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Extension of the FEASIBLE Model to include Municipal Solid Waste Management

Novgorod Case Study

Final Report and Project Ideas

December 2002



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Background

In 2001, the Danish Environmental Protection Agency decided to support the OECD and ministries of environment, finance and economy in the CEE and CIS by financing the development of an improved version of the FEASIBLE model. FEASIBLE is a software tool developed to support the preparation of environmental financing strategies for water, wastewater and municipal solid waste management services in the CIS and CEE regions.

The first version of FEASIBLE, a spreadsheet-based version covering water and wastewater, was released in 2001. The next version will be a stand alone application based on a database, including a module for municipal solid waste management.

The development of the module for municipal solid waste management has taken place in co-operation with the OECD Environmental Action Plan Task Force. Two case studies have been carried out (in Latvia and the Russian region of Novgorod) in order to test the applicability of the model in strategy development and to provide feed-back to the further development of the model to ensure that the specific requirements related to municipal solid waste management and financing were met.

The present report constitutes the final case study report for the Novgorod region in Russia. The three project ideas which were conceived in connection with the case study are attached as appendix 5.

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Acronyms and Abbreviations

C&D	Construction and demolition
CEE	Central and Eastern Europe
CIS	Commonwealth of Independent States
DANCEE	Danish Cooperation for Eastern Europe
DKK	Danish kroner
EFS	Environmental financing strategies
EIA	Environmental impact assessment
FEASIBLE	Financing for Environmental, Affordable and Strategic Investments that Bring on Large-Scale Expenditure
GDP	Gross domestic product
GRP	Gross regional product
HHW	Hazardous household waste
HME	Housing municipal economy
IMF	International Monetary Fund
ISPA	Instrument for Structural Policies for Pre-accession
LSW	Liquid and solid waste
MRF	Materials recycling facility
MSW	Municipal solid waste
NO	Novgorod oblast

O&M	Operation and maintenance
OECD	Organisation for Economic Cooperation and Development
RUR	Russian rouble
SAKH	Specialised waste management utility (Spetsavtokhoziaystvo)
SMART	Specific, measurable, acceptable, realistic and time-bounded (related to targets)
SWM	Solid waste management
UMS	Urban multi-storey (household)
USF	Urban single-family (household)
USSR	Union of the Soviet Socialist Republics
VAT	Value added tax
WWTF	Wastewater treatment facility
WWTP	Wastewater treatment plant

1 Introduction

The extension of the FEASIBLE model to cover municipal solid waste management has been planned in three phases. In the first phase, a pilot version of the solid waste management module of the model was developed. In the second phase, the pilot version has been tested in a CEE country and a CIS region. The finalisation of the model in the third phase builds on the lessons learned and the experience from the case studies.

The Novgorod region was selected for the CIS case study analysis. This report describes the results of the study. A draft final report was presented in November 2002 at a finalising workshop and seminar. The comments received have been taken into account in this report.

The Novgorod case study started in October 2001. An advisory committee headed by the vice-governor of the Novgorod oblast, Mr. A. Boitsov, was established to provide overall supervision and coordination of the Novgorod component. In co-operation with interested local counterparts, the financing strategy has been developed for a 14-year planning period (2002-2015).

This document presents the background analysis for the MSW management strategy for the Novgorod oblast. The report formulates targets and presents different development scenarios for MSW sector, assesses their technical feasibility and affordability in terms of financing and willingness of households to pay relevant tariffs, and, finally, develops recommendations as to the preferable scenario.

It is anticipated that the strategy and FEASIBLE will be useful instruments for strategic and current planning, development of environmental policy and capital investments planning in the waste sector as well as for management improvement in the sector. They will also help to establish SMART environmental targets and priorities for the sector and identify priority projects and activities which are in compliance with the overall environmental priorities and targets, to assess the cost of implementing the projects and develop scenarios balancing the demand for finance with the finance available.

This way it will be possible to improve the quality of public capital expenditure budgets, regional environmental actions plans as well as municipal infrastructure development, rehabilitation and modernisation plans and, finally, to attract more funds to the waste management sector.

1.1 Methodology

It was anticipated that the regional EFS would establish specific realistic (SMART) targets for the sector to be achieved by 2015 which would comply with the environmental priorities of the oblast and be affordable in terms of financing, assess the cost of achieving the established targets, evaluate the social and economic affordability of the cost and recommend specific economic, social and environmental policies (including revised targets) the implementation of which would make it possible to balance the demand for financing with the funds available.

In co-ordination with the DANCEE and local partners, COWI experts suggested and used the following methodology for EFS development:

1.1.1 Study of the Existing Situation

A special questionnaire was prepared to collect the data needed for modelling and strategy development in which, in particular, data on the following issues were requested: data on municipal waste generation from different sources, waste composition, coverage of waste collection services, transport and disposal; availability and status of fixed assets; environmental performance and key environmental problems in the sector; actual financing of current and capital expenditures from different sources, etc.

1.1.2 Development of FEASIBLE

COWI experts have designed algorithms, programmed and verified a computerised model which allows assessment of the current and capital expenditures needed for both sustainable operation of the infrastructure in the waste sector and for achievement of the defined targets. It was anticipated that the waste management module tested during present strategy development provide input for the new version of FEASIBLE.

The input data in FEASIBLE includes numerous technical, economic and financial data, in particular, data on waste generation sources, methods of waste collection and sorting, collection of recyclables, the technical condition of existing infrastructure including containers, special trucks (dust-carts), sorting and transfer stations (if any), recycling facilities as well as sites for waste disposal, etc.

FEASIBLE uses generalised **cost functions** which **have been** elaborated using the regression analysis methods applied to historical data on the cost of achieving specific environmental targets in specific areas; e.g., establishment of a MSW management system with an appropriate park of trucks in a settlement with a defined number of inhabitants, the construction of sorting and/or transfer station, recycling facility or incineration plant with a given capacity, construction of a controlled or EU standard landfill with given capacity etc. Although the empirical costs functions were generated based on data received from different countries and assessed cost in DKK, a price correction method has been

developed to adjust the cost functions to local prices which enables reliable estimates for any country or region.

1.1.3 Oblast Delineation for Development and Modelling of Different Scenarios

FEASIBLE enables estimates of the implementation cost of different scenarios for the whole oblast as well as for specific groups of towns and rayons. Such grouping is expedient taking into account the considerable difference in the present status of waste management systems and development targets established in this or that town/rayon (different coverage by the service, different methods of waste collection, different level of the infrastructure (capacity and quality of dumps and landfills, sorting and transfer stations, recycling facilities, etc.) as well as differing financial strength of local budgets and households (tariffs level and cost coverage by tariffs, ability to pay and collection rate).

In intensive dialog between COWI and local experts and representatives of oblast Administration and other concerned parties, the towns and rayons of Novgorod oblast had been delineated in three groups. For each group SMART targets and set of development scenarios for the waste management sector has been formulated.

1.1.4 Assessment of the Cost of Achieving the Targets

Using FEASIBLE, first, an assessment was made of the financing needed for sustainable operation of the existing infrastructure (so-called baseline scenario). Then, estimates were made of the demand for finance in order to implement defined scenarios to achieve the environmental targets established for each group of towns/rayons.

1.1.5 Assessment and Forecast of Available Funds

In this part, the historical data on financing was analysed, and a forecast was made for a number of indicators, including the following:

- key macro-economic indicators;
- revenue budgets of the oblast and the municipalities forming each group;
- size of population,
- minimum living standard,
- average income and expenditure structure of households.

Based on this, a forecast of the finance available from all sources for recurrent and capital expenditure in the sector was made for each group.

1.1.6 Financing Gap Assessment and Analysis of Options to Bridge the Gap

By comparing the demand for financing of recurrent and capital expenditure with the funds available from all sources, two gaps were estimated. First, the

O&M financing gap which should be closed to achieve sustainable operation and maintenance of existing infrastructure. Second, the capital investments financing gap which should be bridged to achieve the established environmental targets in the sector for each group.

In order to assess whether the targets are affordable for the population in the region and for the regional economy, the affordability of recurrent and capital expenditure was assessed under the assumption that the share of expenditure on housing and municipal economy and municipal utilities in the consolidated public budget and in the households expenditure on housing and municipal services in the household budget cannot exceed a prescribed (maximum affordable) level.

Economic, financial, social and environmental policy options which could close/reduce the financing gap(s) are identified and analysed, and a number of policy scenarios are developed. First, the gaps could be closed by increasing funding, including finding from increase in coverage and/or user charges/tariffs and changing the tariff policy.

Second, there are also options to reduce the gap by improving efficiency, and/or reducing the demand for capital investments by sacrificing/reducing the environmental targets.

The last option becomes necessary as soon as the cost of achieving the environmental targets turns out to be socially or economically unaffordable and/or if the identified options to increase financing are not sufficient to bridge the financing gaps. Scenarios which include a combination of several options (fund raising and, simultaneously, sacrificing/reducing the targets) are also identified and analysed here.

Finally, based on the analysis, the most realistic scenarios for achieving the strategy targets are designed.

In the framework of the recommended scenarios, capital investment project ideas contributing to the achievement of the target have been identified and described.

The key results of the analysis are presented below. The work has been done in close co-operation with the administration of the Novgorod oblast, administrations of municipalities of towns and rayons, the Natural Resources Committee of the Novgorod oblast, and the management of a number of municipal utilities operating in the municipal waste management sector: state unitary enterprise «Novzhilkommunservice», Spetsavtokhozyastvo (SAKH) in Novgorod-the-Great, the multifunctional enterprise in Borovichi and others.

The principal authors of the report are Mr. Alexander Martusevich, Mr. Jonas Byström and Ms. Birgitte Martens, though many other experts also contributed

to the report¹. The computer modeling was done mostly by Mr. Peter Maximenko and Mr. Jonas Byström. The identification and description of capital investment project ideas was done by Mr. Sergey Zaletov in co-operation with Mr. Henrik Holck based on ideas provided by local specialists.

The opinions expressed are those of the consultant. DANCEE (Danish Ministry of the Environment) may not agree with these opinions.

¹ Especially, V.A. Savin and V.I. Kundik, Natural resource committee for the Novgorod oblast, V.N. Smirnova and I.V. Katikhina, Finance Committee at the Novgorod oblast Administration, L.G. Shpakovich, “Novzhilcommunservice” and many others. Technical coordination of the project was provided by Tatyana Shipitsyna (COWI) and Zhanna Lodgun (Natural resource committee for the Novgorod oblast).

2 Existing Situation and Assessment of Key Municipal Solid and Liquid Waste Management Issues

2.1 Mode of Data Collection

In order to carry out the environmental financing strategy for MSW, technical, financial and socio- economic data was required for the Novgorod Oblast and for the 22 rayons.

The data was used for the following purposes:

- to facilitate delineation into model sub-regions,
- to facilitate the setting of targets and development of scenarios,
- to validate assumptions in the cost-functions, and
- as direct input to FEASIBLE.

To facilitate the data collection, a questionnaire was prepared. The questionnaire is presented in Appendix 4. The questionnaire contains sections and questions on administrative, socio-economic, technical and financial matters.

The questionnaire was presented to representatives of the Oblast and the 22 rayons at a workshop held in Novgorod City on 19 November 2001. The questionnaires were filled in and returned at the end of December 2001, and the data was compiled at the beginning of January 2002.

2.2 Overview of the Current Waste Situation in the Novgorod Oblast

2.2.1 Waste Generation

The number of nature users that are to be included in the system of state supervision of the production of waste and consumption management is continuously increasing. In 1995, 213 enterprises, organisations and private business (nature users) got permits for waste disposal and concealment, and in 2000, the number increased to 1,020 users.

Table 2.1 contains information about the quantity and structure of industrial waste for 1995-2000.

Table 2.1: Generation of toxic waste in the Novgorod Oblast, 1995-2000 (tonnes).

Tonnes	1995	1996	1997	1998	1999	2000	% change 95 – 00
Class 1	19	36	25	26	33	40	110 %
Class 2	8,230	8,382	8,576	8,538	8,734	8,636	4.9 %
Class 3	10,649	5,434	5,338	9,002	25,863	26,126	145 %
Class 4	1,835,913	2,579,802	1,431,300	1,675,515	1,986,123	1,808,315	-1.5 %
Total	1,854,811	2,593,653	1,445,238	1,693,081	2,020,753	1,843,117	-0.6 %

Source: Natural resource committee, Novgorod oblast

The growth in the amount of waste generated could be explained mainly by the recent economic recovery and partly by the fact that the reporting system today covers more nature users than it covered in 1995.

The structure of industrial waste has not changed significantly, during recent years. It is seen in examples of 1999/2000:

- **Waste of 4th class of hazardous potential (less danger)** in total: 98.3 / 98.1% (1,953 / 1,808 million tonnes);
- **Waste of 3rd class of hazardous potential** by specific weight: 1.29 / 1.4% (25.71 / 26.13 thousand tonnes);
- **Waste of 2nd class of hazardous potential:** 0.4 / 0.5% (8.56 / 8.64 thousand tonnes);
- **Waste of 1st class of hazardous potential:** 0.0017 / 0.0022% (33.74 / 40 tonnes).

Data on specific waste which forms each class is presented in Appendix 1. Note that some types of waste of the 3rd and 4th class are allowed to be deposited at municipal landfills.

2.2.2 Treatment and Disposal of Industrial Waste

The toxic industrial waste classified as waste of 1st-3rd classes of hazardous potential should be transported to special landfills. Some solid industrial waste of group 4 (E.g. wooden waste) as well as some of the hazardous waste of class 3 is allowed to be deposited at the MSW landfills. Special permits issued by the environmental protection and sanitary-epidemiological supervision authorities are needed in such cases.

Waste disposal and concealment are carried out at sites defined by resolution of local self-government authorities in coordination with specially authorised state

bodies of the Russian Federation in the field of environmental protection and sanitary-epidemiological supervision.

In cases where an enterprise stores waste at the site, it should secure safe waste storage, and prevent any damage to human health and the environment.

Table 2.2 presents data on the treatment and disposal of industrial waste:

Table 2.2: Industrial waste disposal, tonnes

	1995	1996	1997	1998	1999	2000
Waste generated, total	1,854,811	2,593,653	1,455,480	1,693,081	2,020,754	1,843,117
Waste treated	523,543	3,379,367	2,890,250	1,806,752	1,251,149	1,553,225
Waste disposed at authorised sites (disposal and concealment), including industrial sites	5,705,136	12,880,604	11,786,264	11,287,700	11,364,291	11,728,346

Source: Natural resource committee, Novgorod oblast

2.2.3 Sites for Waste Disposal and Concealment

According to the results of a recent inventory of sites for waste disposal and concealment, the Novgorod oblast has:

- 39 authorised dumps (including the MSW landfill of Novgorod the Great);
- 36 sludge collectors and sites;
- 8 ash-slime dumps;
- 1,510 areas, storage facilities, bunkers, containers, a number of artificial ponds designed for temporary storage of waste before its further treatment/disposal.

(see Table 6 in appendix 1 for details):

For 12 dumps, no documentation is available from the dumps administrations of the rayons to prove land planning and establishment of dumps. Only for 2 dumps out of 39, design documents have been worked out and a hydrogeological survey carried out. But even these two dumps started operation not in compliance with the design documentation.

At the landfill operated by the JSC “Novgorod Spetsavtokhoziaystvo”, the waste concealment started from 1986 without any required works for insulation layer preparation. As a result, the filtrate with high content of toxic substances migrates in down laid layers of an area next to the dump.

A special well for water sampling and analysis aimed at assessment of its impact on environment had not been built.

None of dumps/landfills complies with the requirement to regularly cover the compacted waste layer with an insulation layer of ground or other appropriate materials. Therefore, the area of dumps is open to birds and animals, and it spreads smell and evaporates hazardous substances.

At almost half of dumps, the MLW is disposed of together with MSW which creates a potential danger of groundwater contamination, especially at sites with low protective characteristics of the dump foundations (sandy ground, gravels etc.).

Supervision is organised at only 11 landfills of 39, and 24-hour survey is only in place in Novgorod the Great, Borovichi and Chudovo. Thus, more than 62% of the municipal dumps are uncontrolled during the day and 90% during night. This situation provides opportunities for violators without any obstacles or punishment to transport and dispose of hazardous waste that should be disposed at special landfills.

The results of the inventory indicate a need for the construction of new and reconstruction of operating dumps as well as for legal enforcement.

2.3 Existing MSW Management System: Issues and Problems

Waste managed as municipal solid waste (MSW) generally encompasses domestic household waste, non-hazardous waste collected from enterprises and public cleansing waste. Households are the main generators of MSW. It is estimated that they produce about 95% of the total MSW amount. In addition to MSW, households without connection to sewerage produce liquid waste (septic tank waste).

2.3.1 Waste Generation

Data on the annual generation of municipal solid and liquid waste is presented in Table 2.3. Between 1995 and 2000 there was a steady increase in generation of both solid and liquid waste. The average annual generation of MSW per capita depends on the type of housing and varies from 0.9 to 1.4 m³/capita.

Table 2.3: Generation of municipal solid and liquid waste in the Novgorod oblast in 1995-2000 (m³).

	1995	1996	1997	1998	1999	2000	Change between 1995 and 2000, %
MSW	607,315	695,326	815,162	833,239	791,173	775,353	+ 28%
LSW	218,012	2,204,645	306,791	397,895	443,732	430,417	+ 97%
Total	825,327	915,791	1,121,953	1,231,134	1,234,905	1,234,905	+ 50%

Source: Natural resource committee, Novgorod oblast

In the Novgorod oblast, landfilling is the only way of MSW treatment. As several types of industrial waste from the 3^d and 4th toxicity classes are authorized for disposal of MSW facilities, part of the waste generated (Table 2.4) is disposed of together with MSW at municipal landfills and dumpsites which deteriorates their carrying capacity.

Table 2.4: Generation of industrial hazardous waste (the 3^d and 4th toxicity classes only) in the Novgorod oblast in 1995-2000 (tonnes).

Tonnes	1995	1996	1997	1998	1999	2000	Change between 1995 and 2000, %
Class 3	10,649	5,434	5,338	9,002	25,863	26,126	145 %
Class 4	1,835,913	2,579,802	1,431,300	1,675,515	1,986,123	1,808,315	-1.5 %

Source: Natural resource committee, Novgorod oblast

Part of the municipal liquid waste is collected and transported to local wastewater treatment plants for treatment, mostly in urban areas. Due to the lack or insufficient capacity of wastewater treatment facilities, particularly in rural areas, about 20% of the municipal liquid waste is disposed of at landfills or dumpsites which are not designed to handle such waste. However, most of the liquid waste is disposed of without any treatment on non-agricultural lands with poor soil quality.

The composition of MSW has changed significantly, in recent years, due to the increase in the share of consumer goods packed in plastic, glass, metal cans, paper and cardboard boxes and other packaging materials leading to growing volumes of various packaging-derived waste. Data on the composition of MSW in Novgorod City is presented in Table 2.5. Although there have been no investigations of the composition of MSW in other cities and towns of the Novgorod oblast, it is reasonable to expect that their MSW has approximately the same structure.

Table 2.5: MSW composition in Novgorod City, 2000

Paper	7.1%
Cardboard	5.7%
Plastic	5.6%
Metal	3.6%
Food waste	25.9%
Glass	5.8%
Textile	2.8%
Hazardous household waste (HHW)	1.7%
Non-combustible residual	38.7%
Combustible residual	3.1%

Source: Natural resource committee, Novgorod oblast

Although there is no data on the composition of MSW from different types of households, it is supposed that there is considerable difference between waste produced by urban and rural households. Thus, it is assumed that, in rural areas, the MSW contains a large proportion of food waste, garden waste and bulky waste.

In the short term, the generation of MSW is expected to increase, reflecting the transition to a consumer-oriented society; and the waste composition is likely to change with an increasing share of paper, cardboard and plastic fractions.

2.3.2 Waste Collection

The coverage of MSW collection is relatively high in urban settlements and low in rural areas in the Novgorod oblast. It varies from 87% in Novgorod city to 30% in some rural areas (Table 2.6). In general, all urban settlements and large villages have MSW collection systems. However, even in urban areas many private single-family houses are not covered by any organised collection system.

Table 2.6: MSW generation, collection coverage and frequency in ten major cities and towns of the Novgorod oblast, 2000

City/town	Population	Waste generation, m ³	MSW collection coverage, %	Collection frequency (times per week)
Novgorod	240,000	451,560	87	7
Borovichi	61,638	70,000	70	7
Staraya Russa	39,758	45,175	74	5
Valdai	19,499	23,773	79	n.a.
Chudovo	17,713	36,800	69	5
Okulovka	15,619	2,468	51	7
Pestovo	16,363	9,570	57	3
Soltsy	12,842	11,800	58	7
Malaya Vishera	14,697	11,924	40	2
Krestsy	10,601	10,596	n.a.	1

Source: Data from questionnaires

In the Novgorod oblast, the MSW collection system is based on a standardised system which was implemented throughout the former USSR. The prevailing waste collection method is ordinary container collection. Separate collection is almost non-existent. Relatively small metal containers (0.75 m³) without lids are used to collect waste from domestic, commercial and institutional generators. Usually, they are placed at special collection points with concrete or asphalt covering. These points are organised near multi-storey apartment houses or, in the case of private single-family houses, at places within a short distance from the waste generators.

The metal containers used in the collection infrastructure are not very suitable for MSW collection as they are heavy and not weatherproof. Due to poor maintenance over a long period, many containers are in bad condition. Moreover, the available number of containers is insufficient to provide an adequate service for all waste generators covered by the MSW collection system, and the small containers are not suitable for bulky waste. As a result, waste is often accumulated near containers, littering and contaminating the surroundings. Furthermore, as the containers are not fitted with lids, the waste is readily accessible to rats, rodents, flies and other insects, which creates nuisance and risk to human health.

Automated compactor type collection vehicles (mainly in Novgorod city) and small trucks are used to service the containers and to transport the MSW to landfills or dumpsites. The collection frequency varies from 3-7 times per week in urban areas to 1-3 times per week in rural areas (Table 2.6). The collection vehicles fleet is quite old, and the available number of the vehicles is insufficient to support the necessary collection frequency. Due to financial constraints

municipalities are increasingly unable to maintain their fleet of vehicles and collection infrastructure, which results in gradual deterioration of the service.

There is no separate collection of hazardous household waste (e.g., batteries, oil products, medicine with expired shelf life, paints, solvents). As a result, it goes to landfills together with other waste. Even though, the share of HHW in municipal waste is less than 2 per cent by weight, this fraction is very important from an environmental point of view.

2.3.3 Recycling and Recovery

Despite a declared policy of giving priority to recycling and processing of MSW, very little source separation is carried out in the Novgorod oblast. In 1980s, an organised system for recycling of some materials, such as paper and glass, was widespread. However, the established recycling system collapsed in the absence of State subsidies and has not been replaced by a market-based system, although small-scale collection and processing of recyclables have reappeared to serve local markets.

In general, the total demand and average prices of recyclables are not high (Table 2.7) except for aluminium cans. A relatively high demand exists for recyclable paper (13,323 tonnes per year), because the Borovich paper-mill accepts and processes it. This is why all enterprises of the Novgorod oblast are encouraged to separate paper from other waste and send it for recycling.

Table 2.7: Prices of recyclables

Recyclables	Prices, RUR/tonne	Prices, USD/tonne
Paper	1,000	32
Cardboard	1,467 – 1,600	47-52
Textile	917	30
PE film	1,250	40
Plastic bottles	3,000	97
Aluminium (cans)	24,800	800

Source: Spetsavtokhozyastvo, Novgorod-the-Great

In the Novgorod region, several companies collect recyclables, both state-owned and private. However, the activities of these companies are mainly directed at industrial, commercial and institutional generators. Households are, generally, not covered by recyclables collection

Since 1999, a pilot project on separate collection has been implemented in Novgorod city. In the residential areas covered by the pilot project, collection points have been fitted with coloured containers: blue ones for glass, green for paper and cardboard, yellow for plastic and black for other waste. Although the scope of the pilot project has been limited so far, it is planning to expand to a larger area.

2.3.4 Treatment and Disposal

Land disposal is the primary approach to handling municipal solid waste. In the Novgorod oblast, there are 29 authorised MSW landfills and dumpsites. The environmental quality of the facilities is low: only one landfill, in Novgorod city, meets nationally applied environmental, sanitary and construction standards. As a result, most rayons have identified the need for upgrading existing or constructing new MSW landfills which should comply with landfill standards.

Most dumpsites are poorly situated, both geologically and geographically. Thus, in Malaya Vishera, the dumpsite is within town boundaries and at a distance of 100 meters from a residential area. As the majority of disposal facilities were organised without a preceding hydrogeological survey, they are often situated at locations with a high groundwater table and/or permeable rock bed, causing contamination of ground water. In Borovichi, for example, the dumpsite is located on a carbonaceous table and relatively close to aquifer used as a source of drinking water.

Furthermore, most landfills and dumpsites are not properly designed, constructed and operated. The most typical and widespread shortcomings of the current waste disposal system are listed below (except for the Novgorod landfill):

- All disposal facilities are constructed without synthetic liner; many dumpsites even do not have a natural clay lining at the bottom.
- Leachate is not collected and treated at any facility.
- Almost all disposal facilities lack a run-on/run-off control system.
- The groundwater quality is not monitored at any facility.
- Requirements to compact waste and cover it by an intermediate soil layer are often neglected, which makes the waste accessible to rodents, mosquitoes, flies or other animals or insects capable of transmitting disease to humans.
- Landfill combustion is common, reflecting significant generation of methane from landfills and dumpsites.
- As hazardous household waste is not separated from the MSW stream, it is disposed of at MSW facilities without any treatment, posing a continuing danger to the environment, in the long run.
- Several landfills and dumpsites (e.g., in Malaya Vishera, Okulovka and Khvoyninskiy rayon) accept liquid waste (septic tank waste), though they are not designed for this purpose.

- Sometimes medical and veterinarian waste is disposed of at MSW facilities.
- The waste transported to landfills and dumpsites is not weighed which makes difficult to estimate the amount of waste deposited.
- Adequate public access control has been organized at only three MSW landfills (in Novgorod city, Borovichi and Chudovo). Its absence at other facilities results in illegal dumping, unauthorized vehicular traffic and public exposure.
- At several locations (e.g., Malaya Vishera, Chudovo, Soltsy), the capacities of authorised facilities have been exhausted, but still they continue to be used.

Households not covered by MSW collection have to manage their waste themselves. Typically, combustible waste is burned leading to the emission of hazardous air pollutants. Although composting is used by many households living in single-family houses to deal with organic waste, particularly garden waste, it is not common practice in the region, so far. The remaining waste is usually disposed of at random dumps near residential areas. As a result, temporary small dumps frequently appear along the streets in urban districts without organised MSW collection. Occasionally, the municipal services responsible for public cleansing collect the waste and transport it to landfills or dumpsites. In rural areas where MSW is not collected, permanent illegal dumps appear near almost all settlements. Sometimes, municipalities make efforts to remove some of the dumps.

In the summer time, a lot of waste is also generated by gardeners' associations (dachas) in suburban areas. As a rule, they are not included in the municipal system of waste collection which leads to illegal dumping around gardens.

The poor condition of MSW disposal facilities as well as illegal dumps contributes to environmental impacts such as soil, surface and groundwater contamination, air pollution, odour and damage to landscape. Furthermore, current waste disposal practices contribute to overall environmental public health impacts. However, these impacts are mainly indirect through contamination of ground and surface water supplies, and airborne transfer of particulate and volatile contaminants. Additionally, uncontrolled fermentation of non-covered and non-compacted municipal waste at disposal sites creates a food source and habitat for infectious agents such as bacteria, protozoa and helminthes as well as for insects, rodents and some bird species which may act as passive vectors of disease transmission. This may result in additional health risks for the general public, but more particularly for landfill workers.

2.4 Options for Improvement of the Existing MSW System

Current MSW management practices are not sufficiently effective to ensure environmental protection and public health safety. The scale of the problem requires immediate actions to address the most critical problems. Nevertheless, due to financial constraints, it would be impractical to adopt strategies with an emphasis on relatively sophisticated waste treatment and resource recovery initiatives. Therefore, it is necessary to take measures in all MSW management sectors which enable achieve sustainable improvements in environmental performance at a low cost.

2.4.1 Waste Collection

In general, the collection system is insufficiently developed in the Novgorod oblast outside Novgorod City. A large portion of the population is not covered by a municipal waste collection system, and the provision of collection service is not always satisfactory. The following actions may be taken in order to improve the situation:

- To expand the organised MSW collection system to private single-family households in urban areas not covered by the service. This may be easily achieved as all cities and towns have already developed a MSW collection system covering multi-storey apartment buildings. The most cost-effective way of expanding the collection is to organise small collection points in non-covered districts which may serve single-family houses within distance of 100-120 m.
- To organise separate collection of hazardous waste from households and small businesses in order to keep it away from landfills.
- To increase the collection frequency where necessary.
- To develop inter-municipal co-operation.

2.4.2 Recycling and Recovery

In the short term, there is a modest potential for expanding the recycling and resource recovery activities in the Novgorod oblast. However, these activities will expand only to the degree, and on a scale at which they can be sustained by the demand for recyclables and the market for recovered materials. At the moment, the demand is not high, and it is not realistic to expect a significant increase in waste diversion rates.

Achieving significant resource recovery rates will have to wait until it is feasible to apply economic instruments such as selective consumer product charges which are usually necessary to finance large-scale waste diversion programmes.

Composting of organic waste may be widely used in private single-family houses in both urban and rural areas provided that municipalities will organise

training programmes to teach people how to do it at low cost and in a safe manner.

2.4.3 Treatment and Disposal

At the moment, examples of good treatment and disposal facilities are the exception rather than the rule. Due to financial constraints, land disposal is likely to remain the primary approach in MSW management in the near and medium term. Therefore, a realistic MSW management strategy should aim to provide secure waste disposal and storage through upgrading existing facilities or developing new ones which are located, designed and operated to limit, if not eliminate, negative impacts on the environment and human health. A practical approach to waste disposal has to include the following elements:

- MSW facilities with exhausted capacities (Malaya Vishera, Chudovo, Soltsy) and facilities imposing serious damage to the environment, particularly to groundwater supplies used for drinking purposes (Borovichi), should be closed.
- New municipal landfills should be constructed where necessary, taking into consideration geological and design restrictions.
- The sanitary and environmental performance of existing landfills and dumpsites may be improved through the use of operating practices such as compacting and covering waste with soil, which will help reduce odour; control litter, insects and rodents; and protect public health.

3 Supply of Finance Overview

3.1 Mode of Financial Data Collection

In order to carry out the model runs and develop a financing strategy for municipal waste management in the Novgorod Oblast, technical, financial and socio-economic data was required for Novgorod oblast and for the 22 rayons.

The data was used for the following purposes:

- to assess the financing available in each of the model sub-regions,
- to check if the defined targets and development scenarios are financially viable (affordable),
- to validate assumptions in the cost functions, and
- to use data for the base year (2001) as direct input to the model.

In order to facilitate the financial data collection, a questionnaire was prepared. The questionnaire contains sections and questions on administrative, socio-economic, technical and financial matters (see Appendix 4).

The questionnaire was presented to representatives of the Oblast and the administrations of 22 rayons at a workshop held in Novgorod City in November 2001. The questionnaires were filled in and returned at the end of December 2001, and the data was compiled at the beginning of January 2002.

Data on public budget was taken from reports on public budget performance (in monthly format). Other socio-economic data was taken from the annual statistical yearbook and report on the socio-economic development of the Novgorod Oblast published by the Novgorod Oblast.

3.2 Public Operating Subsidies and Capital Investments

Based on statistics on the expenditure of the utilities² and an assumption that public expenditure on housing and municipal economy would be divided among the utilities in a similar pattern, we have estimated that public expenditure in relation to municipal solid waste management would account for 9% of the expenditure on housing and municipal economy. This is equal to an amount of RUR 81.17 million or 2.48% of the total public expenditure or 0.35% of the GRP as illustrated in Table 3.1 below. These figures relate to the base year. It is important to note that the current public expenditure on HME includes target subsidies to the poor (least heavy item), compensation of discounts to the privileged consumers as well as compensation of “inter-tariff difference” (compensation of losses due to the difference between the economically justified tariff and the subsidised domestic tariff – most heavy item).

Table 3.1: Public expenditure on MSW management, Novgorod oblast, 2000

	Million RUR, year 2000	% of public expenditure	% of GRP
Public revenue (excl. federal transfers)	2,335		
Public expenditure	3,268		
Current	3,059	93.6%	
Capital	209	6.40%	
Expenditure on HME	924	28.3%	
Capital	78	2.4%	
Current	846	25.9%	
Expenditure on MSW (estimate: 9% of expenditure on housing & municipal economy)	81.17	2.48%	0.35%
Capital	6.85	0.21%	0.03%
Current incl. subsidies to households	74.32	2.27%	0.32%

Source: Status of reforming the housing and municipal economy in the Novgorod Oblast, Novgorod Oblstat, 2001

3.3 Tariffs

The historical development of tariffs for municipal waste removal and disposal in selected municipalities of the Novgorod Oblast are presented below in Table 3.2. The data reveals the following:

- Huge tariffs variation across municipalities which cannot be explained by different cost structures of waste management (if only cost related to waste management are considered);

² Source: “Status of reforming the housing and municipal economy in the Novgorod Oblast”, Novgorod Oblstat, 2001

- Low household tariff level and slow tariff growth in some municipalities at the expense of other consumers (cross-subsidization) and/or local public budget in spite of the declared policy target to achieve full cost recovery and phase out cross-subsidisation.

Table 3.2: Historic development in tariffs (RUR per m³, net of VAT)

City / Rayon:	Veliki Novgorod			Novgorodskiy rayon (Novzhilkomkhoz)			Novgorodskiy rayon (Novzhilkommunservice)		
	1999	2000	2001	1999	2000	2001	1999	2000	2001
Households	19.91	29.75	29.75	15.72	26.15	26.15	12.07	24.22	32.21
Budgetary organisations	13.57	29.00	29.00	15.72	26.15	26.15	12.07	24.22	32.21
Commerce	25.47	82.51	82.51	15.72	26.15	26.15	12.07	24.22	32.21
Industries	25.47	82.51	82.51	15.72	26.15	26.15	12.07	24.22	32.21

City/Rayon	Valdai, Valdaysky Rayon			Borovichi			Okulovka		
	1999	2000	2001	1999	2000	2001	1999	2000	2001
Households	0.35	0.44	0.74	20.23	20.23	30.75	N.a.	N.a.	N.a.
Budgetary organisations	8.20	13.25	19.82	20.23	20.23	30.75	N.a.	N.a.	N.a.
Commerce	8.20	13.25	21.54	20.23	20.23	30.75	N.a.	N.a.	N.a.
Industries	8.20	13.25	21.54	20.23	20.23	30.75	N.a.	N.a.	N.a.

City / Rayon	Staraya Russa			Soltsy			Batetsky		
	1999	2000	2001	1999	2000	2001	1999	2000	2001
Households	6.80	11.57	27.00	9.96	9.96	26.54	7.26	7.26	11.31
Budgetary organisations	8.12	15.00	29.21	9.96	9.96	26.54	7.26	7.26	11.31
Commerce	10.91	17.4	37.32	10.8	10.8	27.75	10.96	10.96	23.76
Industries	10.91	22.5	117.22	10.8	10.8	27.75	10.96	10.96	23.76

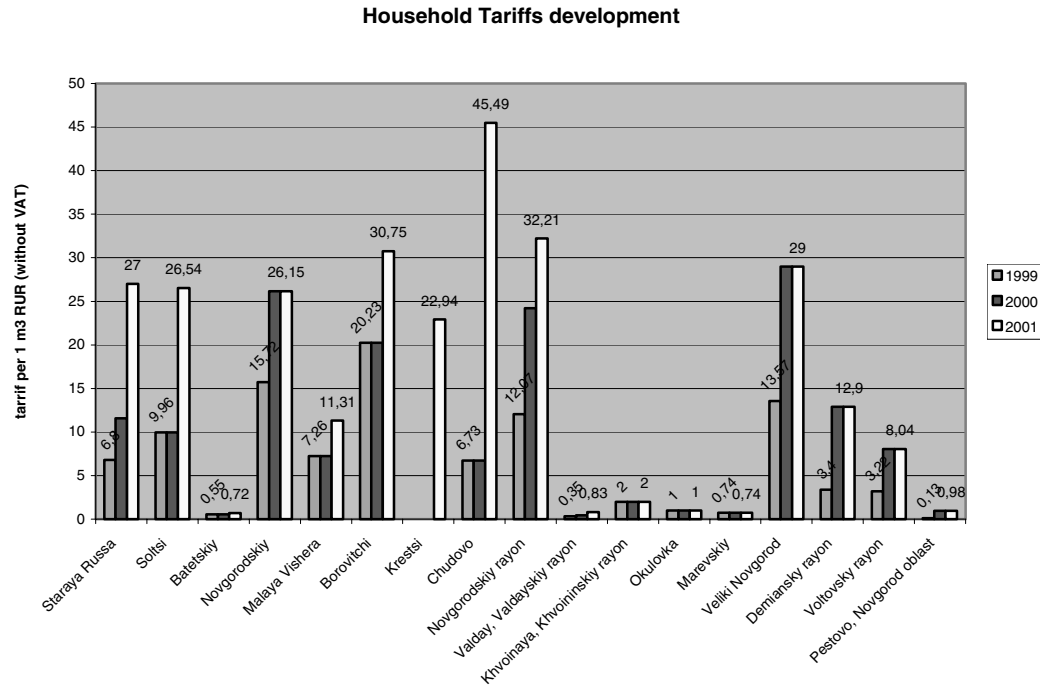
City / Rayon	Chudovo			Krestsy			Demyansky rayon		
	1999	2000	2001	1999	2000	2001	1999	2000	2001
Households	40.00	40.0	45.49	28.68	28.68	28.68	3.40	12.90	12.90
Budgetary organisa-tions	6.73	6.73	54.01	n.a.	n.a.	n.a.	8.00	14.47	35.12
Commerce	6.73	6.73	54.01	n.a.	n.a.	n.a.	8.00	14.47	35.12
Industries	6.73	6.73	54.01	n.a.	n.a.	n.a.	8.00	14.47	35.12

City / Rayon	Batetsky			Khvoynaya, Khvoyninsky rayon			Marevsky rayon		
	1999	2000	2001	1999	2000	2001	1999	2000	2001
Households	6.89	18.01	18.01	9.90	12.08	16.68	0.74	0.74	0.74
Budgetary organisa-tions	6.89	18.01	18.01	9.90	12.08	16.68	n.a.	n.a.	n.a.
Commerce	6.89	18.01	18.01	9.90	12.08	16.68	n.a.	n.a.	n.a.
Industries	6.89	18.01	18.01	9.90	12.08	16.68	78.07	110.36	194.55

City / Rayon	Poddorie, Poddorsky Rayon			Volotovskiy rayon			Pestovo		
	1999	2000	2001	1999	2000	2001	1999	2000	2001
Households	n.a.	n.a.	1.87	3.22	8.04	8.04	14.22	18.25	25.09
Budgetary organisa-tions	19.91	19.91	42.0	8.9	11.1	11.13	14.88	17.87	28.23
Commerce	19.91	19.91	42.0	8.9	11.1	11.13	18.39	27.11	32.26
Industries	19.91	19.91	42.0	8.9	11.1	11.13	18.39	27.11	32.26

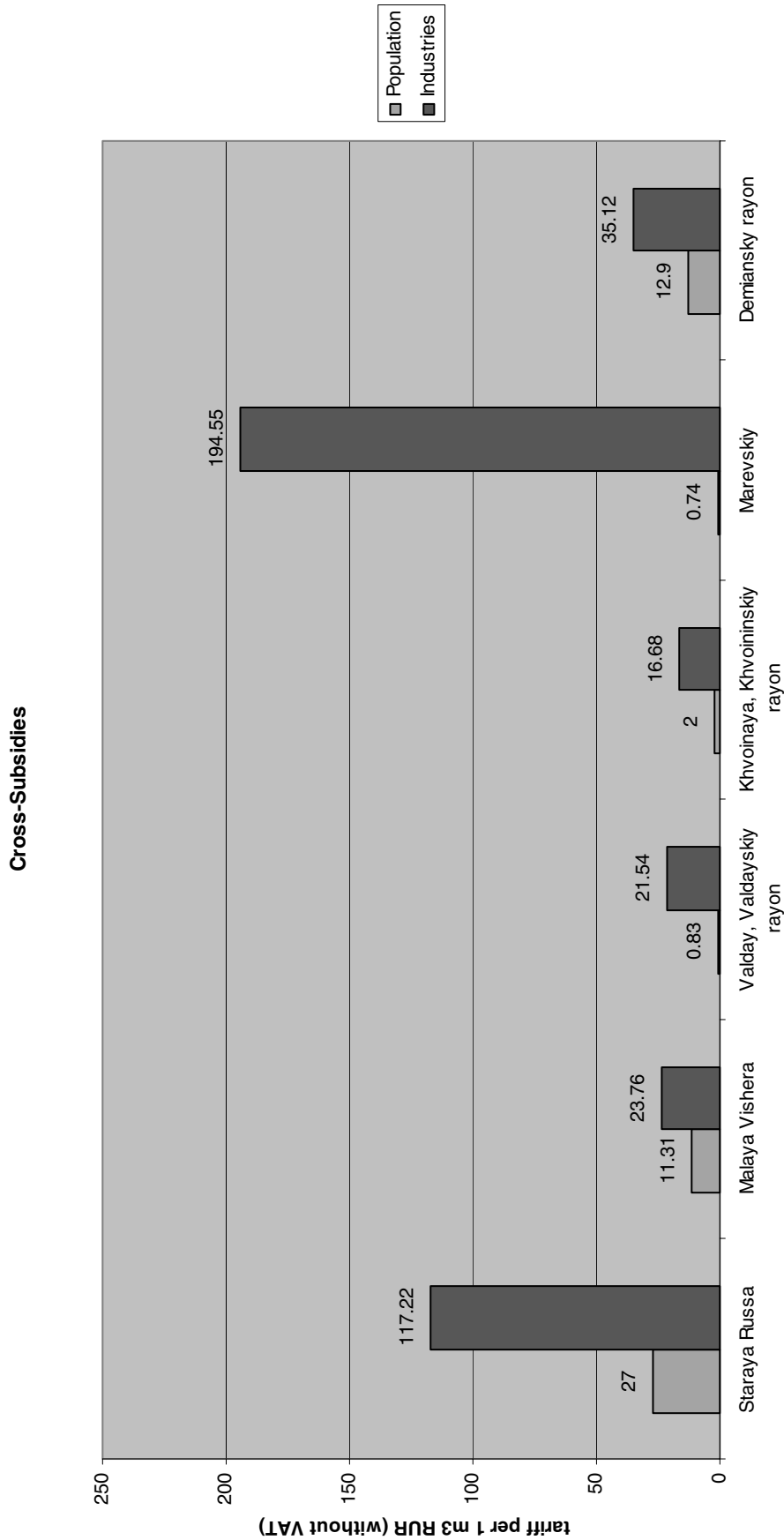
Source: Data provided by waste management companies

Figure 3.1: Tariffs (RUR per m³, net of VAT) historic development in selected municipalities of the Novgorod Oblast



Tariffs for household and industries are presented in Figure 3.2.

Figure 3.2: Tariffs (RUR per m3, net of VAT) for household and industries in selected municipalities of the Novgorod Oblast, 2001



3.3.1 User Charges

Data on the revenue from user charges has been received from the waste utilities operating in each municipality. The data covers billed amount, collection rate and amount received for each source of waste generation. In addition, information has been provided on the share in cash of amounts received and the value of non-cash receivables, if any.

It has been decided to use data from 2001 (base year), since a considerable tariff increase took place in 2001. In order to ensure a realistic projection of the future income from user charges, the year 2001 has been used as the base year. The data is summarised below for Novgorod oblast and for each waste management model group.

Table 3.3: Revenue from user charges, Novgorod oblast, 2001 (RUR 000)

Source	Billed	Collected	Total cash value of user charges collected
Urban population	14,945	11,668	11,668
Rural population	2,751	1,875	1,827
Budget	12,701	8,776	8,681
Commerce	14,870	14,803	14,442
Industry	1,293	728	720
WWTP	21,049	17,512	12,497
Total	67,611	55,364	49,837

Source: Data provided by waste management companies

Note: See details in tables below

Group 1

Group 1 covers Novgorod City and surrounding rayon with three companies: "Novgorod Spetsavtokhozaystvo", serving Novgorod City, "Novzhilcommun-service" and "Novzhilcomkhoz" serving the rayon.

Table 3.4: Revenue from user charges, group 1, 2001 (RUR 000)

Source	Billed	Collected	Collection rate	Share in cash	Non-cash value	Total cash value of user charges collected
Urban population	8,632	8,128	94%	100%		8,128
Rural population	1,193	1,004	84%	87%	80%	955
Budget	1,875	1,098	59%	84%	80%	1,002
Commerce	6,981	7,169	100%	94%	80%	6,808
Industry	23	23	100%	100%		23
WWTP	903	722	80%	70%	80%	585
Total	19,609	18,146	86%	76%	80%	17,504

Source: Data provided by waste management companies

Notes:

- share in cash for WWTP assumed at 70% - data indicates 100%;
- where collection rate given is above 100% due to payment of debts from previous years, a collection rate of 100% has been assumed;
- where data was missing, the value of non-cash receivables has been assumed to be 80% of the cash value.

Group 2

Group 2 consists of the cities Borovichi, Okulovka, Staraya Russa, Parfino and Valdai and relevant rayons.

Table 3.5: Revenue from user charges, Group 2, 2001 (RUR 000)

Source	Billed	Collected	Collection rate	Share in cash	Non-cash value	Total cash value of user charges collected
Urban population	3,680	2,472	67%	100%		2,472
Rural population	676	351	52%	100%		351
Budget	9,845	7,457	76%	100%		7,457
Commerce	7,756	7,508	97%	100%		7,508
Industry	525	439	84%	80%	80%	431
WWTP	18,682	15,561	83%	70%	80%	10,972
Total	41,166	33,790				29,193

Source: Data provided by waste management companies

Notes:

- where data was missing, the value of non-cash receivables has been assumed to be 80% of the cash value;
- share in cash for WWTP assumed at 70% - data indicates 100%;

- for Valdai (revenue from urban population), the figure for year 2000 has been used as no data for 2001 was available, and a collection rate of 52% (average of the rest of the group) has been assumed.

Group 3

Group 3 consists of Malaya Vishera, Pestovo, Soltsy, Kholm, Chudovo, Batetsky, Krestsy, Demyansk, Lubytno, Moshenskoe, Poddorie, Shimsk, Khvoynaya, and Marevo.

Table 3.6: Revenue from user charges, group 3, 2001 (RUR 000)

Source	Billed	Collected	Collection rate	Share in cash	Non-cash value	Total cash value of user charges collected
Urban population	2,632	1,067	41%	100%		1,067
Rural population	881	520	59%	100%	0%	520
Budget	980	220	23%	100%	0%	220
Commerce	132	124	94%	100%	0%	124
Industry	744	265	36%	100%	0%	265
	-	-	-	-	-	-
WWTP	1,463	1,228	84%	70%	80%	939
Total	6,835	3,427				3,138

Source: Data provided by waste management companies

Notes:

- where data was missing, the value of non-cash receivables has been assumed to be 80% of cash value;
- share in cash for WWTP has been assumed at 70% - data indicates 100%;
- for several sources, the data indicates that there is no revenue. In all cases, we have found that this corresponds to low or non-existent waste generation from the particular source. Therefore, it has been assumed that the data is correct;
- for Lubytno, there was no data on billed and collected amounts from industry. Waste generation figures indicate that the industry of Lubytno constitutes 221% of the rest of the group. Amounts billed and collected have therefore been calculated as 221% of the respective totals of the other rayons.

4 Delineation of Model Regions

4.1 General

The Novgorod Oblast covers a large area with 22 municipalities (rayons) of very different size and character. The largest city, Novgorod City has about 240,000 inhabitants, while the smallest rayon, Kholm, has only about 5,000 inhabitants. It is evident that there are major differences with regard to socio-economic conditions, waste generation, present and possible future waste management systems in these cities. In order to study the solid waste management expenditure needs for the entire oblast, generalisations with regard to the present condition and future development of waste generation would thus be required, and also the future development of the solid waste management system.

In order to increase the accuracy of the environmental financing strategy, it is therefore required to delineate the oblast into a number of sub-regions which will be modelled individually in FEASIBLE. The results will then be aggregated to produce a financing strategy for the entire oblast.

4.1.1 Present Plans for Regional Co-Operation

It is evident that present plans for inter-rayon co-operation in the field of solid waste management must be considered in the delineation of sub-regions.

Today, the following co-operation schemes are ongoing or planned:

- Novgorod City and Novgorod Rayon are discussing joint utilisation of the controlled landfill outside Novgorod City.
- Borovichi and Okulovka are discussing joint use of the planned controlled landfill in Borovichi.

4.1.2 Motives and Potential for Regional Co-Operation

Solid waste management is a financially demanding municipal service. Increasing levels of ambition for the development and operation of solid waste management facilities such as landfills will make it increasingly difficult for small cities/towns to cope by themselves. Inter-municipal co-operation on the devel-

opment and operation of solid waste management facilities is, therefore, an attractive solution.

In the Novgorod Oblast, many of the small rayons will not be able to develop controlled landfills, and co-operation with neighbouring rayon, is the only option.

4.1.3 Basis for Model Delineation

In the Novgorod case study, inter-municipal co-operation in relation to the development and operation/maintenance of controlled landfills is one relevant parameter to consider in the model delineation. In this regard, the existing plans for inter-municipal co-operation must be considered. Furthermore, suitable locations for new controlled landfills must be considered taking into account the potential for inter-municipal co-operation and transport distances between different rayons.

The potential to develop the solid waste management systems in the direction of increased recycling/recovery is another important factor to consider.

4.1.4 Identification and Analysis of Various Model Delineation Options

The issues highlighted in the previous section were discussed with the project stakeholders during a workshop in Novgorod City on 22 January 2002. The discussions revealed the following:

- there are some ongoing discussions about inter-rayon co-operation on the development and operation of controlled landfills.
- there are major differences in the level of the present waste management systems, e.g. with regard to the coverage of waste collection, efforts concerning recycling/recovery and types of waste disposal.
- there are major differences in the future ambitions with regard to solid waste management in the different rayons.
- there are differences in the urban characteristics of the different rayons.

Based on the data and information received through the questionnaires and in the discussions during the workshops, it has been agreed that it will be advisable to subdivide Novgorod Oblast into three subcategories for application of the solid waste management component of FEASIBLE. The three categories are:

Group 1

Group 1 covers Novgorod City and surrounding rayon with three companies: "Novgorod Spetsavtokhozaystvo", serving Novgorod City, "Novzhilcommuneservice" and "Novzhilcomkhoz" serving the rayon.

Group 2

Group 2 consists of the cities Borovichi, Okulovka, Staraya Russa, Parfino and Valdai and corresponding rayons.

Group 3

Group 3 consists of Malaya Vishera, Pestovo, Soltsy, Kholm, Chudovo, Batetsky, Krestsy, Demyansk, Lubyтино, Moshenskoe, Poddorie, Shimsk, Khvoynaya, and Marevo.

4.2 Description of Model Regions

4.2.1 Economic/Financial Indicators

The estimated distribution of the gross regional product (GRP 2001) among the three model regions is presented below.

Table 4.1: Estimated distribution of gross regional product (GRP 2001) among the three model regions, Novgorod oblast, 2001, million RUR.

Group 1	Group 2	Group 3
14,300	8,400	5,300

Source: Consultant's own estimate

It is assumed that the average yearly growth in GRP within each group will be 4%, and it will remain constant within the planning period.

The GRP structure by sectors is also anticipated to be invariable until 2015. The distribution on different economic sectors and groups is given in Table 4.2 below.

Table 4.2: Estimated GRP structure in the three model regions, Novgorod oblast, 2001

	Group 1	Group 2	Group 3
Industry	45%	41%	40%
Commerce and services	40%	30%	28%
Construction and demolition (C&D)	12%	8%	7%
Agriculture and forestry	3%	21%	25%

Source: Consultant's own estimate

The forecast of end users' consumption in % of GRP and the share of goods and services are anticipated to be equal for each group. The trend of change for the planning period is presented in Table 4.3.

Table 4.3: Projected share of final consumption in GRP and consumption structure, Novgorod oblast, %

	2000	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
End users' consumption, %	45	45	45	45	46	46	46	46	47	47	47	47	48	48	48	48
Goods, %	87	87	87	87	86	86	86	86	85	85	85	85	84	84	84	84
Services, %	13	13	13	13	14	14	14	14	15	15	15	15	16	16	16	16

Source: Consultant's own estimate

The estimated shares of urban and rural population, respectively, in the total consumption of goods and services within the three groups are presented in Table 4.4.

Table 4.4: Estimated shares of urban and rural population in total consumption of goods and services in the three groups, Novgorod oblast, 2001

	Group 1	Group 2	Group 3
Urban	91%	68%	68%
Rural	9%	32%	32%

Source: Consultant's own estimate

Social Indicators

The same tendency of population decrease is presently taking place in Novgorod oblast as in Russia as a whole. It reflects the severe socio-economic situation in rural areas and small towns which results in natural migration to large cities where the labour market is more dynamical. The population forecast within the planning period is given below (Table 4.5).

Table 4.5: Population dynamics from 2000 to 2015 (000' people), and percentage.

	Group 1		Group 2		Group 3		Total	
	2000	2015	2000	2015	2000	2015	2000	2015
Population	296	281	219	215	213	206	728	702
Urban, (UMS)	12%		10%		6%			
Urban, (USF)	80%		55%		23%			
Households, rural	8%		35%		68%			

Source: Consultant's own estimate

Present Waste Generation

It is anticipated that there will not be any increase the quantity of generated food waste as a result of an increase in households income. This fact is connected with the widespread use of packaged products, which enables a reduction in the quantity of food waste at the end users due to the consumption of

semi-finished products. In EU countries, the level of food waste in 2000 was 135 kg per person/per year in urban areas and 65 in rural areas. By experts' assessment, the same level of food waste generation in Novgorod oblast will be achieved in approximately 25 years.

Based on collected data on waste generation from different sources, the annual amount of waste generated has been determined for selected groups, both for sectors and households. The present survey contains data on waste disposed at the landfills/dumps only in 2000.

Table 4.6: Waste generation from different sources, Novgorod oblast, 2001

	Group 1	Group 2	Group 3
Urban population, tonnes/year	71,061	40,798	17,033
Urban population, kg/person/year	262	284	250
Rural population, tonnes/year	5,073	8,264	27,007
Rural population, kg/person/year	209	109	134
Industries, tonnes/year	19,053	4,071	11,044
Commerce and services, tonnes/year	11,875	6,486	11,307
C&D, tonnes/year	0	190	1,578
WWTF sludge*, tonnes/year	0	0	0
Total tonnes/year	107,061	59,810	67,969

*WWTP sludge has not been considered in the study.

Source: Natural resource committee, Novgorod oblast, Questionnaire

4.3 Future Waste Generation Predicted by FEASIBLE

Based on a model run using FEASIBLE, the waste generation in 2015 has been predicted, and the results are presented in Table 4.7. The assumptions made are described in Section 4.4.

Table 4.7: Projected waste generation from different sources in 2015, Novgorod oblast

	Group 1	Group 2	Group 3
Urban population, tonnes/year	105,503	59,337	24,779
Urban population, kg/person/year	408,105	424	375,899
Rural population, tonnes/year	883	15,394	35,893
Rural population, kg/person/year	395	204	256
Industries, tonnes/year	32,993	7,049	19,124
Commerce and services, tonnes/year	20,563	11,231	19,580
C&D, tonnes/year		329	2,732
WWTF sludge, tonnes/year			
Total tonnes/year	167,944	93,342	102,110

*WWTP sludge has not been considered in the study.

Source: Model run by the consultant using FEASIBLE

4.4 Macro-Economic Forecast and Basic Financial Assumptions

In order to input data and run FEASIBLE, the consultant has made a number of assumptions:

1. Population in the Novgorod oblast

The population in the Novgorod oblast will go further down before stabilising at 715,000 people. However, due to net migration from rural to urban areas within the oblast, the population in group 1 (Novgorod-the-Great and Novgorodsky rayon) will increase by 3,000 people in the planning period, while the population in rayons which form group 3 will go down by 5,000 people.

2. GRP development

It is assumed that the GRP of the Novgorod oblast as well as the real income of households will grow at 4% per year on average in 2001-2015.

The contribution by each group to the GRP is generally assumed to be in proportion with the industrial output produced in the group, but the contribution of Novgorod-the-Great is a bit higher as many public goods are produced in the capital of the region.

There is no statistical data on the GRP structure in each group, so the consultant has assumed that, in group 1, the contribution by industry and services (especially due to non-market services) is higher than the average figure for the oblast, while in group 3, the contribution by forestry and agriculture is much higher than the average figure for the oblast.

Table 4.8: GRP production and structure in the three model groups, Novgorod oblast, 2001

	GRP 2001, mRUR	Industry	Commerce & Services	Construction	Agriculture & Forestry
Group 1	14,300	45.0%	40.0%	12.0%	3.0%
Group 2	8,400	41.0%	30.0%	8.0%	21.0%
Group 3	5,300	40.0%	28.0%	7.0%	25.0%
<i>Total</i>	<i>28,000</i>				

Source: Consultant's own assumptions

3. GRP distribution

The distribution of the GRP in the Novgorod region in the base year is presented in Table 4.2.

Table 4.9: GRP distribution, Novgorod oblast, 2001

GRP distribution	%
Net export*	29.5%
Government expenditure**	23.0%
Savings***	2.5%
Private consumption	45.0%

* - also includes "capital flight" and savings transferred abroad;

** - the figure represents the share of the consolidated state budget;

*** - calculated to balance other items.

4. Private consumption

It is assumed that the distribution will change so that the share of private consumption will gradually increase to 48% from the current 45%, while the share of services in the private consumption will increase to 16% from the current 13%, as presented in Table 4.10.

Table 4.10: Share (in % of GRP) and structure of private consumption, Novgorod oblast, 2001

	2000	2001	2005	2010	2015
Private consumption	45%	45%	46%	47%	48%
Goods, %	87%	87%	86%	85%	84%
Services, %	13%	13%	14%	15%	16%

Source: Consultant's own assumptions

The estimated share of urban population in the total private consumption is presented in Table 4.11.

Table 4.11: Share of urban population in total private consumption, Novgorod oblast, 2001

	Group 1	Group 2	Group 3
Urban consumption	91%	68%	68%
Rural consumption	9%	32%	32%

Source: Consultant's own assumptions

5. Financial assumptions

Revenues of waste management companies. In the baseline scenario (scenario 1A), it is assumed that, while the coverage remains the same, the real revenues of waste management companies will grow in line with the growth in GRP (that is by 4% per annum) due to the increasing amount of waste generated and/or growth in tariffs.

It is also assumed that domestic tariffs (in real terms, in constant base year prices) will grow at such a rate that the share of the average household income spent on municipal waste services will remain constant at base year level.

The public budget financing allocated for the sector will also grow in real terms in line with the growth in GRP.

5 Targets and Scenario Definition

5.1 Use of FEASIBLE

The computerised decision support tool called FEASIBLE is intended as a supporting instrument for the development of a financing strategy. A financing strategy consists of a scenario where there is no gap between the estimated expenditure need and supply of finance. The purpose of a financing strategy is to identify an agreed realistic and affordable service level and to demonstrate how the associated environmental expenditure can be financed.

In relation to the MSW sector, the natural point of departure in developing a financing strategy will be the targets and objectives expressed in national or regional waste management plans or similar documents. A financing strategy cannot replace a waste management plan, however, the financing strategy may prove that targets of the plan are too ambitious or too low considering the financing situation. Consequently, the financing strategy can have an important influence on the target-setting process and could be seen as a supporting element in the elaboration of a waste management plan.

The FEASIBLE model can be used as a means for testing various policy options and scenarios for the financing strategy, however, the actual setting of priorities and implementation of initiatives are

Using the FEASIBLE model can assist in the preparation of financing strategies through providing an aggregate picture of the expenditure need associated with certain targets. As the calculations are based on generic cost functions, the calculations are only valid on the aggregate level. When it comes to the detailed level, feasibility studies are necessary to determine the exact cost profile associated with a particular project.

The model can be used to calculate expenditure needs and waste flow results under different assumptions concerning input parameters related to:

- objectives and targets,
- technical development measures,
- waste generation projection,
- technical and price correction factors.

In the model, targets and objectives are not entered directly but expressed in terms of selected technical development measures. The translation from objectives and targets to technical development measures is done as a pre-modelling exercise by the user. The model cannot optimise the selection of technical development measures in terms of cost effectiveness or environmental protection needs.

Technical development measures can differ with regard to:

- Change in collection coverage, e.g. by specifying the year when full collection coverage will be achieved
- Selection/timing of new waste collection methods, e.g. by specifying different combinations of collection systems for mixed waste, organic waste and recyclables, and the timing of their introduction
- Selection/timing of waste treatment/disposal systems, e.g. by specifying different alternative new disposal/ treatment options and the timing of their introduction, as well as timing of de-commissioning of existing facilities.
- Definition of the technical aspects of a scenario will entail defining a specific combination and scheduling of collection coverage, collection systems and treatment/disposal systems, meeting some set specifications and guidelines or variations thereof.

The FEASIBLE can illustrate the estimated effects of possible policy decisions regarding supply of finance from user charges, the public budget, etc. This is compared to the estimates regarding expenditure need and a financing gap (positive or negative) is calculated. This is useful for a consideration of:

- whether the selected objectives and technical development measures are realistic considering the supply of finance situation
- whether other policies for supply of finance should be considered to ensure that the supply of finance matches the expenditure need.

The model may be used as a tool for testing the suitability of various choices in this regard. However, the model cannot, in itself, ensure that the chosen targets and policies are realistic and affordable in the given context.

What the model cannot substitute:

- Feasibility studies
- Cost-effectiveness optimization
- Priority setting
- Good policy making and effective implementation
- Willingness-to-pay and affordability-to-pay analysis

5.2 Solid Waste Management Objectives and Targets

Solid waste management (SWM) objectives and targets refer to qualitative or quantitative goals for the improvement and development of the present solid waste management system.

Objectives are qualitative goals regarding the future development, e.g.

- improved service level, especially with regard to collection coverage
- reduced adverse impact from waste disposal, i.e. upgrading of existing dumpsites and landfills
- increased focus on waste recovery/recycling, i.e. establishment and operation of new systems for collection of materials for recycling and recovery

Targets are concrete quantitative goals, often operational in nature, e.g.

- collection coverage increased to x% by 20XX
- all illegal dumpsites closed by 20XX
- all dumpsites upgraded to controlled landfills by 20XX
- a XX% recovery/recycling ratio reached by 20XX

The objectives and targets used as a base in SWM planning are often related to national or regional directives and regulations. In cases such as the Novgorod Oblast, where the only relevant document is the environmental action plan for 2000-2004, a qualitative set of targets/objectives can be taken as the point of departure for the SWM planning exercise.

Working group discussions on SWM objectives and targets in the Novgorod Oblast resulted in an agreement to differentiate the objectives/targets between Novgorod City, a number of medium-size cities and the small cities/towns. This is done acknowledging the differences between the three groups in population and socio-economic conditions, current the status of municipal waste management and existing facilities and also the different potential for development and improvement of the present SWM system.

The three sub-groups and the characteristics of their present SWM system are presented in Table 5.1 below.

Table 5.1: Short characteristic of their present SWM system in the three sub-groups, Novgorod oblast, 2001

Sub-group	Cities/rayon	Present SWM system		
		Collection coverage	Collection system	Landfill
1	Novgorod City, Novgorod Rayon	90-93%	Ordinary waste collection Pilot-scale bring banks, recycling stations (glass, plastic, paper)	Controlled landfill
2	Borovitchi, Okulovka, Valdai, Staraya Russa, Parfino	50-75%	Ordinary waste collection Pilot-scale bring banks, recycling stations (glass, plastic, paper)	Dumpsites
3	Krestsi, Chudovo, Malaya Vishera, Shimsk, Soltsi, Vol- tovsky, Marevskiy, Demiansky, Kholm Podzorie, Moshen- skoy, Pestovo, Lju- bitinsky, Khvoinaya	40-100%	Ordinary waste collection Pilot-scale recycling stations in Staraya Russa Some recycling activities dur- ing waste collection at the landfill in Chudovo Pilot-scale recycling stations and some composting activi- ties in Pestovo Some composting activities in Ljubytno	Dumpsites

Source: data from Spetsavtokhozyastvos and multi-functional municipal utilities

The working group also agreed to focus on setting targets/objectives within the three areas of:

- 1 Magnitude and timing of increase in the collection coverage,
- 2 Closure of dumpsite and upgrading or development of existing dumpsites and landfills,
- 3 Establishment and operation of new systems for the collection of materials for recycling and recovery.

5.3 Definition of Technical Development Scenarios

A technical scenario can be defined as:

A specific development in waste management system which meets some specific objectives/targets.

Technical scenarios can be developed as:

- Alternative technical developments which meet one specific set of objectives/ targets, or
- alternative technical developments which meet different sets of objectives/targets.

Technical scenarios can differ with regard to e.g.

- Rate of increase in collection coverage.
- Selection/timing of new waste collection methods, e.g. by specifying different combinations of collection systems for mixed waste, organic waste and recyclables, as well as the timing of their introduction.
- Selection/timing of waste treatment/disposal systems, e.g. by specifying different alternative new disposal/ treatment options and the timing of their introduction, as well as the timing of de-commissioning existing facilities.

The definition of technical scenarios for Novgorod Oblast entails defining a specific combination and scheduling of collection coverage, collection systems and treatment/disposal systems which meet some set specifications and guidelines or variations thereof.

5.4 Definition of the Baseline Scenario (Scenario 1)

The baseline scenario (scenario 1) can be referred to as a "no developments" or "business as usual" scenario. The common assumptions for the baseline scenario are presented below.

- The present (base year) solid waste management system is maintained over the entire planning period. However, needed landfill and dumpsite capacity is added when required.
- The operating costs rise according to increased waste amounts generated.
- Major repair to maintain sustainable operability of the infrastructure is included. Major repair means rehabilitation and replacement of fixed assets required to maintain existing infrastructure and service level.
- The kerbside ordinary collection system is maintained over the entire planning period.
- Tariffs for all consumers (in real terms, in constant base year prices) will grow in line with the GRP that is at 4% per annum so that the share of household income spent on municipal waste services will remain constant at base year level. While the coverage remains the same in the baseline scenario, the real revenues will also grow due to increasing amounts of waste generated and growth in tariffs.

Here and after, the **base year is 2001**, and the planning period is 2002-2015, in all scenarios.

The development scenarios, referred to as scenarios 2 and 3, evaluated in this study are described below.

5.5 Scenario 2

A sensible first development scenario to study involves increase in the collection coverage and closure of dumpsites/upgrade of landfills.

Based on the consultant's experience from other comparable regions, it is not motivated to study scenarios with other treatment options than landfills, e.g. incinerators. The reason for this is that as long as suitable land for developing proper landfills is available within a not too long distance from the cities/towns, this option for waste disposal is the least costly of the environmentally acceptable options, and therefore generally the most advantageous.

The working group has proposed an inter-municipal co-operation set-up resulting in three regional landfills in sub-group 2, and 9 regional landfills in Sub-group 3. As a comparison, a setup with only 2 landfills in sub-group 2 and 4 in sub-group 3 have been also studied. The first alternative is referred to as Scenario 2a and the second as 2b.

Including scenario 2b in the evaluation is motivated by that experience tells that a regional approach with a fewer number of large landfills and longer transports is generally more economic than a larger number of small landfills with short transport distances. The regional approach is also advantageous from an environmental impact point of view, since the landfill impact is concentrated on a fewer number of landfills. Furthermore, it can prove more difficult to properly site and get acceptance for many small landfills than for a few larger regional landfills. It should however be acknowledged that in the final evaluation of the two scenarios 2a and 2b, there are also other local issues and concerns that must be considered, such as the state of the local road network, and institutional factors affecting the potential for regional co-operation on development and operation of landfills.

Finally, it should be noted that the Working Group is strongly advocating the scenario 2a option with many local landfills.

A summary of the specific details of scenario 2a and 2b is given in Table 5.2 and Table 5.3 below.

The capacity of the landfills and other facilities were planned on an approximate 20 year life length.

The transport distance to landfills has been weighted considering each rayon's waste generation and their transport distance to a possible local/regional landfill site.

Table 5.2: Summary of the specific details of scenario 2a

Sub-group	Development scenario 2a - Increased collection coverage and upgraded landfills alternative a		
	Collection coverage	Collection system	Landfill
1	92% today, 98% in 2015	Ordinary waste collection Weighted transport distance to landfill: 17 km	1 controlled landfill (incl. expansion) Existing: 870,000 tonnes New line from year 2011: 2,400,000 tonnes
2	68% today, 90% in 2015	Ordinary waste collection Weighted transport distance to landfill: 12 km	Dumpsites until year 2005 3 controlled landfills 2004 Borovitchi, Okulovka 725,000 tonnes, 2005 Staraya Russa, Parfino 580,000 tonnes 2006 Valdai 145,000 tonnes
3	61% today, 85% in 2015	Ordinary waste collection Weighted transport distance to landfill: 27 km	Dumpsites until year 2010 3 controlled landfills from 2009 3 controlled landfills from 2010 3 controlled landfills from 2011 Average capacity 125,000 tonnes

Table 5.3: Summary of the specific details of scenario 2b

Sub-group	Development scenario 2b - Increased collection coverage and upgraded landfills alternative b		
	Collection coverage	Collection system	Landfill
1	92% today, 98% in 2015	Ordinary waste collection Weighted transport distance to landfill: 17 km	Controlled landfill Existing: 870,000 tonnes New line from year 2011: 2,400,000 tonnes
2	68% today, 90% in 2015	Ordinary waste collection Weighted transport distance to landfill: 23 km	Dumpsites until year 2005 2 controlled landfills 2004 Borovitchi, Okulovka, Valday 870,000 tonnes, 2005 Staraya Russa, Parfino 580,000 tonnes
3	62% today, 85% in 2015	Ordinary waste collection Weighted transport distance to landfill: 69 km	Dumpsites until year 2010 1 controlled landfill from 2009 1 controlled landfill from 2010 2 controlled landfills from 2011 Average capacity 300,000 tonnes

5.6 Scenario 3

Considering the third objective/target specified above, scenario 3 involves adding recycling/recovery objectives to the collection coverage and landfill development targets of scenario 2a. The reason for choosing scenario 2a is that the local stakeholders have expressed a strong interest in studying this scenario further. It should, however, be noted that there are advantages in scenario 2b that have not been fully considered in the model, e.g. the reduced environmental impact from having a smaller number of large landfills, rather than a larger number of small landfills, and the possible difficulties in locating and getting acceptance for all new small landfills.

As can be seen in Table 5.4 below, the ordinary collection of scenario 2a has been complemented with two collection methods for recyclables (recycling centres and bring banks) believed to be applicable and appropriate in Novgorod Oblast. The differences between the three sub-groups with regard to timing and selection of collection system, reflect the varying capability of the sub-groups to shoulder the costs of establishing and operating these collection systems.

Table 5.4: Summary of the specific details of scenario 3

Sub-group	Development scenario 3 - Increased collection coverage, upgraded landfills, and recycling		
	Collection coverage	Collection system	Landfill
1	92% today, 98% in 2015	Ordinary waste collection until year 2003 Weighted transport distance to landfill: 17 km Recycling centres by 2004 Bring banks by 2006	Controlled landfill (existing and new) Existing: 870,000 tonnes New line from year 2011: 2,400,000 tonnes MRF from 2004: 25,000 tonnes/year
2	68% today, 90% in 2015	Ordinary waste collection until year 2005 Weighted transport distance to landfill: 12 km Recycling centres by 2006 Bring banks by 2010	Dumpsites until year 2005 3 controlled landfills from 2006 2004 Borovitchi, Okulovka 700,000 tonnes, 2005 Staraya Russa, Parfino 560,000 tonnes Valdai 140,000 tonnes 2 MRF from 2006: Borovitchi, Okulovka 9000 tonnes/year, Staraya Russa, Parfino 7500 tonnes/year
3	62% today, 85% in 2015	Ordinary waste collection until year 2010 Weighted transport distance to landfill: 27 km Recycling centres by 2011	Dumpsites until year 2010 9 controlled landfills from 2009-2011 (3 each year) Average capacity 125,000 tonnes

5.7 Scenario 4

Finally, scenario 4 differs from scenario 3 only by the assumption that an incineration plant will be constructed with capacity of 105,000 tonnes/year for incineration of the MSW generated in group 1 and, probably, from neighbouring settlements from other groups. The plant is assumed to be located close to existing municipal landfill.

It anticipated that, before incineration, the MSW generated in group 1 will be sorted at a sorting station to separate recyclables (paper, cardboard, plastic, metal, glass), and that only 80% of total amount of waste generated will be incinerated. The ashes will be disposed of at a specially constructed cell at the existing controlled municipal landfill.

The capacity of the incineration plant has been chosen based on a forecast of the increase in MSW generation in line with the growth in GDP and households income up until 2015. The required capacity of Novgorod's landfill is reduced appropriately compared to scenario 3.

In groups 2 and 3, no changes are anticipated as compared to scenario 3.

6 Description of Modelling Results

Below, the modelling results are presented for each of the modelled groups. A number of scenarios have been tested in each group in accordance with the scenarios outlined in Chapter 5. The results of these scenarios are presented individually for the groups.

6.1 Group 1

6.1.1 Baseline Scenario (Scenario 1)

Scenario 1 is a baseline scenario in which it is assumed that the MSW management system will remain unchanged in the planning period (no change in waste collection rate or collection and treatment methods).

Scenario 1a

Scenario 1a illustrates a situation in which there is no change in the background assumptions as to supply of finance. User charges and public expenditure grow in line with the GRP.

The overall result of the scenario is that there is a financing gap. The supply of finance is not sufficient to cover the expenditure need. Hence, the expenditure need associated with operating and maintaining the existing MSW management system cannot be met unless changes in the supply of finance are made. If no changes in the supply of finance are made, the system will deteriorate due to lack of maintenance.

The results are illustrated in Table 6.1 below.

Table 6.1: Expenditure need and financing gap, group 1, scenario 1a, total and selected years (000 RUR)

	Total	2001	2005	2010	2015
Collection	388,399	21,293	23,852	27,163	30,894
Additional transport	0	0	0	0	0
Facility investment	62,589	0	0	27,532	0
Facility O&M	50,375	2,533	3,297	3,010	3,599
Total expenditure need	501,362	23,826	27,149	57,705	34,493
Total financing	407,016	22,544	23,008	27,993	34,057
Financing gap	-94,346	-1,283	-4,141	-29,712	-436

Source: Model calculations

The major part of the expenditure need arises from the collection system. The expenditure need for collection increases during the planning period because waste generation is projected to increase. The increased amounts of waste will be a larger burden on the collection system. The facility investment expenditure need arises from the required investments as the landfill is expanded³.

Scenario 1b

The above results illustrate that an increase in supply of finance is needed to run the current MSW management system. In scenario 1b, the supply of finance from user charges is increased through a steep growth in revenue from household user charges during the first three years of the planning period (2002-2004). Instead of a continuous 4% growth in user charges, the following is assumed:

Table 6.2: Assumptions as to growth rates of household user charges (real terms), scenarios 1a and 1b

Growth in user charges	2002-2004	2005-2015
Urban households	20%	4%
Rural households	10%	4%

Source: Consultant's assumptions

It is also assumed that collection of user charges is improved significantly and, by year 4, will reach almost 100% of the amount billed. The above assumptions are in line with the policy objectives to achieve full cost recovery from household user charges as well as to eliminate cross-subsidisation from industry to households.

³ The generic cost function in the model has been constructed based on the assumption that landfills consist of cells which are opened when there is a need for additional capacity (when the existing cell is full). The opening of a new cell is associated with investment costs.

Such a policy which forms the Scenario 1B helps to bridge the gap and also to reduce the financing deficit within first 5 years of the strategy implementation. Cross-sector subsidy to households will also be phased-out within the first three years from the beginning of the strategy implementation. Table 6.3 illustrates the development in user charges and the effect on the total level of financing in the two scenarios.

Table 6.3: Supply of finance, group 1, scenarios 1a and 1b (000 RUR)

Source of finance	Total	2001	2002	2003	2004	2015
Public expenditure	56,809	2,837	2,951	3,069	3,191	4,913
Loans	0	0	0	0	0	0
Grants	12,000	3,000	3,000	3,000	3,000	0
Other	3,000	750	750	750	750	0
User charges, scenario 1a	335,206	15,956	16,899	17,888	18,932	29,144
User charges, scenario 1b	421,699	15,956	18,288	21,064	24,384	37,538
Total financing, scenario 1a	407,016	22,544	23,600	24,707	25,873	34,057
Total financing, scenario 1b	493,508	22,544	24,988	27,882	31,325	42,451

Source: Model calculations

The results for scenario 1b with the same expenditure need as scenario 1a and increased supply of finance are illustrated in Table 6.4 below.

Table 6.4: Expenditure need and financing gap, group 1, scenario 1b, total and selected years (000 RUR)

	Total	2001	2005	2010	2015
Total expenditure need	501,362	23,826	27,149	57,705	34,493
Total financing	493,508	22,544	28,679	34,892	42,451
Financing gap	-7,854	-1,283	1,530	-22,813	7,958

Source: Model calculations

The results indicate that, with this change in user charge revenue, the expenditure need is almost covered. A few additional tariff adjustments would have to be made in order to ensure sufficient supply of finance to sustain the present level of service provided by the MSW management system.

However, when considering development scenarios with more ambitious objectives for the service level, policies for additional supply of finance will be an essential part of the package.

6.1.2 Scenario 2

In scenario 2, a more ambitious objective for the service level is considered. The waste collection coverage is increased to include the areas of the rayon which are more distant from Novgorod City. This implies an increased expenditure need due to several factors:

- The amount of waste collected is higher and, therefore, expenditure need for collection increases.
- Due to the geographical distance from the city, there is an expenditure need for additional transport.
- The amount of waste being disposed of at the landfill increases, which implies a slightly increased expenditure need for O&M of the landfill.

Table 6.5 illustrates the differences in expenditure need components between scenario 1 and scenario 2.

Table 6.5: Expenditure need, group 1, scenarios 1 and 2 (000 RUR)

Expenditure need component	Scenario 1	Scenario 2
Collection	388,399	417,941
Additional transport	0	7,291
Facility investment	62,589	62,589
Facility O&M	50,375	51,323
Total expenditure need	501,362	539,143

Source: Model calculations

In terms of supply of finance, it is realistic to assume that the revenue from user charges will increase as additional households are provided with the MSW services. In addition, it is assumed that the increase in revenue from user charges in scenario 1b is implemented as well.

Table 6.6: Supply of finance, group 1, scenarios 1b and 2.

Source of finance	Total	2001	2005	2010	2015
Public expenditure	56,809	2,837	3,319	4,038	4,913
Loans	0	0	0	0	0
Grants	12,000	3,000	0	0	0
Other	3,000	0	0	0	0
User charges, scenario 1b	421,699	15,956	25,359	30,854	37,538
User charges, scenario 2	518,781	15,956	28,170	38,699	53,447
Total financing, scenario 1b	493,508	22,544	28,679	34,892	42,451
Total financing, scenario 2	590,590	22,544	31,489	42,737	58,360

Source: Model calculations

Under these assumptions, the additional revenue from user charges is sufficient to cover the increased expenditure need. This is illustrated in Table 6.7 below.

Table 6.7: Expenditure need and financing gap, group 1, scenario 2, total and selected years (000 RUR)

	Total	2001	2005	2010	2015
Total expenditure need	539,143	24,159	28,396	60,636	40,192
Total financing	590,590	22,544	31,489	42,737	58,360
Financing gap	51,447	-1,615	3,093	-17,899	18,168

Source: Model calculations

Given that there is a considerable positive financing gap in this scenario, a more ambitious development objective could be considered. This is the aim of scenario 3.

6.1.3 Scenario 3

Scenario 3 focuses on a more ambitious development target where the collection system is changed to be geared towards recycling, in addition to the development measures in scenario 2. Compared to scenario 2, this implies increased expenditure needs due to the following factors:

- Increased expenditure need for collection due to more advanced collection systems
- Increased expenditure need for facility investment and O&M due to the need to establish an MRF to handle the recyclable materials

Table 6.8 illustrates the expenditure need in this scenario compared to scenario 2.

Table 6.8: Expenditure need, group 1, scenarios 2 and 3 (000 RUR)

Expenditure need component	Scenario 2	Scenario 3
Collection	417,941	423,176
Additional transport	7,291	6,533
Facility investment	62,589	95,402
Facility O&M	51,323	63,176
Total expenditure need	539,143	588,288

Source: Model calculations

It is possible to implement these measures with the supply of finance level of scenario 2.

Table 6.9: Expenditure need and financing gap, group 1, scenario 3, total and selected years (000 RUR)

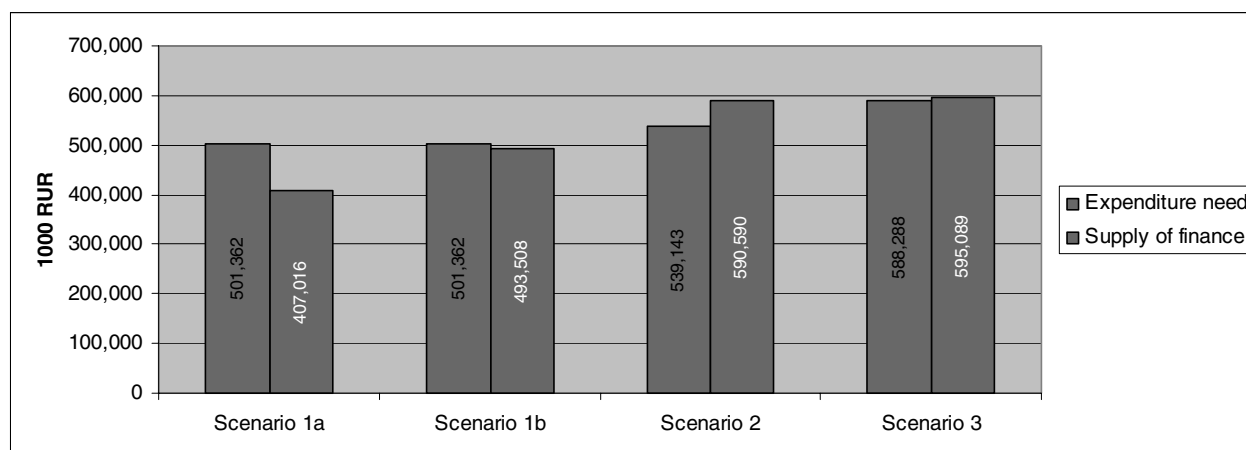
	Total	2001	2005	2010	2015
Total expenditure need	588,288	24,503	69,670	62,402	42,018
Total financing	595,089	22,760	31,747	43,059	58,761
Financing gap	6,801	-1,742	-37,923	-19,343	16,743

Source: Model calculations

6.1.4 Overview of Scenarios

The graph below provides an overall view of the results of the three scenarios.

Figure 6.1: Scenario results, group 1



6.1.5 Scenario 4

Scenario 4 anticipates the construction of an incineration plant for Novgorod-the-Great and Novgorodsky rayon. The capacity of the plant should not be less

than 105,000 tonnes per year, taking into account the expected growth in the amount of waste generated. It is anticipated that the plant will be located close to the existing controlled landfill (17 km from Novgorod) and that it will start operations in 2006. In other aspects, scenario 4 is identical to scenario 3.

The construction of the incineration plant is estimated to require capital investments amounting to RUR 280 million and re-investments later in the period. Moreover, the annual O&M cost under this scenario will be 5 times more than the O&M cost under scenario 3.

Table 6.10: Expenditure need, group 1, scenario 4 (RUR million)

Expenditure need component	Scenario 3	Scenario 4
Collection	423,176	423.176
Additional transport	6,533	2.730
Facility investment	95,402	436.659
Facility O&M	63,176	249.411
Total expenditure need	588,288	1,111.976

Source: Model calculations

In total, the demand for finance under scenario 4 will amount to about RUR 1,100 million in the period 2001-2015, or double the amount in scenario 3.

Assuming the same supply of finance as in scenario 3, the financing gap would be around RUR 440 million. The elimination of such a huge deficit seems to be a big problem as the oblast budget will not be able to allocate required additional funds (totalling RUR 440 million of which RUR 280 million is required for the construction of the plant), and bridging the financing gap by an increase in user charges is not acceptable politically, as it will lead to a multi-fold increase in tariffs for waste collection services.

6.2 Group 2

6.2.1 Baseline Scenario (Scenario 1)

Scenario 1 is a baseline scenario in which it is assumed that the MSW management system will remain unchanged in the planning period (no change in waste collection rate or collection and treatment methods).

Expenditure needs

The model estimates the total expenditure needs at RUR 180.2 million. The expenditure figure is low because it is assumed that existing dumpsites will be operated at the current (very poor) level.

Supply of finance

Two scenarios for supply of finance have been generated - scenarios 1a and 1 b.

In scenario 1a, it is assumed that, while the tariffs will grow at 4% per annum, the collection rate will remain at the current low level (67% for urban population and 52% for rural population). Under these assumptions, the model estimates the finance available in 2001-2015 at RUR 256.9 million, of which only RUR 56.4 million (22%) is contributed by revenue from household user charges.

Table 6.11: Expenditure need and financing gap, group 2, scenario 1a, total and selected years (000 RUR)

	Total	2001	2005	2010	2015
Collection	166,361	9,093	10,172	11,635	13,346
Facility O&M	13,807	807	869	952	1,044
Total expenditure need	180,167	9,901	11,041	12,587	14,389
Total financing	256,936	12,923	14,935	18,170	22,107
Financing gap	76,769	3,022	3,893	5,583	7,717

Source: Model calculations

Gap assessment

In Scenario 1a, there is no deficit of financing. Even with the current low tariff collection efficiency, the system generates a surplus of finance, which may be used to achieve a more ambitious target.

Taking into account the fact that the current tariff collection rate is very low, a fast tariff increase may result in an even lower collection rate. Hence, there is an urgent need to substantially improve the tariff collection efficiency before implementing any development scenario, as such a scenario will most likely require much more financing than what is available in the baseline scenario.

Therefore, in group 2, the consultant would recommend to focus on collection efficiency improvement while allowing real tariffs to grow slowly in line with the economic and household income growth. This is reflected in scenario 1b which illustrates the potential for revenue increase in case of achieving full collection of payments for the services provided. Compared to scenario 1a, this policy could generate an additional RUR 28 million of revenues (20% increase) in the period 2001-2015.

Table 6.12: Supply of finance, group 2, scenarios 1a and 1b (000 RUR)

Source of finance	Total	2001	2005	2010	2015
Public expenditure	33,371	1,667	1,950	2,372	2,886
Loans	0	0	0	0	0
Grants	0	0	0	0	0
Other	2,000	500	0	0	0
User charges, scenario 1a	221,566	10,756	12,985	15,798	19,221
User charges, scenario 1b	249,246	10,756	14,785	17,989	21,886
Total financing, scenario 1a	256,936	22,544	23,600	24,707	34,057
Total financing, scenario 1b	284,616	22,544	24,988	27,882	42,451

Source: Model calculations

6.2.2 Development Scenario 2

Scenario 2 anticipates that new landfills will be constructed in 2004-2006 after which all the cities in the group will dispose of waste at a controlled landfill. Moreover, the scenario anticipates a significant increase in waste collection coverage as presented in Chapter 5.

Expenditure needs

Two sub-scenarios (2A and 2B) have been generated based on two different options for inter-municipal co-operation in relation to constructing and running the landfills.

Scenario 2A anticipates that 3 new landfills will be constructed, i.e. 1 controlled landfill for each of the following groups of rayons:

- 1 Borovichi and Okulavka,
- 2 Staraya Russa and Parfino
- 3 Valday.

Scenario 2B suggests that Valday will also send municipal waste to the Borovichi-Okulovka's joint landfill, which means that only 2 controlled landfills will be constructed. Of course, this incurs additional recurrent transport cost while it helps to save some investment funds.

Table 6.13: Expenditure need, group 2, scenarios 2a and 2b (RUR million)

Expenditure need component	Scenario 2a	Scenario 2b
Collection	196,853	196,786
Additional transport	0,169	37,480
Facility investment	56,561	49,507
Facility O&M	36,022	32,444
Total expenditure need	289,605	316,218

Source: Model calculations

As illustrated in Table 6.13 above, the model calculation indicates that scenario 2B is RUR 25-30 million more costly than scenario 2A. Therefore, in the following, only the less costly scenario 2A is considered (3 new landfills for group 2).

Under this scenario, the model estimates the expenditure needs at RUR 289.6 million within 2001-2015. Compared to the baseline scenario, the expenditure figure has increased by some RUR 110 million reflecting the investment cost of RUR 55.6 million and increased O&M costs related to the 3 new controlled landfills.

Supply of finance

Referring to scenario 1b, the expenditure need of scenario 2 can almost be covered by the assumed increase in revenue from user charges suggested there. In this light, it has been assumed for scenario 2 that the tariffs will grow at 4% per annum while the collection rate will be substantially improved and reach almost 100% (this is just a technical assumption which is hardly realistic in real life, but the losses due to lower collection could easily be compensated by appropriate higher tariff growth, so that overall revenue would be the same as in the case of full collection). In addition, the revenue from user charges is assumed to increase due to the increase in the number of households services by waste collection.

Under these assumptions, the model estimates the finance available in 2001-2015 at RUR 311.3 million, of which RUR 110.7 million (35.6%) is the contribution of the households which has increased due to the increase in coverage.

Table 6.14: Expenditure need and financing gap, group 2, scenario 2, total and selected years (000 RUR)

	Total	2001	2005	2010	2015
Total expenditure need	289,605	9,212	24,145	23,575	34,150
Total financing	311,266	12,923	17,440	22,523	29,343
Financing gap	21,661	3,711	-6,704	-1,052	-4,807

Source: Model calculations

Gap assessment

Though scenario 2 anticipates a substantial improvement in tariff collection with very modest tariff growth over time, it is affordable as there is no deficit of financing (on the contrary, a surplus amounting to RUR 21.7 million).

Therefore, the more advanced development options presented in the scenario 3 could also be considered.

6.2.3 Development Scenario 3

In addition to the construction of 3 new controlled landfills and increased coverage as anticipated in scenario 2, scenario 3 anticipates the establishment of a system for recycling and, hence, the establishment of material recovery facilities (MRF).

Expenditure needs

Compared to scenario 2, this implies increased expenditure needs due to increased expenditure need for facility investment and O&M because of the need to establish an MRF to handle the recyclable materials.

The model estimates the expenditure needs at RUR 321.9 million within 2001-2015, of which RUR 80.1 million covers investment costs. Table 6.15 illustrates the expenditure need in this scenario compared to scenario 2.

Table 6.15: Expenditure need, group 2, scenarios 2 and 3 (000 RUR)

Expenditure need component	Scenario 2	Scenario 3
Collection	196,853	197,075
Additional transport	169	160
Facility investment	56,561	95,888
Facility O&M	36,022	44,576
Total expenditure need	289,605	321,919

Source: Model calculations

Supply of finance and gap assessment

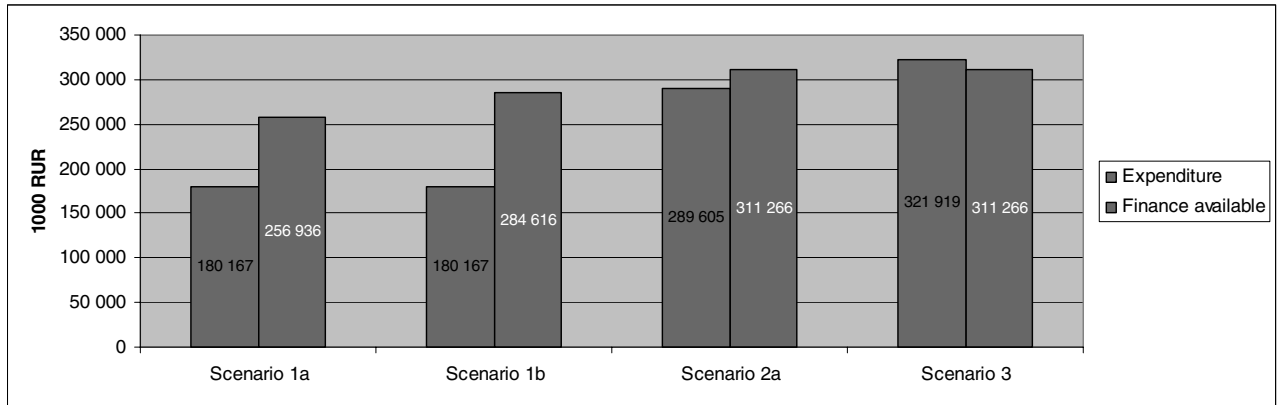
Referring to scenario 2, it is nearly possible to cover the expenditure need with the assumed supply of finance from this scenario. This would result in a small accumulated deficit of financing (RUR 13.3 million) which is within the preciseness of the model calculations ($\geq \pm 5\%$). But the gap could be easily bridged by allocating more public funds to the sector from the public budgets of the 5 municipalities (in total, some RUR 1 million per year would be sufficient to bridge the gap).

Consequently, scenario 3 is also affordable for the municipalities which form group 2.

6.2.4 Overview of Scenarios

Figure 6.2 provides an overview of all scenarios generated for group 2.

Figure 6.2: Scenario results, group2



Source: Model calculations

6.3 Group 3

6.3.1 Baseline Scenario (Scenario 1)

Scenario 1 is a baseline scenario in which it is assumed that the MSW management system will remain unchanged in the planning period (no change in waste collection rate or collection and treatment methods).

Expenditure needs

The model estimates total the expenditure needs at RUR 91.8 million of which RUR 78.5 million covers recurrent operating cost of waste collection, transport and landfill disposal. The expenditure figure is low because it is assumed that existing dump sites will be operated at the current (very poor) level.

Supply of finance

Two scenarios for supply of finance have been generated – scenarios 1a and 1b.

In scenario 1a, it is assumed that, while the tariffs will grow at 4% per annum, the collection rate will remain at the current low level (41% for urban population and 59% for rural population). Under these assumptions, the model estimates the finance available in 2001-2015 at RUR 71.6 million. The contribution by the households in this group (RUR 32 million) amounts to 45%.

Table 6.16: Expenditure need and financing gap, group 3, scenario 1a, total and selected years (000 RUR)

	Total	2001	2005	2010	2015
Collection	78,454	4,124	4,728	5,531	6,466
Facility O&M	13,350	762	831	925	1,029
Total expenditure need	91,804	4,886	5,559	6,456	7,495
Total financing	71,624	3,543	4,127	5,022	6,110
Financing gap	-20,180	-1,342	-1,432	-1434	-1,385

Source: Model calculations

Gap assessment

In scenario 1a, there is a substantial deficit of financing. Due to the very low efficiency in user charges collection, the system does NOT generate enough revenues to cover even the recurrent (operating) cost of the system.

Taking into account the fact that the current tariff collection rate is very low, a fast tariff increase may result in an even lower collection rate. Hence, there is an urgent need to substantially improve the efficiency of tariff collection before implementing any development scenario, as such a scenario would most likely require much more financing than what is available in the baseline.

Therefore, in group 3, the consultant would recommend to focus on collection efficiency improvement while allowing the real tariffs to grow slowly in line with the economic and household income growth. This is reflected in scenario 1b which illustrates the potential for revenue increase in case of full collection of payments for the services provided is achieved.

Table 6.17: Supply of finance, group 3, scenarios 1a and 1b (000 RUR)

Source of finance	Total	2001	2005	2010	2015
Public expenditure	21,055	1,052	1,230	1,497	1,821
Loans	0	0	0	0	0
Grants	0	0	0	0	0
Other	2,000	500	0	0	0
User charges, scenario 1a	48,569	1,992	2,898	3,525	4,289
User charges, scenario 1b	83,002	1,992	5,137	6,250	7,605
Total financing, scenario 1a	71,624	3,544	4,128	5,022	6,110
Total financing, scenario 1b	106,057	3,544	6,368	7,747	9,426

Source: Model calculations

Comparing to scenario 1a, this policy could generate an additional RUR 34.4 million of revenues (28% increase) in the period 2001-2015, and the baseline gap would thus be bridged.

Table 6.18: Expenditure need and financing gap, group 3, scenario 1b, total and selected years (000 RUR)

	Total	2001	2005	2010	2015
Total expenditure need	91,804	4,887	5,560	6,457	7,495
Total financing	106,057	3,544	6,368	7,747	9,426
Financing gap	14,253	-1,343	808	1,291	1,930

Source: Model calculations

6.3.2 Development Scenario 2

Scenario 2 anticipates the construction of new landfills in 2004-2006 after which all the cities in the group will deposit waste at controlled landfills. Moreover, the scenario also anticipates a significant increase in the coverage of waste collection services as presented in chapter 5.

Expenditure needs

Though the representatives of the municipalities which form group 3 did NOT find any opportunity to co-operate in connection with the construction and running of the landfills, the consultant decided to assess two different sub-scenarios – scenarios 2A and 2B:

Scenario 2A anticipates that 9 new landfills will be constructed (one for each municipality, as the representatives of the municipalities preferred).

Scenario 2B suggests that only 4 new landfills be constructed and that all municipalities send their municipal waste to the newly constructed landfills, that is, they will be forced to co-operate. Of course, this incurs additional recurrent transport cost while it helps to save some capital investment funds. Moreover, in the winter time and the rainy season, the delivery of waste to distant landfills may be a very difficult task taking into account the poor state of some roads and the need to clear the roads of snow in winter time.

The model calculation indicates that scenario 2B (with only 4 landfills) is some RUR 15 million less costly than scenario 2A. This indicates that there is some economic incentive to co-operate, as soon as the above transport risk is acceptable.

Table 6.19: Expenditure need, group 3, scenarios 2a and 2b (000 RUR)

Expenditure need component	Scenario 2a	Scenario 2b
Collection	126,935	126,935
Additional transport	4,736.76	12,700.58
Facility investment	53,790	39,301
Facility O&M	36,437	29,064
Total expenditure need	221,898	208,000

Source: Model calculations

In scenario 2B, the model estimates the expenditure needs at RUR 208 million in the period 2001-2015. Compared to the baseline scenario, the expenditure figure has increased by some RUR 116 million reflecting the investment cost of RUR 40 million and the increased operating and O&M costs related to the 4 new controlled landfills.

Supply of finance

In development scenario 2, it is assumed that, while the tariffs will grow at 4% per annum, the collection rate substantially improve and reach almost 100% by year 2005 (note that this is just a technical assumption which is hardly realistic in real life. However, the losses due to lower collection could easily be compensated by appropriate higher tariff growth, so that overall revenue would be the same as in case of full collection).

Under the above assumptions, the model estimates the financing available in 2001-2015 at RUR 150.3 million, of which RUR 106.2 million (71%) is the contribution by the households which increases substantially due to the increase in coverage as well as the improvement in collection.

Table 6.20: Expenditure need and financing gap, group 3, scenario 2b, total and selected years (000 RUR)

	Total	2001	2005	2010	2015
Total expenditure need	208,000	4,887	7,008	19,635	21,452
Total financing	150,289	3,760	7,748	11,338	16,427
Financing Gap	-57,711	-1,126	739	-8,297	-5,025

Source: Model calculations

Gap assessment

Even in the less costly development scenario 2B, there is a significant financing gap amounting to RUR 58 million over the period 2002-2015 in spite of a substantial improvement in tariff collection and (though modest) tariff growth over time. As a result, none of the versions of development scenario 2 are affordable for group 3.

Therefore, there is no need to assess the more advanced development options presented in scenario 3, as they will require even more financing than scenario

2. Rather, a less ambitious (in terms of new capital investments) scenario 2C should be suggested, e.g. a scenario anticipating the construction of a smaller amount of new controlled landfills, for example in Chudovo, Soltsy and Shimsk as these are bigger municipalities with stronger public budgets. While for other municipalities only low-cost operating improvements and rehabilitation of existing dump sites could be suggested.

A proposed Scenario 2C is presented below.

6.3.3 Development Scenario 2C

Scenario 2C anticipates increased coverage of waste collection services (as in scenario 2A) and the construction of only 3 new controlled landfills in the following rayons:

- Chudovo
- Malaya Vishera
- Soltsy-Shimsk

Expenditure needs

The model estimates the expenditure needs at RUR 175.3 million within 2001-2015, of which RUR 24 million covers investment costs.

Supply of finance

The finance available in 2001-2015 in this scenario remains at RUR 150.3 million as in scenarios 2A and 2B.

Table 6.21: Expenditure need and financing gap, group 3, scenario 2c, total and selected years (000 RUR)

	Total	2001	2005	2010	2015
Total expenditure need	175,270	4,887	7,008	20,551	19,364
Total financing	150,289	3,760	7,748	11,338	16,427
Financing gap	-24,980	-1,126	739	-9,213	-2,936

Source: Model calculations

Gap assessment

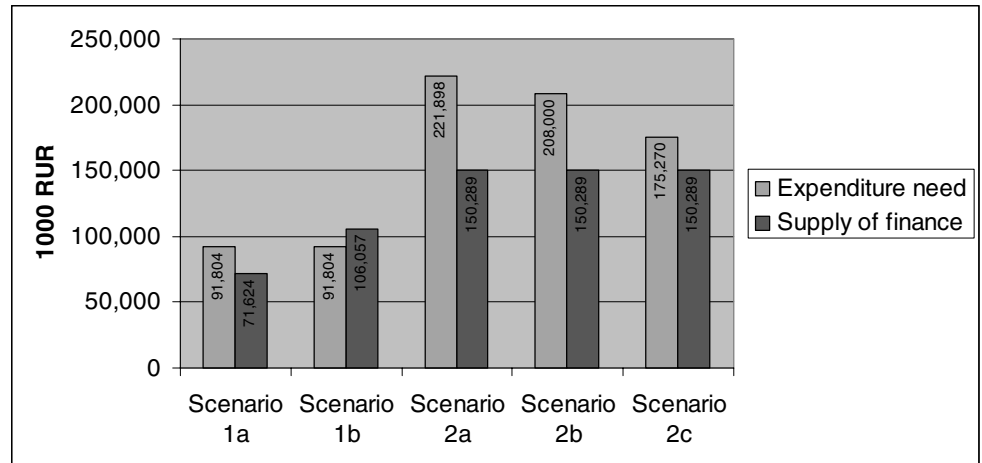
Compared to scenario 2b, the gap has been reduced to RUR 25 million. This gap could be bridged by allocating more public funds and/or attracting donor funds to the sector. As in the municipalities which form group 3 (**except Chudovo**), the local public budgets are rather weak which means that an adequate oblast budget contribution is crucial in order to make the scenario affordable.

If the oblast budget could allocate an additional RUR 25 million in the period 2003-2025 to develop the waste management sector in the towns and rayons included in group 3, scenario 2C becomes affordable for the municipalities which form group 3.

6.3.4 Overview of Scenarios

Figure 6.3 provides an overview of all scenarios generated for group 3.

Figure 6.3: Scenario results, group 3



Source: Model calculation

7 Conclusions

Based on the results of the various scenarios for each group as described in the previous chapter, some general conclusions concerning the feasibility of improving the municipal solid waste management in the Oblast can be derived.

Concerning the **coverage of the MSW collection system**, the results clearly indicate that there is a considerable potential to increase the coverage in the oblast, and this option seems reasonable in all three groups considered.

Concerning the **choice of MSW collection system**, the results indicate that separate collection of recyclables through the establishment of recycling centres and bring banks would be expedient in major cities where one can expect a sufficient volume of sorted recyclables to make the business commercially viable.

With regard to **MSW treatment options**, the target of closing existing dumps and constructing controlled landfills seems to be a financially feasible strategic target for groups 1 and 2. In case of the economically depressed rayons in group 3, achieving the target would require substantial co-financing from the oblast budget. The construction of controlled landfills requires a relatively large investment and the O&M costs are higher compared to dumps. The results from the model runs indicate that inter-municipal co-operation is necessary in order to ensure a cost-effective system.

There are a lot of good options of inter-municipal cooperation in the Novgorod oblast. Especially, the following neighbouring municipalities could jointly build and operate controlled MSW landfills: Borovichi and Okulovka; Staraya Russa and Parfino; Soltsy and Shimsk inviting also other neighbouring town settlements to use the facility. Batetsky could use the municipal landfill of Novgorod City, which would require the construction of a transfer station in Batetsky. At the same time, a number of distant settlements have limited opportunities for cooperation due to high transport costs and an undeveloped road network.

The model calculation proved that the construction of a waste incineration plant in the oblast is not financially expedient - neither for Novgorod-the-Great, Novgorod rayons and neighbouring rayons nor for the whole oblast (in the latter case, the cost of transporting waste from distant rayons would be very high). Additional arguments against the construction of such a plant are low popula-

tion density and the availability of sufficient number of sites suitable for proper waste disposal.

On this basis, the scenario presented below is proposed as the recommended scenario. The scenario is based on the following scenarios for the individual groups:

- Group 1 Scenario 3
- Group 2 Scenario 3
- Group 3 Scenario 2c

Group	Recommended development scenario – Coverage increase, landfills upgrade and waste recycling/recovery		
	Coverage	Collection system	Landfill
1	92% at present, 98% in 2015	Ordinary collection system until 2003 Average weighted distance of transport: 17 km Recycling centres by 2004 Bring banks by 2006	1 controlled landfill (including 2 nd line) Remaining capacity of existing landfill: 870,000 tonnes New line put into operation by 2011. Additional capacity: 2,400,000 tonnes Recycling stations: 25,000 tonnes/year starting from 2004
2	68% at present, 90% in 2015	Ordinary collection system until 2005 Average weighted distance of transport: 12 km Recycling centres by 2006 Bring banks by 2010	Dumps until 2005 3 controlled landfills 2004 : Borovichi – Okulovka - 700,000 tonnes, 2005 : Staraya Russa – Parfino – 560,000 tonnes, 2006 : Valdai – 140,000 tonnes. Two recycling stations from 2006: Borovichi-Okulovka – 9,000 tonnes/year; Staraya Russa- Parfino – 7,500 tonnes/year
3	62% at present, 85% in 2015	Ordinary collection system until 2010 Average weighted distance of transport: 15 km	Dumps until 2010 3 controlled landfills (from 2009 to 2011) 2009 : Chudovo with a capacity of 230,000 tonnes; 2010 : Malaya Vishera – 60,000 tonnes; 2011 : Soltsy-Shimsk – 400,000 tonnes In other towns, the low-cost measures in relation to the reconstruction of existing dumps and improvement of the collection system should be implemented OR options for joint use of a new landfill located closely to settlements should be used

The results of these scenarios when added up are indicated in Table 7.1 below.

Table 7.1: Recommended scenario vs. Baseline Scenario (All groups), RUR million

	Recommended scenario	Baseline scenario
Expenditure need		
Collection	747	633
Additional transport	7	0
Facility investment	199	63
Facility O&M	132	78
Total expenditure need	1,085	773
Supply of finance		
Public expenditure	111	111
Loans	0	0
Grants	12	12
Other	7	7
User charges	924	605
Total financing	1,054	736
Financing gap	-31	-38

Source: Tables in this report

The implementation of the recommended scenario would require some RUR 1,085 million during the period 2001-2015. Based on the modelled scenarios, the supply of finance is slightly below the expenditure need. This relatively small gap could be bridged with revenues from the sale of recyclables (paper and cardboard, glass and plastic waste, scrap metals) which have not been included in the calculations. Alternatively, a minor increase in financing from the public budget and/or faster growth in real tariffs than anticipated in the above development scenarios could be employed.

The expenditure need of the recommended scenario exceeds the baseline scenario with approximately RUR 300 million. The additional financing required is assumed, mainly, to be supplied through an increase in the revenue from user charges. This should secure that MSW management enterprises earn aggregated operating profits, which is an important precondition for the financial viability of the recommended development scenario.

With regard to group 3, it is not regarded as feasible to finance the establishment of the three landfills through an increase in the revenue from user charges. Everywhere in group 3, maybe except Chudovo, implementation of the recommended scenario will require co-financing from public sources, mainly from the oblast budget.

In spite of the absence of a financing gap, in total over the period 2002-2015, there will, in some years, be a rather substantial deficit in terms of financing for the capital investments required for construction of the facilities anticipated by the scenarios. This is a problem, which may, to some extent, be solved by real-

locating the available finances over time and across municipalities. This could be accomplished through attracting loans, including paid-back loans, from the oblast budget to the municipalities which are willing to implement rehabilitation or construction of appropriate components of the MSW management infrastructure.

Improving the revenue from user charges

Presently, there is some scope for improvement in the efficiency of the collection of user charges. Collection rates are less than 100% in all the three groups and are particularly low as concerns group 3. Therefore, a key recommendation is to improve the collection efficiency. In the recommended scenario, it is assumed that a 100% collection rate is achieved within the first four years in all three groups. In addition, it is assumed that the tariff level in group 1 (mainly Novgorod City) is increased during the first four years. This is regarded as feasible in this group, where the household affordability situation is more in favour of such a development compared to group 2 and 3.

However, improving the revenue base of the MSW management enterprises will require comprehensive institutional and organisational reform initiatives.

Currently, many MSW management companies and multi-functional municipal utilities are cross subsidising the sanitary cleaning of towns and providing of other types of housing and municipal services at expense of operating profits from municipal waste collection and disposal. Lack of financing for the sanitary cleaning of towns from the local budgets hence undermines the financial health of enterprises in the MSW management sector.

Furthermore, there is scope for improvement in both the regulatory framework and the practical organisation of collection of user charges. In this regard, it may be expedient to take into consideration the experience of EU member countries, for example, Denmark, where the municipal waste management services are billed in connection with the real estate/property tax.

Appendix 1: Current Waste Situation

1. Introduction

1.1 Waste classification

The Federal classification catalogue of waste (the FCCW) used in Russia contains a list of waste of production and consumption that are systematised by features: origin (source of generation), aggregated condition, chemical composition, hazardous potential.

The catalogue has 5 levels of classification following to hierarchic principle: block, group, sub-group, item, sub-item. There are 4 blocks by waste origin:

- 1 – organic waste (from animals and plants) and products of its treatment;
- 3 – mineral waste, chemical waste;
- 9 – municipal waste, including household ones.

Each block of waste of any origin contains groups that are divided in sub-groups. Each sub-group contains items and corresponding sub-items.

The following features are used as a basis for group, sub-group, item and sub-item:

- origin of initial raw-materials;
- Its attribution to specific industry, technology;
- Chemical content;
- aggregative state and other property.

In each group these features hierarchically are described in more details (from general to specific). The item defines most comprehensive characteristic of the waste type. Sub-item contains an information about a hazardous potential of specific waste. The name of waste is attributed taking into consideration its origin and chemical content.

1.2 The principles of waste coding.

The code of waste in the waste catalogue is written with Arabian figures. The codes of blocks, groups, sub-groups, items and sub-items are inter-connected. The structure of codes is built up based on decimal system and includes codes of block, group, sub-group, item and sub-item. Each block includes 9 groups. Each group has 9 sub-groups. Each sub-group may contain 99 items.

The block-group-subgroup chain reflects a comprehensive characteristic of a waste origin. The item and sub-item indicate content and properties of waste. Last number indicates class of hazardous potential and varies from 1 to 5 in accordance with the order of definition of hazardous potential class. The code is more valuable rather name of waste when seeking the type of waste in the Catalogue.

The similar system of waste classification and coding is used in Novgorod oblast.

2. Industrial waste

2.1 The number of nature users that are to be included in the system of state supervision over waste of production and consumption management is continuously increasing. In 1995 213 enterprises, organisations and private business got permits for waste disposal and concealment, in 2000 their number increased up to 1020.

Table 1 contains information about quantity and structure of industrial waste for 1995-2000.

Table 1. Generation of toxic waste in the Novgorod Oblast, 1995-2000.

<i>Tonnes</i>	1995	1996	1997	1998	1999	2000	% of change 95 – 00
Class 1	19	36	25	26	33	40	110 %
Class 2	8230	8382	8576	8538	8734	8636	4.9 %
Class 3	10649	5434	5338	9002	25863	26126	145 %
Class 4	1835913	2579802	1431300	1675515	1986123	1808315	-1.5 %
Total	1854811	2593653	1445238	1693081	2020753	1843117	-0.6 %

The structure of industrial waste has no considerable change during recent years. It is seen in examples of 1999/2000:

- **Waste of 4th class of hazardous potential (less danger)** in total amount has 98,3 / 98.1% (1.953 / 1.808 million tons);
- **Waste of 3rd class of hazardous potential** by specific weight amount to 1.29 / 1.4% (25.71 / 26.13 thousand tons);
- **Waste of 2nd class of hazardous potential** – 0.4 / 0.5% (8.56 / 8.64 thousand tons);
- **Waste of 1st class of hazardous potential** – 0.0017 / 0.0022% (33.74 / 40 tons).

The main amount of **waste of 1st class of hazardous potential** 32,54/37,94 tons (96,4/94,9%) is contained from used luminescent and bow-discharge lamps (mercury containing waste).

Waste of 2nd class of hazardous potential are presented by three key groups:

- ammonia-tar liquor from the shop of formalin production and carbamide tars of the JSC “Akron”» (7633.1 / 7705.5 tons), neutralised by incineration at the site in special plant;
- exhausted oil-products (890 / 869 t) are used again at the source of their generation (more than 640 / 720 t), around of 600 / 305 tons are passed for use to other enterprises.
- Used acid and alkaline electrolytes from batteries (31.4 / 49.5 т). 25.8 / 40.5 tons (82.2 / 82%) of which are neutralised at the source of generation.

Waste of 3rd class of hazardous potential are presented by 43 groups. The key groups are:

- Soil mazuted (15296,83/5614 tons, 59,5/21,5%). From which 14855/4000 tons (waste had been generated during repair works carried out by the MUE “Remstroydor” – road repair enterprise) are disposed on the MSW landfill in Novgorod. 344/440 tons were generated by locomotive depot and neutralised at the site with bio-technology use. At the moment due high cost of neutralisation by bio-technology and absence of specialised sites for neutralisation of mazuted grounds in rayons the biggest mass of such waste is dieposed in landfill and authorised dumps for MSW;
- Waste spoiled by oil-products (3,0/7,2%), namely: sediments of oil-traps (83,62/89,14 tons), oiled sawdust and rags (78/105 tons), polluted rubbish (635/1695 tons). Mainly these waste are disposed at the landfills and authorised dumps of MSW. The special section for industrial waste concealment is foreseen in the project of reconstruction of the MSW landfill in Novgorod. Including:
 - Oil sludge (7,4/24,3 t, 0,03/0,09%). The biggest part is used in boilers;
 - Metal-cutting oil (7,3/6,4 т, 0,03/0,02%). Due pendency of the problem of their neutralisation, this waste is mainly accumulating at the enterprises;

- Phenol and formaldehyde containing waste (5156,78/5169,25 т, 20,0/19,8%). Mainly that is a waste of large laminated plywood production at the JSC “Chudovo-RWS»; 95/85% of waste is used as a fuel in boiler-house of the enterprise;
- Poultry dung (3156/12467tons, 12,0/47,7%). Passed to agricultural enterprises to be used as fertiliser;
- Dewatered sediment of local treatment facilities (WWTF) in galvanic shops and sites (86,0/67,5 tons, 0,33/0,26%). 80,0/63,3 tons of which is neutralised in stoves of JSC “Keramzit” for production of claydite gravel.
- Scraps of lead from battery (138,12/184,9 tons, 0,53/0,71%). It is passed to treatment enterprises in other regions.

Waste of 4th class of hazardous potential are presented by 107 groups. Main of them:

- stripping rocks and excavation mass (1,152/0,988 million tons, 59,0/54,6%), generated under clay, sand-gravel mixture and other natural materials extraction. These wastes are used for the aims of recultivation (rehabilitation).
- Conversion chalk (372/343 thousand tons, 19/19%) generated in a process of production of azophoska at the JSC “Akron”. Only 35/33 thousand tons of that waste is transported to consumers in other oblasts. The main share of waste is continuing to accumulate in special tank at the JSC “Akron”;
- Wooden waste – pieces, soft, bark – (181/228 thousand tons, 9,5/12,6%). From them more than 77/138 thousand tons is used at wood processing plants themselves. 102/97 thousand tons is passed to other enterprises, organisations, population to use as a fuel., litters for animals, compost production, deposits rehabilitation etc. However, the key problem of effective use of wooden waste remains in the oblast. More than 6,5/6,8 thousand tons of such waste is disposed at the MSW landfills, wooden waste dumps, at the site. More than 5 thousand tons of wooden waste are registered at the enterprises in remains. Till now more than 375 thousand tons of bark at pulp & paper factory in Okulovka are disposed on the river Peretna bank. There are technologies and equipment for wooden waste recycling, but the problem is not solved due lack of finances;
- Ash and slimes from coal, peat and wood burning up (27,7/29,2 thousand tons, 1,4/1,6%). 7,7/11,4 of which are used at the sites where waste had been generated. 7,8/10,8 thousand tons are passed to other enterprises and population for use, 4,4/3,5 thousand tons are use at dumps as insulation material. More than 500 thousand tons is accumulated in ash dump of Novgorod power plant “Novgorodenergo”, that cannot find their consumer;
- Scraps and waste of non-ferrous and ferrous metals (38/284 thousand tons, 2/15% and 1,1/62 thousand tons, 0,06/3,4% correspondingly), that had been transported to other oblasts for recycling. More than 6/19 thousand tons of ferrous metals’ waste and 0,15/4,5 thousand tons of non-ferrous metals’ waste had been exported abroad.
- Paper and cardboard waste (1,5/11,7 thousand tons, 0,08/0,6%) are used by treatment enterprises, including outside of the oblast (0,7/0,5 thousand tons);
- Used tires (720/680 tons, 0,04/0,04%). Main way of used tires recycling is their secondary use in dachas, building up from them architectural elements of land planning. The problem of used tires collection is still sharp in the oblast due lack of finances and underdevelopment of a system of collection points. Totally 179/184 tons of car tires are treated, around of 40/53 tons are disposed at the MSW landfills, more than 670/550 tons remain at the enterprises;
- Waste of thermoplastic (204/214 tons, 0,1%) are passed to the procurement enterprises located within the oblast (121/140 т), 34/8 tons are transported outside of the oblast;
- Sludge of Biological waste water treatment facilities (BWWTf) (around of 40/49,8 thousand tons, 2,0/2,8%). Mainly it is accumulated at the sludge accumulators of the BWWTf. By the end of a year (?) it is accumulated more than 228/231 thousand tons. The problem of sludge disposal is a very sharp one for Novgorod, as its use as a fertiliser is limited, and capacity of site for sludge accumulation is almost exhausted;

- Rubbish of production (12/15 thousand tons, 0,6/0,8%), commercial waste (2,5/2,3 thousand tons, 0,13/0,13%), medical waste (2,6/3,5 thousand tons, 0,13/0,19%). All listed wastes are disposed at the MSW landfills and authorised dumps.

2.2 Treatment and disposal of industrial waste

The Table 2 contains information about treatment and disposal of generated industrial waste:

Table 2. Industrial waste disposal, tons

	1995	1996	1997	1998	1999	2000
Waste generated, total	1854811	2593653	1455480	1693081	2020754	1843117
Waste treated	523543	3379367	2890250	1806752	1251149	1553225
Waste disposed on authorised sites (disposal and concealment), including within industrial sites	5705136	12880604	11786264	11287700	11364291	11728346

Waste disposal and concealment is carried out at sites defined by resolution of local self-government authorities in coordination with specially authorised State bodies of the Russian Federation in the field of environmental protection and sanitary-epidemiological supervision.

The toxic industrial waste classified as waste of 1st-3rd classes of hazardous potential should be transported to special landfills. Some solid industrial waste of group 4 (E.g. wooden waste) as well as some of the hazardous waste of class 3 is allowed to dispose at the MSW landfills. Special permits issued by the environmental protection and sanitary-epidemiological supervision authorities are needed in such cases.

In cases when enterprise stores up waste at the site, it should secure safe waste storage, exclude any damage to human health and environment.

The legal framework for activities related to MSW had been established in the former USSR, most of Acts and Ordinances adopted before 1991 are still in force. For instance, sanitary norms and rules (SanPin), State Standards (GOST) established requirements to the MSW landfills and municipal services involved in waste collection. In order to promote new legal basis, the Federal Law "On waste of production and consumption" had been approved in mid of 1998. Based on this Law it's needed to adopt a number of new governmental Acts to specify and develop Laws' article that are under rafting nowadays.

In 1994 the NO Administration approved "The temporary rules for waste management" according to which the local authorities are in responsible for waste management. Each city/town has own municipal enterprise (ME) that carry out solid and liquid waste collection, transportation and disposal. (ME SME "Spetsavtokhoziaystvo"). In many cases ME SAKH is a MSW landfills operator.

According to acting legislation all legal entities that have waste of production and/or consumption must get a special permit issued by the Committee of Natural Resources of Novgorod oblast.

The application for obtaining of the permit should be filled in each year. The application form includes:

- Request for waste transportation to the treatment site;
- Declaration on type and amount of waste generated;
- Plans for reduction of amount of waste generated;
- Declaration on sites and condition of temporary/constant storage of waste.

In order to get a permit, the legal entity/enterprise should either sign an agreement with local ME SAKH and pay for waste disposal, or dispose waste at the site. If an enterprise transports waste itself to the Municipal landfill, then it pays only for waste disposal. All legal entities must take care and transport toxic waste to the place of its disposal in own or rented trucks.

The legal entities pay charges for toxic and non-toxic waste disposal. The charges are differentiated based on type and toxicity of waste, and type of waste utilisation/disposal.

The legal entities are obliged to pay higher rate for above limit waste generation, as well as fine for unauthorised waste disposal. If waste that could be used as secondary raw-materials are disposed on landfills, then charges are established in accordance with market price in the region.

"The temporary rules for waste management" defines order of waste management for nature users, starting from norm establishment till waste generation and concealment/disposal. E.g. the enterprises are obliged:

- To use cleaner technologies, recycle waste, reduce quantity of unutilised waste;
- To carry out separate collection of waste at the source, by types, classes of hazardous potential and other properties;
- To report yearly about hazardous waste.

The waste transportation should be carried out by specially equipped trucks securing all measures that could prevent environment against pollution and human health damage.

3. Solid and liquid municipal (household) waste

Solid and liquid municipal waste (MSW and MLW) is a waste generated due people daily activities. The Table 3 shows waste generation in 1995-2000.

Table 3. Municipal solid and liquid waste generation in 1995-2000, m³

	1995	1996	1997	1998	1999	2000
MSW	607315	695326	815162	833239	791173	775353
MLW	218012	220465	306791	397895	443732	430417
Total	825327	915791	1121953	1231134	1234905	1205770

Key method for MSW treatment in the oblast, as well as for Russia in whole is its disposal at landfills. Almost 100% of generated MSW are disposed on landfills. Around of 20% of MLW due absence of BWWTF or their insufficient capacities are disposed on dumps or transported to other sites not equipped for MLW neutralisation.

The average yearly accumulation of MSW per capita in the oblast is a little bit more than 1 m³ while the average norm for Russia varies from 0,9 to 1,2 m³/year.

The main amount of MSW consists from food waste, paper, cardboard, plastic that is evident from data given in Table 4.

Table 4. MSW content, Novgorod the Great

No	Waste category	Amount, m ³	Volume, m ³	Specific weight by mass, %	Density, t/m ³
1.	Food waste	193,0	0,76	25,9	0,253
2.	Paper	52,8	0,58	7,1	0,091

3.	Cardboard	42,4	0,87	5,7	0,048
4.	Plastic	41,4	1,14	5,6	0,036
5.	Textile	20,7	0,27	2,8	0,076
6.	Glass	43,0	0,37	5,8	0,116
7.	Metal	27,0	0,39	3,6	0,692
8.	Hazardous waste	13,0	0,1	1,7	0,130
9.	Other burned out waste	23,5	0,49	3,1	0,048
10.	Other not-incinerated waste	289,0	0,84	38,7	0,344
11.	TOTAL	745,8	5,81	100,0	0,128

The mass of polymers is increased in MSW that leads to risk raise as the process of MSW incineration becomes dangerous due dioxin generation.

4. Medical waste

In 1994 Russia ratified the Basel Convention on prevention of transboundary movement of hazardous waste. The list of such waste is opened by medical waste, however there is no even a definition of third type of waste in Russian system of legal and normative documents.

Today such terms as medical waste, clinical waste, waste of medical and prophylactic institutions, ambulance etc. are used for medical waste. All these waste are generated in health protection organizations therefore it is possible to use unified term – waste of health protection, i.e. waste generated during daily activities of health protection institutions (HPI).

The hazardous potential of waste of health protection is related to specific features of all types of waste generated in health protection institutions. Most of us cannot see thrown away blooded bandages, most disgusting is to discover among MSW something that some time ago was a part of human body. Two other aspects of waste of health protection characterise their specific properties – epidemiological and ecological. The possibility of infection spreading out and environmental pollution requires to make stricter the rules of HPI waste management.

The HPI waste includes the following types:

- Biological: anatomical waste, histological waste.
- infection;
- chemical, bio-chemical, toxic and pharmaceutical.
- thrust and cutting things.

The Table 5 gives quantities of HPI waste generated in Novgorod oblast.

Table 5. HPI waste generated in Novgorod oblast, tons/year

No.	Name of waste	Amount generated	
		1999	2000
1.	Biological waste	4,5	7,0
2.	Medical rubbish	2600	3400
3.	Syringes one-time use	5,8	7,3
4.	One-time systems for blood transfusion	1,7	3,1
5.	X-ray units' waste	5,0	6,5

In 1999-2000 the biological waste in amount of. 8,7 tons had been generated in Novgorod, all are concealed at the city's cemetery.

The biological waste generation in rayons' hospitals are burned out at boiler houses owned by the municipal enterprises, excluding Staraya Russa and Valdai rayons territorial medical associations and Malay Vishera Central Rayon Hospital that have crematories for biological waste incineration.

The medical rubbish is concealed on the authorised landfills for MSW.

The one-time syringes and blood ... systems are passed to collecting organizations and further are disposed on landfills and incinerated. In 2000 6.7 tons of one-time syringes had been passed to collecting organizations, i.e. 91%. Only those syringes are incinerated that had been collected from infection units of Hospitals.

The waste of X-ray units (used photo-solutions and films) are also passed to procurement organisations.

5. Sites for waste disposal and concealment

In accordance with results of sites for waste disposal and concealment inventory, the Novgorod oblast accounts (Table 6):

- 39 authorised dumps (including MSW landfill of Novgorod the Great);
- 36 sludge-collectors and sites;
- 8 ash-slime dumps;
- 1510 areas, storage facilities, bunkers, containers, a number of artificial ponds designed for temporary accumulation of waste before its further treatment/disposal.

The documents of rayons' Administrations are unavailable for 12 dumps that prove land planning and dumps establishment. Only for 2 dumps apart of 39 the design documents had been worked out and hydrogeological survey had been carried out. But even these two dumps started operation not in compliance with design documentation.

At the landfill operated by the JSC "Novgorod Spetsavtokhoziyaystvo" the waste concealment started from 1986 without any required works for insulation layer preparation. As a result the filtrate with high content of toxic substances migrates in down laid layers of area neighbouring to the dump.

Special well for water sampling and analysis aimed at assessment of its impact on environment had not been build up.

None of dumps/landfills complies with a requirement to cover regularly compacted waste layer with insulation layer of ground or other proper materials. Therefore the area of dumps are opened for birds, animals and spreads out smell, evaporation of hazardous substances.

Almost at a half of dumps the MLW are disposed together with MSW that creates a potential danger of ground water contamination, especially at the sites with low protective characteristic of dumps' foundations (sandy ground, gravels' ground etc.).

Table 6. Information on sites for waste disposal and concealment

No.	Name of rayon	Landfill for concealment of MSW and industrial waste	Authorised dump	Sludge accumulating dump, tailing sludge ponds	Slag heaps, ash-dumps	Open cast mines	Long-term storage at the industrial sites	Temporary accumulators at the industrial sites	Artificial accumulators, tanks, bunkers, containers and other for waste disposal and concealment
1.	Novgorod the Great	1	1	14	2		8	132	300
2.	Batetsky		1					11	1
3.	Borovichy		1	2	1			132	172
4.	Valdai		1	2				23	18
5.	Volot		1					12	1
6.	Demyansk		1					18	2
7.	Krestsy		2	1				10	6
8.	Lubyatino		3				1	23	7
9.	Malaya Vishera		3					20	6
10.	Marevo		2		2			18	4
11.	Moshenskoe		2					16	1
12.	Novgorod		3	6				28	34
13.	Okulovka		2	2	2			11	17
14.	Parfino		1					10	13
15.	Pestovo		2				1	32	18
16.	Poddorie		1					8	3
17.	Soltsy		1					25	20
18.	Staraya Russa		2	2	2			70	60
19.	Khvoinoe		1						
20.	Kholm		3					21	2
21.	Shimsk		2	1	1			23	5
22.	Chudovo		2	4		1	5	77	100
	TOTAL	1	38	36	8	1	15	720	790

The supervision is organised only at 11 landfills of 39, and 24 hours' survey is only in Novgorod the Great, Borovichi and Chudovo. Thus, more than 62% of municipal dumps are uncontrolled during a day and 90% - during night, that provides opportunities for violators without any obstacles and punishment to transport and dispose hazardous waste that should be disposed at special landfills.

The listed violations of requirements for municipal waste landfills planning and construction are related also to the dumps owned by industrial enterprises. E.g. Krestsy Forestry, Glass plant in Malaya Vishera, JSC "Svetlabna", car repair plant in Novoselitsy have dumps that do not comply with requirement. These dumps are not designed, no hydrogeological surveys preceded to its construction (except the JSC "Akron").

The special care should be taken after glass plant in Malaya Vishera because waste of this enterprise contains lead and other hazardous substances. But due lack of finances the enterprise postpones working out of design documents.

The inventory results indicate a necessity to enforce specific measures for construction of new and reconstruction of operating dumps.

6. Sources of environment pollution with waste

The impact from waste on environment takes place at authorised landfills as well as at illegal dumps. In first case this is due wrong choice of landfills location and improper operation of them.

There are cases when filtrate from dump sites being not collected and not treated migrates in low stratum of neighboring areas. For example, in 12 km from Borovichi there is an old dump located on the carbon Plato. The speed of filtration is around of 500 m/day. The Babinsky water intake boarder is laid near this landfill. The dispersion (воронка) is formed when water is taken from reservoir. Thus there is a threat of filtrate penetration from dump to zone of Babinsky underground water intake. At present any serious contamination does not exist but in the future the products of dump operation may impact the water quality. Only one right solution is a construction of new landfill. The old dump must be closed with compliance of all requirements in order to exclude a probability of filtration from dump to water protected zone.

The most part of population lives in private sector that is not included in centralised system of waste collection. Usually one family is living in private house. Wastes are treated by composting, incineration etc. But partly waste are disposed within an area provoking environment pollution. The owners of private houses and inhabitants of houses without water supply, sanitation facilities use outside toilets (accumulating ditch). The solid fraction is usually taken manually and transported to the dump. The liquid fraction is pumped by accenization trucks. In such residential areas the toilets are connected with a septic of built in the yard.

The waste accumulated in the backyard's and septic tanks may damage seriously the environment if they are improperly located or built and operated improperly. Moreover, neighboring zone is polluted quickly, as well.

The biggest danger is unauthorized dumps of household and industrial waste. In high degree it relates to areas near settlements.

The content of waste disposed at unauthorized dumps differs considerably – from domestic waste to industrial and demolition waste. At unauthorized dumps the following waste prevails: biogenic material – 20-25%, glass – 8-10%, plastic – 6-8%. The peculiarity of unauthorized dump is a high concentration of heavy and rare metals, most toxic among chemical elements, organic toxicants are present constantly.

Unauthorized dumps of MSW bring epidemiological risk, in addition they are places of GRYZUNY concentration, that are bearers of infection disease.

Waste also are generated within gardeners' associations. Most often they are not included in the municipal system of waste collection. The lack of legal ways for garden waste disposal leads to illegal dumping and environmental pollution.

7. Market of secondary raw materials

The market of recyclable materials in Novgorod oblast is undeveloped. Although the tendency to its development is seen of which the data in Table 7 witnesses. The factors influenced on demand and supply of recyclable materials are as following:

- increased charges for secondary raw materials disposal in environment;
- availability of a network for recyclable waste collection;
- limitation of mercury containing waste storage at the enterprises by the Order of oblast Administration;
- availability of technical base for demercurization of mercury containing waste.

Table 7. Indicator of market of recyclable materials in Novgorod oblast in 2000

No	Name of secondary raw materials	Supply (amount of recyclable materials generation), tons				Demand (recyclable materials used), tons				Percentage of waste use as secondary materials, %	Concealed or temporary stored	Average prices for secondary materials (waste) RUR/t	
		total	Generated at the regional (oblast) enterprises	Imported in the NO	Imported	Total	Used at own enterprise	Used at other enterprises of the NO	Exported the NO				Exported from
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	7.1.2 Paper/cardboard waste	13471	2486	10985	-	13323	11447	1413	463	-	99	220	1000
2	Polymeric waste	226	226	-	-	189	41	140	8	-	84	81	770-6000
3	7.1.3 GlassC теклобой	1084	1084	-	-	1053	741	112	200	-	86	323	N/a
4	Used oils	970	970	-	-	1055	735	305	15	-	100	254	-/-
5	Textile	18	18	-	-	21	6	15	-	-	100	5	500
6	Used tires	711	711	-	-	665,5	129	351	185	0.5	94	604	-730
7	Ash and slimes of power plants	29221	29221	-	-	22234	11422	10812	-	-	76	554144	-
8	Wooden waste	209410	209410	-	-	207371	111960	94020	1035	356	76	7305	-

9	Waste and scraps of ferrous metals	309088	303000	6088	-	309514	2416	250565	36807	19726	100	4685	800-850
10	Waste and scraps of non-ferrous metals	62966	62397	569	-	63008	119	57239	1065	4585	100	110	18000-25000
11	Lead containing waste	506	506	-	-	505	3	110	392	-	100	98	1000-1200
12	Nickel containing waste	13	13	-	-	14	-	11	3	-	100	1	600-3000
13	Slimes of halvanic production	68	68	-	-	66	3	63	-	-	97	43	-6000
14	Oil-slimes	24	24	-	-	17	14	1	2	-	-	8	-
15	Mercury containing waste	132	51	81	-	151,3	-	151	0.3	-	100	56	-11300 --25500

Notes:

1. Data is given taking into account remained waste from previous year except rows 4 and 5
2. In point 7 amount of peat and wooden ash is taken into account
3. In p. 8 the amount of CORA is not added.
4. In p. 14 (column 8) the volumes of neutralized oil-slimes are not taken into account.
5. In column 10 the waste of collecting and treating organizations are not included.
6. In p. 3 all glass waste are included: clean, polluted, silver containing, after demercurization.

Appendix 2: Macro-Economic Survey

2.1 Background

The Novgorod oblast (NO) is located in the north-western part of Russia and covers about 55,300 km². The Oblast consists of 22 administrative entities, including 21 districts (rayons) and the City of Novgorod-the-Great. 90% of the oblast territory form part of the Baltic Sea basin, while the remaining territory (two rayons: Pestovo and Khvoynaya) belong to the Caspian Sea basin.

The oblast possesses 109 mineral deposits (in that: fireproof clay, limestone and quartz) and a number of fresh and mineral water sources. 75% of the oblast territory is covered by forests.

The population in the oblast has gradually decreased during the last decade and by the beginning of 2001 it amounted to 719.4 thousand people. 71% of population live in urban areas. The oblast has a homogenous population (95% are Russians), and no conflicts between nationalities.

The oblast has a relatively well-developed industry which plays a key role in the oblast economy. The key industries are: chemical, metallurgical, forestry and wood processing, pulp and paper, machine building and power sector, food processing. The industrial structure is characterized by the dominating position of one major enterprise in most of industrial segments⁴.

The share of industries in the GRP is more than 40%. 50% of consolidated public revenues in the oblast are provided by industrial enterprises.

The strategy of social and economic development of the oblast implemented in previous years laid the foundation for further reforming and better adjustment of the oblast economy to market conditions. One can state that to the moment major enterprises in the oblast have adjusted their economic behaviour to the market economy and perform quite successfully.

2.2 Macroeconomic indicators

Gross Regional
Product

The real **gross regional product (GRP)** in the NO has been growing since 1998. The real GRP growth rates are reported as follows: 5.7% in 1998, 6.5% in 1999, 0.7% in 2000 and some 12.6% (estimate) in 2001 (cf. Table 2.1)

So, in the NO the real GRP **had increased by 27.6% over 1998-2001**, while for the whole Russia the cumulative growth of the real GDP comprised only 14% over the same period.

⁴ Chemical industry: "Akron"; Ferrous Industry: "Borovichskij Kombinat Fireproof Materials"; Energy and Electricity: "Novgorodenergo"; Food Processing: "Cadberry"; Wood Processing: "Parfinskij Veneer Kombinat".

Table 2.1 Development of the GRP in the Novgorod oblast, 1995- 2001

	1995	1996	1997	1998	1999	2000	2001e
GRP, billion RUR	4.4	7.0	7.4	9.4	16.4	21.2	28.0
Real GRP growth, % p.a.	-9%	14%	-5.4%	5.7%	6.5%	0.7%	12.6%
Real GDP growth Russia %	-4.1%	-3.6%	0.8%	-4.9%	5.4%	8.3%	5.0%

e – estimate;

Source: Figures for Novgorod are calculated by the Consultant using statistical report on "Socio-economic development of Novgorod oblast, 2001", Novgorod Oblast Committee for State Statistics (Oblstat), and preliminary estimates for 2001 provided by the Oblast Administration and Oblstat

Expected growth

According to the Russian Ministry of Economic Development and Trade, annual real GDP growth in Russia is expected to amount to 3.5-4.5% per year over the medium term. The Novgorod oblast is expected to experience GRP growth rates in line with this forecast. According to the Oblast Economic Committee the NO nominal GRP is expected to grow to RUR 31.8 billion in 2002, RUR 36.9 billion in 2003 and RUR 42.4 billion in 2004.

Composition of GRP

The main contributors to GRP are industry, agriculture, construction, commerce and non-market services. Though Novgorod oblast is relatively well-developed in industrial terms, industry's share of GRP has fallen over 1992-1998, but has recovered since 1999.

Table 2.2 The development in Novgorod GRP structure in 1995, 1998 and 2000, %

Year	Goods					Services					Other
	Total	Industry	Agriculture & Forestry	Construction	Other	Total	Market services			Non-market services	
							HMS	Commerce	Other		
1995	64.0	41.4	14.1	7.4	1.1	34.0	4.1	12.0	8.9	9.5	2
1998	53.5	36.3	8.3	7.7	1.2	45.1	6.2	14.0	6.4	18.5	1.4
2000	63.3	42.4	10.5	9.3	1.1	35.0	2.8	11.0	7.9	13.3	1.7

Source: "Socio-economic development of Novgorod oblast, 2001", Novgorod Oblstat, data for 2000 was provided by the Novgorod Oblast Administration by Consultant's request

Main service sectors are commerce, transport, communication, municipal and social services. The service sectors' share of the local economy increased from 34% in 1995 to 45% in 1998 mainly reflecting an increase of the public non-market sector. But in line with the recovery in 1999-2001 the service sectors' share came back to 35% in 2000.

Some changes in the GRP structure in the Novgorod oblast are expected in the short to medium term: the housing and municipal services' (HMS) share of GRP will likely recover to 4-5% while the non-market services' share may decrease. Share of the construction industry will stabilise at 9-10%, while share of industry will stay at 42-44%.

Industrial Production

Since 1997 the industrial production in the oblast has increased considerably, real growth rates are reported at 1% in 1997, 4.7% in 1998, 14.8% in 1999, 7.7% in 2000 and 16.7% in 2001. The growth took place in all leading industries – chemical, machine building, metal works, forestry and wood processing, food processing and light industries.

Real growth rates in **production of food and other consumer goods** were at 17.9% in 1997, 25.3% in 1998, 37.3% 1999, 16.7% in 2000. In food processing industry the growth happened due to successful performance of the JSC “Cadberry” (31% of food production in the oblast), JSV “Lacto-Novgorod”, JSC “Crown” and others. In 2001 some slow down is assumed due to reduction in alcohol production. No new large food producing enterprises were established in 2001.

Machine building experienced high growth in real terms in 2001: by 63% on average achieving 70-100% at some leading enterprises.

The situation in **chemical branch** (real growth by 10% in 2001) is sustainable due to stable operation of the few main enterprises (JSCs “Akron”, “Flyderer-Chudovo”, “Novgorod plant of glass-fibre”).

In **forestry, wood processing and pulp&paper industries** a modest growth by 2% in 2001 was stipulated by increase of plywood production at the JSC “Chudovo-RVS”.

It is expected that continued growth of the chemical, food and wood-processing industries will provide a boost to regional industrial production, but also challenges to environmental protection. The above mentioned concentration in each industrial branch implies that the largest enterprises' compliance with environmental norms and standards may significantly contribute to attaining environmental policy goals in the region.

Export-Import

Significant share of goods produced in the NO is exported to other regions of Russia, CIS and other foreign countries. In its turn the oblast imports consumer G&S and many other items, but export exceeds import (cf. Table 2.3), i.e. the oblast is a net exporter.

Table 2.3 Export -import data, Novgorod oblast, 2000

	Export	Import	Total turnover
Other regions of Russia, million RUR	5,639	2,928	8,567
CIS countries, million USD	15.2	20.7	35.9
Other foreign countries, million USD	256.4	56.7	313.1

Source: "Socio-economic development of Novgorod oblast, 2001", Novgorod Oblstat, data for 2000 was provided by the Novgorod Oblast Administration by Consultant's request

In 2000 net export of the NO amounted to RUR 2.7 billion (domestic trade) plus USD 194.2 million (international trade), totally amounting to 39% of GRP. In Jan.-Nov. 2001 the turnover of the international trade increased by some 32% while net export comprised USD 169.5 million.

Investments

The favourable investment climate in the oblast promoted growth in private capital investments. In 1994-2000 USD 536.4 million had been invested in the oblast economy. Most of this money had been invested in food processing (56%), chemical (26%), forestry and wood processing (9%), construction material industries and telecommunications (3%).

The oblast co-operates with 28 countries. Some 100 enterprises have foreign strategic investors (stake-holders). More than 16 thousand people are or had been working at implementation of 185 investment projects, including 33 foreign investments made since 1992. The share of enterprises with foreign capital participation in total industrial production in the oblast is more than 68%. On average in Russia this indicator is 10 times lower. The enterprises' share in oblast's export is 80%, and 30% - in its import.

Employment

The Novgorod official statistics⁵ reports that by the beginning of 2001, the economic active population amounted to 364,000 corresponding to 50% of the population. The labour force is expected to stay at constant level in the medium term.

In line with the economic recovery in 1999-2001 the unemployment rate has significantly fallen from its peak level of 15% in 1999 amounting to 8% in 2000 and down to only 5% in the first half of 2001.

Salaries and incomes development in nominal and real terms are depicted in Table 2.4.

⁵ "Socio-economic development in Novgorod oblast, 2001", Novgorod oblastat, 2002

Table 2.4 Nominal and real (gross) salary developments 1995-2000, in RUR per month

	1995	1996	1997	1998	1999	2000	2001*
Average per head money income	434	702	757	939	1,337	1,686	2,070
Average monthly salary	361	622	758	862	1,246	1,743	2,524
Real salary, yoy change, %	-24.9	18.0	7.1	-9.6	-17.1	14.1	17.8

* - estimates based on data for January-November

Source: "Socio-economic development of the Novgorod oblast, 2001", Novgorod Oblstat, 2002

The real salaries started growing in 2000-2001 following the dramatic drop in 1992-1995 and in 1998-1999.

It is also seen that average monthly salaries in the Oblast were only some USD 85 in 2001. Although labour productivity is also lower than in the Western European countries, still unit labour costs are substantially lower in the Novgorod region.

2.3 Public finances

Total revenues

Table presents an overview of the total public revenues and expenditure of the Oblast, i.e. the consolidated revenues and expenditure of the Oblast Administration, local municipalities and rayons plus Oblast budgetary ear-marked funds.

Table 2.5 Overview of consolidated public revenues and expenditure, Novgorod oblast, 1997-2001, in 000' RUR

	1997	1998	1999	2000	2001
Total revenues	1,747,519	1,695,974	2,138,476	3,325,283	4,067,582
Total expenditure	1,731,670	1,672,581	2,140,839	3,267,742	4,108,669
Budget balance	15,849	23,393	-2,363	57,541	-41,087

Source: Annual reports of the Department of Finance, Novgorod Oblast administration

2.3.1 Public revenues

The total public revenues in 2001 amounted to about RUR 4.07 billion corresponding to some USD 135 million. 79% of all revenues were generated from own sources, but federal transfers (named *dotatsii, subventsii, subsidii, kompensatsii, transferty*) also remained substantial (RUR 861 million), though have been reduced significantly in real terms since 1997-1998. In real terms, public revenues had declined by 32% from 1997 to 1999 and partly recovered afterward.

Table 2.6 Novgorod regional revenue budget, 1997-2001 (RUR '000)⁶

	1997	1998	1999	2000	2001
Total revenues	1,747,519	1,695,974	2,138,476	3,325,283	4,067,582
Total revenues/GRP,	22.6%	17.3%	13%	15.7%	14.5%
Own revenues*	1,112,821	1,093,175	1,780,828	2,334,943	3,206,835
Own revenues/GRP,	14%	11%	10.8%	11%	11.5%
Inflows from Federal budget	552,940	602,366	357,648	990,340	860,747
Share of federal budget transfers in total revenues	33%	36%	17%	30%	21%

* **Own revenues** stands for total revenues (including oblast's ear-marked budgetary funds) minus transfers from the Federal budget (*transferty, dotatsii, subsidii, subventsii, kompensatsii*) and grants from other state bodies.

Source: "Socio-economic development of Novgorod oblast in 1999"; Novgorod Oblstat, 2000; Annual reports of the Department of Finance, Novgorod Oblast administration

From Sept. 2000 it was prohibited to pay taxes by money surrogates. As a result in 2001 "cash revenues" comprised 100% of own revenues of the consolidated Novgorod Oblast public budget compared to 77% in 1999 and 90% in 2000. Some 2/3 of own revenues (excluding budgetary ear-marked funds) of the consolidated oblast budget in 2000-2001 were revenues collected and controlled by rayons and local municipalities.

Main revenue sources

The main sources of own revenue over the period 1997-2001 are indicated in Table 2.7.

Table 2.7 Structure of own revenue sources 1997-1999, Novgorod region

Source	1997	1998	1999	2000	2001
Personal income tax	24%	24%	19%	21%	27%
Profit tax	16%	16%	27%	27%	29%
VAT	14%	14%	11%	9%	0% *
Excise and Sales Tax	7%	6%	12%	12%	8%
Property tax	13%	13%	9%	9%	7%
Natural resource taxes	6%	4%	3%	3%	3%
Other, including induced income tax	19%	23%	19%	19%	26%

* - from January 2001 100% of VAT due to the Federal budget

Source: Calculated based on data provided by the Department of Finance, Novgorod Oblast Administration

⁶ Excluding new loans and draw-down on working capital.

It is important to note that **since 1999 two taxes - profit tax and personal income tax - have been the main contributors to the consolidated public revenue budget** in the NO.

Natural resource taxes accounted for about only 3% of own revenues in 2000-2001 down from more than 6% in 1997. Remarkably, that **contribution of the induced income tax levied on small businesses has increased considerably** from 1.4% of consolidated own revenues in 2000 to 5.7% in 2001 (the tax is due to the local/municipal budgets). But the contribution of the property tax has decreased from 13% in 1997-1998 to only 7% in 2001. Due to recent changes in taxation of small and medium businesses it is very difficult to predict the contribution of the taxes in 2003 public revenue budget.

Federal Transfers and co-financing

In the short to medium term it is not expected that significant changes will occur in the assistance from the federal budget. For year 2002 federal transfers (*dotatsii, subiddii, subventsii, kompensatsii, transferty*, etc.) to the Oblast are anticipated to amount totally to RUR 1,127.9 million. The funds from the federal budget transferred by line ministries and departments destined for investments are very limited.

Other sources

Of the public ear-marked funds existing in the oblast only the environmental fund is relevant as a source of financing for environmental projects. In 2001 the fund's revenues amounted to RUR 13.8 million (0.34% of total revenues).

2.3.2 Public expenditure

Development in total public expenditures is presented in Table 2.8.

Table 2.8 Regional Expenditure Budget 1999-2001 (RUR'000)

	1999	2000	2001	2002 (plan)
Total expenditure	2,140,839	3,267,742	4,108,669	5,297,514
Current Expenditure	2,033,839	3,058,788	3,861,029	5,118,882
In that: public debt service	-	109,329	11,346	n.a.
Current expenditure*, % of total	95%	93.6%	94%	96.6%
Capital expenditure	107,000	208,954	247,640	174,057
Capital expenditure % of total	5%	6.4%	6.0%	3.4%

Source: data provided by Department of Finance of the Novgorod oblast Administration.

* - does NOT include investments from budgetary ear-marked funds (Road fund, EF)

Current expenditure accounted for 94% of total expenditure in 2000-2001, while the remaining 6% referred to capital expenditure. The capital expenditure figure has varied significantly upon 1999-2002 depending on how much the federal budget allocates to the NO in the current year budget to fulfil its obligation under the Housing Divestiture Programme (housing which belonged to the federal ministries - many of which were merged or just liquidated - had been transferred to the municipal property, but the Federal Government was obliged

either to renovate/repair the housing prior transfer or to pay the municipalities compensation equal to the cost of renovation/repair. Due to budget deficit experienced in 1992-1998 this obligation has never been fully fulfilled and now the Federal Government owes a lot to the regions under the programme). That is why the planned nominal figure for 2002 is lower than the figure for even 2000.

Capital expenditure were mainly spent on education (schools) and health service (hospitals) as well as on construction and rehabilitation of housing and municipal infrastructure. Though public capital expenditure increased considerably in 2001 to compare to 1999, the figure planned for 2001 (RUR 327 million) was not achieved.

In recent years, the share of the **environmental investments** in the capital expenditure has been less than 20% of total capital expenditure, equivalent to less than 1% of total public expenditure in the Oblast.

Expenditure on HME

Expenditure on housing and municipal economy (**HME**) comprised significant share of total public expenditure in the region: some 28% in 2000, and 21% in 2001 (cf. Table 2.9).

Table 2.9 Expenditure on HME in the Novgorod Oblast, 2000 -2001 (RUR'000)

	2000	2001
Expenditure on HME	923,805	854,342
(as % of total expenditure)	28.3%	20.8%
In that: Public capital investments in HME	26,192	n.a.
Capital investments as % of total public expenditure on HME	2.8%	n.a.
Target subsidies to low-income households	16,171	18,526

Source: data provided by Department of Finance of the Novgorod oblast Administration

Current expenditure on HME *inter alia* includes the following: compensation of operating losses of the utilities (due to existing inter-tariff difference, discounted tariffs for privileged consumers) as well as target subsidies for the poor (household with average per head monthly income below minimal living standard). It is important to note that capital expenditure comprised less than 3% of total expenditure on HME in 2000. This focus on financing primarily current expenditures does not allow achieve significant cost saving through capital repair and rehabilitation of highly deteriorated fixed assets.

Budget 2002

In accordance with Novgorod oblast Law "On Novgorod oblast budget for 2002" RUR 76.6 million or 2.6% of the Oblast expenditure budget (RUR 2980.7 million) is allocated for capital investments in 2002. Of this amount RUR 30 million will be provided from the Federal budget as co-financing of state target investment programmes, while RUR 46.6 million is so called Development fund within the Oblast expenditure budget. Though additional RUR

16.8 million totally is allocated for capital investments in local/municipal budgets, the Oblast budget remains the main source of public investments.

The Law "On Novgorod oblast budget for 2002" also allows the Oblast Administration to establish an Oblast Investment Insurance Fund amounting to RUR 100 million.

96.6% of consolidated public budget is current expenditure. Subsidies to residential service companies and municipal utilities (including MSW management companies) will amount to RUR 690 million, about 13% of the total budget. Unfortunately, these public service companies and utilities have one common budget heading. It is therefore difficult to isolate the subsidies to SWM sector.

2.3.3 Investment Planning

Procedure

New investment and maintenance of the existing communal infrastructure is planned without an overall waste planning framework to refer to – but rather as part of the annual budgeting procedures. Public capital expenditure budget planning in the Novgorod region starts with an assessment of resources available for capital investment projects financing on one side, and identification and costing of capital investment projects to be implemented in the following year on the other side. The extensive list of projects suggested by the local administration, units of the regional Administration and other regional agencies is considered by the Department for Construction and Investment Policy and the Department of Finance at the regional Administration in co-operation with other interested parties.

Selection criteria

Other things equal the following projects are considered as more prior at regional level: projects being implemented\started earlier if cost of completion is not high, projects listed in federal and regional target programmes, projects with ready design documents which meet all the rules and requirements (construction, environmental, sanitary, etc.) and help to achieve social and economic targets of the region, projects with co-financing provided by local administrations and other parties.

Political consideration and bargaining with local administrations and the regional Duma is also an important factor affecting both the project selection and the approval process. Capital expenditure budget planning process still depends on discretionary powers of the politicians.

Public capital investment budgets are approved by local/municipal Dumas (Councils) and Oblast Duma (regional parliament) as part of the local /regional public budget, respectively. The result of the process is the Master list of capital investment projects (*Perechen' stroek i ob'ektov*) to be co/financed from relevant public budget(s). The list includes projects from federal and regional target programmes as well as other urgent investment projects.

In 1992-1998 it was general practice that approved capital development programmes lacked financing and actual financing usually was much less than

planned. Several years ago it was recommended that regional budgets should have a separate budget line (called Development Fund) allocating financing for capital investments which address urgent regional economy and infrastructure development and structural reform needs.

2.3.4 Public Sector Indebtedness and Creditworthiness

Public debt

Table 2.10 presents the amount and structure of the Oblast outstanding debt.

Table 2.10 Novgorod Oblast Public Debt, 2000-2001 (RUR'000)

	E	2001
Debt outstanding	888,642	828,944
<i>in that:</i>		
Guarantees provided by the NO	692,439	642,898

Source: Annual reports of the Department of Finance, Novgorod Oblast administration; The Novgorod oblast Law "On Novgorod oblast budget for 2002"

The Novgorod oblast Law "On Novgorod oblast budget for 2002" allows the Oblast Administration to provide public guarantees of RUR 30 million for the Novgorod State Fund for Small Businesses Support. The Law says that as of Jan. 01, 2003 the outstanding debt of the NO should not exceed RUR 784 million, in that guarantees provided by the NO should not exceed RUR 682 million. So, in 2000-2002 the outstanding debt of the NO has been reduced by some RUR 45-60 million per year.

Official creditworthiness

The Russian Ministry of Finance's methodology for assessing creditworthiness provides a relative measure of the "strength" of the region's public finances. The creditworthiness of the Novgorod oblast was assessed as "medium" according to the methodology.

2.3.5 Environmental fund

Fee for use of water and biological resources, as well as all pollution charges and fines and compensation for pollution-inflicted damages to the environment are paid to the budgetary ear-marked environmental fund (EF). So, the revenue base of the NO EF has been increased since 1998. The financial resources are earmarked for the financing of environmental projects and activities, including bioresources (fauna and aquatic bioresources) recovery.

Table 2.11 Current year revenue and expenditure of the budgetary ear-marked Environmental Fund, Novgorod Oblast, 2001 ('000 RUR)

	2001
Transfer from previous year	786
Current year cash revenue (water and bioresources use fee, pollution charges, fines)	13,022
Total resources	13,808
Total expenditure	11,887
Not disbursed as of 01/01/2002	1,921

Source: Natural resource committee for the NO, "Transfer from previous years" means funds not spent last year and therefore available in the current year.

In 1996-1999 an increasing share of total revenues (from 38% to 63%) was spent supporting environmental committees. These transfers were made due to insufficient public budget financing. However, one implication was that the environmental funds in the Novgorod region allocated negligible funds for environmental investments.

The situation have been improved in 2000-2001, e.g. in 2001 Oblast ecofund allocated 47% of collected pollution fees and charges (RUR 1,5 million) for environmental capital investments, in that RUR 1.1 million was spent on rehabilitation of wastewater pipelines and treatment plants in Batetsky and Chudovo and on improvements in wastewater treatment at one pig and one rabbit farms. Other RUR 160,000 was spent on improvements in landfills in Borovichi and Novgorod-the-Great.

The Novgorod oblast Law "On Novgorod oblast budget for 2002" anticipated that revenue of the Novgorod Oblast budgetary Environmental Fund (NOEF) will amount to RUR 16.9 million in 2002, **but** recent developments with legal status of the pollution fees and charges will most likely undermine this year revenues of the NOEF.

As is known this summer the Supreme Court decided that existing system of pollution fees and charges contradicts with the Tax Code and hence the regulation (Federal Government decision # 632) which has been used as a legal basis for the charges is no more effective (see Box 1).

Therefore many polluters in Russia just stopped paying pollution fees and charges to the federal budget and regional budgetary Environmental Funds. It is not the case in Novgorod, but the risk that polluters stop paying is rather high.

Box 1. How pollution fees and charges became illegal in Russia due to inconsistency in the federal regulation and lack of coordination between federal ministries.

The story is as follows: when the previous Law on Environmental protection introduced pollution fees and charges it did not specify the charges base, rates, etc. The government issued the resolution #632 specifying that and the system started working.

Then the Tax Code was adopted which listed **all** the taxes including environmental tax to be introduced. It also states that no tax is legal if it is not listed in the Tax Code. From the Code it was not clear if the new environmental tax would replace the existed system of environmental fees or it would be some additional instrument, but existing pollution fees and charges were not on the list.

In the meantime responsibility for collection pollution fees and charges was levied on Tax inspectorates (before it was responsibility of regional and local committees for Environmental protection of former Goscomecologia). Being asked by many nature users (enterprises) whether existed pollution fees and charges were just obligatory payment (like e.g. royalty) or a Tax the Ministry of Taxes and Fees many times officially stated (by publishing official letters to Tax inspectorates) that existed pollution fees and charges were a Tax.

If so then as soon as the Tax Code became effective (Jan. 1, 1999) the existed pollution fees and charges (being declared a tax by the Ministry of Taxes and Fees) became **illegal** as they were not listed in the Tax Code – that was the argument of the industries in their appeal to the Court. The Supreme Court agreed with the argument and the Ministry of Natural resources and the MoE also agreed that it was their mistake that they neither reset properly existed pollution fees and charges nor suggested changes to the Tax Code.

2.4 Demographic snapshot

Size	On 1 st January 2001, the population in the region comprised some 720,000 inhabitants.
Migration	The population decreased by 4.4% over the period 1991-2001. The decline in the number of inhabitants before taking migration into account was about 1% per year. A positive migration balance led to a less pronounced decrease in the total number of inhabitants. Main migration flows originated from other Russian regions (48%) and nearby CIS/CEE countries.
Urban conglomerations	71% of the population lives in urban areas (cities, towns and urban settlements) while the balance live in rural areas.
Forecast	In the short to medium term, the following changes in the number of inhabitants are expected: total population will further decrease by some 5-10 thousand people before stabilising by 2005. Natural growth of population will

be negative and is expected to be only partly compensated by migration in-flows. There will be also some migration from rural to urban areas within the NO.

Table 2.13 *Urban and rural population in 1996,2001 and forecast till 2020, Novgorod region*

'000 persons	1996	2001	*2005	*2010	*2015	*2020
Total	741.1	720	715	715	715	715
Rural	217,7	212	205	205	205	205
Urban	523,4	508	510	510	510	510

Source: Socio-economic development of Novgorod oblast in 1998, 1999

* - consultant's forecast for 2005-2020

2.5 Socio-economic features

Income levels

GRP per capita amounted to about RUR 38,900 (USD 1,275) in 2001 which was about 37% lower than the average for Russia.

Table 2.14 *GDP/GRP per capita for Russia and Novgorod Oblast.*

	1994	1995	1996	1997	1998	1999	2000	2001
Russia (RUR)	3,584	9,562	13,349	15,362	16,513	32,673	48,780	62500
Russia (USD)	1,868	2,348	2,910	3,056	1,867	1,330	1,730	2,155
Novgorod region (RUR)	2,464	5,948	9,490	10,488	11,048	22,350	29,160	38,920
Novgorod region (USD)	1,274	1,476	2,066	2,078	1,250	781	1,035	1,342
Novgorod in % of Russia	68%	62%	71%	68%	67%	68%	60%	61%

Source: Statistical yearbook of the Russian Federation and the Novgorod Oblast, 2000, Goscomstat and Novgorod Oblast (figures in USD calculated by the Consultant)

The USD value of GDP/GRP is (naturally) highly dependent on the real exchange rate. The purchasing power parity (PPP) adjusted GDP for Russia is approximately 5,100 USD/capita.

Table 2.15 depicts the development in real income and the number of inhabitants with incomes below the official "minimal living standard".

Table 2.15 Selected indicators of real income.

	1994	1995	1996	1997	1998	1999	2000	2001e
Novgorod region								
Minimal living standard, RUR per head per month	n.a.	263	325	349	416	843	929	1050
Ratio of average income to official "minimal living standard"	1.9	1.65	2.2	2.2	2.3	1.6	1.8	2.1
Share of population living below the official "minimal living standard" (%)	17.5	22.8	17.4	17.8	17.9	34.0	24.7	24.0
Russia								
Ratio of average income to official "minimal living standard"	2.4	2.0	2.1	2.3	2.0	1.8	1.8	n.a.
Share of population living below the official "minimal living standard"	22.4	24.7	22.0	20.7	23.3	28.4	29.1	n.a.

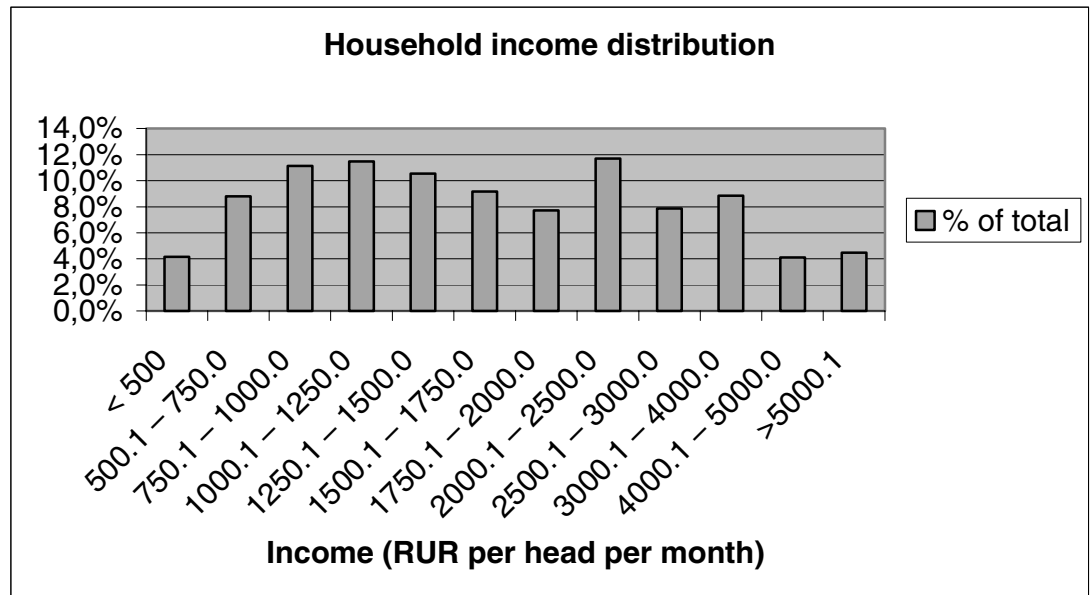
Source: Statistical Yearbook of RF, 1999, Goskomstat, Socio-economic development of Novgorod oblast in 1997 and in 1999, 1998, 2000, e- estimate, n.a. – not available

Income distribution Income distribution is more equal in the region than in Russia on average, and fewer people have an income lower than the minimum living standard.

Table 2.16 Income distribution in the Novgorod region, 2001

Income groups	Thousand people	% of total
< 500 RUR/month		29.9
500.1 – 750.0		63.3
750.1 – 1000.0		80
1000.1 – 1250.0		82.5
1250.1 – 1500.0		75.7
1500.1 – 1750.0		65.8
1750.1 – 2000.0		55.5
2000.1 – 2500.0		84.0
2500.1 – 3000.0		56.5
3000.1 – 4000.0		63.6
4000.1 – 5000.0		29.6
>5000.1		32.1
<i>Total population</i>		719.4
		100

Figure 2.1 Income distribution in the Novgorod region (RUR per head per month)



The graph demonstrates two “hunchbacks” of income levels. The bigger (left one) corresponds to people with income below or close to minimal living standard, including most of retired, unemployed and least paid employed people. The graph clearly presents the gap between average salaries and low pensions paid to retired people, invalids, etc.

In 2000 similar “two hunchback” shape of household income distribution was identified in other regions of Russia and at national level in Russia. It clearly indicated that **social policy was lagging far behind economic recovery**. This fact was recently recognised by the Russian Government and now the government is aware to provide faster growth of pensions and social support to the poor.

We assume that the predicted income growth of the region also will lead to a decrease in the share of people with incomes below the “official minimum level”. This share is expected to decline by 10 percentage points by year 2010.

2.6 Affordability of housing and municipal services

Housing and municipal services (HMS). Payment for HMS as % of household income is low compared to international levels. In late 1990-s the per capita payments for municipal services (water heating, power, rent) were still very modest, amounting to less than 4% of per capita income. However, the expenditure for municipal services is increasing. In 2000-2001, it reached approximately 7.5-8% (which is still affordable on average) of the average per capita monthly income that grew up to RUR 2,630 by the end of 2001. Table 2.17 outlines monthly charges per capita and/or per m² for the most important municipal services. The table has been prepared assuming that on average each inhabitant has 20 m² of housing space with all facilities.

Table 2.17 Monthly charges for municipal services in the NO, Dec. 2001

	RUR per month	As % of average per capita income ⁷
Drinking water and sewerage (per capita)	21.8	0.8
Heating (per 20 m ² house, apartment)	47.0	1.8
Hot water (per capita)	21.9	0.8
Electricity (per 50 kWh)	45.0	1.7
Rent (per 20 m ²)	44.4	1.7
Natural gas (per head)	6.4	0.2
Municipal solid waste (per capita)	12.0	0.5
Total (per capita)	198.6	7.6

Source: "Social-economic development of Novgorod oblast in 2001", Novgorod oblstat, 2002.

Municipal solid waste. For solid waste average household expenditure on this service is about 0.5% of average household income.

But the low tariff only covers the cost associated with collecting and transportation of the solid waste. The remaining operating costs are covered by industry (cross subsidy) and (limited) operating subsidies from the municipal budgets.

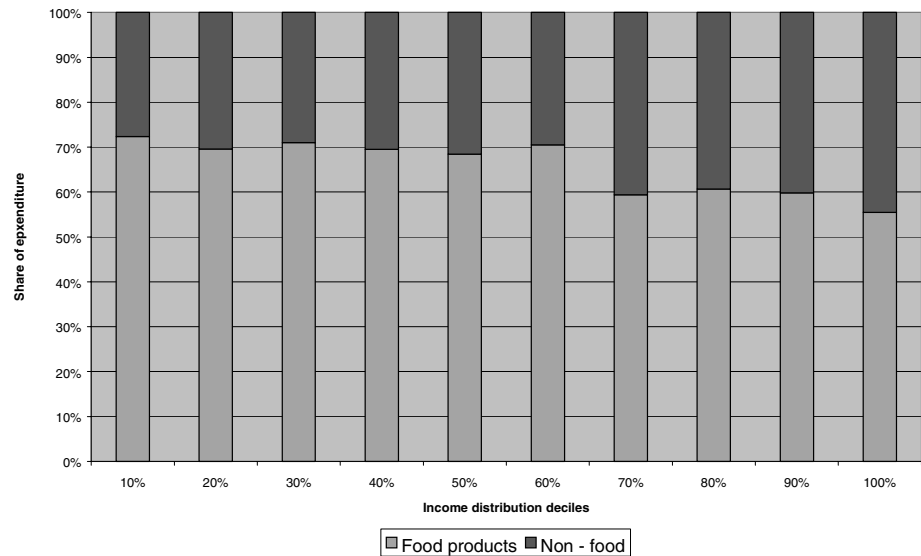
As municipal services adjust to full cost recovery levels, the charges are likely to continue to rise faster than the growth in prices (measured in terms of CPI) and wages. This will exacerbate the household affordability issues. Moreover, taking into account specific "two hunchback" shape of income distribution affordability of HMS for low end of income distribution needs to be carefully assessed.

Payment for municipal services and household incomes

When considering affordability of household tariffs, income distribution is a key concern. Household tariffs may be affordable on average, but difficult to afford for the poorest households. The figure below provides another illustration of income distribution and affordability to pay for municipal services.

⁷ Average monthly income comprised RUR 2,630 in Q4 2001.

Figure 2.1 Household expenditure pattern by income group, Novgorod region 1999



The data for 2001 indicates that in 2001 expenditure on food constituted 54% of total expenditure for all groups compared to 55% in 2000. According the one World Bank definition, households are absolutely poor if food constitutes more than 70% of total expenditure. This is true for the 35% of the population of Novgorod region. Thus, while household expenditure on municipal services on average are quite low, the data on expenditure patterns indicate that the affordability issue is relevant to low end of income distribution.

Extension of the FEASIBLE Model to include Municipal Solid Waste Management
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Appendix 3: Institutional Setup

3.1 Legal framework for waste management

This section provides a brief overview of the existing waste management regulation, including a description of the waste classification system, in Russia and the Novgorod oblast.

Federal level

The legal framework for waste management is still marked by the legacy of the former USSR. Many legal acts and ordinances adopted before 1991 are still in force. In order to establish an improved legal basis, a new Federal Law “On waste of production and consumption” was passed in mid-1998 (hereafter referred to as "Federal waste law"). A number of federal and regional regulations are being drafted and amended to ensure conformity with the federal waste law and to further specify the provisions.

Important provisions dating back from the former Soviet Union and establishing requirements to collection and landfills for MSW include: sanitary norms and rules (SanPiN), construction norms and rules (SNiP), and State Standards (GOST).

In addition, other Federal laws allocate responsibilities and regulate activities related to waste management. This concerns in particular the Federal Law “On Environmental Protection” (No 7-FZ DD as of 10 January 2002), the Law on General Principles for Local Self-Governance (1995), the Tax Code (part 1 effective since July 31, 1998 No. 146-FZ and part 2 effective since August 5, 2000 No.117-FZ (last amendments dated May 29, 2002), and the Law on Natural Monopolies (DD August 17, 1995, No.147-FZ (amendments DD August 8 and December 30, 2001).

The federal laws define the allocation of competencies between the federal, regional, and local levels, definitions of waste, waste classification, and overall substantial norms regarding handling of waste (prohibitions, permitting systems, etc.). The most important provisions in the federal laws are described below.

Regional and city rules

The legal framework at the federal level is complemented by rules at regional and city/town levels. In Novgorod, temporary regional rules on waste management were established in June 16, 1994. According to local sources (“Novzhilkommun-service”) after 1994 no revision or other regional documents regarding this matter have been approved. After enactment of the Federal waste law, both documents are basic ones for waste management in Novgorod oblast.

The individual cities and towns in the oblast have generally specified their own rules concerning waste management.

These rules concern relationships between ‘nature users’ and environmental authorities (oblast, town and local environmental committees) and specially authorised public authorities. The rules cover all activities related to generation, collection, transportation, recycling, utilisation, disposal and concealment of

waste of consumption and production (hereinafter referred as waste management).

The rules contain environmental requirements for waste of consumption and production management, set up rules and procedures for permits obtaining as well as for environmental control in waste management system, specify rules for calculation of charges for waste disposal, establish administrative liability for non-compliance with requirements for waste management, contain glossary and annexes with a list of legal acts and regulations.

These rules are assumed to be valid until relevant federal normative and methodological documents are adopted.

3.1.1 Definition of waste

The federal law on waste defines waste as follows:

“Waste of consumption and production (further – waste) are residues of raw materials, materials, semi-finished products, other articles or products which are generated during process of production or consumption, as well as final goods (products) that lost their value for consumers.” (Federal waste law).

Consequently hazardous waste are defined as waste containing

“hazardous substances that possess harmful properties (toxicity, explosive, inflammable, high reactivity) or containing pathogenic organisms which are either directly or potentially hazardous independently or after contact with other substances for environment or human beings. (Federal waste law).

As the new Federal law on environmental protection (2002) has not introduced any other definition of waste, so the above definition is still applied.

The Novgorod regional rules contains their own definition of waste

Waste is defined as waste of consumption and production generated in national economy.

Waste of production – residues of raw materials, materials, semi-finished products generated during production process or works implementation which lost fully or partly their value for consumers. The waste of production includes enclosing and overburden rock generated during minerals extraction, as well as by- and associated products.

Waste of consumption – articles and materials that lost their value for consumers as a result of their physical or moral depreciation. These include solid household waste generated in daily human activities.

3.1.2 Waste classification

The Article 14 of the Federal waste law is a legal basis for development of criteria for waste attribution with class of hazardous potential. (Criteria for hazardous waste attribution with class of hazardous potential for environment, approved by the Order No. 511 issued by the Ministry of Natural Resources of the Russian Federation (RF), DD June 15, 2001. This document contains a reference on Federal waste classification catalogue approved by below Order No. 527).

The legal basis for elaboration of the **Waste catalogue** was the Ordinance of the Government of the RF No. 766 “On State regulation and control of trans-boundary movement of hazardous waste” DD 01.06.96. The same document contains form to be filled in compulsory by waste generators with use this waste classification.

Waste classification catalogue description is in the Order of Goskomecologia No. 527 “On Federal waste classification catalogue”, DD 27 November, 1997. This document also provides rules for waste generators to record waste in the Catalogue, the maintenance of which was a responsibility of Goskomecologia and its regional bodies.

Monitoring and control responsible of the authorities are defined by the Federal Law “On environmental Protection” (Chapter X-XI, No.7-FZ, DD 10.01.2002). The powers of Federal, RF constituents and local authorities’ for monitoring and control are defined also by Chapter II (Articles 5-8) of the Federal Waste law and in a number of other legal acts.

Following to the regulation “ On Temporary Rules for Environmental protection from waste of consumption and production in the Russian Federation” (Letter of Minpriroda No. 01-15/29-2115) the nature user is in charge to define class of hazardous potential f or waste generated or stored at the enterprise industrial node (p.2.15-2.17 of Temporary Rules). These Rules are in force till approval of a new edition of the Temporary Rule (letter of Minpriroda of the RF No. 01-15/29-3603, DD Dec19, 1994).

The waste classification is based on a code containing 5 components, which describes the nature of the waste. The components include:

Table 1-3 Waste classification system

Component	Description
Block	There are 4 blocks: - organic - mineral - chemical - municipal
Group	Origin of raw materials. Each block includes 9 groups.
Sub-group	Attribution to specific industries. Each group includes 9 sub-groups.
Item	Chemical content. Each sub-group may contain up to 99 items.
Sub-item	The sub-item indicates other features with regard to the contents and properties of the waste, including a code for the hazardous potential of the waste.

Source: Waste classification catalogue of the Russian Federation

The code for the hazardous potential of the waste includes 4 classes (class 1 being the most hazardous and class 4 the least). **Most of Class 4 waste would not be classified as hazardous in OECD countries.** Other (non-hazardous waste defined by Criteria for hazardous waste attribution to specific class of hazardous potential. Approved by the Order of the Ministry of Natural Resources of RF No. 511, DD June 15, 2001) form another class ("class 5"). But if there is no experimental (lab tests) proof that the waste is of Class 5, than this waste may be attributed with Class 4.

3.1.3 Key provisions regarding handling of waste

According to the Federal Waste Law (Art.11), all legal entities (enterprises, organisations, etc.) are required to get a permit for handling with their waste. This means that they are responsible for the handling with their own waste. However, they can also, under a specified contract, transfer their waste to another legal person, who has the required permit.

With regard to domestic waste from households, the municipalities (bodies of local self-government) have the responsibility for waste collection and disposal/recovery (Art. 13).

According to the Federal Waste Law (Art. 12, para 1) waste disposal is only allowed on special designated sites, for which a permission for waste disposal has been granted.

Waste disposal is prohibited within the territories of towns and other settlements, forests and parks, resorts, medical and sanitary recreation areas, water-protection zones, catchment areas of underground water bodies, which are used for drinking water supply. Waste disposal is also prohibited in areas of mineral extraction and mining in cases where there is a threat that these areas are contaminated or that safety requirements to mining activities are violated.

Basic rules for solid and liquid municipal waste collection and transport were approved by Government of the Russian Federation in 1997 (Resolution DD Feb. 10, 1997 N 155). Article 51 of new Federal Law “On Environmental Protection”, Federal law No. 89-FZ “On waste of production and consumption”, Federal target program “Waste” also contain key provisions for dealing with waste. In this respect the Concept of solid household waste management in the Russian Federation approved by the Ordinance of Gosstroy Collegium No. 17, DD Dec 22, 1999 should also be mentioned.

3.2 Institutional set-up for municipal waste management in the Novgorod Oblast:

All four levels of governance in Russia – Federal, Federal District, regional and local/municipal, are involved in waste management in one way or another. However, at the operational level, the main responsibilities lie with the municipalities.

The responsibilities of the various institutions involved in the waste management tasks as waste planning and target setting, waste handling, tariffs and subsidies and monitoring and reporting are outlined below.

3.2.1 Waste planning and target setting

In the present legal framework, there is no obligation for any of the levels of governance to develop waste plans (national waste plan, regional waste plan, local waste plan). However, Federal institutions have the responsibility for setting out the overall policies and objectives for waste management through federal legislation, the national environmental action plan, and targeted federal investment programs. Correspondingly, the regional level is responsible for the detailed waste management planning in terms of investment programmes and design and construction of facilities for waste management.

Federal level

The key federal executive bodies in respect to MSW management and control include the Federal Ministry of Natural Resources (MoNR) and the State Committee for Construction and Housing and Municipal Economy (Gosstroy) as well as State Service for Sanitary- Epidemiological Supervision (Sanepidnadzor).

3.2.1.1 The Ministry of Natural Resources of the Russian Federation

The Ministry (MoNR) is the main institution responsible for the management of natural resources and environmental protection. It determines the overall environmental policy of the Russian Federation⁸ and co-ordinates activities of other Federal bodies of the executive power related to environmental protection.

⁸ After the reorganisation started in May 2000, when it was joined by the State Committee for Environmental Protection (SCEP) of the Russian Federation, which had these responsibilities before.

In 2000-2001 the structure of the ministry was modified. As of October 2001, regulatory functions are delegated to five State Services, four of them being the sector-oriented regulatory type (State Water Service, State Geological Service, State Forestry Service, State Environmental Protection Service). The fifth Service has control functions - the State Service for Control regarding Nature Resource Management and Environmental Safety. The Services have several specialised departments and divisions.

Each federal district has Inter-Regional Department for Natural Resources located in the central city of the Districts (for the North-West Federal District in St. Petersburg). Committees for Natural Resources operate at oblast level, and at local level the ministry is represented by a corresponding unit or just a staff member in charge.

Regional Administration has also Deputy Governor, Advisor to the Governor and a unit (*otdel*) responsible for the issues of natural resources management and environmental protection as according to the Constitution of the Russian Federation some natural resources are property of Subjects of the Russian Federation, as well as some natural resources management and environmental protection issues are responsibility of the Subject of the Russian Federation.

3.2.1.2 State Committee for Construction and Housing and Municipal Economy

The Committee (GOSSTROY) regulates and co-ordinates activities related to construction, architecture, municipal infrastructure development and housing and communal services, including e.g. water supply, wastewater collection and treatment, district heating, and solid waste management.

At lower administrative levels there are departments/committees of Housing and Municipal Services within relevant administrations. But such a committee does not exist at the Novgorod Oblast Administration, while coordination in the housing and municipal economy of the Oblast is provided by “Novzhilcommuneservice”.

Regional level

According to the Federal Waste Law (Art. 6), the regional level (subjects of the Russian Federation) has the competence of designing and constructing the facilities for waste recovery and disposal. Also, they can design and implement regional investment programs in the waste management field. Hence, the regions are responsible for waste planning, but they are not required to produce an actual regional waste plan.

3.2.1.3 Regional and local (municipal, rayon) public authorities

In Novgorod Oblast, the most important institutions involved in planning/target setting are Oblast Administration that approved temporary rules for waste management, City's and municipalities' administrations issuing specific local regulations (e.g. on approval of average yearly norms of solid waste accumulation at the enterprises and organisations of Novgorod-the Great) and approving tariffs.

Novgorod City Duma is involved in approval of rules for cleansing of the city area. In accordance with acting legislation all legal entities generating or storing waste of production and consumption must obtain a permit from the Oblast Committee of Natural Resources which is responsible for permits issuing for waste handling. The local authorities are responsible for daily waste management.

In order to obtain the permit each legal entity must sign an agreement with the local municipal enterprise (ME) responsible for solid and liquid household waste collection, transportation and disposal (exists in each city and rayon) and pay a charge for waste disposal of store of waste within the own area. The charges are differentiated depending on type and toxicity of waste, kind of utilisation or disposal.

The Novgorod City administration in 1996 established the Customer Service as a municipal enterprise under the Municipal Construction and Service Committee. The Customer Service is the real estate manager for the city and is responsible for municipal services and infrastructure, maintenance and repair. These are procured from private or municipal companies.

Customer Service

In case of Novgorod City, the Customer Service has signed contract with the waste management company, SAKH (*Spetsavtokhozyaistvo*) on behalf of the City Administration.

3.2.2 Waste handling

With respect to waste collection and waste disposal/recovery for domestic waste, the municipalities have the operational responsibility, as mentioned above.

In cities the municipal utilities providing municipal services, including the waste utilities, are most often set up as separate managing entities or municipal enterprises operating under the municipality rule.

In many smaller towns, there are so called *Zhilkomkhozy* – municipal enterprises responsible for waste collection, transportation and treatment/disposal as well as for other municipal services, such as water supply and wastewater treatment.

In few cases, a private company is contracted to provide the services – this is the case in Novgorod-the-Great City. The waste company, SAKH, is a private, closed, joint-stock company owned by the present and retired employees. The SAKH operates the landfill, however the City is the property owner of the landfill and the SAKH operates it under a special agreement.

Agreement with waste company

No matter which model is chosen, the municipality establishes a contract/agreement with the entity or company. This agreement may cover one year or a number of years. Example of an agreement is presented below in section 3.3.

The landfills and other immobile fixed assets (e.g. transfer stations) are usually owned by municipalities while municipal or private waste management companies (contractors) use and operate them. Other fixed assets (tracks, compactors, containers) can be owned by the waste management companies and industries. But in near future private operators most likely will own more and more immobile assets like landfills, transfer stations, waste recycling facilities, etc.

The waste utility, in turn, establishes a contract with each of its clients. The clients constitute:

- Municipal housing associations, which are municipal enterprises managing a certain number of blocks of multi-storey apartment buildings. This is the most common means of accommodation in Russia.
- Housing co-operatives and single-family private housing. A small, but increasing, share of the population lives in private single-family houses. In principle, the municipality is responsible for waste collection and disposal/recovery for these households. In some areas, the regular municipal waste collection services have been expanded to cover these households. However, a practise of semi-annual cleaning of streets and surroundings of the premises containing private single-family housing is still common.
- Commercial and industrial enterprises, public institutions, etc. generating waste similar to household waste may establish a contract with the waste utility to collect their waste. Alternatively, they may bring the waste to the disposal/recovery facility themselves against payment of a fee for disposal.

In Novgorod City, the SAKH has one main contract with the municipal administration covering waste collection from municipal housing associations. Other agreements with some 1000 individual clients cover collection, transport, and disposal from other residential buildings, commercial enterprises, industries, institutions, etc. In addition, a coupon system is operated, through which clients can buy rights to dispose a certain amount of waste at the landfill.

3.2.3 Tariffs and subsidies

The municipalities and utilities can claim tariffs for the municipal services they provide. However, as it is a monopolistic situation, the decision-making power regarding the tariff level is with the local Administration and/or Duma and with a veto-right to the regional level.

The tariffs are usually established by Ordinances issued by local Administrations. (E.g. Ordinance No. 146 DD 20.10.2000 issued by the Administration of Novgorod the Great).

Tariff set up procedure The tariff level is calculated by waste utility based on a cost-plus formula. Federal rules by the State Committee for Construction and Municipal Economy (“Methodology on planning, accounting and calculation of prime-cost for municipal services” approved by Ordinance No.9 of Gosstroy RF DD Feb 23,

1999 with amendments DD Oct 12, 2000) recommended the methodology for cost calculation. Key cost items include: materials (spare parts for trucks, containers), fuel, depreciation, salary, social taxes, costs of waste disposal on landfills.

The unit cost is calculated then per m³ of waste collected. The average tariff is equal to the unit cost plus approved profitability mark up. There is a limit to the profit margin, which can be added. The limit is established at 25% according to the Federal regulation.

The tariffs for different consumer groups are still differentiated and it is often the case that households pay only for waste collection and transport to landfill while other consumers (budgetary and commercial organisations and industries) pay higher tariff covering cost related to waste disposal on landfill.

But Federal Government Resolutions No. 887 “On improvement of payment system for housing and communal services and measures for social protection of population”, DD August 2, 1999 (amendments DD July 1, 2002) and No. 609 “On measures to phase-out tariff cross-subsidisation in water supply, sanitation, district heating and solid municipal waste management services” (DD August 21, 2001) state that cross-subsidies should be gradually phased-out by year 2004, so that households will pay full tariff for the services while the poor will get target income subsidies. This policy is being implemented in the Novgorod oblast though the oblast is behind the phasing-out schedule recommended by the federal regulation.

The calculated tariff is presented to the local Administration and/or Duma for approval. Some municipalities have established a Price and tariffs committee or council under the Administration and/or Duma to consider and approve tariffs. For instance, in the City of Novgorod, a special council consisting of the Mayor, his four deputies, and six appointed persons, including the deputy Chairman of the local Duma, has been granted decision-making power. The tariff level decided by the Administration and/or Duma may be lower than the calculated level. The tariff as approved by the local (rayon/municipal) Administration and/or Duma is presented to a Regional (oblast level) committee, who has the right to veto against the tariff.

The level of tariff is highly dependent on various cost items, which are produced by other state-controlled utilities, e.g. energy and electricity. These are also subject to tariff regulations. The tariffs change quite often – when one utility changes the tariff, the others have to follow.

The Federal level political decision to reach full cost recovery should put pressure on local Administrations and Dumas. However, this is not popular to increased tariffs especially just before coming elections. And as those elections are coming one after another tariffs often stay at very low level as the tariffs approval procedure is still highly depended on local and regional politics.

Tariff discounts and public subsidies

According to Federal legislation (Law on veterans, Law on status of military servants, etc.), about 40 numerous groups of privileged consumers have been entitled to discounts. These *inter alia* include:

a) 100 % discount is granted to the Heros of the Soviet Union and Russia, Heros of Socialistic Labour and Full Cavalier of the Glory Orden;

b) 50% discount is granted to:

- wars and local military actions veterans including members of their families;
- invalids and families with children-invalids;
- retired veterans of labour (most numerous category);
- policemen (50% at expense of public budget specially allocated for this purpose), customs service officers (which have been on service for 20 years and more), employees of federal tax authorities (50% are compensated form public budget specially allocated for this purpose);
- citizens that got radiation after nuclear tests near Semipalatinsk and after nuclear explosions in Chernobyl, Chelabyunsk oblast, etc.;
- Judges of Supreme Court, Supreme Arbitrary Court and Constitutional Court (also compensated from the public budget);
- people that have an order "Honoured blood-donor";
- rehabilitated victims of political repressions, participants of anti-terrorists operations (in case of their death and under conditions that they had exemptions before death, the members of family continue to get 50% discount);

c) 30% discount is provided to families with many children (more than 3 kids).

General rule is that operating losses of the housing and municipal services providers due to the above privileges should be compensated by the public budget, but they are very seldom fully compensated in reality.

If a household has an income per capita less than the officially approved minimal living standard then the bill for housing and municipal services for this household cannot exceed a half of minimum salary established by federal law (450 RUR in 2002). Operating losses of the services providers should be (but very seldom are fully) compensated from the public budget.

The federal acts which regulate the above provisions are:

- Statute on subsidies provision to people to pay rent and communal services (approved by the RF Government Decision No. 887 "On improvement of payment system for housing and communal services and measure on social protection of population", DD August 2, 1999);

- Federal law No. 134-FZ “On minimal living standard in the Russian Federation”, dated 24.10.97;
- Ordinance of the RF Government No.192 DD 17.02.99 (amendments DD 16.03.2000) defines minimum consumer basket, including municipal services, waste removal is NOT included in minimum set of communal services;

and some others. In addition, there are federal rules concerning target subsidies to low income households.

During transition period to full cost tariff the right to establish maximum allowed share of households' income paid for housing and municipal services is attributed to the local self-governing authorities. (The Ordinance of the RF Government No. 609 “On measures to phase-out tariffs cross-subsidisation in water supply, sanitation, district heating and solid municipal waste management services”). This Ordinance recommends also to avoid discounting practice for some categories of communal services users (though there is no indication which categories).

Until the full cost household tariff is not achieved the municipal budget (depending on the rule) should compensate to the services providers so called inter-tariff difference (the difference between average tariff and discounted household tariff times amount of service provided to households).

But in case of private company (e.g. in Novgorod-the-Great) households (except privileged consumers) pay full (not discounted) tariff.

3.2.3.1 User charges collection

The collection of tariffs takes place in different ways depending on the municipality. In some municipalities, the utility itself is responsible for the entire billing and collection procedure. In Novgorod City, the SAKH uses the services of the Customer Service and the Financial Settlement Centre (FSC). The invoices from the SAKH are sent to the Customer Service, who presents the invoice to the FSC. The FSC includes the payment due in the monthly invoice to citizens, which covers a number of municipal services (including rent for those living in municipal housing associations). The CS receives money directly from the municipal budget to cover subsidies to poor families. In theory, the amounts should be paid to SAKH, however, this payment does not always take place.

The Financial Settlement Centre is a municipal enterprise established under the city administration. While the Customer Service deals with municipal real estate, the FSC is supposed to service all categories of the population, including those in private buildings⁹. The FSC has three tasks:

⁹ However, presently, those living in private buildings - as well as companies and municipal or state owned administrations, hospitals, schools, etc have contracts directly with the SAKH.

1. national registration of citizens;
2. billing and collection of payment for municipal services;
3. decision and administration of subsidies for utility services.

The FSC gets a bonus (*commission*) of 2.5% of the billed amount. In case of late payment, the penalty (0.1% to 0.5% of the amount, depending on the time) goes to the FSC.

3.2.4 Waste monitoring and reporting

Ministry of Natural Resources and the Natural Resource Committees at regional level are responsible for data collection from waste generators, waste utilities, permit system, inspection of utilities, etc.

Enterprises are also obliged to present statistic reports on waste generation, use, disposal, neutralisation, etc. to the MoNR and Goscomstat.

3.2.5 Implementation of approved maintenance repair and capital investment plan(s)

New investment and maintenance of the existing infrastructure is planned without an overall waste planning framework to refer to – but rather as part of the annual budgeting procedures.

3.3 Sample Agreement between Municipality and local waste management company (SAKH) on cleaning up the city area (structure key provisions)

The sample agreement is from Novgorod-the-Great in which the municipality is represented by the Customer Service

AGREEMENT No. 209

Contract on cleaning up of city's area

Novgorod the Great

December 31, 2000

General part of the Agreement consists of the name of Contract parties (Customer and Contractor), names and positions of Heads of contracting organisations and legal basis of their operation.

1. Subject of the Agreement

This part contains list of functions to be implemented by the Contractor and objects for services.

2. General Terms

- 2.1 List of Regulations related to order and conditions for works to be implemented by the Contractor under the contract.
- 2.2 Payment conditions
- 2.3 Current tariffs
- 2.4 Terms for tariffs change
- 2.5 Start and completion of seasonal services (as snow collection and disposal)
- 2.6 Other conditions and clauses

3. Rights and responsibilities of the parties

From Customer side:

- 3.2 Conditions of payments
- 3.3 Quality control
- 3.4 Coordination of plans
- 3.5 Problems solving
- 3.6 Other responsibilities within this Agreement

From Contractor side:

- 3.7 Quality insurance
- 3.8 Reporting (including financial)
- 3.9 Planning of current repairs
- 3.10 Monthly presence at the meeting summoned by the Customer
- 3.11 Other responsibilities within this Agreement

4. Quality assessment

- 4.1 Weekly control of a quality of works carried out by the Customer in presence of Contractor representative, signing of the works acceptance act.
- 4.2 The mark (satisfied/unsatisfied) is to be fixed in the above act.
- 4.3 If Contractor refused to participate in quality monitoring, than the Customer has right to carry out it one-sided order.
- 4.4 Customer reduce volume of works done by the Contractor at the rate of unsatisfied quality works.

5. Responsibilities of the parties

- 5.1 Parties are accounted for failure to execute their commitments
- 5.2 parties are not accounted for non-fulfillment in case of fundamental changes in legislation, force-major circumstances, natural calamities effect that made impossible to fulfill commitments under the Agreement. This should be announced immediately in written form.
- 5.3 In a case of non-fulfillment of commitments indicated in 6.1 the Customer obliged to pay penalty fee as 0.1% from billed amount per each day of payment delay.
- 5.4 If the Contractor did not eliminate during 30 days defects indicated in the Act of works' acceptance than it must pay to Customer penalty fees in amount of 5 minimum salary per each day of delay.

6. Payments conditions and order

- 6.1 The Customer is obliged to transfer money on Contractor bank account monthly in accordance with bills
- 6.2 Bank transaction is carried out within 3 days after receipt of money by Customer from city's budget.

7. Terms of Agreement validity and denouncing

- 7.1 The agreement is valid from dd/mm/yy to dd/mm/yy.
- 7.2 The Agreement can be cancelled if both parties agreed upon.
- 7.3 One-sided denouncement of the Agreement may be done by Arbitrary Court decision
- 7.4 The Agreement stops to be valid in case of
 - Liquidation of one of the parties;
 - Other circumstances foreseen by Russian legislation.

8. Other provisions

(May include procedure for amendment or change of the contract provisions, disputes settlement rules and other provisions).

The Agreement ends with legal address and bank accounts of both parties, parties signatures and stamps.

Appendix 4: Questionnaire

For questions where answers can not be based on direct data/statistics, please give a best estimate.

Abbreviations are explained in a legend in the end of the questionnaire

1. Identification					
1.1	City / District:	_____			
1.2	Contact Person:	_____			
1.3	Department:	_____			
1.4	Telephone:	_____			
1.5	Telefax:	_____			
1.6	E-mail	_____			
2. Socio-economic Data					
2.1a	Total number of Inhabitants:		1990	1995	2000
		_____	_____	_____	_____
2.1b	Number of inhabitants serviced by ME Sakh		_____	_____	_____

	2005	2010	2015	
2.2a	Predicted future number of Inhabitants:	_____	_____	_____
2.2.b	Number of inhabitants serviced by ME Sakh	_____	_____	_____
	Industry/ Agriculture	Institutions	Commerce	
2.3	Number of employed population in year 2000			
2.4	Average wage in year 2000:			
<i>Share of population covered by services on SHW collection (separately for LHW) in present and a forecast for 2010:</i>				
2.5	% of population living in urban households:	_____		
2.6	% of population living in municipally owned buildings:	_____		
2.7	% of population living in co-operative housing organization buildings:	_____		
2.8	% of population living in enterprise owned residential buildings:	_____		
2.9	% of urban population living in single family houses:	_____		
2.10	% of rural population living in single family houses:	_____		
2.11	Average number of inhabitants per urban household:	_____		
2.12	Average number of inhabitants per rural household:	_____		

3. Waste Generation		1990	1995	2000
3.1	Total generation of Class 4 MSW (m ³):	_____	_____	_____
3.2	Total generation of LHW/septage (m ³ , ton):	_____	_____	_____
3.3	Total generation of WWTP sludge (m ³ , ton)	_____	_____	_____
3.4	Total generation of Class 3 waste disposed on MLF (m ³):	_____	_____	_____
3.5	Total generation of Class 3 waste disposed on PLF (m ³):	_____	_____	_____
3.6	Total generation of septage/WWTP sludge disposed on MLF (m ³):	_____	_____	_____
3.7	Total generation of class 1 and 2 waste (m ³):	_____	_____	_____
3.8	Estimated density of waste as collected (ton/m ³):	_____	_____	_____
3.9	Estimated density of waste in compactor truck (ton/m ³):	_____	_____	_____
3.10	Estimated density of waste in landfill (ton/m ³):	_____	_____	_____
3.11	Estimated present MSW distribution by source (%):			
	Urban house-holds			
	Rural households			
	Institutions			
	Commerce/institutions			
	Industry			
	Construction/demolition			

Solid	_____	_____	_____	_____	_____	_____	_____	_____
Liquid	_____	_____	_____	_____	_____	_____	_____	_____
3.12 Estimated present MSW composition by fraction (%)								
	Urban households	Rural households	Institutions	Commerce/ institutions	Industry	Construction demolition		
Paper:	_____	_____	_____	_____	_____	N/A		
Cardboard:	_____	_____	_____	_____	_____	N/A		
Plastic:	_____	_____	_____	_____	_____			
Glass:	_____	_____	_____	_____	_____	N/A		
Metal:	_____	_____	_____	_____	_____			
Food waste:	_____	_____	_____	_____	_____	N/A		
Garden waste:	_____	_____	_____	_____	_____	N/A		
Others:	_____	_____	_____	_____	_____			
Bulky waste:	_____	_____	_____	_____	_____			
Con-crete/tile/rubble:	N/A	N/A		N/A	N/A			
3.13 Please describe the most pressing issues/problems concerning the present waste generation								

4. Waste Collection

4.1	Waste collection coverage (% of MSW waste generat.):	_____	1990	_____	1995	_____	2000	_____
4.2	What areas/housing types are not covered?	_____						
4.3	Predicted future MSW waste collection coverage (%):	_____	2005	_____	2010	_____	2015	_____
<i>Definition of municipal waste collection container types:</i>								
4.4	Target waste types for container (MSW, OW, R)	_____	Type A	_____	Type B	_____	Type C	_____
4.5	Container material (e.g. plastic, metal):	_____						

4.6	Volume of waste container (m ³):	_____	_____	_____
4.7	Average container capacity used upon collection (%)	_____	_____	_____
4.8	Average life time of container:	_____	_____	_____
4.9	Cost of new container:	_____	_____	_____
4.10	Total number of containers serving UHH:	_____	_____	_____
4.11	Total number of containers serving RHH:	_____	_____	_____
4.12	Total number of containers serving BO:	_____	_____	_____
4.13	Total number of containers serving C:	_____	_____	_____
4.14	Total number of containers serving I:	_____	_____	_____
4.15	Total number of containers serving C&D:	_____	_____	_____
4.16	Total number of collection points serving UHH:	_____	_____	_____
4.17	Total number of collection points serving RHH:	_____	_____	_____
4.18	Total number of collection point serving BO:	_____	_____	_____
4.19	Total number of collection points serving C:	_____	_____	_____
4.20	Total number of collection points serving I:	_____	_____	_____
4.21	Total number of collection points serving C&D:	_____	_____	_____
4.22	Average number of UHH served by one container:	_____	_____	_____

4.23	Average number of RHH served by one container:	_____	_____	_____
4.24	Average number of BO served by one container:	_____	_____	_____
4.25	Average number of C units served by one container:	_____	_____	_____
4.26	Average number of I units served by one container:	_____	_____	_____
4.27	Average number of C&D units served by one container:	_____	_____	_____
4.28	Average driving distance between CP in UHH areas:	_____	_____	_____
4.29	Average driving distance between CP in RHH areas:	_____	_____	_____
4.30	Average driving distance between CP in BO areas:	_____	_____	_____
4.31	Average driving distance between CP in C areas:	_____	_____	_____
4.32	Average driving distance between CP in I areas:	_____	_____	_____
4.33	Average driving distance between CP in C&D areas:	_____	_____	_____
	<i>Definition of municipal waste collection truck types:</i>	Type A	Type B	Type C
4.34	Waste collection truck type (e.g. open, compacting):	_____	_____	_____
4.35	Fuel type (petrol, diesel, LPG):	_____	_____	_____
4.36	Waste collection truck capacity (m ³):	_____	_____	_____
4.37	Waste collection truck capacity (ton):	_____	_____	_____
4.38	Total number of trucks:	_____	_____	_____

4.39	Cost of new truck:	_____	_____	_____
4.40	Average age of trucks:	_____	_____	_____
4.41	Economic life-time of trucks:	_____	_____	_____
4.42	Average mileage of trucks:	_____	_____	_____
4.43	Average maintenance rate (% of "on duty" time):	_____	_____	_____
4.44	Number of stand-by vehicles:	_____	_____	_____
4.45	Service area (UHH, RHH, BO, C, I, C&D):	_____	_____	_____
4.46	Average number of WGU served by one truck:	_____	_____	_____
4.47	Collection frequency MSW (times per week):	_____	_____	_____
4.48	Collection frequency BW (times per month):	_____	_____	_____
4.49	Collection frequency OW (times per month):	_____	_____	_____
4.50	Collection frequency R (times per month):	_____	_____	_____
4.51	Collection frequency IDW (times per year):	_____	_____	_____
4.52	Number of operation (collection) days per year:	_____	_____	_____
4.53	Average daily collection distance:	_____	_____	_____
4.54	Average daily transportation distance:	_____	_____	_____
4.55	Average daily operation time:	_____	_____	_____

4.56	Collection time as % of total operation time:	_____	_____
4.57	Average number of daily trips to landfill:	_____	_____
4.58	Average landfill roundtrip time:	_____	_____
4.59	Please describe the most pressing issues/problems concerning the present waste collection system	_____	_____
4.60	Please describe any plans/proposals to introduce new systems for waste storage/collection	_____	_____
4.61	Please describe any plans/proposals to purchase new waste collection trucks	_____	_____
5. Recovery/Recycling			

<p>5.1 Is source separation presently practised, and if so give the estimated % of waste generation units practising source separation.</p>	Urban households	Rural households	Institutions	Commerce/ institutions	Industry	Construction demolition
Source separation:	_____	_____	_____	_____	_____	_____
5.2 If source separation is practised, which materials are separated (mark with an x)						
Paper:	_____	_____	_____	_____	_____	_____
Cardboard:	_____	_____	_____	_____	_____	_____
Plastics:	_____	_____	_____	_____	_____	_____
Glass:	_____	_____	_____	_____	_____	_____
Metal:	_____	_____	_____	_____	_____	_____
5.3 If recycling presently is practised, give the estimated % of each fraction being recycled (as % of total MSW generation)						
Paper:	_____	_____	_____	_____	_____	_____
Cardboard:	_____	_____	_____	_____	_____	_____

Plastics:	_____	_____	_____	_____	_____	_____
Glass:	_____	_____	_____	_____	_____	_____
Metal:	_____	_____	_____	_____	_____	_____
5.4	How are recyclables being collected, by door-to-door collection (mark with a D), at bring banks (mark with a BB), at recycling centres (mark with a RC), during collection (mark with a C) or at disposal sites (mark DS).					
	Urban households	Rural households	Institutions	Commerce/institutions	Industry	Construction demolition
Paper:	_____	_____	_____	_____	_____	_____
Cardboard:	_____	_____	_____	_____	_____	_____
Plastics:	_____	_____	_____	_____	_____	_____
Glass:	_____	_____	_____	_____	_____	_____
Metal:	_____	_____	_____	_____	_____	_____
5.5	Describe the companies that accept/buy recyclables and their present and future capacity/demand for recyclables (ton/year)					
	Company name/location			Capacity/demand	2000	Capacity/demand 2010

Paper:	_____	_____	_____	_____
Cardboard:	_____	_____	_____	_____
Plastics:	_____	_____	_____	_____
Glass:	_____	_____	_____	_____
Metal:	_____	_____	_____	_____
5.6 What is current and predicted future market price for recyclables (RUR/ton)				
	Market price 2000		Market price 2010	
Paper:	_____	_____	_____	_____
Cardboard:	_____	_____	_____	_____
Plastics:	_____	_____	_____	_____
Glass:	_____	_____	_____	_____
Metal:	_____	_____	_____	_____
5.7 Is food waste/garden waste being composted (give % of total MSW generation being compost.)				
	Urban SFB households	Urban MFB households	Rural households	Institutions Commerce/ institutions
Food waste:	_____	_____	_____	_____
Garden waste:	_____	_____	_____	_____

5.8 Is composting carried out at source (mark HC) or at a central facility (mark CF)

	Urban SFB households	Urban MFB households	Rural households	Institution	Commerce/ institutions
Food waste:	_____	_____	_____	_____	_____
Garden waste:	_____	_____	_____	_____	_____
Food+garden waste:	_____	_____	_____	_____	_____

5.9 How is the compost utilised (e.g. agriculture, gardening), and what is the estimated present and future capacity/demand in each type of utilisation (ton/year)?

	Utilisation	Capacity/ demand 2000	Capacity/ demand 2010
Food waste compost:	_____	_____	_____
Garden waste compost:	_____	_____	_____
Food+garden waste compost:	_____	_____	_____

5.10 What is current and predicted future market price for compost (RUF/ton)?

	Market price 2000	Market price 2010
Food waste compost:	_____	_____
Garden waste compost:	_____	_____
Food+garden waste compost:	_____	_____
5.11 Please describe any plans/proposals to introduce new source separation systems	_____ _____ _____	
5.12 Please describe any plans/proposals to introduce new systems for collection of recyclables	_____ _____ _____	
5.13 Please describe any plans/proposals to introduce new systems for composting	_____ _____ _____	

	Type A	Type B	Type C
6. Municipal Solid Waste Disposal			
6.1	Number of disposal sites Type A (controlled landfill):	_____	_____
6.2	Number of disposal sites Type B (formal dumpsite):	_____	_____
6.3	Number of disposal sites Type C (illegal dumpsite):	_____	_____
6.4	Total area of existing landfill(-s)/dumpsite(-s) (m ²):	_____	_____
6.5	Total (design) capacity of landfill(-s)/dumpsite(-s) (m ³):	_____	_____
6.6	Total remaining capacity of landfill(-s)/dumpsite(-s) (m ³):	_____	_____
6.7	Start year of operations:	_____	N/A
6.8	Estimated remaining life time (years)	_____	N/A
6.9	Total disposed waste volume during the year 2000 (m ³):	_____	_____
6.10	Total disposed waste tonnage during year 2000 (ton):	_____	_____
6.11	Aver. dist. from city/district centre to disposal site:	_____	N/A
6.12	No. of disposal sites that do not fulfill regulat. requirem.:	_____	_____
6.13	No. of disp. sites without hydrogeological characterisat.	_____	_____
6.14	No. of disp. sites to be closed within 1 year.	_____	_____

6.15	No. of disp. sites to be closed within 3 years.	_____	_____	_____
			Type A	
6.16	Planned number of new disposal sites (Type A):	_____		
6.17	Planned year of commissioning for new disposal sites:	_____		
6.18	Planned total design capacity (m ³) of new disposal sites:	_____		
6.19	Estimated total life length (years) of new disposal sites::	_____		
6.20	Cities/district to be served by new disposal sites:	_____		
6.21	Aver. dist. from city/district centre to new disposal site:	_____		
6.22	Please describe the most pressing issues/problems concerning the present waste disposal system	_____		

7. Hazardous Waste Treatment/Disposal				
7.1	Please describe the present treatment/disposal of Class 1 waste:	_____		

8.4	Total municipal expenditure (in 1000 RUR)	_____	_____	_____
	of which:			
8.4.1	- investment expenditure (in 1000 RUR)	_____	_____	_____
8.4.2	- recurrent expenditure (in 1000 RUR)	_____	_____	_____
		1999	2000	2001
8.5	Budget balance (in 1000 RUR)	_____	_____	_____
8.6	Own expenditure for solid waste management (in 1000 RUR)	_____	_____	_____
	of which:			
8.6.1	- investment expenditure (in 1000 RUR)	_____	_____	_____
8.6.2	- recurrent expenditure or operational subsidies (in 1000 RUR)	_____	_____	_____
8.7	Transfers (from Environmental Fund or other public budget) for solid waste management (in 1000 RUR)	_____	_____	_____
	of which:			
8.7.1	- investment expenditure (in 1000 RUR)	_____	_____	_____
8.7.2	- recurrent expenditure or operational subsidies (in 1000 RUR)	_____	_____	_____
9. User charges (to be filled out once for each SAKH)				
9.1	Name of SAKH	_____		

9.2	If this municipality is covered by more than one SAKH, please indicate names and approximate share of households covered by each SAKH below				
9.2.1	Name of SAKH _____	Share of population covered _____%			
9.2.2	Name of SAKH _____	Share of population covered _____%			
9.2.2	Name of SAKH _____	Share of population covered _____%			
	<i>Urban Households</i>		1999	2000	2001
9.3	Billed amount (excl. VAT) per household per year	_____	_____	_____	_____
9.4	Billed amount (excl. VAT) total all households	_____	_____	_____	_____
9.5	Collected amount (excl. VAT) total all households	_____	_____	_____	_____
9.5.1	Collected amount (excl. VAT) total all households - C	_____	_____	_____	_____
9.5.2	Collected amount (excl. VAT) total all households - NC	_____	_____	_____	_____
	<i>Rural Households</i>		1999	2000	2001
9.6	Billed amount (excl. VAT) per household per year	_____	_____	_____	_____
9.7	Billed amount (excl. VAT) total all households	_____	_____	_____	_____
9.8	Collected amount (excl. VAT) total all households	_____	_____	_____	_____
9.8.1	Collected amount (excl. VAT) total all households - C	_____	_____	_____	_____
9.8.2	Collected amount (excl. VAT) total all households - NC	_____	_____	_____	_____

	1999	2000	2001
9 Institutions			
9.9 Billed amount (excl. VAT) total institutions	_____	_____	_____
9.10 Collected amount (excl. VAT) total institutions	_____	_____	_____
9.10.1 Collected amount (excl. VAT) total institutions - C	_____	_____	_____
9.10.2 Collected amount (excl. VAT) total institutions - NC	_____	_____	_____

	1999	2000	2001
Commercial			
9.11 Billed amount (excl. VAT) total commercial	_____	_____	_____
9.12 Collected amount (excl. VAT) total commercial	_____	_____	_____

9.12.1	Collected amount (excl. VAT) total commercial - C	_____	_____	_____
9.12.2	Collected amount (excl. VAT) total commercial - NC	_____	_____	_____
	<i>Industry</i>	1999	2000	2001
9.13	Billed amount (excl. VAT) total industry	_____	_____	_____
9.14	Collected amount (excl. VAT) total industry	_____	_____	_____
9.14.1	Collected amount (excl. VAT) total industry - C	_____	_____	_____
9.14.2	Collected amount (excl. VAT) total industry - NC	_____	_____	_____
	<i>Wastewater utility (sludge if applicable)</i>	1999	2000	2001
9.15	Billed amount (excl. VAT) total Vodokanal	_____	_____	_____
9.16	Collected amount (excl. VAT) total Vodokanal	_____	_____	_____
9.16.1	Collected amount (excl. VAT) total Vodokanal - C	_____	_____	_____
9.16.2	Collected amount (excl. VAT) total Vodokanal - NC	_____	_____	_____
10.	Tariffs			
	price users for which payment is based on actual amount of removed/disposed waste. Indicate 3 or tons) and tariff trends in 1999-2001			
10.2	For each category of service users that are paying based on norms of waste generation, please, indicate norms in 1999-2001 (E.g. – for urban inhabitants living in multi-stores buildings the norm is 1.5m ³ /per capita/per year)			

- 10.3 Please, indicate, which items of expenses related to collection, transportation and disposal of waste are included in a tariff, and which ones have not been included and why? (e.g. low income of population). Indicate a profitability included in a tariff in 1999-2001
- 10.4 Please, draw a table with data on tariff trends for key categories of users in 1999-2001 (RUR/m3 or RUR/ton, for UHH and RHH in RUR/p.c./month)Indicate, which % of economically grounded tariff is paid by population.

11. Accounts receivable and payable

- 11.1 Please, indicate an account receivable on 01.07.01 by:
- UHH
 - RHH
 - BO (by budget level)
 - federal, oblast and local budgets – by compensation of privilege to population and coverage of inter-tariffs discrepancies (if households are not paying 100% of cost for service provided)
 - C
 - I
 - Agriculture

<p>11.2 Please, indicate an account receivable on 01.07.01 by terms of its generation:</p> <ul style="list-style-type: none"> - less than 3 months; - less than 1 year; - less than 3 years; - more than 3 years.
<p>11.3 please, indicate an account payable by:</p> <ul style="list-style-type: none"> - suppliers and contractors; - salary/wage; - taxes and compulsory payments.
<p>12. Finance</p> <p>12.1. Please describe special (regular and once-only) sources of financing in 1999-2001 (e.g. grants, co-financing from any enterprise etc.)</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p>13. Financial results in 1999, 2000 and 1st half of 2001</p> <p>13.1 Please provide financial results for the year 1999, 2000 and 1st half of 2001</p>

14. SAKH/ZHKKH expenses				
	Collection + transportation		SHW disposal	
	2000	2001 (1 st half)	2000	2001 (1 st half)
14.1 Expenses related to SHW collection, transportation and disposal (1000 RUR)				
14.2 Expenses related to septage (LHW) collection, transportation and disposal (1000 RUR)				
Expenses by items:		2000		2001 (1 st half)
- Salary/wage				
- Current repair of vehicles				
- Lubricants/Fuel				
- Depreciation				
- ETC				

14.3 Normative and Actual number of staff and average salary/wage in 2000 and 1st half of 2001:

- Administrative and Engineering personnel
- Workers
- Landfill workers
- Drivers
- Repairmen

15. Fixed Assets info

	Number of units	Initial cost	Depreciation (%)	Depreciated cost
- landfill/dumps, including weighing stations, administrative buildings etc.				
- Sorting station and recyclable collection point				
- Other buildings and facilities				
- Containers				
- Waste collection trucks				
- Bulldozers				
- Etc.				

Legend

N/A	Not applicable
MLF	Municipal landfill
PLF	Private landfill
WWTP	Waste water treatment plant
UHH	Urban households
RHH	Rural households
BO	Budget organisations/institutions/enterprises
C	commercial/institutional waste generators
I	Industrial waste generators
C&D	Construction and demolition waste generators
MSW/SHW	Municipal solid waste/Solid Household Waste
LHW/Septage	Liquid Household Waste
BW	Bulky waste
OW	Food and garden waste
R	Recyclables
SFB	Single-family buildings
MFB	Multi-family buildings

WGU	Waste generation unit (e.g. household, commercial establishment)
CP	Collection Point
IDW	Illegally dumped waste
C	Cash
NC	Non-Cash
RUR	Russian Roubles
VAT	Value-added tax