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Support for the Implementation of the Environmental Policies and NEAPs in the NIS

Financing Strategy for Municipal Water Supply and Sanitation Services in Yaroslavl Oblast

May 2003
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<th>Description</th>
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<tbody>
<tr>
<td>BWWTP</td>
<td>Biological wastewater treatment plant</td>
</tr>
<tr>
<td>BOD</td>
<td>Biological oxygen demand</td>
</tr>
<tr>
<td>DANCEE</td>
<td>Danish co-operation for environmental protection in the countries of Central and Eastern Europe</td>
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<tr>
<td>GDP</td>
<td>Gross domestic product</td>
</tr>
<tr>
<td>GRP</td>
<td>Gross regional product</td>
</tr>
<tr>
<td>WSWW</td>
<td>Water supply and wastewater</td>
</tr>
<tr>
<td>SS</td>
<td>Sanitation services</td>
</tr>
<tr>
<td>EBRD</td>
<td>European Bank for Reconstruction and Development</td>
</tr>
<tr>
<td>MHE</td>
<td>Municipal and Housing economy</td>
</tr>
<tr>
<td>MHS</td>
<td>Municipal and housing services</td>
</tr>
<tr>
<td>PS</td>
<td>Polluting substances</td>
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<tr>
<td>COB</td>
<td>Consolidated Oblast Budget</td>
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<tr>
<td>LTP</td>
<td>Local Treatment Plants</td>
</tr>
<tr>
<td>L/c/d</td>
<td>Litres per capita per day</td>
</tr>
<tr>
<td>IBRD</td>
<td>International Bank for Reconstruction and Development, including World Bank</td>
</tr>
<tr>
<td>VAT</td>
<td>Value Added Tax</td>
</tr>
<tr>
<td>N (R)EAP</td>
<td>National (Regional) Environmental Action Plan (NEAP)</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental impact assessment</td>
</tr>
<tr>
<td>WWTP</td>
<td>Wastewater treatment plant</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>MAC</td>
<td>Maximum allowed concentrations (toxic and polluting substances)</td>
</tr>
<tr>
<td>PCE</td>
<td>Project Cost Estimate</td>
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<td>NIS</td>
<td>New Independent States</td>
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<tr>
<td>FeS</td>
<td>Feasibility Study</td>
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<tr>
<td>FS</td>
<td>Financing strategy</td>
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<tr>
<td>FEASIBLE</td>
<td>Model for calculation of costs and financing</td>
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<tr>
<td>CEE</td>
<td>Central and Eastern Europe</td>
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<td>YO</td>
<td>Yaroslav Oblast</td>
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Executive Summary

A BCEOM-HALCROW GROUP LTD. COWI Consortium in co-operation with the Ministry of the Economic Development of the Russian Federation, Ministry of Natural Resources of the RF and Oblast Administrations is implementing the TACIS project “Support for the implementation of Environmental Policies and NEAPs in the NIS”.

Within the framework of the Russian component of the project, it has been agreed with the Government of Yaroslavl Oblast that a Financing Strategy (FS) for the Solid Waste Management sector of the municipal services of Yaroslavl oblast will be developed. In addition, the project team will support the Oblast in developing an EFS on Water Supply and Sanitation Services (WSSS). The current report shows the results of the second EFS of yaroslavl Oblast on the WSWW sector. A special Project Advisory Committee was formed in order to define the targets used in the scenarios for strategy development.

During the development of the Financing Strategy a methodology was used that allowed developing a long-term (5-20 years) financing strategy for the running and capital costs of the sector, including a programme for priority capital investments. The programme should be realistic and take into account the necessary and available financing sources. A computerised model FEASIBLE was used when preparing the FS allowing quantitative estimates of operation and maintenance costs as well as for the capital costs, required for normal operations within the sector.

Two scenarios are developed: 1) the Baseline scenario (no-change) and 2) the Development scenario, which includes policy packages for sector development. Analysis of the scenarios point in the direction, which set of policy measures leads to attracting additional funds in order to close or decrease the financing deficit.

Existing Situation

The sector of water supply and sanitation services in Russia has been suffering from insufficient financing for a long time. As a result the quality of the service is decreasing and this process will continue if the situation with financing will not improve. The main problems are the following:

⇒ Water losses are 20% or higher, often caused by frequent breakdowns in the distribution networks. The general technical condition of the networks is poor. A big part varying between 40 and 60% needs (urgent) replacement.

⇒ Deteriorating drinking water quality. The existing state of potable water supply for the population of Yaroslavl Oblast does not comply with federal sanitary and epidemiological norms due to overloading and absence of modern methods of water preparation and disinfection at the treatment facilities of the water mains.

⇒ The unsatisfactory sanitary and technical condition of the water distribution and sewage networks leads to frequent emergency situations resulting in secondary pollution of the drinking water.

As of 01.01.1999, on average 90% of the urban and 68% of the rural population is covered with centralised water supply in Yaroslavl Oblast, but this can vary between 15% in rural and more than 90% in urban settlements. According to the statistical data the average daily water consumption in the system of centralised water supply is 320 liters per capita (345 liters in towns and urban-type settlements, and 217 liters in rural areas). The fact that the average daily consumption per capita in Yaroslavl exceeds the same value in Western European countries shows evidence of the inefficient centralised water supply systems in the oblast and irrational use of water resources.

Of the water-supply networks 30 to 100% exceeds their technical life time and need (urgent) replacement. About 500 km of street networks, which is about 30% of the total length, are completely worn out and require replacement. Breakdown rate reaches 3-4 accidents per

BCEOM HALCROW GROUP LTD. COWI CONSORTIUM v
one km of network a year. Amount of unaccounted losses in some water supply systems exceeds 30% of the total production volume, which amounts to some 69 million m$^3$ a year for the oblast in general, that is more than 23%.

The main share of polluting substances arrives with the wastewater of the largest urban wastewater systems of Yaroslavl and Rybinsk. Their treatment facilities are overloaded for 40-50% and cannot guarantee projected level of wastewater treatment.

Discharge volume going to the sewage systems and passing through treatment facilities amounts to about 70% of the total water consumption. About 80% of the total wastewater discharge is treated at BWWTP. Volume of normatively treated discharge reaches not more than 50% of the total discharge volume.

Tariffs for water supply and wastewater did not change drastically over the period of 2000-2002: In Yaroslavl the tariff for water supply on average amounted to 1.31 RUR/m$^3$, and wastewater tariff to 0.72 RUR/m$^3$, in total 2.03 RUR/m$^3$ (excl. VAT). The average monthly payment for WSWW services in Yaroslavl Oblast is 16.13 RUR (including VAT) per person.

The priority expenditure items of WSWW enterprises in 2001 were power and gross salaries. Under-financed were only those expenditure items that could bring long-term profit from the operational point of view, for example, technical maintenance, planned capital overhaul and modernization of fixed assets. One of the reasons for expenditure under-financing at the enterprise is that the actual required expenditures of the enterprise are not fully covered by the established tariff.

Although payment collection rates for the services from all user categories is quite high according to the questionnaire data (it can be seen from the table below), these data do not reflect the present collection rate (year-by-year), but only show collection of current payments, advance payments and accounts receivable.

Income distribution in Yaroslavl Oblast is more balanced than on average in Russia and only a relatively small percentage of the population has an income level lower, than the official «minimum living standard». Although there is no sharp differentiation in the oblast population by income level, there is still a significant gap between the average salary in industry on the one hand and very low salaries in budget-financed sphere and pensions, paid to disabled population – retired people, handicapped, etc. on the other hand. More than 60% of the population have income in between 1000 to 3000 RUR a month. This includes the share of population that has an income below the official “minimum living standard”, mainly retired people, unemployed and low-paid working population. In 2000-2001 expenditures on HMS on average reached 13% of the average income per capita (which is considered affordable), meanwhile the income itself grew to 2503 RUR by the end of 2001. However, at the same time 37.6% of the population – those who have an average income per capita not more than 1500 RUR a month, payment for HMS reached more than 22% of their average disposable income.

**Financing Strategy**

The strategy was developed for the following 24 towns and settlements with the total population amounting to 1184 thousand people, i.e. about 84.5% of Yaroslavl Oblast population:

**The baseline scenario** can be referred to as a "no development" or “business as usual” scenario. It is assumed in the baseline scenario that tariffs for households and public financing of the HME will increase in line with GRP, i.e. on average at 5% per year in comparable prices. At the same time the payment collection rate remains at the base year level (72% for households, 90% for budgetary organisations and 85% for other consumer categories). With such assumptions, the expected revenues of the WSWW communal enterprises for the period of 2001-2015 are estimated at RUR 11.7 billion in base year prices. The share of household payments will amount only to RUR 2.6 billion (22%).
Model calculations show that expenditures on water and wastewater services are estimated at RUR 25.3 billion under the assumption of required supply of finance for planned capital repairs and replacement of the deteriorated fixed assets over the same period, including:

- 14.5 billion RUR. – operational expenditures;
- 10.8 billion RUR. – expenditures on maintenance, capital repairs, planned replacement of the fixed assets.

In general over the modelling period it is expected in the baseline scenario that the expenditure need will significantly exceed the revenues – by RUR 13.6 billion (i.e. more than 130% of the expected supply of finance in the sector over the period). With such a great financing gap, capital repairs, planned renewal and reconstruction of the deteriorated fixed assets will remain under-financed.

To reduce the financing gap in the baseline scenario, the following measures should be implemented:

1) **Tariff policy:**

*Tariff increase (in base year prices):*

- For households, tariffs are increased so that expenditures on water and wastewater services amount to 2.5% of the average disposable income in 2005 (from 0.6% in base year) and are maintained at this new level in 2005-1015;
- For budgetary organisations tariffs are increased at 5% per year (in comparable prices) in 2002-2007 and then stabilized starting from 2008;
- For industrial and commercial consumers tariffs are increased at 10% per year (in comparable prices) in 2002-2007 годах and then stabilized starting from 2008.

*Increase of collection rate to the level:*

- Budgetary organisations - to 100%;
- Other consumer categories - to 95-97%.

2) **Public supply of finance** – increase of expenditures on housing and municipal economy to the level of 1.25% of the consolidated expenditure budget (from the present level 1.0%) with the subsequent priority adjustment of public expenditures.

3) **Expenditure savings** – replacement of pumping equipment for more durable and energy-efficient one, implementation of measures for detection and prevention of leakages and measures for more rational water use. According to conservative estimates, these measures, even if implemented only partially during the period 2003-2008 can easily reduce power consumption by 10% of the base year level, which gives savings of some RUR 30 million per year in constant prices.

If the whole policy package will be implemented, the financing gap in the HME of the oblast will go down quickly and the balance between the demand for financing and actually available supply of finance will be achieved by 2006, and in the future the sector will have available resources for development.

Implementation of the proposed (or a similar) policy package allows attracting additionally RUR 14.4 billion over 2003-2015. About 54% of this amount will be received at the expense of tariff increase for households, another 25 % will be gained from improved collection rate for all consumer categories while other policy measures (tariff increase for industrial and commercial consumers and budgetary organisations as well as increase of public supply of finance) will give provide the remaining 21%.

Under these assumptions from the moment of balancing the financing gap (on average from 2005-2006) the oblast will have possibilities for implementation a modernization and
development scenario of HME from internal financing sources, and from this moment on a programme for considerable capital investments into HME can be implemented.

In 2003 – 2005 when the current financing gap remains considerable, it is feasible to implement activities for water demand management, management of the energy savings, to carry out reconstruction and construction of the most urgent facilities and implement the most effective least-cost projects.

In the Development scenario a more ambitious target related to improvement of the service quality is set in comparison with the one in the baseline scenario. Also an extension of the area of coverage of the population with WSSS is envisaged as well as replacement of part of the water mains and sewage networks – upgrading to the level of functional stability of the WSSS system (depreciation of networks not more than 40%). This will lead to an increase of total expenditures for the period because the planned reconstruction of the facilities and additional replacement of networks will lead to expenditure increase related to reconstruction of the existing and commissioning of the new fixed assets. However, with new more reliable networks and energy-efficient equipment the current operational expenditures and expenditures on fixed assets maintenance will be reduced.

The following table shows the assessment of the volume of the required expenditures for the proposed development scenario (hereafter - scenario 2). This table was calculated under the assumption that the implementation of the programme for wastewater treatment will start two years after the programme for water supply is completed, and will be fully implemented during 2003-2010.

<table>
<thead>
<tr>
<th>Expenditure item</th>
<th>Scenario 2</th>
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</thead>
<tbody>
<tr>
<td>Current operational expenditures</td>
<td>9.9</td>
</tr>
<tr>
<td>Expenditures on maintenance, capital repairs and planned renewal of fixed assets</td>
<td>9.3</td>
</tr>
<tr>
<td>Expenditures on the reconstruction and modernisation of fixed assets, commissioning of the new fixed assets of WSSS</td>
<td>4.5</td>
</tr>
<tr>
<td>Total expenditures</td>
<td>23.7</td>
</tr>
</tbody>
</table>

Source: Model calculations

As for the financing volume, revenues received from payments for the services will increase because of tariff growth so the population will spend on average 2.5% of the disposable income per capita for WSSS instead of 0.6% in the base year 2001. Besides, it is assumed that number of consumers provided with the services will somewhat increase (including population).

The calculations also took into account EBRD loan in the amount of $16 million that was attracted by the Yaroslavl Administration for implementation of reconstruction programme of water supply and wastewater system of the city.

As it turned out this loan together with the proposed policy package on closing the existing financing gap of the baseline scenario will not be sufficient to finance capital repairs, reconstruction and construction of new WW facilities envisaged in the development scenario during first 4-5 years of the programme implementation. At the beginning of the investment programme implementation (2003-2006) the current financing gap will reach RUR 600 million a year at the beginning of the period, then it will reduce to RUR 300 million in 2005 and will be fully closed only by 2008.

The following policy package to obtain additional financing during 2003-2007 was considered in the course of scenario analysis:

- First, increased budgetary financing for the initial period of the investment programme implementation up to 1.5% of the Consolidated expenditure budget (i.e. share of
expenditures for WSSS will increase by 50% as compared to the base year). After that this share will be reduced to 1% of COB over 2010-2012, to 0.5% in 2012-2014 and starting from 2015 budgetary financing will be stopped;

- Second, the possibility of attracting additional loan financing;
- Third, attraction of funds from the private sector (share holding of the enterprises and house owners interested in connection to the centralised water supply and sanitation and ready to pay fully or partially pay for the related expenditures);

Closing the financing gap of the capital investment programme in 2003-2007 by implementing only the first two proposed measures (data for estimating potential of the third source are not available) then it will be necessary to additionally attract loans in the amount of RUR 1.6 billion over 2004-2007, that is some 50 million USD. Attraction of such a significant amount by the towns of the oblast seems quite doubtful and problematic in the current situation. Besides, it will still not be sufficient to compensate for under-financing of the SS sector over 2001-2003.

Solutions for this problem can be found first by looking at the possibility of extending the timeframe for implementation of the programme for water supply (its completion in principle by 2015) and programme for sanitation services, its implementation in principle during the period 2006 - 2017.

The analysis shows further that policy measures that improve payment collection and tariff increases are the most important ones.

The proposed strategy that allows achieving a balance between financing needs and supply of finance over the period 2001-2015 consists of the following:

1. In the period of 2003-2006, when current financing gap is still significant it is expedient to implement activities for water demand management, energy/resource saving activities and conduct renovation and construction of the most urgent facilities requiring fewer expenses at the same time implementing the most effective least-cost projects.

This in particular includes:

⇒ Installation of water meters at wells, water intakes, water-pumping stations, building perimeters and other objects and also switching to a system of payments for actually consumed water;
⇒ Implementation of measures for the systematic detection and prevention of water leakage in the networks;
⇒ Replacement of pumping equipment and other energy-consuming equipment with more reliable, durable and efficient ones.
⇒ Promotion of economic and rational water consumption, first of all among households

In addition to the activities, listed above, the following activities may be considered first priority and have to be implemented at the first stage:

- Programme for reconstruction and development of the water supply and wastewater system of Yaroslavl co-financed using funds of the EBRD loan;
- Reconstruction and increase of WWTP capacity of Rybinsk;
- Construction completion of WWTPs in Myshkin, Danilov and Breytovo, construction of new facilities in Otradny;
- Connection to the sewage collector of houses in Borisoglebsky in order to increase discharge volume and ensure normal functioning of WW treatment facilities.
1 Introduction

A Consortium comprising three companies: BCEOM French Engineering and Consulting, Halcrow group Ltd and COWI AS (further referred to as the Consortium) in co-operation with the Ministry of the Economic Development of the Russian Federation, Ministry of Natural Resources of the RF and Oblast Administrations has been implementing the TACIS project “Support for the implementation of Environmental Policies and NEAPs in the NIS”.

Within the framework of the Russian component of the project, it was decided that the main focus should be given to urban water supply and wastewater treatment as well as to the sector of municipal solid waste management.

In particular, it has been agreed with the Government of Yaroslavl Oblast that a Financing Strategy (FS) for two sectors of the municipal services of Yaroslavl oblast will be developed within the framework of the project. These sectors are water supply and wastewater and solid waste management.

1.1 Financial Strategy Concept

During the development of the Financing Strategy a methodology was used that allowed developing a long-term (5-20 years) financing strategy for the running and capital costs of the sector, including a programme for priority capital investments. The programme should be realistic and take into account the necessary and available financing sources.

Also a computer model FEASIBLE was used when preparing the FS\textsuperscript{1}, that allows quantitative estimates of operation and maintenance costs, required for normal maintenance and operation of the existing and newly constructed infrastructure of the water supply and wastewater treatment sector, including the costs for current and capital repairs, as well as the capital costs for the introduction of new fixed assets or rehabilitation of depreciated fixed assets.

Furthermore, a comparison is made between the identified demand for financing and the forecasted supply and sources of financing and an estimate of the resulting deficit or surplus is determined. Not only the overall financing deficit is considered but also the analysis of such deficit is carried out in relation to the coverage of the various types of costs, such as capital costs (reconstruction and increasing of capacities), and operation and maintenance costs. Knowledge of the structure of the deficit gap is important for the identification of the key problems and determination of the priority measures for their solution.

The municipal water supply and wastewater sector in Russia has been suffering from insufficient financing for a long time. As a result the service quality has declined and this process will continue if the situation with financing will not improve.

There are two possibilities for solving the problems of the sector:

**Mobilising additional resources.** This implies income growth at the enterprises of the sector as a result of water tariff increases, improved payment collection, grants and subsidies from the budgets of different levels together with possible grants of international donors and loans.

**Supporting and stimulating more rational use of the resources.** This implies the optimisation of the WSWWT system and increasing the operational efficiency, as well as

\textsuperscript{1} This methodology was developed by the Consulting Company COWI under the command of the EAP TF Secretariat and with the support of the Danish Government. For more information: [http://oecd.org/env/eap](http://oecd.org/env/eap)
the use of limited investment resources for the most feasible and high-priority investment projects.

A financing strategy does not give final and complete answers to all these questions but it can help in identifying activities that have to be implemented as a priority. The model FEASIBLE that is used for the development of the financing strategy should be able to forecast the results of implementation of the key strategic variants.

Analysis that precedes the development of the financing strategy is divided into a number of key stages:

**Stage 1:**
For the baseline scenario that does not imply any development and infrastructure modernisation, the demand is calculated for financing of expenditures on operations and maintenance, current repairs, sustainable maintenance and planned renewal of the existing infrastructure to avoid its further degradation and lower quality of service. Then these expenditures are compared with the available financing resources from all possible sources on the condition that the tariff policy as well as the budget grants and subsidies to the sector, etc remain unchanged. The result of the comparison is the financing gap assessment (if there is one). A financing gap means that the demand for financing exceeds the financial resources available in the sector.

**Stage 2**
The second stage includes identification and analysis of the activities that will help to close this gap according to the baseline scenario, i.e to balance demand for financing with the available financial resources. Activities acceptable for inclusion into the scenario cover the following:

- Changes in the assumptions regarding tariff policy, including level of tariffs, level of payment collection, collection of «real money» and level of cross subsidies of the population at the expense of other groups of consumers;
- Increase of financing from other sources such as budget subsidies, donor grants and loans;
- Savings on expenditures, first of all on electricity. This in particular can be achieved by reducing water losses in the networks, searching for and preventing leaks, reducing water demand through more rational water use, which will lead both to reduction of energy expenditures and reduction of investment demand for new capacities/replacement of the old ones and by reducing power consumption by replacement of pumping equipment with a more effective one; and
- Savings on other operational expenditures (for example through optimisation of the number of personnel at the enterprises of the sector) and also in the long-term – savings on required annual overhaul on the condition of the production volume and the size of the infrastructure optimisation.

**Stage 3**
The choice of the strategic goals for the development of the WSWW sector for selected towns of the Oblast is explained, then the adequate scenario for achieving these goals is developed (development scenario), calculation of expenditures for reaching the goals of the strategy and financing gap assessment (if any) are carried out.
Stage 4

The same as at the second stage, identification and analysis of the activities is carried out that will help to close the financing gap for the development scenario, that is to balance the demand for financing with the available financial resources. Additional possibilities for closing the financing gap here consists in lowering ambitions of the set strategic goals for the sector development, including the degree of coverage of the consumers with the services and the quality of service. This can be achieved by setting less ambitious goals, for example, for wastewater treatment and extension of the services to the small settlements, or by shifting dates for the solution of the problems to a later time.

**Financing Strategies** are determined by the iterative use of the computer model FEASIBLE with the use of the various assumptions with respect to the implemented measures for the mobilisation of the additional or reallocation of the available financial resources.

![Diagram of Financing Strategies](image)

**Source:** *EAP task Force Secretariat for NEAP implementation*

Experience in development of the strategies in other NIS countries and regions of Russia shows that preparation of the financing strategy can help decision-makers in solving the following problems:

- Results of the analysis can demonstrate the necessity to increase the level of tariffs for financing the required investments at the same time not exceeding the limits of acceptability and affordability of tariffs for the population, taking into account the existing level and distribution of the incomes;
- Well-documented calculation of costs can highlight the importance of requests for financing for WSWW from other sources (these can be international donors or budget organisations at the city, Oblast or federal level);
- Determination of the acceptable level of service that can provide the sector of WSWW will stimulate the attraction of limited investment resources into the most feasible and high-priority investment projects; and
• Analysis of different activities for optimisation of the system of the WSWW and for increasing the efficiency of the work of the sector helps concentrating on most perspective directions, for example on measures for energy savings by replacement of the pumps or on activities for managing demand for water and more rational water consumption.

Project Implementation

Work on the project consisted of the following stages:

• Establishing the Project Advisory Committee (PAC) with the participation of key people, decision-makers at the Oblast level and also the managers of the project on behalf of the Consortium and organising Working Group for immediate works on the project that consisted of representatives of the involved ministries and committees of the Oblast, representatives of the Consortium and local experts;

• Transfer of the computer model and training of the WG experts for using this model;

• Data collection on existing urban municipal systems of water supply and wastewater treatment of the Oblast on the basis of the developed questionnaires;

• Data collection on volumes, sources and tools for financing WSWW services in the Oblast, including user charges, budget financing and other possible sources (loans, grants, etc.);

• Use of the computer model in the concrete conditions of Yaroslavl Oblast compiling the necessary databases, and calculation of the financing gap for the baseline scenario (this is the scenario implying the maintenance of the current technical level and operational reliability of the infrastructure, preventing its further degradation because of the constant lack of the necessary financing);

• Analysis of the different scenarios for the development of the infrastructure and packages of practical measures for attracting additional financial funds to attain the right balance of the available and required financing (the Strategy itself);

• Discussion of the Financial Strategy report at the extended meeting of the WG and its presentation to the PAC for further discussion, additions (if necessary) and possible approval of the strategy by the government of the Oblast;

• Determination of the capital investment volume into the engineering infrastructure of the WSWW, acceptable from the point of view of the available financial resources, and also identification of the top priority objects for capital investments that have priority for financing from the oblast and local budgets and also for potential co-financing from the IFI such as IBRD and EBRD.

Project Reporting

The present report contains the draft of the financing strategy for the sector, general recommendations for investments in the Housing and Municipal Services sector of Yaroslavl oblast and also a draft list of main directions for activities related to improvement of financing and increased efficiency of sector performance.

Analysis of the current situation in the HME of YO was carried out on the basis of representative sampling. The sampling included 24 settlements with the total population of 1184 thousand people that is about 84,5% of the Yaroslavl oblast population.

Data on the infrastructure conditions and financing was collected as of January 1, 2002 so the year 2001 was taken a base year. The analysis was carried out in the prices of the base 2001 year (constant prices). The projection period is taken 15 years, from 2001 to 2015.
1.2 Acknowledgements

The work was carried out in close cooperation with the Yaroslavl Oblast Administration Departments, vodokanals and other enterprises directly involved in the municipal water supply and wastewater sector.

The Working Group of the project would like to express their special gratitude to the Department of HME of Yaroslavl Oblast Administration and to the Advisory Committee members for their assistance in the project implementation and valuable comments.
2 Existing situation in WSWW sector

2.1 Mode of data collection
In order to develop environmental financing strategy for the sector of WSWW it was necessary to collect technical, financial and socio-economic data on Yaroslavl Oblast, on its towns and rayons.

The collected data were used for the following purposes:
- Formulating targets and developing scenarios;
- Identifying prerequisites for calculations using cost functions, and
- As input data to include into the computer model FEASIBLE.

A special questionnaire was prepared to facilitate the process of data collection. It is presented in Annex 1. This questionnaire consists of a few sections and contains questions on socio-economic, technical and financial parameters.

This questionnaire was presented at the workshop, which took place in Yaroslavl in the summer of 2002 with the participation of HME Department of the Yaroslavl Oblast Administration and many other municipalities of the oblast. These questionnaires were filled in and returned in the fall of 2002 and the data processing began soon after.

2.2 Overview of the current situation in WSWW sector
The present chapter will focus on environmental situation description, main indicators of the service level, key problems in the water supply and wastewater sector of Yaroslavl Oblast.

This description will serve as a basis for target formulation and priorities setting in the subsequent chapters.

2.1.1 Water supply sources

Surface waters
Water resources of Yaroslavl Oblast are considerable. The main waterway is the Volga River; its length on the territory of the oblast is 340 km. It is regulated by dams and is in fact a chain of water reservoirs: Uglich reservoir (Yaroslavl and Tver Oblasts) with the total volume 1245 million m$^3$, Rybinsk reservoir (Yaroslavl, Tver, and Vologda oblasts) – 25420 million m$^3$, Gorky reservoir (Yaroslavl, Kostroma, Ivanovo, and Nizhny Novgorod oblasts) – 8815 million m$^3$.

There are 83 lakes on the territory of the oblast, the largest of them are Plesheevo and Nero with the total volume of 636.5 million m$^3$, 4327 rivers with the total length 19340 km, out of them 3969 are rivers up to 10 km long and with catchment area of 6 km$^2$.

The main source of water supply for towns and rural settlements is the river flow, which provides for more than 80 % of domestic and drinking water supply. Over an average water year the river flow amounts to some 38.8 km$^3$/year (average multi-year run-off), including 8.2 km$^3$ that are formed on the territory of the oblast and 30.6 km$^3$ that flow from the neighboring oblasts (Tver and Vologda oblasts). Resources of local surface flow with 95% probability reach 12 m$^3$/day per capita. River flow is evenly distributed across the oblast rayons.

Water quality of surface sources does not correspond to Sanitary requirements 4630 - 88 “Sanitary rules and norms of surface waters protection against pollution” in 39 % of samples for sanitary-chemical (average for the oblast) and in 28% samples for microbiological indicators. Most characteristic (priority) indicators of water pollution in surface water sources are microbiological and organic pollution indicators. From time to
time, higher pollution level is registered for oils products, phenols, and oxygen for BOD and COD. Ground water sources are mainly characterized by a higher content of iron and manganese, less often by higher mineralisation, which concentrations are at the second-class level (GOST 2761-84). When using surface waters and in some decentralised systems higher nitrogen concentration is registered in ammonium or nitrate form, and also microbiological and oil pollution. 28% of the water networks that receive ground water sources have water preparation installations (de-ironing).

Table 2.1 Share of samples that does not comply with domestic and drinking water quality standards.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Share that does not comply with WQS, %</th>
<th>Average values mg/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity *</td>
<td>0</td>
<td>5-12</td>
</tr>
<tr>
<td>Color index*</td>
<td>40</td>
<td>45-100</td>
</tr>
<tr>
<td>BOD</td>
<td>35</td>
<td>1,5-3,4</td>
</tr>
<tr>
<td>COD</td>
<td>50</td>
<td>14-50</td>
</tr>
<tr>
<td>Oil products</td>
<td>60</td>
<td>0,1-0,4</td>
</tr>
<tr>
<td>Ammonium</td>
<td>1,2</td>
<td>0,2-0,7</td>
</tr>
<tr>
<td>Nitrites</td>
<td>0</td>
<td>0,008-0,015</td>
</tr>
<tr>
<td>Nitrates</td>
<td>0</td>
<td>0,8-2,5</td>
</tr>
<tr>
<td>Iron</td>
<td>30</td>
<td>0,2-0,3</td>
</tr>
<tr>
<td>Copper</td>
<td>0</td>
<td>0,003-0,005</td>
</tr>
<tr>
<td>Zink</td>
<td>0</td>
<td>0,005-0,1</td>
</tr>
<tr>
<td>DDT</td>
<td>0</td>
<td>0,0002</td>
</tr>
<tr>
<td>Phenols</td>
<td>19</td>
<td>0,0005</td>
</tr>
<tr>
<td>Mineralisation</td>
<td>0</td>
<td>250-450</td>
</tr>
<tr>
<td>Koli-fagi</td>
<td>20</td>
<td>0-333</td>
</tr>
<tr>
<td>Koli-index</td>
<td>40</td>
<td>10000-50000</td>
</tr>
</tbody>
</table>

Source: Data from Sanitary Epidemiological Station, Yaroslavl Central Hydro meteorological Station

The main pollutants of the water bodies in Yaroslavl Oblast are oil products and copper; their concentrations are higher than MAC in 72% and 96% of the samples respectively. Alongside with these pollutants, higher concentrations are observed for iron and BOD₅.

Wastewater from industrial enterprises of the oblast has a great impact on the water quality in the surface bodies. The largest polluting enterprises are:
- Municipal enterprise "Yaroslavl Vodokanal" (wastewater discharge volume in 2001 amounted to 100.3 million m³, in 2000 – 98.6 million m³);
- Municipal enterprise "Vodokanal" in Rybinsk (2001 – 35.5 million m³, 2000 – 32.2 million m³);
- JSC "Slavneft-Yaroslavnefteorgsyntez" (2001 – 12.9 million m³, 2000 – 10.0 million m³); and
- JSC “Yaroslavl tire plant” (2001 – 21.2 million m³, 2000 – 19.8 million m³), and
- JSC “Avtodizel” (2001 – 6.7 million m³, 2000– 6.9 million m³).

JSC “Slavneft-YANPZ named after Mendeleev” is the main polluter of the Pechegda River (The Volga tributary) (2001 – 3.33 million m³, 2000 – 4.3 million m³). The total volume of wastewater discharge by all the above-mentioned enterprises-polluters in 2001 amounted to 60.5 % of the total wastewater discharge (in 2000 – 58.9 %).

In general, the water quality in the oblast according to the complex indicator value has improved in 2001 as compared to the previous years. Gorky water reservoir is one of the most polluted water bodies in the oblast.
Ground waters

There are sufficient ground water reserves suitable for drinking water supply on the territory of Yaroslavl Oblast. However, reserves of fresh ground waters used for centralised water supply on the territory of Yaroslavl Oblast are not distributed evenly.

The following towns and urban-type settlements have proved reserves of ground waters: Borisogleb, Danilov, Porechye, Petrovskoye, Pereyaslav, Yaroslavl, Semibratovo, Poshekhtonye, Nekrasovskoye, Nekouz.

Currently more than 1550 wells are used for water abstraction from underground sources, about 350 wells are destined for backfill.

As of 01.01.2001 the explored reserves of ground waters at 29 sites amount to 229 thousand m$^3$, potential reserves are 1038 thousand m$^3$ a day (694 l/capita). These are mostly relatively small deposits with a reserve of 2-6 thousand m$^3$ a day that were explored at a short distance from the water consumers. Out of 29 explored reserves only 15 are operated for water intake in the range of 24.4 thousand m$^3$ a day.

According to GOST Classification 2761-84 the ground waters of Yaroslavl oblast are classified as second category of centralised drinking water supply sources. Ground waters used for domestic and drinking needs in general do not satisfy sanitary requirements 2.1.4-559-96, as a rule, for iron content and require additional water preparation. Ground waters, more often than surface water sources, exceed existing norms for mineral composition, including content of chlorides and sulphates, and are usually harder due to a higher level of manganese content. There are 323 water network systems in the oblast, whose underground sources have an iron content 5 times higher than MAC (0.3 mg/l). In two municipalities (Nekouzsky and Breytovsky rayons) iron content in the ground water sources reaches 8-10 mg/l.

Table 2.2. Quality characteristics of ground water in Yaroslavl Oblast

<table>
<thead>
<tr>
<th>Indicator</th>
<th>% of samples not complying with the norm</th>
<th>Minimal value</th>
<th>Average value</th>
<th>Maximum value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coli-index</td>
<td>15.5</td>
<td>0.0</td>
<td>&gt;3</td>
<td>250</td>
</tr>
<tr>
<td>Nitrates</td>
<td>0.1</td>
<td>0.0</td>
<td>0.8</td>
<td>13.5</td>
</tr>
<tr>
<td>Ammonium</td>
<td>3</td>
<td>0.0</td>
<td>0.24</td>
<td>8.5</td>
</tr>
<tr>
<td>Nitrites</td>
<td>0</td>
<td>0.0</td>
<td>0.012</td>
<td>0.12</td>
</tr>
<tr>
<td>Iron</td>
<td>70</td>
<td>0.1</td>
<td>0.75</td>
<td>15.0</td>
</tr>
<tr>
<td>Solid residue</td>
<td>14</td>
<td>250</td>
<td>500</td>
<td>2000</td>
</tr>
<tr>
<td>Chlorides</td>
<td>7</td>
<td>4</td>
<td>20</td>
<td>1500</td>
</tr>
<tr>
<td>Sulphates</td>
<td>6</td>
<td>20</td>
<td>35</td>
<td>2000</td>
</tr>
<tr>
<td>Manganese</td>
<td>40</td>
<td>0.0</td>
<td>0.04</td>
<td>0.2</td>
</tr>
<tr>
<td>Fluorine</td>
<td>4</td>
<td>0.1</td>
<td>0.4</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Source: Empirical data from rayon Sanitary Epidemiological Inspections of Yaroslavl Oblast

2.1.2 Water supply and water consumption

Water supply for domestic and drinking needs and also for industrial production needs for the population and enterprises of Yaroslavl Oblast is provided mostly from surface water sources. The share of ground waters in the total water intake is small and reaches about 15 %. The table below shows the total water intake and the share of groundwater for 2000 and 2001.
Table 2.3  Total water intake in Yaroslavl Oblast, 2000-2001, million cubic meters.

<table>
<thead>
<tr>
<th>Source</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water intake</td>
<td>392.96</td>
<td>389.76</td>
</tr>
<tr>
<td>of which:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>62.5</td>
<td>63.8</td>
</tr>
<tr>
<td>(% of total intake)</td>
<td>(15.9)</td>
<td>(16.4)</td>
</tr>
</tbody>
</table>

Reduced water consumption is related to reduction of water consumption by a number of oblast enterprises, decrease in the number of reporting water users as well as to introduction of permits for use of surface and ground water sources and specification of water balance at the enterprises. Water intake at the enterprises and organisations is measured with metering devices or calculated.

Water quality does not satisfy sanitary-chemical norms in 40% of surface and 35% of ground water sources and does not correspond to microbiological indicators in 29% of surface and 13% of ground water sources. The most characteristic (priority) water quality indicators when using surface water sources are microbiological and organoleptic. It is common for ground water sources to have a higher iron and manganese content, less often higher levels of salinity.

Applied water preparation technologies are often inadequate as to the composition of the water in the sources. Often there are no water preparation stations at all and water supply to the network is done directly from pumps of the first and second lift (characteristic of underground sources with permanent composition within one year). This leads to frequent deviation of the quality parameters and composition of the water supplied to the network from the established norms.

Centralised water supply
As has been stated previously, more than 80% of drinking water needs is provided from the surface water sources.

Water supply of the largest oblast cities – Yaroslavl, Rybinsk, Uglich, Tutayev is mainly provided with the water intake from the Volga and its tributaries. Ground waters are used mainly for domestic and drinking water supply of small towns, urban-type and rural settlements, for agricultural needs and to lesser extent for industrial production needs. Use of ground water mainly for drinking needs is natural and related to its natural purity.

Specific water consumption in the oblast in general amounts to 320 l/c/d (surface and ground waters), including ground water consumption - 51 l/c/d. Reduction in specific water consumption as compared to 1999 is related to reduced surface water consumption and higher efficiency of HME enterprises.

Demand for domestic and drinking water supply on average in the oblast amounts to some 800 thousand m$^3$/day while consumption amounts to some 500 thousand m$^3$/day. Existing drinking water deficit can be covered by use of ground waters. Explored ground water resources are currently sufficient to fully satisfy the demand of 7 towns and 5 urban-type settlements and partially the demand of 4 towns and one urban-type settlement. Domestic and drinking water demand can be fully satisfied from explored ground water resources in Borisoglebsky, Danilov, Porechye, Petrovskoye, Pereslavl, Yaroslavl, Rybinsk, Semibratovo, Nekrasovskoye, Nekouz, and partially in towns of Rybinsk, Yaroslavl, Myshkin, Tutayev. For other towns and settlements it will be necessary to implement exploration in order to find fresh ground water resources suitable for drinking water supply.
Service Coverage of the oblast with the centralised water supply

There are 11 towns, 29 urban type and 767 rural settlements with the centralised water supply system in Yaroslavl Oblast. At the same time 49 water distribution networks providing almost 70% of the total service volume are municipal property.

There are 1102.2 thousand people residing in towns and urban-type settlements, and 365 thousand people living in rural settlements. As of 01.01.1999 the percentage of coverage with centralised water supply in Yaroslavl Oblast is:

- 90% of urban population населения городов и поселков городского типа;
- 68% of rural population.

According to the statistical data the average daily water consumption in the system of centralised water supply amounts to 320 liters per capita (345 liters in towns and urban-type settlements, and 217 liters in rural areas). The fact that the average daily consumption per capita in Yaroslavl exceeds the same value in Western European countries shows evidence of the inefficient centralised water supply systems in the oblast and irrational use of water resources and lack of respect to drinking water from the population. Such attitude is the result of traditional view that this resource is free and unlimited comfort.

The coverage level for the centralised water supply system varies from more than 90% in Yaroslavl, Tutayev, Rybinsk, Uglich and some urban-type settlements to only 10-15% in some rural settlements. In general about 1100 thousand people in the oblast have access to the centralised water supply system. Some 150 thousand people use decentralised water supply sources. Street water pumps provide water for some 450 thousand people.

Technical condition of water intake and water distribution systems

Production capacity of the first lift pumping stations reaches 840 million m$^3$ a year, water network treatment facilities – 278 million m$^3$ a year, water networks – 440 million m$^3$ a year. In reality about 30% of available capacities for first lift, about 35-50% of the existing water network capacities and about 85% of water preparation capacities are used. 97% of the total water treatment facility capacities are located in towns. The share of treated water reaches 75% of the total water supplied to the network.

Total length of street water-pipe networks in towns, urban-type and rural settlements of Yaroslavl Oblast amounts to some 2335 km, including 1720 km of municipal property and 615 km of private property (mainly agricultural enterprises). Total water mains length reaches 1072 km.

Of the water-supply networks 30 to 100% exceeds their technical life time and need (urgent) replacement. About 500 km of street networks, which is about 30% of the total length, are completely worn out and require replacement. Breakdown rate reaches 3-4 accidents per one km of network a year. Amount of unaccounted losses in some water supply systems exceeds 30% of the total production volume, which amounts to some 69 million m$^3$ a year for the oblast in general, that is more than 23%.

Unsatisfactory condition of many water-supply networks becomes the reason for great water losses due to leaks and to secondary water pollution in the networks.

2.1.3 Existing situation – wastewater collection and treatment

General overview of wastewater treatment in Yaroslavl oblast

Wastewater treatment in 2001 increased by 8.72 million m$^3$ a year as compared with 2001 and amounted to some 325.47 million m$^3$ a year (with a total supply to the network reaching 389.76 million m$^3$/year). Total water discharge into water bodies increased by 6.08 million m$^3$ a year as compared with 2000.

A significant increase of polluted wastewater discharge was observed at the energy sector enterprises (JSC “Yarenergo”, Heat and Power Plant-1) and at the municipal services
enterprises. Such large enterprises as JSC “Slavneft – Yaroslavnefteorgsintez”, JSC “Yaroslavl Tire plant” and JSC “Rezinotehnika” also increased their wastewater discharge.

Analysis of the main pollutants discharge demonstrates that in general there is a stable tendency for reduced discharge of all pollutants into the natural water. Together with the reduction in the total wastewater discharge there was a slight decrease of its pollution degree (see Figures 2.1 and 2.2).

**Figure 2.1 Discharge development for the main PS in conventional tons**

*(conventional tons – ratio of discharge amount to the MAC value)*

**Figure 2.2. Changes of the absolute loading of wastewater with polluting substances (conv. t/thousand m³)*

The main share of polluting substances arrives with the wastewater of the largest urban wastewater systems of Yaroslavl and Rybinsk. Their treatment facilities are overloaded for 40-50% and cannot guarantee projected level of wastewater treatment.

Wastewater quality at majority of the enterprises does not satisfy the environmental standards for PS discharges into water bodies. Industrial discharge at the JSC “NPO Saturn” (former JSC “Rybinskie motory”) amounted to 6103.7 thousand m³/year with the treatment facility capacity of 745 thousand m³/year. Storm waters of JSC “Yaroslavl tire plant” are discharged without any treatment. The construction of third-stage treatment facilities in Yaroslavl was completed in 2001, currently start-and-adjustment works are carried out. Construction of second stage treatment facilities in Rybinsk has been practically stopped. Treatment facilities of Myshkin are also in unsatisfactory condition. In large industrial centers (Yaroslavl, Rybinsk, Tutayev, Uglich) a great volume of PS flows to the water bodies due to lack of town rainwater treatment.
Emergency situations that lead to pollutants’ discharge into the water bodies also have a negative impact on their quality. 6 emergency and accidental pollutant discharges into water bodies and catchment areas were registered in 2001: municipal enterprise “Yaroslavl Vodokanal” (2 incidents of industrial and domestic wastewater discharge into the Dunayka and the Kotorosl rivers), SC “Ship-building plant “Slip” (industrial wastewater discharge into the Volga River), municipal enterprise “Rybinsk Vodokanal”— domestic wastewater discharge first on the land and then in the Volga River. Charges claiming reparation of damage were sent to all the violator enterprises.

Centralised wastewater collection systems

Total length of sewage networks is 990 km, of the main headers - 420 km. More than 258 km have to be replaced. Sanitation networks are mainly made of steel and cast iron, and inner surface (often outer surface as well) are not protected against corrosion. The same situation is observed with latches, connections and junctions of the networks. Corrosion deterioration usually comes after 10-15 years, at steel water passages this happens during 5-10 years.

Wastewater treatment

Discharge volume going to the sewage systems and passing through treatment facilities amounts to about 70% of the total water consumption. About 80% of the total wastewater discharge is treated at BWWTP. Volume of normatively treated discharge reaches not more than 50% of the total discharge volume.

Among municipal facilities, great wastewater treatment problems exist in Myshkin (unfinished construction of second stage treatment facilities, overloading of existing structures by 2.5 times), in Danilov (unfinished construction of second stage treatment facilities), in Breytovo (unfinished construction of treatment facilities), in Otradny (treatment facilities are in complete decay, wastewaters are not treated), and in Borisoglesbsky (it is necessary to connect apartment buildings to the header in order to increase discharge volume and operational normalization of working treatment facilities). This is the opinion of experts from MHS Department and enterprise “Yaroslavlkommunservis”. It is necessary to speed up the construction of these facilities.

2.3 Current financial situation of the WSWW enterprises

Data on tariff development for water supply and wastewater in 2001

Tariffs for water supply and wastewater did not change drastically over the period of 2000-2002: in Yaroslavl tariff for water supply on average amounted to 1.31 RUR/m³, wastewater tariff amounted to 0.72 RUR/m³, in total 2.03 RUR/m³. Adding 20% VAT, we arrive at 2.44 RUR/m³. The average monthly payment for WSWW services in Yaroslavl Oblast amounts to 16.13 RUR (including VAT) per person (see Table 2.3).

Table 2.4 Tariffs for water supply and wastewater services in YO, 2001

<table>
<thead>
<tr>
<th>Town, rayon</th>
<th>Water supply tariff, RUR/m³</th>
<th>WW tariff, RUR/m³</th>
<th>Town, rayon</th>
<th>Water supply tariff, RUR/m³</th>
<th>WW tariff, RUR/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yaroslavl</td>
<td>1.58</td>
<td>0.86</td>
<td>Rostovsky</td>
<td>3.05</td>
<td></td>
</tr>
<tr>
<td>Danilov</td>
<td>No data</td>
<td>No data</td>
<td>Pereslav Zalessky</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Nekrasovskoye</td>
<td>No data</td>
<td>No data</td>
<td>Gavrilov-Yamsky</td>
<td>1.55</td>
<td>0.93</td>
</tr>
<tr>
<td>Konstantinovsky</td>
<td>1.68</td>
<td>1.42</td>
<td>Zavolzhye</td>
<td>2</td>
<td>1.6</td>
</tr>
</tbody>
</table>

BCEOM-HALCROW GROUP LTD.-COWI CONSORTIUM 21
<table>
<thead>
<tr>
<th>Town, rayon</th>
<th>Water supply tariff, RUR/m³</th>
<th>WW tariff, RUR/m³</th>
<th>Town, rayon</th>
<th>Water supply tariff, RUR/m³</th>
<th>WW tariff, RUR/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poshekhonye</td>
<td>No data</td>
<td>No data</td>
<td>Rybinsk</td>
<td>1.8</td>
<td>1.38</td>
</tr>
<tr>
<td>Myshkin</td>
<td>2.14</td>
<td>1.76</td>
<td>Rostov</td>
<td>1.95</td>
<td>1.7</td>
</tr>
<tr>
<td>Borisoglebsky</td>
<td>3.00</td>
<td>4.00</td>
<td>Breytovsky</td>
<td>2</td>
<td>1.8</td>
</tr>
<tr>
<td>Lyubim</td>
<td>2.30</td>
<td>1.8</td>
<td>Bolshoye Selo</td>
<td>4.25</td>
<td>3.62</td>
</tr>
<tr>
<td>Krasnye Tkachi</td>
<td>2.00</td>
<td>2.00</td>
<td>Novy Nekouz</td>
<td>3.14</td>
<td>2.93</td>
</tr>
<tr>
<td>Prechistoye</td>
<td>No data</td>
<td>No data</td>
<td>Borok</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Pereslavsky, Berendeevskaya</td>
<td>No data</td>
<td>No data</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: data from the enterprises

Expenditure structure at the enterprises of the sector

Figure 2.3 Expenditure structure of the WSWW enterprises in YO in 2001

Source: data from the enterprises

Figure 2.4 Key expenditure elements for water supply at the WSWW enterprises
The priority expenditure items in 2001 were power and gross salaries. Under-financed were only those expenditure items that could bring long-term profit from the operational point of view, for example, technical maintenance, planned capital overhaul and modernization of fixed assets.

**Figure 2.5 Key expenditure elements for wastewater at the WSWW enterprises in YO**

![Bar chart showing key expenditure elements for wastewater at WSWW enterprises in YO]

One of the reasons for expenditure under-financing at the enterprise is that the actual required expenditures of the enterprise are not fully covered by the established tariff.

**Payment collection from the users of WSWW services**

Although payment collection rates for the services from all user categories is quite high according to the questionnaire data (it can be seen from the table below), these data do not reflect the present collection rate (year-by-year), but only show collection of current payments, advance payments and accounts receivable.

**Table 2.5 Payment collection rate from all user categories, 2001**

<table>
<thead>
<tr>
<th>Town</th>
<th>Payment collection from the population</th>
<th>Payment collection from industrial enterprises</th>
<th>Payment collection from budget-financed organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yaroslavl</td>
<td>87.2%</td>
<td>93%</td>
<td>67.6%</td>
</tr>
<tr>
<td>Danilov</td>
<td>86%</td>
<td>90%</td>
<td>92%</td>
</tr>
<tr>
<td>Nekrasovskoye</td>
<td>98%</td>
<td>81%</td>
<td>57%</td>
</tr>
<tr>
<td>Konstantinovsky</td>
<td>95%</td>
<td>100%</td>
<td>102%</td>
</tr>
<tr>
<td>Poshekholeye</td>
<td>96%</td>
<td>98%</td>
<td>98%</td>
</tr>
<tr>
<td>Myshkin</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
</tr>
</tbody>
</table>
### Payment Collection

<table>
<thead>
<tr>
<th>Town</th>
<th>Payment collection from the population</th>
<th>Payment collection from industrial enterprises</th>
<th>Payment collection from budget-financed organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lyubim</td>
<td>97%</td>
<td>99%</td>
<td>137%</td>
</tr>
<tr>
<td>Krasnye Tkachi</td>
<td>92%</td>
<td>99%</td>
<td>87%</td>
</tr>
<tr>
<td>Prechistoye</td>
<td>80%</td>
<td>0</td>
<td>79%</td>
</tr>
<tr>
<td>Pereslavsky, Berendeevskaya</td>
<td>77%</td>
<td>100%</td>
<td>0</td>
</tr>
<tr>
<td>Rostovsky</td>
<td>75%</td>
<td>77%</td>
<td>96%</td>
</tr>
<tr>
<td>Pereslavl-Zalessky</td>
<td>89.4%</td>
<td>90.1%</td>
<td>90%</td>
</tr>
<tr>
<td>GavriloV-Yamsky</td>
<td>100%</td>
<td>84%</td>
<td>84%</td>
</tr>
<tr>
<td>Zavolzhje</td>
<td>78.8%</td>
<td>93.6%</td>
<td>93.6%</td>
</tr>
<tr>
<td>Rybinsk</td>
<td>78.4%</td>
<td>84.1%</td>
<td>93%</td>
</tr>
<tr>
<td>Rostov</td>
<td>54%</td>
<td>90%</td>
<td>98%</td>
</tr>
<tr>
<td>Breytovsky</td>
<td>82.3%</td>
<td>80.6%</td>
<td>29.6%</td>
</tr>
<tr>
<td>Bolshoye selo</td>
<td>69.4%</td>
<td>57.1%</td>
<td>57.1%</td>
</tr>
<tr>
<td>Borok</td>
<td>73%</td>
<td>90%</td>
<td>82%</td>
</tr>
</tbody>
</table>

Source: Data from the enterprises

### 2.4 Affordability of HMS tariffs for the population

Income distribution in Yaroslavl Oblast is more balanced than on average in Russia and only a relatively small percentage of the population has an income level lower, than the official «minimum living standard».

#### Table 2.6 Population distribution in Yaroslavl Oblast by average income per capita, 2001

<table>
<thead>
<tr>
<th>With average monetary income per capita, RUR per month:</th>
<th>Thousand people</th>
<th>in % to the total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 500</td>
<td>19.6</td>
<td>1.4</td>
</tr>
<tr>
<td>500.1 – 750.0</td>
<td>71.7</td>
<td>5.1</td>
</tr>
<tr>
<td>750.1 – 1000.0</td>
<td>121.9</td>
<td>8.7</td>
</tr>
<tr>
<td>1000.1 – 1500.0</td>
<td>299.3</td>
<td>21.4</td>
</tr>
<tr>
<td>1500.1 – 2000.0</td>
<td>267.3</td>
<td>19.1</td>
</tr>
<tr>
<td>2000.1 – 3000.0</td>
<td>334.9</td>
<td>23.9</td>
</tr>
<tr>
<td>3000.1 – 4000.0</td>
<td>153.3</td>
<td>10.9</td>
</tr>
<tr>
<td>&gt; 4000.0</td>
<td>132.7</td>
<td>9.5</td>
</tr>
<tr>
<td><strong>Total population</strong></td>
<td><strong>1400.7</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: Statistical yearbook – Yaroslavl Oblast Statistical Committee, 2002
This figure shows that although there is no sharp differentiation in the oblast population by income level, there is still a significant gap between the average salary in industry on the one hand and very low salaries in budget-financed sphere and pensions, paid to disabled population – retired people, handicapped, etc. on the other hand. More than 60% of the population have income in between 1000 to 3000 RUR a month. This includes the share of population that has an income below the official “minimum living standard”, mainly retired people, unemployed and low-paid working population.

It is assumed that the projected income growth will lead to decrease in the share of population having an income below official “minimum living standard”.

**Payment for housing and municipal services (HMS)** in % to the average household income is relatively small if compared with the international level. At the end of the 1990-ties payment for HMS (heating, electricity, rent) remained low, on average amounting to less than 4% of the household income. But expenditures for service payments are growing.

In 2000-2001 expenditures on HMS on average reached 13% of the average income per capita ([which is considered affordable](#)), meanwhile the income itself grew to 2503 RUR by the end of 2001. However, at the same time 37.6% of the population – those who have an average income per capita not more than 1500 RUR a month, payment for HMS reached more than 22% of their average disposable income.
Figure 2.7 Monthly payment for HMS in % to the average disposable income, YO, 2001.

Source: own calculations

A major part of the population spends not more than 2% (including VAT) of their average disposable income on water and wastewater services (see figure 2.6). Only 6.5% of YO population – people having average income not more than 750 RUR a month, spent more than 2.5% of their disposable income on water and wastewater services.

Figure 2.8 Expenditures on water and wastewater services (including VAT) in % to the average disposable income, YO 2001

Source: own calculations

On average in 2001 Yaroslavl oblast population spent about 0.6% of their disposable household income on water and wastewater services.
3 EFS and baseline scenario assumptions

3.1 FEASIBLE as a tool of supporting strategic solutions

A financing strategy is 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 WSWW sector, the natural point of departure in developing a financing strategy will be the targets and objectives expressed in national or regional plans or similar documents. A financing strategy cannot replace a management plan for WSWW sector; however, the financing strategy may prove that targets of the plan are either attainable, or 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 general management plan for WSWW.

The computerised FEASIBLE model is a tool for supporting the adopted solutions and is meant to facilitate the development of financing strategies. 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 the responsibility of the decision-makers.

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 following various preconditions and assumptions related assumptions concerning input parameters related to:

- objectives and targets,
- technical development measures,
- service level projection for WSWW,
- technical and price correction factors.

Targets and objectives for WSWW development are expressed in FEASIBLE model in terms of technical measures for infrastructure development. The transition 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 user coverage level, e.g. by specifying the year when 100% coverage will be achieved
- Selection of new technologies, used in WSWW sector and dates of their implementation.
- Selection of productivity level and dates for commissioning of new objects, and also dates for decommissioning of the existing objects
- Definition of the technical aspects of a scenario will entail defining a specific parameter combination and timing for achieving different user coverage level with WSWW system,
correspondence to a number of technical parameters, directives and instructions or their combination.

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 can be found to ensure that the supply of finance matches the financial demand in the sector.

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 FEASIBLE model cannot substitute:

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

For analysis of WSWW sector of the YO and assessment of possible perspectives for its development specific parameters were selected that limit the spectre of applicability of the analysis and make the expressed objectives concrete in terms of targets and timing for their achievement.

#### 3.2 Baseline scenario definition

**The baseline scenario** can be referred to as a "no development" or "business as usual" scenario. The common assumptions for the baseline scenario are presented below:

- The present (base year) WSWW infrastructure is maintained over the entire planning period.
- Scale of sector services grows proportional to the population growth which leads to a corresponding increase of the current expenditures on WSWW;
- Expenditures on capital overhaul and planned replacement of the fixed assets are financed in the required volume in order to maintain the service level and sustainable operation of the fixed assets, preventing their further degradation;
- Tariffs for households (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 water and wastewater services will remain constant at base year level (0.6%). While the coverage remains the same in the baseline scenario, the real revenues of the WSWW enterprises will also grow due to tariff growth.

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

The strategy was developed for the following 24 towns and settlements with the total population amounting to 1184 thousand people, i.e. about 84.5% of Yaroslavl Oblast population:
Table 3.1 Towns and settlements of YO, included in the baseline scenario

<table>
<thead>
<tr>
<th>Town/settlement</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yaroslavl</td>
<td>608 000</td>
</tr>
<tr>
<td>Rybinsk</td>
<td>266 400</td>
</tr>
<tr>
<td>Tutaev</td>
<td>45 300</td>
</tr>
<tr>
<td>Pereslavl-Zalessky</td>
<td>44 500</td>
</tr>
<tr>
<td>Uglich</td>
<td>36 900</td>
</tr>
<tr>
<td>Rostov Veliky</td>
<td>35 000</td>
</tr>
<tr>
<td>Gavrilov-Yamsky</td>
<td>30 500</td>
</tr>
<tr>
<td>Zavolzhje</td>
<td>19 021</td>
</tr>
<tr>
<td>Danilov</td>
<td>18 000</td>
</tr>
<tr>
<td>Konstantinovsky</td>
<td>9 250</td>
</tr>
<tr>
<td>Nekrasovskoye</td>
<td>8 260</td>
</tr>
<tr>
<td>Poshekhoneye</td>
<td>7 300</td>
</tr>
<tr>
<td>Myshkin</td>
<td>6 400</td>
</tr>
<tr>
<td>Borisoglebsky</td>
<td>6 325</td>
</tr>
<tr>
<td>Lyubim</td>
<td>6 300</td>
</tr>
<tr>
<td>Krasnye Tkachi</td>
<td>6 000</td>
</tr>
<tr>
<td>Prechistoye</td>
<td>5 300</td>
</tr>
<tr>
<td>Ryazantsevo</td>
<td>2 000</td>
</tr>
<tr>
<td>Pereslavsky, Berencheevskaya</td>
<td>1 927</td>
</tr>
<tr>
<td>Breytovsky</td>
<td>9 700</td>
</tr>
<tr>
<td>Bolshoye selo</td>
<td>4 040</td>
</tr>
<tr>
<td>Novy Nekouz</td>
<td>3 676</td>
</tr>
<tr>
<td>Borok</td>
<td>2 168</td>
</tr>
<tr>
<td>Preslavsky</td>
<td>1 819</td>
</tr>
</tbody>
</table>

Source: Data from the questionnaires

While developing the present financing strategy and doing the calculations for the Water model, the consultant made a number of assumptions that are presented below.

3.3 Macroeconomic and financial assumptions

3.3.1 Population of Yaroslavl Oblast

The population in Yaroslavl oblast as overall in Russia diminished over the last ten years. It is assumed that the population will go further down before stabilising at 1 184 000 people in 2006. However, due to net migration from rural to urban areas within the oblast because of difficult socio-economic situation in villages and small towns, rural population will decrease sooner than urban population.

Population forecast for the projection period is presented below.

Table 3.2. Population forecast in Yaroslavl Oblast over 2001-2015

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2001</td>
</tr>
<tr>
<td>Population, total</td>
<td>1235</td>
</tr>
<tr>
<td>Urban</td>
<td>82%</td>
</tr>
<tr>
<td>Rural</td>
<td>18%</td>
</tr>
</tbody>
</table>

Source: Consultant’s estimation
3.3.2 GRP development

It is assumed that the GRP of Yaroslavl Oblast as well as the real income of households will grow at 5% per year on average in 2001-2015.

3.3.3 Consolidated expenditure budget of the oblast (COB)

We will assume further growth of real revenues and expenditures of the Yaroslavl oblast consolidated budget in line with GRP growth, i.e. on average at 5% per year in comparable prices.

Table 3.3 Consolidated Oblast Budget, 1999-2000

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditures of the COB, RUR million</td>
<td>5812,8</td>
<td>6749,1</td>
<td>9427,3</td>
</tr>
<tr>
<td>Expenditures/GRP, %</td>
<td>16</td>
<td>14,4</td>
<td>13,4</td>
</tr>
</tbody>
</table>

Source: Statistical yearbook, Yaroslavl Oblast 2002.

It is assumed in the **baseline scenario** that the ratio “Expenditures/GRP, %” will stabilise at the attained 13.4% level starting from 2002.

3.4 Assumptions on financing sources for WSWW sector

3.4.1 Public financing of current and capital expenditures in HME and WSWW sector

According to the statistical data the public expenditures on HME in YO in 2001 (base year) reached 18% of the consolidated expenditure budget while expenditures on water and wastewater sector were 5% of the total expenditures on HME. This is equal to an amount of RUR 94 million, or 1% of the total expenditure budget as shown in the Table 3.4 below.

Table 3.4 Public financing of WSWW sector, YO, 2001

<table>
<thead>
<tr>
<th></th>
<th>RUR, million.</th>
<th>In % to expenditure COB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues of the COB</td>
<td>9352,9</td>
<td></td>
</tr>
<tr>
<td>Expenditures of the COB</td>
<td>9427,3</td>
<td></td>
</tr>
<tr>
<td>Expenditures on HME</td>
<td>1707</td>
<td>18%</td>
</tr>
<tr>
<td>Expenditures on WSWW (5% HME expenditures)</td>
<td>94</td>
<td>1%</td>
</tr>
</tbody>
</table>


At the same time public subsidies for current expenditures on WSWW sector in 2001 reached 61% of the total public expenditures on HME.

It is assumed in the **baseline scenario** that public financing of WSWW sector will increase in line with GRP growth and revenues of the consolidated budget, i.e. on average at 5% per year in comparable prices. In addition, as tariff increases to the cost recovery level, the necessity of subsidies to the HMS enterprises to cover their operational losses will gradually disappear, and public budget funds will be mainly spent on capital investments and specific subsidies to the low-income consumers.
3.4.2 User charges

Data on the revenues of WSWW enterprises from user charges have been received from these enterprises. The data covers billed amount, collection rate and amount received for each group of consumers (population, industrial enterprises and budgetary organisations). In addition, information has been provided on the share in cash of amounts received and the value of non-cash receivables (in % to the nominal).

Data for base year 2001 are presented below for Yaroslavl Oblast as a whole.

Table 3.5 Revenues of the WSWW enterprises (including VAT), Yaroslavl Oblast, 2001

<table>
<thead>
<tr>
<th>Source</th>
<th>Billed, RUR thousand</th>
<th>Collected, RUR thousand</th>
<th>Collected, % of billed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>197 747</td>
<td>152 265</td>
<td>77</td>
</tr>
<tr>
<td>Industrial enterprises</td>
<td>566 428</td>
<td>481 464</td>
<td>85</td>
</tr>
<tr>
<td>Budgetary organisations</td>
<td>38 585</td>
<td>34 727</td>
<td>90</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>802 760</strong></td>
<td><strong>668 456</strong></td>
<td><strong>83</strong></td>
</tr>
</tbody>
</table>

Source: Data provided by the enterprises in the questionnaires

Note: If the collection rate in the questionnaires was indicated higher than 100% due to the debt collection of the previous years then the collection rate was taken at 100%.

It is assumed in the baseline scenario that revenues of the WSWW communal enterprises from providing service to the households will grow in line with GRP, i.e. on average at 5% per year in comparable prices. The collection rate will remain at the base year level.

Assumptions made in the development scenario are formulated in the relevant section below.
4 Baseline scenario modelling results

4.1 Financing possibilities for WSWW sector
It is assumed in the baseline scenario that tariffs for households and public financing of the
HME will increase in line with GRP, i.e. on average at 5% per year in comparable prices. At
the same time the payment collection rate remains at the base year level (72% for
households, 90% for budgetary organisations and 85% for other consumer categories).
With such assumptions, the expected revenues of the WSWW communal enterprises for
the period of 2001-2015 are estimated at RUR 11.7 billion in base year prices. The share of
household payments will amount only to RUR 2.6 billion (22%).

4.2 Demand for financing in WSWW sector
Model calculations show that expenditures on water and wastewater services are estimated
at RUR 25.3 billion under the assumption of required supply of finance for planned capital
repairs and replacement of the deteriorated fixed assets over the same period, including:

14.5 billion RUR. – operational expenditures;
10.8 billion RUR. – expenditures on maintenance, capital repairs, planned
replacement of the fixed assets.

Modelling results for demand and supply of finance for HME in the selected towns of
Yaroslavl oblast for the baseline scenario are presented in figures 4.1 and 4.2.

Figure 4.1 Baseline financing gap in WSWW sector in Yaroslavl oblast, 2001-2015

Source: Model calculations
4.3 Analysis of the financing gap

In general over the modelling period it is expected in the baseline scenario that the expenditure need will significantly exceed the revenues – by RUR 13.6 billion (i.e. more than 130% of the expected supply of finance in the sector over the period). With such a great financing gap, capital repairs, planned renewal and reconstruction of the deteriorated fixed assets will remain under-financed.

These results prove the necessity to search for reserves to increase revenues and diminish expenditures to bridge the existing financing gap in the sector.

4.4 Possible measures for reducing the financing gap

To reduce the financing gap in the baseline scenario, the following measures should be implemented:

1) Adjustment of tariff level for certain consumer categories – differentiated by municipalities of the oblast

For example, in 2001 household expenditures on water and wastewater services on average in the oblast amounted to 0.6% of average disposable income, while the maximum affordable payment level is not less than 2.5-3%.

2) Increase of collection rate for water and wastewater services

The existing collection rate ranges from 77% to 90%, while the realistically attainable level is 95-97%.

3) Expenditure savings

This can be achieved by reducing water losses in the network, more rational water use and installation of new energy-saving equipment. Estimations done for a number of vodokanals in Russia show that this could reduce energy consumption by 25-30%.
Taking into account the projected price growth on energy resources, including power, energy saving becomes one of the priority tasks for modernization and development of housing and municipal economy.

Replacement of pipes, stop valves, pumps and other equipment for more durable and energy-efficient ones, even with higher initial expenditures, can allow savings during the total equipment lifetime through reduction of operational expenditures and expenditures on capital repairs.

Personnel optimisation at the HMS enterprises will also allow some savings on labour costs at the same time increasing considerably the average salary.

4) Increase in public supply of finance for the sector

Here it concerns not only allocation of the additional public supply of finance (including for target programmes) but also changes in the direction of public funds' spending. It is feasible to spend those first of all on capital repairs and reconstruction of the existing infrastructure as well as on completion of the facilities construction that are basically ready in order to achieve a maximum effect from the investments, including the effect of energy savings.

In order to develop a realistic scenario, the effects of the policy package implementation for increasing the supply of finance to the sector and expenditure saving will be analysed in the following section.

Tariff policy:

Tariff increase (in base year prices):

- For households, tariffs are increased so that expenditures on water and wastewater services amount to 2.5% of the average disposable income in 2005 (from 0.6% in base year) and are maintained at this new level in 2005-1015;
- For budgetary organisations tariffs are increased at 5% per year (in comparable prices) in 2002-2007 and then stabilized starting from 2008;
- For industrial and commercial consumers tariffs are increased at 10% per year (in comparable prices) in 2002-2007 годах and then stabilized starting from 2008.

Increase of collection rate to the level:

- Budgetary organisations - to 100%;
- Other consumer categories - to 95-97%.

Public supply of finance – increase of expenditures on housing and municipal economy to the level of 1.25% of the consolidated expenditure budget (from the present level 1.0%) with the subsequent priority adjustment of public expenditures.

Expenditure savings – replacement of pumping equipment for more durable and energy-efficient one, implementation of measures for detection and prevention of leakages and measures for more rational water use. According to conservative estimates, these measures, even if implemented only partially during the period 2003-2008 can easily reduce power consumption by 10% of the base year level, which gives savings of some RUR 30 million per year in constant prices.

If the whole policy package will be implemented, the financing gap in the HME of the oblast will go down quickly (dashed line on figure 4.2.3) and the balance between the demand for financing and actually available supply of finance will be achieved by 2006, and in the future the sector will have available resources for development.
Figure 4.3 Current financing gap reduction in HME of Yaroslavl Oblast with the proposed policy measures, 2001-2015

Source: Model calculations

Although accumulated financing gap will increase in 2003-2006 (with accumulating total from 2001), then it will start to go down and will reach zero level by 2012-2013 (dash line), while with the conservation of the existing situation with the supply of finance for the sector at the base year level, the accumulated financing gap will exceed RUR 13.5 billion by 2015 (solid line).

Figure 4.4 Accumulated financing gap reduction in HME of Yaroslavl Oblast with the proposed policy measures, 2001-2015

Source: Model calculations

Implementation of the proposed (or a similar) policy package allows attracting additionally RUR 14.4 billion over 2003-2015. About 54% of this amount will be received at the expense of tariff increase for households, another 25% will be gained from improved collection rate for all consumer categories while other policy measures (tariff increase for industrial and commercial consumers and budgetary organisations as well as increase of public supply of finance) will give provide the remaining 21%.

Out of this amount the public budget will provide additionally only RUR 660 million, including RUR 120 million indirectly, through tariff increase for water and wastewater services for budgetary organisations.
Note that the projected tariff increase when households will be spending 2.5% of average disposable income for water supply and wastewater services in prices of 2001 means 62.5 RUR/month for first-class accommodation. This expenditure level will be affordable for the majority of the population. However, data presented in section 2.4 show that this level would be a very heavy burden for some 36.6% of the oblast population that have an average monthly income not more than 1500 RUR/month. They would be spending more than 4% of their disposable income for water and wastewater services. This is hardly affordable. This is why tariffs should be increased gradually in line with household income growth especially that of incomes of low-paid workers and retired population.

Only when the share of population requesting subsidies will not exceed 10-15% of the population one can be sure that tariff increase will indeed provide additional revenues for WSWW enterprises, these revenues will exceed the expenditures on specific accommodation subsidies to the needy population.

Under these assumptions from the moment of balancing the financing gap (on average from 2005-2006) the oblast will have possibilities for implementation a modernization and development scenario of HME from internal financing sources, and from this moment on a programme for considerable capital investments into HME can be implemented.

In 2003 – 2005 when the current financing gap remains considerable, it is feasible to implement activities for water demand management, management of the energy savings, to carry out reconstruction and construction of the most urgent facilities and implement the most effective least-cost projects.

Possibilities for improvements in WSWW sector are presented in the development scenario presented in the next section.
5 Development scenario

A development scenario of WSWW sector contains specific quantitative and qualitative targets for improvement and development of the existing infrastructure.

Examples of qualitative targets (development directions) for the future development of the system are:

⇒ Improvement of the service quality, in particular, increasing the coverage of the population with WSWW services;

⇒ Reduction of adverse impacts on the environment by rehabilitation of existing WW treatment facilities;

Expenditures on these quality targets are very difficult to estimate. Therefore, the targets of the strategy should be specified in terms of specific quantitative targets, for example:

⇒ Increase the coverage of the population with WSWW services by X% by the year 20xx;

⇒ Rehabilitate all WWTPs and upgrade them in order to meet the sanitary and environmental standards by 20xx;

Targets and objectives for HME development in the oblast should certainly meet the requirements of federal and oblast legal regulations, target programmes and environmental actions plans.

5.1 Definition of the technical development scenario

Technical development scenario can be defined as:

*Development of WSWW system, while meeting specific targets and objectives*

Technical Scenarios vary by different parameters, for example:

- Degree of coverage increase with water and waste water services for the households;
- Selection of new methods of water treatment and dates of their application;
- Targets and objectives of WSWW system and dates for their achievement, and also dates for decommissioning of existing facilities.

Definition of the technical development scenarios for WSWW system of Yaroslavl Oblast consists in identification of the specific variants and dates for achieving the planned coverage level, application of new technologies and systems in accordance with some technical parameters and standards or a combination of the above.

In order to identify the real options for development of WSWW sector and perform the financing gap analysis, two scenarios are proposed for consideration at the initial stage.

**Scenario 1** – so called *Baseline Scenario* (scenario with no changes – see chapter 4)

**Scenario 2** – *Development scenario*;

5.2 Development scenario description

For Yaroslavl Oblast targets for development of HME were formulated separately for three categories of towns and settlements (depending on the population).

- Large and medium-size cities with population more than 40 000 people (4 cities);
- Towns with population ranging from 20 000 to 40 000 people (3 towns);
• Towns and settlements with the total population up to 20,000 people.

Proposals from municipalities and WSWW enterprises formulated as answers in the questionnaires were used as basis. Table 5.1 presents targets for extending the coverage with centralised water supply by 2015 by categories of settlements.

**Table 5.1 Coverage with the centralised water supply by 2015**

<table>
<thead>
<tr>
<th>Category</th>
<th>Existing situation</th>
<th>Target²</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 40,000</td>
<td>71-98%</td>
<td>not less 90%</td>
</tr>
<tr>
<td>20,000 - 40,000</td>
<td>71-83%</td>
<td>not less 90%</td>
</tr>
<tr>
<td>до 20,000</td>
<td>81 - 93%</td>
<td>no change</td>
</tr>
</tbody>
</table>

*Source: Proposals from municipalities and WSWW enterprises*

Besides, in addition to the annual planned renewal, that is defined by the depreciation rate, it is envisaged carrying out a programme of capital repairs and reconstruction of wells, water intakes and wastewater treatment facilities in the volume as presented in Table 5.2.

**Table 5.2 Targeted indicators for reconstruction of water supply facilities, 2002-2015**

<table>
<thead>
<tr>
<th>Town/settlement</th>
<th>Volume of reconstruction in % to the total rehabilitation cost of the infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Water supply networks</td>
</tr>
<tr>
<td>Yaroslavl</td>
<td>20%</td>
</tr>
<tr>
<td>Rybinsk</td>
<td>30%</td>
</tr>
<tr>
<td>Tutayev</td>
<td>25%</td>
</tr>
<tr>
<td>Pereslav-Zalessky</td>
<td>10%</td>
</tr>
<tr>
<td>Uglich</td>
<td>10%</td>
</tr>
<tr>
<td>Rostov (Veliky)</td>
<td>30%</td>
</tr>
<tr>
<td>Gavrilov-Yamsky</td>
<td>10%</td>
</tr>
<tr>
<td>Zavolzhje</td>
<td>10%</td>
</tr>
<tr>
<td>Danilov</td>
<td>10%</td>
</tr>
<tr>
<td>Konstantinovsky</td>
<td>10%</td>
</tr>
<tr>
<td>Nekrasovskoye</td>
<td>10%</td>
</tr>
<tr>
<td>Poshekonje</td>
<td>10%</td>
</tr>
<tr>
<td>Myshkin</td>
<td>10%</td>
</tr>
<tr>
<td>Borisoglebsky</td>
<td>35%</td>
</tr>
<tr>
<td>Lyubim</td>
<td>40%</td>
</tr>
<tr>
<td>Krasny Tkachi</td>
<td>10%</td>
</tr>
<tr>
<td>Prechistoye</td>
<td>30%</td>
</tr>
<tr>
<td>Ryazabtsevo</td>
<td>10%</td>
</tr>
<tr>
<td>Pereslavsky (Berendeevskaya)</td>
<td>10%</td>
</tr>
<tr>
<td>Breytovsky</td>
<td>10%</td>
</tr>
<tr>
<td>Bolshoye Selo</td>
<td>50%</td>
</tr>
<tr>
<td>Novy Nekouz</td>
<td>10%</td>
</tr>
<tr>
<td>Borok</td>
<td>10%</td>
</tr>
<tr>
<td>Preslavsky</td>
<td>10%</td>
</tr>
</tbody>
</table>

*Source: Working group, based on the proposals from municipalities and WSWW enterprises*

² Only for those towns, where currently the coverage with the services of water supply is lower than end use.
Water mains are in poor condition that leads to significant leakages and losses (23% of the water supplied to the network). On average about 30% of the water mains in the oblast have to be replaced.

In this scenario, it was set as a target that in addition to the annual planned renewal defined by the depreciation rates 20% more of the water supply networks would be replaced on average in the considered settlements.

In general, this will mean a replacement of 60-65% of all the WS networks during the period of 2001-2015 (except for the networks within the buildings that are not considered in the present analysis). This will allow a considerable increase in the quality of the drinking water, and that in its turn will have a favourable effect on human health.

With respect to increase of service coverage with centralised sewage system, this target is not yet set in the oblast, except for Borisoglebsky where it is expedient to increase coverage level from 20% to approximately 30% in order to increase discharge volume and ensure normal functioning of treatment facilities.

About 30% of the sewage networks in the Oblast need to be replaced. The target set here is that in addition to the annual planned renewal as defined by the depreciation rates, 20% more of the networks will be replaced in the indicated period. This means a replacement of 60-65% of all the sewage networks for the period of 2001-2015 (except for the networks inside buildings).

As an environmental target the objective is by the end of the indicated period to provide for mechanical and biological treatment of the collected wastewater. Cost of the reconstruction of the mechanical treatment facilities with the introduction of biological treatment technology was estimated at 40% of the total rehabilitation cost of the existing infrastructure and 20% of the rehabilitation cost for the facilities providing mechanical-biological treatment.

It is assumed in the development scenario that the initial financing gap resulting from the baseline scenario is eliminated, for example, with the help of the implementation of the proposed package of measures.

Priorities and timeframe for the implementation of the investment programme

The following is envisaged in the considered scenario with respect to the timing of the investment programme implementation.

During 2003-2005, while the current financing gap remains significant, it is expedient to implement activities on water demand management, carry out reconstruction and construction of the most urgent cost-effective projects and implement efficient least-cost projects for energy and resource saving.

These activities, inter alia, should include:
- Installation of water meters at wells, water intakes, water-pumping stations and building entrances and other objects and also switching to a system of payments for actually consumed water;
- Activities for the systematic detection and prevention of water leakage in the networks, including replacement of old pipes and stop valve;
- Promotion of economic and rational water consumption, first of all among households;
- Replacement of pumping equipment and other energy-consuming equipment for more reliable and energy-efficient ones.

The volume of the investment resources to achieve these objectives, and also for the capital repairs, reconstruction and renewal of the WSSS infrastructure in the development

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3 That is cost of the new facilities construction with the same project characteristics.
scenario is estimated at the level of 3% a year of the total rehabilitation cost of the existing basic assets of the WS system.

As a result of the implementation of activities for managing the water demand, energy savings and more rational water use, it will be possible to define more precisely the demand for capacity of the WSSS facilities.

In addition to the activities, listed above, the following activities may be considered as a first priority and have to be implemented at the first stage:

- Programme for reconstruction and development of the water supply and wastewater system of Yaroslavl co-financed using funds of the EBRD loan;
- Reconstruction and increase of WWTP capacity of Rybinsk;
- Construction completion of WWTPs in Myshkin, Danilov and Breytovo, construction of new facilities in Otradny;
- Connection to the sewage collector of houses in Borisoglebsky in order to increase discharge volume and ensure normal functioning of WW treatment facilities.

Beginning from 2006, when the existing financing gap will be fully eliminated as the result of the proposed policy package implementation, it will be feasible to start the implementation of the investment programme for the WSSS system that is needed for the achievement of the strategy goals.

The results of the model calculations show that during the initial period of the investment programme implementation for Yaroslavl Oblast it will be extremely difficult to finance at the same time both the programmes for WS and SS.

In this situation it is expedient to start with the implementation of the investment programme for WS, including replacement of the WS networks. This will allow reducing water losses and defining more precisely the demand for capacity of water intake, treatment facilities and pumping station as well as sewage treatment facilities during their reconstruction and construction. This in turn will help to get significant savings on capital investments.

Then it will be possible with a few years delay to start the implementation of the programme for SS. This does not mean that nothing will be done for SS for the time being. It just implies that due to financial limitations the sector will have to do with only small projects for reconstruction of the networks and infrastructure focusing on energy saving and savings on operational costs.

A number of priority wastewater facilities are listed above. According to the scenario, the construction and reconstruction of these objects will be carried out from the very beginning of the implementation of the described investment programme.

5.3 Modelling results of the development scenario

In the development scenario a more ambitious target related to improvement of the service quality is set in comparison with the one in the baseline scenario. Also an extension of the area of coverage of the population with WSSS is envisaged as well as replacement of part of the water mains and sewage networks – upgrading to the level of functional stability of the WSSS system (depreciation of networks not more than 40%). This will lead to an increase of total expenditures for the period because the planned reconstruction of the facilities and additional replacement of networks will lead to expenditure increase related to reconstruction of the existing and commissioning of the new fixed assets;

However, with new more reliable networks and energy-efficient equipment the current operational expenditures and expenditures on fixed assets maintenance will be reduced.
The following table 5.3 shows the assessment of the volume of the required expenditures for the proposed development scenario (hereafter - scenario 2). This table was calculated under the assumption that the implementation of the programme for wastewater treatment will start two years after the programme for water supply is completed, and will be fully implemented during 2003-2010.

Table 5.3 Volume of required expenditures according to Scenario 2, 2001-2015, billion RUR

<table>
<thead>
<tr>
<th>Expenditure item</th>
<th>Scenario 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current operational expenditures</td>
<td>9.9</td>
</tr>
<tr>
<td>Expenditures on maintenance, capital repairs and planned renewal of fixed assets</td>
<td>9.3</td>
</tr>
<tr>
<td>Expenditures on the reconstruction and modernisation of fixed assets, commissioning of the new fixed assets of WSSS</td>
<td>4.5</td>
</tr>
<tr>
<td>Total expenditures</td>
<td>23.7</td>
</tr>
</tbody>
</table>

*Source: Model calculations*

As for the financing volume, revenues received from payments for the services will increase because of tariff growth so the population will spend on average 2.5% of the disposable income per capita for WSSS instead of 0.6% in the base year 2001. Besides, it is assumed that number of consumers provided with the services will somewhat increase (including population).

The calculations also took into account EBRD loan in the amount of $16 million (equivalent to some EUR 18.5 million at the moment of signing the loan agreement) that was attracted by the Yaroslavl Administration for implementation of reconstruction programme of water supply and wastewater system of the city.

As it turned out this loan together with the proposed policy package on closing the existing financing gap of the baseline scenario will not be sufficient to finance capital repairs, reconstruction and construction of new WW facilities envisaged in the development scenario during first 4-5 years of the programme implementation. This can be seen from Figure 5.1. At the beginning of the investment programme implementation (2003-2006) the current financing gap (dash line) will reach RUR 600 million a year at the beginning of the period, then it will reduce to RUR 300 million in 2005 and will be fully closed only by 2008.

*Figure 5.1 Financing gap under Development scenario, 2001-2015, million RUR*
As forecasted within the period of 2003-2007 the accumulated financing gap in Sanitation Services sector will reach RUR 3.6 billion, although in general for the period 2001 – 2015 there is no accumulated financing gap. Moreover, according to calculations for the period on the whole it is assumed that the available financing will slightly exceed the demand – by about RUR 1.4 billion. Therefore it is important to ensure additional financing specifically in the initial period, in 2003-2007.

The following policy package to obtain additional financing during 2003-2007 was considered in the course of scenario analysis:

- First, increased budgetary financing for the initial period of the investment programme implementation up to 1.5% of the Consolidated expenditure budget (i.e. share of expenditures for WSSS will increase by 50% as compared to the base year). After that this share will be reduced to 1% of COB over 2010-2012, to 0.5% in 2012-2014 and starting from 2015 budgetary financing will be stopped;
- Second, the possibility of attracting additional loan financing;
- Third, attraction of funds from the private sector (share holding of the enterprises and house owners interested in connection to the centralised water supply and sanitation and ready to pay fully or partially pay for the related expenditures);

The first proposed measure will provide additionally RUR 185 million over the period 2003-2007, however, it will still be sufficient for bridging the financing gap for capital costs;

If one tries to close the financing gap of the capital investment programme in 2003-2007 by implementing only the first two proposed measures (data for estimating potential of the third source are not available) then it will be necessary to additionally attract loans in the amount of RUR 1.6 billion over 2004-2007, that is some 50 million USD.

Attraction of such a significant amount by the towns of the oblast, even through tranches of 10-15 million USD a year, seems quite doubtful and problematic in the current situation. Besides, it will still not be sufficient to compensate for under-financing of the SS sector over 2001-2003.

Solutions for this problem can be found first by looking at the possibility of extending the timeframe for implementation of the programme for water supply (its completion in principle by 2015) and programme for sanitation services, its implementation in principle during the period 2006 - 2017. This will somewhat facilitate the task of financing in the most difficult initial period of the programme implementation for reconstruction and modernization of sanitation services sector (2003-2007). Besides, it is expedient to narrow to some extent the scope of activities of programme implementation for reconstruction over the period 2004-2007 with transfer of some of the activities to the period 2008-2015.

As can be seen from Figure 5.2, if the timeframe for the programme implementation proposed in the development scenario is extended and if the proposed measures for increase of supply of finance are implemented then there is no accumulated financing gap (dash line) over the period 2001-2015 in general and in total the expected supply of finance will slightly exceed the total expenditures for the period. Therefore the proposed measures are worthwhile. However, it is not possible to predict exactly within the framework of the present analysis, which activities should be postponed till later (2008-2017). This will require a detailed feasibility study for the alternatives.
Computer-simulated calculations show that after the development programme implementation, i.e. after 2015 there will be no need for budgetary financing of operational expenditures of the WSSS sector anymore (except targeted subsidies to the poor including housing subsidies). Budgetary resources then could be spent on further development of municipal WSSS systems and service improvement.

However, if private operators were involved in the future for example through concessions, there will be also no need for budgetary financing of capital expenditures.

Moreover, as the programme of modernisation and development of the WSSS system is realised, it may be possible to reduce tariffs for the population and other users. Policy measures directed to energy saving will also create conditions for a considerable reduction of the burden related to payments for WSSS (in % of average income per capita) compared with the level assumed in the scenarios.

The analysis shows that of the following policy measures intended to ensure financing of the proposed scenario the most important ones are:

- Improvement of payment collection to the target level of 96-100%;
- Proposed tariff increases

For example, if tariffs for the population are increased to the level when expenditures on WSSS reach only 2% of average per capita income instead of 2.5% as suggested above, then instead of minor total surplus of some RUR 1 billion there will be a financing gap amounting to some RUR 1.4 billion over the period 2001-2015.

Similarly, if the payment collection rate remains at the level of 2001 and payment discipline is not improved then, even if all other measures are implemented, the loss in revenue for the same period is estimated at RUR 3.5 billion in general for the period.
6 Conclusions and recommendations

6.1 Financing gap

WSSS Enterprises in large and medium-size towns of Yaroslavl Oblast are significantly under-financed. Even according to the “baseline scenario” that does not envisage development of the existing WSSS system (it only maintains the service level in the base year allowing no further degradation), the forecast made by the computerised model shows that the required expenditures will considerably exceed revenues. For the period 2001-2015 the shortfall is RUR 13.6 billion (i.e. a financing gap equals to about 130% of expected total revenues in the sector).

With such a large gap first of all the enterprises engaged in capital repairs will not be adequately financed, and the same apply to the scheduled renovation and reconstruction of depreciated capital assets.

Therefore it is urgent to find additional resources to increase revenues and reduce expenditures in order to be able to cover the existing financing gap in the sector.

Model-simulated calculations show that it is possible to close the initial financing gap by implementing the following package of policy measures:

A) Tariff policy

- Tariff increase:
  - For population to the level when expenditures on WSSS services increase to 2.5% in % of average disposable income per capita in 2006 (with 0.6 % in base year) and are maintained at the new level in 2006-2015;
  - For budgetary organisations by 5% a year (in compatible prices) in 2003-2007 and stabilisation of real tariff beginning from 2008;
  - For industrial and commercial users by 10% a year (in compatible prices) in 2003-2007 and stabilisation of real tariff beginning from 2008.

- Improvement of payment collection for:
  - Budgetary organisation - up to 100%;
  - Other categories - up to 95-97%.

B) Budgetary financing

Increase WSSS-expenditures to 1.25% of the COB (from the current level of 1.0%). At the same time change the priorities of budgetary funds, which should be directed primarily to capital repair and reconstruction of existing facilities, completion of construction for the facilities (with optimisation of their productivity) in order to achieve maximum effect from the investment including in particular effect from energy and resource saving.

C) Costs savings

Replacement of pumping equipment by more durable and energy saving one combined with the implementation of measures directed to detection and elimination of leakage and promotion of water conservation. A conservative assessment of the effects of these measures - even if realised only partially between 2003-2008- shows a possibility to reduce energy consumption by 15% compared to the level of the base year. This corresponds to a saving of some RUR 25 million a year in 2001 prices.

Implementation of these measures will lead to a rapid reduction of the existing financing gap (see the dash line on Figure 4.3) and by 2006 a balance will be reached between the financing demand and available supply of finance. Thus in future the sector will have free resources for its further development.
6.2 Strategy targets and implementation

The development objectives, envisaged by the development scenario (reconstruction and development of the infrastructure, increased quality of WSSS services and a minor increase of service coverage for the population) are described in detail in section 5.2 above. Model calculations show that

- The targets relating to the development of WSSS systems in large and medium size cities of Yaroslavl Oblast within the terms envisaged (up to 2016) could not be achieved completely with the described policy package. However they can be achieved in the long term (by 2018).
- This conclusion means that for some cities of Yaroslavl oblast the development objectives should be either less ambitious or that implementation should be postponed to later period.

The proposed strategy that allows achieving a balance between financing needs and supply of finance over the period 2001-2015 consists of the following:

1. In the period of 2003-2006, when current financing gap is still significant it is expedient to implement activities for water demand management, energy/resource saving activities and conduct renovation and construction of the most urgent facilities requiring fewer expenses at the same time implementing the most effective least-cost projects.

This in particular includes:

- Installation of water meters at wells, water intakes, water-pumping stations, building perimeters and other objects and also switching to a system of payments for actually consumed water;
- Implementation of measures for the systematic detection and prevention of water leakage in the networks;
- Replacement of pumping equipment and other energy-consuming equipment with more reliable, durable and efficient ones.
- Promotion of economic and rational water consumption, first of all among households

The volume of investment resources needed to achieve these objectives, and also for the capital repair, reconstruction and renewal of the existing infrastructure and equipment of the water supply system over 2003-2006 in the scenario is determined at the level of 3% per year of the total rehabilitation cost of the existing fixed assets of the WS system.

The use of water meters and tariff increase will also promote the more rational use of water. It is important that as a result of the measures taken to manage water demand, conservation and rational water use, it will be easier to determine more accurately the need for productive capacities of water supply and sanitation facilities. This will also help obtaining significant savings on capital investments for the reconstruction, modernisation and construction of new WSSS infrastructure.

In addition to the activities, listed above, the following activities may be considered first priority and have to be implemented at the first stage:

- Programme for reconstruction and development of the water supply and wastewater system of Yaroslavl co-financed using funds of the EBRD loan;
- Reconstruction and increase of WWTP capacity of Rybinsk;
- Construction completion of WWTPs in Myshkin, Danilov and Breytovo, construction of new facilities in Otradny;
- Connection to the sewage collector of houses in Borisoglebsky in order to increase discharge volume and ensure normal functioning of WW treatment facilities.
Beginning from 2007, when the existing financing gap will be fully closed as the result of the implementation of the proposed (or similar) policy package, it will be feasible to start the implementation of the WSSS investment programme that is needed for the achievement of the strategy goals.

The results of the model calculations show that during the initial period of the investment programme implementation for Yaroslavl Oblast it will be extremely difficult to finance at the same time both the programmes for WS and SS.

In this situation it is expedient to start with the full implementation of the investment programme for WS, including replacement of the WS networks. This will allow reducing water losses and defining more precisely the demand for capacity of water intake, treatment facilities and pumping station as well as sewage treatment facilities during their reconstruction and construction. This in turn will help to get significant savings on capital investments.

Then as model calculation show it will be possible with 2-3 year delay to start the implementation of the programme for SS. This does not mean that nothing will be done for SS for the time being. It just implies that due to financial limitations the sector will have to do with only small projects for reconstruction of the networks and infrastructure focusing on energy saving and savings on operational expenditures.

Implementation of the investment programmes will ensure acceptable operational safety and reliability of functioning of the communal systems of water supply and sanitation services in the considered towns and settlements, also quality of the service will improve noticeably.

6.3 Financial issues

- Implementation of the proposed development scenario will require about RUR 23.7 billion (current and capital expenditures) during the period of 2001-2015, out of this total, expenditures for reconstruction and modernisation of the existing fixed assets, construction and commissioning of the new facilities for SS will amount to some RUR 4.5 billion while expenditures on maintenance and replacement of the deteriorated fixed assets will reach some RUR 9.3 billion (the rest will be current expenditures).

- The proposed policy package for closing the financing gap in the baseline scenario is not sufficient for financing of the development scenario.

- The financing gap in the development scenario may be closed if in addition to the proposed policy package the following will be done:
  1. Over the period of investment programme implementation WSSS budget financing should be increased to the level of 1.5% of the COB expenditures (that is the share of expenditures for the WSSS will increase by 50% in comparison with the base year level, and these funds will be mostly used for capital investments);
  2. In the period till 2007 budgetary financing of SS sector will be very significant as it remains the only source for compensation of under-collection of revenues at the planned level in case if slow income increase of the poorer households will become an obstacle for tariff increases in line with the proposed timeframe;
  3. Funds from the private sector are attracted (share holding of the enterprises and house owners interested in connection to the centralised water supply and sanitation system and ready to pay fully or partially pay for the related expenditures);
4. Household tariffs will be eventually increased (taking into account affordability limits) to the level when expenditures on WSSS per person will reach 2.5% of the average disposable income;

5. Terms for achieving the set targets for water supply will be postponed till 2015, and for sanitation system – for another two years.

However, although there will be no financing gap for the period 2001-2015 in general if proposed or similar measures are implemented, some current financing gap will be still observed during 2003-2007. Among solutions for the problem, it is proposed to extend the timeframe for implementation of some activities from 2003-2007 to a later period 2008-2015. To predict exactly which activities should be postponed till later period it will be necessary to develop a detailed feasibility study for the alternatives.

6.4 Implementation of the recommendations

- When making the strategy implementation decisions, it is necessary to take into consideration first of all that the model estimates contain elements of uncertainty. Secondly, the estimates are based on certain assumptions, which will not necessarily follow real events. Thirdly, it is assumed that the estimates are based on optimal logistical arrangements as well as on the optimal mix of facilities, and also their proper maintenance and timely renewal of the fully depreciated assets. In case of substantive deviations from the optimal solutions the actual costs could be much higher than the ones used in the model.

- As the model presents an aggregate result for Yaroslavl Oblast on the whole, the absence of the financing gap for the oblast in general for the entire planning period does not necessarily mean that in every town and each year the available supply of finance will exceed the financing demand. It is assumed that tariffs for the services of WSSS will change considerably with time and that expenditures, in particular, capital costs are also spread quite unevenly over time in the considered scenario.
**Background**

With an area of 36.4 thousand sq. km, Yaroslavl Oblast is located in the center of the European Russia in the Volga basin. Yaroslavl is the administrative center of the Oblast, which comprises 6 cities reporting to the oblast center, 5 cities reporting to district authorities, 17 districts and district centers.

The population of the Oblast is 1,400.7 thousand people, including 1,126.2 of city inhabitants which offers an 80 percent urban concentration. An average population density is 38 people per sq. km. The last decade saw the decrease in the population.

Yaroslavl Oblast is one of the most developed industrial oblasts of the Central Okrug of Russia. Among the leading industries are: engineering and metal working, chemical, petrochemical, fuel and power engineering, as well as wood working, light food processing industries. In this country, Yaroslavl is the leading supplier of diesel engines for large trucks and tractors, fuel equipment, automobile, agricultural and aviation tires, high quality oil products, paints and varnishes, general mechanical rubber goods, electrical motors, electric vibrators, road making machines, duck fabric, aviation instruments industry, cables, printing equipment, medical equipment, wood working and tire assembling machines, rubber and latex, trawlers, rescue-boat, cutters for border guard service, watches. The share of industry, which provides 50% of the consolidated oblast budget, in the gross regional product (GRP) is over 40%.

During the last years, the Oblast pursued the strategy of development, which laid the groundwork for reforms and adaptation of the oblast economy to market. By now, major industries in the Oblast appear to have embraced market and improved their performance.

**The Gross Regional Product**

The performance of the real Gross Regional Product over the last years indicates that real growth in the Yaroslavl Oblast GRP alternated with its real decrease. The growth of real GRP in 1998 was 7.2%, while in 1999 it was 9.8%, reaching 11.7% in 2000 and an estimate of 8% in 2001 (Table 2.1).

Thus, from 1998 to 2001, the real GRP of Yaroslavl Oblast increased by 17.1%, while for Russia the cumulative GDP growth was only 14%.

### Table 2.1 GRP Performance in Yaroslavl Oblast, 1995 - 2001

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GRP, bln. ruble</td>
<td>14.8</td>
<td>18.1</td>
<td>19.6</td>
<td>22.5</td>
<td>36.3</td>
<td>46.9</td>
<td>70.5</td>
</tr>
<tr>
<td>Growth in GRP in comparable prices, %</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>7.2%</td>
<td>-</td>
<td>11.7%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Growth in GDP of Russia in comparable prices, %</td>
<td>-4.1%</td>
<td>-3.6%</td>
<td>0.8%</td>
<td>-4.9%</td>
<td>5.4%</td>
<td>8.3%</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

*Source: Yaroslavl Oblast Statistical Yearbook, 2002*

**Growth prospects**

The Russian Ministry of Economic Development and Trade forecasted the real annual growth in GDP at some 3.5 to 5 percent for the mid term period. The growth in the Yaroslavl Oblast GRP is expected to be slightly higher to the extent of 5% a year.

**GRP Structure**
The main GRP contributors are the industrial sector, agriculture, construction, trade and non-market services. Despite the fact that Yaroslavl Oblast demonstrates a fairly high level of industrial development, the share of industries in GRP decreased in 1992-1998, while from 1998 it displayed an upward trend.

Table 2.1 Changes in Yaroslavl Oblast GRP Structure in 1995, 1998 and 2000, %

<table>
<thead>
<tr>
<th>Year</th>
<th>Goods</th>
<th>Services</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Industry</td>
<td>Agric.</td>
</tr>
<tr>
<td>1995</td>
<td>56.2</td>
<td>39.4</td>
<td>9.1</td>
</tr>
<tr>
<td>1998</td>
<td>47.0</td>
<td>35.4</td>
<td>6.6</td>
</tr>
<tr>
<td>2000</td>
<td>56.4</td>
<td>42.3</td>
<td>8.2</td>
</tr>
</tbody>
</table>

Source: Yaroslavl Oblast Statistical Yearbook, 2002

The service sector is mainly represented by trade, transport, telecommunications, utilities and housing, and social services. The share of services in the economy of the Oblast increased from 31.3% in 1995 to 41.0% in 1998, which is mainly the reflection of non-market services of the government sector. Recover of the economy in 1999-2001 brought the service sector share back to the level of 2000 (33%).

Certain changes are forecasted in the short and mid-term performance of the Yaroslavl Oblast GRP: the share of public utilities and housing may well reach the level of 4 to 5 percent, with the level of non-market services going down. The share of construction sector is expected to remain at the level of 7-9 percent, with the share of industrial sector at the level of 42-44 percent.

It is expected that the ongoing growth in the chemical, food processing and wood processing sectors will contribute to the overall industrial growth. As the said sectors are well represented in the Oblast, there is reason to believe that sound environmental performance of the major enterprises will lead to attainment of the goals set out in the Oblast environmental policies.

**Investments**

The enabling investment environment in the Oblast contributed to the growth of private investments. In 1998-2001, the economy of the Oblast received $68.8 US mln. in investments. Most of the investments went to machine engineering (62%), oil refinery (18%), light industries (11%), chemical and petrochemical (4%) sectors.

**Employment**

According to official statistics, the number of economically active population in 2001 was 688,000 or 49% to the total population of the Oblast. Mid-term, labor resources are expected to be on the same level.
The 1999-2001 economic growth made a dramatic reduction in the unemployment level. Compared to the 1995 peak unemployment rate of 11%, the 2000 unemployment was 9.6%, while in 2001 it was 6.3%.

Table 2.2 below reflects the performance of straight-time and real wages (before taxes) and income of the population.

Table 2.2 Changes in nominal and real wages in 1995-2000 (ruble per month)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average per capita income</td>
<td>624</td>
<td>725</td>
<td>793</td>
<td>1267</td>
<td>1678</td>
<td>2197</td>
</tr>
<tr>
<td>Nominal average monthly wage</td>
<td>647</td>
<td>787</td>
<td>888</td>
<td>1290</td>
<td>1906</td>
<td>2831</td>
</tr>
<tr>
<td>Real wage growth</td>
<td>106.2</td>
<td>106.9</td>
<td>83.2</td>
<td>81.6</td>
<td>108.9</td>
<td>106.3</td>
</tr>
</tbody>
</table>

Source: Yaroslavl Oblast Statistical Yearbook, 2002


The Table also illustrates that in 2001 the average monthly wages were only $98 US. While the productivity in the Oblast is considerably lower than in West Europe, the cost of labor is also much lower.

Oblast Budget

Table 2.3 offers the analysis of overall revenues and expenses of budgets of all levels in the Yaroslavl Oblast, i.e. consolidated revenues and expenses of the Oblast Administration, local municipalities, districts and earmarked budget funds.

Table 2.3. Revenues and expenses of the Yaroslavl Oblast consolidated budget in 1997-2001 (thousand ruble)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall revenues</td>
<td>4 005 600</td>
<td>3 843 100</td>
<td>5 743 800</td>
<td>6 960 000</td>
<td>9 352 900</td>
</tr>
<tr>
<td>Overall expenses</td>
<td>4 372 800</td>
<td>3 929 200</td>
<td>5 812 800</td>
<td>6 749 100</td>
<td>9 427 300</td>
</tr>
<tr>
<td>Surplus/shortage</td>
<td>-367 200</td>
<td>-86 100</td>
<td>-69 000</td>
<td>210 900</td>
<td>-74 400</td>
</tr>
</tbody>
</table>

Source: Yaroslavl Oblast Statistical Yearbook

Oblast Revenues

In 2001, the Oblast budget received about 9.35 bln. ruble revenues, which amounts to some $323 US mln. Internal revenues amounted to 83% of the overall revenues, while federal transfers (so called dotations, subventions, subsidies and transfers) are also a sizable contribution (1,547 million ruble), though in real terms these are lower than in 1997-1998. In real terms, the CBR went down by 60% in 1997-1999, followed by a slight increase.

Table 2.4 Yaroslavl budget revenues in, 1997-2001 (thousand ruble)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total revenues</td>
<td>4 005 600</td>
<td>3 843 100</td>
<td>5 743 800</td>
<td>6 960 000</td>
<td>9 352 900</td>
</tr>
<tr>
<td>Total revenues/GRP</td>
<td>20.4%</td>
<td>17.1%</td>
<td>15.8%</td>
<td>14.9%</td>
<td>18%</td>
</tr>
</tbody>
</table>
Internal revenues

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal income tax</td>
<td>17%</td>
<td>16%</td>
<td>17%</td>
<td>18%</td>
<td>27%</td>
</tr>
<tr>
<td>Profit tax</td>
<td>19%</td>
<td>18%</td>
<td>21%</td>
<td>29.5%</td>
<td>28%</td>
</tr>
<tr>
<td>VAT</td>
<td>24%</td>
<td>21%</td>
<td>16%</td>
<td>10%</td>
<td>0</td>
</tr>
<tr>
<td>Excises</td>
<td>5%</td>
<td>8%</td>
<td>8%</td>
<td>10.5%</td>
<td>16%</td>
</tr>
<tr>
<td>Property tax</td>
<td>15%</td>
<td>15.5%</td>
<td>12%</td>
<td>9%</td>
<td>10%</td>
</tr>
</tbody>
</table>

* as of January 2001. 100% of VAT is to be paid to the federal budget.

Source: Yaroslavl Oblast Statistical Yearbook, 2002

It is important to note that from 1999, two taxes, a profit tax and personal income tax, as well as excises were the main contributors to the consolidated Oblast budget.

The share of the property tax went down from 15% in 1997-1998 to 10% in 2001. The recent changes in the taxation of small and medium-sized business make it difficult to calculate the share of these taxes in the Oblast budget in 2003.

Other sources

No major changes are expected in the volume of the federal transfers in the short and medium term. Out of all earmarked Oblast fund only the ecological fund could be viewed as a source for environmental financing. In 2001, the fund revenues are part of the Oblast budget revenues amounting to over 83.5 mln. ruble of pollution charges.

Budget Expenses

Table 2.6 demonstrates the performance of the consolidated budget expenses.
Table 2.6 Yaroslavl budget expenses in 1999-2001 (thousand ruble)

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total expenses</td>
<td>5 812 800</td>
<td>6 749 100</td>
<td>9 427 300</td>
</tr>
<tr>
<td>Including: state debt servicing</td>
<td>-</td>
<td>85 000</td>
<td>67 354</td>
</tr>
</tbody>
</table>

*Source: Yaroslavl Oblast Statistical Yearbook, 2002*

The share of current expenses in the total expenses of the oblast budget in 2000-2001 was 94%, with the remaining 6% for capital investments.

The oblast mainly invested in the construction and furnishing of educational and health facilities, as well as in construction and reconstruction of utilities and housing and housing.

Despite a considerable increase in the 2001 budget investments as compared to the 1999 figure, the 2001 target was not attained.

Utilities and housing expenses comprise a considerable share of the total expenses amounting to 23% in 2000 and 18% in 2001 (see Table 2.7).

Table 2.7 Utilities and housing expenses of the Yaroslavl Oblast budget, 2000-2001 (thousand ruble)

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilities and housing expenses</td>
<td>1 571 600</td>
<td>1 707 000</td>
</tr>
<tr>
<td>(as % to the total budget expenses)</td>
<td>23%</td>
<td>18%</td>
</tr>
</tbody>
</table>

Including:

- Capital investments in utilities and housing | 175 100

Capital investments as % to the total budget utilities and housing expenses | 10.3%

Including:

- Current utilities and housing expenses | 1 532 200

Current utilities and housing expenses as % to the total budget utilities and housing expenses | 89.7%

*Source: Yaroslavl Oblast Statistical Yearbook за 2001*

Current utilities and housing expenses include: compensation for the lost income of the utilities due to: (i) the difference in tariffs for the population and economically justified ones, (ii) tariff incentives of the population: (iii) earmarked subsidies to the poor (families below the poverty line). It is important to note that the share of capital expense in 2000 was 10% to the total utilities expenses. Priority financing of the current expenses does not allow for a considerable cut in expenses by way of capital repairs and replacement of worn out infrastructure.

**Environmental Financing in Yaroslavl Oblast**

The Yaroslavl Oblast Environmental programs and activities are financed from the budgets of federal, oblast, municipality levels, as well as from own funds of enterprises and institutions.

**Environmental Investments**

According to the review of the Yaroslavl Oblast State Committee for Statistics called “Capital Investments for Environmental Protection and Natural Resource Management in
2001”, the environmental investments in Yaroslavl Oblast were 489.9 mln. ruble (582.6 mln. ruble in 2000) including:

- atmospheric air protection 62.3%;
- water resources management 25.4%;
- toxic industrial, municipal and other waste management 6.6%;
- land management 5.7%.

Generally, environmental financing was carried out by enterprises themselves. These account for 368 mln. ruble (75.1%). The federal budget invested in environmental protection 28.2 mln. ruble (5.8%), with the oblast and local budgets investing 93.8 mln. ruble (19.1%). Environmental funds account for 3.5 mln. ruble of capital investments into environmental protection.

The share of capital investments in environmental protection and natural resources management in 2001 was 3.4% of the total capital investments in Yaroslavl Oblast (8.1% in 2000).

The structure of capital investments in environmental protection and natural resources management with a breakdown by ownership status was as follows (million Rubles):

<table>
<thead>
<tr>
<th>Ownership Status</th>
<th>Capital Investments</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>- state owned</td>
<td>12.0</td>
<td>2.5%</td>
</tr>
<tr>
<td>- federal</td>
<td>12.0</td>
<td>2.5%</td>
</tr>
<tr>
<td>- municipal</td>
<td>114.9</td>
<td>23.4%</td>
</tr>
<tr>
<td>- private</td>
<td>356.8</td>
<td>72.8%</td>
</tr>
<tr>
<td>- mixed (without foreign participation)</td>
<td>6.3</td>
<td>1.3%</td>
</tr>
</tbody>
</table>

Industrial enterprises account for most of capital investments (362.2 mln. ruble – 73.9%), with oil refineries accounting for 311.5 mln. ruble of capital investments.

The total receipts of the environmental fund in 2001 were 83.5 mln. ruble or 133% as compared with 2000 figures including pollution charges, environmental penalties, and environmental damages.

Out of these the federal budget received 16.1 mln. ruble, the oblast budget – 21.8 mln. ruble and the local budgets – 45.6 mln. ruble.

In 2001, the Yaroslavl Oblast Law “On the 2001 Oblast Budget” established the revenues of the oblast budget from charges for the allowed and abnormal emissions and discharges, disposal of wastes and environmental financing in an amount of 12.0 mln. ruble.

The oblast budget environmental expenditures are approved by a Resolution of the Yaroslavl Oblast Administration. The main ones include: (thousand ruble):

- construction of environmental facilities including cost sharing - 6 000.0
- implementation of cleaner technologies – 75.0
- R&D in environmental protection and natural resources management – 1 111.6
- emergency and natural disaster prevention and management – 1 331.0

A Committee, established by a Resolution of the Yaroslavl Oblast Administration, selected environmental projects, programs and activities along with a decision making to finance them from the federal budget.

BCEOM-HALCROW GROUP LTD.-COWI CONSORTIUM 55
The most important environmental activities under these expenditures are: construction and reconstruction of treatment facilities, construction of communal wastewater system, reconstruction of a dam, etc. In the context of land management funds were allocated for the reconstruction of dumps, industrial waste disposal facilities.

In 2001, effective environmental expenses of the oblast budget were 11.5 mln. ruble or 65% as compared with the last year. The last year oblast budget was underdisbursed. For example, for construction, upgrading and reconstruction of environmental facilities (including co-financing) the budget allocated 7.2 mln. ruble, with only 2.8 mln. ruble disbursed, thus 4.4 mln. ruble were in arrears.

The 2002 oblast budget allocated 16 mln. ruble as environmental spending including 6.7 mln. ruble to finance the construction of environmental facilities.

Generally, pollution charges received by local budgets remain the main sources of spending for the construction, upgrading and reconstruction of environmental facilities. The total value of local environmental spending in 2001 was 23.8 mln. ruble.

Construction and reconstruction of environmental facilities received 15.3 mln. ruble or 64% of budget allocations. Most of it (13.2 mln. ruble) was used for the protection and management of water resources: water supply, laying pumped wastewater collectors, reconstruction and construction of city wastewater network, construction of a wastewater collector, etc.

Land management activities accounted for 1.3 mln. ruble including the construction of solid waste handing and disposal facilities in Uglicht Municipal District, expansion and construction of dumps in the New Nekouz Township, etc.

It is to be noted that in 2001 the charges for the allowed and abnormal emissions and discharges, waste disposal accounted for 67.4 mln. ruble paid to the local and oblast budgets. At the same time, only 35.4 mln. ruble of environmental spending was disbursed. It is evident that the balance of 32 mln. ruble is spent for something, which is not related to environmental protection. This is mainly due to the fact that ecological safety is not a priority objective of the oblast budget policy.

Removing ecological funds from the environmental legislation framework created a loophole for environmental charges to finance activities, which are not related to environmental protection.

Planning of Investments

Procedure

New investments and capital repair of the current city infrastructure are part of the budgeting for the following year. Budgeting of oblast investments starts with the evaluation of availability of current investment resources, on the one hand, and identification of required spending for the projects and construction to be carried out in the following year, on the other hand. The list of projects and investment targets proposed by local administrations, departments of oblast administrations and other entities is subject for consideration by the Department for Construction and Investment Policies, Finance Department and other parties involved.

Selection Criteria

All other conditions equal, the following projects are viewed by oblast authorities as priorities: uncompleted projects, if the completion cost is not forbidding; projects under federal and oblast earmarked programs; projects with project documentation that meet the current rule and standards (construction, environmental, sanitary, etc) and help attain social and economic goals set out in the oblast policies; projects co-financed by local administrations and other organizations.
Political set offs and negotiations of local administrations with the oblast administration and Duma are also important contributors to the budgeting process. Weight and drive of local politicians are still important drivers in the budgeting of capital investments.

**Earmarked Environmental Programs**

Yaroslavl Oblast is a participant in two approved earmarked federal environmental programs.

The EFP “Environmental Health of the Volga River and its Tributories; Restoration and Pollution Abatement of the Natural Complexes of the Volga River Basin till 2010” (“The Volga Revival”)

The Volga Revival Program was developed in the 90s for all the Volga Basin regions. For some years, the program was financed only to support the PIU in Nizhny Novgorod. The Program goals, methods of program implementation and financing tools are rather vague and general. In April 1998, the Government of the RF issued a resolution approving the program as a federal earmarked program. The Resolution nominated the Ministry of Natural Resources of the Russian Federation as a state coordinator of the Program.

The resolution also proposed an implementation mechanism. To this end, the Resolution assigned the Ministry of Natural Resources of the RF and other customers of the Program with the task of submitting as of 1998 to the Committee of Investment Bidding of the Ministry of Economy of the RF projects for the implementation of the activities under this Program. The Resolution instructed the Ministry of Economy and Ministry of Finance to plan the allocation of capital investment thresholds and expenditures in the integrated development forecasts for the corresponding year to implement the activities under the Program taking into consideration the Committee recommendations. The Resolution encouraged the executive authorities of the relevant constituent entities of the Federation to allocate in their budgets the financing required for the implementation of the Program including off-budget sources.

As early as in August of 1996, the Oblast Administration approved a plan of action for the restoration and protection of water bodies under the Volga Revival Program for 1996-2010 with a budget of 9.3 bln. ruble at 1996 prices.

The priority projects (water management) under this Program (1996-2003) in the Oblast were agreed with the Oblast Administration and provided for the construction of the Level III Aeration Station in Yaroslavl, Level II – in Rybinsk, expansion and reconstruction of treatment facilities in Uglich, reconstruction of city treatment facilities in Myshkino, in a township Dunilovo, construction of industrial and storm water treatment facilities, reconstruction of storm water sewerage in a number of major enterprises, cleaning of the river section at their estuaries, river bank works, removal of cattle farms, workshops, fuel tanks from the littoral area of the Rybinsk Reservoir, reequipping rural boilers for gas, establishment of additional monitoring network at small rivers and other projects of water management importance.

**Table 2.8 Effective implementation of priority activities under the Program (according to the Committee for Natural Resources)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total (mln. ruble.)</th>
<th>Including sources:</th>
<th>Oblast Budget</th>
<th>Enterprises</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Federal budget</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>35.46</td>
<td>5.8</td>
<td>24.8</td>
<td>4.8</td>
</tr>
<tr>
<td>1999</td>
<td>90.64</td>
<td>3.74</td>
<td>82.86</td>
<td>4.64</td>
</tr>
<tr>
<td>2000</td>
<td>42.71</td>
<td>7.2</td>
<td>--</td>
<td>35.51</td>
</tr>
<tr>
<td>2001</td>
<td>159.65</td>
<td>23.0</td>
<td>(14.4%)</td>
<td></td>
</tr>
</tbody>
</table>
The feasibility of the proposed expenditures to finance the projects could be evaluated by the 2001 performance. Early in the year, the actual disbursement for water management projects under the Volga Revival and Potable Water Supply Programs was only 4.2% of the budgeted amount, with the federal share of only 14.4%.

The Potable Water Supply Program.

The Program budgeted 171.26 mln. ruble for the use and rehabilitation of water resources. As of January 1, 2001, an overall water management budget of the Potable Water Supply Program unand the Volga Revival Program was 3.8 bln. ruble. In 2001, the program disbursed 159.7 mln. ruble from all sources of financing including federal financing of 23 mln. ruble.

The federal money was used to finance bank works at the Rybinsk and Uglich Water Reservoirs and monitoring of water bodies. The oblast budget money was used to clean the Sogozha River and monitoring of water bodies. The cities of Rybinsk and Yaroslavl financed the construction of Level II Aeration Station in Yaroslavl and pumped collectors in Rybinsk.

As of 2002, the Volga Revival and Potable Water Supply Programs became part of the Ecology and Natural Resources of Russia Earmarked Federal Program. For 2001-2010, this Program budgeted 199.1 mln. ruble for water management expenses from the following sources
- federal budget – 132.3 mln. ruble.;
- oblast budget – 66.7 mln. ruble.

The federal budget (96.1 mln. ruble) mainly finances bank works at the Rybinsk and Gorky Water Reservoirs.

Demographic Situation

As of January 2001, the population of the Oblast was some 1400.7 thousand people.

Migration

There was a 5% reduction of the population from 1992 to 2001. The natural population decline averaged about 1% per year. A positive migration balance mitigated the decline. The main immigration flows appear to have originated from other Russian regions (43%) and neighboring CIS countries.

Urban population comprises the bulk of the Oblast population (80%) with the rest residing in rural areas.

The following trend is expected in short and mid-term context. The decline trend will continue and will stop by 2005. The natural growth will still be negative to be set off to some extent by positive migration. The rural to urban migration will also persist.

Table2.9 Urban and rural population in 1996 -2001 and forecasts till 2020 . Yaroslavl Oblast

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1450.1</td>
<td>1400.7</td>
<td>1353</td>
<td>1353</td>
<td>1353</td>
<td>1353</td>
</tr>
<tr>
<td>Rural Population</td>
<td>284.1</td>
<td>274.5</td>
<td>265.2</td>
<td>265.2</td>
<td>265.2</td>
<td>265.2</td>
</tr>
<tr>
<td>Urban Population</td>
<td>1166.0</td>
<td>1126.2</td>
<td>1087.7</td>
<td>1087.7</td>
<td>1087.7</td>
<td>1087.7</td>
</tr>
</tbody>
</table>
**Socio-Economic Situation**

**Income level**

In 2001, per capita GRP was 50 332 ruble (equivalent to $1736 US), which is 19% lower than the national average.

Table 2.10 Per capita GDP/GRP in Russia and Yaroslavl Oblast.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>National per capita GDP (ruble)</td>
<td>3 584</td>
<td>9 562</td>
<td>13 349</td>
<td>15 362</td>
<td>16 513</td>
<td>32 673</td>
<td>48 780</td>
<td>62 500</td>
</tr>
<tr>
<td>National per capita GDP ($ US)</td>
<td>1 868</td>
<td>2 348</td>
<td>2 910</td>
<td>3 056</td>
<td>1 867</td>
<td>1 330</td>
<td>1 730</td>
<td>2 155</td>
</tr>
<tr>
<td>Yaroslavl Oblast per capita GDP (ruble)</td>
<td>4 023</td>
<td>10 148</td>
<td>12 503</td>
<td>13 609</td>
<td>15 720</td>
<td>25 450</td>
<td>33 170</td>
<td>50 332</td>
</tr>
<tr>
<td>Yaroslavl Oblast per capita GDP ($ US)</td>
<td>2 097</td>
<td>2 492</td>
<td>2 725</td>
<td>2 707</td>
<td>1 778</td>
<td>1 036</td>
<td>1 177</td>
<td>1 736</td>
</tr>
<tr>
<td>Per capita GRP as share (%) of per capita GDP</td>
<td>112%</td>
<td>106%</td>
<td>94%</td>
<td>89%</td>
<td>95%</td>
<td>78%</td>
<td>68%</td>
<td>81%</td>
</tr>
</tbody>
</table>

Source: Statistical Yearbook of RF. 200 . Yaroslavl Oblast Statistical Yearbook  ($ value are estimates made by Consultant)

The US dollar ratio of GDP/GRP depends (quite naturally) on the current rate of exchange. The GDP, computed on the basis of the purchasing power par, for Russia is $5,100 US per person.

Table 2.11 offers the dynamics in real income and population living below the official poverty line.

Table 2.11 Real disposal income of the population.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yaroslavl Oblast</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per capita subsistence level</td>
<td>212</td>
<td>296</td>
<td>346</td>
<td>428</td>
<td>793</td>
<td>1211</td>
<td>1500</td>
</tr>
<tr>
<td>Average monthly income vr. official subsistence level</td>
<td>1.8</td>
<td>2.2</td>
<td>2.3</td>
<td>2.1</td>
<td>1.6</td>
<td>1.6</td>
<td>1.9</td>
</tr>
<tr>
<td>Poverty rate (%)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>22.6</td>
<td>24.2</td>
<td>28</td>
<td>36.6</td>
</tr>
<tr>
<td>Russian Federation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average monthly income vr. official subsistence level</td>
<td>2.0</td>
<td>2.1</td>
<td>2.3</td>
<td>2.0</td>
<td>1.8</td>
<td>1.8</td>
<td>-</td>
</tr>
<tr>
<td>Poverty rate (%)</td>
<td>24.7</td>
<td>22.0</td>
<td>20.7</td>
<td>23.3</td>
<td>28.4</td>
<td>29.1</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Yaroslavl Oblast Statistical Yearbook. 2002

**Distribution of income**
Distribution of income in Yaroslavl Oblast is more even than in the national average, with only a small share of the population living below poverty line.

Table 2.12  Breakdown of population by per capita disposable income in Yaroslavl Oblast. 2001

<table>
<thead>
<tr>
<th>Per capita disposable income per month (ruble):</th>
<th>Thousand people</th>
<th>% to total</th>
</tr>
</thead>
<tbody>
<tr>
<td>до 500</td>
<td>19.6</td>
<td>1.4</td>
</tr>
<tr>
<td>500.1 – 750.0</td>
<td>71.7</td>
<td>5.1</td>
</tr>
<tr>
<td>750.1 – 1000.0</td>
<td>121.9</td>
<td>8.7</td>
</tr>
<tr>
<td>1000.1 – 1500.0</td>
<td>299.3</td>
<td>21.4</td>
</tr>
<tr>
<td>1500.1 – 2000.0</td>
<td>267.3</td>
<td>19.1</td>
</tr>
<tr>
<td>2000.1 – 3000.0</td>
<td>334.9</td>
<td>23.9</td>
</tr>
<tr>
<td>3000.1 – 4000.0</td>
<td>153.3</td>
<td>10.9</td>
</tr>
<tr>
<td>Свыше 4000.0</td>
<td>132.7</td>
<td>9.5</td>
</tr>
<tr>
<td>Total population</td>
<td>1400.7</td>
<td>100</td>
</tr>
</tbody>
</table>

This figure illustrates an even distribution of population by income. There is still a considerable gap between the average pay and pensions to economically inactive groups: pensioners, disabled persons, etc. Over 60% of the population has an income from 1000 to 3000 rouble per month. This includes the population with an income below the poverty line, as well as pensioners, unemployed and low paid groups of the economically active population.
It is assumed that the forecasted growth of the income may result in poverty reduction.

The utilities charges as a share (%) of a household average income are not large if compared to the international level. In late 90s the utilities charges (heating, electricity, house rent) remained low at the level of 4% to the household income. But these charges tend to grow. In 2000-2201, they reached some 10-15% (this could be viewed as acceptable) of the average per capita income, which reached 2197 ruble in late 2001.

Table 2.17 features the values of monthly charges per person and/or per 1m² by the main utilities. The assumption under this table is that each person has at his/her disposal 20m² of living space with all the amenities.

<table>
<thead>
<tr>
<th>Service</th>
<th>Ruble/month</th>
<th>% to average per capita income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water and waste water services (per person)</td>
<td>18.9</td>
<td>0.9%</td>
</tr>
<tr>
<td>Heating (per 30m² of living space)</td>
<td>185</td>
<td>8.4%</td>
</tr>
<tr>
<td>Hot water service (per person)</td>
<td>34.2</td>
<td>1.5%</td>
</tr>
<tr>
<td>Power (per 50 kWh)</td>
<td>25</td>
<td>1.1%</td>
</tr>
<tr>
<td>Rental (per 30m²)</td>
<td>28</td>
<td>1.3%</td>
</tr>
<tr>
<td>Natural gas service (per person)</td>
<td>7.1</td>
<td>0.3%</td>
</tr>
<tr>
<td>Garbage service (per person)</td>
<td>3.45</td>
<td>0.15%</td>
</tr>
<tr>
<td>Total per person</td>
<td>302</td>
<td>13.7%</td>
</tr>
</tbody>
</table>

Source: «Performance of Yaroslavl Oblast utilities in the context of the reforms in 2001»

Solid waste. Solid waste service charges comprise 0.15% of an average per capita income of a household.

But as a rule, the low tariff only covers the cost of collection and removal of solid waste. The remainder of the operational cost is covered by industry (cross) and (limited) subsidies from local budgets.

As the utilities tend to ensure full cost recovery for the utility services, the utility charges are likely to grow faster than wages and overall prices (measured in terms of consumer prices index). This raises the issue of acceptability of utility tariffs to the population.
Annex II  Environmental management in Yaroslavl Oblast
System of Environment and Nature Management in Yaroslavl Oblast

The Duma is the legislative body, while the Administration is the executive body of the Oblast. The Governor controls the activity of the Administration. The Administration has units responsible for the comprehensive nature and environment management. There are four levels of the natural resources and environmental management of the Yaroslavl Oblast: federal, oblast, municipal and enterprise levels.

Federal Level Environmental and Natural Resources Management

This is the statutory responsibility of several government agencies. In recent years, the system of management has become more complicated due to the restructuring organized by the Government of the Russian Federation (the 726 Resolution of the Government of the Russian Federation dated September 25, 2000) as a follow up of the Decree of the Russian President No.867 dated May 17, 2000 “On the Structure of the Federal Executive Bodies”. According to the Resolution, the Ministry of Natural Resources of the Russian Federation is a competent state body responsible for the use, care, protection of the forest resources and rehabilitation of forests; environmental protection; state environmental expert review; protection, control and regulation in the use of wild life and habitat; protection of atmospheric air and hydrosphere as well as for waste management (except radioactive) within its jurisdiction; for the state control of the use and protection of land resources. The Ministry of Natural Resources is responsible for the formation of environmental management policy, development and implementation of earmarked federal programs, development of legal and regulatory acts and economic mechanisms in the environmental management and other important objectives. The MNR has a number of other roles, which are implemented at the level of constituent entities of the Federation and municipal formation. It establishes, reorganizes, liquidates its territorial authorities and agencies under its jurisdiction.

Oblast Level Environmental and Natural Resources Management

This is carried out by competent territorial federal authorities as well as by specially established structural units of the Oblast Administration.

The main the Yaroslavl Oblast Department for Natural Resources and Environmental Management of the MNR of RF is the competent state body responsible for the following:

- Environmental management;
- Use of protection of water resources;
- Protection of atmospheric air, waste management within its jurisdiction, state control for the use and protection of lands;
- Use, care, protection of forest resources and rehabilitation of forests;
- Protection, control and regulation of wildlife and habitat;
- State Environmental Review.

-Oblast Agencies;

- The 581 Resolution of the Oblast Governor dated August 15, 2000 approved the TOR for Department of Natural Resources and Environmental Management comprised of two committees:
  Committee for Environmental Protection and Nature Use;
  Committee for Inventory and Use of Natural Resources.

- Coordination of the territorial units of the federal bodies in the Yaroslavl Oblast and structural environmental agencies of the Oblast Administration is carried out through:
In the late 2000, the Oblast level environmental management system went through a dramatic change resulting in the liquidation of the territorial bodies of the State Environmental Committee of Russia and transfer of their functions to the territorial bodies of the MNR. This lead to downsizing of the staff (including 60% of the central headquarters staff and 85% of district level units).

At the same time, the transfer of powers for environmental control to the oblast and municipal levels presents a legal problem associated with the division of powers in the area of environmental management including of state environmental control. The transfer of these rights to the constituent entities of the Federation and municipalities depends on a lengthy procedure associated with the modification of many laws and other regulatory environmental acts. In the meantime, the current new system of state environmental and nature resource management has brought about severe distortions in the system of sound environmental and nature management.

**Municipal Level Environmental and Natural Resources Management.**

The reorganization initiated by the MNR after October 08, 2000, dismantled practically all the municipal inspectorate units responsible for state environmental control over all the enterprises and organizations all year round. Currently, the territorial body of the MNR, the Yaroslavl Oblast Main Department for Natural Resources and Environmental Management, has its representatives only in two municipal formations of the Oblast, Rybinsk and Pereslavl, staffed with 3 and 1 officers correspondingly.

The administration of cities and municipal formations of the Oblast have taken steps to establish municipal environmental services of their own, for example:

- A Committee for Nature Use at the Yaroslavl Mayor’s Office (as a department) staffed with 10 officers and financed from the city budget;
- Environmental Department of the Agricultural Board of the Administration of the Rybinsk Municipal Formation staffed by 4 officers and financed by the Administration budget;
- A number of Municipal Formations of the Oblast established environmental specialists within agricultural boards of the administrations (usually 1-2 officers).

According to the competence of the local authorities as set out in the Law of the Russian Federation “On Environmental Protection” these administrative units (specialists) are responsible for the development of environmental programs, implementation of activities for the recreation of natural resources, preparation of draft budgets, disbursement of proceeds of the municipal earmarked ecological budget fund, etc. At the same time, delegating the functions of the environmental control over major enterprises – donors of the municipal budget – to municipal inspectors, whose activity is financed from the municipal budget does not provide for effective environmental performance.

**Environmental Management at Enterprises.**

Depending on the environmental impact of the economic activity, environmental management at the level of an enterprise is the responsibility of a deputy chief engineer (technical director) who manages a specialized unit and laboratory service. At smaller enterprises environmental management is usually the responsibility of the chief power engineer and of a dedicated specialist whose responsibility is to provide environmental reports to statistical authorities.

Many enterprises have ineffective systems of environmental management, which are incapable of making use of modern experience of other regions of Russia or EOCD, for example those based on ISO-14000 or EMAS.
Efficiency of environmental management at the Oblast level is power due to the following reasons:

− lack of efficient legal, regulatory, methodological, institutional and economic mechanisms for environmental and nature use management responsive to the changes in the economy of the region.
− lack of financial resources along with low efficiency of funds utilizations in the area of nature use and environmental management;
− lack of effective incentives for enterprises and entrepreneurs to apply resource and power saving technologies, environmentally safe production facilities, equipment, and transport;
− financial situation of great many enterprises of major industries resulting the lack of the required mitigation measures;
− desire of many enterprise and entrepreneurs to maximize on-off profits while ignoring the need in the renovation of business assets;
− utilization of suboptimal operation of equipment with extensive use of power, materials, raw materials.
− deficit of qualified environmental expertise.

CONCLUSIONS

The main weaknesses of the current institutional arrangement of environmental management and nature use are:

− inadequate of coordination of too many executive federal and local authorities responsible for sound use of natural resources and environmental management;
− lack of a clear division of powers and functions in the federal legislation between the various levels of executive bodies and federal government units in the area of environmental and nature use management having impact on the effectiveness of management at the oblast and municipal levels.

Excessive centralization of environmental and nature use management functions at the federal level does not provide for empowerment of the constituent entities of the Federation at the level of a territory. There is no clear description of the government authorities in the current legislation and other regulatory and statutory acts. The reformation of the federal environmental bodies makes it necessary to enhance the role and responsibility of the constituent entities of the Federation in this sphere.

At the municipal level, the main problem of environmental management is the coordination of the various territorial units in the area of environmental management and nature use, the need to enhance the leading role of municipalities in this sphere.

Environmental management at enterprises faces the problem related to the establishment and running of the environmental management system using the best practice of enterprises of the Russian Federation and OECD (recommendation of ISO-14000, EMAS and others) to ensure environmentally sound enterprise performance.
Annex III  Map of Yaroslavl Oblast