns targeted at the various economic sectors (e.g. households, public and private institutions, commercial enterprises etc.) and the public in general carried out by year XX.

[13] See OECD/EAP Task Force reports on Local Capital Markets for Environmental Infrastructure (2006), Intergovernmental Transfers for Environmental Infrastructure (2006)

Note that this set of recommendations specifically addresses recycling and the need for proper disposal and treatment of waste. However, incineration is not considered an appropriate option. This reflects that incineration is usually not cost-effective where land with a proper location and hydro-geological conditions is available for landfills. EECCA countries are much more sparsely populated than EU countries and they typically have landfills as a more economic and viable option, whereas EU countries such as e.g. Denmark and Germany have difficulties to find appropriate sites.

Development scenarios for municipal waste management - selected examples

In this section, features of development scenarios elaborated in the framework of FS case studies in Armenia and Rostov province (*oblast*) of Russia are presented. Simulations were made using FEASIBLE computer model. Note that in both scenarios revenues from sale of recyclables were not taken into account, mostly because reliable data was not available, but also because it is very difficult to predict respective revenues due to high volatility of prices for recyclables.

Development scenario with inter-municipal co-operation in Armenia

Table 10 indicates the main features of a development scenario based on inter-municipal cooperation in two Armenian marzes. Table 11 presents the associated assumptions on tariffs and assessment of their affordability. Figure 8 presents the results of the simulation (using FEASIBLE computer model) on the cash flow gap for municipal waste management.

It follows that this scenario could help bridge the existing O&M financing gap in the MWM sector in Lori marz of Armenia and would even generate some surplus for capital investment.

Table 10. Development scenario with inter-municipal co-operation

Lori and Shirak marzes, Armenia

Marz	Coverage	Collection system	Waste disposal infrastructure
Lori	Private houses: increase from 51,5% to 84,2% by 2012 Apartment blocks: increase from 53,5% to 85,1% by 2010 Commerce and industrial enterprises: 100%	2003-2023: conventional collection system, disposal at landfills and dumpsites	Gradual replacement of existing dumpsites with new landfills: Alaverdi – by 2010 a new landfill with 200 th.t capacity will be constructed (for disposal of waste also from Akhtala and Toumanyan cities) Vanadzor – by 2008 a new landfill with 1.5 Mt capacity will be constructed for disposal of waste also from Spitak city Stepanavan – by 2006 a new landfill with 200 th.t capacity will be constructed for disposal of waste also from Tashircity
Shirak	Private houses: increase from 61,2% to 78,1% by 2012 Apartment blocks: increase from 62,9% to 82,9% by 2010 Commerce and industrial enterprises: 100%	2003-2023: conventional collection system, disposal at landfills and dumpsites	Gradual replacement of existing dumpsites with new landfills: Gumry - by 2009 a new landfill with 1.5 Mt capacity will be constructed, sufficient for disposal of 100% waste also from Artic, Maralik, Akhouryan cities.

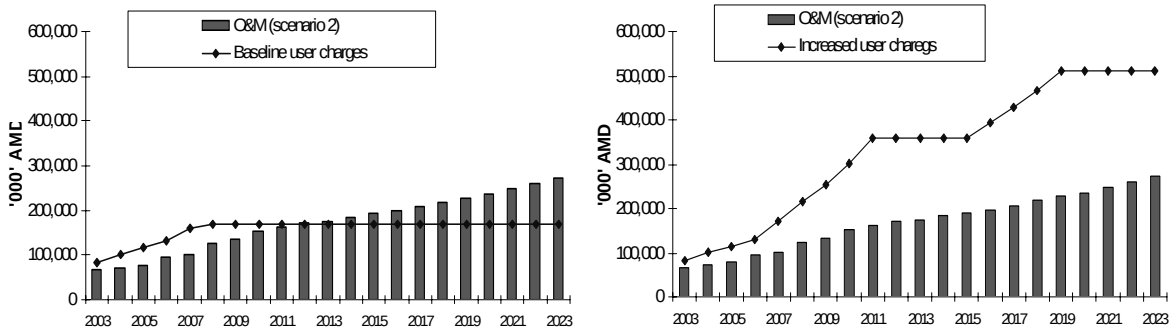
Source : OECD/EAP Task Force MUD RA, 2006

Table 11. Assumptions on the tariff increase for households in Lori marz, Armenia

Tariff increase	Affordability for households
Tariff increase by : - 20% per year until 2011* - 10% per year from 2016 to 2019	Charges for household waste collection and disposal in 2011 reaches 0.95% of total household expenses. This share will slightly decrease to 0.90% by 2019

Note: no need for tariff increase in 2012-2014
Source : OECD/EAP Task Force MUD RA, 2006

Figure 8. Tariff scenario and improved coverage of O&M expenditure needs in Lori marz



Note: surplus could and should be used to cover capital costs
Source : OECD/EAP Task Force MUD RA, 2006

Development scenario with inter-municipal co-operation in Rostov oblast, Russia

Table 12 presents the main features of a development scenario based on inter-municipal cooperation in Rostov oblast, Russia. Figure 9 compares the cash flow gap for municipal waste management in the Business-as-usual Scenario and in the Development Scenario with inter-municipal cooperation of medium-sized cities in Rostov oblast over 2001-2015.

Table 12. Inter-municipal co-operation scenario

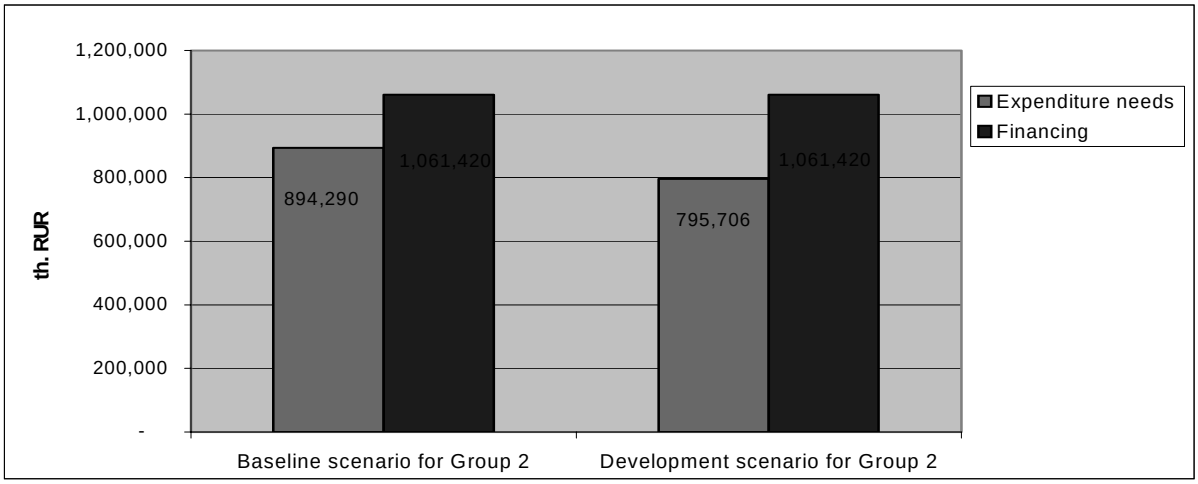
Planned commissioning of new facilities for municipal wastes disposal over 2001-2015

Co-operating Cities (Group 2)	**Planned rehabilitation of existing MW dump sites and construction of new inter-municipal landfills**	**Distance from cooperating cities to the new inter-municipal landfill, km**	
		Average	**Weighted average**
Tsimlyansk	Till 2004 - the existing waste disposal facilities, from 2005 – a new inter-municipal landfill with capacity of 3,326 th.t near Tsimlyansk	5 km	18
Volgodonsk		20 km	
Azov	Till 2003 - the existing waste disposal facilities, from 2004 – a new inter-municipal landfill with capacity of 12,445 th.t near Bataysk	30 km	22
Bataysk		5 km	
Goukovo	Till 2006 - the existing waste disposal facilities, from 2007 – a new inter-municipal landfill with capacity of 18,705 th.t near Krasny Soulin	33 km	26
Novoshakhtinsk		34 km	
Shakhty		27 km	
Krasny Soulin		19 km	

Note: th.t. – thousand tonnes;
Source : EC TACIS OECD, 2004

Figure 9. Cash flow gaps in two alternative scenarios for municipal waste management

Rostov oblast, Russia, over 2001-2015



Source: EC TACIS OECD, 2004

In this development scenario allocations from the public budget for the MWM sector in Rostov oblast were anticipated at the level of the base year (0.1% of GRP or 0.5% of total public expenditures in the oblast), growing at 5% per annum - in line with GRP growth. The FS case-study has revealed that inter-municipal co-operation would bring savings amounting to some RUR 100 million over the period of strategy implementation compared to an alternative scenario which anticipates construction of an individual landfill for each municipality in question; of which some RUR 66 million (USD 2.2 million) would be saved on capital expenditure.

Implementing a finance strategy

Implementation is a challenge in most EECCA countries, even for a good strategy. Experience from both EECCA and EU accession countries suggests that for successful implementation, it is pivotal to integrate the financing strategy into the budgetary process. On the one hand experience confirms that such an anchoring process makes the request for funding from line ministries to the Ministry of Finance more convincing and may simply be necessary in order to secure appropriate levels of finance. It also raises donors' attention to the investment plan, demonstrating a coherent approach and a stronger political commitment. In fact, for EU accession countries, it has become a requirement to access structural funds for the MWM sector.

At the national level the medium term expenditure framework (MTEF) (or similar instrument) is the most appropriate vehicle. For international finance, the financing strategy may additionally be integrated into overarching strategy papers such as the poverty reduction strategy papers (PRSP) promoted by the World Bank in low-middle income countries, or a socio-economic development strategy, or a medium to long-term sectoral development programme in a richer country. The recurrent revision of these framework documents provides an opportunity to update the finance strategies and to anchor them into the programmes of work of the line ministries, municipalities and utilities.

Other key success factors include:

- ownership of local stakeholders and local communities, and assignment of an appropriate government agency responsible for implementing the strategy, with sufficient managerial capacity; and

- implementation of complementary policy measures (legal, institutional, etc.) from the policy package suggested by the strategy– this typically involves many players in the central government, as well as at local level (municipalities, operators etc.).

ANNEXES

Annex 1. Adaptation of the methodology

Assessing the FS methodology

Perceptions of stakeholders and outcomes of financing strategies

The FS case studies implemented so far helped to increase sector profile on the national/regional political agenda, provided substantial valuable input to national/regional Master plans for municipal waste management, and in several cases helped attract donors' attention.

The key challenge in the case studies has been the ability to organise a productive policy dialogue, involving not only utilities, environmental authorities and local experts, but also key budgetary decision-makers. The starting point for the FS case study is important in addressing this challenge. If the FS case-study is perceived mainly as a merely environmental or a technical financial modelling exercise, it may not help to change the status of the waste sector on the policy agenda. But if it is seen as an exercise which will help improve service quality and the infrastructure through making available sufficient financial resources, such a case-study would have a greater chance for success. Probably for this reason the case studies carried out in EU accession countries at the appropriate time have tended to be more successful than the case-studies in EECCA in this respect[14].

It is therefore essential that the FS case studies be not a technical exercise but rather a process involving key decision makers, while its outputs are not only reports suggesting a feasible financing strategy supported by calculations and comparing alternative scenarios, but also policy and management decisions which would promote or even ensure the strategy implementation.

Challenges related to implementation

Longer-term outcomes from the FS case studies have been uneven so far, especially regarding implementation. There have been success stories. For instance, the strategy developed in Novgorod oblast is being implemented successfully with minor deviations from the suggested scenario. Deviations are mostly related to deadlines and to suggested options for inter-municipal co-operation: only two of them have been utilised, while in few other cases municipalities preferred to build new landfills individually.

[14] An environmental financing strategy carried out in Lithuania was seen as instrumental in ensuring ISPA funds to the country and was quite successful in engaging budgetary authorities in a policy dialogue. In Turkey, the financing strategy was also linked to EU funds and had a major impact on the national waste management policies. In contrast, in Latvia the case study was carried out at the time when political commitments regarding the MWM sector and the funding hereof related to EU accession had been already made. The financing strategy case-study there had a limited policy impact.

However, in general, a sound, integrated approach to implementing financing strategies in the MWM sector needs to be developed. Experience from the water supply and sanitation sector, where such an approach has been recently developed and pilot-tested could be used.

Other methodological challenges

General and country/province specific objectives were achieved in all case studies, though all of them faced a number of challenges.

One of them relates to data availability and quality. All studies required an intensive data collection, supplementary to what was available from statistics. Data often was either of poor quality or just missing, and was substituted by expert estimates (e.g. on waste composition, inventory of existing landfills and dump sites) and "guesstimates" (e.g. on amount of waste accumulated at some waste disposal sites).

Lessons on FS Methodology learnt from the case studies

As the result of a number of case studies, the FS methodology has been further developed. Particular attention is now paid to the following steps:

1. Organisation of a structured sectoral policy dialogue with local stakeholders at the national and local level, involving also their international partners where appropriate. This includes:

   – Identification of local and international stakeholders and engaging them into the FS project;

   – In-depth study and discussion of the present situation in the sector, its priorities and development targets;

   – Discussion of, and consensus building on the targets, scenarios and policy packages which would help to implement them. Agreement on priority investments anticipated by the selected scenario;

2. Appointment of an implementing agency, which will be in charge of coordinating and monitoring the implementation of the national/regional strategy;

3. Translating the scenario into a package of measures and investment projects (usually involving also preparation of few priority project concepts for the first contact with donors and IFIs), ranking them and preparing an Action plan;

4. Implementing the FS:

   – Integrating the FS into the budgetary process, programmes of work of the line ministries, municipalities and utilities; in particular, the methodology now systematically aims at anchoring the strategy into the MTEF, and into the revision of PRSPs;

   – Preparing and implementing suggested measures and investment projects, according to the priority ranking.

A key difference in applying the FS methodology in EECCA and EU accession countries is that in EECCA countries targets are mostly open-ended, so both targets, deadlines and financing could be

discussed, while in EU accession countries the targets are given (set in EU Directives), only deadlines could be discussed, and it is the financing that has to close the eventual financial gap.

Lessons from applying the FEASIBLE computer tool

In a number of cases a computerized tool called FEASIBLE has been used for the FS case studies. This tool, which is briefly described in Annex 2, is basically a tool which integrates into one structure (1) the calculation of expenditure needs based on to the assumption of shifting from the existing situation in year X to a target in year Y (or many targets in different years) at the prevailing costs of inputs in the country in question (2) with the calculation of financing needed (by year, by expenditure item and by source) in order to meet these expenditure needs. Since it is a quantitative and computerized tool, it ensures internal consistency of the results and allows "what - if" analyses.

Experts involved in the FS case studies, based on their experience with FEASIBLE, generally agree upon the following:

- FEASIBLE is a useful tool for developing financing strategies and for strategic/master planning in the municipal waste management sector. It helps to reveal consequences of choices and measures (technical, on tariffs etc.) immediately and transparently;

- FEASIBLE is not an expert system; an experienced planner in the field of municipal waste management, supported by an economist, is needed for the modelling exercise. This is a constraint which to some extent limits applicability of the tool by regional/national governments on their own;

- Being quite complex and requiring sufficient knowledge of the sector, the tool can be viewed as a “black box” for local stakeholders and local experts. This may result in distrust;

- In particular the price corrections (to customize the generic cost functions in the model to the country or region in question) currently require outside the model calculations. The methodology to make price corrections is not well documented and this reduces its replicability and transparency;

- Data requirements are extensive and time consuming, though still much less demanding than for feasibility studies;

- Because it can not take account of many site-specific circumstances, FEASIBLE is neither suitable for detailed studies at the local level, nor as a tool for feasibility studies for specific investment projects.

At an expert workshop in December 2005 in Moscow, experts came with specific suggestions on how the tool and the User manual could be further improved or developed:

- increased flexibility for specification of waste flow (collection and treatment system options);

- better ensure integrity of entered data;

- generate additional output charts presenting the results of calculations; this would be useful for scenarios analysis and assessment;

- improve scenario management facility of the tool;

- consider integrating marginal cost functions into the tool;

- further develop the User Manual and better document the methodology, including cost functions; for instance, by providing inexperienced users with guidance on how to overcome the problem of unavailable entry data, how to delineate modelling regions, and how to design and simulate scenarios.

All these suggestions would need to be considered if a new version of the tool is developed.

Applicability to other countries and regions

Although so far the FS methodology and FEASIBLE model have been applied in EECCA and EU accessing countries only, the tools are also applicable in developing countries. Best candidates are countries/regions which have experienced fast urbanisation over past decades, since growing urban settlements usually need sound municipal waste management and investment in related infrastructure.

These countries are often highly dependant on the international support from donors and IFIs, while financing strategies help prioritise investment and reveal what is feasible and affordable for the country and its population. Financing strategies also help donors and IFIs to better co-ordinate their aid.

Adaptation of the tools to these contexts would require a particular attention:

- Cost functions should be revised/fine-tuned and probably added, to take into account the particular technologies and processes which are available in the developing countries;

- The system for determination of the so-called price correction factors should be documented and (preferably) incorporated into the model;

- The policy dialogue process should be adapted to the particular institutional contexts of these countries.

Annex 2. FEASIBLE Model as a Tool for Designing Financing Strategies

This annex briefly describes the so-called FEASIBLE model – a computer-based tool which has been developed in co-operation between the EAP Task Force and Denmark, by the Danish consultancy firm COWI AS, with the financial support from the Danish government (DEPA/DANCEE) and methodological guidance from the OECD/EAP Task Force Secretariat. It was used for several financing strategies, by OECD/EAP Task Force and DEPA/DANCEE, recently also by the European Commission.

The "FEASIBLE" model is a public domain and can be downloaded from the official web site of COWI A/S at **www.cowi.dk/feasible** or requested from OECD/EAP Task Force Secretariat.

This Annex presents the tool's structure, functionalities and entry data requirements. For more details about the FS methodology and FEASIBLE tool see also publications (DANCEE OECD/EAP Task Force, 2002), (DANCEE OECD/EAP Task Force, 2004), (OECD/EAP Task Force, 2003), and the COWI's website (www.cowi.dk/feasible).

FEASİBLE tool as part of the financing strategy development process

The FEASIBLE model was designed to facilitate the development of scenarios which aim to match the costs of achieving policy targets with the available supply of finance. The tool is based on so called *generic cost functions* (which often reflects the economy of scale and need to be fine-tuned to a specific country or province by applying special price correction factors), and allows for assessing expenditure needs associated with different scenarios for municipal waste infrastructure rehabilitation and development, incl. that complying with the national standards or with waste-specific EU Directives, and confronting the expenditure needs with the finance available under different scenarios, presenting the annual financing gap.

The tool can assess expenditure needs associated with a specific design of infrastructure, and total finance available under different financing scenarios, so that different designs and financing scenarios could be compared afterward to find a more economic solution out of several scenarios under consideration, but the tool is not intended for finding *an optimal* solution/scenario.

The FEASIBLE computer tool is used for simulating certain scenarios regarding waste collection, treatment and disposal meeting the agreed targets [15]: This *inter alia* involves:

- making projections for waste generation and for waste flow on facilities,
- calculating the expenditure needs and assess the availability of finance needed to achieve the established targets.

The model calculates three gaps and constraints:

- Cash flow gap,
- Affordability for households,
- Affordability for the economy and public budget.

[15] FEASİBLE includes modules for water supply, wastewater, rural water supply and municipal waste as well as a joint financing module. The text here relates to the municipal waste and financing modules only.

Process of developing a financing strategy

According to the FS methodology elaborated by OECD/EAP Task Force, developing a FS (whatever is the tool) involves the following steps:

1. identify priorities, long-term objectives and targets, incl. those set in international agreements signed\ratified by the country;

2. define a scenario - that is a set of different measures (technical, institutional, economic and financial) required to reach the established objectives/targets, or a set of scenarios;

3. calculate expenditure needed for implementing the scenario (for implementing the measures and operating the system)

4. make projections for volume/structure of finance available from all sources of finance

5. assess affordability of the scenario for households and other users (tariffs and user fees) and for the public budget (capital expenditure programme, operating subsidies and social support measures)

6. calculate the difference between the expenditure needs and the supply of finance (the cash flow gap)

7. if necessary revise objectives/targets and/or financing to adjust the expenditure needs to the finance available.

The FS case-study usually starts from assessing the present situation in the sector and assessing a so called baseline (business as usual) scenario, which anticipates just maintaining the present status of the infrastructure, present level of services, and continuation of the present trend with the supply of finance.

It is very important to develop a sound "business as usual" scenario since in most EECCA countries the decision makers do not have access to information which describes the true cost of properly operating and maintaining existing systems. This is a particular problem for large network systems (such as water and wastewater), but even for the municipal waste management sector the focus at present is more on cash budgets rather than on accrual budgeting, and the lack of the required information often explains why the long-term budgeting is neither available, nor even possible.

So, overall the FS development is an **iterative process** of adjusting targets (and/or scenarios to achieve them, incl. deadlines) to the finance available, and developing a package of policy measures which would allow to bridge the gaps.

An outcome of this iterative process is a set (or several sets) of SMART targets and a realistic, feasible and affordable scenario (or several scenarios) to achieve them, including a policy package.

Application of the FS methodology (and of a tool like FEASIBLE) is not just a technical exercise; it involves all relevant stakeholders into a reflection process and sectoral policy dialogue, so as to build consensus and to ensure a close link between strategy development and implementation. Thus it is important to involve decision makers from the budgetary institutions and environmental policy institutions in addition to sector experts. Experience indicates that the policy discussion gains extra leverage when major financing donor agencies (for example the EU, or IFIs) are also involved.

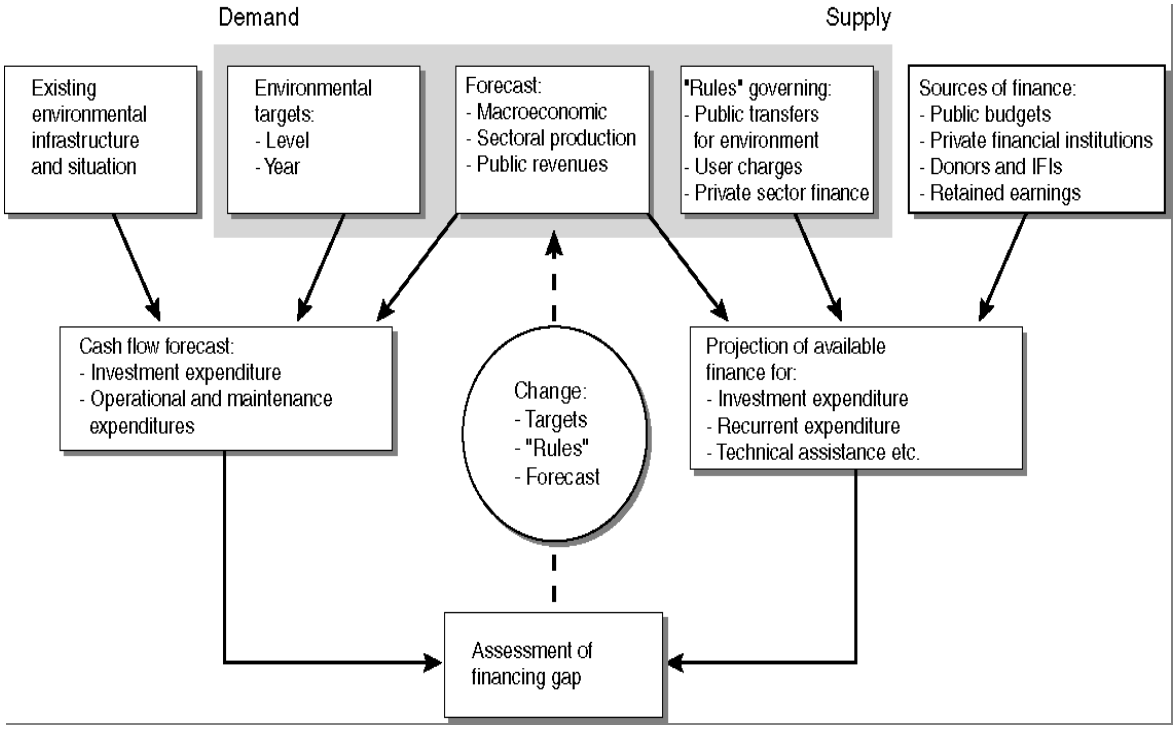
Moreover, FS methodology does not only involve financial analysis: the associated policy and institutional arrangements for mobilizing and allocating financial resources must also be examined.

Importance of complementary policies and measures

The experience with the FS demonstrates that a number of complementary measures should be undertaken to ensure successful implementation of a suggested financing strategy. Typically, this refers to adopting legislation setting service quality standards, or tariff setting rules and procedures, developing institutions and building capacity, etc.

Structure of the FEASIBLE tool

Figure 10. Structure of the FEASIBLE tool



FEASIBLE tool – general characteristics:

1. Generic cost functions and price correction factors

2. Functionalities: while often being regarded as a simple municipal service, municipal waste management is in fact is a very complex area. Accordingly, the FEASIBLE model can simulate the following number of options:

   – waste generation sources (6 options)

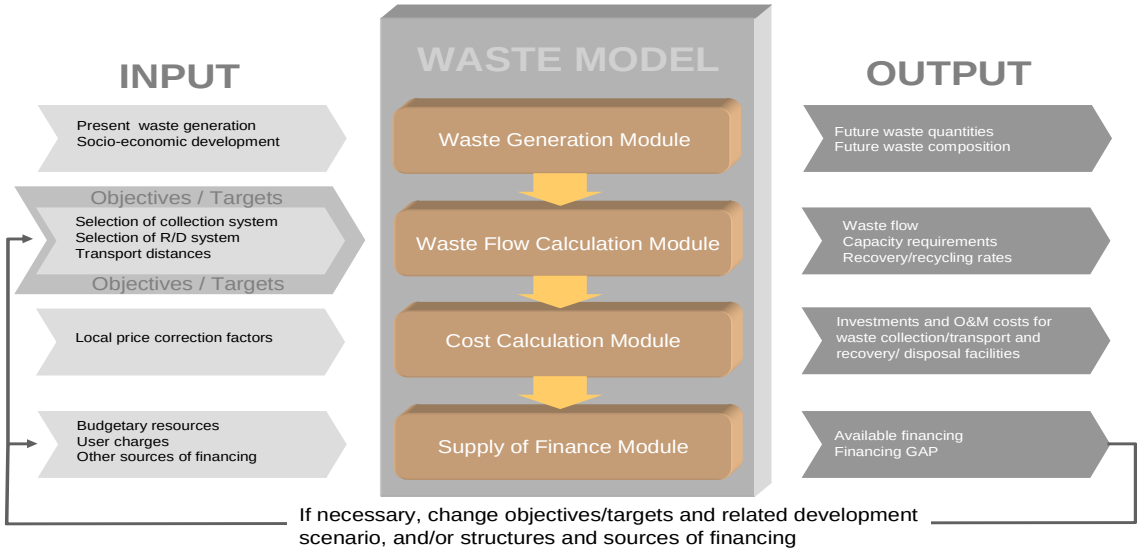
   – types of waste (15 options)

   – waste collection options (8 options + combinations)

- treatment and disposal options (16 options)
- options for financing the services (6 options)

3. Input data requirements: for each municipality or group of municipalities the following input data is required:
   - General data (socio-economic data, price correction factors)
   - Defining and delineating the modelling area
   - Waste generation and waste composition (the model distinguishes 6 sources), incl.
     - Packaging content in generated/collected municipal waste
     - Generation of biodegradable waste in the base year
   - Definition of waste collection system (in all 6 sources)
   - Definition of import/export of municipal solid waste between regions/municipalities
   - Distribution of waste flow onto treatment/disposal facilities
   - Definition of waste transport
   - Definition of no./capacity of treatment/disposal facilities
   - Prices of the recyclable waste (scrap metal, glass, paper and cardboard, etc.) and prices for recovered recyclables and energy
   - Data on finance available (by sources and instruments of finance)
4. Waste Modelling Process

Figure 11. Waste modelling process



5. Output data: the following outputs and results are produced by the FEASIBBLE model:
   - waste flow (can be presented for waste fraction/source/treatment method)
   - waste import between municipalities
   - recovered amounts and value of materials and energy (based on given unit prices)
   - recovered packaging waste (defined so that they may be compared to the EC Packaging Directive targets)
   - landfilled biodegradable waste (defined so that they may be compared to the diversion requirements in the EC Landfill Directive)
   - expenditures (investment and operation & maintenance costs)
6. Scenario simulation, output results interpretation
7. Scenarios management facility
8. User interface

Applying FEASIBLE tool, key steps:

- delineate the region and set long-term objectives and targets for each group of municipalities – *inter alia* the targets could be taken from the international agreements, and/or from national or international legislation and regulation (e.g. waste-specific EU Directives);
- define a scenario (a set of measures and investment projects) to achieve the targets;
- calculate expenditure needed for implementing the scenario;

- make projections for volume/structure of finance available (all sources and instruments) of finance;

- assess affordability of the scenario for households (tariffs and user fees) and for the public budget (capital expenditure programme, operating subsidies and social support measures);

- calculate the difference between the expenditure needs and the supply of finance (the cash flow gap);

- if necessary revise objectives/targets and/or financing to balance expenditure needs with the finance available.

In accession countries, where the goal is to identify scenarios that meet targets set in relevant EU Directives, and establishing realistic deadlines, FEASIBLE was found to be a useful tool for developing and evaluating different scenarios in an iterative manner.

Constraints

It is also useful to keep in mind some constraints of the FEASIBLE tool. It is not and will never be a "push the button for the optimal waste management solution" type of the model. FEASIBLE model can not substitute for the following:

- setting policy priorities and policy implementation;
- feasibility studies;
- cost optimisation;
- ability-to-pay and willingness-to-pay assessment.

Equally, FEASIBLE tool can not address complex institutional issue, including the issue of delegated management and concessions.

Alternative approaches and tools

Alternative approaches and tools for strategic are also available for developing financing strategies, with different functionalities, entry data requirements and scenario simulation facilities. One example is a computer-based tool called MOSES, developed by the TME (the Institute for Applied Environmental Economics), a consultancy firm from the Netherlands.

The tool is based on marginal cost curves and designed for assessing least cost associated with achieving specific environmental targets, incl. those set in the in the waste-specific EU Directives. The marginal cost curves are country-specific and should be derived prior application of the tool.

But the tool does not suggest specific design of the infrastructure which would allow to achieve these least costs, and confronting the costs with the finance available is carried out outside of the model.

For water supply and sanitation, another alternative tool called SWIFT is being developed, based on unit costs. There are plans to compare the two tools, SWIFT and FEASIBLE, and supporting methodologies in the near future.

Annex 3. The Kyoto protocol and finance for municipal waste management

by Ms. Nina Korobova, consultant to DEPA[16]

On November 16, 2004, the Russian Federation (RF) has ratified the Kyoto Protocol (KP) to the United Nations Framework Convention on Climate Change (UN FCCC). Three months later it came into force giving the possibility to Annex I countries to cooperate using flexible economic mechanisms of Kyoto Protocol in line with Article 6 of the protocol. This annex discusses how these mechanisms could be used for financing investment in the MWM infrastructure, using Russia as an example.

Of all Annex B countries, Russia has the largest potential of joint implementation projects (JIP), that is evaluated from 50 million tons of CO2 equivalent per annum (a pessimistic scenario) to 250 - 300 tons million of CO2 equivalent per annum (an optimistic scenario). According to some expert estimates (e.g. by *Pont Carbon*) the housing and communal services (HCS) sector, including municipal waste (MW) sector, accounts for some 18% of this potential. Thus even at the lowest current price of 6 Euros per tone of CO2, the HCS sector can attract up to Euro million 324 per year as CO2 reductions purchase revenues. It might be considered as not such a big amount for the whole Russia, but for some projects these revenues can cover up to 100% of the required investment.

It is difficult to assess what is the share of municipal waste (MW) sector-related joint implementation (JI) projects in total JI projects potential in the HCS sector. In practice methane capture at MW landfills is most probably to be the most popular type of projects in this sector in the nearest future, due to existence of a proven technology, lower investment requirements and high demand for more environmentally sound options of MW management and disposal.

Technical issues

According to the Russian Federal Agency for construction and HCS (*Rosstroi*), more than 80% of MW landfills in Russia are more than 30 years old with full capacity used. Most of the landfills have 1 way (road) access to the landfill. That means that landfill can not be split into parts – one closed for methane collection with a capture system installed, and the other still in operation. So in most of the cases to implement JI project on MW landfill would require its full closure and building a new landfill, or other (alternative) option for MW treatment and disposal to be in place. It seems to be the most important problem for JI activity in this sector in Russia.

Most of the potential buyers require an annual 50,000 tons of CO_2 emission threshold for JI projects, and would purchase only 75% of the potential emission reduction to reduce the risks. Bearing in mind that 1 tone of methane is equivalent to 21 tones of CO_2 with respect to its green-house potential (GHP), a MW landfill should have fugitive methane emission amounting to some 3200 tons per year. In practice, only 25-30 years old MW landfills in cities with population of not less than 400 thousands could meet this threshold.

JIP options include:

1. simple flaring;
2. heat generation;
3. combined heat and power (CHP) generation.

[16] Official web site of the Danish Environmental Protection Agency (DEPA): www.mst.dk

Flaring is part of options 2 and 3 as well, to avoid methane fugitive emissions in case of boilers not working for some reasons. Under options 2 and 3 additional emission reductions (ERs) appear due to the switch from coal or *mazut* to the landfill gas, if a boiler house or a combine heat and power plant (CHPP) already exists.

In case of installation of a new gas turbine to have additional ERs it is necessary to prove that relevant amount of electricity was deducted from the local electricity market. In practice only cities with population of 1 million people and more can "afford" gas turbines working on the landfill gas, otherwise the amount of the captured gas will not be enough to utilize the turbine in its full capacity.

When assessing MW landfill methane capture capacity, test drilling and pumping should be done in different places of landfill. It is also important to take into account gas pureness and methane content. In general 65% methane content (in European practice, some Russian engineers insist that 40% is enough. In any case 40% seems to be the lowest threshold) is required for heat and electricity generation. In case of different chemicals like sulphates being present in gas pre-treatment is needed.

Financial issues

Investment cost estimates highly depend on project site specifics. If it is required to close the landfill meeting the EU or Russian standards the cheapest option (clay and soil layers without plastic liner) costs around EUR 800–900 thousand (estimates of Danish experts – Euro 4,5 per m2 multiplied by average size of a landfill). Simple flaring option without landfill cover costs not more than EUR 0,7 million. If a boiler house already exists than replacement of the burner (Euro 30 thousand) and pipeline cost should be added (Euro 130 – 150 thousand per km) to flaring option. If existing boiler house is located at 3 km distance from landfill project investment cost will be around EUR 1 million. Electricity generation options add some EUR 1 million to project cost for the smallest turbines. Thus project cost ranges from EUR million 0.7 to 2.2, depending on options without cover and almost EUR 1 million higher with cover.

In practice the most feasible option is heating if boiler house exists and is closely located. If project generates 100,000 tons of CO_2 and purchases 75% at EUR 6 per ton it gets EUR 450 thousand per year or EUR million 2,250 for the whole 5 year period. If project cost is EUR million 1.9 (inclusive cover) than these revenues fully cover investment cost. But project host gets advance payment that it can use as investment up to 50% of purchase amount (Danish carbon for example) or EUR 1.125 million out of EUR 1.9 required so the difference of EUR 0.775 million should be co-financed by project host. It should be noted that advance payment is provided against bank guarantee of 10 biggest Russian banks and it is difficult for financially unhealthy enterprise to get it. This could be solved by different project organization.

Institutional issues

In most of the cases municipality owns MW landfill and thus owns potential emission reduction units (ERUs). Municipalities heaving weak budget face with difficulties providing direct co-financing or getting bank guarantees . The same problem exists if municipality delegates the MW landfill operator to be the project host. If landfill is owned by subject of Federation like for example in Moscow and Saint Petersburg, any guarantee is considered as a foreign debt (purchaser and provider of advance payment is from another country) and should be coordinated with the Ministry of Finance RF and in case of many other debts may not be approved in line with Budget Code. Besides Emission Reduction Purchase Agreement (ERPA) to be signed between seller and buyer is an international agreement and in line with the Law on International Agreements should be coordinated with the

Ministry of Foreign Affairs RF, Ministry of Finance RF and leading conceptual ministry – Ministry of Economic Development and Trade RF (MEDT RF) in this case.

The way out from this complicated situation is to involve private partner as closed landfill operator. This could be done by concluding Concession agreement between MW landfill owner and operator. The object of concession could be not only closed landfill but boiler or CHP if relevant. In this case operator becomes owner of ERUs and gets revenues form ERUs purchase. If decision on post Kyoto period will be taken then operator can get additional revenues for the next 5 years with minimum O&M (inclusive monitoring and reporting) expenses. Moreover we considered minimum forward price of EUR 6 relevant per today. If actual ERUs generated is higher than commitment on ERPA the difference to be sold in commitment period (2008 – 2012) and if relevant in post Kyoto period (2013-2107) at spot market prices expected to be much higher than forward prices. So it could be a good business for private companies.

Project cycle

What to do to initiate and implement the project. First of all to follow recommendations in technical issues paragraph for meeting threshold. Then to try to assess investment cost and seek co-financing and to design project organization. Then to find the relevant tender to apply. At the web site of *Danish carbon* (www. DanishCarbon.dk) all formats of documents to be submitted for tender are presented inclusive examples in Russian language. If necessary Danish carbon can provide assistance in filling the documents by means of hot line opened for applicant's questions.

If the tender is won, a Letter of Intent specifying preliminary amounts of ERUs to be generated and sold , prices and advance payments is signed between Project host and DEPA. After that DEPA earmarks DKK 250,000 for Project Design Document (PDD) development that will be later paid to project designer and is not revolvable. Then project host (or any company involved as project designer) develops PDD. PDD is assessed by Danish experts and then is sent by Project host to independent internationally accredited determinator. After determination project is submitted to Russian JI approval procedure to receive Letter of Approval. Project designer gets its payment against acceptance note of documents for the Russian JI approval procedure. After getting the Letter of Approval, the ERPA is signed and project starts. When first ERUs are generated they are monitored and reflected in Annual monitoring report. Monitoring report is verified by independent company. After approval of Verification report ERUs are registered at its account of Russian National Registry and then transferred to the Danish National Registry. Within 30 days payment for ERUs generated in reporting period is transferred to project host.

Average cost estimates for typical project at MW landfill are presented at table below.

Table 13. Cost estimates for MW landfill gas capture and use for heating

at existing boiler house located at 2 km from landfill of 20 ha. Emission reductions of 75,000 tones of CO2 equivalent per year purchased at EUR 6 per ton

Stage	Cost item	Cost. EUR thousand	Cost covered by	
			Project owner	**Buyer (Danish Carbon)**
Project preparation	Project idea (PIN)	3		
	Test drilling and pumping	30	30	
	PDD	35		
	Determination	10		(**?**)
	Approvals	2		
	Subtotal	**80**	**42**	**38**
	Design and approvals in line with Russian regulations	**181**	**181**	
Project implementation	*Investment cost:*			
	Soil cover	900		
	Collection	400		
	Flare	200		
	Boiler house improvements	30		
	Gas pipes	280		
	Subtotal	**1810**	**685**	**1125 (advance payment)**
	O&M cost (annual):			
	Monitoring and verification	6		
	Other	15		
	Subtotal	**21**		**225**

The table needs some comments:

- in the Russian practice design and approval costs are estimated at 10% of total investment cost
- (?) - means that determination cost could be born by buyer if specially agreed
- Advance payment is at maximum rate of 50% of total purchase
- Buyers contribution to O&M cost is annual revenues from ERUs purchase
- For simplicity, only ERs from methane capture are taken into account, while operation savings from switch from coal or *mazut* to methane are not taken into account. The latter factor, if included,. will only improve the cash flow of the project

Table 1 clearly demonstrates the investment attractiveness of such projects.

Annex 4. List of associated experts

The experts below contributed to the expert workshop on Financing strategies for municipal waste management, Moscow, December 2005.

Table 14. List of associated experts

Name	Organization, Position
ALEXANDROV Sergey Alexeevich	JSC “Novgorodskoye Spetsavtokhoziaystvo”, Novgorod-the-Great, Deputy General Director
BAGDASARYAN Ashot Borisovich	COWI, Denmark Economist
BYSTROM Jonas	COWI, Denmark Expert on waste management
EFIMOVA Tatiana Victorovna	COWI, Moscow Economist
JACOBSEN Michael	COWI, Turkey Deputy Director, Chief Economist
JANTZEN Johem	Institute for Applied Environmental Economics, Netherlands, Director
LEFLAIVE Xavier	Organization for economic co-operation and development
MARTOUSSEVITCH Alexander Petrovich	Organization for economic co-operation and development
MAXIMENKO Peter Yourievich	COWI, Moscow Expert on MW and IT
NEVSKAYA Marina Anatolievna	Saint Petersburg Scientific Center under the Russian Academy of Sciences, Senior Lecturer
OSTROUKHOVA Valentina Mikhailovna	Committee of environment protection and natural resources under Rostov oblast Administration, Chairman
SHIPITSINA Tatiana Petrovna	COWI, Moscow Manager of International Projects
TARATAYTSEV Stanislav Zbislavovich	Ministry of construction, architecture and ZJKKH of Ukraine, Chief Specialist of the Department of housing-municipal services
TSAPKOVA Nadezhda Nikolaevna	Centre of environmental audit and management, Rostov-on-Don, Executive Director

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