Financing Strategy for the Urban Water Supply and Sanitation Sector in Georgia

ENVIRONMENT

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JOINT MEETING OF

THE EAP TASK FORCE'S GROUP OF SENIOR OFFICIALS ON THE REFORMS OF THE WATER SUPPLY AND SANITATION SECTOR IN EASTERN EUROPE, CAUCASUS AND CENTRAL ASIA

THE EAP TASK FORCE'S ENVIRONMENTAL FINANCE NETWORK

THE EU WATER INITIATIVE'S EECCA WORKING GROUP

DOCUMENT 2

FINANCING STRATEGY FOR THE URBAN WATER SUPPLY AND SANITATION SECTOR IN GEORGIA

Action Required: For information and discussion

Content

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Used abbreviations and acronyms

BOD	Biochemical oxygen demand
CEE	Central and Eastern Europe
CIS	Commonwealth of Independent States
EAP TF	Environmental Action Plan Task Force
EBRD	European Bank for Reconstruction and Development
EECCA	Eastern Europe, Caucasus and Central Asia (region)
EUR	Euro (the currency of the European Monetary Union)
EU WI	Water initiative of the European Union
FEASIBLE	Financing for Environmental, Affordable and Strategic Investments that Bring on Large-Scale Expenditure (computerised tool)
FS	Financing Strategy
FSU	Former Soviet Union
GDP	Gross Domestic Product
GEL	Georgian Lari (national currency), in calculation exchange rate was assumed at 1 USD = 565 AMD
IDA	International Development Association (in the World Bank group)
IFIs	International Financial Institutions
KfW	Kreditanstalt für Wiederaufbau (German bank)
LWWTF	Local Wastewater Treatment Facilities
lcd	litres/capita/day
NEAP/ REAP	National / Regional Environmental Action Plan
NIS	Newly Independent States (republics of the FSU, except Baltic states)
OECD	Organization of Economic Cooperation and Development
RG	Republic of Georgia
SMART	Specific, Measurable, Affordable, Realistic, Time-bound (about targets)
UFW	Unaccounted for water
USD	United States dollar
VAT	Value-added Tax
Vodocanal	Water utility
WB	The World Bank
WHO	World Health Organisation
WSS	Water supply and sanitation (wastewater collection and treatment)
WS/WW	Water supply/wastewater
WWPS	Wastewater pumping station
WWTF	Wastewater treatment facilities
WWTP	Wastewater treatment plant

1 Executive summary

1.1 Background

In this project, the OECD/EAP Task Force secretariat cooperated with the Georgian Government to assess the financial implications of achieving the Millennium Development Goals (MDGs); to help the Government of Georgia to set realistic targets for the rehabilitation and development of *urban* water supply and sanitation infrastructure and services; and to identify options to bridge the financial gap between the expenditure needed for achieving policy objectives and the financing available. The analysis was conducted using FEASIBLE, a model developed to elaborate alternative financing scenarios. It should be noted that the study only addresses *urban* infrastructure, while it is obvious that in Georgia, with almost 50% of the population living in *rural* areas, the challenges of the rural water sector will be similar, if not more serious.

A similar study was undertaken in 2000, drawing a bleak picture of financing options for the water sector. Since then, and in spite of a significant economic recovery, the situation of the water supply and sanitation sector in Georgia remains critical:

- The condition of the infrastructure has continued to deteriorate, due to insufficient maintenance – more than 60% of the infrastructure is totally depreciated, approx. double the figure considered acceptable internationally

- The quality of the service has also deteriorated, resulting in regular outbreaks of water-related diseases, and in degradation of water resources – in spite of relatively high coverage by centralized water supply, varying from almost 100% in the 3 biggest cities to 64-82% (on average) in 17 other cities and towns under consideration. Approx. 30% of the population outside Tbilisi receive water for less than 12 hours per day, many people living in upper floors do not receive water at all, and water often contains sediments, smell and colour

- The financial situation of the utilities is both a cause and a consequence of these developments; tariff policy for households is inadequate and the collection rate of user charges is low.

1.2 The need for immediate action

These trends raise doubts as to whether the Georgian Government will be able to meet the goals that it set for itself. This is particularly the case for the reform of the housing and utilities sector initiated in 1998, and for the water-related Millennium Development Goals which were adopted by the Georgian Government in 2003.

More importantly, current trends are unsustainable. The report establishes that current financial resources are insufficient to prevent further deterioration of the existing infrastructure and services. Assuming that water tariffs were increased in line with household income growth, the stabilization of both infrastructure and service at their 2003 level in the 20 cities and towns under consideration would require additional annual finance, amounting to GEL 29.2 million in 2006 (USD 16.2 million), then gradually decreasing to GEL 2 million by 2023 (USD 1.1 million).

Thus, urgent action is needed to prevent further deterioration of the infrastructure. Further delays will generate additional costs and make the re-establishment of a satisfactory level of WSS services for the population and for the environment even more difficult and costly.

1.3 Measures to close the current financing gap, and the affordability issue

A baseline scenario was developed that would allow the current financing gap to be closed and provide for the stabilization of the present quality of water services (in terms of regularity and water quality) and the state of the infrastructure. This would require implementation of the following policies:

- Improve the collection rate of water bills, for business firms and budget organizations (from 70% in 2003 to 100% by 2007), and for households (from 34% in 2003 to 85% by 2010);

- Adopt payment based on actual consumption, by introducing water metering (including in apartments), and conduct regular leak detection and prevention; this would provide incentives for and result in a reduction of physical and commercial losses, which currently amount to 50-60% of the water supplied in the network

- Raise the annual water bill for households to the highest affordable level, followed by annual increases at the same rate as nominal growth of the GDP. As the annual water price for households in Tbilisi is already at the maximum affordability level, it is suggested to leave it unchanged in 2006. However, it is suggested that the annual water bill for households in other cities is doubled. For business firms and budget organizations further increases of tariffs would probably induce them to opt out of the network system and find alternative sources; water prices for these organizations would therefore remain at the current levels

- Increase budgetary resources (be they domestic, or from donors or international creditors) allocated to investment in the water and sanitation sectors from 1.34% of state expenditure in 2003 to 1.76%.

The policy recommendations for tariffs have been developed in the framework of a social assessment, including affordability and preliminary willingness to pay analysis. In particular, it was assumed that the proposed tariffs would ensure that 95% of Georgian households would spend less than **2.5%** of their expenditure on water, while only 5% would have to pay more. It was also assumed that implementation of a water saving programme would result in reducing water consumption from 800 litre/capita/day (lcd) to 300 lcd in Tbilisi, while in other cities water consumption would remain constant at the 2004 level of 82 lcd.

Under these assumptions in the baseline scenario, the monthly payment for WSS services in 2006 would be approx. GEL 4.50 (USD 2.50) per household per month in Tbilisi and approx. GEL 3.40 (USD 1.90) per household per month in other cities in Georgia. These monthly payments would be in line with the affordability threshold and the willingness to pay analysis, which revealed that people in Tbilisi have only limited willingness to pay, whereas the households in Rustavi were willing to pay more for improved WSS services.

1.4 Achieving the Millennium Development Goals on water supply and sanitation in urban areas of Georgia

The baseline scenario demonstrates that simply maintaining and rehabilitating the existing urban water supply and sanitation infrastructure represents a significant financial challenge for Georgia. Going beyond this goal and aiming to achieve the Millennium Development Goals on water supply and sanitation, i.e. extending access to safe water to half of those who currently do not have such access, is therefore an even greater challenge.

To assess the implications of achieving the Millennium Development Goals on water supply and sanitation, the project's steering group, composed of high-level representatives of the Ministries of Economic Development, Finance and Environment, suggested that the following scenarios be developed, in order to identify additional policy measures that would go beyond those in the baseline scenario:

1 Scenario 1 "all in-house tap connection": This would involve rehabilitation of the existing water mains and sewerage in the 20 cities and towns; construction of new infrastructure (water intake, distribution and treatment facilities) to provide sustainable access to safe water via in-house water taps to all urban consumers, including those who do not have such access at the moment; reducing losses and unaccounted for water in Tbilisi

2 Scenario 2 "in-house tap connections plus stand-pipes" shares the objectives of scenario 1, albeit using another technology: safe water to be delivered by standpipes located within 200 metres of households that do not currently have sustainable access to water (i.e., where water quality or continuity of supply are insufficient). This would involve approx. 5% of the urban population in Georgia receiving water through stand-pipes.

3 Scenario 3 "all in-house tap connection plus wastewater treatment in coastal zones" is a variant of scenario 1, which also entails the rehabilitation of mechanical treatment of wastewater in the Black Sea coastal area. This would be a first step towards a complete rehabilitation of the treatment of wastewater in Georgia, and towards abating pollution in a region which hosts an important part of the Georgian tourism industry – a potential driver of economic growth in the country.

Please note that the scenarios involve no hypothesis on improving access to sanitation, as all households in the 20 cities under consideration already have access to at least *basic* sanitation (although this does not mean that all collected wastewater is treated).

The table below shows that scenarios 1 and 3 would require much more capital investment than scenario 2 and could only be sustained if the state devotes more than 4% of public budgets to water supply and sanitation for the next 15 years. Considering all the other demands on public budgets (e.g., rural water, education, transport, health), this seems unrealistic. Even implementing scenario 2 - much less demanding from the financial point of view but requiring some difficult choices and an effective policy dialogue with the population - would be a challenge for Georgia.

Table 1.Feasibility of alternative scenarios

	Scenario 1	Scenario 2	Scenario 3
Capital investment over 2006-2015 (M GEL)	**417.5**	**170.8**	**445.0**
Capital investment, annual basis (M GEL)	47.5	15.9	49.7
Capital investment per head per year (USD)	**7.0**	**2.3**	**7.5**
Year of elimination of the accumulated financial gap	2015-2018	2013-2014	2016-2019
Funding for WSS as proportion of the public expenditure budget (%)	4.7-3.9	3.0-2.7	4.7-3.9

Source: EAP Task Force / OECD, calculation from FEASIBLE

Achieving the Millennium Development Goals on water supply and sanitation would require significant additional efforts to improve the situation in rural areas, where water services are even more seriously deteriorated than in urban areas, and where almost half of the Georgian population lives. While this report focuses on *urban* water only, and the costs of improving water supply and sanitation in *rural* areas are not assessed, it seems obvious that doing this would significantly add to the financial challenge.

Achieving the water related MDGs in urban Georgia is possible, but will be financially painful for households and public budgets.

The proposed tariff scenario in all three scenarios assumes that monthly charges in Tbilisi and other cities of Georgia will amount to approx. GEL 4.50 and GEL 3.40 per household per month, respectively, which is in line with the affordability threshold, but most likely well above the present willingness to pay.

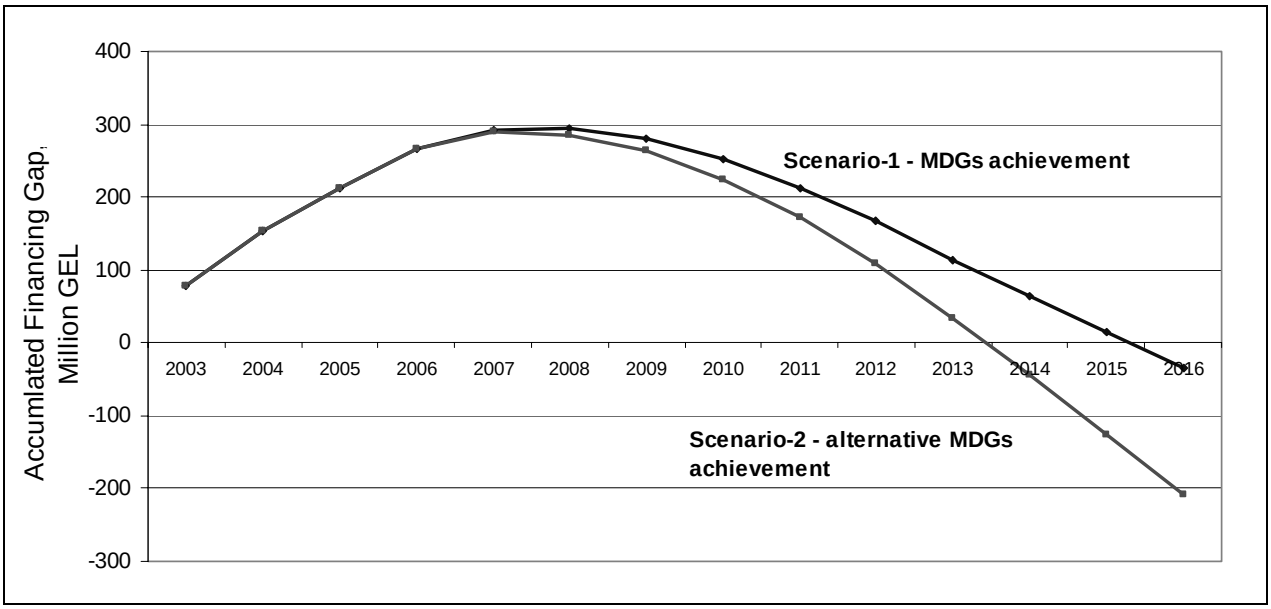
Thus, implementation of the tariff scenario requires (a) a well-designed information and public awareness campaign to improve the willingness to pay; and (b) that appropriate measures to protect the poor sections of the population are put in place. Georgia is a poor country with approx. 50% of the population living on less than USD 2 per day. The social protection mechanisms that are currently in place appear to be insufficient to cope with the situation as projected in the tariff scenario due, in part, to insufficient targeting of assistance. A reform of the social protection system which is currently under way should help to improve this situation if its implementation is successful, but the amounts allocated would probably still remain insufficient to compensate poor households adequately.

While scenario 2 involves the use of stand-pipes rather than in-house taps and would be politically quite challenging to implement (because it would involve downgrading of a share of poor quality in-house connections to standpipes), it is also the only scenario that appears realistic from the financial point of view, unless the Government of Georgia is willing to spend a significant share of its public expenditure budget on water. Even in this scenario, approx. 3% of the public budget would need to be allocated to the *urban* water sector over the next 10 years, which is approx. three times that of the level in most OECD countries.

Compared to the present situation it means that public expenditure on the WSS sector would need to be doubled; missing funds amounting to approx. GEL 26 million (USD 14 million) per annum would need to be mobilized. Official development assistance could help to reduce this burden.

Despite the considerable financial effort involved in all three scenarios, the calculation in the report shows that it will be impossible to eliminate the accumulated financial gap (maintenance backlog) before 2013. This means that the accumulated depreciation of fixed assets of the WSS sector will remain critically high, even higher than the baseline year level (2003), over the period, leaving the infrastructure in a fragile state throughout this period (Figure 1).

Figure 1 Accumulated financing gap in scenarios 1 and 2, in million GEL



Source: FEASIBLE calculations

1.5 Main recommendations

The report recommends the following set of policy measures to address the situation in the urban water sector:

- To set (and to implement) priorities for the water supply and sanitation sector, at national level – politicians should seriously consider introducing an appropriate combination of in-house tap and stand-pipe technologies to achieve water-related MDGs
- To allocate more public money to the WSS sector, and to monitor its use in accordance with set priorities; the outcome of the financial strategy should be integrated into medium-term expenditure programmes and annual public budgets, at both national and local levels
- To increase the collection rate, and to review the tariff policy, taking affordability constraints in the population into account; experience from Armenia has shown that this is feasible and can yield significant and rapid improvements; a well-planned public awareness campaign should accompany these measures
- To mitigate the leaks in the network and to decrease the unaccounted for water; *incentives* should be designed to reward leak detection, disruption of illegal connections, the introduction of water meters and to promote a more rational use of water resources.

This package can only be implemented if:

- The sector's governance structure is reformed; experience in Armenia and the Ukraine is relevant in this regard
- Human and institutional capacities are significantly strengthened in municipalities and water utilities; incentives and performance based rewards are designed and built into the contracts between municipalities and utilities
- An effective social protection mechanism is implemented, in order to mitigate the social consequences of greater cost recovery through increased user charges.

2 Introduction

In January 2004, at the annual meeting of the EAP Task Force Group of senior officials for water supply and sanitation sector reform in EECCA, the Georgian delegation applied to the OECD EAP Task Force with a request for assistance in elaborating a financing strategy for the water and wastewater (W&WW) sector of Georgia. This request was supported by most participants of the meeting.

In December 2004 the consortium of COWI A/S (Denmark) and the Moscow Representative Office of COWIconsult Int. Ltd. won the tender for consultancy services held by the OECD EAP Task Force Secretariat for implementation of the TACIS financed project "Support to the Georgian Government in Developing and Implementing a Financial Strategy for Urban Water Supply and Sanitation in Georgia and Carrying Out the Feasibility Analysis".

The project included two directions or components: the first one deals with elaboration of the financing strategy for the urban water and wastewater (W&WW) sector in Georgia, the second focuses on the assessment of affordability of water and wastewater services for the population in Georgia.

This project was carried out under the general guidance of the steering committee consisting of representatives from the Ministry of Finance, the Ministry of Economic Development, the Ministry of Environment of the Republic of Georgia, Gruzvodocanal LLC and other W&WW utilities with the participation of local experts.

The present report presents the key project outputs.

2.1 Financing strategy concept and methodology

The financing strategy (FS) is *stricto sensu* a set of strategic goals for the sector development and the scenario of their achievement, where there is no financing gap, i.e. it implicates an approximate balance of the required and the available financing.

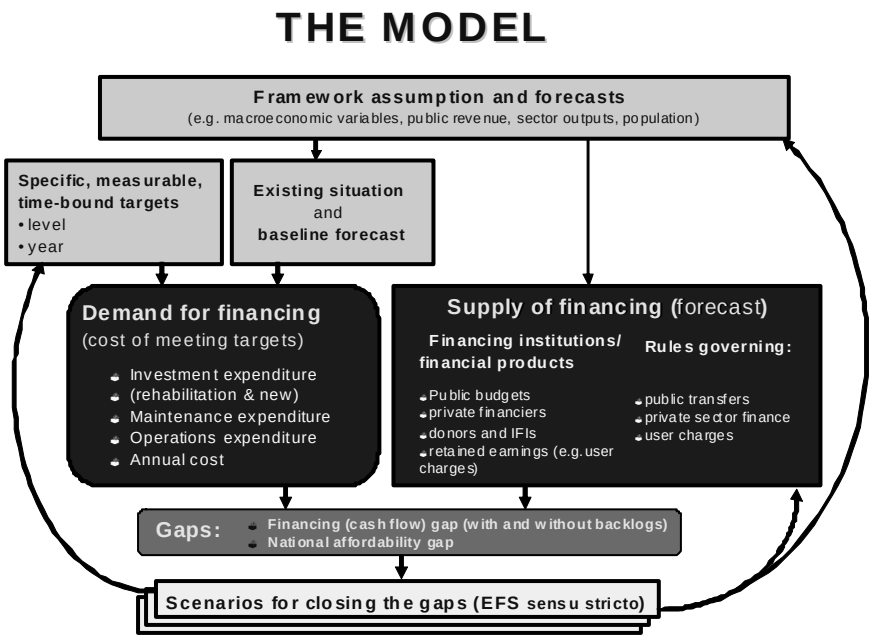
The used methodology allows the development of a long-term (10 to 20 years) financing programme of current and capital expenditure in the selected sector, including a programme of priority capital investments that is realistic and balanced from the point of view of the required and available financing.

FS tools include a computerised model, FEASIBLE[1], which makes it possible to assess the current expenditure required to maintain and operate existing and new water supply and sanitation infrastructure, including expenses for capital and current repairs, as well as new capital investment and scheduled renewal (reconstruction) of depreciated capital assets.

The FEASIBLE computerised model is used to define the FS in an iterative manner, by changing the assumptions behind the measures used to mobilise the additional or to reallocate the available financial resources.

[1] This methodology was developed by the Danish consulting company COWI A/S under the supervision of the OECD EAP Task Force Secretariat and with assistance by the Government of Denmark.

The model structure is shown below. Figure 2



Source: OECD EAP Task Force Secretariat

The identified financing needs are then compared with forecast levels and sources of financing, thus defining a financing gap or surplus. At the same time consideration is given to the size of the financing gap, and an analysis is performed to determine the capability of covering various expenses such as capital costs (reconstruction and expansion of capacity) and maintenance and operation costs. It is important to understand the structure of a financing gap and to identify the main problems and priority measures required to overcome the difficulties.

Project implementation stages

In compliance with the accepted methodology, elaboration of the financing strategy for water and wastewater systems in large and medium-size settlements of Georgia has been divided into **two stages**:

Stage 1; analysis of the baseline scenario (the scenario envisages the unchanged technical condition and operating safety of the infrastructure preventing its further deterioration).

The baseline scenario includes estimation of the costs of operation and maintenance of the existing infrastructure. These costs are then compared with the available financing resources under the condition that there are no policy changes in respect to, for example, tariffs, budget subsidies, etc. An assessment of the financing gap is obtained as a result of such comparison; and if the financing gap is revealed, the relevant measures to cover it should be elaborated.

This phase entails the collection and assessment of detailed data on W&WW organisational and legal structure, the technical condition of the infrastructure and a number of financial and technical performance indicators of the utilities, including data on the size of tariffs, amounts billed

and payments collected, accounts receivable and accounts payable, current and capital expenditure and financing sources (internal funds, budget allocations, loans and grants) etc. The data was collected via specially developed questionnaires. Moreover, the experts of the task force visited more than half of the facilities selected for the analysis, in order to carry out visual inspection of their condition and performance efficiency. The data entering, modelling and baseline scenario analysis were implemented, including the development of a set of measures aimed at gradual elimination of the sector financing gap.

Stage 2 includes the development of realistic **W&WW sector development scenarios and goals,** appropriate for attracting financing, including the Millennium Development Goals (MDG) related to the W&WW sector in the selected settlements, and determination of the goal achievement options.

Stage 2 also includes identification and analysis of actions that will help close the financing gap, i.e. to balance the demand for financing with available financial resources. Activities suitable for the scenario analysis include the following:

- **To limit the ambition** for the service level in the sector. This can be achieved by setting less advanced targets of service development, concerning for example the quality of wastewater treatment and the scope of water supply services provided to the population, or by postponing the deadline by when the problems are to be solved
- **To modify the tariff policy assumptions**, including tariff levels, collection rate, degree of cash collections and cross-subsidies to the population at the expense of other groups of consumers
- **To increase financing** from other sources, for example budget subsidies, donor grants and borrowings
- **To enhance energy saving**. This may include for example a reduction of the demand for water and/or a reduction of water loss. This will result in a reduction of energy consumption due to the reduction in the production level, and due to the replacement of existing energy-consuming equipment by more effective ones
- **To enhance other operational cost savings** (e.g. wage costs) and, in the long-term perspective, capital repairs - subject to optimisation of production levels and capacity size.

Moreover, a description of the project ideas (W&WW infrastructure for investment) which have high priority in the opinion project experts and which are financially viable, given the available funding, was prepared. The implementation of these project ideas will allow for getting considerably closer to the sector development goal achievement.

Utilization of the financing strategy output

According to the experience of national and regional financing strategy implementation in EECCA countries, the development of a FS assists in solving two major problems of the sector:

- Analysis may demonstrate the necessity of raising tariffs in order to finance the required investments

- Accurately documented calculation of required expenditure and financing can strengthen the requests for financing from other sources (such as international donors or budget organisations at municipal, regional or national levels)

- The prepared descriptions of the project ideas (W&WW infrastructure for investment) could be presented to the IFO and donors for consideration and potential co-financing
- Defining the sustainable level of services in the sector will promote allocation of limited financial resources to the most effective and prioritised investment projects
- Analysis of various actions promoting the efficiency of the sector may help to focus the work of sector planning authorities on the most promising direction, for example on the calculation of possible energy savings as the result of pump replacement and a subsequent decrease in water/sewage pumping costs.

2.2 Project reporting

After phase 1 was finalized, the interim report was prepared, including a brief description of the existing situation in the water and sanitation sector in Georgia, as well as key issues and challenges of the sector and a baseline scenario analysis, including development of a set of measures aimed at the financing gap elimination in the scenario.

The final report on the development of the financing strategy for the Georgian W&WW sector was prepared on the basis of the interim report after agreement of W&WW sector development objectives, formulation of sector development scenarios and measures to cover the financing gap,.

The assessment is based on the representative sampling, which included 24 W&WW utilities from 20 settlements with a total population of approx. 3.2 mil. people (approx. 70% of the entire population of Georgia). Information on the condition of the infrastructure and financing situation reflected the situation by 1 December 2004, and thus year 2003 was accepted as *a baseline year*. The assessment is based on prices from 2003. The forecast period is 20 years; from 2003 to 2023.

The second project component is described in a separate report. A description of the project ideas is also presented separately.

2.3 Acknowledgements

- The work was carried out in close cooperation with the Ministry of Finance of the Republic of Georgia, the Ministry of Economic Development of the Republic of Georgia, the Ministry of Environment of the Republic of Georgia, Gruzvodocanal LLC, and other utilities directly involved in water supply and sewerage sector performance
- The principal authors of the present report are Ms. Tatyana Efimova and Mr. Peter Maximenko (COWI-Moscow). Essential assistance with the collection and analysis of technical and financial data of W&WW utilities in Georgia was rendered by Mr. Jumber Gulua, Mr. Sego Jologua and Ms. Natella Iordanishvili (the Association of Vodocanals of Georgia). Considerable input to the analysis of institutional and legal issues of the Georgian W&WW sector was provided by Mr. Grigori Kvernadze. A local project coordinator, Mr. Merab Kandelaki (Gruzvodocanal LLC), substantially contributed to the works implementation. Valuable comments to the report were submitted by Mr. Alexander Martousevitch and Mr. Peter Borkey (OECD).

- The project team would like to express their appreciation and thanks to the European Union Commission for financial support of the project, and to the members of the steering committee for fruitful management and contributions to the project implementation and the comments submitted

- The project team would like to thank everyone who was involved and helped with the development of the financing strategy for the water and wastewater sector in Georgia and everyone who presented the comments to the final report.

The opinions presented in this paper are those of the consultant and the project team. These opinions are not necessarily shared by the OECD EAP Task Force, the steering committee, the Ministry of Finance, the Ministry of Economic Development, the Ministry of Environment of Georgia or other institutions involved in the project.

3 Assessment of the existing situation in the Georgian W&WW sector

The Republic of Georgia is situated in the south-east of Europe and occupies a territory of 69,700 m². The length of the Georgian frontier is 1,969 km. 32.19% of the territory is taken up by forests, 10.94% by water bodies, and 39.6% by agricultural lands. The average annual atmospheric precipitation level in the capital Tbilisi is 42 mm.

The longest rivers of the country are: The Alazani – 390 km (basin area – 12,000 km²), the Kura - 351 km (21,100 km²), the Rioni – 333 km (13,400 km²), the Enguri – 206 km (4,100 km²). The biggest lakes are Paravan – with a 37.5 km² mirror area and Kartsakhi with 26.3 km².

Water supply in the country is at an average level, and a safe drinking water supply is the key component of the general objective to ensure the environmental safety and health of the people of Georgia.

3.1 Brief description of the Georgian W&WW sector

At present, all 85 cities and districts of Georgia are provided with centralized water systems. Totally there are 156 major water intakes. Drinking water is mainly withdrawn from the ground sources. A total design capacity of the ground drinking water sources is 3.1 mil. m³ a day.

Wastewater discharge systems operate in 41 cities and districts, 30 of which have wastewater treatment plants with a total design capacity of 1.6 mil. m³ a day (including regional treatment facilities in the Gardabansky district with a capacity of 1.0 mil. m³ a day, which serve Tbilisi and Rustavi).

The total length of waterways and water distribution networks in Georgia is 9,500 km, and the length of wastewater networks and sewers is 4,000 km.

In general, the sanitary and technical condition of the water intake of most water supply facilities is inadequate, which is apparent from regular outbursts of mass water-borne infections (see Annex 3). Today many water intakes have no protected sanitary zones. 60% of water facilities and 50% of wastewater networks and sewers are beyond their service lives.

Maintenance and repair works have not been carried out at most of the water utilities for a long time. This has resulted in frequent accidents in water and wastewater systems, leading to drinking water losses and contamination of the receiving and ground water bodies. The average water losses in Georgia reach 30-50% of the volumes supplied.

Most of the settlements of Georgia receive water with interruptions. There is no accurate registration of water produced and consumed. The situation is worsened by a lack of laboratory water control, which means that supplied water often does not comply with Gosstandart (State Standards) or sanitary and epidemiological requirements.

The more alarming problems exist in collection and treatment of domestic sewage and industrial wastewater. The energy crisis which ensued on the dissolution of the Soviet Union, and significant electricity tariffs increases due to a lack of financing, have negatively influenced almost all WWTFs of the country. The technological processes were interrupted, the microorganisms used for biological treatment were lost, and pipes and conduits were clogged up. Therefore most of the wastewater treatment facilities have become disabled and the wastewater is discharged untreated into the open water bodies, ultimately causing contamination of

rivers and basins of the Black and the Caspian Seas. This contamination of water resources is the main reason for **mass intestinal and infection diseases** in Georgia.

The mentioned problems are strongly linked to the poor management and institutional capacity in the sector (see below).

3.1.1 Brief institutional characteristic of the Georgian water and sanitation sector

In Georgia the main consumers of water supply and sewage disposal services are the population, budget organizations, industrial enterprises, public utility enterprises and the private sector. Relationships, obligations, rights and functions between the water supply and sewage sector and other subjects of legal relations in Georgia are regulated by contracts between water utilities and service consumers. The contracts form a basis for relationships between them.

The facilities of engineering infrastructure and other main assets of the water supply and sewage systems of Georgian towns and settlements are, for the major part, **municipal property**. Relationships between municipalities and water utilities are built on contracts for utilization of municipal infrastructure on the basis of economic control rights.

Methodological guidance, coordination, random inspections and pursuance of a unified technical policy used to be performed by the Ministry of Urbanization and Construction of Georgia, whose functions were transferred to the Ministry of Economic Development of Georgia after the structural reorganization of the Government of Georgia.

Tariffs are designed by water supply and sewage organizations, coordinated with and approved by local authorities and registered with the Ministry of Justice of Georgia. There are no approved methodologies or rules for tariff calculations in Georgia. It should be noted that in some towns and settlements, in spite of the fact that local budgets are unable to subsidize household tariffs, local authorities consider the difficult economic situation of the people and do not allow water supply and sewage enterprises to introduce tariffs covering expenditures on provision of water supply and sewage disposal services. This negatively affects the financial situation of the water supply and sewage organizations.

The accounting of the supplied and consumed water, prevention of losses and irrational use of water, along with a reduction of water consumption, are among of the most important tasks of the operational services of the water supply and sewage organizations. Pursuant to the rules of using public water mains and sewerages (Order № 81 of the Ministry of Municipal Economy and Construction of Georgia of 21 October, 1998) **all users connected to water supply and sewage systems must have the necessary devices to record the amount of supplied water and discharged sewage waters; connection of new users to the water supply and sewage network without meters is not permitted**. Such accounting is performed for all categories of users **other than the population** having established norms of water consumption per capita and paying for it on a fixed tariff.

All categories of users make payments for the water supply and sewage disposal services through a bank on the dates stipulated by the contract. In order to improve collection of payments from private users, a single invoice document was designed for the population of the City of Tbilisi, starting from 2004 under an agreement with a Tbilisi-based power supply company, "Telasi". It yielded a certain result and payments from the population significantly increased. For the provided services the company receives a certain percentage of the total funds collected from the population. In some small towns and districts, payment for the use of water supply

and sewage disposal services is received by bill collectors who receive 5-10% of the collected amount, and then enter it into the cash register of the organization. The effectiveness of this way of collecting payments is not always high.

Currently there is no *competition* between water supply and sewage operators in Georgia, although an attempt to create it, at least in the city of Tbilisi, was undertaken in the scope of a World Bank project. For a number of reasons implementation of this project was not started.

Target development programmes, plans of capital investment, overhauling and new construction are designed by the Ministry of Economic Development. The programmes are coordinated with the Ministry of Finance and implemented if funds are available in the budget. At the moment rehabilitation, development and capital construction in the water supply and sewage sector as well as transfer of national budgetary funds to all municipal facilities, with exception of the city of Tbilisi are performed by the Municipal Development Foundation and the Fund of Social Investment of Georgia. For the city of Tbilisi the funds for development and rehabilitation of the water supply and sewage sector are allocated from the municipal budget.

3.1.2 Institutional problems of the W&WW sector

Lack of a well thought-out sectoral policy, the lack of institutional set-up and regulation are among the main reasons for the technical and financial problems in the water and sanitation sector in Georgia.

Since the 1990's there has been almost no national water sector management system in Georgia nor a united water management policy, due to a critical political and economic crisis.

At present, agencies which could be responsible for the development and implementation of the sector policy and W&WW reforming programmes, sector regulation, development of sector investment programmes and resource mobilization for their implementation (budget financing and/or external loans), hardly tackle these issues. **There is no clearly defined state sector policy and, consequently, no state body is responsible for its implementation.**

The fact that W&WW sector rehabilitation is not among the priorities of economic and social policy is also reflected in a low level of budget financed capital investments.

There is no adequate regulative framework for tariff policy which could ensure a sufficient level of income for W&WW utilities and affordability of water and wastewater services for low-income households. Therefore, the available funds are obviously insufficient to cover the justified costs of the utilities.

Currently the social factor (assessment of the acceptability of the tariffs) is not taken into account in the process of tariff design and no grass roots activities are conducted with the purpose of raising people's willingness to pay for the services.

In most cases W&WW utilities performance is regulated by outdated SNiPs and overly tough environmental norms, which leads to excessive capital and operating costs. Comparing these norms and standards with those applied in foreign countries confirms the possibility for more effective use of the available resources. **Relevant methodological acts and by-laws need to be developed or updated to reflect the new reality.**

Currently there are no united W&WW utilities coordination centres in Georgia which could provide methodological and practical assistance to the utilities in implementation of the competent and unified policy and introduction of modern technologies and techniques. At present the Association of Vodocanals of Georgia is being established. This is sure to be a positive step towards a solution to the problem related to the information and methodological vacuum in which W&WW utilities are operating.

Today there are no incentives or regulative and information reasons for private sector involvement in the Georgian W&WW sector. The need has arisen for water supply and sewage enterprises to adopt performance-based contract relations with municipal administrations.

One of the most acute problems the sector is facing is the lack of professional human resources, both at the managerial level and specialists of water supply and sewage enterprises, and at the level of municipalities and ministries.

A detailed description of the organizational, legal and institutional arrangement of the W&WW sector in Georgia, as well as on Georgian Government policy in this sector, is given in Annex 1.

The mentioned weak points of management and institutional set-up of the sector have to a significant extent contributed to the development of a critical situation in the sector as a whole and in most of the W&WW utilities in particular.

3.2 The technical condition of water and wastewater facilities in Georgia

The assessment within the framework of the financing strategy covers the settlements with a population above 5,000 inhabitants. A total of 20 settlements were selected, with a total population of 3,191 mil. The settlements were divided into three groups using a number of criteria.

The first group includes cities with more than 140,000 inhabitants. The second group consists of the resort towns of the Black Sea coastal zone with 13,600 to 138,000 inhabitants. The third group includes the rest of the selected settlements.

The data from W&WW utilities selected for the project analysis was collected by means of technical and financial questionnaires to be filled in with detailed information on the situation in the relevant sectors.

3.2.1 Description of the water and wastewater sector of the selected settlements

The collected data served as a basis for preparation of summary tables which reflect the key performance parameters of W&WW utilities. Data from these tables was used as background information to be entered into the FEASIBLE model.

Table 3.1. Summarized water supply data

Group	City/town	Total population in the baseline year	Abstracted from		Total volume of water abstracted	Reported share of population served by centralized water supply system	Water consumption by households	Water supply regularity
			Underground sources	Surface sources				
		people	%	%	1,000 m3/year	%	l/c/d	hour/day
	Large cities (above 140,000 people)							
1	Tbilisi	1,080,000	60%	40%	553,279	100%	743	24
	Rustavi	140,500	100%	0%	10,070	100%	94	8
	Kutaisi	189,960	100%	0%	16,642	99.5%	116	6
	Average in the group		86.6%	13.4%			**Mean value**	13
	Resort towns of the Black sea coastal zone							
2	Batumi	138,000	34%	66%	31,938	90.0%	432	24
	Borjomi	18,900	33%	67%	2,035	40.5%	324	8
	Tskhaltubo	13,600	100%	0%	1,791	100%	180	20
	Poti	70,000	100%	0%	3,382	65%	101	10
	Kobuleti	21,600	100%	0%	1,112	91.0%	84	12
	Average in the group		86.8%	13.2%			**Mean value**	16
	Other settlements							
3	Samtredia	30,000	100%	0%	4,032	61.3%	260	24
	Khashuri	32,000	100%	0%	1,700	49.4%	87	10
	Zugdidi	70,000	100%	0%	234	14.3%	31	10
	Marneuli	28,400	100%	0%	1,350	100.0%	75	7
	Chiatura	22,500	100%	0%	1,186	80.0%	57	10
	Zestaphoni	25,000	100%	0%	977	36.0%	119	8
	Ozurgeti	23,000	100%	0%	240	35.0%	37	8
	Senaki	28,000	100%	0%	2,122	47.5%	150	14
	Gori	66,300	100%	0%	3,030	60%	112	24
	Kaspi	15,200	100%	0%	886	62.5%	149	5
	Gurdjaani	12,000	100%	0%	726	81.0%	125	4
	Terdjola	5,500	100%	0%	1,451	100%	447	22
	Average in the group		100%	0%			**Mean value**	12

Source: Data from the utilities

Table 3.2 Summarized wastewater data

Group	City/town	Reported share of population connected to the centralized sewerage system	Total volume of wastewater collected	Including		Total volume of treated wastewater
				Domestic sewage	Wastewater from industries and other consumers	
		%	th.m^3/year	th.m^3/year	th.m^3/year	%
	Large cities (above 140,000 people)					
1	Tbilisi	96.4%	296,096	272,001	24,095	74%
	Rustavi	68.3%	7,000	4,800	2,200	
	Kutaisi	74.1%	12,200	11,900	300	0%
	Resort towns of the Black sea coastal zone					
2	Batumi	76.8%	17,900	16,300	1,600	0%
	Borjomi	26.5%	470	300	170	0%
	Tskhaltubo	48.4%	880	580	300	0%
	Poti	8.7%	3,150	2,170	980	0%
	Kobuleti	63.0%	1,070	900	170	0%
	Other settlements					
3	Samtredia	8.3%	324,0	146	178	0%
	Khashuri	34.4%	800,0	570	230	100%
	Zugdidi	23.4%	500,0	250	250	0%
	Marneuli	25.0%	400,0	350	50	0%
	Chiatura	55.6%	1050,0	346	704	0%
	Zestaphoni	36.0%	440	280	160	0%
	Ozurgeti	14.3%	114	91	23	0%
	Senaki	0.0%	0	0	0	0%
	Gori	57%	1,750	1,200	520	0%
	Kaspi	36.0%	700	620	80	0%
	Gurdjaani	80.0%	650,0	490	160	0%
	Terdjola	16.4%	200	80	120	0%

Source: Data from the utilities

3.2.2 Coverage of population with water and wastewater services

The collected data indicates that **a level of population coverage with centralized water supply services is within 40-100% on average for the sampling**, including population receiving water from the pipelines or from the street water stand posts. However, there are cases of lower levels of water services coverage, e.g. 14% of the connected population in Zugdidi, which is probably related to political aspects (water supply through the mains from Abkhazia) than to technological or financial problems.

Table 3.3 Average coverage with water supply and wastewater collection services by groups of cities.

City group	Covered by centralized water supply	Covered by centralized wastewater collection
Large cities (above 140,000 inhabitants)	100.0%	93.2%
Resort towns of the Black sea coastal zone	81.5%	32.3%
Other settlements	63.7%	28.7%

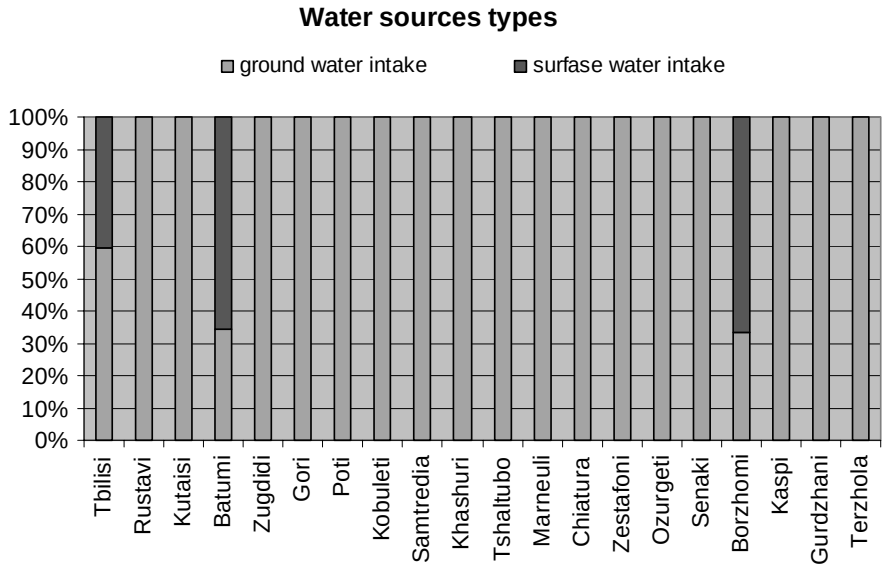
Source: Data from the utilities

3.2.3 The existing situation in urban water supply

Water sources and quality

Drinking water is mainly abstracted from groundwater sources and sometimes from surface water intakes. Large cities with a population of over 100,000 inhabitants use combined ground and surface water intakes, whereas small towns use groundwater sources.

Figure 3.1Water supply sources in Georgia



Source: Data from the utilities

The distinctive feature of water supply in Georgia is that the major share of water is abstracted from underground sources containing water of stable composition, of rather good quality with organoleptic, chemical, toxicological and microbiological properties at the intakes complying with national and WHO requirements.

However, there are surface water intakes (Tbilisi, Batumi, Borjomi), where water is of much lower quality and requires proper treatment and disinfection.

Water treatment

Water abstracted from underground sources in Georgia is usually delivered to the network without treatment; however, in most of the large cities disinfection is applied. In medium and

small settlements **water is not disinfected at all or disinfected only seasonally, for** reasons mainly related to financing of chlorine procurement and problems of the technical operation of chlorination facilities. The main concern is the fact that most of the settlements located along the river banks providing drinking water sources for downstream cities do not have sewerage treatment facilities and therefore may cause pollution of the waterways (in some locations the colibacillus index varied between 4 - 46). This is apparent from periodical outbreaks of intestinal diseases.

Water distribution and water services quality

Water is often delivered to the consumers directly from the wells (in small settlements), or after second lift pumping stations. Such practice is mainly connected to an unstable and energy consuming water supply and, in the case of a lack of network zoning, compensating reservoirs and water towers with low service quality.

Most of the water pipelines and pumping equipment are worn out and require replacement, but the needs for pump replacements have not been supported financially for several years. The lack of proper financing of replacement and reconstruction of the outdated water distribution networks results in high water losses – **unaccounted for water and water losses reach 50-60% of the total volume of water delivered to the network**, which is at least 4-5 times higher than "normal" water losses registered in adequately operated and hydraulically adjusted networks in Western Europe, and at least 1.5-2 times higher than the average level of losses in the water networks of many CIS cities.

The values in the table below are calculated on the basis of average statistical data, reflecting direct water losses in water supply networks in various size settlements.

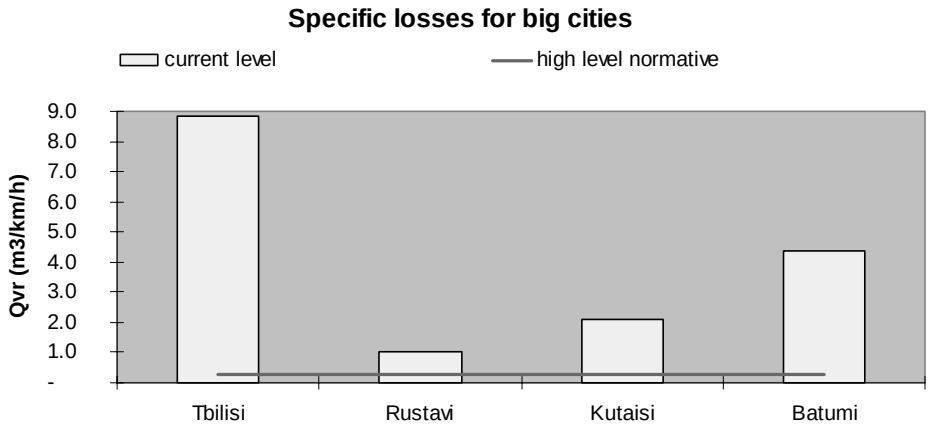
Table 3.4International performance indicators of water supply networks in various size settlements

	Water supply systems		
	Large city	Small town	Rural districts
Number of consumers,1,000 inhabitants	>100	10-100	<10
Direct water losses in the water network	Average specific water losses Qvr in m3/km/h		
Low water losses	<0,13	<0.07	<0.05
Average water losses	0.13-0.25	0.07-0.15	0.05-0.10
High water losses	>0.25	>0.15	>0.10

Source: COWI data

The following relations could be drawn from the analysis of data from Georgian water utilities.

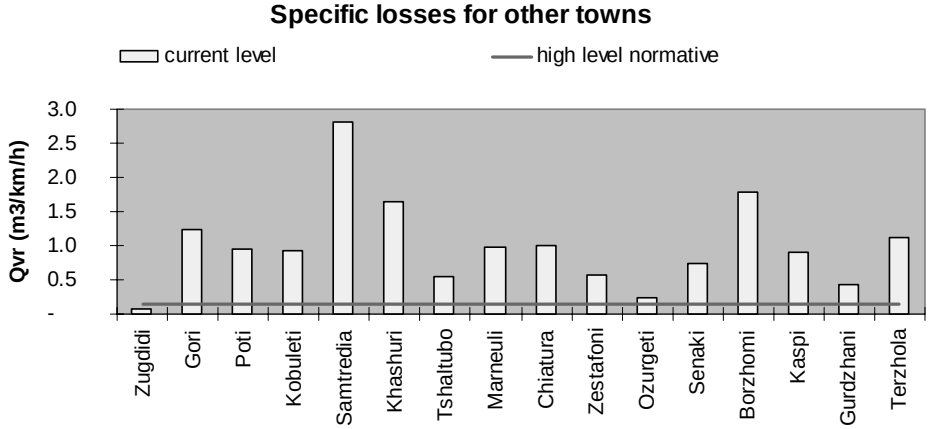
Figure 3.2Specific losses for cities with a population of over 100,000 inhabitants



Source: COWI estimations

The existing specific losses in water supply networks considerably exceed the international indicative values for high water losses. This makes it even more evident that water supply networks in Georgia are in an extremely poor condition.

Figure 3.3Specific water losses for cities with a population of over 100,000 inhabitants



Source: COWI estimations

The line in the diagram reflects so-called "high specific water losses in the networks". In all selected cities this level is much higher.

The Table below contains detailed data on the selected cities.

Table 3.5Water losses in the water networks per 1 km of pipe

Location	Population, inhabitants	Qvr in m^3/km/h	High water losses by city type Qvr=
Tbilisi	980,000	8.8	Qvr=0.25 m^3/km/hour For cities > 100,000 inh.
Rustavi	140,500	1.0	
Kutaisi	188,115	2.1	
Batumi	138,000	4.4	
Zugdidi	70,000	0.1	Qvr=0.15 m^3/km/hour For cities up to 100,000p.
Gori	66,300	1.2	
Poti	70,000	0.9	
Kobuleti	21,600	0.9	
Samtredia	30,000	2.8	
Khashuri	32,000	1.6	
Tskhaltubo	13,600	0.5	
Marneuli	30,000	1.0	
Chiatura	22,500	1.0	
Zestaphoni	25,000	0.6	
Ozurgeti	23,000	0.2	
Senaki	28,000	0.7	
Borjomi	18,900	1.8	
Kaspi	15,200	0.9	
Gurdjaani	12,000	0.4	
Terdjola	5,500	1.1	

Source: COWI estimations

Therefore, it can be said that water supply networks in all selected settlements (except for Zugdidi) are in bad condition.

For comparison Table 3.6 provides data on specific losses in a number of Western and Eastern European countries.

Table 3.6Specific water losses in Western European countries

Country/city/utility	Qvr	
	m^3/km/day	m^3/km/hour
Denmark (2002)	4	0.17
Copenhagen, Denmark (2000)	4.9	0.20
Odense Water, Denmark (2002) [1)]	2.2	0.09
Latvia (1996)	40-60	1.67-2.50
Lithuania (1996)	20-30	0.83-1.25
Estonia (1996)	20-35	0.83-1.46
Ukraine	40-50	1.67-2.08
Moldova (2001)	47	1.96
Great Britain (2001) [2)]	7.2	0.30
Seven Trent, Great Britain (2000) [2)]	6.3	0.26
Bristol Water, Great Britain (2000) [2)]	7	0.29
Englian Water, Great Britain (2000) [2)]	5.9	0.25

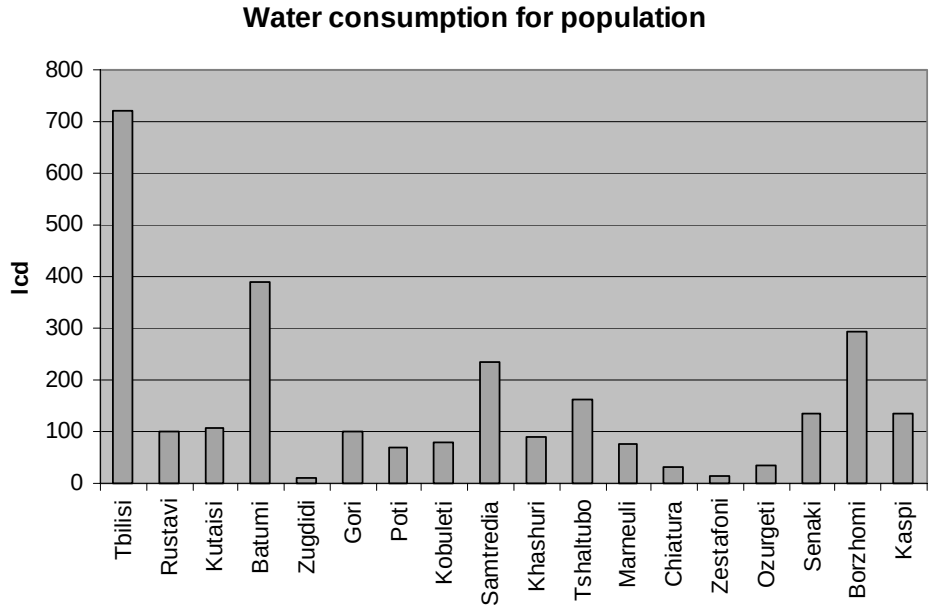
Note: 1) including consumer connections; 2) excluding consumer connections

In-house plumbing

The in-house plumbing also requires urgent measures, as water over-consumption occurs everywhere, partly because of leaking pipe joints causing a considerable pressure drop in the system.

The figure below indicates an estimated water consumption figures.

Figure 3.4Estimated specific water consumption by population in the selected settlements



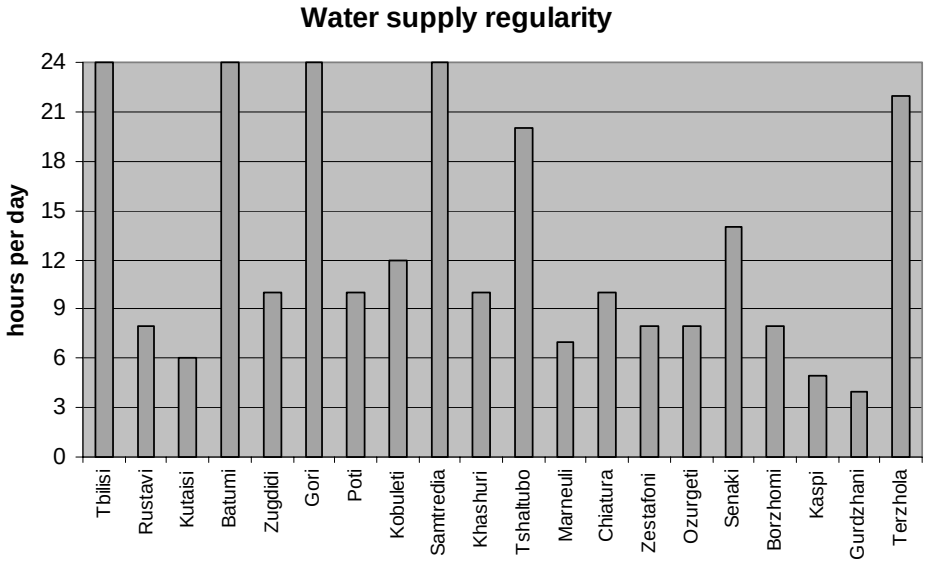
Source: COWI estimations

However, water consumption in some settlements looks rather low, even compared to European norms. It should be stressed that water in such locations is delivered according to schedule for several hours a day (see figure below).

Water supply regularity and water consumption

Water supply regularity in most selected settlements is in general far from the required level, and constitutes from 4 (Gurdjaani) to 24 hours a day, whereas round-the-clock water supply takes place only in 4 cities (data from 2004).

Figure 3.5Water supply regularity



Source: Data from the utilities

Due to a large number of accidents and breaches in the networks caused by low pipes and valve replacement rates, consumers sometimes suffer from more considerable interruptions in water supply, which sometimes last for several days. All these result in **a notable deterioration of the service quality**. Consequently, **low service quality negatively influences the consumers' willingness to pay.**

The practice of water supply "according to schedule" causes additional problems:

- A reduction of the network service lives due to more rapid corrosion and increased deterioration of water mains and valves as a result of frequent hydraulic shocks

- Water stagnation in the networks and low pressure zones in the pipelines (which may lead to groundwater penetration and subsequent secondary contamination).

Energy consumption in the sector

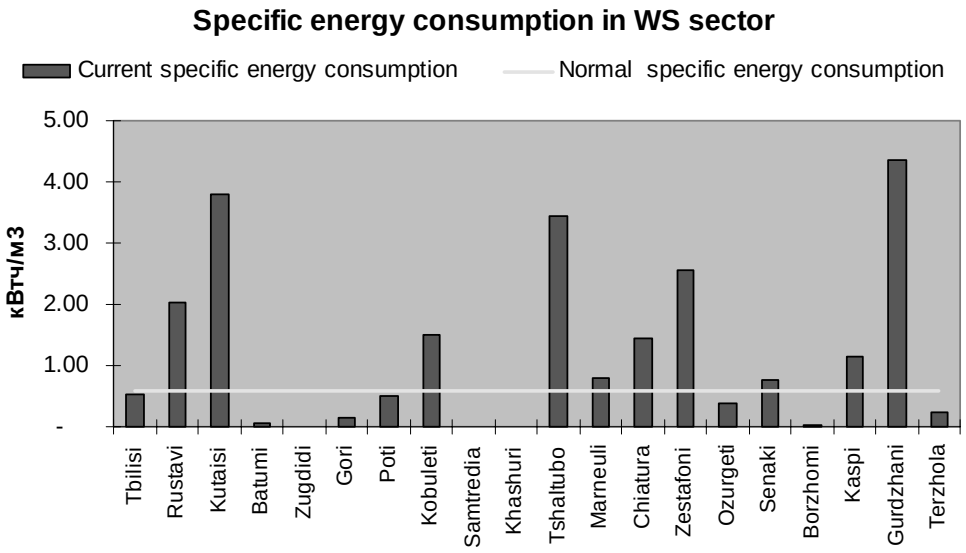
The main electric power consumer in the sector is pumping equipment which is used for water abstraction, treatment and delivery. **The currently used pumps are outdated and not very effective.** Distribution networks were designed and constructed in the first part of 20th century. Pumps and other equipment were selected and designed on the basis of water consumption changes foreseen at that time. After the dissolution of the Soviet Union and the subsequent cessation of financing, pumping equipment has neither been replaced nor rehabilitated.

Thus Georgia still uses pumps which quite often obviously do not comply with the modern capacity and efficiency requirements.

The use of obsolete equipment not adapted to the changing water demand and the lack of application of modern hydrating networks modelling methods cause higher energy consumption.

The internationally recognized average energy consumption norms of 1 m^3 of water supplied and discharged under normal conditions are equal to 0.6 kWh for water supply and 0.4 kWh/m^3 for wastewater collection and treatment. The similar indicators in Georgia are the following:

Figure 3.6Specific energy consumption in the water supply sector, kWh/m³



Source: Data from the utilities and COWI estimations.

Substantial, specific energy consumption in some settlements may be partly explained by the specificity of the relief (mountainous landscape) and existence of several water lifts. However, the following formula can be used in order to estimate specific electric energy per 1 m³ of water delivered:

$$E_{уд} = \frac{9{,}81 \cdot H \cdot Q}{3600 \cdot КПД_н \cdot КПД_м \cdot КПД_ч}$$, where

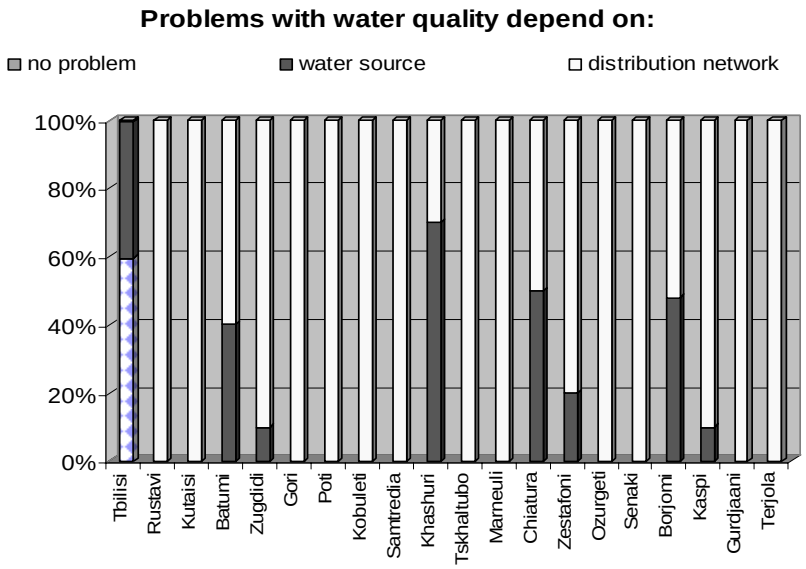
H = general lifting height
$КПД_н$ (EF_p), $КПД_м$ (EF_e), $КПД_ч$ (EF_c) = efficiency factor of pump, engine and frequency converter respectively.

The sanitary and hygienic condition of the sector

Drinking water supplied through the centralized water supply network is not always safe for the health and often does not correspond to microbiological or other standards. This indicates an urgent need for tackling the problems with drinking water transportation from the source and/or water treatment plant to the end user.

Water quality deterioration, which is becoming worse by moving away from the headwork, is especially felt in big cities. The key reason for this is the bad condition of the water supply network – a considerable deterioration of the pipes. For instance 98-99% of the samples which do not comply with the "GOST Drinking Water" requirements for microbiological indicators are taken from the distribution network, which indicates **a secondary contamination of water in the network**.

Figure 3.7Reasons for poor water quality



Source: Data from the utilities and COWI estimations.

An important matter is also the fact that a considerable share of water in big cities is withdrawn from surface water sources which are contaminated with untreated wastewater. Due to the low self-purifying capacity of the surface waters (rivers etc.), the first priority should be given to **proper water treatment** at the headworks. It should be obligatory to disinfect at the headworks in order to ensure that the water complies with sanitary and epidemiological safety norms.

There is a clear trend of sanitary and technical deterioration of water pipelines from year to year. This situation affects the public health. In 1992 cases of water-borne acute intestinal infections outbreaks happened quite rarely. Since 1992 the number of cases with hundreds of infected people has increased. The prevailing registered infections are shigellosis and acute intestinal infection, in single cases salmonellosis, typhoid, gastroenterocolitis and acute viral hepatitis were observed.

Sanitary statistics expressively confirm the need for urgent interventions, including the rehabilitation of water pipelines and disinfection of the water supplied.

3.2.4 Wastewater collection and treatment – Existing situation

Wastewater collection systems operate in 41 cities and districts, 30 of which have wastewater treatment facilities with a total design capacity of 1.6 mil. m³/day (including regional treatment facilities in the Gardabansky District with a capacity of 1.0 mil. m³/day, serving Tbilisi and Rustavi). All wastewater treatment facilities were designed and constructed as mechanical-biological treatment plants. The total length of the wastewater networks and sewers is 40,000km.

Wastewater is collected through centralized municipal sewerage systems, and in most cases, due to relief peculiarities, flow to the treatment facilities by gravity. At present none of the

treatment facilities operates with the design capacity. Biological treatment is not employed anywhere. At best, wastewater is treated mechanically.

In the settlements without treatment facilities, wastewater is discharged directly to the receiving water, usually through several outlets. In the settlements where WWTF exist and operate, only mechanical treatment is applied (if any). In the settlements where WWTF do not operate, wastewater is discharged directly into the receiving water either through emergency outlets passing the treatment facilities or after all or a part of the technological chain without treatment.

Table 3.2 shows that only 4 out of 20 of the selected settlements use mechanical treatment for all or part of their wastewater. A considerable share of the incoming wastewater is primarily discharged, without treatment and disinfection, directly into the water bodies.

All wastewater treatment facilities were constructed before 1990. The design technology is now outdated and does not comply with modern requirements, especially with regard to sludge treatment. Moreover, the technology relies on almost free electric energy and natural gas.

In the present situation, with electricity costs being the urgent issue, **the treatment technologies at WWTF are extremely costly.**

The energy crisis which followed the dissolution of the Soviet Union, the significant electricity tariff increase and the lack of financing have negatively influenced almost all WWTF of the country. The technological processes were interrupted, the microorganisms used for biological treatment were lost, and pipes and conduits were clogged up.

The condition of water and wastewater infrastructure in other settlements is rather lamentable: many facilities are being destroyed, and the equipment is completely worn out and partly lost.

However, despite the difficulties related to the water and wastewater sector of Georgia, there is evidence of possibilities of treating wastewater and reconstructing treatment facilities. Regional treatment facilities operated by Gruzvodocanal LLC, located in the Gardabansky District and receiving wastewater from Tbilisi and Rustavi, may serve as an example. Presently regional treatment facilities are reconstructed at the expense of Gruzvodocanal LLC with participation of the Association of Vodocanals of Georgia.

Figure 3.8Sand traps and primary sedimentation tanks in operation

Figure 3.9Rehabilitated grids

Figure 3.10Primary radial sedimentation tank in operation. Overflow

3.3 Financial analysis of the Georgian W&WW sector

3.3.1 Tariff calculation and approval

There are no approved methods or procedures of calculation of water and wastewater tariffs in Georgia. In practice principles of development and approval of tariffs are almost similar at all water utilities in Georgia, and are established separately for water supply and sewerage. Each city and district has its own tariff rates for all consumer categories.

In case of a lack of water metering devices, the payment for water supply services is calculated on the basis of *norms*. A norm of water consumption per capita for domestic consumers of Tbilvodocanal LLC is **800** l/day/capita. For domestic consumers of Vodocanals in other cities it varies between **60** and **500** l/cap/day.

The tariff approval procedure employs the following steps: The W&WW utility calculates the tariff and confirms the necessity of changing it, taking into account the market changes and sector demands. Then it submits the documents to the city administration for consideration by the relevant departments. The revised and updated version is submitted to the legislative assembly of the city/head of the municipality, where a special expert commission is established to assess and produce a statement, based on which a new tariff is approved and further registered in the Ministry of Justice. The information is made public through publication in the official press.

3.3.2 Water and wastewater tariff changes in 2002-2004

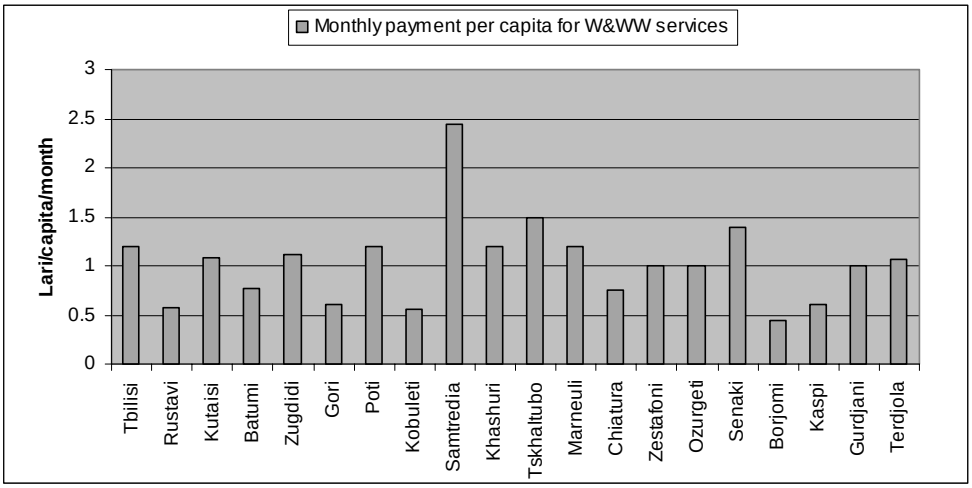
Tariffs for water and wastewater services in 2003-2004 in cities of Georgia remained unchanged.

In **Tbilisi** the tariff per $m^3$of water in 2004 was equal to GEL 0.04 for households (the average annual exchange rate in 2003 was: **1 USD= 2.16 GEL**), and wastewater tariffs were GEL 0.01, GEL 0.05 (incl. VAT) in total. Monthly payments for W&WW services based on norms

amounted to GEL 1.2 per person. The tariffs for other consumer categories in Tbilisi were GEL 1.2 per m^3 of water and GEL 0.4 per $m^3$of collected and treated wastewater respectively.

In other selected cities of Georgia the average household water tariff per m^3 was equal to GEL 0.11 per 1 m3, and GEL 0.56 per 1 m3 for other consumers. Wastewater household tariff averaged GEL 0.07 per 1 m^3. The average monthly W&WW payment based on norms amounted to GEL 0.40 per capita per month.

Figure 3.11Monthly household charges for water and wastewater services by selected cities of Georgia, 2004



Note: monthly charges in Senaki and Gurdjaani include only water services.
Source: Data from the utilities

W&WW services tariffs vary widely between different cities and districts of Georgia and depend on the geographical location of the area served by W&WW utilities. If a settlement is situated on the plane, it has gravity water networks, and the cost of services provided is less than in the settlements where water is pumped, and where energy costs are therefore higher. Thus, the costs of services and the tariff rate are higher for such towns.

Table 3.7Water and wastewater tariffs in the selected settlements (2003-2004), GEL/m3 incl. VAT

No.	Utility	2003		2004	
		Water	Wastewater	Water	Wastewater
1	Tbilvodocanal	0.04	0.01	0.04	0.01
2	Gruzvodocanal	-	0.014	-	0.014
3	Batumivodocanal	0.025	0.03	0.025	0.03
4	Gorivodocanal	0.05	0.05	0.05	0.05
5	Khashuritskali	0.08	-	0.08	-
6	Borjomivodocanal	0.04	0.02	0.1	0.04
7	Marneulivodocanal	0.55	0.3	0.55	0.3
8	Chiaturavodocanal	0.2	0.13	0.2	0.13
9	Kutaisivodocanal	0.25	0.04	0.25	0.04
10	Kobuletivodocanal	0.05	0.06	0.05	0.06
11	Zugdidivodocanal	0.3	0.25	0.3	0.25
12	Zestefonivodocanal	0.27	0.11	0.27	0.11
13	Rustavcanal	-	0.12	-	0.12
14	Samtrediacanal	-	0.2	-	0.17
15	Samtrediatskali	0.08	-	0.075	-
16	Gurdjaanitskali	0.5	-	0.5	-
17	Kaspivodocanal	0.08	0.02	0.08	0.02
18	Ozurgetivodocanal	0.23	0.2	0.23	0.2
19	Khashuricanal	-	0.66	-	0.66
20	Терджолавodocanal	0.01	0.065	0.01	0.065
21	Vodocanal of Poti	0.35	0.25	0.35	0.25
22	Tskhaltubovodocanal	0.2	0.1	0.2	0.1
23	Rustavtskali	0.073	-	0.073	-
24	Senakitskali	0.31	-	0.3	-

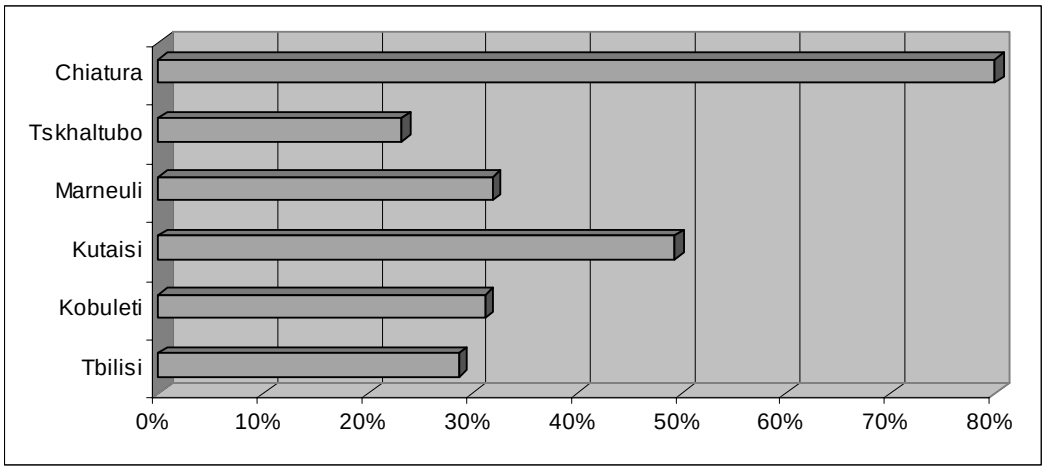
Source: Data from the utilities

In 2003-2004 the average W&WW tariffs did not exceed 4 US cents (in the equivalent GEL), including Tbilisi, and 10 US cents on average in Georgia excluding Tbilisi; i.e. they remained very low compared to international standards. The W&WW tariffs did not include depreciation costs, as inclusion of this component in full could have resulted in a sharp increase of the existing tariffs.

Cost coverage from the household tariffs and cross-subsidizing

The level of cost coverage from household tariffs in all selected settlements of Georgia was very low. The approved household tariff in Tbilisi covers only of 29% of water and wastewater service costs. Other cities experience the same. The figure below indicates the level of cost coverage from household tariffs in several cities.

Figure 3.12Factual cost coverage from household tariffs in several cities of Georgia, 2004

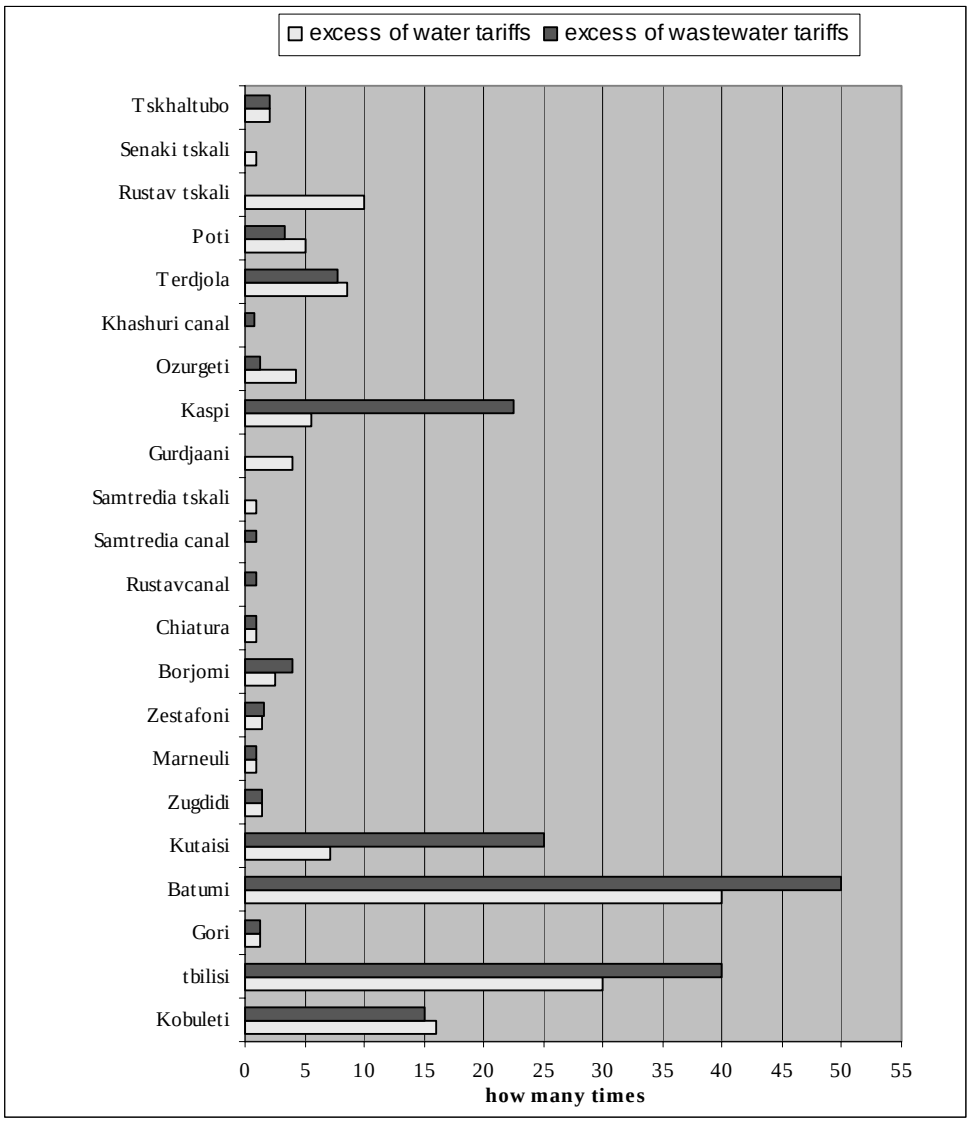


Source: Data from the utilities

Cross-subsidizing of household water and wastewater tariffs is applied everywhere in the republic. Exceeding tariffs for other consumers is more than 10 times higher in some cities. The biggest difference between tariffs for households and other consumers is observed in Batumi, Tbilisi, Kobuleti, Kaspi and Kutaisi. In other settlements the difference is smaller; up to 5 times.

It is also worth mentioning that the difference in wastewater tariffs for households and other consumers exceeds the difference in water tariffs in all places. For instance, the difference in Batumi is 40 times for water and 50 for wastewater.

Figure 3.13Excess of wastewater tariff over water tariffs for households and other consumer categories, 2004



Source: Data from the utilities

3.3.3 Payment collection rates

The W&WW payment collection rates remain low for all water and wastewater utilities in Georgia. The table below shows collection of payment for water and wastewater services in 2003-2004 from households, industries and public institutions.

As can be seen, the payment collection rate from the households was the lowest, which is partly explained by the inability to pay for the services due to low incomes. In 2003 expenditures for water and wastewater services payments amounted to approx. **1.35%** of the average income per capita in Georgia, i.e. W&WW services were quite affordable for most of the population.

The household payment collection rate varied between 1% (Rustavi) and 46% (Ozurgeti). The average household payment collection rate in 2003 amounted to 34% for water and only 30%

for wastewater. For industrial consumers the average collection rate was 82% for water and 89% for wastewater. The collection rate of payments from public and other institutions was also rather low (59% and 48% respectively). The payment collection rate for all consumer categories was a little higher in Tbilisi, Khashuri, Kobuleti.

The table below shows that the collection rate was especially low in places were household incomes are notably lower than the average for the republic (Rustavi, Samtredia, Zugdidi). Therefore, there is a correlation between income level and W&WW payment collection rates.

Table 3.8W&WW payment collection rate (current payments, advance payment, liquidated accounts receivable) by W&WW utilities in Georgia, 2003-2004

	Households		Industries		Public institutions	
	2003	2004	2003	2004	2003	2004
Tbilisi	40%	54%	91%	83%	57%	81%
Batumi	16%	18%	91%	108%	92%	93%
Gorivodocanal	24%	26%	104%	135%	149%	123%
Khashuri tskali	54%	54%	127%	126%	100%	100%
Borjomi	13%	14%	76%	123%	43%	126%
Marneuli	13%	12%	16%	50%	-	-
Chiatura Vodocanal	13%	13%	47%	115%	14%	55%
Kutaisi	30%	24%	81%	74%	33%	58%
Kobuleti Vodocanal	37%	35%	102%	101%	53%	53%
Zugdidi	6%	5%	73%	84%	-	-
Zestefoni	17%	33%	94%	140%	90%	99%
Rustavcanal	1%	1%	35%	74%	5%	6%
Samtredia canal	3%	1%	102%	69%	104%	148%
Samtredia tskali	8%	12%	68%	65%	133%	93%
Gurdjaani	5%	10%	90%	134%	3%	27%
KaspiVodocanal	41%	42%	75%	88%	35%	85%
Ozurgeti Vodocanal	46%	50%	61%	111%	30%	43%
Khashuri canal	33%	35%	95%	98%	93%	97%
Терджола Vodocanal *	100%	100%	100%	100%	100%	109%
Vodocanal Poti	19%	43%	23%	34%	89%	119%
Tskhaltubo	27%	35%	35%	87%	48%	95%
Rustavtskali	15%	12%	36%	46%	4%	21%
Senaki tskali	13%	16%	-	-	131%	-

Source: COWI estimations based on data from Vodocanals

*Payments on billed amounts of payments for all categories to Terjola Vodocanal LLC are covered from the municipal budget.

Note: here the collection rate is calculated as the relation (in %) of the W&WW payments billed amount and factual cash receipts. The collection rate above 100% means that consumers not only paid fully for the services provided but also paid off the outstanding debts.

The reasons for such a low collection rate are mainly low household incomes, poor service quality (irregular water supply, bad quality of water), and the fact that some people do not consider payments for W&WW services obligatory. This has become widespread because of inadequate coordination of the utilities with the debtors and lack of sanctions for non-payment similar to those in the electric energy supply sector, and because of the unwillingness of many consumers to pay for the services of low quality, especially if they are not actually provided (in

some cases water supplied 3-4 hours a day, in many multi-storied buildings water is not delivered to the upper floors etc.). The attitude towards W&WW services as the material comfort which was provided by the state almost free of charge inherited from the Soviet times has seemingly contributed to the existing situation.

In the existing situation, the Vodocanals have to act as social protection authorities.

One of the reasons for the low collection of payments from the population has to do with the practice of involving bill collectors – private individuals – in collecting funds. In this case the actual amount of collected payments remains uncontrollable.

There have also been cases of low collection rates from public institutions (e.g. in Rustavi, Chiatura, Kutaisi, Kobuleti), which points to either improper financial discipline of the non-paying utilities or errors in the operation cost estimation. A low collection rate from industrial enterprises in Marneuli, Zugdidi, Poti was also observed. The reason for this is apparently a lack of effective enforcement mechanisms, such as disconnection or alienation.

Measures to improve payment collection rates, 2003 - 2004
In 2004 the payment collection rates increased, especially in Tbilisi (up to 73% for all consumer categories, as compared to 61% in 2003, including up to 54% for households, compared to 40% in 2003). This positive change was largely due to the initiative of Tbilvodocanal LLC. In order to increase the household payment collection rate in Tbilisi, a unified format of the bill for households was developed together with the Tbilisi Energy Company "Telasi" in 2004. "Telasi" prints and sends out the bills, based on which the households are to pay for consumed electric energy and water through "Telasi" cash payment centres on the day that the payment for water is transferred to the account of Tbilvodocanal LLC. This resulted in a considerable increase of household payments.

In 2004 the intermediary company received approx. **GEL** 550,000 for the services provided, which is equal approx. 8% of the total amount of household payment. In some small towns and districts the payment for W&WW services is collected by cash messengers (who receive 5-10 % of the collected amount) and then paid into the cashier's office of the company.

In order to increase the payment collection rate, the utilities are to cooperate with the debtors more intensively and initiate public awareness campaigns in the mass media, which may include publication of specialized booklets explaining that the W&WW services quality can be improved only through saving on water consumption and regular payment for the services provided.

One of the ways of improving payment collection and the utilities' "balance clearance" (restructuring of accounts payable and receivable), as well as the transition to water metering and payment for factual volumes of water consumed, could be **to restructure and write off a considerable share of household debts related to W&WW service payment,** given that the relevant agreements are concluded between the households and the utilities, that the water meters are installed and that the payments are timely paid.

3.3.4 Revenues of W&WW utilities

Data on the W&WW utility revenues in Georgia was obtained directly from the utilities. The data includes information on the billed payment amounts, payment collection rates and cash

received from each consumer category (households, industries and public institutions). Moreover, the utilities provided information on the cash payment share and real value (in % of a face-value) non-monetary settlements. The data in the table below is given for the baseline year 2003.

Table 3.9W&WW utility revenues from water and wastewater services, GEL (incl. VAT), 2003

Consumer category	Billed amount	Collected amount	Collected in % of the billed amount
Water supply			
Households	15,029,595	5,122,503	34.1%
Industries	10,398,382	8,498,281	81.7%
Public and other institutions	10,947,239	6,434,927	58.8%
Total	36,375,216	20,055,711	55.1%
Wastewater			
Households	4,247,976	1,268,757	29.9%
Industries	3,837,035	3,402,991	88.7%
Public and other institutions	7,254,561	3,460,002	47.7%
Total	15,339,572	8,131,750	53.0%

Source: Data from the utilities entered into the questionnaires

It is clear that overcoming the existing situation with non-payment of W&WW services requires an accelerated transition to factually metered consumption payment. CIS experience shows that such a forced transition to W&WW services payment based on the readings of individual water meters (installed for each apartment) without a preliminary change of tariffs may, in some cases, lead to the bankruptcy of W&WW utilities within a short period of time.

Hence, a decrease in the financial status of W&WW utilities is a risk which is triggered by the accelerated installation of water meters and on the fact that payments are calculated on the basis of the metered consumption which is not supported by the adequate changes in the *structure and level of the tariff structure*. Variable costs of the utilities change in proportion to the volume of water supplied and, in the case of no subsidising and a 100% collection rate, are always covered by current incomes, irrespective of the volume of water supplied and its changes. But a utility's cost coverage when applying a *volumetric tariff* completely depends **on the accuracy of the forecast water supply volume**, based on which the tariff is calculated.

If the payment is calculated on the basis of the **overestimated** consumption norms, the planned water supply volume is large, and a share of fixed charges of a utility in the tariff per m^3 is comparatively small. However, in the course of the transition to payments for metered consumption it could turn out that actual water consumption is much less than the norm which the tariff was based on. As long as water supply volumes decrease and the tariff and collection rate remain unchanged, the utility's revenue will decrease. In such conditions, even with a 100% collection rate, the utility might not receive enough money to cover the *fixed costs*.

It is evident that regarding a rapid transition to W&WW service payments based on metered values, **the uncertainty regarding future water supply volumes is quite considerable and principally unavoidable**. If the formula is not changed, the same will be the case for the billed payment amount and the utility's revenue. The collection rate increase will positively influence the utility's revenues, but only to a certain limit, as (a) the growing difference between the consumption norm and the actual volumes consumed and (b) water demand flexibility will cause a revenue decrease. The uncertainty related to these factors will not allow for reliable forecasting of the utility's revenue.

In case of insufficient revenue, the utility will have to insist on the tariff increase. The higher tariff is likely to result in a further decrease in water supply volumes, thus necessitating tariff growth etc.

However, continuous tariff increases **may give rise to discontent among people** who have spent money on water meter installation, in the hope of reducing their water payment (as opposed to the overestimated consumption norm). They are unlikely to understand why tariffs are increasing again.

To prevent such a situation the following measures must be taken:

1. Public awareness campaigns providing information to the general public on the reforms undertaken, *thus making a basis for the households' willingness to pay*, which influences the payment collection rate

2. Introduction of the necessary changes in the tariff policy, e.g. transit tariff formulas which **ensure full coverage of the fixed and variable costs of the utilities, irrespective of the forecast water supply volume.** This is the case for e.g. the **double-rate tariff**[2] which is a fixed monthly payment charged from each connection/inlet to an apartment or house, for the amount sufficient for coverage of the *fixed costs* of a utility (including not only depreciation and overheads, but also a major share of labour costs, as several of the utility's staff depend more on the condition and composition of the fixed assets, networks and their length than on the water supply volume), and payment of actual water consumption based on a rate sufficient for complete coverage of *variable costs*.

Introduction of the double-rate tariff will require development and adoption of the relevant laws and regulations and a political will. An information campaign in the mass media explaining the economic reasons for a new tariff structure will also be necessary.

All the tariff reforming options require careful control of payment affordability for the majority of the population, keeping in mind that low-income households should have social support.

[2] A double-rate tariff is used, for instance, for payment of mobile phone communications: A fixed monthly payment plus variable payment per minute of conversation.

Affordability of water and wastewater services

In Georgia as a whole, the average value of water and wastewater service affordability (as a percentage share of W&WW payments of an average income per capita in Georgia in 2003) amounted to **1.35%** in 2003[3].

This value is lower than the threshold level established by international financing institutions (3-4%). Nevertheless, in some of the selected settlements in Georgia, the W&WW tariff affordability level is rather high (for instance in Samtredia).

Although the estimations for all settlements of Georgia were based on an average household level per capita of GEL 79 per month, the value for Tbilisi is much higher.

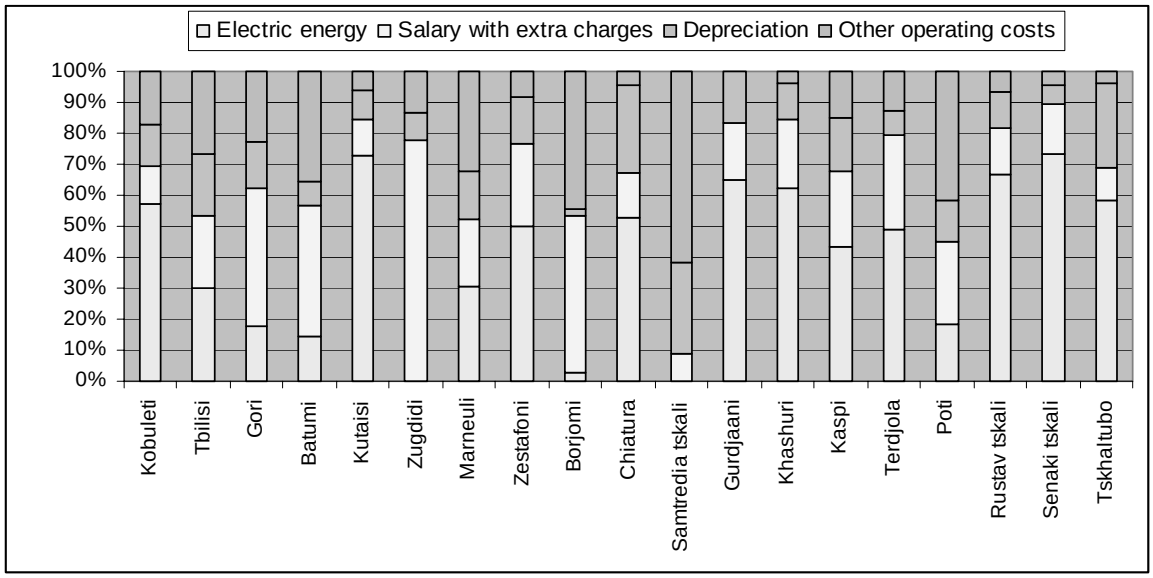
The detailed analysis of tariff affordability was carried out within the framework of the second project component, i.e. during assessment of the affordability and willingness to pay for water and sanitation services in Georgia (see Volume 2).

3.3.5 Production costs

The figures below present the structure of water and wastewater service costs.

[3] The calculation was based on the data from the survey of households in Georgia in 2003, i.e. average household income was equal to GEL 284 per month. The average size of a household is 3.6 persons.

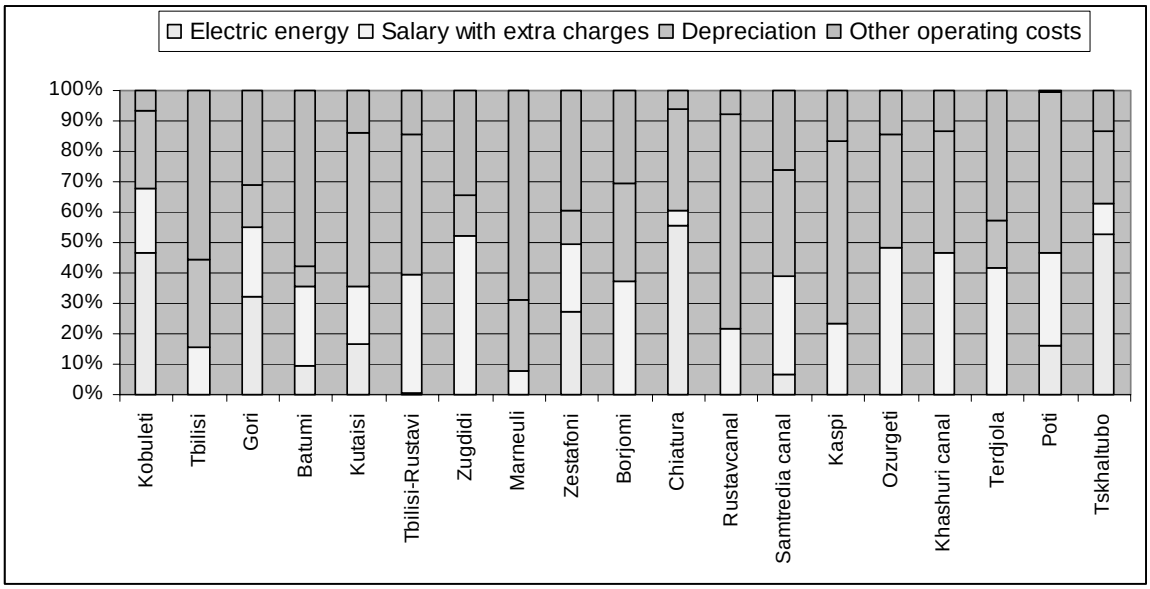
Figure 3.14Structure of average production costs related to water services by W&WW utilities in Georgia, 2003



Source: Data from the utilities

Most priority cost items are electric energy and salary with extra charges. Energy costs in 2003 amounted to approx. 33% of the total costs of all W&WW utilities in Georgia.

Figure 3.15Average costs of wastewater services by W&WW utilities in Georgia, 2003



Source: Data from the utilities

Please note that in many places, the costs of electric energy and wastewater discharge are almost zero, and a share of labour costs is approximately 50%. Minimal energy expenses indicate that electricity is consumed only for the pumping of wastewater and the treatment facilities virtually do not function (wastewater flows through the WWTF without treatment or with minimal

treatment). The most serious costs items related to wastewater are depreciation charges (38%) and other operating costs (37%).

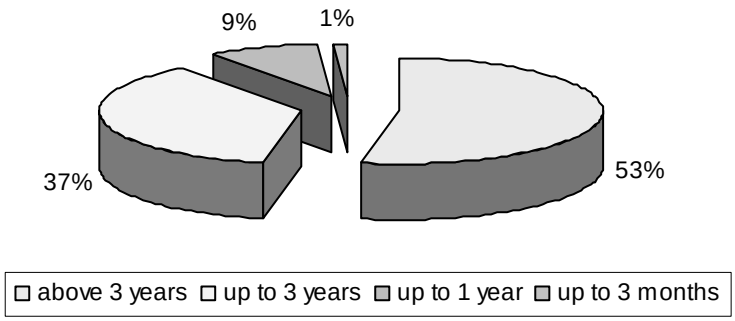
3.3.6 Financial obligations

Accounts payable and receivable

Accounts receivable of water and wastewater utilities in Georgia are at a high level, although the debt growth rates have obviously decreased during the latest years. The largest share of accounts receivable of the utilities by the beginning of December 2004 (53%) occurred more than 3 years ago. Approx. 37% of indebtedness occurred during the past 3 years, and only 9% in the last year.

The total amount of accounts receivable by all W&WW utilities in Georgia by 1 December 2004 was **GEL** 117 mil. (i.e. over USD 55 mil.).

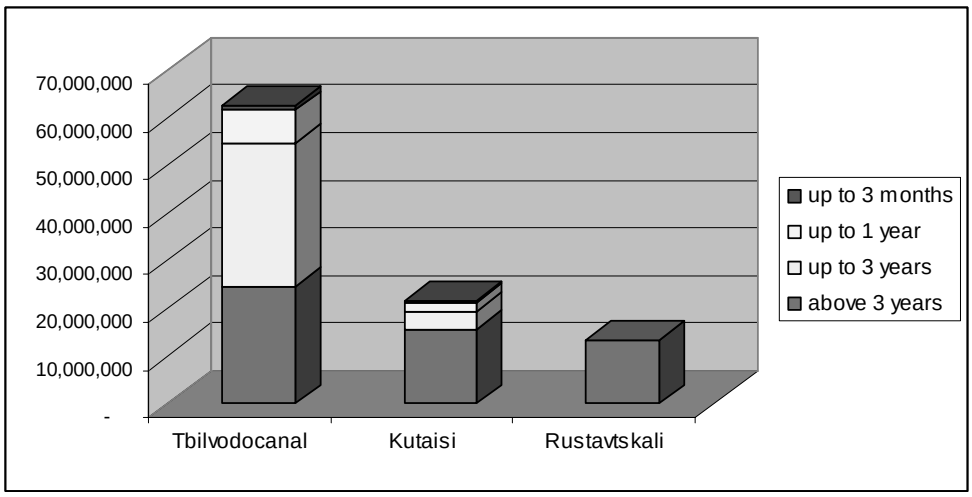
Figure 3.16Accounts receivable of W&WW utilities in Georgia by 01.12.2004 (date of occurrence)



Source: Data from the utilities

83% of the accounts receivable belong to the three utilities in Tbilisi, Kutaisi and Rustavi.

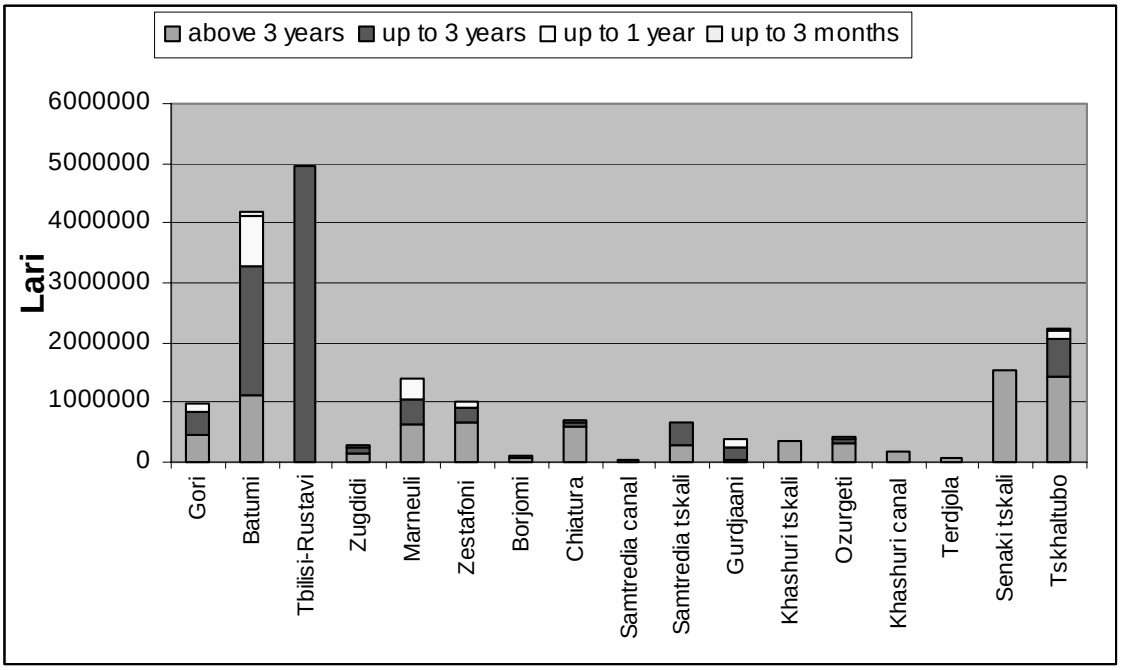
Figure 3.17Accounts receivable by date of occurrence in the utilities in Tbilisi, Kutaisi and Rustavi



Source: Data from the utilities

The other utilities with the largest share of the accounts receivable are the wastewater treatment plant Tbilisi-Rustavi (Gruzvodocanal), Vodocanals in Batumi and Tskhaltubo, and Senaki Tskali.

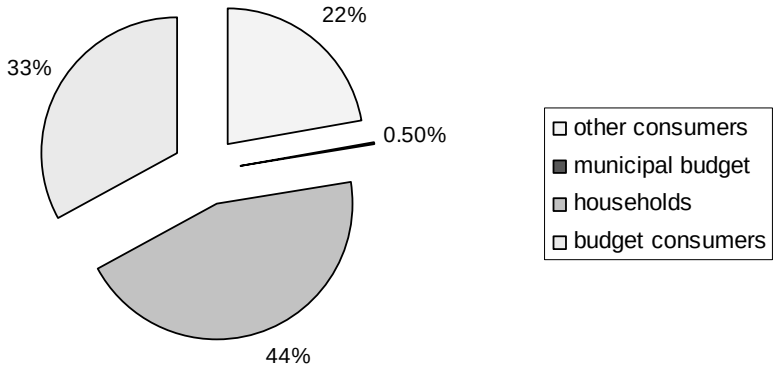
Figure 3.18Distribution of the accounts receivable among other selected W&WW utilities of Georgia



Source: Data from the utilities

Over 44% of accounts receivable are debts of households related to payments for W&WW services.

Figure 3.19Accounts receivable by sources, 01.12.2004.



Source: Data from the utilities

The accounts payable of W&WW utilities in Georgia by 1 December 2004 amounted to GEL 102 mil. . The structure of the accounts payable includes a considerable share of indebtedness to electricity providers – over 85%. Arrears of wages are minor – approx. 1.4%.

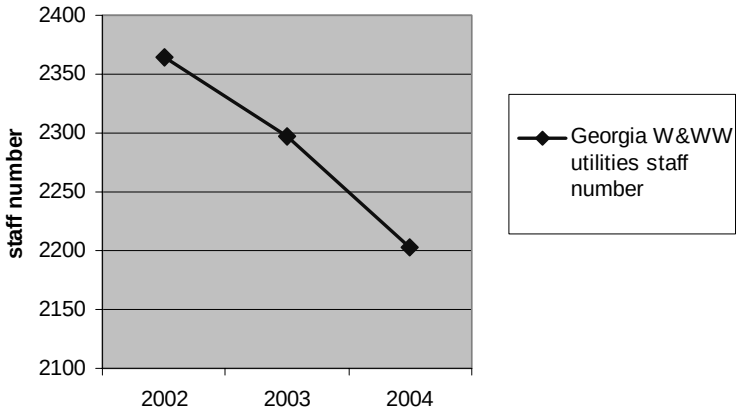
The large amount of accounts receivable and the need for priority payment for electric energy create an extra burden for the cash flow. In such situations, the limited funds which could be allocated to capital investments are often used for payment of electricity and remuneration. The cost items which could provide long-term benefits in terms of operating efficiency, especially maintenance, capital repair and asset modernization costs, still lack funds.

The key reasons for the lack of financing of these costs are: (1) incomplete inclusion of depreciation in the approved tariff, (2) lack of W&WW tariffs behind the resource price growth, particularly prices of electricity, (3) incomplete coverage of actual costs from the household tariff and (4) low payment collection rates which cause a cash flow deficit.

3.3.7 Personnel administration in the W&WW sector

The total number of employees in the Georgian W&WW sector steadily decreased in 2002 - 2004. In the beginning of 2002 the utilities staff number amounted to 5,246, whereas by the end of 2004 this amount had decreased by 5% and totalled 5,023 employees.

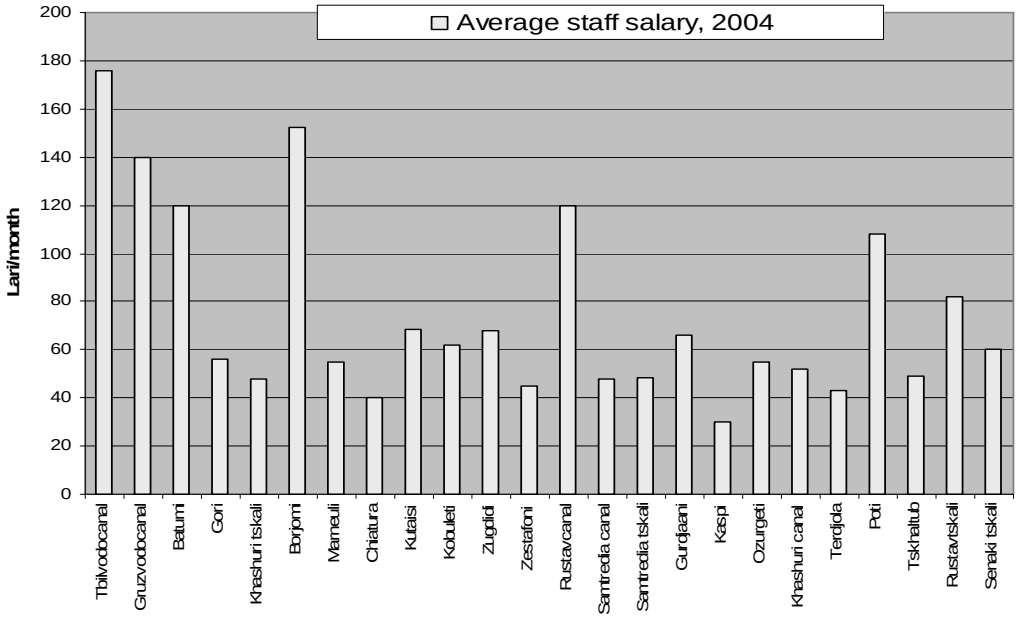
Figure 3.20Changes in W&WW utilities manning level in 2002-2004



Source: Data from the utilities

The share of staff in Tbilvodocanal LLC of the total number of employees in the sector was 55%. In 2004 the average number of employees of the utility was 2,820.

Figure 3.21Average salary in W&WW utilities in Georgia, 2004



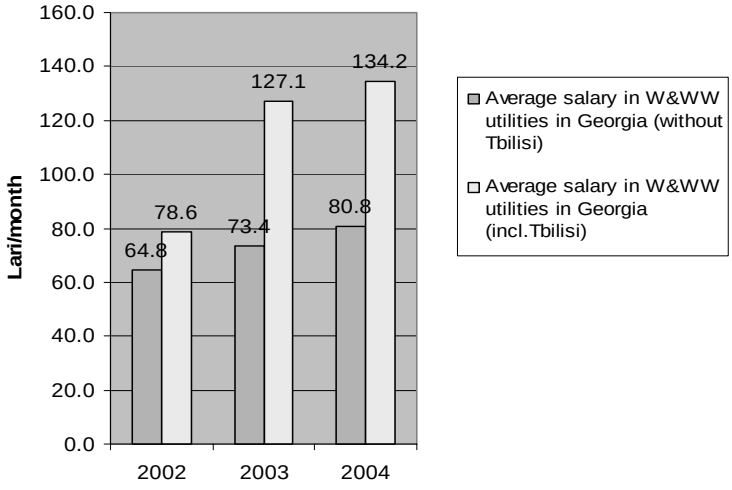
Source: Data from the utilities

The average salary in W&WW utilities in Georgia has been low for the past years. Figure 3.21 shows that the lowest average salary among the W&WW utilities in 2004 was at the water-works and wastewater collection and treatments facilities in Kaspi; at GEL 30/month (USD 15).

The average salary at Chiatura was GEL 40/month (USD 20), at Zestefoni GEL 45/month (approx. USD 23), and at Terjola GEL 43/month (approx. USD 22). The average salary in most of the other utilities was no higher than GEL 70-80/month.

The average salary value in the water and wastewater sector of Georgia changes depending on whether Vodocanal of Tbilisi is included in the estimations or not. The fact that this utility employs a large share of the employees of the total number of W&WW sector employees in Georgia, and that the average salary is higher, provides considerably higher values of the average salary in the sector as a whole (see Figure 3.22).

Figure 3.22Change in the average salary of W&WW employees in Georgia, 2002-2004



Source: COWI estimations

In spite of the difficulties experienced by the W&WW sector Georgia in the past years, the staff capacity is still high. Water and wastewater utilities are basically manned by specialists with higher and secondary education, and with experienced workers who have been employed for more than 3 years.

3.3.8 Budget financing of current and capital costs in the W&WW sector

The financial support which water and wastewater utilities in Georgia are provided with from the budget can be divided into two types. The first is financing of current operating losses or coverage of the so-called inter-tariff difference (the difference between an estimated tariff value and an approved tariff for households) and subsidies to privileged households. This type of budget expenditures relates to the current expenditures.

The second type is financing of capital costs in the W&WW sector in the form of target allocations to municipalities for implementation of agreed and approved activities included in the budget.

The size of the budget subsidies to the utilities is determined on the basis of the evaluation of the financial performance results and financial flows of the current year. The forecast cash

flows of the utilities make it possible to determine the amount of budget allocations to the relevant utilities.

Public budget allocations to cover the current expenditures of W&WW utilities remained unchanged during 2002-2004 in relative values; 0.95% of the total public budget expenditures, whereas in absolute values this amount increased from GEL 10.9 mil. to GEL 15.5 mil.

These are funds that are transferred to municipalities to support water supply and sewage enterprises at the local level.

The table below contains data of budget subsidising of W&WW utilities.

Table 3.10Expenditures of the consolidated public budget of Georgia for the W&WW sector in 2002-2004, GEL

	2002	2003	2004
Public consolidated budget expenditures, total	1,140,500,000	1,301,000,000	1,630,000,000
Total consolidated budget expenditures in the W&WW sector	14,375,000	17,180,830	22,796,800
Subsidies to cover operating losses and current expenditures financing in the W&WW sector	10,877,800	12,286,730	15,470,300
In % of budget expenditures	0.95%	0.94%	0.95%
Capital expenditures of the consolidated public budget in the W&WW sector	3,704,700	5,141,300	7,420,000
In % of budget expenditures	0.32%	0.40%	0.46%

Source: the Ministry of Finance of Georgia and data of the utilities

Act No. 543 of the President of Georgia of 23 September 1998 adopted a concept of housing and communal sector reform in Georgia. In the framework of the concept, a programme of sanitary and technical improvement of water and wastewater systems in cities and districts of Georgia for 1999-2001 was prepared. An approximate cost of the programme was **GEL** 82 mil. , including **GEL** 48.8 mil. for rehabilitation of water supply systems, and GEL 36.2 mil. for rehabilitation of wastewater systems.

However, due to a lack of financing, only a minor part of the programme has been implemented. At present, rehabilitation, development and capital construction in the W&WW sector is carried out by the **Municipal Development Fund and Social Investments Fund of Georgia**, as well as through transfers from the national budget to territorial budgets, with the exception of Tbilisi, where development and rehabilitation of the W&WW sector is financed from the municipal budget.

Table 3.11Capital costs in the W&WW sector in Georgia in 2001-2005 by financing sources, GEL

	2001	2002	2003	2004	2005 (forecast)
Municipal Development Fund	1,068,700	6,368,900		3,155,700	5,500,000
Social Investments Fund of Georgia			2,389,300		8,758,310
Transfers from the consolidated budget of the republic		1,250,000	330,000		
Budget of Tbilisi		3,590,000	4,927,500	3,146,400	
Total	1,068,700	11,208,900	7,646,800	6,302,100	14,258,310

Source: the Ministry of Finance of Georgia

Thus, the total amount of capital costs in the Georgian W&WW sector in 2003 was GEL 7.6 mil., which is equal to approx. **USD 3.5 mil.**, i.e. **less than USD 1 per year per person.**

The provided data indicates that **decentralization of W&WW service provision authorities to the municipal level was not supported by sufficient financial resources.**

4 Water supply and wastewater collection in Tbilisi

The centralized water supply system in Tbilisi dates back to 1862. Therefore the service life of particularly water and wastewater facilities is over a century. The majority of the facilities are completely worn out and require complete replacement and capital reconstruction.

One of the key challenges for the water and wastewater sector of Tbilisi is a reduction of water loss in the centralized water supply system in the following stages:

- Water transportation (water mains, distribution networks, local street plumbing)
- Water consumption (consumption by households, in-house plumbing).

The key actor in addressing this task is Tbilvodocanal LLC, as the utility which deals with raw water abstraction, water treatment, delivery to the end users, operation of W&WW infrastructure in Tbilisi, and all water consumers (i.e. households, public and other institutions).

Water loss reduction could be promoted by:

- Repair and proper maintenance of the networks in order to reduce physical water losses
- Detection and reduction of commercial water losses (i.e. unpaid consumption).

Water loss reduction will result in reduction of the utility's costs, for electric energy first of all, due to decrease in water to be pumped.

Proper operation and maintenance of W&WW infrastructure is felt by households and other consumers primarily through access to reliable and good quality drinking water supply services and ultimately through payment for the actually consumed water volumes metered.

4.1 Existing situation - Tbilisi

At present the water intake capacity in Tbilisi is 21.0 m^3/sec. Water is withdrawn from 6 underground water intakes (with a total capacity of 330 mil. m^3/year) and 2 surface water intakes (with a total capacity of 232 mil. m^3/year).

Water mains in Tbilisi provide drinking water not only to the people in the city, but also to the suburban resorts and the Mtsektski, Dushetsky and Gradabansky districts (34 settlements in total). Thus, **Tbilvodocanal LLC serves approx. 24% of population in the country.**

Relief in Tbilisi vary between 400 and 1,400 m above sea level. This influences the water and wastewater transportation process.

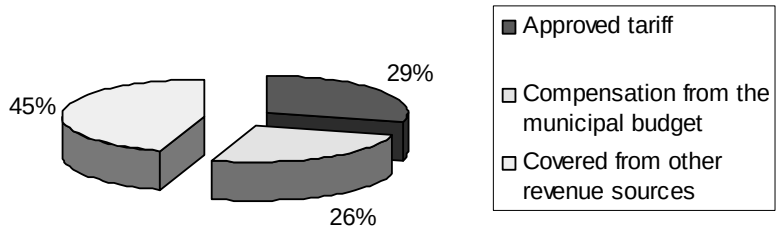
There are 32 lift pumping stations, 41 reservoirs (with a total volume of 305,000 m^3). A single length of a water supply network is 3,352 km, and a wastewater network is 2,041 km. Tbilvodocanal LLC replaced 0.1% of water supply pipelines (3,25 km) and 0.08% of wastewater

pipelines (1.59 km) required a minimum replacement norm of 3-4% of the total pipeline length a year.

Household tariff

Presently, the households pay for the drinking water supply services based on the established norms. The water consumption norm for Tbilisi households is 800 l/cap/day at the **approved tariff** of **GEL** 0.04 per m³, which is equal to 29% of the **estimated tariff**, covering service costs (**GEL** 0.17/m³ incl. VAT). The inter-tariff difference (71% or GEL 0.13/m³) is compensated partly from the municipal budget subsidies and partly from other income by the Vodocanal.

Figure 4.1Coverage of costs of water supply services for households of Tbilisi, 2004



Source: COWI calculations

As can be seen from Figure 4.1, almost 45% of domestic water supply costs are now covered by other sources of revenue of Tbilvodocanal LLC, i.e. revenues from other W&WW service consumers, tariffs which were approved at the level exceeding the household tariff by 30 times for water and 40 times for wastewater in 2002-2004, equal to GEL 1.2 /m^3 and GEL 0.4 /m^3 respectively.

Water supply

As estimated by Tbilvodocanal LLC, the existing water consumption norm for households (800 l/cap/day) corresponds to the volumes of water and related costs for their lifting, treatment and delivery. Moreover, the established norm also includes water losses due to leaks in the internal plumbing, but does not take into account technological losses in main and distribution networks or losses during treatment. Therefore, technologically unexpected losses during the treatment process are considered as diseconomies of the Vodocanal, as they are not covered by the consumer charges.

By 2004 water losses during treatment in Tbilisi made up 4%, and technological losses in the networks 39.7%, which signifies huge losses. Furthermore, this estimated percentage is probably even understated. According to the expert estimates, the percentage of losses in main and distribution pipelines in Tbilisi may be as high as 45-50% of the total water delivered to the network.

In the existing situation, where monthly household payments for water are based on the consumption norms and not on actual volumes consumed according to the water meters, the population is not concerned about water saving. On the other hand, charging on the basis of the unified water consumption norm for the entire population of Tbilisi Vodokanal is not interested in leakage detection and repair measures.

A change in the situation - which would ultimately lead to sustainable development of water and wastewater sector in Tbilisi, reduce of the electricity costs share in the service costs, ensure an adequate service quality and make the sector financially viable - could be achieved through a set of targeted measures.

4.2 Necessary measures aimed at water consumption reduction

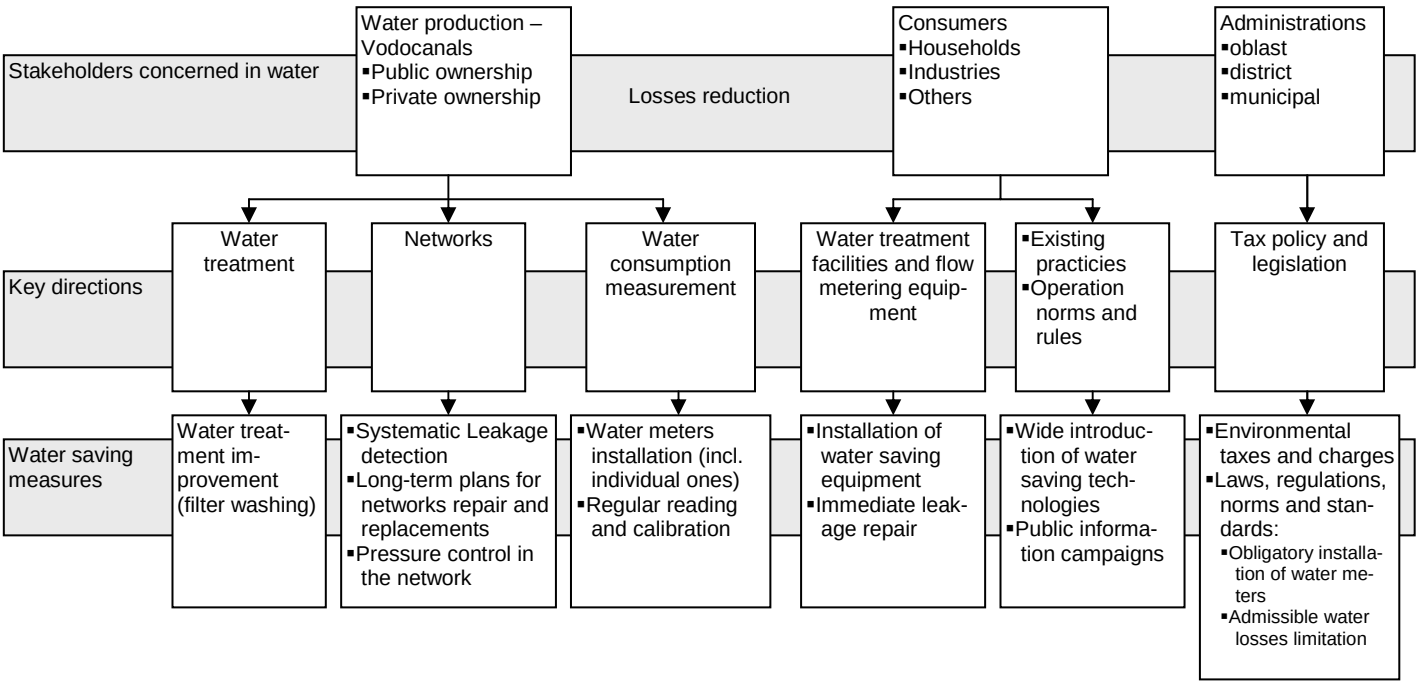
Water saving capacity, especially for domestic purposes, exists in many countries. In Western Europe the water supply level is 110-140 litres per capita per day. Such results were achieved due to the application of various water saving technologies and measures aimed at water loss reduction.

Figure 4.2 below shows a number of water saving measures and the key sector actors.

The key water demand management component is water distribution management, ensuring a reduction of unaccounted for water. Water losses in the distribution network may constitute up to 75% of total water losses, which may reach 20-50% of water delivered to the network. That is why rehabilitation of water supply systems, systematic leakage detection and repair are the major aspects related to water distribution management.

The main objective is water saving to be followed by operating cost reduction. However, a reduction of water supplied will have particular effects on the utilities dealing with water production and transportation.

Figure 4.2Water loss reduction measures and the key actors



Effects of water demand decrease

A decrease in the total water consumption stimulated by water saving measures, including water metering and tariff increase, may lead to the following:

- **Operating cost reduction:** A real decrease in water consumption will cause a decrease in the water production and distribution volumes. This will be accompanied by a decrease in various components of the operating costs (primarily electric energy and chemicals), which usually constitute up to 70% of the total costs, whereas the effect on the fixed costs will be minimal. It is also important to acknowledge that any reduction of costs is possible only in case of a **factual** consumption decrease.

  Although it is often thought that a decrease in water consumption is immediately followed by a cost reduction, this is usually not the case. The former costs are too low to ensure proper maintenance and operation of the system. Furthermore, use of water meters is linked with additional expenses which partly compensate for the operating cost reduction. Finally, a decrease in water demand due to the application of water meters and timely billing based on actual metered water consumption should result in a considerable (but not proportional) reduction of the operating costs.

- **Decrease in the investment needs and production capacity extension:** The old water management system used priority development of production capacity to produce large volumes of water reflecting demand forecasting based at so-called "water consumption norm". Instead, it seems reasonable to use and maintain the existing infrastructure in a more efficient manner. In many places, a sharp decrease in water consumption as a result of implementation of water saving measures has obviated the need for investments in production capacity expansion for the nearest future. In fact, some facilities require investments to reduce the existing capacity so as to keep operating with much lower performance modes compared to those that existed before the introduction of water saving measures.

- **Reduction of the Vodocanal's revenues and a forced increase in water tariffs.** A water supply decrease at the unchanged tariff rates will obviously lead to a reduction in the Vodocanal's revenues. In many countries, most of the utilities which have implemented obligatory installation of water meters and billing based on the actual consumption volumes have encountered a rapid decrease in water supply volumes and the revenues received. In order to maintain their financial ability, the utilities have had to introduce higher tariffs, thus compensating for the payment collection gap.

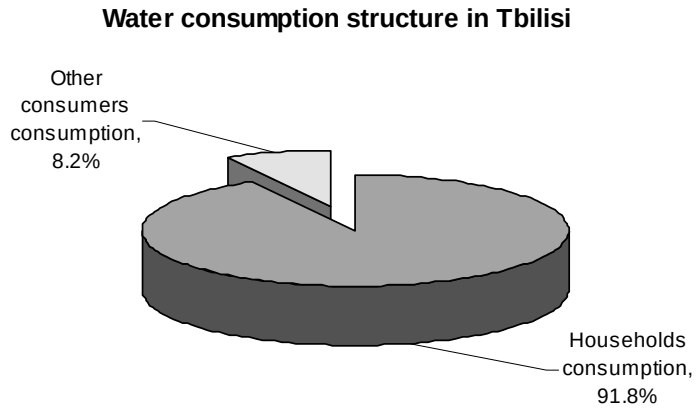
  Tariff increases are often considerable in nominal values, although factual increase is not significant, taking inflation into account. Any notable **increase in** tariffs may provoke public and political discontent. However, accurate calculation of new tariffs provides compensation for the increased cost of 1 cubic metre of water through the reduced consumption. Therefore, consumer will pay the same amount for water as before water meters were installed - or less.

4.2.1 Facilitation of the utilities' implementation of water saving measures

Today Tbilvodocanal LLC has no possibility of providing sustainable development or improved service quality, as revenues from water supply services do not even cover costs related to water delivery to the end users.

Water consumption in Tbilisi as compared to Tbilvodocanal LLC is presented in the figure below.

Figure 4.3Water supply in Tbilisi



Source: Data from Tbilvodocanal LLC

According to Figure 4.3, the basic consumer category in Tbilisi is households. However, the share of the households in the billed consumption is below 50%, and given a low collection of the household payments (40% in 2003 and 54% in 2004), this share is half. The underestimated tariff for the households and a low collection rate make the sector dependent on the budget subsidies.

The option of increasing the "approved norms" for domestic water consumption, which would compensate for further degradation of the infrastructure and water losses during transportation,

is extensive and currently at a deadlock. This will ultimately lead to a complete degradation of installations and transportation networks (both water and wastewater). Moreover, sector will be fully dependent on budget allocations compensating for the difference between the approved household tariff and services cost.

Introducing water saving measures will reduce the sector dependence on budget financing, make it commercially attractive for private operators and investors, condition sustainable development, and improve the service quality.

Example of water loss reduction in the water supply sector of Tbilisi
The table below provides a number of indicators describing the situation of payments for water supply services and the technical condition of the assets in Tbilisi in **2003**, on which the further analysis will be based.

Table 4.1Financial and technical performance indicators of the water sector in Tbilisi, 2003

Indicator	Measurement unit	Value
		2003
Water services payment		According to consumption norms
Approved household tariff, incl. VAT	GEL/m3	0.04
Estimated household tariff, incl. VAT	GEL/m3	0.17
Water consumption norm	l/cap/day	800
Monthly consumption based on norm	m3/cap/day.	24.00
Approved household tariff, incl. VAT	GEL/cap/day	0.96
Estimated household tariff, incl. VAT	GEL/cap/day	4.08
Cost of 1 kWh of electric energy	GEL/kWh	0.034
Households connected to the centralized water supply system in Tbilisi	Person	980,000
Total delivered to the network	m³/year	531,147,840
Billed water consumption by households	m³/year	257,800,000
Billed water consumption by other consumers	m³/year	14,357,500
Total losses (technological and commercial)	m³/year	258,990,340
Energy consumption related to water pumping	kWh /year	276,196,877
Electric energy used for pumping	GEL/year	9,390,694
Billed households charges	GEL/year	10,312,000
Billed charges for other consumers	GEL/year	17,229,000
Revenue of the Vodocanal from billed water sale	GEL/year	27,541,000
Total water services cost	GEL/year	48,628,630
Financial performance indicators of the principal water supply activity	GEL/year	(- 21,087,630)
Budget subsidies to cover current expenditures	GEL/year	11,466,400

Source: COWI questionnaire

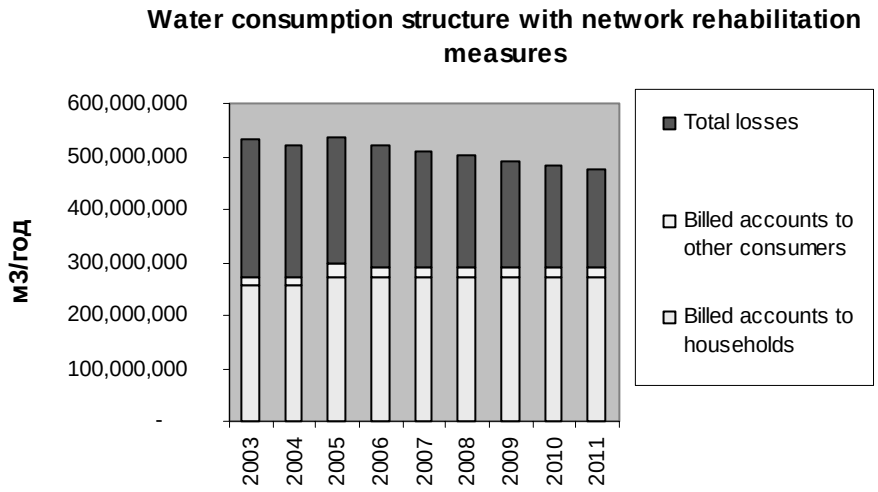
The data from the table indicates that Tbilvodocanal LLC is now a subsidised and unprofitable utility. Budget subsidies to cover current expenses amounted to GEL 11.5 mil. annually, or 42% of Vodocanal's revenues from billed water consumption (GEL 27.5 mil. annually, according to the billed amount). Water losses amount to 258.9 mil.m^3 annually, i.e. 49% of 531.1 mil. m^3 total water volume supplied.

Given that all the technical performance indicators of 2003 remain unchanged in the nearest future, and taking into account all financial indicators in prices of 2003 as the baseline year, an overview of the impact of a number of water saving measures was carried out.

The most effective options aimed at the reduction of the Vodocanal's costs are reviewed: Network repairs followed by water loss reduction and replacement of the outdated pumps with more efficient ones equipped with frequency converters.

It is assumed that from 2006 Tbilvodocanal LLC will be repairing and replacing the networks at a rate of 4% per year of the total network length.

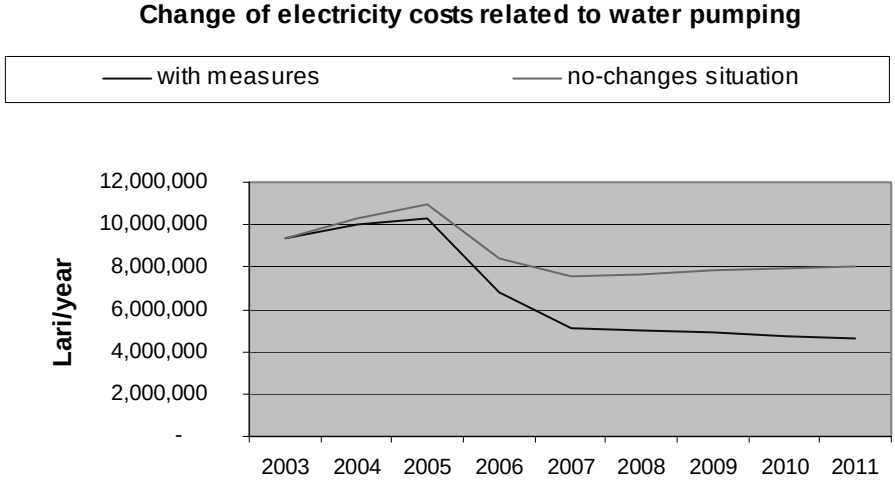
Figure 4.4Water consumption structure with network rehabilitation measures



Source: COWI calculations

This network replacement rate will promote a decrease in the lost water share, but will not cause a substantial reduction. Nevertheless, the proposed activities are expected to bring about a reduction in operating costs, the greater part of which are expenses for electricity. The figure below presents the dynamics of change on this parameter. **The proposed set of measures will lead to a considerable reduction of energy consumption as against the baseline situation** (the upper line).

Figure 4.5Change of electricity costs related to water pumping



Source: COWI calculations

Consequently, it is assumed that one of the cost saving measures could be an accelerated replacement of pipes. This could be financed from the target loan of an international financial institution, and/or through donor fund attraction.

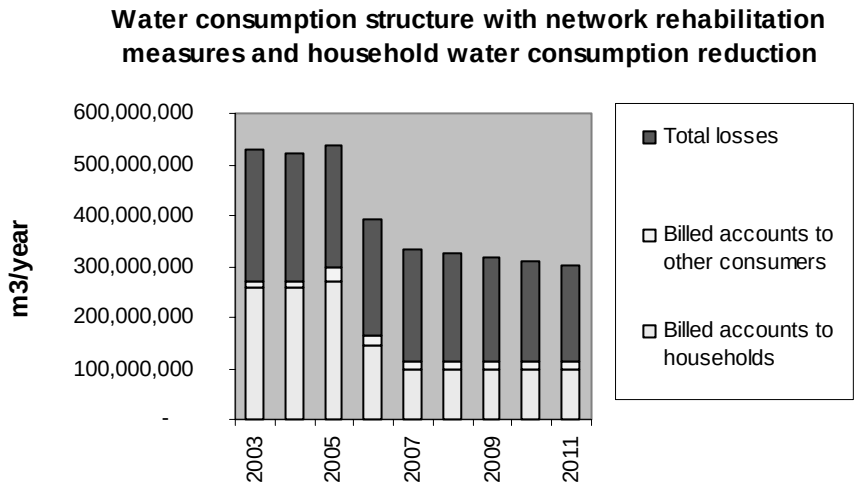
Intensive development of Tbilvodocanal LLC will make the water consumption reduction effects smoother.

Installation of water meters and adoption of payments for the actual amount of consumed water

Preconditions for the overview: Further increases in the water consumption norm has no future, and therefore it is assumed that by 2005-2007 the individual water meters will have been installed in almost 100% of the households, which will pay for the water services according to the metered actual volume of water consumed. This measure will ensure a considerable decrease in water consumption. It is assumed that by 2006 water consumption will have decreased from 800 to 450 l/cap/day, and in 2007 will reach 300 l/cap/day and remain at this level.

The water consumption structure will be changed as shown in the figure below.

Figure 4.6Water consumption structure



Source: COWI estimations

* Note: This figure and the figures further on are based on the data provided by Tbilvodocanal LLC and related to water consumption from 2003 to 2004, and the forecast values for 2005.

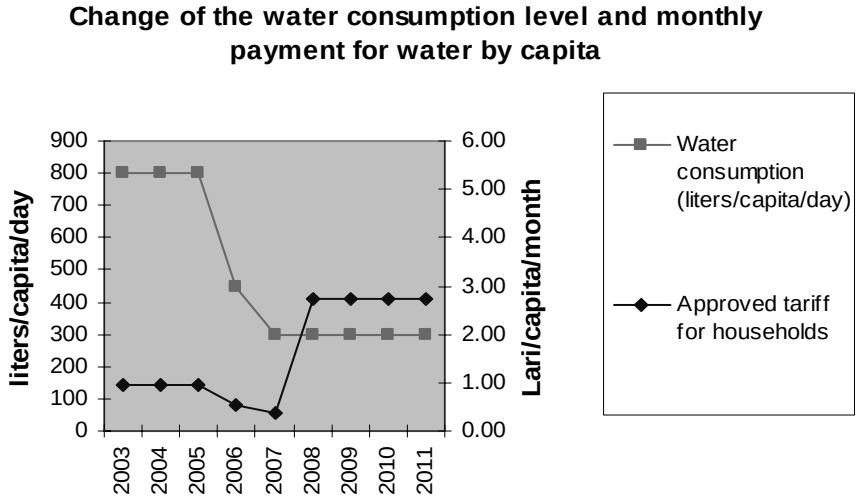
Considering water consumption by other consumers as a constant value, the change in relation between volumes of water supplied and water lost becomes apparent. The share of the latter increases, *inter alia,* due to the deterioration of the water distribution network. The retirement of the networks exceed replacement or repair.

A decrease in water consumption will result in the reduction of Vodocanal's revenues from water services. Thus, in order to avoid Vodocanal going bankrupt, it will be necessary to increase the tariff.

At the existing tariff rate, the households pay GEL 0.96 a month at the 800 l/cap/day norm. Given that the tariff remains unchanged and the individual water meters are installed, a monthly payment may decrease down to GEL 0.54 at the average water consumption of 450 l/cap/day, and further down to GEL 0.36 at the average water consumption of 300 l/cap/day. But a low tariff means continuation of budget subsidising at least at the same level, and the decreasing revenues of Vodocanal together with water consumption reduction will not cause a proportional cost reduction.

Therefore, assuming that the budget subsidising will have been ceased by 2008, the make-out tariff was calculated. This tariff should be equal to GEL 0.30/m^3 or GEL 2.73/cap/month if the water consumption is an average of 300 l/cap/day (see Figure 4.7).

Figure 4.7Change of the water consumption level and monthly payment for water by households at no budget subsidising by 2008

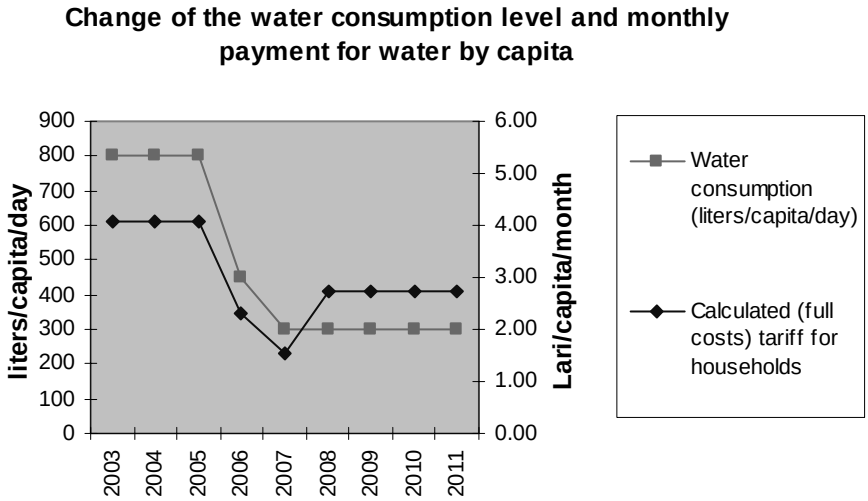


Source: COWI estimations

The households' monthly payments for water **in case of full cost coverage** would be at the level of GEL 4.08 (at 800 l/cap/day). Installation of water meters will not only saving water, but also money for the households as, in spite of the expected tariff growth, a full water payment would amount to just GEL 2.73 /cap/month in 2008.

Therefore, these savings would compensate the population for the water meter installation.

Figure 4.8 Change of the water consumption level and monthly payment for water by households at full coverage of the households expenses



Source: COWI estimations

Thus, implementation of water saving measures and transition to water charges based on actual water consumption with the approved household tariff growth by 7.5 times (from GEL 0.04/m^3

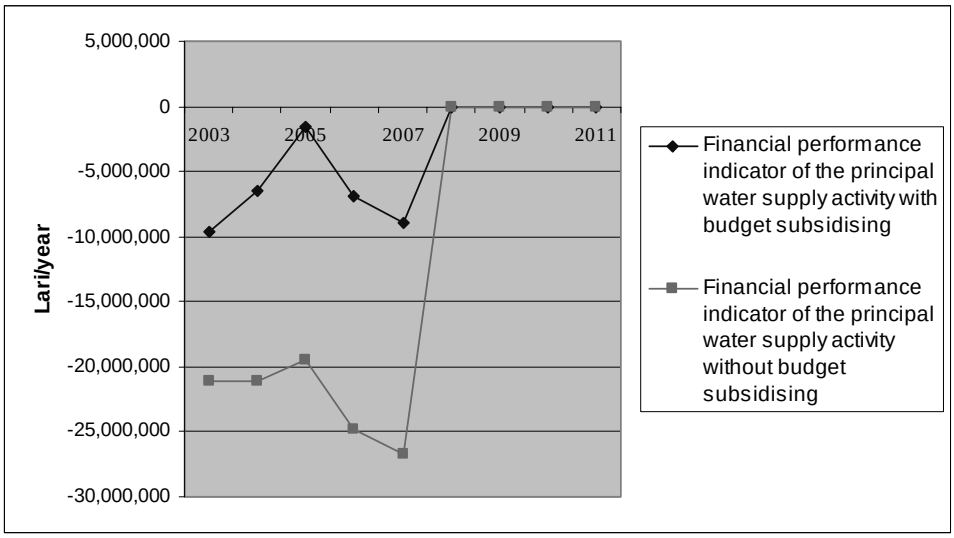
to GEL 0.30/m^3) will result in only 3 times increase in monthly household payment (from GEL 0.96 to GEL 2.73 per person per month)

A 1.8 increase in the *estimated tariff* (from GEL 0.17 to 0.30/m^3), given that the service cost is fully paid and water consumption is reduced, will be followed by a payment decrease of 1.5 times (from GEL 4.08 to 2.73 /cap/month).

The brief conclusion is: The relations between Vodocanal and its main consumers, as described above, will necessitate annual budget subsidising of the W&WW sector and financing from other sources, increasing in absolute terms from year to year.

At the same time, a reduction of water consumption to 450 and further to 300 l/cap/day together with a household tariff increase to GEL 0.30/m^3 will allow Tbilvodocanal to avoid budget subsidizing and to reach the profitability level (financial independence).

Figure 4.9Change of financial performance indicators of water services of Tbilvodocanal LLC, with and without budget subsidising



Source: COWI estimations

As can be seen from Figure 4.9, Vodocanal's losses started growing in 2005 due to a water consumption reduction, but as soon as budget subsidising is ceased and the new tariff is introduced in 2008, the utility will reach the make-out level.

When making a decision on the household tariff increase, it is necessary to assess the tariff affordability for various household groups in Tbilisi. Households where the W&WW payment share exceeds 4% would need targeted social support.

Such analysis has been carried out within the framework of the second component of the project. Conclusions of the assessment are presented in the Volume II of the report.

In all of the scenarios it is assumed that the above-discussed activities for the city of Tbilisi are implemented.

5 Baseline scenario analysis

5.1 Key assumptions in the baseline scenario

The key objective of the baseline scenario for the whole planning period (2003-2023) is the maintenance of W&WW systems and services at the level of the baseline year 2003.

The FEASIBLE Model **calculates the cost financing need** under the assumption that there is proper operation, maintenance, capital repair and timely rehabilitation of the assets.

Financing forecast in the baseline scenario
The sources of financing of the water and wastewater sector in the baseline scenario are user charges for water and wastewater services, as well as budget allocations directly depending on the national economic development. Therefore, the baseline scenario includes the following assumptions:

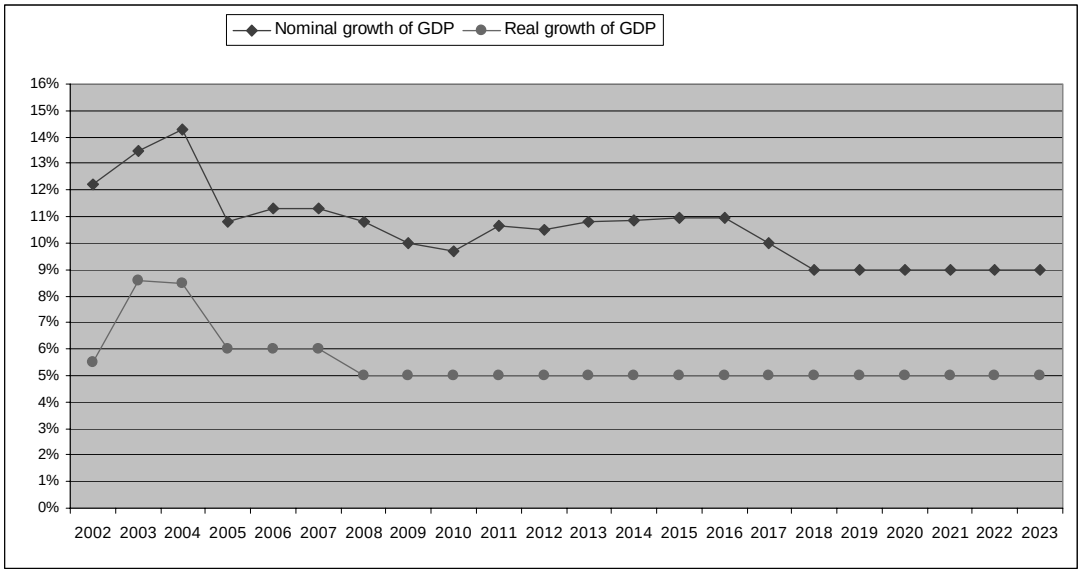
- Macroeconomic assumptions
- Assumptions for changes in budget expenditures of the Republic of Georgia
- W&WW service consumption charges and assumptions for their changes.

The aim of the forecasts in the baseline scenario is not determination of the most likely development options, but rather development of a scenario to be implemented with the available funds; i.e. no considerable changes in the situation are expected.

All forecast values in the baseline scenario are provided in the real prices of 2003, i.e. without inflation.

Macroeconomic preconditions
Figure 5.1 below shows the dynamics of change of nominal and real GDP in Georgia in 2002-2023. GDP growth was forecast by the experts of the International Monetary Fund and the Ministry of Finance of Georgia assuming the real GDP growth stabilisation in 2008 at the level of 5% a year.

Figure 5.1Changes of nominal and real GDP in Georgia in 2002-2023



Source: The Ministry of Finance of Georgia

In spite of the fact that this estimate is made with caution, the experts believe that it allows levelling fluctuations of the real GDP growth in the long run.

Budget expenditures in the W&WW sector

Estimation of the available financing is based on the macroeconomic forecast, including forecast of budget receipts of the republic and expenditures in percent of GDP, expenditures for the W&WW sector in percent of the total budget expenditures, current budget expenditures for the W&WW sector in percent of the total current budget expenditures, as well as capital budget expenditures for the W&WW sector in percent of the total capital budget expenditures.

Table 5.1 Forecasting of a number of macroeconomic variables

Forecast variable	**2002**	**2003**	**2004**	**2005**	**2006-2023**
Total budget expenditures of Georgia, in % of GDP	18%	18%	19%	19%	19%
Budget expenditures of Georgia for the W&WW sector in % of total budget expenditures of Georgia	1.13%	1.15%	1.24%	1.24%	1.24%
Current budget expenditures of Georgia for the W&WW sector in % of the current budget expenditures of Georgia	0.90%	0.87%	0.91%	0.90%	0.90%
Capital budget expenditures of Georgia for the W&WW sector in % of capital budget expenditures of Georgia	4.81%	4.83%	5.03%	4.30%	4.30%

Source: The Ministry of Finance of Georgia and COWI estimations

User charges
The billed revenue is calculated as water volume (in m^3) billed for a consumer category based on water consumption norm or metered consumption multiplied by the relevant approved tariff rate. The factual revenue of the utility is usually lower, as the annual payment collection rate is below 100%.

As regards tariff policy and revenues of the utilities, the baseline scenario assumes that **the W&WW services payment amount** for households shall increase in line with the real household incomes; for other consumer categories the tariff will remain unchanged. The household incomes will grow together with real GDP growth. According to the official statistical data, **the available income of the average household in Georgia** in 2003 amounted to **GEL 3,408** a year. (Please note that all calculations are made in baseline year prices).

In the model calculations, the payment collection factor is based on year 2003, and the collection rate increase options are considered below as the measures to cover the sector financing gap.

5.2 Estimations for the baseline scenario

Table 5.2 presents the result of an estimation of the required and available financing in the W&WW sector in the selected 20 settlements of Georgia for the period 2023-2023 for the baseline scenario.

Table 5.2Financing needs for the W&WW sectors in the selected settlements in 2003-2023 – assessment in FEASIBLE of the baseline scenario, in 2003 prices

	2003-2023
W&WW sector, total, mil. GEL	2,827.9
Including:	
Water supply, total, mil. GEL	2,344.9
Including	
Operating costs, mil. GEL	1,547.6
Costs of maintenance, capital repair and rehabilitation of the assets, mil. GEL	797.3
Wastewater collection and treatment, total, mil. GEL	482.9
Including:	
Operating costs, mil. GEL	163.1
Costs of maintenance, capital repair and rehabilitation of the assets, mil. GEL	319.8
The available financing, total, mil. GEL	1,413.6
Financing gap	1,414.3

Source: FEASIBLE calculations

According to W&WW utilities, actual water services costs in the selected settlements in 2003 amounted to approx. **GEL 41.6** mil. (excl. VAT). The modelled estimation of the sector annual financing need was **GEL 104.5** mil.; i.e. the factual financing of the needed total costs of water sector was approx. **40%** of the modelled financing need, including capital repair and compensation based on the depreciation rates (under proper operation and maintenance of the assets). The actual financing of current operating costs made up approximately **46%** of the need estimated in the model.

The wastewater sector demonstrates similar relations. As to the utilities, wastewater service costs in the selected settlements in 2003 amounted to approx. **GEL 10.8** mil. (excl. VAT). This value should be compared to the annual financing need obtained in FEASIBLE, which is **GEL 23.2** mil.; i.e. the factual financing of the wastewater services costs made up **47%** of the modelled financing need, including capital repair and compensation, based on the depreciation rates (under proper operation and maintenance of the assets). The actual financing of current operating costs amounted to approximately **50%** of the need estimated in the model.

Total financing for 2003-2023 will reach **GEL 1,413** mil. **The financing gap will be almost the same; GEL 1,414 mil.**

Moreover, the utilities' revenues will not be capable of covering the costs of proper operation and maintenance of the W&WW infrastructure. An annual financing gap was estimated at GEL 32 mil. a year in 2003, and will steadily decrease to GEL 2 mil. by 2023.

5.2.1 Possibility of gradual elimination of the financing gap

In spite of the substantial amount of the financing gap, it may, however, be covered through implementation of the measures proposed below.

Set of measures aimed at W&WW sector financing increase and costs saving:

1) **Increase in collection rate of the billed charges for W&WW services**

As can be seen from the table below, the collection rates are assumed to be different for various consumer categories and further remain at the achieved level. This measure will cumulatively save **GEL 323 mil.** for the 2003-2023 forecasting period.

Table 5.3Increase in W&WW payment collection rate for various consumer categories

Consumer category	Sector	Collection rate
Households	Water supply	Increase from 34% in 2003 to 85% in 2010
	Wastewater	Increase from 30% in 2003 to 85% in 2011
Industry	Water supply	Increase from 82% in 2003 to 100% in 2007
	Wastewater	Increase from 48% in 2003 to 100% in 2010
Others	Water supply	Increase from 59% in 2003 to 100% in 2009
	Wastewater	Increase from 89% in 2003 to 100% in 2006

Source: COWI estimations

2) Increase in W&WW services payments (in baseline year prices)

One of the options of an increase in the available financing in the sector is an increase in the household tariff in Tbilisi from GEL 0.04 per m³ to GEL 0.17 per m³. This will result in a 2.9 times increase in the average water tariff for all of Georgia – from GEL 0.05 per m³ to GEL 0.14 per m³.

A similar measure is proposed for the wastewater tariff. An increase in the household tariff in Tbilisi from GEL 0.01 per m³ to GEL 0.04 per m³ will lead to a 2.3 times increase in the average tariff in Georgia, i.e. from GEL 0.019 per m³ to GEL 0.044 per m³.

The tariff increase is planned for 2005-2007, assuming that budget funds to finance the current operating activity will be allocated in the same volume, with the same difference as that for capital cost financing.

3) **Increase in W&WW sector financing from the budget** up to **1.76%** of the total budget expenditures of the republic.

Table 5.4Extra funding from implementation of the proposed set of measures (collection rate, tariff, budget), mil. GEL

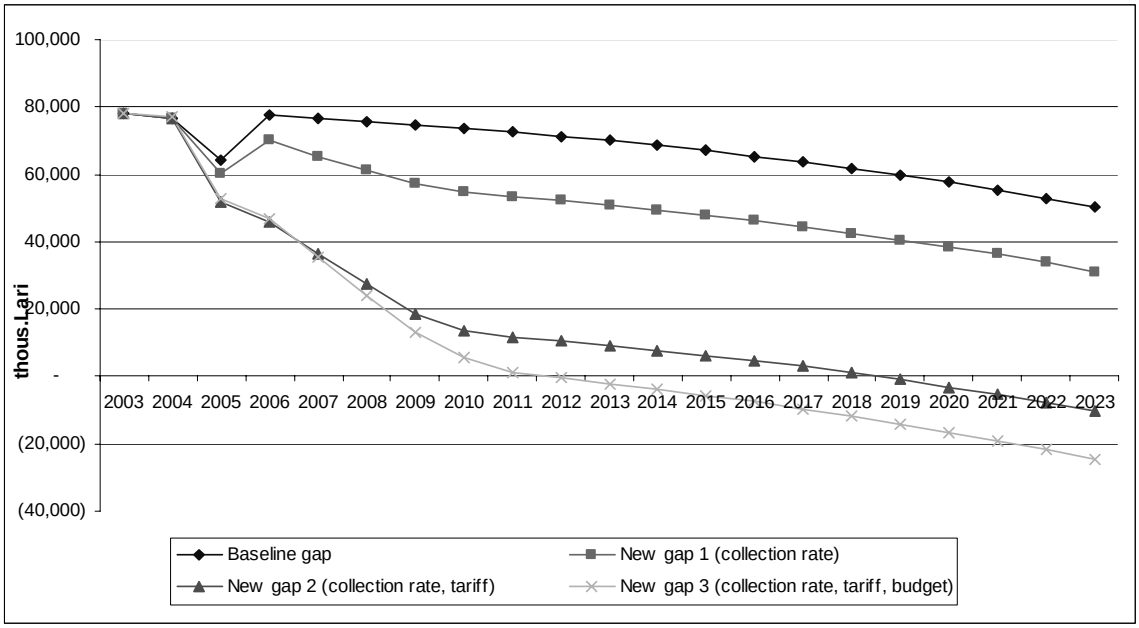
Financing source	2003	2005	2010	2023	TOTAL
Budget	17.4	20.2	37.5	75.5	**949.4**
Household tariffs	6.4	17.8	44.3	49.5	**797.8**
Tariffs for industries, budget-financed and other institutions	23.3	25.5	39.8	46.8	**870.7**
FMD, SIF	2.4	14.3	-	-	**16.7**
TOTAL	**49.5**	**77.8**	**130.5**	**176.9**	**2,734.6**

Source: FEASIBLE calculations

Modelling output

The modelling output is shown in the figure below.

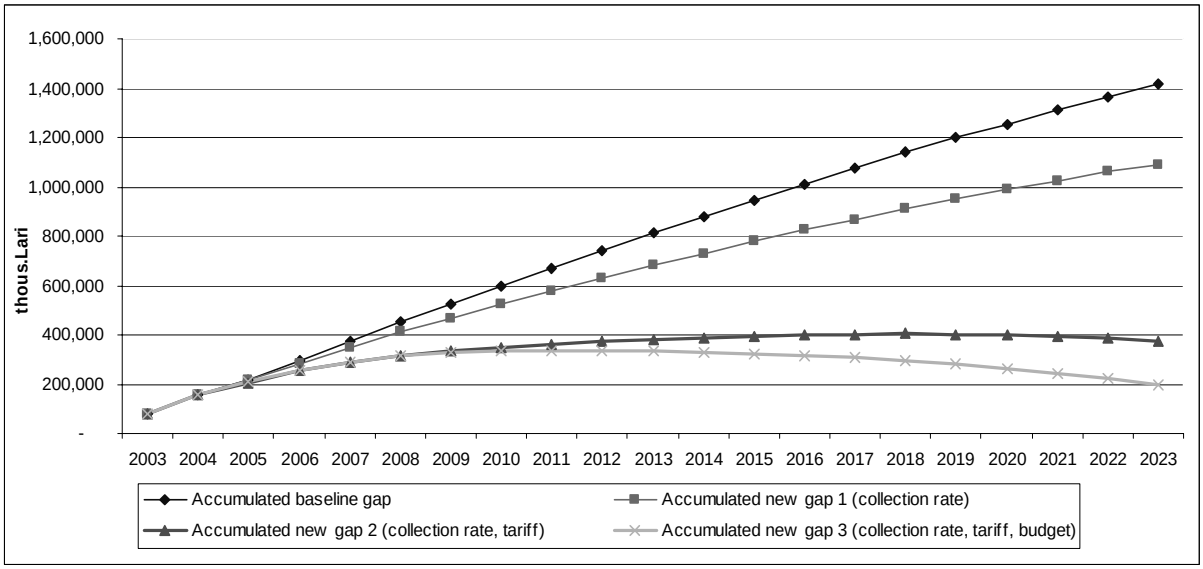
Figure 5.2Total annual financing gap, the baseline scenario, GEL 1,000



Source: FEASIBLE calculations

Figure 5.2 shows a baseline financing gap, as well as new financing gaps under conditions of implementation of the proposed measures, namely, (1) increase in payment collection rates from all consumer categories; (2) increase in payment collection rates and water and wastewater tariffs for households in Tbilisi; (3) increase in payment collection rates, household tariff in Tbilisi, and increase of budget expenditures on the W&WW sector.

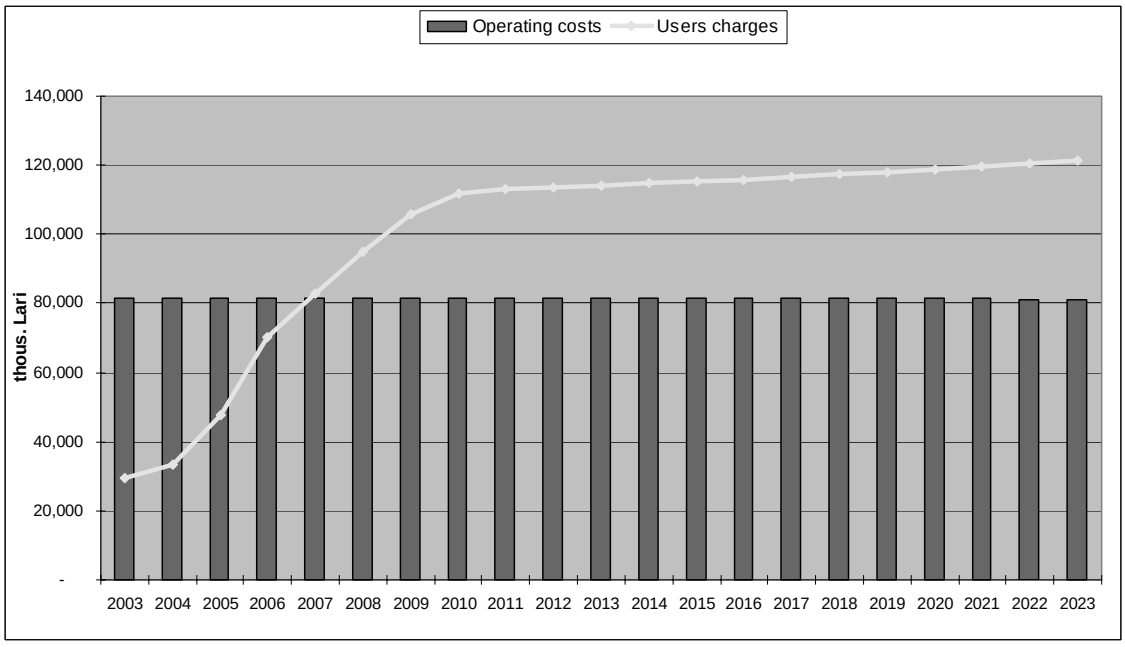
Figure 5.3Accumulated financing gap (the baseline scenario), GEL 1,000



Source: FEASIBLE calculations

As can be seen from Figure 5.3, an annual total financing gap may be eliminated only by around 2012. However, the Vodocanal's revenues increased due to the implementation of the above (or similar) measures aimed at W&WW. By **2007**, financing improvement will cover the operating costs and provide savings for capital repair and reconstruction, new construction and depreciation compensation (see Figure 5.4).

Figure 5.4Coverage of the operating costs from W&WW service user charges, the baseline scenario, GEL 1,000



Source: FEASIBLE calculations

Taking into consideration that water system reconstruction, energy saving initiatives, reduction of losses and facilitation of saving water consumption may also contribute considerably to the reduction of operating maintenance costs, it is vital for such measures to be introduced all over Georgia.

Having implemented the measures aimed at the reduction of water losses and unaccounted for water, measurement of actual water consumption volumes (using water meters) and water demand management through tariff policies, it will be possible **to determine more exactly the water and wastewater capacity required.** This will optimize the infrastructure performance **and further reduce capital costs for implementation of the programme on reconstruction and development of water and wastewater systems**.

The optional development objectives for the water and wastewater sectors, the related costs and possible financing sources and volumes will be presented in the final report in the section related to the development scenarios of the W&WW sector in Georgia.

6 Millennium Development Goals

6.1 Millennium Development Goals (MDGs) for the W&WW sector and their achievement costing approach

In September 2000, 189 UN-members accepted the Millennium Development Goals (MDG), having established clear time-bound objectives, achievement of which will promote progressive development. Georgia is one of the countries which signed the Millennium Declaration, thus undertaking the integration of the Millennium Development Goals into the national development strategies, as well as periodical reporting on the goal achievement progress.

Following the undertaken obligations, on 26 August 2003, the Georgian Government Decree on establishment of a governmental commission for preparation of a MDG implementation report was signed. The commission was headed by the Prime Minister of Georgia. The five working groups were set up in accordance with the relevant development goals: Poverty and development, education, health, environmental protection and gender equality. The working groups included representatives of ministries and agencies, as well as experts from NGOs and international institutions. After the revolution of November 2003, a new Georgian Government renewed the commission and assigned its activity on a permanent basis (Governmental Resolution No. 7, 31 March 2004).

Goal 7 of the Millennium Development Goals is sustainable environmental development. The aim is that, before 2015, the number of the population who do not have sustainable access to safe drinking water and "basic sewerage" should be reduced by half. In spite of the fact that the MDG (including those related to water supply and sewerage) were formulated in 2000, the baseline year was accepted as 1990.

Sustainable drinking water access in MDG terminology means:

- Access to an adequate amount of safe water (including treated surface water, as well as untreated but not polluted water sources, such as springs and wells)
- In urban areas, water sources may be a fountain or a stand-pipe tap located no further than **200** m^4 from a dwelling
- it is assumed that rural households should not spend considerable time to get water;
- An adequate amount of water is a volume corresponding to physiological/metabolic, hygienic and domestic consumption requirements.

Access to “basic sewerage” in MDG terminology means:

- Defecation facilities preventing the contact of people, animals and insects with the excrements

[4] Although in the MDG this distance should not exceed 1,000 metres, in Georgia, given the existing norms and infrastructure development level, this distance was proposed to be 200 metres.

- Appropriate facilities are understood in MDG as simple, but protected cesspools and toilets discharging into the sewerage piping

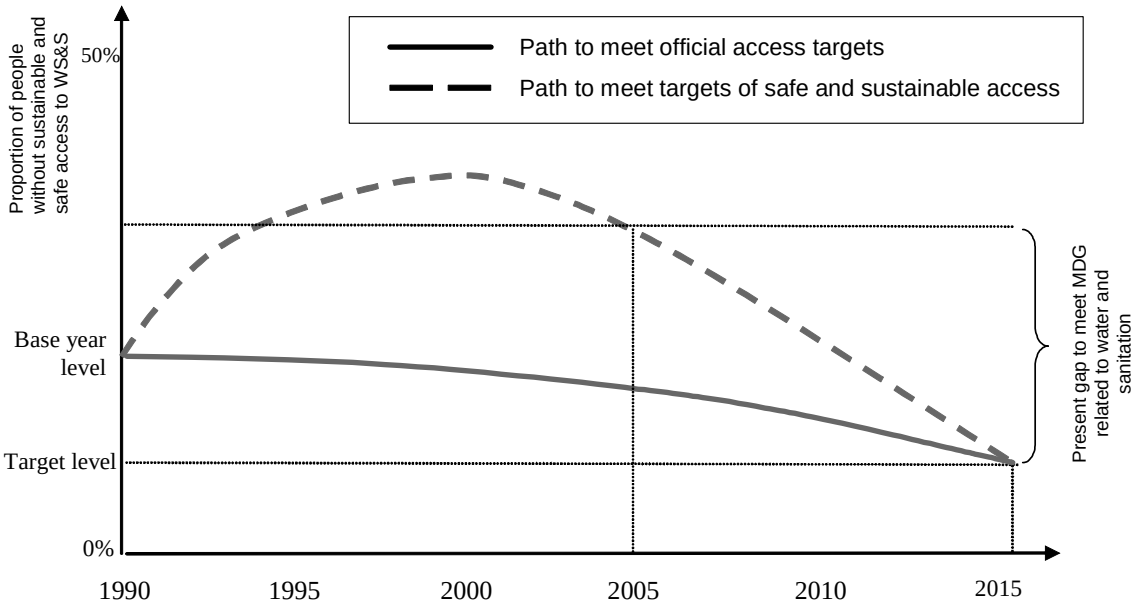
- To ensure effective performance, the facilities should be duly constructed and operated.

However, the accessibility of a service is not always an indication of its sustainability and safety. Hence, the MDG costing methodology should be based on a system of indicators, reflecting population access to *sustainable and safe* water supply.

As noted by the World Bank experts, without **complementary** indicators, water supply regularity and quality of the delivered water MDG-7 achievement cannot be duly assessed. The need for complementary indicators has become especially obvious for cities and villages connected to centralized water supply systems (tap water). In EECCA countries application of global framework indicators does not always facilitate addressing the specific national objectives. As the communal infrastructure has considerably worsened since the 1990's, the indicators of access to centralized water and wastewater facilities do not reflect the level of sustainability and safety.

The development of the water and sanitation sector in EECCA countries is shown in the figure below.

Figure 6.1Urban population in EECCA countries without sustainable and safe access to W&WW services, 1990-2015



Source: The World Bank

6.1.1 Use of complementary and composite indicators for formulation of SMART goals and MDG indicators

Based on the World Bank approach, one of the possible methods of estimating sustainable drinking water and basic sewerage access indicators using complementary and composite indicators is proposed below.

Use of complementary indicators for water supply

The share of the urban population with sustainable access to the safe water supply shall be equal to:

$$ACs = AC \times r \times q \text{ , where}$$

AC – share of population with access to centralized water supply systems

r – regularity (sustainability), i.e. hours of uninterrupted water supply per day or a share of population with uninterrupted water supply

q – quality (safety), e.g. a share of drinking water samples corresponding to sanitary standards by chemical, organoleptic and bacteriological indicators.

The share of the rural population with sustainable access to the safe water supply shall be equal to

$$ADs = AD \times s \text{ , where}$$

AD – share of population with access to decentralized water supply systems

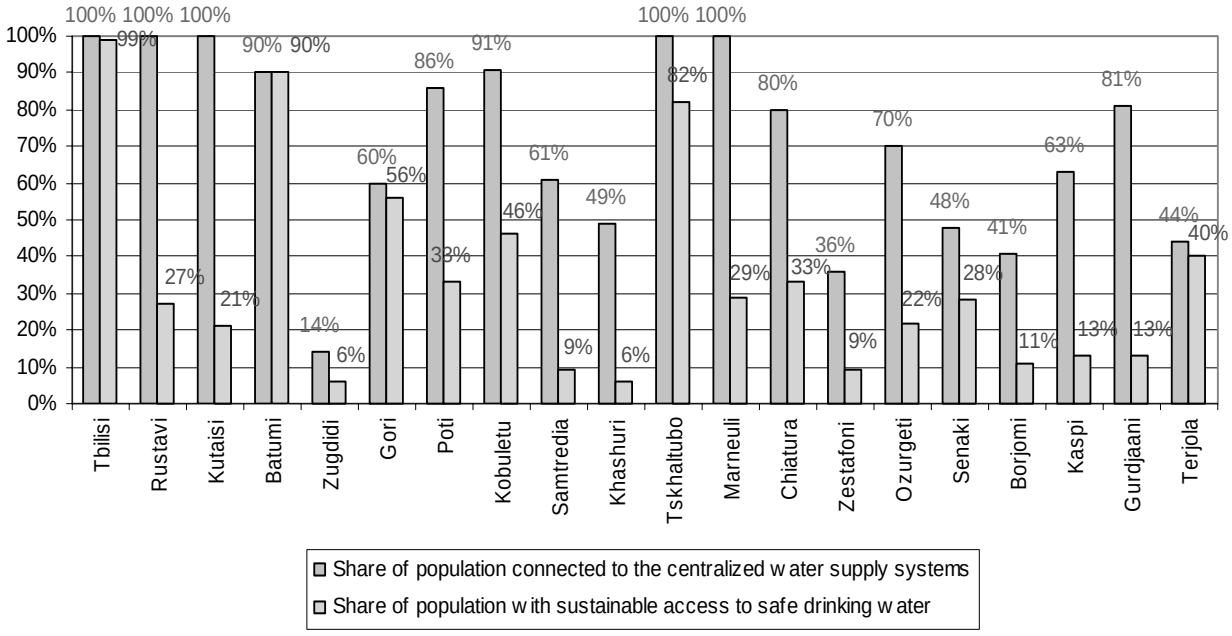
s – water supply reliability and water safety (e.g. see above)

Urban and rural population with sustainable access to safe water supply

As= ACs+ ADs

Table 6.1 and Figure 6.2 present an estimation of the access of urban population in Georgia to sustainable and safe water supply, using the above complementary and composite indicators for 1990 and 2003.

Figure 6.2 Access of urban population in Georgia to sustainable and safe water supply in 2003 (estimated using complementary and composite indicators)



Source: COWI estimations

Table 6.1 Urban population access to sustainable and safe water supply in 1990 and 2003 (estimated using complementary and composite indicators)

Settlement	Share of population connected to the centralized water supply systems,1990	Water supply regularity, 1990	Water supply regularity factor, 1990	Share of drinking water samples not complying with sanitary and bacteriological norms, 1990	**Share of population with sustainable access to safe drinking water, 1990**	Share of population with access to centralized water supply, 2003	Water supply regularity, 2003	Water supply regularity factor, 2003	Share of drinking water samples not complying with sanitary and bacteriological norms, 2003	Drinking water quality,2003	**Share of population with sustainable access to safe drinking water, 2003**
	%	h/d		%	**%**	%	h/d		%		
Tbilisi	100%	24	1.00	n/a	**100%**	100%	24	1	1%	0.99	**99%**
Rustavi	100%	12	0.50	n/a	**50%**	100%	8	0.33	19%	0.82	**27%**
Kutaisi	100%	12	0.50	n/a	**50%**	100%	6	0.25	15%	0.86	**21%**
Batumi	100%	24	1.00	n/a	**100%**	90%	24	1	n/a	н/д	**90%**
Zugdidi	50%	18	0.75	n/a	**38%**	14%	10	0.42	n/a	н/д	**6%**
Gori	70%	24	1.00	n/a	**70%**	60%	24	1	6%	0.94	**56%**
Poti	80%	16	0.67	n/a	**53%**	86%	10	0.42	8%	0.92	**33%**
Kobuleti	95%	14	0.58	n/a	**55%**	91%	12	0.5	n/a	н/д	**46%**
Samtredia	61%	18	0.75	n/a	**46%**	61%	24	1	85%	0.15	**9%**
Khashuri	60%	16	0.67	n/a	**40%**	49%	10	0.42	70%	0.3	**6%**
Tskhaltubo	100%	20	0.83	n/a	**83%**	100%	20	0.83	2%	0.98	**82%**
Marneuli	100%	14	0.58	n/a	**58%**	100%	7	0.29	n/a	н/д	**29%**
Chiatura	90%	20	0.83	n/a	**75%**	80%	10	0.42	n/a	н/д	**33%**
Zestaphoni	50%	16	0.67	n/a	**33%**	36%	8	0.33	23%	0.77	**9%**
Ozurgeti	50%	14	0.58	n/a	**29%**	70%	8	0.33	5%	0.95	**22%**
Senaki	60%	16	0.67	n/a	**40%**	48%	14	0.58	n/a	н/д	**28%**
Borjomi	60%	14	0.58	n/a	**35%**	41%	8	0.33	21%	0.79	**11%**
Kaspi	65%	12	0.50	n/a	**33%**	63%	5	0.21	n/a	н/д	**13%**
Gurdjaani	90%	12	0.50	n/a	**45%**	81%	4	0.17	7%	0.93	**13%**
Terjola	50%	22	0.92	n/a	**46%**	44%	22	0.92	n/a	н/д	**40%**

Source: COWI calculations.

Use of complementary indicators for wastewater

The share of the urban population with access to effective centralized sewerage shall be equal to:

ACeh= AC x d , where

AC – share of population with access to centralized sewerage systems

d – composite indicator of the facilities' deterioration (e.g. based on a share of a sewerage network which requires replacement).

The share of the rural population with access to effective decentralized sewerage shall be equal to:

ADeh= AD x s , where

AD – share of population with access to decentralized sewerage systems

s – composite indicator of the facilities' deterioration.

Urban and rural population with access to basic sewerage

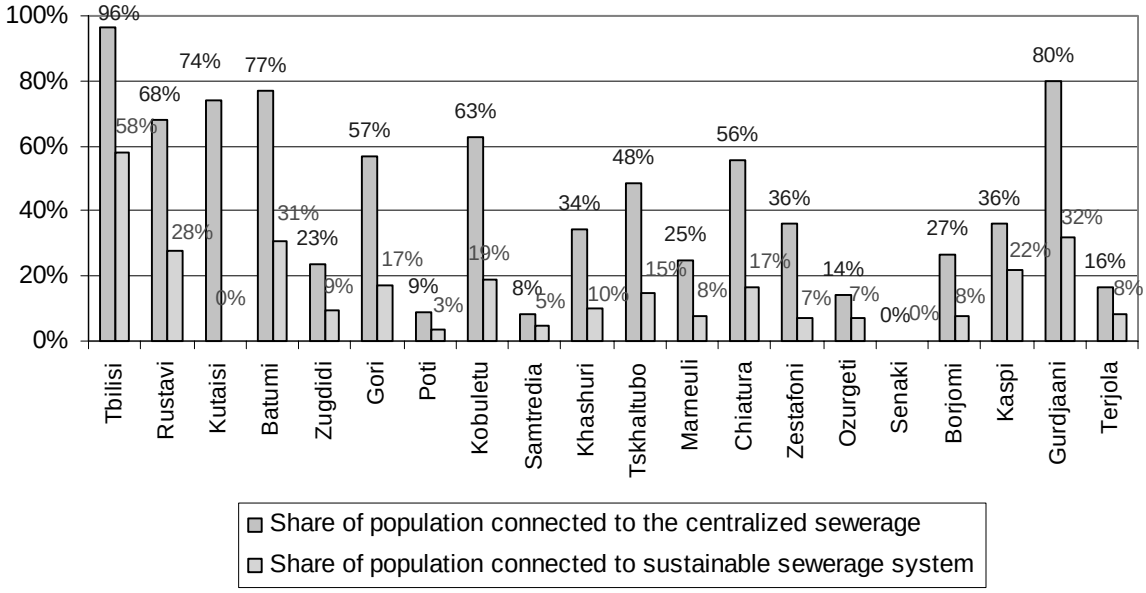
Aeh= ACeh+ ADeh

Table 6.2 and Figure 6.3 present an estimation of the access of the urban population in Georgia to sustainable sewerage, using complementary and composite indicators for 1990 and 2003.

Therefore, collection and evaluation of the data on official and complementary indicators since 1990 until the present will make it possible to determine target indicators of MDG achievement up to 2015.

Afterwards they are to be converted into technical and investment goals which will be estimated in FEASIBLE model. The results are given in section 7.

Figure 6.3Access of urban population in Georgia to sustainable wastewater discharge in 2003 (estimated using complementary and composite indicators)



Source: COWI estimations

Table 6.2 Urban population access to sustainable wastewater discharge in 1990 and 2003 (estimated using complementary and composite indicators)

Settlement	Share of population connected to the centralized sewerage, 1990	Networks which required urgent replacement, 2003	**Share of population connected to sustainable sewerage system, 1990**	Share of population connected to the centralized sewerage, 2003	Networks which required urgent replacement, 2003	System reliability factor, 2003	**Share of population connected to sustainable sewerage system, 2003**
	%	%	**%**	%	%		**%**
Tbilisi	96%	10%	**87%**	96%	40%	0.6	**58%**
Rustavi	68%	10%	**61%**	68%	59%	0.41	**28%**
Kutaisi	74%	100%	**0%**	74%	100%	0	**0%**
Batumi	77%	10%	**69%**	77%	60%	0.4	**31%**
Zugdidi	23%	10%	**21%**	23%	60%	0.4	**9%**
Gori	57%	10%	**51%**	57%	70%	0.3	**17%**
Poti	9%	10%	**8%**	9%	60%	0.4	**3%**
Kobuleti	63%	10%	**57%**	63%	70%	0.3	**19%**
Samtredia	8%	10%	**7%**	8%	40%	0.6	**5%**
Khashuri	34%	10%	**31%**	34%	70%	0.3	**10%**
Tskhaltubo	48%	10%	**44%**	48%	70%	0.3	**15%**
Marneuli	25%	10%	**23%**	25%	70%	0.3	**8%**
Chiatura	56%	10%	**50%**	56%	70%	0.3	**17%**
Zestaphoni	36%	10%	**32%**	36%	80%	0.2	**7%**
Ozurgeti	14%	10%	**13%**	14%	50%	0.5	**7%**
Senaki	0%	0%	**0%**	0%	0%	0	**0%**
Borjomi	27%	10%	**24%**	27%	70%	0.3	**8%**
Kaspi	36%	10%	**32%**	36%	40%	0.6	**22%**
Gurdjaani	80%	10%	**72%**	80%	60%	0.4	**32%**
Terjola	16%	10%	**15%**	16%	50%	0.5	**8%**

Source: COWI estimations

6.1.2 MDG achievement obstacles

Typical obstacles for MDG achievement in the W&WW sectors in EECCA countries, including Georgia, are listed below:

- Lack of financial resources for the investments:

  - it is necessary to attract external funding to facilitate budget and private financing

- Financial resources should be attracted in the framework of national priority action **programme**s

- New construction/reconstruction could be funded from external sources, whereas W&WW operating and maintenance costs should be covered from the tariffs – the latter is usually the most difficult

- The efficiency of investments significantly depends on the quality of further maintenance and repair

- Affordability is a key barrier for the poor to get access to the W&WW infrastructure. If service affordability is not taken into account, it will be very difficult to provide W&WW services to the population with low incomes

- Poor service quality, little interest from potential private investors, irrational use of the available resources and excessive expenses are often caused by inadequate institutional capacity. This problem is especially urgent at the local level due to the decentralization of functions on W&WW service provision to the households not supported by sufficient resources.

7 Main preconditions and results of the development scenario estimations

7.1 Preconditions for the MDG achievement scenario for the W&WW sector

This scenario implicates achievement of the Millennium Development Goals for the water and wastewater sectors of all Georgian cities included in the selected sampling. This goal includes the following aspects: Before 2015 the number of the population who do not have sustainable access to safe drinking water and "basic sewerage" should be reduced by half. The way to assess the access to sustainable and safe water supply and basic sewerage was discussed in the previous section. This served as a basis for calculation of target coverage for each selected city, e.g. for Rustavi:

1) (100%-50%)/2 = 25% – this share of population constitutes half of the population not connected to the sustainable water supply system in 1990, therefore according to MDG 7 this is a value to which the population coverage is to increase by 2015 compared to the 1990 level

2) (50%-27%) = 23% - this difference reflects the decrease in population access to sustainable safe water supply for the period 1990 - 2003

3) (25% +23%)+27% = 75% - target coverage of population with sustainable water supply services to be achieved by 2015 in Rustavi.

In order to achieve the water related MDG-7 it is necessary for Georgia to:

(a) Provide drinking quality water for the consumer through distribution networks of the centralized water supply system

(b) Provide access to the centralized water supply system for the consumers who have not had it so far.

In order to comply with item (a) it is necessary to perform an overhaul and rehabilitation of the pipelines, to raise their conveyance capacity to the level which permits supplying the consumers with the necessary amount of water sufficient, at least, for satisfying their physiological and hygienic needs. It is possible to implement these measures through a complex of activities on rehabilitation of the existing pipelines and building new ones.

Table 7.1Estimation of a target access of urban population in Georgia to safe sustainable water supply and basic sewerage.

	Share of population with sustainable access to safe drinking water, 1990	Share of population with sustainable access to safe drinking water, 2003	Water supply coverage to be achieved by 2015	Share of population connected to sustainable sewerage system, 1990	Share of population with sustainable access, to sewerage system, 2003	Wastewater collection coverage to be achieved by 2015
	%	%	%	%	%	%
Tbilisi	100%	99%	100%	87%	58%	93%
Rustavi	50%	27%	75%	61%	28%	81%
Kutaisi	50%	21%	75%	0%	0%	50%
Batumi	100%	90%	100%	69%	31%	85%
Zugdidi	38%	6%	63%	21%	9%	61%
Gori	70%	56%	85%	51%	17%	76%
Poti	53%	33%	77%	8%	3%	54%
Kobuleti	55%	46%	78%	57%	19%	78%
Samtredia	46%	9%	73%	7%	5%	54%
Khashuri	40%	6%	70%	31%	10%	65%
Tskhaltubo	83%	82%	92%	44%	15%	72%
Marneuli	58%	29%	79%	23%	8%	61%
Chiatura	75%	33%	88%	50%	17%	75%
Zestaphoni	33%	9%	67%	32%	7%	66%
Ozurgeti	29%	22%	65%	13%	7%	56%
Senaki	40%	28%	70%	0%	0%	50%
Borjomi	35%	11%	68%	24%	8%	62%
Kaspi	33%	13%	66%	32%	22%	66%
Gurdjaani	45%	13%	73%	72%	32%	86%
Terjola	46%	40%	73%	15%	8%	57%

Source: COWI estimations

Having determined the target coverage with sustainable water and wastewater services we are to convert the objectives to specific technical measures for the scenario modelling in FEASIBLE. Here we encounter an issue of alternative ways to achieve the goals.

This report presents two options for MDG achievement for the Georgian W&WW sector. They are conditionally called scenario1 and scenario 2. In both scenarios it was assumed that the main technical measure/investment activities for the goal achievement in all cities are reconstruction and extension of the existing water and wastewater networks and construction of the new ones.

If necessary, water abstraction and water treatment facilities will be reconstructed and extended to ensure larger volumes of water supplied. Both scenarios also assume that the measures recommended in chapter 4 of the present report concerning reduction of water losses and unaccounted for water, water meter installation and tariff increases will be implemented in Tbilisi. The scenarios differ in the ways of providing the access to sustainable drinking water.

Scenario 1 envisages rehabilitation of the systems of **water delivery to the water taps in consumers' homes**. To achieve this, scenario 1 entails rehabilitation and construction of additional distribution networks to ensure delivery of water to the water taps in consumers' homes.

Scenario 2 assumes rehabilitation of the existing and construction of additional distribution networks to ensure delivery of water through street stand posts to be placed within **100-200** metres of the dwellings.

In the process of calculations for both scenarios it was assumed that the population density for 1 km of the pipelines is **500** persons for districts with high-rise buildings and **200** persons for those with low-rise buildings. Here it is assumed that in scenario 1, the water consumption of all consumers remains constant and equal to the baseline value, and in scenario 2 the water consumption of newly connected households is assumed not to exceed **60** l/cap/day.

Neither scenario considers the possibility of reducing water consumption, except in the case of Tbilisi (see section 4).

Thus, the difference is that scenario 1 assumes provision of sustainable access to safe drinking water for the households without such access through an in-house water tap, and in scenario 2 by means of the construction of extra stand-pipe taps/wells.

It goes without saying that scenario 2 is appropriate only for the areas with low-rise buildings, and that any viable option of MDG achievement will be a combination of the increased access to sustainable drinking water supply both through in-house taps and through street water stand posts. But for the assessment of financial implications depending on which of the quite different approaches is selected, the estimations were intended for "extreme" cases.

Please note that like scenario 1, scenario 2 also envisages rehabilitation of the existing and construction of extra water supply networks but **lesser in length**.

Technical indicators for both scenarios are given in Table 7.2 below.

–

	Population connected to sustainable water supply, 2003	Population connected to sustainable wastewater collection, 2004	Target water supply coverage, 2015	Target wastewater collection coverage, 2015	Population additionally connected to sustainable water supply	Population additionally connected to sustainable sewerage	Extra water delivery to the net-work, 2015	Extra do-mestic discharges to sewerage, 2015	Length of water network in base-line year 2003	Length of wastewater network in baseline year 2003	Extra length of sewerage network in a target year in scenario 1	Extra length of water network in a target year in scenario 1	Extra length of water network in scenario 2
	person	person	person	person	person	person	m3/year	m3/year	km	km	km	km	Km
Tbilisi	970,200	566,832	980,000	915,124	9,800	348,292	2,657,711	66,118,534	3,353	2074	697	49	10
Rustavi	38,169	39,344	105,375	113,433	67,206	74,088	2,305,832	1,779,383	330	138	148	336	67
Kutaisi	40,401	-	142,470	94,980	102,069	94,980	4,321,604	2,815,017	419	231	190	510	102
Batumi	124,200	42,394	138,000	116,693	13,800	74,299	2,175,984	8,200,848	320	160	149	69	14
Zugdidi	9,042	6,552	48,125	42,371	39,083	35,819	442,228	283,704	204	95	72	195	39
Gori	37,234	11,337	56,355	50,156	19,121	38,819	781,663	1,110,834	68	38	78	96	19
Poti	22,946	2,436	53,667	37,741	30,720	35,305	1,132,511	911,050	182	32	71	154	31
Kobuleti	9,828	4,082	16,785	16,924	6,957	12,841	213,302	275,598	55	36	26	35	7
Samtredia	2,740	1,494	21,896	16,121	19,156	14,627	1,817,918	971,638	48	48	29	96	19
Khashuri	1,976	3,302	22,400	20,954	20,424	17,651	648,564	392,360	73	25	35	102	20
Tskhaltubo	11,118	1,975	12,467	9,762	1,349	7,787	88,607	358,141	149	34	16	7	1
Marneuli	8,283	2,130	22,483	17,395	14,200	15,265	388,725	292,516	50	26	31	71	14
Chiatura	7,500	3,753	19,688	16,880	12,188	13,127	253,561	191,168	50	25	26	61	12
Zestaphoni	2,316	1,800	16,667	16,550	14,351	14,750	623,321	448,466	95	42	30	72	14
Ozurgeti	5,093	1,610	14,854	12,949	9,761	11,339	131,825	107,193	61	16	23	49	10
Senaki	7,758	-	19,600	14,000	11,842	14,000	648,331	536,550	155	0	28	59	12
Borjomi	2,005	1,503	12,758	11,704	10,752	10,201	1,271,534	844,482	56	14	20	54	11
Kaspi	1,979	3,283	10,070	10,062	8,091	6,779	440,020	258,081	44	15	14	40	8
Gurdjaani	1,505	3,840	8,700	10,320	7,195	6,480	328,273	206,955	74	18	13	36	7
Terjola	2,218	451	4,010	3,156	1,792	2,705	292,387	308,923	60	1	5	9	2

7.2 Results of scenarios 1 and 2 estimations

Table 7.1 presents the results of the W&WW cost financing needs assessment in the selected cities during 2003-2023 for scenarios 1 and 2.

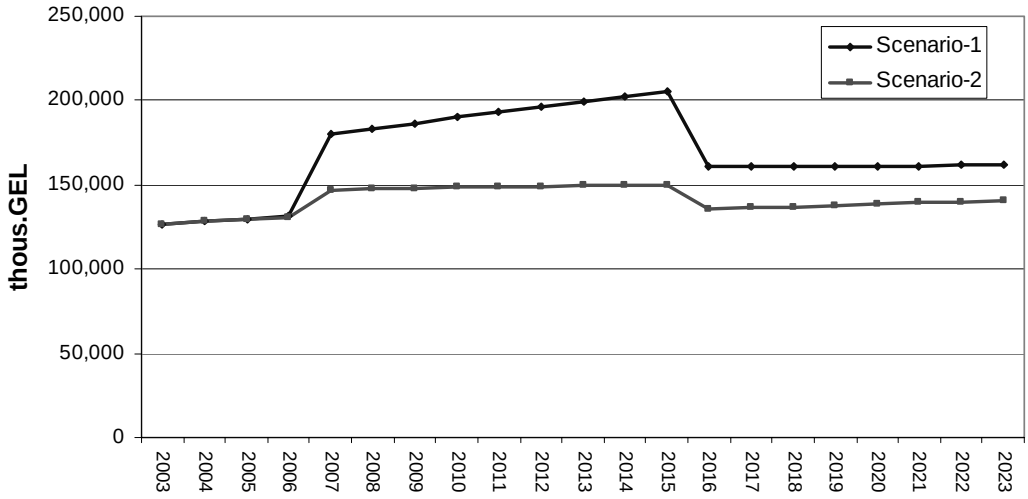
Table 7.2The required W&WW sector financing in the selected cities in 2003-2023 – FEASIBLE estimations for scenarios1 and 2

Mil. GEL (in prices of 2003)	**Scenario 1**	**Scenario 2**
W&WW, total	**3,539.7**	**2,959.1**
Including:		
Water supply, total	2,788.1	2,411.4
Including:		
Operating costs	1,652.8	1,616.9
Costs of maintenance, repair and rehabilitation	984.2	767.2
Reconstruction and new construction	151.1	27.3
Wastewater collection and treatment, total	751.6	547.7
Including:		
Operating costs	184.3	166.4
Costs of maintenance, repair and rehabilitation	300.8	265.0
Wastewater collection and treatment, total	266.4	143.5

Source: FEASIBLE calculations

The results of the assessment of the available and required financing *by years* for scenarios 1 and 2 are given in Annex 5. Please note that the estimations of W&WW capital investments needs in scenarios 1 and 2 produced by the FEASIBLE model differ considerably. Implementation of the technical measures envisioned in scenario 2 will result in capital investments almost **half of those in** scenario 1. The difference is approx. **GEL 270 mil.** or **USD 135 mil**.

Figure 7.1W&WW financing needs in selected Georgian cities in 2003-2023 in scenarios-1 and 2.



Source: FEASIBLE calculations

7.2.1 Possibility of gradual elimination of the financing gap

The estimations indicate that the baseline scenario measures aimed at the financing gap elimination (see p. 5.2.1) are not enough to close the financing gap in this scenario. Thus, it is proposed to strengthen and supplement them.

Optional set of <u>additional</u> measures aimed at the sector financing increase:

1) **Service payment collection rates increase** (see. p. 5.2.1). **–** similarly to the baseline scenario (see p. 5.2.1).

2) **Tariff increase**.

It is proposed to review two variants of raising household tariffs, which were discussed by the working group.

The first variant is recommended in the framework of the conducted analysis of acceptability and willingness to pay and permits only 5% of Georgia's population to pay for water supply and sewage services over **2.5%** of their aggregate family income. Here and henceforth we will call this option the "**affordability limit**", under which tariff growth in Tbilisi and other Georgian towns will be comparable in percentage.

Table 7.3Variant 1 - affordability limit variant

Increase in % from the previous year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Water												
Tbilisi	0%	0%	83%	67%	11%	10%	10%	11%	10%	11%	11%	11%
Other Georgian cities	0%	0%	104%	11%	11%	10%	10%	11%	10%	11%	11%	11%
Wastewater												
Tbilisi	0%	0%	83%	67%	11%	10%	10%	11%	10%	11%	11%	11%
Other Georgian cities	0%	0%	104%	11%	11%	10%	10%	11%	10%	11%	11%	11%

Water and wastewater tariffs, GEL/m3

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Water													
Tbilisi	0.04	0.04	0.04	0.07	0.12	0.14	0.15	0.16	0.18	0.20	0.22	0.25	0.27
Other Georgian cities	0.11	0.11	0.20	0.22	0.25	0.28	0.30	0.33	0.37	0.41	0.45	0.50	0.56
Average weighted tariff	0.05												0.31
Wastewater													
Tbilisi	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07
Other Georgian cities	0.07	0.07	0.13	0.14	0.16	0.18	0.19	0.21	0.24	0.26	0.29	0.32	0.35
Average weighted tariff	0.019												0.14

The second full cost recovery variant of the tariff policy, discussed in this section, permits an increase in funding **through a more moderate escalation of tariffs for Georgian towns,** and a more drastic tariff surge proposed for the city of Tbilisi for the first two years of implementing the development scenarios. This variant was suggested by the steering committee and can partly be justified by the higher incomes of Tbilisi residents, as well as by implementation of activities dealing with reduction of water consumption and people's transition to payment for actual amounts of consumed water (ee section 4 of the report).

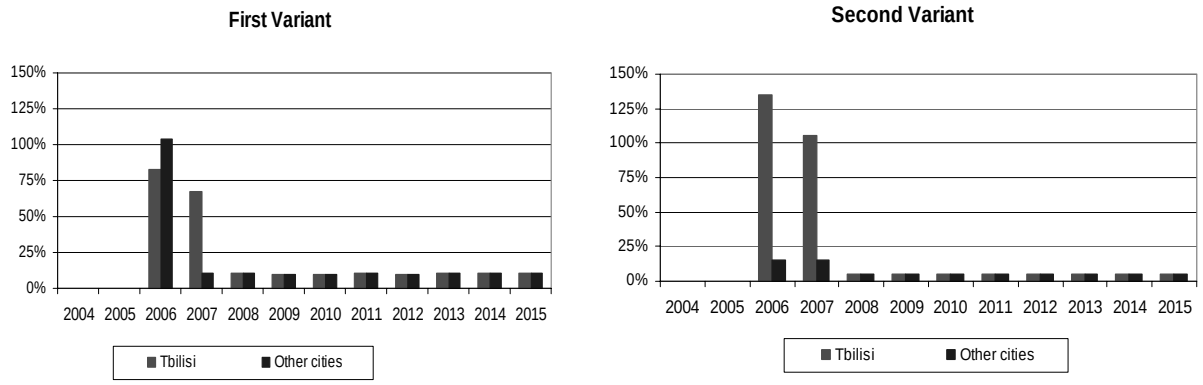
Table 7.4Variant 2 – full cost recovery variant

Increase in % from the previous year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Water												
Tbilisi	0%	0%	135%	105%	5%	5%	5%	5%	5%	5%	5%	5%
Other Georgian cities	0%	0%	15%	15%	5%	5%	5%	5%	5%	5%	5%	5%
Wastewater												
Tbilisi	0%	0%	135%	105%	5%	5%	5%	5%	5%	5%	5%	5%
Other Georgian cities	0%	0%	15%	15%	5%	5%	5%	5%	5%	5%	5%	5%

Water and wastewater tariffs, GEL/m3

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Water													
Tbilisi	0.04	0.04	0.04	0.094	0.193	0.202	0.212	0.223	0.234	0.246	0.258	0.27	0.29
Other Georgian cities	0.11	0.11	0.11	0.13	0.15	0.15	0.16	0.17	0.18	0.19	0.19	0.20	0.21
Average weighted tariff	0.05												0.27
Wastewater													
Tbilisi	0.01	0.01	0.01	0.02	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.07	0.07
Other Georgian cities	0.07	0.07	0.07	0.08	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.14
Average weighted tariff	0.019												0.082

Figure 7.2Affordability limit and full cost recovery variants of household tariffs, increase in % from the previous year



Source: COWI calculations

Under both of the tariff policy variants, the resulting tariff for water supply and sewage services for the city of **Tbilisi** will be the same, that is GEL 0.345 /m³. If the programme of water saving is implemented in the city, a monthly payment for consumption of 300 l/person/day will be approx. GEL 3/person/month (the options differ only in tariff growth rates in Tbilisi and by years). For **the rest of Georgian towns** the household tariff will be **GEL 0.91/m³** under the first variant of the tariff policy, and **GEL 0.35/m³** under the second variant of the tariff policy. Taking the average water consumption in these towns as a constant (82 l/person/day for 2004), a monthly W&WW services payment in these towns will amount to, correspondingly, approx. **GEL 2.22**/person/month or **GEL 0.9**/person/month.

Tariffs for industrial enterprises and other consumers within 2006-2015 are expected to grow by a rate of 5% a year.

Both options of the tariff policy permit an increase of the funding of the sector for implementation of the development scenarios, but the choice in favour of a particular tariff policy option can only be made provided that there is a certain social consensus.

3) **Increase in budget allocations for W&WW financing** up to **2.2%** of the budget expenditures of the republic.

4) **Borrowings**. Capital investments are supposed to be financed through the attraction of concession loans. In the calculations, loan interests were added to the amount of operating costs and were assumed to be paid from the W&WW services charges.

Table 7.5Borrowings in scenario 1

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Credits	920	47,543	47,543	47,543	47,543	47,543	47,543	47,543	47,543	47,543
Loan service							-70	-3,673	-7,445	-11,049
		2016	2017	2018	2019	2020	2021	2022	2023	Total
Credits		368								429,175
Loan service		-14,652	-18,257	-21,860	-25,236	-28,839	-32,444	-32,472	-32,472	-228,469

Source: FEASIBLE calculations

Table 7.6Borrowings in scenario 2

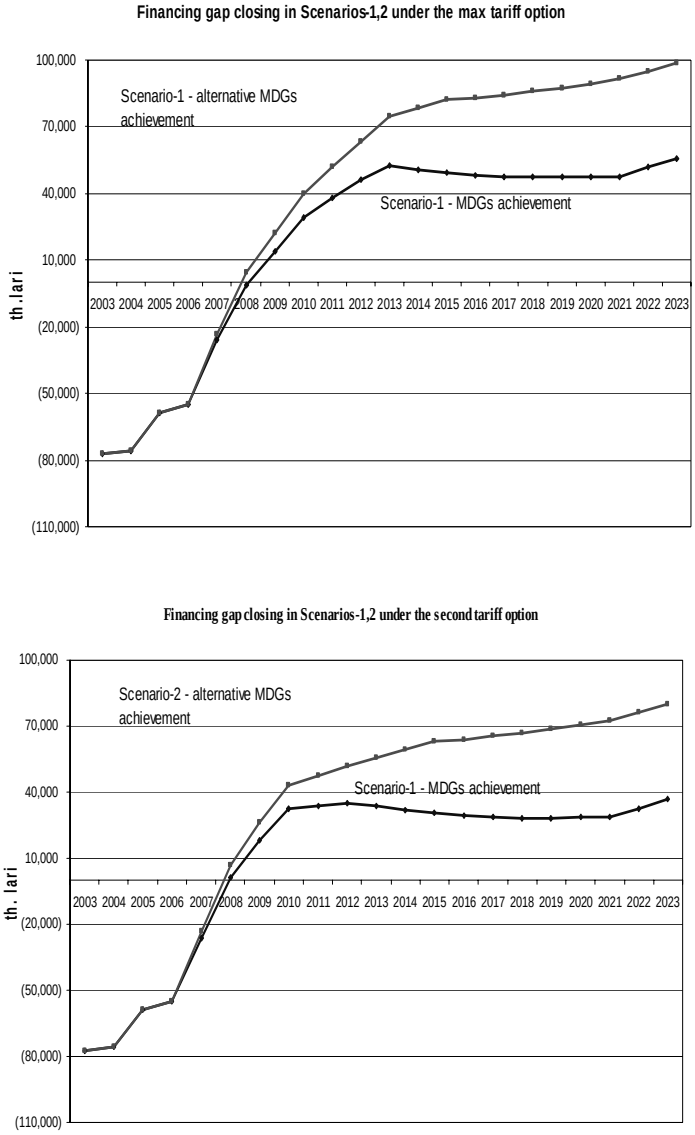
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Credits	282	15,905	15,905	15,905	15,905	15,905	15,905	15,905	15,905	15,905
Loan service							-21	-1,227	-2,433	-3,638
		2016	2017	2018	2019	2020	2021	2022	2023	Total
Credits		133								143,560
Loan service		-4,844	-6,050	-7,255	-8,461	-9,667	-10,872	-10,882	-10,882	-76,232

Source: FEASIBLE calculations

This means that in 2007-2015 the Georgian Government is to attract external loans (or grants) in the range of approx. USD **23.5 mil**. a year in scenario 1 and approx. USD **8 mil.** a year in scenario 2.

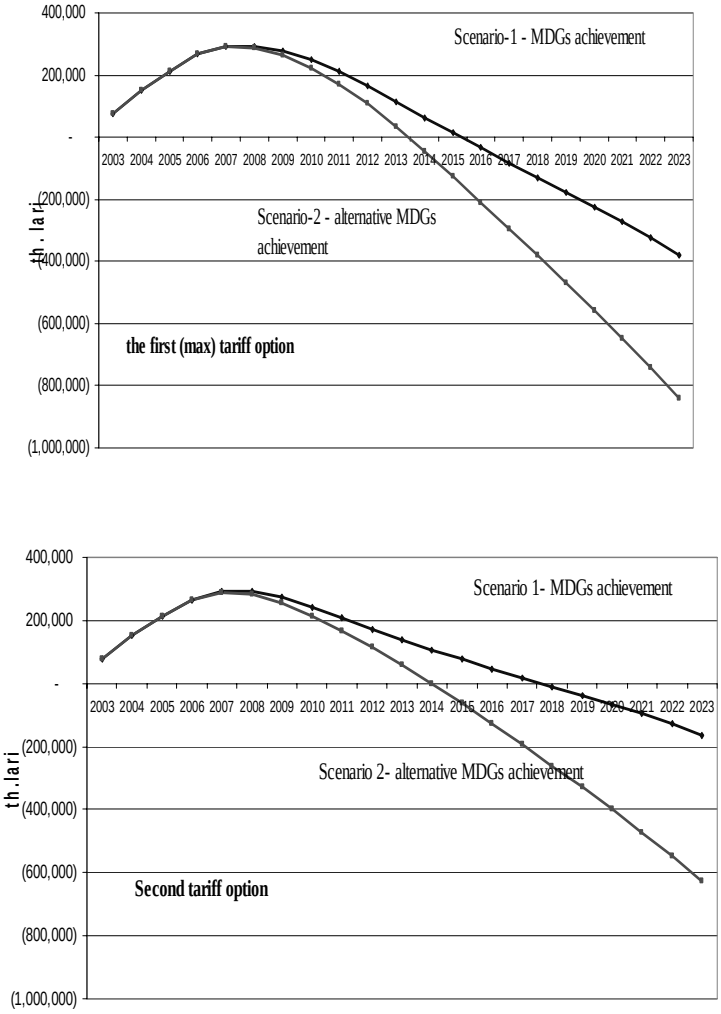
The scenario modelling results are shown below.

Figure 7.3 Financing gap for operation, capital repair, asset replacement and credit service costs in scenarios 1 and 2 by years on implementation of the first and second variants of the tariff policy



Source: FEASIBLE calculations

Figure 7.4Accumulated financing gap in scenarios 1 and 2 on implementation of the first and the second variants of the tariff policy



Source: FEASIBLE calculations

As can be seen from Figure 7.2, the total annual financing gap in operating costs, as well as costs of maintenance, repair, rehabilitation and credits service will be eliminated in 2007 for scenario 2 and in approx. 2008 in scenario 1. But, as can be seen from the further dynamics, scenario 2 is obviously less costly and allows for generating a much larger surplus of funds compared to scenario 1.

It should be noted that in both scenarios the revenue increased as a result of implementation of the above or similar sets of measures to attract extra funding, beginning from **2009 and 2011, respectively.** This will allow the utilities to not only fully cover annual operating costs, but also to have additional funds for reconstruction and new construction.

However, **the accumulated financing gap** (increasing from the beginning of the period in question), under any of the proposed tariff policy options, will be impossible to eliminate at least until 2013, even provided the situation develops

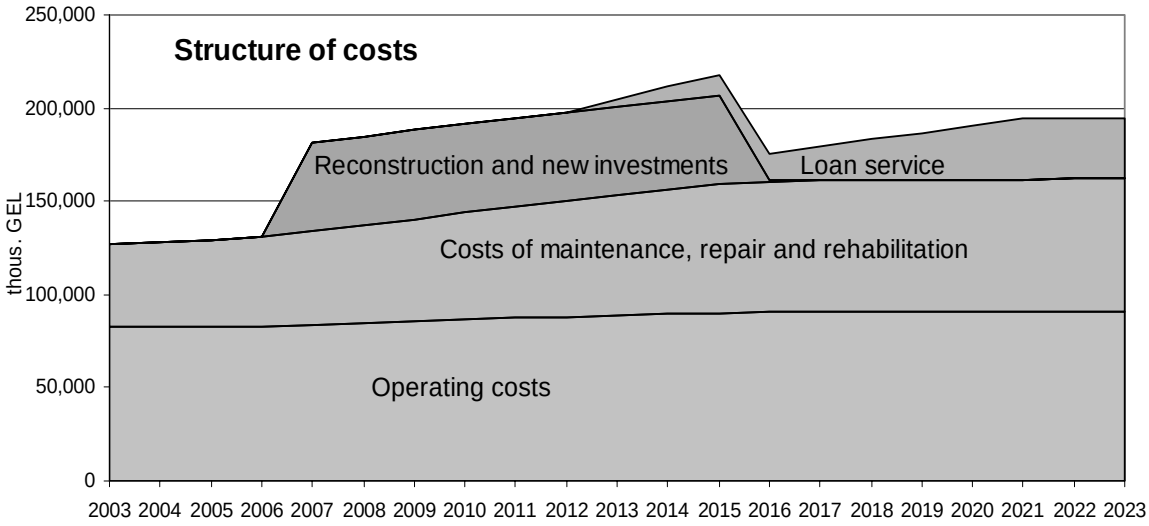
in the most favourable way, i.e. scenario 2, and that the first option of the tariff policy is implemented. The accumulated financing gap in scenario 1 will not have decreased before 2015 (or 2018 under the second option of the tariff policy). This means that **the accumulated deterioration of the key assets in the W&WW sector will remain critically high – even higher than in the baseline year**!

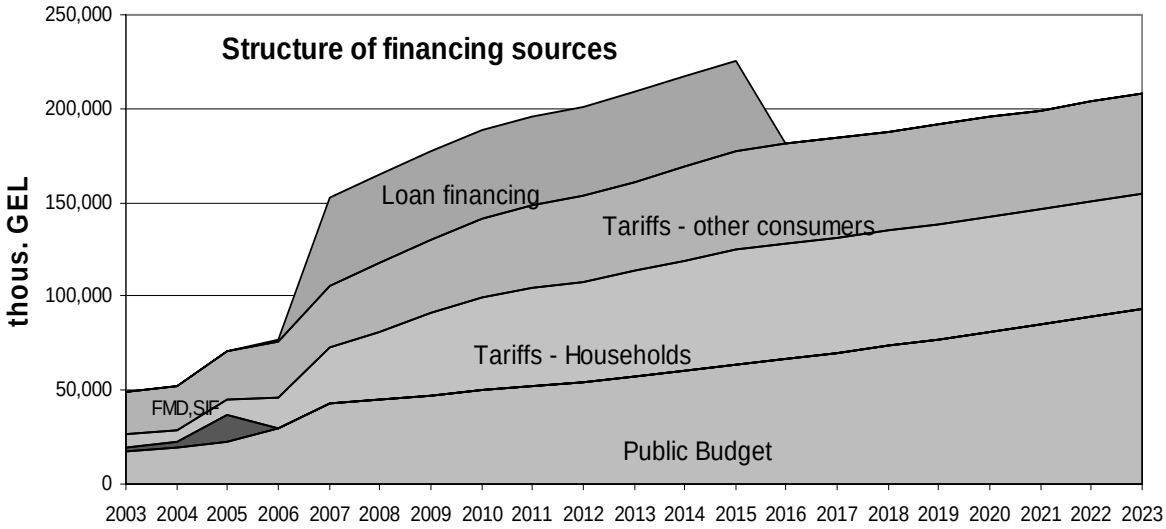
In general, it can be said that under given assumptions scenario 2 is sure to be much more acceptable and financially viable.

Nevertheless, as it was proposed by the working group, scenario 1 formed the basis for further analysis. This scenario requires more intensive replacement and rehabilitation of networks and facilities, as well as sustainable access to the safe drinking water through in-house taps.

The costs and financing sources for scenario 1 are presented below.

Figure 7.5Costs and financing sources in scenario 1





Source: FEASIBLE calculations

7.3 Scenario 3: Combination of MDG-7 achievement and rehabilitation of mechanical treatment in resort towns on the Black Sea coast

All wastewater treatment plants in Georgia were designed and constructed as mechanical-biological wastewater treatment facilities. The wastewater is discharged into the centralized urban wastewater collection systems and in most cases, due to the relief peculiarities flow into the treatment facilities by gravity.

At present, for various reasons, none of the treatment facilities is able to ensure the quality of the designed effluents. Biological treatment is not employed anywhere. At best only mechanical treatment is applied. Thus, after treatment facilities, the wastewater is discharged without any treatment and disinfection directly into the rivers and watercourses.

The following development objectives are proposed for the wastewater sector:

1) Rehabilitation of **mechanical treatment in all cities,** discharging wastewater into **the Black Sea**. Rehabilitation of effective and duly functioning mechanical wastewater treatment will considerably decrease the load on the Black Sea coastal zone and will be the first step towards introduction of a full chain of mechanical and biological treatment

2) The development goal for Gabardansky WWTP, serving such large cities as Tbilisi and Rustavi, is recommended to be the **modernization of Gabardansky WWTP up to the level of mechanical and biological treatment,** as Gruzvodocanal JSC has already done much to restore the effective mechanical treatment and has a significant institutional and human resource capacity.

Table 7.7Objectives of the wastewater sector in resort cities and towns

	Settlement	Total treated wastewater	Total wastewater discharged with-out treatment	The applied way of wastewater treatment	Target way of wastewater treatment
		тыс.м3/год	тыс.м3/год		
Large cities	Tbilisi	219900	79076	M	MB
	Rustavi		7000		
Other cities	Kutaisi	16500	0	M	M
	Batumi		17900		M
	Zugdidi		1500		M
	Gori	1750	0	M	M
	Poti		3900		M
	Kobuleti		1170		M

Rehabilitation of the proposed wastewater treatment modes will considerably reduce a negative environmental impact on the Kura River, which is the drinking water source for a number of downstream settlements both in Georgia and in Azerbaijan, and will improve the environmental conditions in the Black Sea resort area, thus increasing its attractiveness to tourists, which will promote social and economic development and improvement in the living conditions of the population in the region.

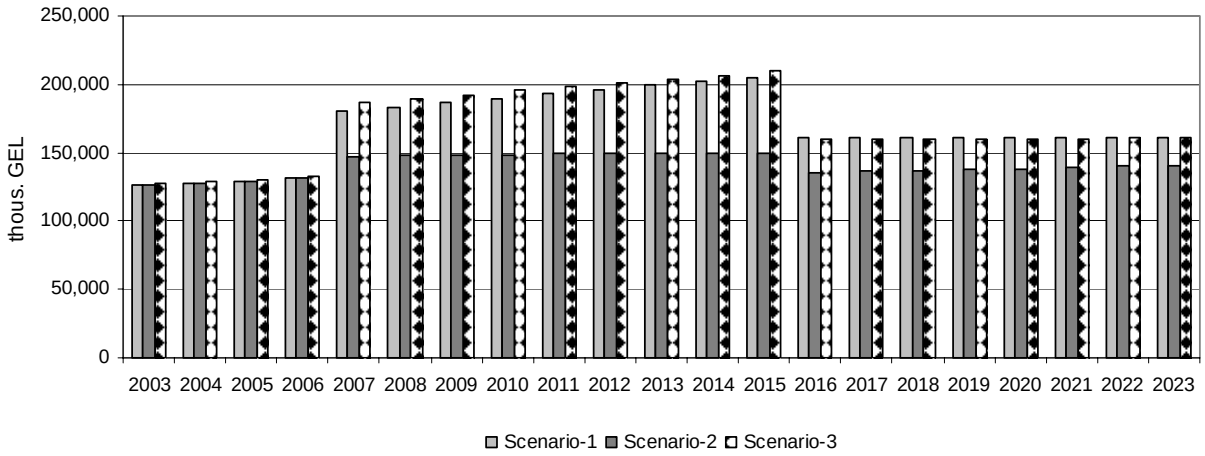
A cost calculation for the implementation of scenarios 1-3 is given in Table 7.9 and Figure 7.6.

Table 7.8The required W&WW sector financing in the selected cities in 2003-2023 – FEASIBLE estimations for scenarios 1, 2 and 3

Mil. GEL (in prices of 2003)	**Scenario 1**	**Scenario 2**	**Scenario 3**
W&WW, total	3,539.7	2,959.1	3,582.5
Including:			
Water supply, total	2,788.1	2,411.4	2,788.1
Including:			
Operating costs	1,652.8	1,616.9	1,652.8
Costs of maintenance, repair and rehabilitation	984.2	767.2	984.2
Reconstruction and new construction	151.1	27.3	151.1
Wastewater collection and treatment, total	751.6	547.7	794.3
Including:			
Operating costs	184.3	166.4	196.4
Costs of maintenance, repair and rehabilitation	300.8	265.0	283.8
Reconstruction and new construction	266.4	143.5	294.0

Source: FEASIBLE calculations

Figure 7.6Annual financing needs of the W&WW sector in the selected Georgian cities in 2003-2023, scenarios 1, 2 and 3



Source: FEASIBLE calculations

In the financing gap closure analysis, the same activities as for scenarios 1 and 2 have been taken into account, with the exception of the attracted credits and/or grants. Here a slight increase is necessary (up to USD 25 mil. a year in 2007-2015), taking into account the larger volume of capital investments in the wastewater sector.

In order to finance capital investments it is proposed to attract loans and, as has been done before, the loan interests were added to the amount of operating costs and were assumed to be paid from the W&WW services charges.

Table 7.9Attracted credits in scenario 3

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Credits	920	49,311	49,311	49,311	49,311	49,311	49,311	49,311	49,311	49,311
Loan service							-70	-3,807	-7,713	-11,451
		2016	2017	2018	2019	2020	2021	2022	2023	Total
Credits		368								445,087
Loan service		-15,189	-18,927	-22,664	-26,174	-29,911	-33,650	-33,678	-33,678	-236,912

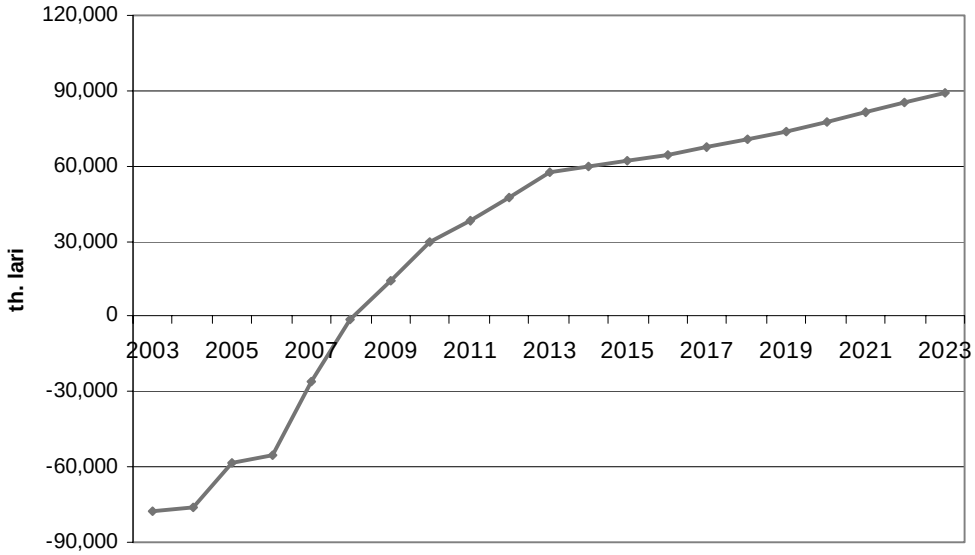
Source: FEASIBLE calculations

As can be seen from Figure 7.7, in scenario 3, given that the proposed set of measures is implemented (under the first tariff policy option), the total annual financing gap in operating costs, as well as costs of maintenance, repair, rehabilitation and credits service will be eliminated in approx. 2009. After this the

utilities will have extra funds to finance capital investments in modernization and extension of the infrastructure.

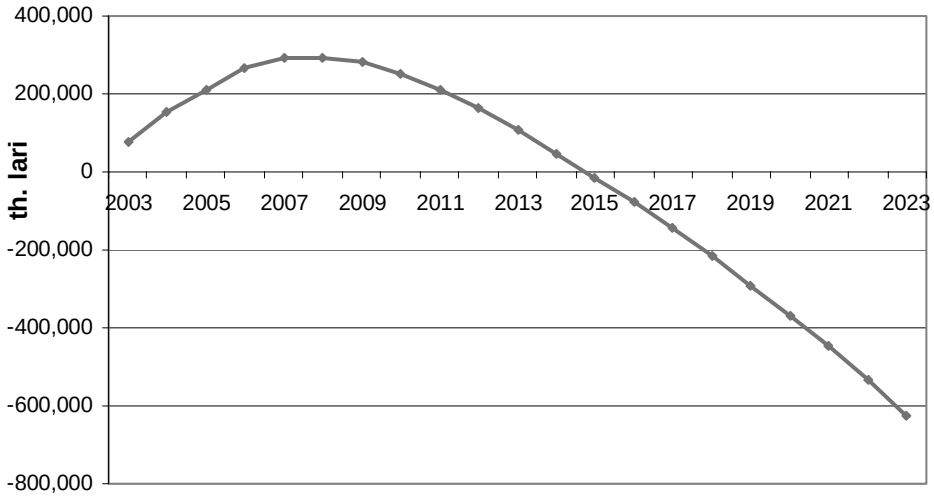
However, the accumulated financing gap in scenario 3 cannot be eliminated before 2015 (see Figure 7.8). This means that **the accumulated deterioration of the key assets in W&WW sector will remain critically high during the whole year– even higher than in the baseline year**!

Figure 7.7Financing gap for operation, capital repair, asset replacement and credit service costs in scenario 3 by years, on implementation of the first option of the tariff policy



Source: FEASIBLE calculations

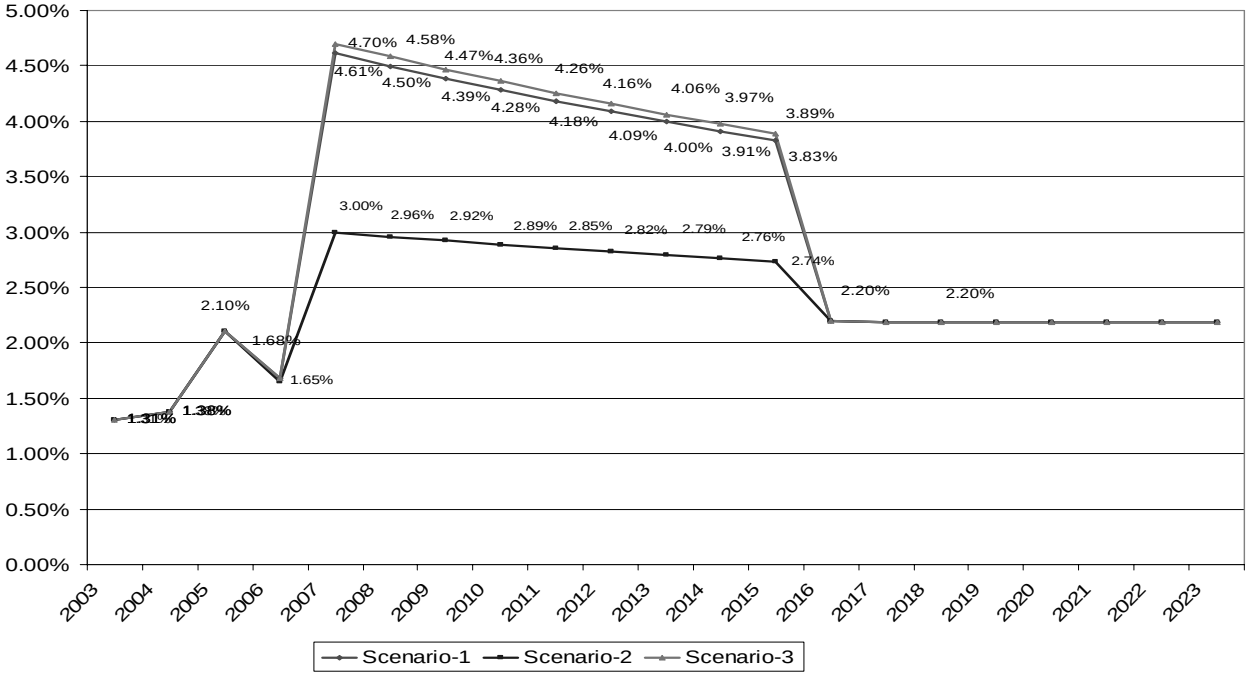
Figure 7.8Accumulated financing gap in scenario 3



Source: FEASIBLE calculations

Please note that all considered sources of capital investments financing are interchangeable. If the Georgian Government does not manage to provide the required financing from one source (e.g. the budget of the republic), the missing funds should be attracted from other sources (loans or grants). In general, the financing level required in scenarios 1, 2 and 3 from the public budget, loans and grants (in percent of the budget expenditures of the republic) is presented in Figure 7.9

Figure 7.9The financing level required in scenarios 1, 2 and 3 from the public budget, loans and grants (in % of the budget expenditures of the republic)



Source: Consultant's estimations

Thus, this section presents calculations for three scenarios of W&WW sector development in Georgia which correlates with the international obligations of Georgia in terms of MDG achievement in the water and sanitation sector. The financing needs analysis shows that the considered scenarios are in principle financially feasible.

If funds are fully mobilized, including budget allocations, consumer charges, credits and grant attraction, and if the available resources are used rationally and efficiently in 2009-2011, there will be extra funds in the sector; not only for coverage of operating costs and costs of maintenance, capital repair, asset rehabilitation and credit service, but also for implementation of reconstruction and new construction programmes.

Of course, the other development scenarios are possible. Selection of the development goals and the development scenarios is ultimately a political decision. But any set of goals may serve as a basis of realistic sector policy in the W&WW sector only if the goal achievement costs coincide with the national financial capacity.

8 Conclusions

8.1 Technical problems of the Georgian water and wastewater sector

- Analysis of the collected data has shown that the average coverage by centralized water supply services in the sample of cities and towns under consideration for this study varied from 40% to 100%, including the population who receive water from street stand pipes

- In the majority of towns, water is supplied for an average of 12-16 hours a day, but there are examples of 4 hours/day water supply; water is supplied around the clock only in 4 towns in the sample (data of 2004)

- The scheduled supply of water to the network is accompanied by a series of additional problems:

  - reduced service life of the networks due to an accelerated corrosion and high wear rate of the main water pipelines and shut-off valves because of frequent hydraulic shocks and frequent emptying of water pipelines

  - stagnation of water in the networks and the formation of areas with reduced pressure in the water pipelines (hence, possible penetration of groundwater and other water and the resultant secondary contamination)

- Water taken from underground sources in Georgia is usually fed to the network without treatment; however in the majority of large towns, chlorine agents are used for disinfection. In small and medium populated centres, the **supplied water is either not disinfected or disinfected depending on the seasons**, which results in potentially significant risk for public health

- The majority of W&WW utilities have not performed the required routine repair and restoration work for a long period of time. **The sanitary and technical condition of the majority of water abstraction facilities in Georgia are unsatisfactory,** which causes regular outburst of water-borne infections

- Deterioration of water quality, especially far away from a headwork, is mostly noticeable in large towns, which indicates **secondary contamination of water in the networks**

- Internal networks (inside houses) are also in bad condition, which is confirmed by widespread excessive water use, in part because of leaking valves and sanitation facilities, which result in a significant pressure drop in the system and the need to increase pressure at the outlet from the pumping stations

- The lack of proper funds for the replacement and reconstruction of worn-out water distribution networks results in a high loss of water – **loss and unaccounted for water can be high as 50-60% of the total volume of water fed to the network**

- The lack of area distribution (zoning) and optimisation of pressure in the networks at the design stage leads to a high degree of wear of the networks, especially in areas with a high elevation difference, and to the use of excessively powerful pumps to maintain the required pressure in the network

- **Most of the water pipelines and of the pumping equipment are worn out and need repair**, however, funds have not been allocated for many years to update the pumping equipment. The use of outdated equipment without adaptation to the changing demand for water and without using modern methods of hydraulic network modelling causes excessive energy consumption and high operation costs

- The most alarming situation exists in domestic and industrial sewage collection and treatment. The majority of wastewater treatment plants have gone out of operation, and therefore wastewater is discharged, without treatment, into open water bodies, which results in the pollution of the rivers and basins of the Black and Caspian Seas. Such contamination of water resources has become the main reason for mass intestinal and infectious diseases in Georgia.

8.2 Institutional and regulatory issues requiring special attention

- **The lack of a well though-out sector policy, the inadequacy of the institutional set-up and regulation are among the main reasons for technical and financial problems in the water and sanitation sector in Georgia.**

- Starting from the 1990's, the state water management system in Georgia collapsed due to a deep political and economic crisis in the country.

- The agencies which are supposed to be responsible for developing and implementing the sector policy and the programme of W&WW sector reform, regulating the sector and its methodological support, developing sector investment programmes and mobilizing resources for their implementation (budgetary funding and/or external loans and grants), practically fail to address these tasks

- Lack of long-term strategic planning both at the national and at the utilities level (business plans for development)

- Lack of an adequate framework for tariff regulation to ensure a sufficient level of income to utilities , taking into account affordability of water and wastewater services for low-income households

- The existing system of social support for low-income groups in Georgia is by no means suitable to mitigate the negative effects on the poor of a possible escalation of tariffs on W&WW services

- In the majority of cases, the water supply and sewerage enterprises use outdated construction norms and rules in their basic activities. Comparison with international indicators confirms that there is a significant potential for improving the efficiency of utilities. Currently no entity in Georgia has responsibility for disseminating know-how and best practices

- Involvement of the private sector in the provision of water and wastewater services in Georgia is hindered by a lack of economic incentives, a poor investment climate, as well as a lack of information and poor regulatory frameworks

- The poor governance of the sector is one of the root causes for the poor state of water infrastructure in the country.

8.3 Financial problems of the water and wastewater sector

- In 1992-2003, *household tariffs* did not cover the actual current and capital expenditure; in the city of Tbilisi in 2003 the tariff covered only 29% of their capital and operating costs. Therefore, many W&WW utilities were highly indebted. Currently, household tariffs cannot reflect all costs incurred by water utilities, in particular depreciation and capital repair

- There is a clear discrepancy between water production and water that is sold, due to a large number of non-registered consumers and widespread theft of water. There is a clear need to introduce metering policies for all types of consumers

- The rate of household payment collection is very low. In 2003, the average collection rate from households was only 34% for water supply and 30% for the wastewater collection and treatment services. Despite obvious improvements in the collection rate, observed in 2004, the rate remains very low. This appears to be a priority issue for utilities to focus on

- As a consequence, receivables of the W&WW utilities in Georgia are high, although recent years have seen a slight reduction. Utilities' debt is mostly due to suppliers of electricity

- Budgetary funds allocated for capital repair are not sufficient to cover capital costs, so there may be a good rationale for the growth of the budgetary funding. Currently, 1.24% of the national public budget is spent on municipal water and there are currently no plans to increase this funding

- Possibilities of raising more finance through user charges have not been exhausted. In 2003, households paid an average of only 1.3% of their expenses for W&WW services (VAT included). There is a real opportunity to increase W&WW services payments up to 3% of disposable incomes, which is frequently regarded as a good threshold for what people are able to pay. However, this requires parallel measures to increase the willingness-to-pay for W&WW services among the households.

8.4 Scenario analysis output

The baseline scenario analysis has shown that if current financial trends continue, the W&WW infrastructure will continue to deteriorate.

However, the implementation of a set of recommended measures to close the financing gap may break the current vicious circle.

These recommendations include a significant reduction of losses and unaccounted for water consumption, and promote more rational use of water by consumers through adequate pricing based on metered consumptions.

The ways of reducing amounts of unaccounted for water are:

- Rehabilitation of pipelines, systematic search for and elimination of leaks
- Elimination of illegal connections and unpaid consumption
- Metering of all major connections
- Introduction, if necessary, of water consumption limits and application of higher (penalty) payment rates for above-the-limit water consumption.

It should be noted that implementation of the above measures will also achieve the following:

- **In the medium term:** To optimize water consumption and make a more accurate assessment of the required capacity of facilities of the W&WW infrastructure before any decisions on possible rehabilitation and extension are made
- **In the longer term:** To save on capital and current costs when rehabilitating and operating the W&WW infrastructure.

The fact that the financing gap can be closed in the baseline scenario makes it possible to set more ambitious *development objectives* for the water and wastewater sector in Georgia. The proposed **goal and development scenarios** were the results of discussions in the working group and the project steering committee and aim at achieving the Millennium Development Goals on water supply and sanitation.

The analysis shows that in order to attain the MDGs by 2015, it is necessary to carry out a number of technical interventions aimed at rehabilitation and exten-

sion of the infrastructure. **Scenario 1**, or "all in-house tap connection", would involve rehabilitation of the existing water mains and sewerage in the 20 cities and towns; construction of new infrastructure (water intake, distribution and treatment facilities) to provide sustainable access to safe water via in-house water taps to all urban consumers, including those who do not have such access at the moment; and reducing losses and unaccounted for-water in Tbilisi.

Scenario 2, or "in-house tap connection plus stand pipes", shares the target to achieve the MDGs in scenario 1, albeit using another technology, safe water would be delivered by standpipes located within 200 metres of households that do not currently have sustainable access to water (i.e. where water quality or continuity of supply are insufficient). This would involve approx. 5% of the urban population in Georgia receiving water through stand-pipes.

Finally, **scenario 3**, or "all in-house tap connection plus wastewater treatment in coastal zones", is a variant of scenario 1, which entails also the rehabilitation of mechanical treatment of wastewater in the Black Sea costal area. This would be a first step towards a complete rehabilitation of the treatment of wastewater in Georgia, and to abating pollution in a region which hosts an important part of the Georgian tourism industry – a potential driver of economic growth in the country.

Modelling of scenario 1 indicates that its implementation will require capital investments in W&WW infrastructure in the selected cities of GEL **417.5** mil. in 2006-2015 (or GEL **47.5** mil. per year), while only GEL **170.8** mil. would be needed for the same period (or GEL **15.9** mil. per year) in scenario 2. Modelling of scenario 3 showed that capital investments would be even higher in scenario 1, at GEL **445** mil. for 2006-2015 (GEL **49.7** mil. per year).

Scenarios 1 and 3 would require much more capital investment than scenario 2, and can only be sustained if the state devotes more than 4% of public budgets to urban water supply and sanitation for the next 15 years. Considering all the other demands that exist on public budgets (e.g., rural water, education, transport, health), this seems unrealistic. Even implementing scenario 2 - much less demanding from the financial point of view but requiring some difficult choices and an effective policy dialogue with the population - would be a challenge for Georgia.

The policy recommendations for tariffs have been developed in the framework of a social assessment including affordability and preliminary willingness to pay analysis. In particular, it was assumed that the proposed tariffs would ensure that 95% of Georgian households would spend less than **2.5%** of their expenditure on water, while only 5% would have to pay more. It was also assumed that implementation of a water saving programme would result in reducing water consumption from 800 litre/capita/day (lcd) to 300 lcd in Tbilisi, while in other cities water consumption will remain constant at the 2004 level of 82 lcd.

Under these assumptions in the baseline scenario, the monthly payment for WSS services in 2006 would be approx. GEL 4.50 (USD 2.50) per household per month in Tbilisi and approx. GEL 3.40 (USD 1.90) per household per month in other cities in Georgia. These monthly payments would be in line with the affordability

threshold and the willingness to pay analysis, which revealed that people in Tbilisi have only limited willingness to pay, whereas the households in Rustavi were willing to pay more for improved WSS services.

FEASIBLE calculations show that implementation of the following set of measures will make it possible to cover current and capital expenditures related to the achievement of the MDGs in the period from 2003-2023:

- Raising collection of billed amounts: From the population up to 85% by 2010 from 34% in 2003, and from industrial and commercial enterprises, budget organizations and other consumers up to 100% by 2007

- Raising tariffs on W&WW services for the population as detailed above

- **Increasing funding from public budgets, including possible foreign loans and/or grants,** up to the level of **4.7**-**3.9%** of the consolidated budget expenditures of the republic under scenarios 1 and 3 and up to **3-2.7 %** of the consolidated public budget expenditures under scenario 2.

If the above measures were implemented and the available resources were used effectively, the *annual total* financing gap would be eliminated by 2008-2011 (depending on the scenario).

However, under any of the proposed tariff policy options it will be impossible to eliminate the *accumulated* financing gap at least until 2013, even providing that the situation develops in the most favourable way, i.e. that the less costly scenario 2 is implemented. The accumulated financing gap in scenario 1 could not be eliminated before 2015 and under scenario 3 not until 2018. Thus, for the next 10 years, **the accumulated deterioration of the key assets in the W&WW sector will remain critically high – even higher than in the baseline year 2003**!

Scenario 2 would therefore appear to be the financially most realistic option, although it may be politically and socially more challenging to implement than the other scenarios, due to the significant scaling-back of infrastructure involved. Achieving the water-related MDGs in Georgia is feasible by the target date 2015, but will require significant political will and efforts to mobilize all available resources and put them to the most effective use.

In order to achieve this, the Ministry of Finance of Georgia would need to consider implementing this financing strategy into its medium-term financial planning. Similarly, municipalities would need to incorporate the strategy into their budget planning. At the same time the Ministry of Economic Development of Georgia would need to develop and set in place the necessary institutional and regulatory measures needed to guide actors at the local level towards the achievement of these objectives. To this end a detailed institutional analysis of the water sector would need to be carried out and recommendations for the restructuring of the sector developed.

8.5 Additional recommendations from the project steering group

- It is expedient to assign responsibility for the development of a programme for the improvement of Georgia's W&WW sector to a specially created intergovernmental *Coordination Committee* consisting of representatives of the Ministry of Economic Development, the Ministry of Finance, the Ministry of Environmental Protection and Natural Resources, the Ministry of Health Protection, Labour and Social Security of Georgia, representatives of water and sanitation utilities and non-governmental organizations concerned

- The possibility of using the positive experience from other EECCA countries (e.g. Armenia and Ukraine) should be considered in the course of the development and implementation of the programme. Also, foreign technical assistance and donor funds for the development of the programme should be attracted as far as possible.

- **Resource conservation** should become one of the priority directions of the programme. This involves the systematic search for leaks, economic incentives for more rational water consumption (paying by meter readings) and other activities for *water demand management*, including a campaign promoting the culture of more rational water consumption. It is expedient to turn to donors with a request to help with the implementation of a metering campaign, while at the same time ensuring adequate changes to tariff policy.

- **Achieving financial sustainability of the sector.** This includes implementation of an adequate tariff policy and drastic improvement of collection of payments for W&WW services, in particular through an improvement of the procedure of charging and collecting payments for water supply and sanitation services from users and application of sanctions for fraudulent non-payments

- **Creation of incentives for efficiency improvements in utilities.** A first step in this direction is to develop contractual relations between water utilities and municipalities in the framework of a performance-based contract, i.e. where the remuneration of utilities depends on their performance. Along with that it is expedient to maintain the infrastructure assets as public (municipal or state) property. Donor assistance could help to develop a few pilot projects in entities that are ready to adopt such contractual relations (e.g. the GruzVodoKanal Ltd. has expressed willingness to do this). *The ultimate goal is to create effective and honest competition for the right of delegated management (leasing or concession) of W&WW utilities*

- **Strengthening the managerial capacity of the agencies which are in charge of development and implementation of the programme.** In particular, the Ministry of Urban Development of Georgia should strengthen its human capacity and the functions of the Department of Construction and Urban Planning, which is responsible for pursuing sector policy

- The creation of an Association of Vodocanals of Georgia could help to address the problem of a lack of information and methodological guidance that local actors are currently suffering from

- **To strengthen the managerial capacity in the sector,** significant training opportunities would be needed. Training programmes should be provided to, first of all, managers and directors, chief engineers and other specialists of water utilities and, in addition to that, representatives of municipalities and personnel of relevant ministries. Donor support should be sought to set up a training centre for W&WW specialists, with the possible involvement of the Caucasus Regional Environment Centre

- **Grass root activities** carried out both through the mass media and interested NGOs should be initiated at the earliest stage, with the purpose of informing the public of the necessary reforms in the sector.

Volume II:
Affordability Analysis and Willingness to Pay

9 Executive summary

This report represents the second volume of the report on the project *Support to the Georgian Government in Developing and Implementing a Financial Strategy for Urban Water Supply and Sanitation in Georgia and Carrying out Affordability Analysis.*

The price variants presented in this chapter were developed taking into account the results of the affordability assessment, as well as the need to bridge the financing gap identified in Volume 1. It is assumed that the affordability price level is lower than the price that ensures full cost recovery, and the aim of the analysis is to find the maximum affordable price. This assumption is confirmed by the financial analysis in Volume 1.

The report covers findings related to the Affordability (or Ability to Pay - ATP) and Willingness to Pay (WTP) analysis. The report considers two price variants discussed in Volume 1:

- Variant 1: Affordability Limit;
- Variant 2: Closing the Financing Gap

In Variant 1, the affordability analysis is taken as starting point and the price for water supply and sanitation (WSS) is determined such that most households are able to pay for the service. In Variant 2, the WSS price is chosen as an example that ensures that the financing cash-flow gap is closed. This variant was advocated by the Steering Committee of the project. Whereas the price increases suggested in Variant 1 follows strictly from the assumptions made in the affordability analysis, the price increase in Variant 2 is one out of many price increases that ensure closure of the cash-flow gap.

The financial viability of the two variants is discussed in Volume 1; the conclusion being that the financial gap is closed in 2015 in the case of Variant 1 and in 2018 in the case of Variant 2. Both variants are used to simulate the financing for a given infrastructure development target/service level.

Conclusion on Variant 1 - Affordability Limit
Variant 1 considers a maximum acceptable price from the point of view of affordability among households in Tbilisi and in other cities. In this variant it is assumed that the limit of an affordable water price is such that only 5% of the households spend more than 2.5% of their total household budget on water supply and sanitation. A separate subsidy scheme is considered to be necessary for these 5% of the households.

The result of the analysis of Variant 1 is a set of appropriate price increases. In Tbilisi, the present price is at an appropriate level and there is no room for increases in the price. In the years up to 2015, the nominal prices are proposed to increase by 10-11% yearly so that the price for water supply and sanitation follows the increase in nominal GDP.

In Rustavi, the result of the analysis is a doubling of the water price in the first year. As for Tbilisi, this is followed by yearly increases of 10-11% because the same economic development is assumed for Tbilisi and other cities. This is because the households out-

side Tbilisi are paying a low amount for the water supply and sanitation at present; the water bill is lower in both monetary terms and as a percentage of total household expenditures.

The proposed changes resulting in Variant 1 is consistent with the information obtained through the focus group secession carried out in connection to the willingness to pay analysis. The purpose of the interviews was to obtain an indication of the WTP among households and hence to have a basis for checking the feasibility of the suggested price increases[5].

The focus group participants in Tbilisi were reluctant to pay more for water supply and sanitation, whereas the focus group participants in Rustavi would like to pay more for an improved level of service.

Conclusion on Variant 2 - Closing the Financing Gap

In Variant 2, the price increases were determined such that there would be no financing cash flow gap during the period considered. As this can be obtained in many ways, Variant 2 is an example of how such a price structure could be formed. This means that neither the affordability analysis nor the willingness to pay analysis has been used as input for this variant. The Variant involves a steep increase in the water price in Tbilisi and a lower increase in other cities, which was an approach advocated by the Steering Committee.

The approach is the opposite; the consequences in terms of affordability are analysed and the price increases suggested in the variant are evaluated according to the information gathered in the willingness to pay analysis.

In Variant 2, the price is increased by 32-37% in Tbilisi and by 15% in other cities in 2006 and 2007. In other years the increase is 5% for both Tbilisi and other cities.

The affordability analysis indicates that under Variant 2 a large part of the households in Tbilisi would be likely to have difficulties in paying for the water and sanitation services. This is especially the case in 2007, where 18% of the households are spending more than 2.5% of their total household expenditures on water supply and sanitation.

On the other hand, less than 2% of the households in other cities would spend this fraction of their household expenditures on water supply and sanitation, which indicates that this variant is unbalanced between Tbilisi and other cities.

This conclusion is supported by the opinion indicated during the focus group sessions on willingness to pay; a higher willingness to pay was found among households in Rustavi (other cities) than among the households in Tbilisi.

Hence following the affordability and willingness to pay analysis, Variant 2 cannot be suggested as a reasonable price variant.

[5] If the purpose of the WTP analysis is to set tariffs, a quantitative survey is needed. An example of this is the World Bank funded work *Willingness to pay for rural infrastructure services in Georgia*, September 2005. This study involved personal interviews with 1,000 households in Georgia.

Social protection

So far the state social assistance in Georgia largely followed the former Soviet approach which provided benefits in a form of defined privileges to certain 'at risk' groups in society (these are the elderly people, families with many children, people with disabilities, subjects to repression, refugees, etc.), as well as citizens who are providing or who completed a special service to the state – participants in the Great Patriotic War, heroes of labour, policemen, etc,

This way of targeting social benefits does often not support the poorest groups of the population and therefore is not an efficient measure for supporting the needy households. However, a reform of the social protection system in Georgia is under way. The new system is planned to be in operation from the year 2006, though the system is introduced on a trial basis from the summer of 2005.

One of the main areas is the provision of social assistance that allows the state to reduce the social risks related to the low and varying incomes of vulnerable groups and to ensure that they receive a minimum level of welfare. The social categories will be replaced by means of test as the entitlement criterion, which means that the benefiting households would include the households in urban areas that have difficulties in paying for the water services.

Hence if the social protection system envisaged is implemented and is working efficiently, the households identified under Variant 1 as not being able to pay the water and sanitation services bill, will receive a subsidy that will cover the increased water price. However, two caveats should be made here. First, the implementation of a targeted system requires significant transactions cost and administrative effort when poor households are to be identified. Second, it is assumed that the price of other infrastructure services are held constant in the period considered. If services such as gas, electricity, telephone and district heating are improved and prices for those services are increased, the planned income support may not be sufficient, even in the case where the social protection system is implemented efficiently.

10 Introduction

10.1 Purpose

This report represents the second volume of the report on the project *Support to Georgian Government in Development and Implementing Financial Strategy for Urban Water Supply and Sanitation in Georgia and Carrying out Affordability Analysis*.

The present report covers the findings related to affordability analysis and willingness to Pay (WTP). The financing strategy for the water and wastewater sector in Georgia is presented in the Volume I. The two volumes represent two integrated parts of the project.

The project was financed from the EU TACIS funds and contracted to COWI by the OECD EAP Task Force Secretariat in December 2004.

The purpose of the present report is to describe the results of the affordability and WTP components and their interrelations with the development of the Financing strategy (FS) urban water supply and sanitation in Georgia.

In this report, emphasis is put on the affordability analysis. Two approaches to the affordability analysis are taken. First a set of price increases is proposed based on an assumption on affordability among households in urban Georgia. The result of this approach is called *Affordability Limit* (Variant 1).

Secondly, the affordability analysis is used to assess the consequences of a proposed set of price increases, motivated by a closure of the financing gap. This is called *Closing the Financing Gap* (Variant 2), and the result of the analysis is an assessment of the price increases in terms of affordability and willingness to pay.

10.2 Structure of the report

The report is structured in the following way:

Chapter 1 contains executive summary of the findings related to the affordability analysis and WTP analysis and is supplementing the executive summary of the Volume 1, covering also general project's conclusions and recommendations.

Chapter 2 presents the purpose of the report and describes the structure of the Volume 2 of the report.

Chapter 3 presents the methodology and is mainly focused on explaining the notions of willingness to pay and affordability (ability to pay). It is further describing how the data is used in the analysis.

Chapter 4 addresses the present situation in Georgia describing the present level of income and expenditures of the population and share of households' expenditures pres-

ently used for the water supply and sanitation (WSS). In particular, the situation in Tbilisi is addressed.

Chapter 5 describes the findings of the WTP analysis. The approach taken in the WTP analysis is qualitative and comprises two focus group sessions and the WTP analysis is used to check if the conclusions drawn up on the basis of the affordability analysis are consistent with the attitudes revealed in the focus group sessions.

Chapter 6 describes two price variants considered, Variant 1- Affordability Limit and Variant 2 - Closing the Financing Gap.

Chapter 7 presents the conclusions of the affordability analysis and hence the main conclusions of this report

Chapter 8 includes a short overview of the social protection system in Georgia and presents the consultant's views on its ability to support the poorest groups of the population in paying for water and sanitation services.

11 WTP and affordability assessment – notes on methodology

Considering alternative water management policies and preparing water sector financing strategy for a country includes evaluation of alternative ways of pricing of water services, different tariff and price setting policies and a thorough analysis of the issue of affordability. This issue concerns the social aspect of water service provision and *affordability (ability-to-pay, ATP) analysis* shall be an integrated part of the policy making process.

It is assumed that both the affordable price and the willingness to pay for water supply and sanitation is lower than the price that ensures full cost recovery. Therefore the aim of the analysis is to find the maximum price affordable for the households.

When improvements are introduced (or are to be introduced), *willingness to pay* (WTP) reflects *the level of increase in payment* that leaves the consumer *indifferent* between the situation before the improvement and after.

In this study, emphasis has been put on the ATP assessment rather than the WTP analysis. The WTP analysis is qualitative and based on a limited sample of households. Whereas the WTP analysis gives an indication about whether the inhabitants feel that water service and sanitation are important to prioritise the ATP analysis is used to inform on a reasonable level of the tariffs. In order to use the results from a WTP analysis for tariff setting a quantitative survey using contingent valuation or stated preference techniques with a representative sample of households needs to be carried out. Such a survey was out of the scope of this project.

11.1 Willingness to pay

The term *willingness to pay* describes the consumer's preferences in relation to changes in water and sanitation services and prices. The willingness to pay is the expected, maximum payment a user is willing to pay for a given service level.

The willingness to pay analysis comprises qualitative interviews with households, focussing on their attitude towards the present services, wishes for future services as well as willingness to pay for improved services. The result of the qualitative interviews gives a first impression of the willingness to pay for improved services and should only be used qualitatively - i.e. are the households willing to pay more for a better service or do they have other and more important concerns (such as electricity supply). The results represent perceptions of the households, and descriptions on the services received are based on these perceptions rather than on facts.

Focus groups and in-depth interviews were conducted in both Tbilisi and Rustavi. In each town, one focus group meeting and five in-depth interviews were un-

dertaken by the company IPM (Institute of Polling and Marketing[6]). The Consultant prepared the interview guide and participated in the first focus group meeting.

The interviews included identification of the most important issues regarding the water services and the sanitation facilities and the willingness to pay for improved services.

11.2 Affordability (ability to pay)

The notion of the ability to pay (affordability) in households is related to the upper limit of expenditure on water and sanitation that a household can pay without undermining its ability to pay for other vital goods and services (food, heating, etc).

A household is assumed to face an *affordability problem* if it cannot pay the bills without having to cut down significantly on basic needs, such as food, heating and other public services. Thus, the share of income spent on water and sanitation should not imply that these expenses become a major post on the household budget.

High charges exceeding the affordability limit for lower income families may result in inadequate access to water and ultimately sub-optimal levels of public health and/or in low collection rates.

However, an upper limit of expenditures on water and sanitation that a household can afford cannot be objectively established. In the literature, a threshold of 3% to 5% of household income is mentioned as a rule of thumb.

Affordability of water services depends on the income level of the household. Lower income families spend a higher proportion of the household budget on payment for the services than those with a higher income. Therefore in this analysis, the expenditures on water and sanitation are compared to the average total expenditures of the households and the distribution of the expenditures across households. This provides an informative set of indicators on affordability.

The threshold assumed to be the limit of the ability to pay is 2.5% of household expenditures. This relatively low threshold is chosen because of the large part of the population living under the poverty line in Georgia.

Georgia has defined two poverty lines: the extreme poverty line which is GEL 58-63 per month for an adult of working age under which 15% of the population was living in 2002, and the minimum subsistence level which is GEL124-128 per month under which 52% of the population is living.

11.3 Data requirements and availability

Statistical data on the households was made available to the consultant. Observing of the Georgian households according to a new system started already in July 1996 and is being continued till now without interruption. The development and implementation of the system began in 1994 with the financial support of the World Bank in the framework of

[6] Cf. www.ipm.ge

the institutional credit and technical support of Statistics Canada. This system, in contrast to the system of budgetary surveys existing earlier (in the Soviet period) allowed obtaining high-precision estimates of a number of socio-economic indicators. Household Survey consists in quarterly interviewing the families in Tbilisi and 8 regions of Georgia and thus covers most of the country.

The affordability analysis is based on the micro data from the survey of household expenditure in 2003 for households in Georgia carried out under the Integrated Household and Labour Force Survey within the framework of the joint project of DFID and the State Department for Statistics of Georgia. In the course of this survey, the households are interviewed on a quarterly basis - approximately 3,000 households which form a representative sample for Georgia, are interviewed each quarter. For the purpose of the analysis, only households living in urban areas have been included. The data are averages for 2003 for each household and weights have been used in order to obtain representative results for the entire urban population of Georgia[7].

Taking into account that the "shadow economy" comprises substantial share of the economy in Georgia, and the fact that there are significant transfers from Georgian labour emigrants working abroad (the transfers are not fully registered in the official statistics), in this report we used the total household expenditures as the best proxy for household income (better than official statistics on household incomes).

When analysing affordability it is important to use the data from individual households, in order to be able to compare a household's expenditure on water and sanitation with the households' total expenditures. The following ratio is calculated and used as a basis in the analysis:

$$EWS_i / TE_i = \frac{Expenditures\ on\ water\ and\ sanitation_i}{Total\ household\ expenditures_i}$$

Subscript *i* denote that it is the i'th household.

The price of water in Georgia is composed of two factors, a tariff per cubic meter and a norm per person, per month:

$$Price\ per\ capita\ per\ month = Tariff\ per\ cubic\ meter * Norm\ per\ person\ per\ month$$

In the affordability analysis, focus is placed on the bill (user charge) that the consumers pay for WSS services per month, and not on the two parts making up this price. The norms per person per month vary across towns and for the towns outside Tbilisi an average was assumed in the analysis.

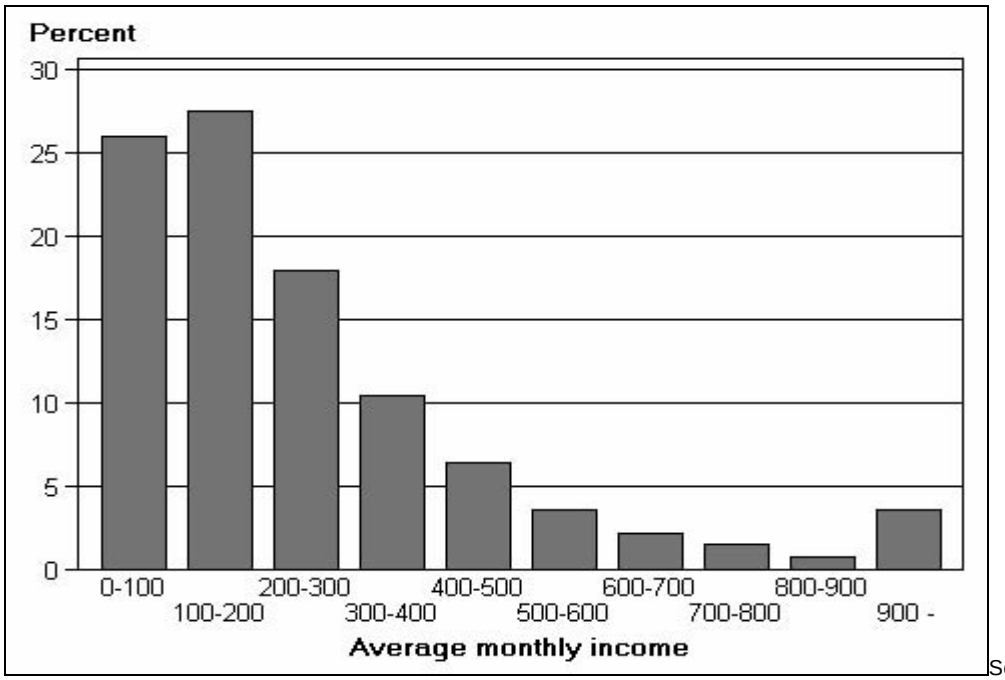
[7] 65 households with no income and 15 households with a monthly income above 2,500 GEL have been removed from the data.

12 Household income level and expenditure structure - present situation in urban Georgia

12.1 Income and expenditures

In 2003, the average monthly household income among households in urban parts of Georgia was 264 GEL (USD 121[8]). The distribution of household income is given in the figure below, which indicates that about 25% of the households have less than 100 GEL (USD 46) in income per month, and more than 50% of the households have less than 200 GEL (USD 92).

Figure 12.1 Distribution of the household income (GEL), urban households in Georgia, 2003



Source: State Department for statistics of Georgia and COWI.

Most of the income stems from wage employment or self-employment cf. Table 12.1

[8] Exchange rate of January 2003 used: 1 USD = 2.18 GEL.

Table 12.1 Sources of income among urban households in Georgia, 2002

	Avg. monthly per cap income, GEL	In percent
From wage employment	23.7	43%
From self-employment	10.9	20%
From selling agricultural production	1.0	2%
Property income (leasing, interest on a deposit etc.)	0.4	1%
Pensions, scholarships assistances	3.9	7%
Remittance from abroad	3.9	7%
Money received from the kin and friends	4.5	8%
Non-cash income	6.2	11%
Total income per household member	**54.5**	**100%**

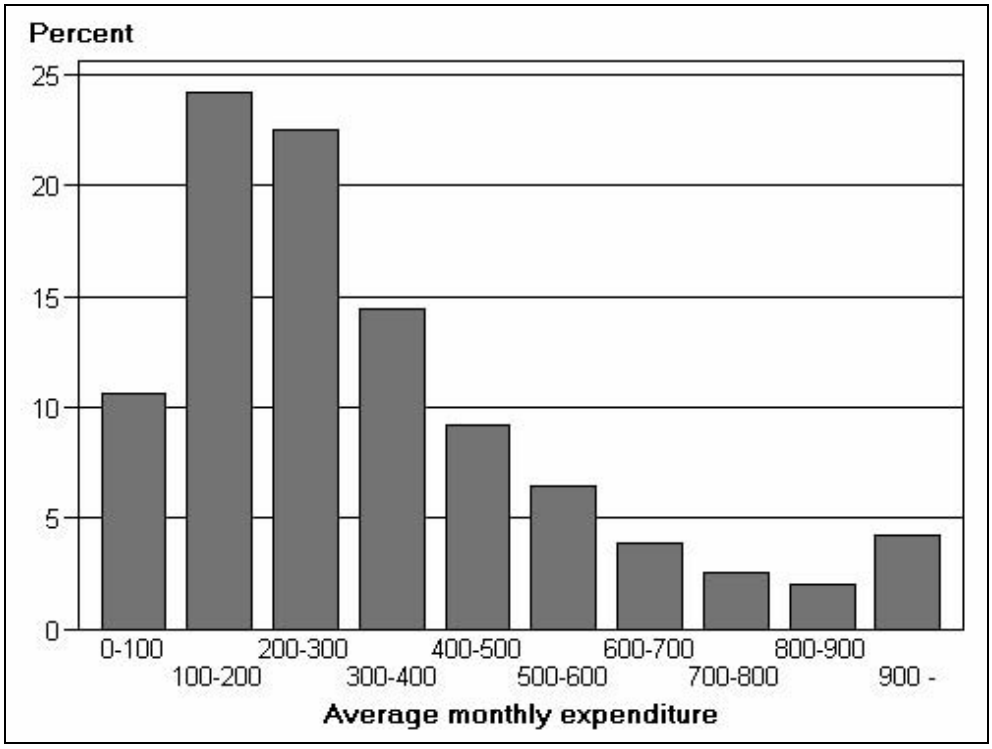
Source: Households of Georgia 2002-2003, State Department for Statistics of Georgia. Tbilisi 2004.

The average household expenditures are 342 GEL (USD 157) per month and hence significantly higher than the income - the expenditures exceed the income by 30%. In income and expenditure surveys, it is generally seen that expenditures exceed income by approximately 20% ranging from 15% to 30%. Survey based estimates on income are often substantially lower than survey based estimates on consumption, even when national level data shows that there are significant savings (cf. e.g. Angus Deaton: The analysis of household surveys - A Microeconometric Approach to Development Policy, John Hopkins University Press, 1997).

Expenditures are generally thought to give a better impression of the standard of living than income, especially in a country in transition such as Georgia where a substantial share of many households income comes from various sources such as remittance from abroad, money received from the kin and friends and non-cash income, cf. table above. Even in the urban areas, a substantial source of income that is obviously omitted from statistical overviews is own produce of food products and food supply from families and friends from the country side.

These reasons make data on household's expenditures a much more reliable source and we therefore primarily base our following analysis on expenditure.

Figure 12.2 Distribution of the average monthly household expenditures (GEL), urban households in Georgia, 2003



Source: State Department for statistics of Georgia and COWI.

The distribution by type of expenditures for households in urban areas in Georgia is illustrated in Table 12.2. The urban households spend on average 7% of their total expenditures on electricity and heating and 10% on transport.

Table 12.2 Expenditures among urban households in Georgia, 2002

	Avg. monthly per cap expendi-tures, GEL	In per-cent
Food, beverages, tobacco	37.2	40%
Clothing and footwear	3.8	4%
Household goods	2.2	2%
Health care	5.1	6%
Electricity and heating	6.8	7%
Transport	8.9	10%
Education, culture and recreation	5.1	6%
Other consumption expenditure	3.6	4%
Non-cash expenditures	6.2	7%
Agricultural expenditures (non-consumption)	0.4	0%
Transfers	1.5	2%
Savings and lending	6.1	7%
Property acquisition	5.7	6%
Total expenditures per household member	**92.6**	**100%**

Source: Households of Georgia 2002-2003, State Department for Statistics of Georgia. Tbilisi 2004.

12.2 Poverty in Georgia

The Poverty Reduction Strategy Paper (PRSP) developed by the Georgian Government in broad consultation with stakeholders and development partners, including the staffs of the World Bank and the IMF in 2003 defines poverty as the standing of a human being or family when it has no capability to satisfy basic needs (food, shelter, physical safety, basic education, personal growth, health, communication) due to low income or the non-availability of money. Poverty indicators are calculated according to household expenditures.

A food basket is applied for calculation of poverty lines. Two poverty lines are used for evaluation:

- Official minimum subsistence– this is GEL124-128 per month for an adult of working age;

- Extreme poverty line –GEL 58-63 per month for an adult of working age.

In 1994, the part of the population living for less than the minimum subsistence level was 80% and in 1995 – 60%. The lowest level of poverty was in 1997 – about 46%. In recent years, the level of poverty has stabilised at around 50%[9] and according to the State Department of Statistics of Georgia the poverty level reached the level of 52% in 2004, while extreme poverty made up 17% of the households. In 2004, households living in extreme poverty increased by 1%-point.

[9] Poverty Reduction Strategy Papers (PRSPs), August 2003, IMF Country Report No. 03/265

The poverty level for a number of regions in the world is given in the table below. As opposed to the national figures for Georgia given above, the figures in Table 12.3 is international poverty lines and hence not fully comparable. Therefore the comparable figures for Georgia have been added to the table.

According to the Word Development Report 2006, World Bank, the proportion of the population living with less than 2$ per day in 2001 was 15.7% and the proportion living with less than 1$ per day was 2.7%. Hence the situation in Georgia is similar to that of the average of the developing countries in Europe and Central Asia.

Table 12.3 Regional breakdown of poverty in developing countries, 2001

	Population in percent	
	Less than 2$ per day	Less than 1$ per day
East Asia and Pacific	47.4%	14.9%
Europe and Central Asia	19.7%	3.6%
Latin America and the Caribbean	24.5%	9.5%
Middle East and North Africa	23.2%	2.4%
South Asia	77.2%	31.3%
Sub-Saharan Africa	76.6%	46.4%
Georgia (International definition)	15.7%	2.7%

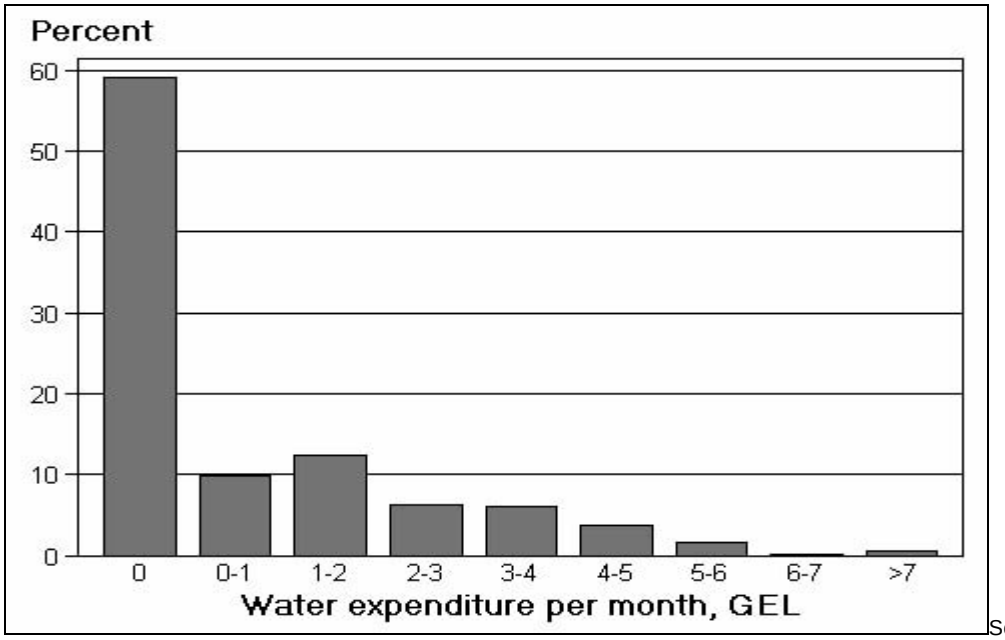
Note: The countries included in the region Europe and Central Asia are Albania, Armenia, Azerbaijan, Belarus, Bosnia & Herzegovina, Bulgaria, Croatia, Czech Rep., Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Rep., Latvia, Lithuania, Macedonia FYR, Moldova, Poland, Romania, Russian Federation, Serbia & Montenegro, Slovak Rep., Tajikistan, Turkey, Turkmenistan, Ukraine and Uzbekistan.
Source: Global Economic Prospects. Trade, Regionalism and Development, The World Bank, 2005, and World Development Report 2006, Equity and Development, The World Bank and Oxford University Press, 2005.

With this background an assessment of affordability becomes a very important element that has to be considered during development of the financial strategy for water and sanitation sector.

12.3 Household expenditure on WSS services

The household survey data indicates that 58% of the households do not pay for the water services at present, cf. Figure 12.3.

Figure 12.3 Distribution of the households' cold water expenditures (GEL), urban households in Georgia, 2003



Source: State Department for statistics of Georgia and COWI.

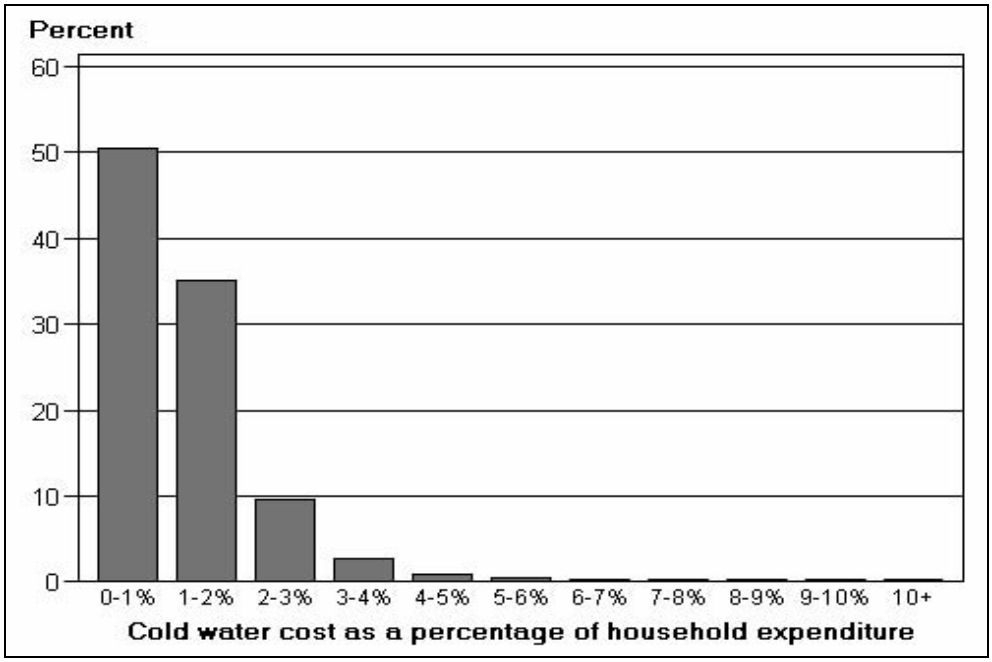
Among the households that do pay for water services, the average monthly payment is 2.62 GEL (USD 1.20), equivalent to 0.78 GEL (USD 0.36) per household member.

Among all households, the average expenditures on water and sanitation is 0.4% of the total household expenditure, and among household which pay, in the present situation, the average share is 1%.

The distribution of water cost as a percentage of total household expenditures has been calculated for households currently paying for water services.

More than 85% of the households currently paying for water services pay less than 2% of their total expenditure for these services. Few households pay more than 5% of the total household expenditure on water and sanitation. cf. Figure 12.4.

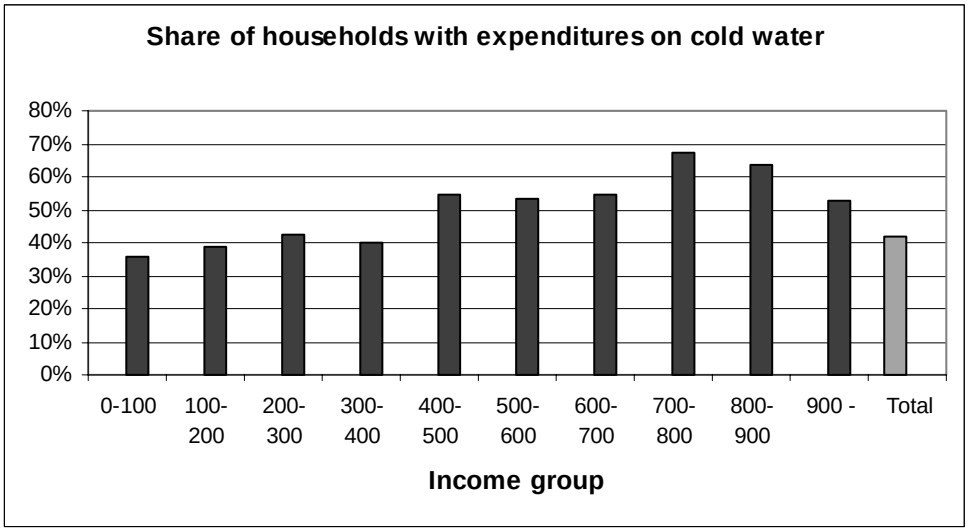
Figure 12.4 Distribution of the urban households' water and sanitation expenditures as a percentage of total expenditures (households currently paying for water services), 2003



Source: State Department for Statistics of Georgia and COWI.

While these figures show that affordability is an issue for a minor part of the population, the high rate of non-payment could indicate that many households have difficulty in paying their bills. If this is the case, low income households should have a lower payment rate compared to households with higher income. Figure 12.5 below illustrates payment rate by income group.

Figure 12.5 Payment rate for different income groups (GEL/month), urban households in Georgia, 2003



Source: State Department for statistics of Georgia and COWI.

Dividing the households into those with a household income below 200 GEL per month and those with an income above, gives two approximately equally sized groups of households for comparison.

On average, households with an income less that 200 GEL (USD 92) per month have a payment rate of 37% while households with an income above 200 GEL have a payment rate of 47%. This difference is statistically significant which means that households with higher income generally are more likely to pay for the water supply and sanitation.

However, the low rate of payment among the households that are better off cannot be explained by an affordability constraint. This is underlined by the group of households with an income higher than 700 GEL /month, approximately 5% of the households, where 60% pay for the services. The low collection rate may be due to limited enforcement of the payment or to a low level of satisfaction with the service received.

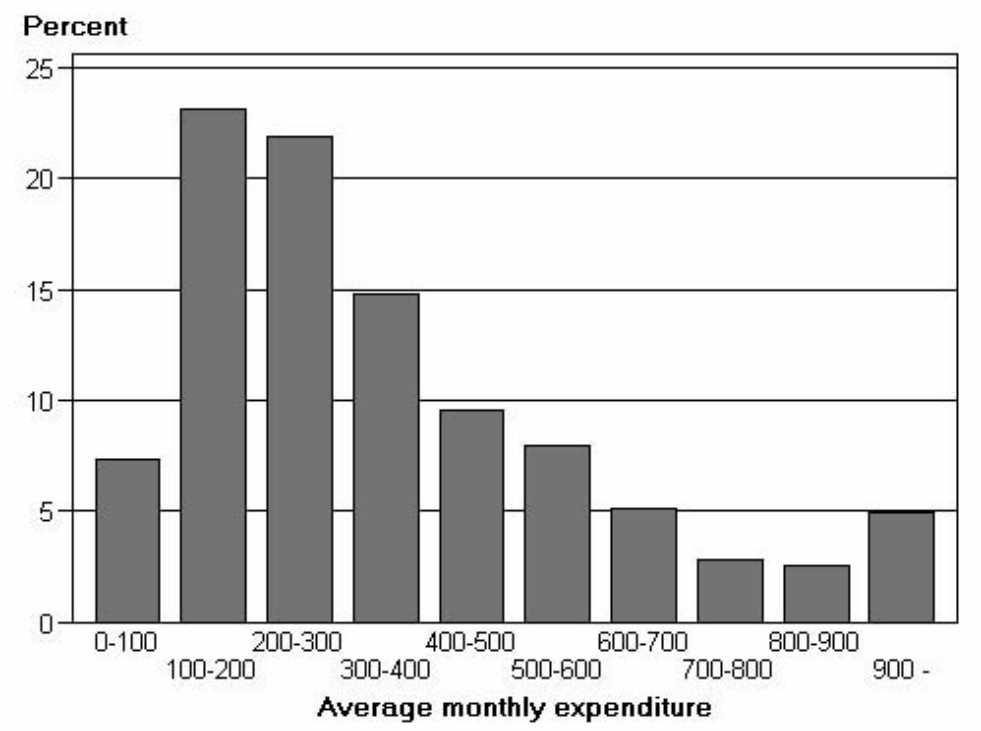
If the average payment of 0.78 GEL (USD 0.36) per household member is used for the households that are not currently paying for water services, 6% of the households would experience payments for water that exceed 5% of their total expenditure. This supports the conclusion that there appears to be a collection issue rather than an affordability issue. This is further supported by the qualitative interviews on willingness to pay, documented in the next chapter, where the non-payer gives the low level of service as one reason for non-payment.

12.4 Present situation in Tbilisi

The result of the affordability analysis for Tbilisi is very similar to those of all urban households in Georgia. This section presents separate results for Tbilisi and is based on information from 1,993 urban households in the Tbilisi region.

The average monthly household income is 282 GEL (USD 129), which is slightly higher than in the rest of Georgia. The average household expenditure of 370 GEL (USD 170) per month indicates a difference between income and total expenditure that is similar in size for urban households in Georgia on a whole, cf. Figure 12.6. In Tbilisi the total expenditure exceeds the income by 31%.

Figure 12.6 Distribution of the total household expenditures (GEL), households in Tbilisi, 2003

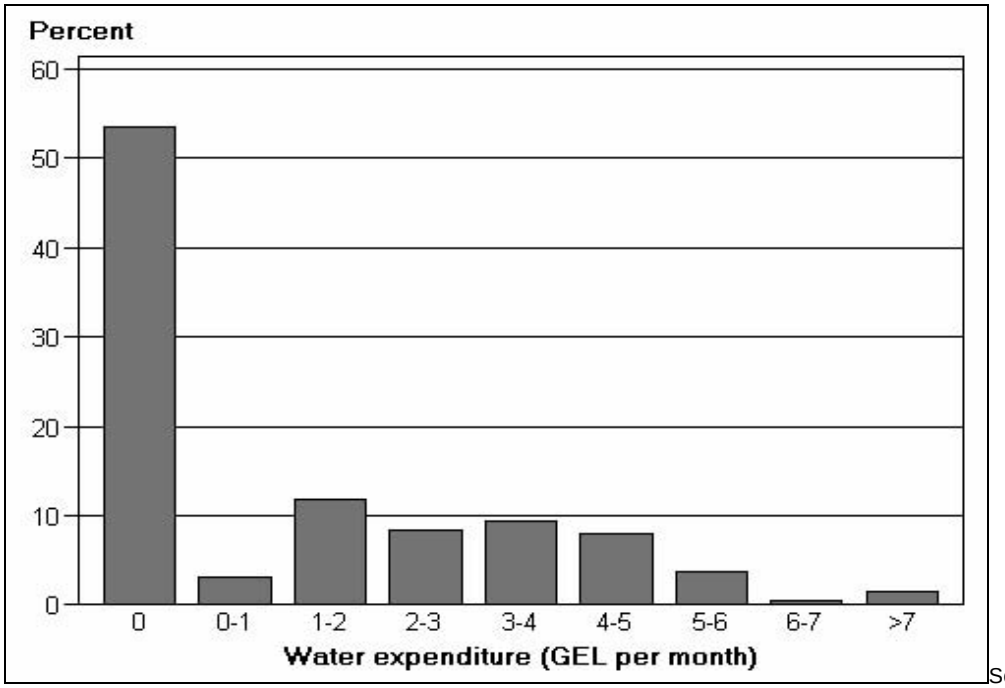


Source: State Department for statistics of Georgia and COWI.

The rate of payment in Tbilisi is similar to that of the other urban areas in Georgia, cf. Figure 12.7. A large proportion of the households do not pay for the water services. This is the case for 54% of the households.

Among the households that do pay for water services, the average monthly payment is 3.24 GEL (USD 1.49), equivalent to 0.95 GEL (USD 0.44) per household member.

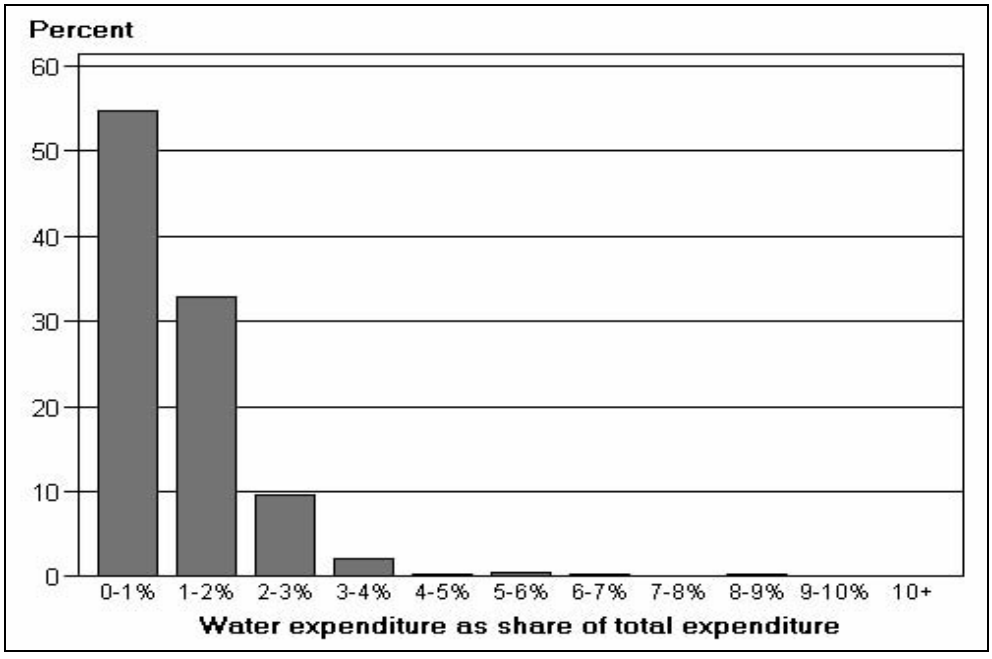
Figure 12.7 Distribution of the households' cold water expenditures (GEL), households in Tbilisi, 2003



Source: State Department for statistics of Georgia and COWI.

The distribution of water cost as a percentage of total household expenditures for households currently paying for water services is shown in Figure 12.8.

Figure 12.8 Distribution of the urban households' water and sanitation expenditures as a percentage of total expenditures, Tbilisi 2003 (households currently paying for water services)



Source: State Department for statistics of Georgia and COWI.

Nearly 90% of the households currently paying for water suppy and sanitation pay less than 2% of their total expenditure for these services.

13 Willingness to pay analysis

The result indicates that there is a willingness to pay for improved water and sanitation services in Rustavi, where the present service level is low. The willingness to pay is more limited in Tbilisi, where the households pay a higher tariff at present and have a better service level.

The WTP analysis in this study uses a qualitative approach. This means that the WTP analysis shows only the qualitative level of the WTP. The overall result shows that the inhabitants of Tbilisi prefer other improvements than better water supply and sanitation, and that the households in Rustavi seem to have a willingness to pay for better water supply and sanitation[10].

13.1 Attitude towards the present level of service

13.1.1 Drinking water

The *regularity* of water supply in Tbilisi varies between districts. Some districts are supplied 24 hours a day (central districts, Big Digomi, part of Isani, part of Nadzaladevi, part of Navtlugi), other districts are supplied 12 hours a day, 6 hours in the morning and 6 hours in the evening (Nutsubidze Plato, part of Nadzaladevi, Svanetisubani, Nakhalovka). Furthermore, in some districts (Verketili – Slope) the water is supplied for 4–6 hours, that is 2-3 hours in the morning and 2-3 hours in the evening.

Water quality also differs between the districts as the water is supplied from two sources: Bulachauri (ground water) and Tbilisi Sea (surface water). According to the respondents, the Bulachauri water is much cleaner than the water from Tbilisi Sea. The latter has sediments and occasionally a bad smell. The respondents supplied from Tbilisi Sea either boil water or buy bottled water.

In Rustavi, the qualitative interviews revealed that the population sees the water supply as very poor, though the population has adapted to the low level of service, and the service level was perceived to have improved during the past year.

The water supply depends on electricity, as the pumps which supply the town are power-operated. When there is no electricity in the town, there is no water. Several respondents mentioned that water pressure in winter is lower than in summer.

It is the respondents' experience that the potable water smells, is yellow and rusty, and contains sand. As the population has to collect water constantly, they say that standing / collected water has sediments. Due to the bad quality of the water, the water is heavily chlorinated.

[10] These results could be further elaborated by conducting a quantitative willingness to pay survey. COWI conducted such a survey for the World Bank in rural Georgia in the spring of 2005, cf. COWI (2005). *Willingness to pay for rural infrastructure services in Georgia*, September 2005.

Water contamination is thought to be caused by damaged water piping systems, which sometimes results in mixing of potable water with sewage water. The respondents believe that the occurrence of bladder diseases is high in Rustavi and that this is caused by the water quality.

Despite the low quality, most of the participants in the qualitative interviews do not purify potable water, unless the water is to be given to a baby. Instead, they leave newly collected water for a while, to let the sediments go down and then drink it. Some families boil the water prior to use. It was also mentioned that permanent use of boiled water is not healthy. In winter they freeze water and then use ice.

The respondents state that a minority of the population in Rustavi buys bottled potable water and that some households have a filtering device.

The water supply differs between Old Rustavi, which mainly consists of private houses, cottages and up to five-floor buildings, and New Rustavi, with mostly nine-floor buildings. The water supply is perceived to be poorest in New Rustavi due to insufficient water pressure which particularly affects households on the upper floors.

Old Rustavi is supplied twice a day: from 6.30 to 9.30 or 10 am and from 8 to 10 pm – in total 5-6 hours daily. This varies, as some household only receive water once a day, while households in the area near the hospital receive water every day. A reason mentioned for the poor service level was that the piping in Old Rustavi is quite old and in a very bad condition.

In New Rustavi, the households are supplied in the mornings from 7 to 9 a.m. During these hours the population collects water in reservoirs and tanks, in order to have a supply for the rest of the day. Districts located on the slope are supplied for a shorter period (1 hour) than the districts located on the plain (3–3.5 hours a day). Variation in water supply times is infrequent but does occur.

The duration of water supply and water pressure differs in the apartment blocks between floors. First, second and third floors are supplied for longer periods and with higher pressure (better flow); fourth and fifth floors are supplied for a shorter period and the water does not reach above the sixth floor. The inhabitants of higher floors collect water every morning, in the yard or from lower floors.

Some households have manual water collectors on high floors (on ropes). Other households have pumps installed on central piping; they pump water, fill tanks and use this water during the day. The households experience several problems with such pumps: Firstly, when the pump is on and the water is being pumped up, the pressure weakens on lower floors, which can cause conflicts between neighbours. Secondly, the pumps result in additional expenses for the household due to installation costs and running expenses for the operation of the pump.

13.1.2 Sanitation

In Tbilisi, the respondents mention that the problems relating to the sewage system are due to the fact that the system is quite old and malfunctioning, which often results in system damage. The repair works are arranged and paid for by the population.

The respondents did not have a clear idea about wastewater and were generally not informed about wastewater treatment. However, when informed of the purpose of wastewater treatment, the respondents evaluated wastewater treatment quite positively, and felt that this should be done and that information campaigns in the media should assure the understanding of the importance of wastewater treatment.

In Rustavi, likewise, the respondents did not have much information on the sewage system, nor were they aware of the sewage tariffs. As was the case in Tbilisi, it was mentioned that the system is quite old and malfunctioning. Due to the malfunctioning of potable water and sewage systems, the respondents referred to cases where sewage water is infiltrated into leaking water pipes, which creates a serious health risk.

Respondents had no information on wastewater treatment. After discussing this issue, the respondents felt that it would be a good idea if the state took care of these systems.

13.2 Willingness to pay for improved services

In Rustavi, the respondents reported that they pay GEL 0.25-0.30 (USD 0.14-0.16[11]) per household member per month, though a majority of the respondents could not remember how much they paid. Some households do not pay their bill, some households pay on a quarterly basis and others once a year.

The respondents mentioned that the majority of the population does not pay at all. They explained this by saying that Rustavi was a poor town and that most of the people are insolvent. Also, it was mentioned that people living on higher floors should not have to pay anything to the government, because of the lack of supply.

The respondents believed that the number of consumers paying would increase if the town was constantly supplied with water, however the economic situation of the population must be taken into consideration when setting tariffs.

The respondents also agreed that awareness on how the water system functions and the use of tariffs is important. Payment of the water bill is motivated by information on the importance of the payment, transparency of the payment system and whether or not the population can see that the payments are used for restoring the water services to the benefit of the households.

13.2.1 Water services

The participants were asked to state their willingness to pay for improved water services. They were asked how much they would be willing to pay if the water services were upgraded such that:

[11] Exchange rate of May 2005 used: 1 USD = 1.82 GEL.

- Water is supplied 24 hours a day with sufficient pressure, with a water quality that is always safe to drink directly from the tap.

In Rustavi, all of the respondents were willing to pay for such an improvement, with a monthly payment varying from GEL 2 to 5 (USD 1.10-2.75) per month per household and an average WTP for the services of GEL 3.60 per month (USD 1.98). This is significantly higher than the present average of approximately 1 GEL per household (USD 0.55).

In Tbilisi, the willingness to pay more in order to obtain the service level described above is lower. In the focus group, consensus appeared on non-willingness to pay more for water services, and among the respondents participating in the in-depth interviews, three out of five interviewed were willing to pay for a better drinking water service. These were the households that did not already receive water 24 hours a day, whereas the remaining two households unwilling to pay for better services already received water 24 hours a day. The three households were willing to pay on average GEL 6 (USD 3.30) per month, whereas the current payment is GEL 4-5 (USD2.20-2.75) for the households in the focus group.

Hence, according to the qualitative interviews, there seems to be willingness to pay for improved drinking water services in Rustavi, whereas there is limited willingness to pay for improved drinking water in Tbilisi.

13.2.2 Sanitation services

Similarly, the willingness to pay for improved sanitation services was investigated. The participants in the qualitative interviews were asked how much their households were willing to pay if the wastewater services were upgraded implying an

- Upgrade of the sewerage and investments in wastewater treatment, ensuring that pollution of the water resources is reduced to a sustainable level

In Rustavi, the willingness to pay varied between GEL 0.10 - 2 (USD 0.05-1.10) per household per month. In the focus group, the participants argued that the population live under hard conditions and that they cannot be asked to pay for sewage removal, or that sewage tariffs must be low and affordable for the families; there was a consensus that the tariff must not exceed GEL 0.5 – 1 (USD 0.27-0.55) per month per household. Based on the willingness to pay reported individually by the respondents interviewed, the average willingness to pay was approximately 1 GEL (USD 0.55).

In Tbilisi, there was a consensus in the focus group that wastewater treatment is important, but that the payment should not exceed 1 GEL per month per household, and that increased awareness on the importance of wastewater treatment would motivate people to pay. Among the households in the in-depth interviews, three out of five households were willing to pay for improved sanitation services; GEL 1-2 (USD 0.55-1.10) per household per month.

14 Price variants

The price variants presented in this chapter were developed taking into account the results of the affordability assessment, as well as the need to bridge the financing gap identified in Volume 1.

The variants were discussed within the Working group of experts and with the SG members, etc., and were a result of an iterative process. As a result of this process, two approaches were suggested for analysis:

- Variant 1: Affordability Limit
- Variant 2: Closing the Financing Gap

In Variant 1 the affordability analysis is taken as starting point and the water price is determined such that most households are able to pay. In Variant 2, the price increases are assumed as an example that ensures that the financial gap is closed. Hence whereas the price increases follow strictly from the assumptions made in the affordability analysis in Variant 1, Variant 2 is just one out of many ways of bridging the financing gap that could have been analysed. However, this variant was advocated by the Steering Committee of the project.

The water consumption norms are assumed to be the same under both variants. In Tbilisi the water norm is reduced from 24 m3 per capita per month to 13.5 m3 in 2006 and further to 9 m3 from 2007 to 2015. The norm in other cities is held constant at 2.45 m3 per capita per month.

14.1 Assumptions for Variant 1 - Affordability Limit

Variant 1 considers an option of the maximum acceptable price from the point of view of affordability for households. This is called the Affordability Limit because the proposed increases in the price follow from the assumptions made regarding affordability. This variant assumes that no more than 5% of households pay more than 2.5% of the total household budget for water and sanitation services . A subsidy scheme will be necessary for these 5%.

In this approach, the affordability analysis dictates the feasible increases in the price and the result in a set of reasonable price increases. As a second step it is investigated whether these increases are sufficient to close the financial gap.

Hence the assumptions behind Variant 1 are the following:

- One single price for Tbilisi and one single price for other cities
- Water and sanitation expenditures exceeding 2.5% of total household budget is assumed to be unaffordable. The price is set so that 5% of the households pay more than 2.5% of total household budget for water and sanitation

- This means that 95% are able to pay the regular price and that the subsidy scheme can be restricted to cover only 5% of the households

For the latter bullet point, it is assumed that that a subsidy is given to needy families as a precisely targeted subsidy. Equally efficient is direct income support to the needy families so that they can afford to pay the water and sanitation bill out of their income.

The price increases are a mathematical function of the assumptions about the ability to pay and therefore the results of willingness to pay analysis is not directly used here. However, the resulting price increases can be compared to the information obtained in the focus groups on WTP, namely a very limited WTP in Tbilisi and a clear willingness to pay in Rustavi.

The percentage of households is chosen in such a way that only a limited number of households, namely at most 5%, need a subsidy in order to pay the bill. Similarly, the choice of percentage that water cost make up of the total household expenditures, 2.5%, is sufficiently low to ensure that all households paying a lower share is considered to be able to pay the water bill.

The choice of these two parameters is based on the discussions in the steering committee and represents the maximum financial effort that can be asked from households. This is the reason for keeping the percentage low compared to rules of thumbs of 3%-5% mentioned in the literature.

This analysis of Variant 1 illustrates how the price level can be set using affordability as a starting point rather than the financial gap. Obviously, the assumption on 5% of households paying more than 2.5% of the total budget could be changed according to the percentage assessed affordable and the preferred extent of the subsidy system.

14.2 Assumptions for Variant 2 - Closing the Financial Gap

The development of the financial strategy described in details in Volume 1 included analysis of several price variants selected in the course of discussions in the Working group and the Steering Committee. These are price variants considered in order to close the financial gap, and it remains to be investigated whether they are affordable to the households. Here, Variant 2 presented in Volume 1 is assessed from the standpoint of affordability.

In Variant 2, the choice of increases in the price is an example that ensures that financial gap is closed. As the gap can be closed in many ways, Variant 2 is only an example of how such a price structure could be formed. For instance the increases in water prices could be spread out more equally over the years, instead of having large increases in 2006-07 only. Or the distribution of increases between Tbilisi and other cities could be changed involving lower prices increases in Tbilisi and higher in other cities.

The approach of choosing Variant 2 means that neither the affordability analysis nor the willingness to pay analysis has been used as input for this variant. Instead consequences in terms of affordability is analysed in the next chapter.

The assumptions regarding tariff and price increase in Variant 2 is summarised in the table below.

Table 14.1Assumption for Variant 2: Tariff, water norm and price in urban Georgia, 2005-2015

	Tariff increase per cubic meter, %	Tariff per cubic meter, GEL	Water Norm, m3/capita/month*	Price per person per month, GEL	Price increase per person per month, %
Tbilisi					
2005	0%	0.05	24.0	1.20	0%
2006	135%	0.12	13.5	1.59	32%
2007	105%	0.24	9.0	2.17	37%
2008	5%	0.25	9.0	2.28	5%
2009	5%	0.27	9.0	2.39	5%
2010	5%	0.28	9.0	2.51	5%
2011	5%	0.29	9.0	2.64	5%
2012	5%	0.31	9.0	2.77	5%
2013	5%	0.32	9.0	2.91	5%
2014	5%	0.34	9.0	3.05	5%
2015	5%	0.36	9.0	3.20	5%
Other cities					
2005	0%	0.18	2.5	0.44	0%
2006	15%	0.21	2.5	0.51	15%
2007	15%	0.24	2.5	0.58	15%
2008	5%	0.25	2.5	0.61	5%
2009	5%	0.26	2.5	0.64	5%
2010	5%	0.28	2.5	0.68	5%
2011	5%	0.29	2.5	0.71	5%
2012	5%	0.30	2.5	0.74	5%
2013	5%	0.32	2.5	0.78	5%
2014	5%	0.33	2.5	0.82	5%
2015	5%	0.35	2.5	0.86	5%

Source: Data from utilities (cf. Volume 1) and COWI

The tariffs in Tbilisi are to increase by 135% in 2006 and 105% in 2007 and 5% in the remaining years; the tariffs in the rest of urban Georgia increase by 15% in 2006 and 2007 and by 5% each year from the third year and throughout the period.

At the same time the water norm in Tbilisi is reduced from 24 m3 per capita per month to 13.5 m3 in 2006 and further to 9 m3 from 2007 to 2015. The norm in other cities is held constant at 2.45 m3 per capita per month.

The reduction of water consumption in Tbilisi compensates the substantial tariff increase foreseen in Variant 2. The resulting price development for water supply and sanitation is illustrated in Table 14.1 above, and hence it is seen that the increase in the price per month is significantly lower than the tariff per cubic meter.

Nevertheless, it should be noted that this increase in water price would be in contrast to the willingness to pay expressed by the inhabitants in Tbilisi in the focus group.

15 Affordability analysis

In this chapter the affordability analysis is carried out. For Variant 1, this means calculating the nominal tariffs and evaluating whether these tariff increases will be sufficient to close the financial gap.

For variant 2, the affordability analysis is more traditional, involving an assessment of the number of households that are likely to have difficulties in paying for the water services and sanitation (WSS).

15.1 Variant 1: Affordability Limit

In this section the analysis of Variant 1 is presented. Here the affordability analysis is taken as the starting point in order to investigate a level of feasible increases.

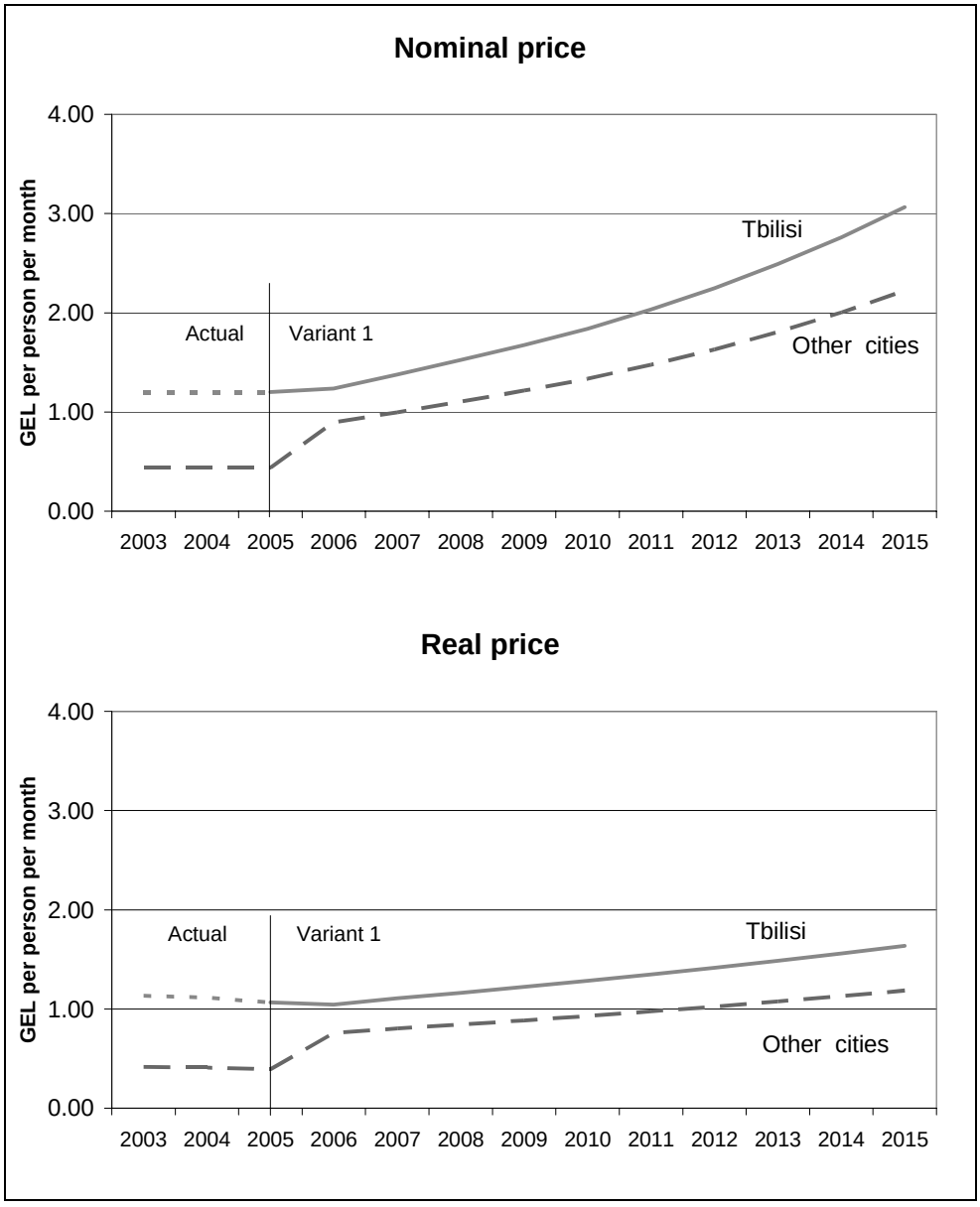
The assumption made is that 5% of the households find the water price unaffordable, and therefore a subsidy scheme will be necessary for this 5%. It is further assumed that the water price is unaffordable when the households have to pay more than 2.5% of their total household budget for water and sanitation services.

The period considered is 2006-2015 because price increases can be implemented in 2006 at the earliest.

Increase in prices
The result is that the price would remain around the same level as now in Tbilisi in the first year (2006), and increase with the nominal GDP-growth in the following years (10-11%, cf. Government of Georgia).

In other cities, the price can increase by 104% in order to reach a level where 5% of the households pay at least 2.5% of their total budget for water and sanitation.

Figure 15.1 Result of Variant 1; 5% of households pay 2.5% of household budget, nominal and real prices, Tbilisi and other cities, 2003-2015



Source: COWI

Analysis of the financial gap carried out as a part of the development of the financial strategy and presented in the Volume I shows that with this price profile, the annual financial gap could be closed by the year 2015 for Scenario 1, cf. Volume 1 p. 92.

The resulting tariff increases per cubic meter are given in Table 15.1.

Table 15.1 Results of Variant 1, 5% of households pay 2.5% or more of household budget: Tariff, water norm and price, Tbilisi and other cities 2003-2015

	Nominal price, GEL/capita/month	Nominal price (WSS bill) increase, %	Tariff per cubic meter, GEL	Tariff increase, %	Water Norm, m3/capita/month*	Real price in GEL, deflated by GDP deflator
Tbilisi						
2003	1.20	0%	0.050	0%	24.0	1.13
2004	1.20	0%	0.050	0%	24.0	1.11
2005	1.20	0%	0.050	0%	24.0	1.07
2006	1.24	3%	0.091	83%	13.5	1.05
2007	1.37	11%	0.153	67%	9.0	1.11
2008	1.52	11%	0.169	11%	9.0	1.16
2009	1.68	10%	0.186	10%	9.0	1.22
2010	1.84	10%	0.204	10%	9.0	1.28
2011	2.03	11%	0.226	11%	9.0	1.35
2012	2.25	10%	0.250	10%	9.0	1.41
2013	2.49	11%	0.277	11%	9.0	1.48
2014	2.76	11%	0.307	11%	9.0	1.56
2015	3.06	11%	0.340	11%	9.0	1.64
Other cities						
2003	0.44	0%	0.180	0%	2.45	0.42
2004	0.44	0%	0.180	0%	2.45	0.41
2005	0.44	0%	0.180	0%	2.45	0.39
2006	0.90	104%	0.366	104%	2.45	0.76
2007	1.00	11%	0.407	11%	2.45	0.80
2008	1.10	11%	0.451	11%	2.45	0.84
2009	1.22	10%	0.496	10%	2.45	0.89
2010	1.33	10%	0.544	10%	2.45	0.93
2011	1.47	11%	0.602	11%	2.45	0.98
2012	1.63	10%	0.665	10%	2.45	1.03
2013	1.81	11%	0.737	11%	2.45	1.08
2014	2.00	11%	0.817	11%	2.45	1.13
2015	2.22	11%	0.907	11%	2.45	1.19

Note: The decrease from 24 m3 to 13.5 m3 and 9 m3 per month per capita is equivalent to a decrease of 800 l/c/d to 450 and 300 l/c/d.

Source: COWI

The results are consistent with the result of the willingness to pay analysis. In the focus group conducted in Tbilisi, few members were willing to pay more for the services and felt that they already paid a high amount.

In Rustavi, one city under the headline of other cities, the focus group participants were willing to pay more for better services.

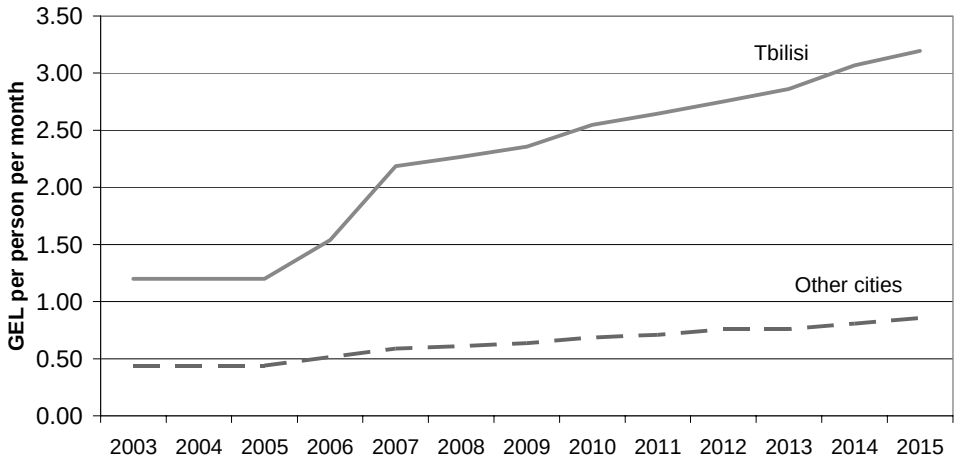
The result of the affordability analysis support these tentative conclusions as the tariffs should only increase marginally to reach the affordability limit in Tbilisi, whereas there

is room for service improvements and tariff increases in other cities, according to the affordability analysis.

15.2 Variant 2: Closing the Financing Gap

In variant 2, the tariff is increasing rapidly in 2006 and 2007 for households in Tbilisi. In this variant the financial gap is closed in the year 2018 for Scenario 1, cf. Volume 1 p. 92

Figure 15.2 Monthly price for water and sanitation services per person, Variant 2, Tbilisi and other cities, 2003-2015



Source: COWI

In 2007, the highest number of households will find it difficult to pay the bill. In Tbilisi, 16% of the households will be spending between 2.5% and 5% of their total household expenditures this year, and 2% of the households will be paying more than 5% of the total expenditures, cf. the figure below.

In other cities, few households will experience problems of affordability. Hence, in Variant 2 the increase in Tbilisi is too steep to be affordable, whereas there is room for higher tariffs in other cities.

Hence, an implementation of Variant 2 would require a subsidy scheme which covers a large part of the population in Tbilisi.

Figure 15.3 Distribution of water and sanitation expenditures as a percentage of total household expenditures, Variant 2, Tbilisi and other cities 2003-2015

Source: State Department for statistics of Georgia and COWI.

15.3 Level of subsidy needed

In order to assess the level of financing required for a subsidy scheme an example aiming at obtaining a first impression of the magnitude is included.

In the example below it is assumed that the support to poor families cover the entire water and sanitation bill such that the poorest 5% of the household receive free water (or equivalently receives an income support of the same magnitude as the water bill). The calculation is made for the year 2007 and indicates that there is a need of a subsidy of a magnitude of 1.5 million GEL (0.8 million USD).

Table 7.2 Estimation of the need for subsidy, Variant 1, Tbilisi and other cities, 2007 as an example

	Tbilisi	Other cities	Total
Total number of households	283,000	273,400	556,400
Households in need of a subsidy (5%)	14,150	13,670	27,820
Family members per household	3.6	3.8	3.7
Price per household member in 2007, GEL	1.37 per month/ 16.44 per year	1.00 per month/ 12.00 per year	-
Total subsidy per year, GEL	837,450	623,450	1,460,900
Total subsidy per year, USD	460,000	342,400	802,400

Source: State Department for statistics of Georgia and COWI

The calculation is made under the assumption that the system is efficient, and hence only the needy families receive the subsidy.

Compared to the present number of families receiving subsidies, the number of families receiving a subsidy is quite low when the assumption is that all household that pay less than 2.5% of their total expenditures are able to pay the water bill themselves.

16 The current social protection system[12]

This chapter briefly describes the present social protection system in Georgia in order to give a first indication of whether the system is adequate for a situation where the water tariffs are increased substantially.

The focus was not to carry out a study of the social protection system and more work will need to be done if a radical reform of the tariff system is considered.

The next section describes the present system and Section 8.2 outlines certain impacts of the undergoing reorganisation of the system.

16.1 Description of the present system

So far, the state social assistance in Georgia has largely been based on the former Soviet approach which provided benefits in the form of defined privileges to certain marginal groups in society (including the elderly, families with many children, people with disabilities, subjects to repression, refugees, etc.), as well as citizens who provide or have provided a special service to the state; participants in the Great Patriotic War, policemen, etc.

The major groups and the number of households entitled to social benefits are listed in the table below.

Table 16.1 Number of households receiving subsidies, by group. Georgia, January 2004

Group	Number of families
Single pensioners (1 person)	51,563
Pensioners family (>=2 persons)	9,568
Orphan children	1,218
Persons with eyesight problems	7,166
Disabled children up to 18 years	9,813
Families with many children (7 and more children)	137
Total	79,465

Note: The notions of households and families are used as equivalents in the table.

Source: Description of the Georgian Social Security System, working document, drafted within the framework of the project on Social Security Reform of Georgia, March-April, 2004.

The eligibility criteria of beneficiaries are defined by the Ministry of Labour, Health and Social Protecion of Georgia.The rules and forms of rendering social assistance to the

[12] The description in this chapter is mainly based on the working paper " Description of the Georgian Social Security System" prepared in April 2004 within the framework of the "Social reform preparation project", financed by the World Bank, written by a group of experts from the Partnership for Social Initiatives (PSI).

poor families are defined under the decree of the Minister of Labour, Health and Social Protecion of Georgia (#69/n dated 25 March 2003).

Currently, there are three main forms of social assistance to the vulnerable groups; *state social allowances, unemployment benefits* and the flat rate *old age pensions.* According to the Economic Development and Poverty Reduction Programme of Georgia (EDPRPG), June 2003, the Government allocates substantial amounts to social protection and security programmes, and many households receive state benefits. For instance, in 2001, 60% of all households received some kind of state benefit.

In Georgia, as in most CIS countries, there are two types of reduction of payments for services; privileges and subsidies. Privileges are given to the marginal groups, while subsidies are given to the households which have difficulties paying their bills.

Special privileges related to WSS imply that groups of households do not pay a normal price for water services. If a large proportion of the households receives privileges or subsidies and is not motivated by affordability problems, the tariff structure is likely to be an inefficient way of supporting poor households.

Social benefits
The groups who receive social benefits i.e. pensions or allowances and subsidies on infrastructure services include:

- Pensions/allowances
- Health services
- Electricity
- Removal of family waste
- Water supply and sanitation
- Household gas

Table A5, attached in Appendix 2, lists the eligible categories, types of benefits and the average quantity of the allocated sum. Citizens from the categories entitled to communal benefits receive, among other things, support for payment of municipal services. For some categories of social clients, water supply and sanitation services could be covered 100%, while some categories could receive a 50% coverage of the expences for water supply. This support however is subject to availability of financing at municipal level, and is presently only effective in Tbilisi, according to a decision by the Tbilisi City Council.

Table 8.3 below represents budget allocations for 2003, 2004 and 2005.

Table 8.3 Public budget allocations for social protection and social security, Georgia 2003-2004, million GEL

Year	State budget	Local budget	Total
2003	257.7	15.8	273.5
2004	304.0	18.7	322.7
2005	347.0	21.0	386.0

Note: Amounts specified under state budget allocation for 2004 and 2005 include 15 million GEL from external funding.

Source: Economic Development and Poverty Reduction Programme of Georgia June, 2003

The table shows that the social protection measures constitute a substantial part of the budgetary expenditures earmarked for poverty reduction in the country. However, it should be noted that most of the funding used for social protection activities comes from the state budget, while almost all communal benefits are supposed to be financed by the local budgets and are subject to the availability of funds.

Comments
The present way of targeting benefits to marginal groups does not necessarily support the poorest groups of the population, and therefore cannot be seen as an effective measure to support the needy households. A thorough assessment of the poverty level among the households is needed in order to redirect the support provided to the families in real need.

The currently applied system of privileges hinders the introduction of alternative tariff strategies and reduces the efficiency of the social protection system. On the one hand it does not support the poorest households in the payment of WSS bills, and on the other hand reduces the motivation for paying for the services among households with comparatively higher incomes. The system of privileges should be revised critically in order to develop a system which targets the poor, or possibly even be suspended to ease the financing of subsidies directed at households with affordability problems.

As social protection payments are meant to support household income on all expenditure items, not only water, the budgetary resources are far more important than the estimates in Chapter 7 which are needed for subsidising the payment of WSS bills. The presently applied targeting of the subsidies does not support the process of tariff reformation and possible tariff increases.

16.2 Reorganisation of the social protection system

The social protection system in Georgia is undergoing a reorganisation process. This includes the work under the framework of preparing a social protection reform project. As a result of this work, the Government of Georgia recently announced their decision to implement changes in the economic and social spheres. The new system will be set

into operation from the year 2006 but will be introduced on a trial basis from the summer of 2005.

The declared goal of the new social protection system is to exercise and protect the economic, social and legal guarantees for human rights and liberty in Georgia. One of the main areas of state management of the social risks is the provision of social assistance. This will allow the state to reduce the social risks related to the low and inconstant incomes of vulnerable groups and to ensure that they receive a minimum level of welfare.

According to the new social assistance scheme, all households living in extreme poverty, which is defined as a 55 GEL (USD 30) income per person per month, will be entitled to benefits[13]. This is approximately 15% of the population in Georgia; 8.6% of the population in rural areas are extremely poor and 6.5% in urban areas are extremely poor. The amount of the benefit will top up household incomes to GEL 60-65 (USD 33-36) per person per month, and approximately 150,000 households would be entitled to the benefit.

Such an income subsidy would be sufficient to cover the increase in water cost under Variant 1, as the households spending the highest percentage of their income on water supply and sanitation would pay 2.1% of the income (in 2006: GEL 1.24 / GEL 60). However, the prices of other infrastructure services are likely also to increase due to investment in service improvements. In this case, the overall increases may be too large to be affordable even for the households receiving an income subsidy.

The social categories will be replaced by a test as the entitlement criterion. This means that the benefit would include the 5% of the households in urban areas that would spend at least 2.5% of their total household expenditure on water services in Variant 1 as these household are among the poorest. However, if all social benefits (cash and in-kind) except for pensions are abolished, an investigation would be required into whether this could cause affordability problems to some marginal groups, i.e. groups that are not presently among the 5% poorest.

The identification of needy families (those below the extreme poverty level) and justification of their right to obtain social assistance will be carried out by social agents specifically trained for implementation of this task.

As a result of the implementation of the proposed reform, social assistance should become a core component of the Georgian social protection system and, together with existing flat rate pensions, will constitute a main poverty reduction instrument.

This follows the priorities and principles of the Economic Growth and Poverty Reduction Programme of Georgia which aims to develop an efficient social safety net by introducing targeted social assistance schemes for the most disadvantaged groups who can not escape extreme poverty through economic activities. Although not directly targeted at supporting the payments for water and sanitation, the system will contribute to general poverty reduction in the country and will indirectly provide the neediest households with resources to pay for the services.

[13] Cf. www.psigeorgia.com

ANNEXES TO VOLUME I

Annex 1. Organizational, institutional and legal structure of water and wastewater (W&WW) sector of Georgia. Georgian Government policy in W&WW sector

1. Key legal actors and organizational structure of W&WW sector in Georgia

1.1 Key legal actors of Housing and Communal Sector of Georgia

The major W&WW services consumers in Georgia are households, public institutions, industrial enterprises, housing utilities and the private sector.

W&WW services for households and other consumers are provided by municipal, district and rural W&WW utilities. Their operational and administrative activities are under supervision of local, municipal and district authorities.

Methodological and functional management, coordination and selective control and unified technical policy had been carried out by the Ministry of Urbanization and Construction of Georgia, which functions have been transferred to the Ministry of Economic Development of Georgia after the restructuring of Georgian Government.

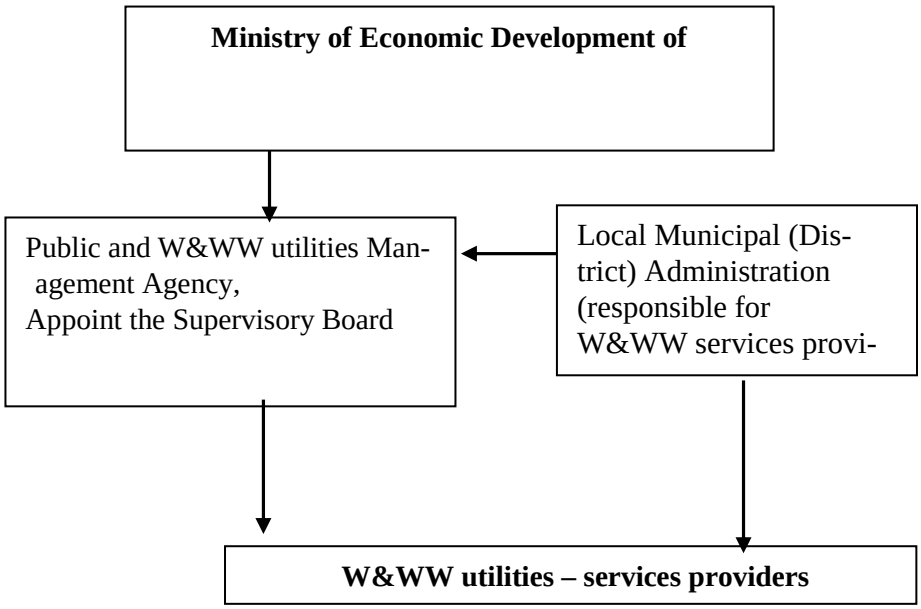
Tax, sanitary and environmental authorities exercise control within the scope of their competence. The tariffs are elaborated by W&WW utilities, agreed and approved by local authorities and further registered by the Ministry of Justice of Georgia.

1.2 Legislative documents regulating functions, rights, obligations and relations of key legal actors

Relations, obligations, rights, functions of W&WW utilities and other legal actors in Georgia are regulated through the agreements between W&WW utilities and consumers. These agreements are the basis for relations between the key actors of W&WW sector, they stipulate their mutual rights and obligations based on the following regulations:

- Rules of technical operation of water and wastewater systems in settlements of Georgia, valid since 1 April 2001 (Order of the Ministry of Urbanization and Construction of Georgia No. 70 of 25 December 2001 agreed with the Chief Sanitary Doctor of Georgia, Ministry of Environment and registered by the Ministry of Justice of Georgia).
- Rules of use of communal water and wastewater systems (Order of the Ministry of Urbanization and Construction of Georgia No. 81 of 21 October 1998)
- Technical conditions of wastewater discharge to sewerage by industrial enterprises (Order of the Ministry of Urbanization and Construction of Georgia No. 05 of 9 February 1998)
- Water Law of Georgia.

Figure 1. Interrelations of the key legal actors in W&WW sector



The Figure shows that W&WW utilities in Georgia are established by the Ministry of Economic Development through the Public and W&WW utilities Management Agency upon the agreement with local municipal and district authorities, except Tbilisi where the founder of W&WW utilities is City Administration.
All W&WW facilities are in public ownership and operated by W&WW utilities.

1.3 **Organizational structure of water and wastewater system (W&WW) of Georgia, service zone and key assets of Gruzvodocanal LLC**

W&WW services in cities and districts of Georgia to all consumer categories are provided through centralized networks, which include 84 W&WW utilities with 165 main facilities, 77 of which are mechanical and 88 are the gravity type structures. Centralized sewerage systems cover 45 cities and districts. Treatment facilities existed in 33 cities and districts. Today only wastewater treatment plant Tbilisi – Gardabani is operating.
Major share of the utilities in large and medium-size cities are independent, and a part of the utilities together with other public services are the part of complex communal enterprises which are subordinated to municipal and district authorities. Before the 90-ies all W&WW utilities were under double subordination: W&WW utilities being a part of complex communal enterprises were accountable to the Ministry of Housing and Communal Sector of Georgia and local authorities, and independent W&WW utilities - to Gruzvodocanal and local authorities. After restructuring of Georgian Government and abolishment of the Ministry of Housing and Communal Sector of Georgia all W&WW utilities were transferred to the local authorities.
In small towns and villages of Georgia water supply and wastewater collection services are provided by local rural networks.

16.3 Gruzvodocanal LLC

Chief Department of Water and Wastewater Sector (now - Gruzvodocanal LLC) was established in the end of 1960-ies under the Ministry of Housing and Communal Sector of Georgia and is situated in Tbilisi.
Gruzvodocanal Limited Liability Company (LLC) has been functioning since 1998. It was founded by the Public and W&WW utilities Management Agency under the Ministry of Economic Development of Georgia.
Gruzvodocanal LLC operates regional treatment facility located in Gardabani, with 1 mln. m3/h capacity, and main sewer from Tbilisi to Gardabani of 26 km length.
Besides, main activities of Gruzvodocanal include:
- addressing the issues related to operation and development of W&WW infrastructure in cities and districts of Georgia.
- provision of organizational and methodological and practical assistance to municipal and district W&WW systems in application of the united policy and introduction of modern technologies.
Recently Gruzvodocanal LLC has been developing a number of regulations.
Gruzvodocanal LLC together with Tbilvodocanal LLC have elaborated the following documents:
- Rules of technical maintenance of water and wastewater systems.
(agreed with the Chief Sanitary Doctor of Georgia Note No. 107-05/2 of 17.07.2000 and with the Ministry of Nature Protection No. 15-15/353 of 20.04.2000. Approved by the Ministry of Urbanization and Construction 25.12.2000, Order No. 70. Registered in the Ministry of Justice of Georgia 400.010.000 11.116 004.537. Valid since 1 January 2001).
- Technical Specifications for wastewater discharges to sewerage by industrial enterprises.
(approved by the Ministry of Urbanization and Construction of Georgia 9.02.1999, Order No. 05)
- Rules of use of communal water and wastewater systems.
(approved by the Ministry of Urbanization and Construction 21.10.98, Order No. 81).

1.4 Ownership for the engineering infrastructure and other key assets of W&WW system in Georgia.

Engineering infrastructure and other key assets of W&WW system in cities and towns of Georgia are basically in municipal ownership. The regional treatment plant and sewer from Tbilisi to Gerdabani operated by Gruzvodocanal LLC are in the state ownership. Key assets of W&WW sector inn all cities and towns of Georgia are operated based on the operation and maintenance agreements.

1.5. Key decisions making in W&WW sector of Georgia

W&WW utilities of Georgia are mainly societies with limited liability. A minor part of them functions as joint-stock companies. According to the Law of Georgia “On Business Undertakings”, the limited liability societies are managed by a supervisory board, members of which are appointed by the Public and W&WW utilities Management Agency and local authorities, for the exception of Tbilisi, where the Supervisory Board of Tbilvodocanal LLC is formed by the City Mayor after consultations and agreement with the legislative body of Tbilisi. The supervisory board upon the agreement with local authorities appoints the director of the limited liability society.

As to Gruzvodocanal LLC, its supervisory board has been established by the Public and W&WW utilities Management Agency under the Ministry of Economic Development of Georgia.
Target development programs, capital investments plans, reconstruction and modernization plans are prepared by the Ministry of Economic Development and further agreed with the Ministry of Finances of Georgia and implemented given the budget funds are available.

1.6. Competitive environment of W&WW services market, procedures of selection of operators and contractors, goods purchase

Water supply, wastewater collection and treatment in Georgia are carried out by municipal and district W&WW utilities, Gruzvodocanal LLC, as well as individual rural water utilities. They all are in public ownership.
In order to create a competitive environment in W&WW sector development in Tbilisi, in pursuance of the decision of the President of Georgia of 22 July 2001 and on behalf of the Prime Minister of Georgia, Georgian Government and the World Bank made a decision on joint elaboration and implementation of the project aimed at rehabilitation of water supply system in Tbilisi. Besides physical rehabilitation, the project envisions institutional reforming, as well as private sector involvement in operation of maintenance of the engineering infrastructure of Tbilvodocanal LLC. The project was tendered with participation of foreign companies. The contracted was awarded to French Company Jeberaul Desi. The project is now suspended.
Constructors, goods and materials for W&WW sector are selected based on tender, in accordance with the Law on Public Procurements.

1.7. Brief description of W&WW sector staffing

Data on staffing capacities in 2004 is presented in the table below.

W&WW utility	Total number of employees	Including with high education	Share of employees with the working experience below 3 years, %	Average salary, lari per month
Tbilvodocanal LLC	2820	18%	3,3%	176
Gruzvodocanal LLC	102	59	10,8%	140
Kutskalkanali LLC	482	43%	24,2%	68,2
Gorivodocanal LLC	75	13%	15,5 %	56
Khashuri Tskali LLC	55	15%	14,0 %	48
Borjomvodocanal LLC	67	13,4%	12,5%	35
Marneulivodocanal LLC	38	16%	16,5%	55
Chiatura Vodocanal LLC	70	11%	11,1%	

As it can be seen from the table, W&WW utilities are staffed mainly with the specialists with high and secondary education and experienced personnel with more that 3 years experience. The average salary in W&WW sector is very low and vary between 35 and 68 lari a month, except Tbilisi, where monthly salary in 2004 amounted to 176 lari per month. However, it should be noted, that employment in W&WW sector in the most part of the cities and districts is the only opportunity to have a job, as industrial enterprises almost do not function.

1.8 Main directions of Georgian Government policy towards support and development of W&WW sector

For the recent years Georgia has been working hard on support and development of W&WW sector. The urgent need for this was confirmed by the outputs of analysis of the existing situation in the sector. The State Government has elaborated a set of activities, which, *inter alias*, include:

1. Concept of Communal and Housing Reform of Georgia.
2. Program of paying off the cost of water consumed by households and determination of operating costs in water and wastewater systems for 1999-2000.
3. Program of paying off the cost of housing and communal services in 1999-2005.
4. Program of sanitary and technical Improvements of water and wastewater systems in cities and districts of Georgia.

All above documents were adopted by the Order of the President No. 531 of 23 September 1998.

However, the activities have not been fully implemented, due to an extremely low households incomes level, and the housing and communal services provided by the utilities are just partly covered by households tariffs. However, the situation has improved a little in Tbilisi, where water services payments in 2003 increased up to 40%, and in 2004 – up to 54%. Nevertheless, percentage of costs coverage by households tariffs in Tbilisi in 2004 was still low and equalled to just 29%. Therefore, households factually covered only 16% of W&WW services cost.

15 November 1997 in Georgia the Law on Water was passed and further amended. In 2003 the final version of the Law on Water complying with international standards was passed. According to the Law on Water, all water resources are the public property and protected by the state. Population of Georgia is obliged to use water in a saving manner and not to contaminate water resources.

2. Tariff policy and tariffs level

2.1. Tariff policy, procedures of tariffs setting and approval in 2002-2004 for Tbilisi and Georgia in general

There are no officially established methods and rules of calculation of water and wastewater tariffs in Georgia. In practice principles of elaboration and approval of tariffs are almost similar at all water utilities in Georgia, and they are established separately for water supply and for sewerage. Each city and district has its own tariff rates for all consumer categories.

For instance, tariffs setting process in Tbilisi involves the following steps:

First, Tbilvodocanal LLC calculates the tariff and confirms the necessity for its changing taking into account the market changes and sector demands. Then it submits the documents to the City Administration for consideration by the relevant departments. The revised and updated version is submitted to the legislative assembly of the city, where a special expert commission is established to assess and produce a statement based on which a new tariff is approved and further registered in the Ministry of Justice of Georgia. The information is notified through publication in the official press. The tariff is calculated based on services cost plus profitability value. However a factual tariff for population in Tbilisi, given low incomes, is much lower than services cost, and the expenses are covered from subsidies allocated to cover intertariff difference allocated from the municipal budget, and through increase of tariff for other consumer categories. Moreover, in pursuance of the decision of legislative assembly of Tbilisi dated 30 June 2001 No. 8-8 and 21 September 2004 No. 15-5, the privileges for particular consumer categories top be covered from the city budget are established.

Table 2. Budget funds allocated to Tbilvodocanal LLC in 2002-2004, lari

Allocated from budget	2002	2003	2004
To cover inter-tariff difference	8 900 000	9 971 700	12 626 800
To cover priviliges for population	1 299 000	1 494 700	1 985 100

Costs W&WW services provided to the refugees in all cities and districts are compensated from the consolidated budget.

2.2 Changes of W&WW services tariffs within 2000-2004 in Tbilisi

W&WW services tariffs dynamics for 2000-2004 in Tbilisi is shown in the table below.

Table 3. W&WW services tariffs dynamics for 2000-2004 in Tbilisi

	Decision of legislative assembly of Tbilisi	HHs tariff, GEL/m3		HHs tariff, GEL/cap/month		Tariff for budget organisations GEL/m^3		Tariff for other organizations GEL/m^3	
		W	WW	W	WW	W	WW	W	WW
Previous period		2,0	0,5	0,6		0,35	0,05	0,45	0,05
1 April 2000	02.03.2000 3 3-13	2,0	0,5	0,6		1	0,02	1	0,02
1 April 2002	13.02.2002 №1-1	4,0	1,0	0,96	0,24	1,2	0,4	1,2	0,4

On March 2, 2000 Decision of Tbilisi Legislative Assembly No. 3-13 set and gave effect to the new tariffs since April 1, 2000. Revision of tariffs adopted in 1997 and setting of new ones was necessitated by a considerable growth of prices for energy and materials. However, due to hard economic status of people, water and wastewater tariff for households in Tbilisi remained unchanged, i.e. equal to 0,025 lari per 1 m3, and the tariff for economic actors and budget financed organizations increased up to 1,02 lari. In 2000 profitability share in the tariff constituted just 0,6 % and the estimated tariff rate amounted to 0,156 lari per 1 m3 water supplied and discharged, and the cost of 1 m3 was equal to 0,129 lari.

Table 4. Water supply tariffs in Tbilisi, 2000, lari

2000	Cost of 1 m^3 (excl. VAT)	Approved tariff (excl. VAT)	% coverage	Calculated cost of 1m^3 water (incl. VAT)	Approved tariff (incl. VAT)	% coverage
HHs	0,129	0,021	16%	0,1558	0,025	16%
Budget and other organi-zations	0,129	0,85	659%	0,1558	1,02	655%

On February 13, 2002 Decision of Tbilisi Legislative Assembly No. 1-1 established another new tariff, which was effectuated on 1 April 2002. In pursuance to this Decision, both tariffs for budget-financed institutions and economic actors and the households were increased. The household tariff amounted to 0,05 lari, for other consumers - 1,6 lari. As previously, the main reasons for tariffs increase were growth of fuel and materials prices and lari devaluation.

In 2002, share of profitability in the tariff increased up to 7 %, and the estimated tariff rate amounted to 0,1909 lari. Relation of the estimated and the approved tariffs by different consumer categories is the following.

Table 5. Water supply tariffs in Tbilisi, 2002, lari

2002	Cost of 1m^3 (without VAT)	Approved tariff (without VAT)	% of coverage	Estimated cost 1 m3 (incl. VAT)	Approved tariff (incl. VAT)	% of coverage
House-holds	0,1521	0,0417	27%	0,191	0,05	26%
Budget-financed institu-tions and economic actors	0,1521	1,333	877%	0,191	1,6	838%

W&WW services tariffs vary a lot between different cities and districts of Georgia and depend on geographical location of the area served by W&WW utilities. In case the settlement is situated on the plane, it has gravity water networks and the cost of services provided is less than in the settlements where water is pumped and therefore energy costs are higher. Therefore, cost of services and the tariff rate is higher for such towns.

Households tariff in the country varies between ?? тетри до тетри, tariff for other consumers – between 0,01 lari (Terjola) to 0,55 lari (Marneuli, Gurdjani) per 1 m^3.
It worth mentioning that in some settlements, in spite of the fact that local budgets have no capacity to subsidy the households tariffs, local authorities, taking into account a hard economic status of population, do not allow W&WW utilities to introduce tariffs covering W&WW services costs, which negatively influences financial performance of W&WW utilities.

3. Water metering, billing, W&WW services payments

3.1 W&WW services consumption by consumer categories

The data is provided in the table below.

Table 6. Volumes of water supplied in mln. m^3, 2003.

	Tbil-vodo-canal	Kutskal-kanal	Gori vodo canal	Marneuli vodoca-nal	Cam-tredia Tskali	Zesta-phoniv odoca-nal	Rustav-tskali	Tskal-turbo-vodo-canal	Po-tivodo canal	Zugdid vodo-canal
House-holds	261,8	2,13	1,46	0,77	1,0	0,39	4,8	0,66	3,1	1,0
Budget-financed institutions	18,8	0,55	0,49	0,86	1,4	0,22	2,2	0,34	1,3	1,0
Economic actors and other con-sumers	6,2	0,66								

The table indicates that major part of water consumers in Georgia are households, whose share in total water consumption volumes constitute 91% in Tbilisi, 63,8% in Kutaisi, 83,3 % in Marneuli, 68 % in Rustavi, 70 % in Poti.
Water consumption per capita based on norms differs from 60 to 800 l/day.

3.1 Legislative documents regulating services provision

W&WW utilities provide services based on the agreement, format of which is recommended in the following regulations:

- Rules of water and wastewater services provision;

(Order No. 81 of the Ministry of Municipal Economy and Construction of Georgia of 21 October 1998, agreed with the Ministry of Health of Georgia, the Ministry of Environment and with Fire Protection Service of the Ministry of Internal Affairs of Georgia).

- Technical Specifications for wastewater discharges to sewerage by industrial enterprises;

(Order No. 05 of the Ministry of Municipal Economy and Construction of Georgia of 9 January 1999, agreed with the Ministry of Health of Georgia and with the Ministry of Nature Protection and Environment).

The agreements stipulate mutual obligations and sanctions. The issues not envisioned in the agreements are settled according to the acting national legislation.

Officially in Georgia the rules of W&WW services provision are the same for all consumers and there are no privileged consumer categories.

3.3 Existing procedures and methods of network water losses and water consumption volumes

Control of water supply and consumption volumes, reduction of water losses and wasteful consumption, as well as decreased water consumption by industrial enterprises is one of the main challenges of W&WW utilities. According to the Rules of use of communal water and wastewater systems (Order No. 81 of the Ministry of Municipal Economy and Construction of Georgia of 21 October 1998) all consumers connected to the W&WW systems must have necessary equipment for supplied and discharged water metering. Connection of new consumers to the W&WW network without metering devices is not allowed. Supplied water should be metered with standard devices duly permitted for application by the Meteorological Service of the State Standardization Agency of Georgia. Installation and operation of water meters should comply with the current construction norms and rules. Meters should be checked and labelled by the Meteorological Service of the State Standardization Agency. Malfunctioning of the metering devices should be reported by consumers to W&WW utilities.

Water consumption volumes are registered based on the data of water meters. In case of the meter malfunctioning not through the consumer fault, consumed water is estimated based on the average consumption for three latest months. If the malfunctioning is caused by a consumer, and the consumer has not informed W&WW utilities about it, the supplied water volumes are determined based on flow in the inlet pipe at the water velocity of 1,5 m a day. Such control is applied for all consumer categories, except households, for which a norm consumption per capita is set, and the payment is effectuated based on the fixed tariff.

Recently the utilities, Tbilvodocanal LLC in particular, have been installing the individual water meters. According to the decision of Tbilisi municipality, pilot installation of the individual water meters has been started in Didi Digomi housing district. Water metering is the best tool for low-income households to secure against the consequences of tariff increase.

According to SNiP, water losses should not exceed 10 %, however, in practice these figures are much higher. Average technological network water losses in Georgia amount to at least 30-40 % of the total volume of water delivered to the network.

3.4 Billing for factual water supplied

Procedures of billing for the services provided are set in the Rules of use of communal water and wastewater systems. According to these, settlements with the consumers are carried on based on the concluded agreement based on the metered water consumption and the tariffs within the terms stipulated in the agreement.

A consumer and a W&WW utility conclude a statement on the water consumed, indicating volumes and quality of the water, based on which a bill is prepared according to which the consumer is to pay for the services.
Consumer pay for W&WW services through the bank account on the dates stated in the agreement. The consumer also may effectuate an advance payment and then pay a recalculated amount. In case a consumer doesn't pay the bill, he is to pay a penalty fee in the amount set in the agreement, and the W&WW utility is empowered to disconnect a non-paying consumer.
In order to increase the households payments collection rate in Tbilisi, an unified format of the bill for households was elaborated together with Tbilisi Energy Company "Telasi" in 2004. "Telasi" prints and send out the bills, based on which the households are to pay for consumed electric energy and water through Cash Payment Centers of "Telasi". On the same day the payment for water is transferred to the account of Tbilvodocanal LLC. This resulted in a considerable increase of households payments (up to 46 %). For 12 months of 2004 the intermediary company received about 550 th. lari for the services provided, which is equal about 8% of the total amount of households payment.
In some small towns and districts the payment for W&WW services is collected by cash messengers (which receive 5-10 % of the collected amount) and then paid in the cashier's office of the company.

3.5 Revenues from the services provided, payments structure and collection rate

Data on revenues from the services provided, payments structure and collection rate for each consumer category is presented in the Table below.

Table 7. Revenues from W&WW services and payment collection by consumer categories, 200

	Total, th. lari	Factual revenues, th. lari	Including		Collection rate %
			Mutual settlements, th. lari	Cash, th. lari	
Tbilvodocanal LLC					
Total	36518,5	28561,8	818,5	27743,3	78,2%
households	10631,7	4882,6	19,0*	4863,6	45,9%
Budget-financed institutions	10984,1	11041,7	36,3	11005,4	100,5%
Economic actors	14902,7	12637,5	763,2	1187,3	84,8%
Kutskalkanal LLC					
Total	3213,1	1196,6	-	1196,6	37,2%
households	2143,5	518,	-	518	24,2%
Budget-financed	691,0	398,6	-	397,6	57,7%

institutions					
Economic actors	378,6	280,0	-	280,0	73,9%
Marneulivodocanal LLC					
Total	643,1	89	-	89	13,8%
households	567	69,5	-	69,5	12,2%
Budget-financed institutions	37,1	-	-	-	
Economic actors	39	19,5	-	19,5	50,0%
Gorivodocanal LLC					
Total	278,6	214,0	-	214	76,8%
households	141,5	37,1	-	37,1	26,2%
Budget-financed institutions	69,7	85,8	-	85,8	122,9%
Economic actors	67,3	91,1	-	135,4	135,4%
Borjomivodocanal LLC					
Total	101	52,2	-	52,2	51,6%
households	66,3	9,2	-	9,2	13,8%
Budget-financed institutions	14,8	18,6	-	18,6	125,6%
Economic actors	19.9	24.4	-	24.4	122.6%

* Administration of one of Tbilisi municipalities carried on the mutual settlements with Tbilvodocanal LLC to cover the households indebtedness.

4. Planning and financing of investments in W&WW

4.1. The existing practices of strategic, medium-term and short-term planning of capital investments. Programs of development and capital construction in W&WW sector of Georgia. Capital costs financing

Order of the President of Georgia No. 543 of 23 September 1998 adopted the concept of housing and communal sector reforming in Georgia. In the frameworks of the concept the program of sanitary and technical improvement of water and wastewater systems in cities and districts of Georgia for 1999-2001 was prepared. An approximate cost of the program was 82 mln. lari, including 48,8 mln. lari for rehabilitation of water supply systems, and 36,2 mln. lari for rehabilitation of wastewater system. However, due to a lack of financing, only minor part of the program has been implemented.

In present, rehabilitation, development and capital construction in W&WW sector is carried out by Municipal Development Fund, Social Investments Fund of Georgia, as well as through transfers from the national budget to territorial budgets, for the exception of Tbilisi, where development and rehabilitation of W&WW sector is financed from the municipal budget.

Municipal Development Fund was established in pursuance of the Order of the President No. 294 of 17 June 1997. The main task of the Fund is mobilisation of financial resources of international financing institutions, agencies, donors, central and local authorities, i.e. making these resources more accessible for municipalities to invest to the municipal infrastructure and services sector.

The objectives of the Fund are the following:

- to render assistance to local self-governments in the investment projects preparation;
- to do financial and technical assessment of the proposals submitted by local self-governments, as well as to assist in submission of the documents to the Government of Georgia and the World Bank;
- to implement tendering during the project implementation and other procedures agreed between the Government of Georgia and the World Bank;
- to control over repayment of credits by local self-governments;
- to carry on technical supervision.

The financing of investment projects by the Municipal Development Fund is made on the following conditions: 20 % is covered by the client of Municipal Development Fund (a local self-government), 40 % - from the governmental grant (International Development Association) and 40 % - from the credit of the Municipal Development Fund. The annual interest rate is 15%, repayment period is 10 years, grace period is one year.

In 2001-2004 in the frameworks of Municipal Development Fund 10,594.0 th. lari were allocated for construction and commissioning of facilities in W&WW sector, including 1,068.7 th. lari in 2001, 6,368.9 th. lari in 2002, 3,155.7 th. lari in 2004. Today 2,994.4 th. lari is allocated for the W&WW infrastructure. About 5,500.0 th. lari is envisioned to be spent in 2005.

For this period 6,543.7 th. lari were allocated for reconstruction of W&WW sector in Tbilisi, 1,324.6 th. lari – in Rustavi, 1,234,. th. lari – in Gori, 868.1 th. lari – in Poti, 622.4 th. lari – in Telavi. The works in Batumi are now carried on. Cost of the project is 2994.3 th. lari. It is planned to fulfil the works in Batumi, Chiatura, Ozugetti, Rustavi, Gori.

Social Investments Fund of Georgia finances the program to abate poverty, in the frameworks of which rural W&WW utilities were rehabilitated in 2002-2003. Rehabilitation of 14 infrastructure facilities cost 2,389.3 th. lari. Presently the second phase is going to be initiated.

Apart from Municipal Development Fund and Social Investments Fund, finances for W&WW systems rehabilitation in 2002-2003 were allocated through transfers from the national budget to the territorial budgets. In 2002 26 municipalities spent 1,250.0 th. lari of the total amount of transfers received for W&WW systems rehabilitation, and in 2003 21 municipality allocated 330.0 th. lari. In 2004 local budgets did not receive any funds for W&WW infrastructure rehabilitation.

Local budget of Tbilisi provided 3,590.0 th. lari in 2002, 4,927.5 th. lari in 2003, and 3,146.4 th. lari in 2004 for rehabilitation, development and capital construction of W&WW infrastructure. The final amount of funds for capital investments in 2005 will be known after adoption of Tbilisi budget for 2005.

Annex 2. Georgia: macroeconomic review

It has been thirteen years since Georgia won independence. The transition from centralized to market economy and major changes in social and political spheres caused serious obstacles on the way of the country's economic development.

However, at the moment, having overcome the difficult years, the country continues to build open and democratic society. The signs of macroeconomic development are obvious: the social structure is currently more stable compared to the situation several years ago; the majority of the population managed to overcome difficult economic problems; reforms are being continued in all spheres of the state system; and legal and institutional fundamentals for sustainable development of the country's economy have been established. In this context assistance of the international community is of particular importance for providing implementation of the prospects of further economic development of Georgia.

This report is a brief review of the macroeconomic situation of Georgia, which has been mainly compiled on the basis of analyzing the country's economic indicators of the past five years. The data quoted in the report is based upon a broad spectrum of information provided by various governmental and municipal agencies of Georgia.

1.Georgia: General background

1.1. Geography

Georgia is situated in the South-East of Europe and occupies an area of 69.7 thousand sq. km. The length of Georgia's state border is 1,969 км. 32.19% of the territory of the republic is covered by forests, 10.94% - by water, and 39.6% -- by agricultural lands. Average annual precipitation for the city of Tbilisi is 42 mm.
The longest rivers within the country are Alazani – 390 km (basin area – 12.0 thousand sq. km), Kura – 351 km (21.1 thousand sq. km), Rioni – 333 km (13.4 thousand sq. km), Yenguri – 206 km (4.1 thousand sq. km). The larges lakes are Paravan with a water surface area of 37.5 sq. km, and Kartsakhi with 26.3 sq. km.

1.2. Administrative territorial division

The reform of the former administrative territorial division of Georgia after the collapse of the USSR took place in 1995. Nowadays Georgia consists of 9 administrative territories (Samegrelo-Zemo-Svaneti; Guria; Imereti; Racha-Lechkhumi and Kvemo Svaneti; Shida Kartli; Mtskheta-Mtianeti; Kakheti; Kvemo Kartli; Samkhret-Javakheti) and two autonomous republics (Ajara and Abkazeti).

1.3. Population trends

During the period between the censuses of enumeration (1989-2001) demographic indicators of the country greatly changed (Table 1). According to the information provided by the Department of Statistics of the Ministry of Economic Development of Georgia, revision of the findings of the 2002 census showed that for the beginning of 2004 the

republic's population totalled **4.54 million**. The population size is shown with regard to Abkhazia and Tskinvali region, which according to experts' information have a population of 230 thousand people.

Table 1. Number of permanent residents and certain demographic indicators of Georgia in 1992-1995 and 2000-2004 (thousand people)

Indicator	1992	1993	1994	1995	…	2000	2001	2002	2003	2004
Population size (for the year end)	5467.4	5345.8	5208.9	5061,7	…	4672.2	4634.8	4601.5	4571.1	4543.0
Births	72.6	61.6	57.3	56.3	…	48.8	47.6	46.6	46.2	46.0
Deaths	55.1	57.5	50.3	49.1	…	47.4	46.2	46.4	46.0	45.8
Natural increase	17.5	4.1	7.0	7.2	…	1.4	1.4	0.2	0.2	0.2

In accordance with the statistics, the city of Tbilisi with **1073.3 thousand** residents (23% of the country's total population) has the largest population in Georgia. The second largest city with regard to population size is Kutaisi with **186.0 thousand** residents, and the city of Batumi comes third with **121.8 thousand** residents.

The number of economically active population of Georgia totals 2049.6 thousand people of the total population

International migration – in particular, migration growth – had negative balance and made up: in 1997 (-123.1) thousand, in 1998 (-39.2) thousand, in 1999 (-36.3) thousand, in в 2000 (-35.2) thousand, in в 2001 (-31.2) thousand, in 2002 (-29.1) thousand and in 2003 (-28.6) thousand people. The majority of migrants leave the republic for NIS countries.

As you can see from Table 2, the number of permanent residents of Georgia in 2000-2004 has annually reduced approximately by 0.7 per cent, however, the balance of external migration of the population has a tendency to decrease, which is accounted for by the improvement of the social and economic situation in Georgia. It should be assumed that in years to come the dynamics of the changing number of the country's permanent residents will gradually turn in the opposite direction and display a tendency to growth.

Following the collapse of the USSR in the mid 1990s Georgia experience major economic difficulties. The crisis in economy was followed by a drastic decline in living standards and prosperity level. By the end of 2003 the foreign debt of Georgia totaled 1,753 million USD but, despite the enormous amount of the debt, which made up over 50% of the GDP in the late 1990s, it is of more importance that since 1998 the foreign debt share in the GDP has been annually decreasing.

Table 2. Dynamics of Georgia's foreign debt

Indicators	1995	1996	1997	1998	1999	2000	2001	2002	2003
Foreign debt, million USD	1390.8	1466	1541.5	1595.2	1629.2	1624.9	1687	1733	1753.8
Debt-to-GDP ratio, %	48.1%	43.1%	44.1%	58.2%	53.4%	52.6%	51.0%	44.5%	41.9%
Debt-to-export ratio, %	359.0%	259.6%	298.9%	231.8%	206.3%	138.1%	120.1%	102.8%	127.4%
Debt service -to-export ratio, %	8.9%	5.9%	10.4%	10.4%	10.1%	3.4%	4.4%	3.9%	6.1%
Debt interest payments-to-export ratio, %	12.7%	8.9%	4.5%	6.3%	7.3%	6.5%	3.1%	4.7%	2.0%
Debt service -to-budget revenues ratio, %	28.5%	11.0%	6.5%	10.5%	16.4%	17.6%	8.2%	12.2%	11.0%

After the information provided by the Ministry of Finance of Georgia

Georgia managed to greatly increase its GDP and, in accordance with the results of 2004, is among the five leading nations in the NIS, with higher growth indicators observed only in Ukraine – 12.7%, Tajikistan – 11.7%, Azerbaijan – 10.6% and Belarus – 10.3%.

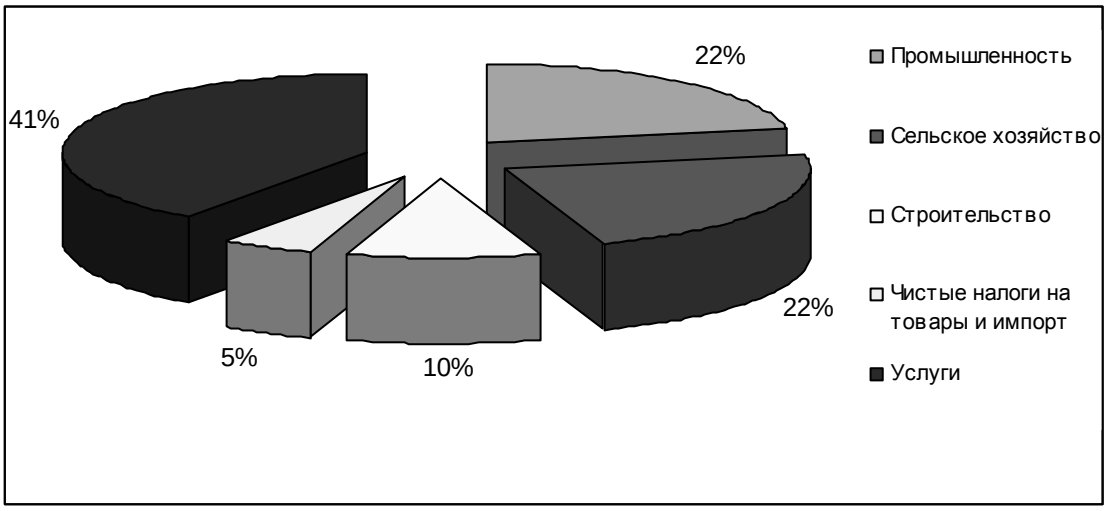
Table 3. GDP growth, %

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
GDP growth (actual)	2.6	10.5	11.6	2.9	3.0	2.0	4.,9	5.5	8.6	8.,5

After the information provided by the Ministry of Finance of Georgia

The GDP growth in Georgia was achieved mainly thanks to the five basic economy sectors (industry, agriculture, construction, transportation and trade) as a result of the changes in the overall production of goods and services.

Figure 1. Contribution of economy sectors into Georgia's GDP in 2003, %



Промышленность = Industry
Сельское хозяйство = Agriculture
Строительство = Construction
Чистые налоги на товары и импорт = Net taxes on commodities and import
Услуги = Services

Besides, for the past five years Georgia has been keeping inflation at 4 – 5 per cent level, considering that just in 1998 this indicator exceeded 11 per cent.

Table 4. Inflation, %

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Inflation for the end of the period	57.3	13.8	7.3	10.7	11.1	4.6	3.4	5.4	5

After the information provided by the Ministry of Finance of Georgia

Consumer price index, which is one of the major economic indicators, in 2002 was 106.6% compared to 2001 and in 2003 – 109.7% compared to the same year of 2001. Expressed as a percentage ratio, the CPI changed by 6.2% and 6.6% over 2001 and 2002, correspondingly, and just by 3% over 2003.

Table 5. Consumer price index in Georgia (2001 = 100), %

	2001	2002	2003
Consumer price index	100.0	106.6	109.7
Changes expressed as percentage	6.2	6.6	3.0

After the information provided by the Ministry of Finance of Georgia

Over the past decade Georgia has been an import-oriented nation; in late 1990s its import exceeded export more than two times.

Table 6. Georgia's export and import, billion of lari (nominal)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Export	0.4	0.5	0.7	0.,8	1.1	1.4	1.6	2.1	2.6
Import	0.8	1.3	1.9	1.9	2.2	2.4	2.6	3.1	3.8

After the information provided by the Ministry of Finance of Georgia

But in the recent years the growth rate of export has been higher than that of import and the difference between them has been diminishing.

Table 7. Growth of Georgia's export and import in percentage of the previous period

	2001	2002	2003
Export	12.0	23.7	25.4
Import	3.2	11.7	25.,9

After the information provided by the Ministry of Finance of Georgia

We should note the increase of domestic investment in the country, both public and private, as well as a growth of consumption and savings, which testifies to positive shifts in the economy.

Table 8. Amount of consumption and domestic investment in Georgia, million lari (actual)

	2001	2002	2003
Consumption, total	**6232.9**	**6330.5**	**6957.0**
public	645.5	619.4	751.9
private	5587.4	5711.1	6205.1
Investment, total	**1375.7**	**1538.5**	**1812.2**
public	71.9	103.	96.6
private	1303.8	1434.9	1715.6
Savings	**1375.8**	**1542.0**	**1788.6**
Domestic savings	954.9	1082.6	1108.1
public	-12.8	-15.0	-57.4
private	967.7	1097.7	1165.,5
Foreign savings	420.9	459.3	680.5

After the information provided by the Ministry of Finance of Georgia

In the recent years interest on loans was approximately 24%, and the interest rate on deposits has been fluctuating between 10 – 11 per cent, which is a sign of development of the banking sector in Georgia. On the whole, judging by the basic banking indicators, a tendency for growth is continuing, although we cannot fail to notice that 81% bank assets, 85% bonds, and 84% deposits are concentrated in the 6 largest banks, each of them owning over 5 per cent of the banking system assets.

Table 9. Interest rates on loans and deposits, %

	2001	2002	2003
Interest rate on loans	23.6	24.4	24.4
Interest rate on deposits	9.6	10.7	9.6

After the information provided by the Ministry of Finance of Georgia

Speaking of the money market of Georgia, we should note a slowdown in the growth of foreign assets. If in 2001 banks with excess liquidity preferred to place idle funds with foreign banks, the year of 2003 was characterized only by a slight growth of foreign assets, but this might be explained by the lowering of interest rates in the West, rather than an improved situation in Georgia's financial market. And, most likely, such slow-down in the growth of foreign assets is beneficial for the Georgian economy, since any foreign asset means withdrawal of money from the economy of Georgia. On the one hand, it leads to beneficiation of Georgian banks. But, on the other hand, this several million lari could be used for crediting, which, correspondingly, would result in economic growth.

The dynamics of foreign liabilities has not been stable. If in 2001 and 2002 a certain growth of foreign liabilities occurred, in 2003 they decreased, which testifies to the changed behavior of foreign investors, who preferred, at best, to refuse to prorogate crediting and, at worst, to withdraw the issued loans ahead of time.

As for domestic assets, we could note an increase of the pure credit money issued to government administration agencies, as well as a stable increase of net credits to the rest of the national economy over the past three years.

M3 money stock, which is M2 combined with deposits in foreign currency, was twice larger than M2.

Dollarization factor of Georgia's economy is very high – it was 86% in 2003, although dollarization is typical of all nations with a high inflation in retrospective.

Table 10. Money market of Georgia, million lari

	2001	2002	2003
Net foreign assets	**-335.6**	**-298.7**	**-268.5**
foreign assets	480.4	621.6	640.1
foreign liabilities	816.0	920.3	908.6
Domestic assets	**1068.0**	**1162.3**	**1328.9**
net credits to government administration agencies *	724.6	713.7	766.1
net credits to the rest of the national economy	572.3	713.8	875.9
other	-228.9	-265.2	-313.1
Monetary aggregate M3	**732.4**	**863.6**	**1060.4**
Monetary aggregate M2	403.8	462.3	527.4
deposits in foreign currency	328.6	401.3	533.0
Dollarization factor	85.7%	84.9%	86.1%

* Net credits to government administration agencies are credits issued to the Government of Georgia and local administration bodies minus deposits and other investments made by the Government of Georgia and local administration bodies.

After the information provided by the Ministry of Finance of Georgia

Revenue structure of the consolidated budget of Georgia looked as following:

Table 11. Revenues of the consolidated budget of Georgia, million lari

	2001	**2002**	**2003**
Total revenues and grants	727.3	801.5	930.0
Total revenues	679.3	778.9	881.9
Tax revenues	627.0	721.0	817.8
Indirect taxes	433.0	500.2	513.8
Direct taxes	57.7	79.2	94.4
Taxes on income	136.3	141.7	209.,6
Non-tax revenues	52.2	57.9	64.1
Grants	48.1	22.6	48.1

After the information provided by the Ministry of Finance of Georgia

Expressed as percentage of the GDP, the amount of tax revenues constituted less than 10%. Though, in the recent years tax revenues have increased, e.g. in 2002 they grew by 15%, and in 2003 – by 13%.
Over all of the past years budget expenditures have exceeded budget revenues and the country experienced a budget deficit.

Table 12. Expenditures of the consolidated budget of Georgia, million lari.

	2001	2002	2003
Expenditures and net crediting	848.0	931.9	1140.7
Total expenditures	810.9	926.1	1093.,8
Current expenditures	739.,0	815.7	987.8
Expenditures on commodities and services	245.3	231.6	330.5
salaries and wages	79.8	92.0	108.7
other commodities and services	165.4	139.6	221.9
Transfers and subsidies	376.1	417.1	519.7
subsidies	43.8	57.8	85.5
transfers	332.3	359.3	434.2
private sector	289.5	294.2	364.4
sector	42.,8	65.1	69.8
Interest payments	117.,6	167.0	137.6
Domestic	66.2	66.8	84.,6
External	51.4	100.2	53.0
Investments	71.,9	110.4	106.0
Net lending	37.1	5.8	46.9

After the information provided by the Ministry of Finance of Georgia

As you can see from the table below, expenditures on state administration and law enforcement constitute the largest share of the state expenditures. We can note a gradual increase of expenditures on education and international activities.

Table 13. Composition of expenditures of the consolidated budget of Georgia, %

	2001	2002	2003
Total expenditures	100	100	100
State administration	21.3	23.5	24.9
International activities	4.5	5.2	5.5
Maintenance of public peace	9.6	8.7	9.8
Education	3.9	4.0	5.2
Health protection	4.1	4.3	3.7
Provision of social security	28.8	28.80	26.3
Housing and public utilities	0.5	0.5	0.3
Transportation	4.2	4.,0	4.4

After the information provided by the Ministry of Finance of Georgia

2.Household income, poverty level and poverty headcount

2.1. Number of economically active population and unemployment rate

In 2003 the economically active population of Georgia constituted 2049.6 thousand people or 45% of the population. Out of this number the following economy sectors employ:

- Agriculture – 994.9 thousand people;
- Education – 135.0 thousand people;
- Construction – 40.0 thousand people;
- Commerce – 198.0 thousand people;

Table 14 Composition of the economically active population (thousand people)

	1997	1998	1999	2000	2001	2002	2003
Economically active population, total	1999.4	2025.8	2009.5	2051.6	2113.3	2104.1	2049.6
Including:							
Employed	1847.9	1731.1	1732.6	1839.3	1877.7	1839.2	1813.,7
Among them:							
Wage workers	673.,3	747.6	731.5	684.3	654.3	650.9	618.4
Self-employed	1070.9	969.3	982.8	1042.9	1135.9	1184.9	1195.3
Unemployed	151.5	294.7	276.9	212.2	235.6	265.0	235.9
% of the total							
Economically active population, total	100	100	100	100	100	100	100
Including:							
Employed	92.4	85.5	86.2	89.7	88.9	87.4	88.5
Among them:							
Wage workers	33.7	36.9	36.4	33.4	31.0	30.9	30.2
Self-employed	53.6	47.8	48.9	50.8	53.8	56.3	58.3
Unemployed	7.6	14.5	13.8	10.3	11.1	12.6	11.5

Table 15 Composition of the unemployed (thousand people)

	1997	1998	1999	2000	2001	2002	2003
Officially registered unemployed, total	**142.5**	**98.7**	**102.6**	**117.3**	**109.5**	**37.0**	**45.9**
1. Including:							
women	78.4	54.5	55.6	61.8	60.9	16.6	21.6
ratio of women	55.0	55.2	55.4	52.7	55.6	44.9	47.1
unemployed –to-economically active population ration	5.0	4.2	5.0	3.5	5.5	1.2	2.1
2. Including by age groups:							
16-29	18.2	31.9	32.9	36.7	35.7	3.0	4.9
30-49	86.9	33.9	39.1	40.2	39.1	12.2	3.1
50 and over	13.1	19.7	20.2	23.7	23.1	6.7	7.0
3. Including by level of education:							
Post primary	14.8	15.3	26.1	26.8	26.1	0.1	0.2
secondary	47.4	33.4	32.8	44.7	43.5	14.5	28.2
higher (college)	55.9	36.8	33.3	29.1	28.2	7.3	14.5

2.2. Dynamics and composition of monetary income and expenditures of the population

Actual and average per capita income has decreased 4 – 5 times compared to 1990. On the basis of the available data, approximately 45% of the population have an income under the sustenance level, and 5-6% of the richest people receive about 1/3 of the total income. Over 1991-1995, the share of salaries and wages in the composition of monetary income kept growing: from 810 lari in 1999 to 1510.8 lari in 2003, that is by 53.3%.

Since 1995 monetary income in the republic has been growing faster than the consumer price index. Starting from 1995, as a result of price stabilization and income growth, paying capacity of the population has increased almost twofold.

As you can see from table 12, nominal monetary income of Georgian population has significantly grown since 1999. The main sources of income include wage and salary income, pensions and maintenance allowances, revenues from sale of agricultural products, and money orders from relatives living abroad.

Table 16 Amount and composition of monetary income and expenditures of Georgian population, 2002-2003

	2002	2003
Monetary income, million lari	2913.6	2974.8
per capita, lari per year	729.6	775.2
per capita, USD per year	349.09	373.59
Composition of monetary income		
Total income, million lari	2913.6	2974.8
Wage and salary income, million lari	1166.4	1137.6
Monetary expenditures, million lari	2782.8	2698.8
Total consumer spendings, million lari	2782.8	2698.8
Payment for services, million lari	1075.2	1009.2

The factor, determining the degree of irregularity of income and spending distribution among the population, was 0,49 for income and 0,40 for expenditures.

The people's expenditures are still dominated by spendings to purchase foods, which make up over 60% of consumer spendings and thus, pursuant to the World Bank criteria, allow for classing most of Georgian population as the poor.

2.3. Consumer goods basket, poverty criteria and ratio of the poor

It is assumed that households spend on average 60% of their budgets on minimum consumption in accordance with the "consumer goods basket", and the rest of their expenditures make up 40%. The average per capita consumed foods cost approximately USD 55. The cost of the entire "consumer goods basket" of the population is approximately USD 136.8.

Compared to this, the minimum monthly salary makes up only 43.34% of the cost of the "basket". Since 1998-1999, the cost of the actual food basket, that is food poverty line, on average has dropped lower than the "absolute poverty" line.

The ratio of households and the population living under the poverty line had the following values for 2003.

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Table 17 Households and population living under the poverty line in 2003 (%)

Population			
	Total	**Urban**	**Rural**
Poor	50,7	47,2	54,2

Poverty depth constitutes 19.2% of the total population, including 16.8% of the urban residents and 21.6% of rural residents. Ratio of people, who are on the verge of poverty, is 10.0%. **Actually, a potential share of the population who are eligible for social protection (welfare) constitutes 50%.**

Annex 3 Sanitary-Epidemiologic Data and Dynamic of Water Abstraction and Use

1. Drinking Water Quality

Drinking water quality standards are stipulated in the Hygiene Requirements for Drinking Water Quality. These Standards are excessively detailed, while monitoring is limited to a short list of basic parameters.

Before 1990-1992 all municipal water supply utilities, as well as some (centralized) water supply utilities in rural area had own laboratory for drinking water quality control. Last years most of the laboratories (more than 50%) are out of order because of lack of finances, equipment, reagents most of the remaining ones operate at a very limited capacity. In some places they are assisted in their duties by the laboratories under the authority of the State Sanitary Supervision Inspectorate.

The Inspectorate is responsible for the chemical and microbiological safety of drinking water, maintains its monitoring program at water intakes and throughout distribution systems, where samples are taken from fixed sites in accordance with specified schedules. There are 64 laboratories (chemical and bacteriological) in the 67 units of the State Sanitary Supervision Inspectorates, out of which 53 laboratories are functioning. Most of the laboratories are located in badly maintained buildings that are not suitable for quality laboratory analysis - neither chemical nor microbiological. Much of the equipment and apparatus are old and worn out – 10 regional laboratories have extreme equipment shortage, the rest have just enough for low level functioning. Only the laboratories in Rustavi, Gori, Zugdidi, Tkibuli, Poti and Chiatura can do some kind of basic research work. Chemicals are often outdated. Electricity interruptions often occur.

Available data demonstrate that there is a problem of microbiological and chemical contamination of drinking water in some centralized water supply system.

Table 1. Results of sanitary-chemical and bacteriological study of centralized water supply systems

	2000		2001		2003	
	Number of samples	Did not correspond to the norm	Number of samples	Did not correspond to the norm	Number of samples	Did not correspond to the norm
Chemical analyses	21660	3658	20583	3939	29057	5255
	53,8%	16,9%	53,2%	19,0%	57,1 %	18,1 %
Bacteriological analyses	18578	3392	18106	3005	21839	3467
	46,2%	18,3%	46,8%	17,0%	42,9 %	15,9 %
Total	40338	7050	39689	6944	50896	8722
	100%	17,5%	100%	18%	100%	17,1 %

Source: Annual Reports of the State Sanitary Supervision Inspectorate

Table 2. Results of microbiological study of centralized water supply systems in the towns

Low risk group cities and districts	Cases of bacteriological pollution %	Middle risk group cities and districts	Cases of bacteriological pollution %	High risk group cities and districts	Cases of bacteriological pollution %
Tbilisi	1,0	Borjomi	21,4	Tianeti	42,8
Khoni	1,3	Signagi	22,7	Kvareli	55,6
Chokhatauri	1,6	Zestaponi	22,8	Tsageri	58,3
Tskaltubo	1,9	Adigeni	25,2	Sagarejo	62,2
Martvili	2,0	Akhmeta	32,4	Kharagauli	62,8
Ozurgeti	5,1	Bagdati	33,2	Khashuri	70,0
Khobi	5,1	Mtskheta	35,7	Vani	71,4
Gori	6,4	Lanchkhuti	36,8	Sachkhere	77,4
Gurjaani	7,1	Tetritskaro	37,6	Samtredia	85,1
Tkibuli	8,0			Chiatura	85,3
Chkhorotsku	8,0			Gardabani	86,5
Poti	8,2			Kareli	87,1
Oni	8,4			Dusheti	98,2
Abasha	9,8			Lagodekhi	100
Bolnisi	10,5				
Tsalenjikha	12,9				
Kutaisi	14,5				
Akhalkalaki	14,6				
Rustavi	18,5				
Akhaltsikhe	18,8				
Ambrolauri	19,1				

Source: National Environmental Health Action Plan of Georgia “Environment and Health” (NEHAP of Georgia), 2004

The following particularizes the drinking water quality in Georgia;

- despite the large amount of water resources, the significant part of population has no access to safe drinking water, that meets the sanitary-hygienic demands,
- most of the drinking water distribution systems needs reconstruction and repairing as there are cases of secondary contamination of water in these systems.

2. Source Protection

In accordance with the Water Law of Georgia, three zones of sanitary protection are established for all drinking water intakes:

- In the first and strictest zone no construction of any facility, wastewater discharge or any other activity that are not connected with water intake functions are allowed; this zone should be fenced off and have security.
- In the second zone (less strict) no activities are allowed that can impact on water quality and quantity as well as railway and road construction;
- In the third zone activities, which can cause chemical water pollution, are not allowed.

The sanitary rules, "Zones of Sanitary Preservation of Water Pipelines for Economy and Drinking Purposes", of 2001 set procedures of designing the zones, requirements to conditions and monitoring.

The design of the sanitary protection zones for any water intake should be developed by local authorities in accordance with "Norms and Rules for Construction" (1992, old Soviet Union norms are in use) and approved by the State Sanitary Supervision Inspectorate.

Currently, the situation regarding zones of sanitary protection for water intakes is critical. In 2001 1319 drinking water intakes were inspected by the State Sanitary Supervision Inspectorate, 565 of them (43%) had no protection zones at all.

Table 3. Water intakes inspected by the State Sanitary Supervision Inspectorate in 2001

Water supply intakes	Inspected in 2001	Had no zones of sanitary protection	
		Number	%
1. Total	1319	565	43
Surface water intakes (included in total)	189	78	
1. Municipal – total	112	16	14
surface water intakes (included in total)	29	6	21
2. Rural – total	1023	478	47
Surface water intakes (included in total)	143	65	46
3. Private – total	184	71	39
Surface water intakes (included in total)	17	7	41

Source: Annual Report of the State Sanitary Inspectorate, 2001

Most other protection zones are in a poor condition and don't meet sanitary requirements. Typical violations are poor security and use of fertilisers.

Some examples:

- Forbidden activities were registered in the limits of the second zone of sanitary protection of the Batumi drinking water intake (use of fertilisers, washing of cars etc.). Some cases of pollution of the territory of the second zone took place as a result of the sewerage collector being damaged.
- The first sanitary protection zone of most of the towns and villages of the Imereti region are not fenced off; the first zone of the Kutaisi water intakes is not secured sufficiently;
- the sanitary protection zone of Gori and Kaspi municipal water supply systems don't meet sanitary requirements;
- in the Kakheti region drinking water intakes of about 100 rural water supply systems are not fenced off and have no security; the facilities are in a bad technical condition, water storages are not covered;
- in the Kvemo-Kartli region the first protection zone of most of the water intakes is not secured; a lot of use of fertilisers and livestock grassing are registered.

3. Health effects of drinking water contamination and water related diseases

Public health in Georgia suffers from the effects of declining economic activity in the last years. The drinking water quality and supply situation is clearly unsatisfactory and adversely affects public health to a considerable extent. Even in Tbilisi, where the drinking water supply situation is relatively well-functioning, contamination often occurs due to insufficient maintenance of drinking water and wastewater pipelines.

Contaminated drinking water can cause infectious and parasitic diseases and it affects health in general and the well-being of the population. The Disease Control Centre of the Ministry of Health reports the following incidents:

Table 4. Waterborne disease outbreaks in 1997-2003

#	Cities and regions	1997		1998		1999		2000		2001		2002		2003	
		Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of dis-eases
1	Ajara			3582[1]	DOCD[2]							51[3]	Hepati-tis A A		
2	Zemo Kartli											36[4]	Shigellosis		
3	Tbilisi											187	Hepati-tis A A		
4	Poti							267	DOCD						
5	Axmeta	98	Hepati-tis A												
6	Gurjaani														
7	Dedoplis Tskaro														
8	Telavi			32	Shigello-sis	77	Shigello-sis	63	DOCD						
9	Lagodexi														
10	Sagarejo														
11	Signagai														
12	Kvareli														
13	Kutaisi					86	DOCD			169	DOCD	135	DOCD	53	DOCD
14	Chiatura														
15	Tkibuli														
16	Tskaltubo														
17	Bagdati														
18	Vani														
19	Zestaponi														

#	Cities and regions	1997		1998		1999		2000		2001		2002		2003	
		Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of dis-eases
20	Terjola														
21	Samtredia														
22	Sachkhere														
23	Kharagauli														
24	Khoni			94	DOCD	77	Typhoid			59	Typhoid				
25	Zugdidi			86[5]	D DOCD										
26	Abasha														
27	Martvili														
28	Senaki														
29	Chkhoritsku														
30	Tsalenjikha														
31	Khobi														
32	Gori														
33	Kaspi														
34	Kareli														
35	Khashuri			37	D DOCD	145	DOCD	23	DOCD						
36	Rustavi	944	DOCD												
37	Bolnisi														
38	Gardabani			25	DOCD			39	DOCD						
39	Dmanisi														
40	Tettitskaro														
41	Marneuli														
42	Tsalka														
43	Lanchkhuti														
44	Ozurgeti														
45	Chokhatauri														
46	Adigeni														
47	Aspindza														

#	Cities and regions	1997		1998		1999		2000		2001		2002		2003	
		Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of diseases	Number of cases	Type of dis-eases
48	Akhalkalaki														
49	Akhaltsikhe														
50	Borjomi	499	DOCD					64	DOCD	403	Hepatitis A				
51	Ninotsminda														
52	Akhalgori														
53	Dusheti														
54	Tianeti														
55	Mtskheta														
56	Kazbegi														
57	Ambrolauri														
58	Lentekhi														
59	Oni														
60	Tsageri														
61	Mestia									25[6]	Shigel-losis				

[1] _ Cases of Diarrhea in Kobuleti, Ajara.
[2] _ Disease outbreaks characterized by diarrhea (DOCD)
[3] _ 38 and 13 cases of viral hepatitis in Batumi and Khelvachauri respectively.
[4] _ Cases of Shigellosis in the village of Tamarasheni, Zemo Kartli;
[5] _ Diarrhea cases in the village of Jvari, Zugdidi.
[6] _ Cases of Shigellosis in the village of Latali, Mestia.

Source: Results of epidemiological studies carried out by the Disease Control National Center

Almost all cases of drinking water related diseases were registered in towns, not in rural areas, were people use water from wells, springs and other non-centralised sources. To explain the situation in more detail, one additional aspect should therefore be recalled:

It is well known from other studies that in societies with difficult access to medical treatment (e.g. because of distance, scarcity of public health facilities or lack of transport) and with a difficult economic situation, people do not seek medical assistance if they are not very ill. This is often the case with waterborne diseases, diarrhea in particular. People almost get used to it, hope that it will disappear without any treatment, and do not seek treatment until it is absolutely necessary.

The economic situation in Georgia may contribute to understand why the figures mentioned above do not give a full picture of the occurrence of water borne diseases. According to a study performed by CDC in 2001 only around 35% of people with diarrhea asked for medical treatment, and around 40% of children suffering from diarrhea were not offered medical treatment because of insufficient economic means of their parents. This may also explain why waterborne diarrhea is not registered in Georgian rural areas: people there are – generally speaking – poorer than in urban areas and access to medical care limited.

4.Water Abstraction and Use

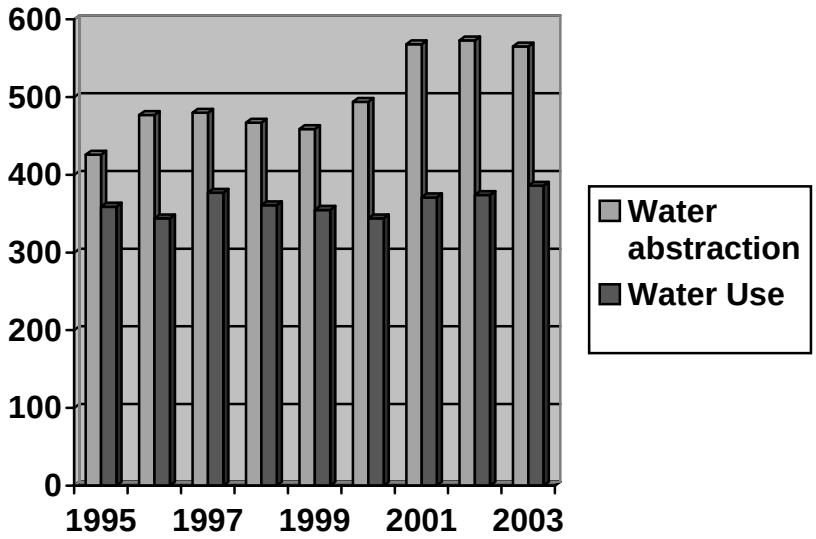
In 2003 25663 mil.m^3 water was abstracted from the water sources. The water use for different purposes constituted 24705 mil.m^3, 435 mil.m^3 - losses during transportation.

The main water users are:

- hydropower - 23998 mil.m^3 (97%)
- households - 429 mil.m^3 (2%)
- agriculture - 120 mil.m^3 (1%)
- industry and others - 25 mil.m^3 (<1%).

Detail information on water abstraction and use in 2003 is given in Annex 1.

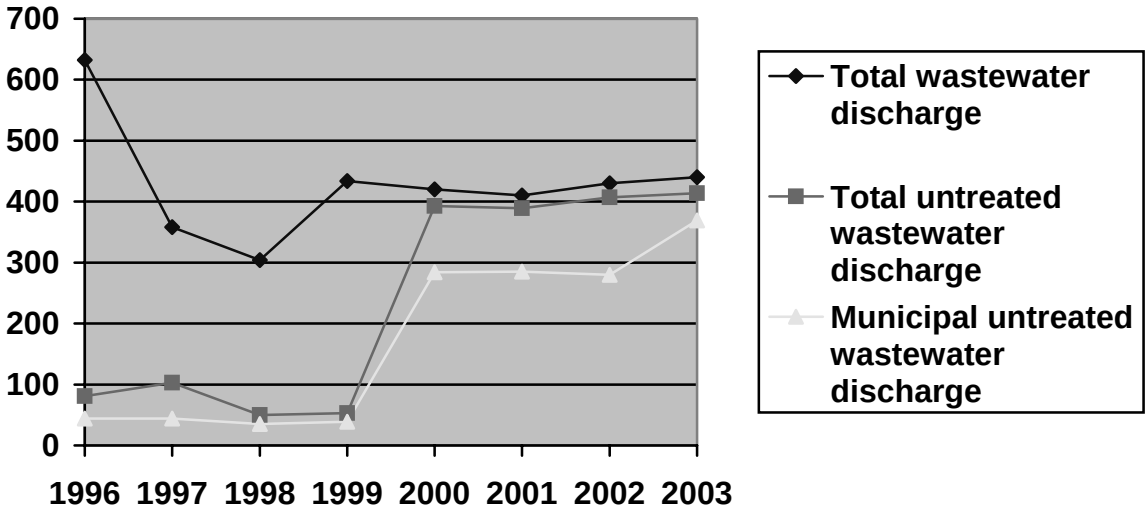
Picture 1. Water abstraction and use by Municipal Water Supply Systems (mil.m^3/year)



Dynamics of water abstraction by different sectors is given in Annex 2, table 2-1.

Wastewater treatment and discharge is a precondition for having good drinking water sources, not only from surface water but also from ground water, ground water originating from bank filtration in particular. Wastewater constitutes an important part of the water resource build up side of the circle. Unfortunately, most part of wastewater is discharged into the surface waters without any treatment, and the largest polluter of surface water is municipal wastewater:

Picture 2. Wastewater discharge,mil.m3/year



The data on waste water discharge in 2003 by sectors, regions and river basins are given in Annex 1. Dynamics of waste water discharge in 1995-2002 is given in Annex2, tables 2-2, 2-3.

5. Environmental financing and expenditures

National sources of finance

Strategies, objectives and major directions for Georgia's socio-economic development are defined in the Indicative Plan for Social and Economic Development. An indicative plan can be worked out for the short (one year), medium (five years) and long term (10 to 20 years). It is the basis for drafting the State budget. The indicative plan is based on programmes and project proposals from different ministries, agencies and other executive bodies. The project proposals are submitted to the Ministry of Economical Development. When the priority projects are approved, they are included in the draft indicative plan for the upcoming year to be subsequently considered in the draft State budget. The State budgets that were adopted according to the indicative plans over the past ten years show a decline in the expenditures on environmental protection. In 2002 only the 12 environmental projects proposed by the Ministry of Environment, only 5 received any financing from the State budget. However, environment-related investment projects are also indirectly grouped under other sectors. The projections of expenditure by sector show that continuing priority is given to public order and safety. Health and education have received substantial increases in spending in recent years.

Most environment-related programs and plans were developed with the assistance of various international financial institutions. Plans usually include activities that are solely designed to attract future funding from international organizations. Most ongoing and planned measures receive financial support from donor countries and international financial institutions.

The municipalities have authority over the natural resources in their area and have to ensure services for water supply, waste water and municipal waste management. At the moment, the municipalities are financially dependent on State budget allocations, which barely cover salaries and related expenditures. Additional sources of revenue under the control of municipalities are property taxes, communal fees and income from municipal services.

Extrabudgetary funds

Unlike other East European, Caucasian and Central Asian countries that have established similar systems of environmental taxes, Georgia does not have a special national or regional environmental fund. Revenues from the environmental taxes are distributed to the regional budgets of the administrative units and are primarily spent on social and other urgent needs.

Despite the efforts of the Ministry of Environment to establish an environmental fund, which would distribute revenues from environmental taxes for environmental protection purposes, no consensus has been reached on this issue in the Government and Parliament. The main argument of the opposing parties (Ministry of Finance and the Parliamentary Committee on Financing and Budgeting) is that extrabudgetary funds would undermine the policy of fiscal integrity, which is strongly supported by the International Monetary Fund.

The Ministry of Environment is now pursuing an approach of debt-for-nature swaps, as a means of reducing foreign debt and increasing expenditure on the environmental sector. Georgia has signed an agreement with the "Paris Club" creditors to restructure its official external debt, and a debt for nature swap clause has been included.

Annex 4. Short Justification of Project Ideas

Introduction

In the framework of the project on development of Financial Strategy for water supply and sewage sector of Georgia COWI experts visited several water supply and sewage facilities, which made part of the preliminary list of project ideas. This document features a more detailed analysis of the condition of facilities belonging to water supply and sewage infrastructure, which were entered on the above mentioned list.

The Zhinvali – Tbilisi sewerage collector

Brief description

Originally the Zhinvali – Tbilisi sewerage collector was constructed with the purpose of waste water disposal from the residential area of Zhinvali settlement, which was built to provide dwelling for the Zhinvali hydroelectric power plant personnel. Besides, the sewer collected sewage waters from small settlements, villages, and holiday villages developed in the Aragvi River Valley, and also had a connection to the Dusheti rayon.

At present, on the bank of the Aragvi River construction of a hotel complex for 1 500 persons + maintenance staff of 300 is nearing completion; a decision has been taken to build a canning factory in the river valley; however the problem of waste water disposal for these and similar facilities remains unsolved.

Due to the fact that for a long time there has been no funding allocated for repair and operation of the sewer, it got completely out of order and its further usage without proper rehabilitation is impossible. Along the entire length of the sewerage collector the land disposal of waste water occurs. Most inspection wells are junked and do not function. The discharges are filtered immediately into the Aragvi River.

Figure 0.1 The Zhinvali – Tbilisi sewer. Intensive land disposal of effluents through the damaged vault of sewerage collector.

The total population residing in the river valley is about 3 thousand people and varies depending on a season (holiday villages). The Dusheti rayon, which is also connected to this sewer, has a population of about 10 thousand.

Environmental situation

The Aragvi River is a source of water supply for the Saguram-Natakhtar water intake. The Saguram-Natakhtar water treatment plant is the main water supply source for the city of Tbilisi. It produces around 75% of the total volume of potable water.

The average production capacity of the water treatment plant is 12m^3/sec. The average water consumption from the hydroelectric plant that is necessary for normal functioning of cascaded sediment ponds of the water treatment plant makes 35-40m^3/sec. The water reservoir of the hydroelectric plant is filled in spring and summer by the melting high mountain snows (1,100-1,500m above the sea level) and atmospheric precipitation. Fluctuation of water level in the water reservoir of the hydroelectric plant is 50 m (760-810 m above the sea level), the aggregate maximum volume of the reservoir is 520mln m^3. The average sanitary water consumption from the water reservoir is 5m^3/sec.

At the water treatment plant there is a laboratory which conducts sampling and determines chemical and organoleptic parameters of the water, derived and supplied into the network. The sanitary inspection office of the city of Tbilisi performs daily sampling for bacteriological parameters. The information received from the agency for sanitary and epidemiological control testifies to the presence of bacteriological contamination in the source, which results from discharge of waste water into the river immediately before the water intake.

Conclusions and recommendations

With regard to the intended intensive development of the Aragvi River territory involving construction of holiday villages, tourist hostels, a canning factory, etc., it is necessary to perform rehabilitation of the sewer. The existing feasibility study of the sewer rehabilitation, prepared by a Japanese company, comprises proper drawings, recommendations and detailed calculation of the reconstruction costs.

Marneuli

Brief description

At present the town of Marneuli and its suburbs (28 000 residents) are supplied with potable water, derived from ground water intake, which is situated on the bank of the Khrami River, through a water main 9,3 km long (D600mm). The ground water intake consists of a number of bore holes with the water level -20..25m below the earth surface. The water is supplied from the bore holes to a reservoir with a holding capacity of 300m^3, from where the water is pumped (Q=1,250m^3/hr, H=125m) to the town. Since the specific yield of remaining in good condition bore holes is insufficient, the town is supplied with water only 7 hrs per day.

The project idea, presented by Gruzvodokanal, dealt with construction of a new gravity water main 25km long with a throughput capacity of 100 l/sec, which would ensure 24 hr water supply for the entire town and its suburbs. It was intended that the gravity water main would start in a mountainous district from water wells; after that the water, derived in such a way, should undergo mandatory treatment, since the quality of water in this source does not allow for supplying water to consumers without preliminary treatment. According to the information of the Marneuli vodokanal, the water that can be supplied to the town through the new water main, contains zinc concentrations exceeding the state standard. Besides, some organoleptic indicators are also above the norm.

During a visit to the ground water intake, specialists of Marneuli Vodokanal briefed the consultants on various options for raising the level of services, provided in the town. In particular, they shared their opinion that, according to rough estimates, rehabilitation of the existing ground water intake can be suggested as an alternative, which will be cheaper than construction of a new mountain water intake, water main and water treatment plant.

Rehabilitation of the existing ground water intake envisages dropping the usage of a number of bore holes and submersible pumps. Instead it is intended to perform water collection with the help of a water collection gallery, situated in parallel to the river, at a distance of 30-50m for capturing the upper part of the aquifer of modern alluvial sediments, which are represented mainly by boulders and pebble with sand fill. The thickness of alluvial sediments in this area is 20-25m. The aquifer is directly linked to the river. The original ground water level is 2,5-3m deep. Seasonal fluctuations of the ground water level do not exceed 0.5-0.6m. By their chemical composition the waters are sulfate bicarbonate and calcium / magnesium hydrocarbonate-sulfate. With regard to its bacteriological indicators, the water fully meets the state standard for “Drinking water”.

Along with constructing a gallery, it is intended to replace the second lift pumps and repair the water pressure main (replace 5 km of steel pipe D600 with laying on bedplates). The existing water main was built with technological violations and at present regularly breaks down.

Figure 0.1 Repairing the water main by installing a clamp, town of Marneuli.

Evaluation of the proposed options of water supply for the town

In the advisor's opinion, both options have benefits and flaws.

Benefits:

1. The option of building a new gravity water main will ensure provision of potable water for both the town of Marneuli and all the residential areas along the main. The water supply will be energy-independent, as the significant elevation difference makes it possible to supply consumers with water using exclusively gravity method. Moreover, there is a possibility to construct several mini hydroelectric plants at the pipeline sections that has sufficient elevation difference.

2. The option of rehabilitation of the existing ground water intake will allow for provision of 24 hr supply of drinking quality water for the town and the suburbs with no need to build a water treatment plant. It would allow for dropping the usage of numerous submersible pumps and corresponding power facilities. Replacement of pumping equipment with frequency adjustable and energy-saving one will allow for saving significant amount of electricity, which is currently being lost due to local losses, resulting from the regulating the flow by throttling the valve on the pressure side of the pump.

Flaws:

1. High cost of construction work compared to rehabilitation of existing water intake. Lower quality of water in the source compared to the existing variant and, due to this, a need for mandatory construction of a water treatment plant near the town limits.

2. Rehabilitation and expansion of the existing ground water intake will lead to a significant increase of the volume of the water arriving into the reservoir. Its holding capacity ($300m^3$) will be definitely insufficient for ensuring safe water supply, as even now the throughput capacity of the used pump is enough to pump out the entire reservoir in 10-20 min. Marneuli Vodokanal remains fully dependent on the availability of electric power and funds to pay for it.

Figure 0.2 Retention reservoir V=300m^3 with immediate supply of chlorine from a container.

Rustavi

Brief description

The town of Rustavi, located 10 km away from Tbilisi, is supplied with water through two water mains constructed in 1964 and 1986.

Water intake characteristics

The old water intake represents number of shaft wells situated at the junction of two rivers – the Khrami and the Debeda – from where the collected water is pumped out by first lift pumps into a reservoir, located at the second lift pumping station, where it is subjected to chlorination and supplied through the water mains to consumers. The capacity of the pumps installed in shaft wells is 1,200m^3/hr H=45m. Altogether there are 6 shaft wells with 2 pumps in each. The water is lifted from the depth of 24m.

Figure 0.1 Shaft well of the old water intake

At the second lift pumping station of the old water intake only 2 pumps out of 5 are in operation. They work alternately. The throughput capacity of each pump is 1,250 m^3/hr, with head of 125m. The installed energy capacity of engine is 360kWt.

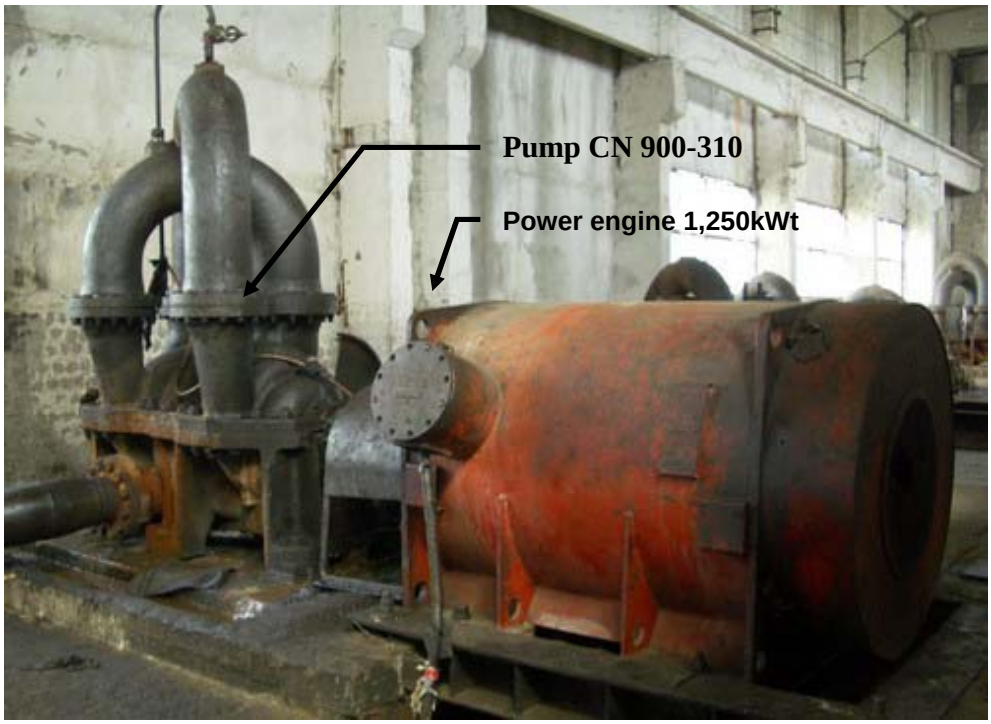
Figure 0.2 The second lift pumping station. Pump D 1250-125.

On the bank of the same river a new water intake has been built. It consists of 24 bore holes, only 12 of which are operational. The bore holes are equipped with submersible pumps ECV 12-160-65 (ЭЦВ 12-160-65). Production capacity of the new water intake is 1,200 l/sec, however, at present the aggregate production capacity of all operational bore holes can provide only 500 l/sec.

Figure 0.3 Pavilions of the new ground water intake

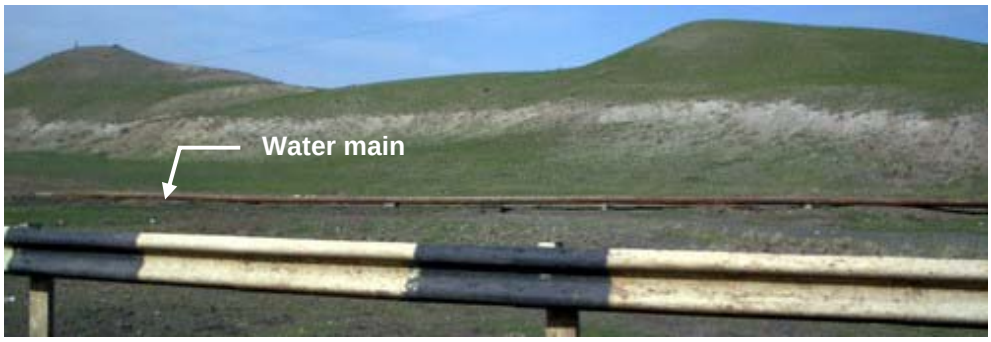
At the second lift pumping station of the new water intake two CN 900-310 (ЦН 900-310) pumps, working alternately, are operational as well. The electrical capacity of the installed engine is 1,250kWt.

Figure 0.4 The second lift pumping station. Pump CN 900-310 (ЦН 900-310).



The water is supplied to the city through two water mains: an old one, 20km long, with 2 lines (D800mm), and a new one with 1 line consisting of 2 parts of correspondingly 16 km (D700mm) and 6 km (D600mm).

Figure 0.5 Water main



Water supply of the town of Rustavi.

The water from both water mains is supplied to 3 reservoirs of 6,000m^3 each and further distributed among consumers by gravity. Unfortunately, currently the gravity mains cannot supply all the consumers, because – among other reasons – the town has greatly "grown" lengthwise and now cannot be supplied with water solely by gravity.

Despite the fact that the aggregate yield of the both water intakes is sufficient for supplying all the consumers (including those connected along the entire length of the mains), the town of Rustavi experiences acute shortage of water. Among other reasons it is accounted for by:

- poor condition of the networks;

- outdated pumping equipment;
- due to a long-term lack of funding the existing distribution network has not been repaired and currently its condition does not allow for maintaining water pressure needed to deliver it to upper floors of buildings;
- for the same reason there occur cases of secondary water pollution that result in outbreaks of diseases among the population;
- high cost of electricity does not allow the Vodokanal to provide uninterruptible water supply for consumers;
- significant number of unauthorized tap-ins in water mains result in lower pressure and significant excess water consumption;
- absence of individual water meters in apartments both in the town and in the residential areas situated along the water main, as well as usage of water for irrigation leads to a situation when people are not interested in water saiving and, as a consequence, consumption greatly exceeds the real needs.

According to the information, provided by representatives of Vodokanal, about 815 bursts in the networks are annually registered in the town, only 700 out of which get fixed. The Vodokanal operates exclusively in the mode of responding to registered visually detectable leaks. The forced leakage detection, as well as events aimed at rehabilitation of the water supply and sewage facilities (cleansing distribution pipes, preventive maintenance) have not been performed for over 10 years.

Sanitary and epidemiological control

The laboratory of the Vodokanal controls quality of supplied water on a regular basis. Besides, sampling is regularly performed at control points in the territory of the town (there are 25 control points on the left bank and 31 on the right bank).

The water is controlled by organoleptic (color, turbidity, taste, smell, transparency) and chemical indicators (pH, ammonia, nitrites, nitrates, iron, chlorides, oxidability). Control of residual chlorine content in the supplied water is performed every hour, and at the control points – once per day. Once per year an analysis of the content of sulfates, hardness, fluorine, copper and dry residues is conducted.

Daily sampling for bacteriological contamination is performed at the control points. The *e-coli* indicator fluctuates between 4 and 240. If the water is supplied without interruptions, it has 90% compliance with the state standard for “Drinking water” regardless of the season, and in case of forced interruptions in the supply (mainly related to power supply) there occur deviations from the standard specifications.

Conclusions and recommendations.

Despite the fact, that in the general opinion of the personnel of Vodokanal the most urgent problem is the necessity of replacing the obsolete pumping equipment with more energy-efficient once, the consultant has no doubt that the problem of supplying the town of Rustavi with water should be solved using a complex approach. Upon conducting a rather brief inspection of the main components of the water supply system of the town, the following conclusions can be drawn.

- The water supply system was designed to work with practically gratuitous electric power, available under the Soviet Union. Currently payments for electric power make the major cost item of the water supply and sewage department. Having three lifts of water supply

leads to a significant increase of specific power consumption per 1 m^3 of water delivered to the consumer. It can be noted that this value is one of the highest for Georgia on the whole. Such a value of specific power consumption is typical mainly of mountainous districts with significant elevation differences, which do not occur in the Debeda River Valley.

- The distribution network is in non-satisfactory condition and keeps degrading. Over 50% of the delivered water is lost through discovered and hidden leaks, leaking joints, faulty valve and fittings, and plumbing appliances in consumers' apartments.
- The system of delivering water from water intakes to clean water reservoirs in the town currently suffers from many factors. They include, first of all:
  - significant amount of losses of water during transportation and non-satisfactory condition of water mains,
  - lack of practice of identification and timely repair of water pipes,
  - unauthorized connections and "hitch-hiking" consumers along the entire length of the water mains,
  - lack of practice of network zoning and pressure management, etc.

Figure 0.6 Damaged pressure pipe in the water intake.

- The water distribution system in the town of Rustavi has become obsolete and demands a complex of measures, involving water auditing, hydraulic modeling of the water supply and sewage pipeline network, drawing up a plan for development and optimization of the water distribution network on the basis of the performed modeling with the use of modern techniques of water demand management.

- It is necessary to perform a number of measures focusing on reduction of water consumption and irrational usage of water resources. Installation of meters in the consumers' appartments should be coordinated with proper changes in the tariff policy.

Implementation of the proposed measures will allow for assessing the real demand for water in both the town of Rustavi and the surrounding residential areas. It will allow for proving or disproving the need for expansion of the infrastructure and available production capacities. Besides, improvement of the water distribution system and higher collectability of adequate payments for provided services will enable the water supply and sewage sector to reach a financially sustainable avenue of development.

Kutaisi

Brief description

The town of Kutaisi is situated 280 km west of Tbilisi. The town is supplied with water from ground water sources. The water is supplied to the town on schedule – for 6 hrs every second day.

The Vodokanal of the town of Kutaisi jointly with a design institute developed a project of rehabilitation of the water supply system of Avtozavodskoi district of the town with the purpose of ensuring 24 hr water supply in this district and increasing the general duration of water supply for the town due to release of the capacities of the other two water intakes.

Water intake characteristics

The ground water intake, situated 14 km west of the town on the right side of the road to the airport, represents a number of bore holes 22 m deep. The static level of the water table is at the mark of 7 ±4 m and fluctuates depending on the season. The dynamic level is at the mark of 14 m, with seasonal fluctuations ±3 m. According to observations of many years, which have been conducted in inspection bore holes, the level of aquifer does not become lower.

Figure 0.1 A bore hole pavilion and a bore hole.

The water from 7 operational bore holes is delivered to a clear water reservoir V=500m^3, subjected to chlorination and supplied to the water main by the second lift pumping station. The pumping station has 2 operational pumps, working alternately. At present the peak capacity of the water intake is 720 m^3/hr.

Figure 0.2 Second lift pumping station and clear water reservoir (CWR) V=500 m^3.

According to the developed feasibility study for rehabilitation of the existing ground water intake and changing over water mains with the purpose of ensuring 24 hr supply of drinking water to Avtozavodskoi district, it is intended to perform a number of measures that will allow for increasing the output capacity of the water intake from the existing 720 m^3/hr up to 2,000 m^3/hr. To achieve this it is necessary:

- To perform cleansing of the 12 non-operational bore holes,
- To replace submersible pumps,
- To replace the installation for water chlorination,
- To replace existing second lift pumps with more efficient and energy-saving ones,
- To repair 2 out of 14 km of the water main, delivering water to Avtozavodskoi district,
- To repair the distribution network, which should result in reducing the length of the distribution network of Avtozavodskoi district from 27 to 22 km.
- To perform pipeline change over for the purpose of hydraulic isolation of Avtozavodskoi district in order to release resources for the rest of the town.

According to the developed feasibility study, the total cost of the project is USD 900,000.

Characteristics of Avtozavodskoi district

Avtozavodskoi district of the town of Kutaisi is situated in the western part of the town and features primarily old 3-5 storey buildings and a number of 9 storey buildings, located at the outskirts of the town – closer to the water intake in question.

Рисунок 0.3 Living blocks in Avtozavodskoi district of the town of Kutaisi. . Low rise houses – on the left, high rise – on the right.

Considerations on the investment projects involving replacement of equipment.

All the investment projects, presented in the list of “Project Ideas” and involving replacement of equipment with more efficient and energy-saving models, have a single significant flaw. Representatives of the Vodokanals disregard the problem of water demand forecast and pursue an extensive way of infrastructure development. Upon the results of the analysis of the data collected during the work on the financing strategy in the water supply and sewage sector, the consultant concluded that the existing condition of the infrastructure does not allow for approaching the solution of the problem of supplying consumers with good quality potable water and safe discharge of waste water from this standpoint. The table below features data on specific losses for 1 km of pipeline per hour.

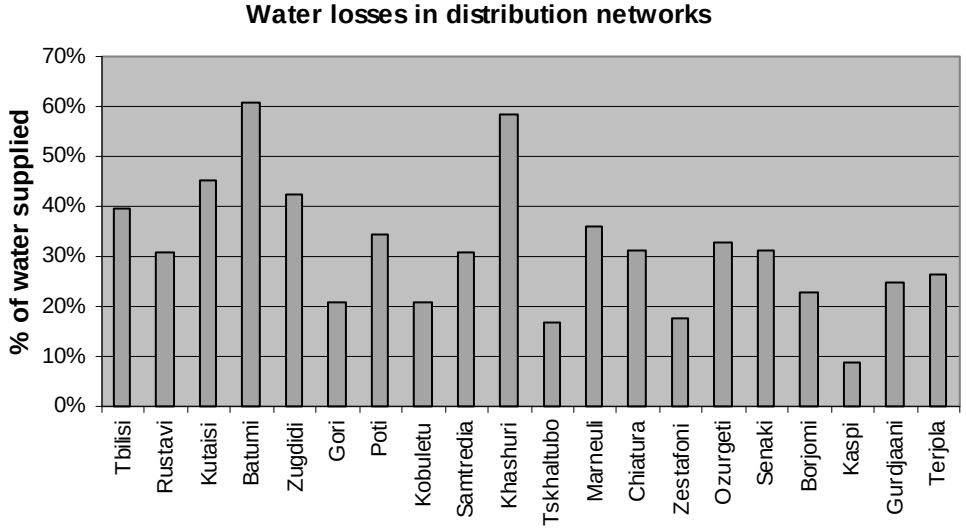
Table 0.1 Amount of water losses in the networks for 1 km of water pipelines.

Town	Population, persons.	Qvr in m^3/km/hr	High losses by town type Qvr=
Tbilisi	980,000	8.80	Qvr=0.25m^3/km/hr For cities and towns with populations > 100 thousand people.
Rustavi	140,500	1.00	
Kutaisi	188,115	2.10	
Batumi	138,000	4.40	
Zugdidi	70,000	0.10	Qvr=0.15m^3/km/hr For towns with populations under 100 thousand people.
Gori	66,300	1.20	
Poti	70,000	0.90	
Kobuleti	21,600	0.90	
Samtredia	30,000	2.80	
Khashuri	32,000	1.60	
Tskhaltubo	13,600	0.50	
Marneuli	30 000	1.00	
Chiatura	22,500	1.00	
Zestafoni	25 000	0.60	
Ozurgeti	23,000	0.20	
Senaki	28,000	0.70	
Borzhomi	18,900	1.80	
Kaspi	15,200	0.90	
Gurdjaani	12,000	0.40	
Terzhola	5,500	1.10	

After COWI calculations

Qvr is an integral (it does not depend on the peculiarities of a town) indicator that allows for comparing effectiveness of work of water supply and sewage infrastructures. Virtually in all the towns, which made part of the sample frame, specific losses significantly exceed the value of "high losses in networks". The declared weighted average water losses by towns are at the level of 41% of the supplied amount. And, considering that for the most part of Vodokanals of Georgia do not have water meters (production etc), the actual losses level can prove to be much higher.

Figure 0.1 Declared losses in the water supply networks by Georgian towns. Information for 2003.



It has been a long time since the water supply and sewage departments stopped performing annual replacement of pipelines in the scope that would prevent them from deteriorating at a catastrophic rate (The generally recognized scope of pipeline replacement is 2-4% per year of its total length). Leaks and bursts in the networks are repaired in an “emergency” mode, and some obvious spots of water losses do not get fixed at all.

Figure 0.2 Leaking valve (D800mm) on the pressure water main on second lift pumping station, Kutaisi.

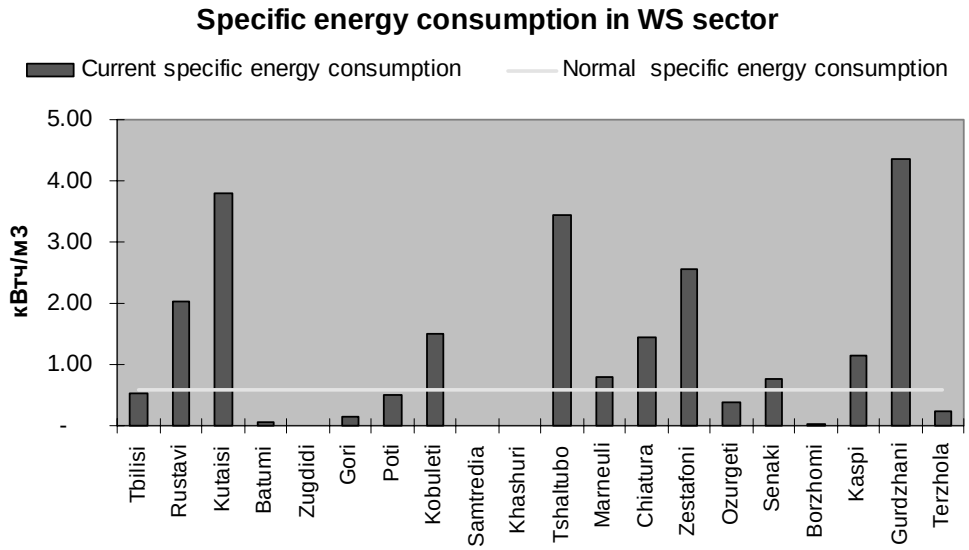
Thus,

-simple replacement of equipment with comparable devices or those with increased efficiency,
-increase of the water intake capacities by expanding it, installing additional pumps and drilling additional bore holes
-and other extensive methods

will after all **not** bring about the desired result, without rehabilitation of transportation and water distribution networks, analyzing and forecasting of water demand, introduction of the practice of accounting produced and consumed water, hydraulic modeling of networks, conducting advertising campaigns aimed at reduction of water consumption, etc., it is **impossible** to assess a need for water of a particular residential areas with high probability. In most cases, implementation of a complex of the above listed measures proves that there is **no need for any expansion** of the available capacities. There have been cases of proper calculations, which lead to conclusions on the expediency of cutting down the pump base, number of bore holes, etc.

The data on specific energy consumption speak of the availability of water supply systems, which were originally designed for cheap electric power.

Figure 0.3 Specific energy consumption in the water supply sector, kWh/m³.



Source: Vodokanal's data and COWI calculations.

In such residential areas it makes sense to think about validation of having several lifts of water and of a possible optimization of delivering water to the consumer.

Project title:

"Rehabilitation of water mains and distribution networks in Tbilisi city"

Sector: Water-supply
Country: Georgia

Municipality: Tbilisi

Project background and justification:

The centralized water supply system in Tbilisi dates back to 1862. Therefore, the service life of particular water and wastewater facilities is over a century. The greatest share of the water transportation infrastructure is completely worn out and requires complete replacement and capital reconstruction. According to the estimates, percentage of losses in main and distribution pipelines in Tbilisi may reach 45-50% of the total water delivered to the network. A single length of water-supply network is 3,352 km. During 2003-2004 Tbilvodocanal LLC replaced 0.1% of water-supply pipelines (3.25 km). About 60% of water network is to be repaired/replaced.

Overall objective:

Reduction of losses and unaccounted-for-water through rehabilitation of water mains and distribution networks. Introduction of in-situ lining of water pipes ("no-dig" method) technology.

Social benefits of the project:

Improvement of water quality. Prevention of secondary pollution of drinking water and prevalence of infectious diseases.

Environmental and natural resource benefits of the project:

Significant water savings, reduction of load on the water intakes.

Key investment components:

1) Procurement of leak detection equipment and organization of leak detection unit in frame of Tbilvodocanal LLC.
2) Procurement of in-situ lining equipment, establishing specialized team on the basis of Tbilvodocanal LLC.

Project costs:

To be identified. Approximately $ 12 mln.

Studies undertaken to date:
To be developed.
Project title: "Rehabilitation of regional Gardabani Waste Water Treatment Plant"

Sector: Waste Water

Country: Georgia

Municipality: Tbilisi

Project background and justification:

Gardabani WWTP was constructed as normal mechanical-biological treatment plant with total capacity of 1 mln.m^3/day. At the present time, Gardabani WWTP treats the waste water transported from two largest cities in Georgia – Tbilisi (980 thous. inhabitants) and Rustavi (141 thous. inhabitants) by the sewer collector (42km). In addition, a number of smaller towns are connected to this collector as well. The total inflow of waste water is equal to 600 thous. m^3/day.

Only mechanical treatment of wastewater is carried out presently, and no biological treatment anymore. Energy crisis which ensued on the dissolution of the Soviet Union, and further significant electricity tariffs growth at a lack of financing have negatively influenced on all WWTF of the country, and particularly, Gardabani WWTP. The technological process was interrupted, the microorganisms used for biological treatment were lost, pipes and conduits were clogged up.

Mechanically treated water is discharged directly to river Kura which is used as a source of water supply for some down stream located settlements.

Overall objective: Recommencement of biological treatment at Gardabani WWTP.

Social benefits of the project:

Significant reduction of pollution load caused by insufficiently treated waste water which is discharged directly to river Kura what would result in improvement of ecological safety of water supply systems of down stream located settlements.

Environmental and natural resource benefits of the project:

Significant improvement of ecological condition of river Kura and the Kaspian Sea.

Key investment components:

Rehabilitation of process tanks (concrete structures, aeration system, replacement of blowers), secondary clarifiers (concrete structures, scrapers, replacement and procurement of missing mechanical equipment) etc.

Project costs:
To be identified. Preliminary costs are estimated at the level of $10-12 mln.

Studies undertaken to date:
To be developed.

Project title: "Optimization of water-supply and sewerage infrastructure in Kutaisi and Zestafoni cities"

Sector: Water-supply and wastewater

Country: Georgia

Municipality: Kutaisi, Zestafoni

Project background and justification:

Use of the obsolete equipment not adapted to the changing water demand and lack of application of modern hydraulic networks modelling methods cause higher energy consumption. Water-supply in the both cities, Kutaisi (190,000 inhabitants) and Zestafoni (25,000 inhabitants), is carried out through pumping stations. Specific energy consumption indicators of 1 m^3 of water supplied are extremely high in the both cities (3.8 kWh/m^3 in Kutaisi and 2.6 kWh/m^3 in Zestafoni) while the internationally recognized average energy consumption norms of 1 m^3 of water supplied under normal conditions are equal to 0,6 kWh for water supply.

Using modern methods of hydraulic network modelling (simulation) would optimize networks operation. Additionally, it would make possible to identify sections required special attention, to assess required capacities of pumping stations and water pipes diameters, to use efficiently existing resources, to forecast long-term capital costs in water-supply and wastewater sectors.

Replacement of pumping equipment to energy efficient one with frequency regulation would significantly increase servicing level due to stabilization of pressure in the network. Also it would result in decrease of water pipes breaks and ensure water-supply regularity.
Such replacement of pumping equipment in wastewater sector would result in electric energy costs savings.

Overall objective:
Optimization of water-supply and sewerage infrastructure in Kutaisi and Zestafoni cities.

Social benefits of the project:
Sustainability of service quality.

Environmental and natural resource benefits of the project:
Optimization of water infrastructure will result in water consumption decrease due to reduction of water losses as technological as unaccounted-for-water.

Key investment components:

Procurement of new highly efficient pumping equipment, rehabilitation of pumping stations, introduction of hydraulic network modelling methods.

Project costs:
To be identified.

Studies undertaken to date:
To be developed.
Project title: "Development of feasibility study for the project "Increase of sustainability and regularity of water-supply in Rustavi and other towns of Kvemo Kartli region (Tetri Tskaro, Marneuli, Gardabani)"

Sector: Water-supply

Country: Georgia

Municipality: Rustavi, Tetri Tskaro, Marneuli, Gardabani

Project background and justification:

Water supply regularity in Rustavi, Tetri Tskaro, Marneuli, Gardabani is far from the required and amounts from 6 (Marneuli) to 8 hours a day (Rustavi). Due to a large number of accidents and breaks in the networks caused by low pipes and valves replacement rates, consumers sometimes suffer from more considerable interruptions in water supply, which sometimes last for several days. All these result in a notable deterioration of the services quality.

To address water-supply problems in Rustavi and other towns of Kvemo Kartli region (Tetri Tskaro, Marneuli, Gardabani) and to ensure round-the-clock water-supply it is suggested to construct a new gravity water main on the basis of Trialetsk underground sources.

Some preliminary estimates show that the project could be expensive. As a strong point of this project is reduced energy consumption due to use of the gravity water main. Moreover, on the

water pipe route three hydro power stations could be constructed with total capacity up to 22 MW.

It is suggested to draft a feasibility study covering detailed analysis of all potential benefits and weaknesses of the project. In addition, because of a very difficult situation in water and sewerage sector of Georgia and many other priority objects requesting for capital investments there is obviously a strong need to make a "cost-benefit" analysis of alternatives.

Overall objective: To develop a feasibility study with participation of international experts with subsequent initiating and justification of loan providing by a specific IFI.

Social benefits of the project: Sustainability and regularity of water-supply for Rustavi (141 thous. inhabitants) and other towns of Kvemo Kartli region.

Environmental and natural resource benefits of the project:
Minor consumption of electric energy using specificity of the relief (mountainous landscape), potential for construction three hydro power stations.

Key investment components:
Construction of water-pipe.

Project costs:
To be identified. Preliminary costs are estimated at the level of $180-200 mln.

Studies undertaken to date:
To be developed.

Project title:

"Rehabilitation of waste water mechanical treatment in Batumi, Ozurgetti, Kobuleti, Poti, Ureki cities"

Sector: Waste Water

Country: Georgia

Municipality: Batumi, Ozurgetti, Kobuleti, Poti, Ureki

Project background and justification:

Batumi (138,000 inhabitants), Ozurgetti (23,000 inhabitants), Kobuleti (22,000 inhabitants), Poti (70,000 inhabitants) and Ureki cities are located on the costal zone of Black Sea. Unfortunately, due to lack of funding existing WWTP in Batumi was completely destroyed during last 10-15 years while in other cities no treatment plants had been constructed at all. So, the whole amount of waste water collected by centralized waste water collection systems from these cities (in total, about 24 mln. m^3 per year) is discharging directly to the Black Sea with no treatment.

Overall objective:

Construction of waste water treatment plants (1st phase - mechanical treatment) in the mentioned cities to prevent a discharge of waste water without any treatment to the Black Sea.

Social benefits of the project:

Increase of ecological safety of the Black Sea. Development of the Black Sea costal zone resort area.

Environmental and natural resource benefits of the project:

Significant improvement of the Black Sea water basin ecological condition.

Key investment components:

Design and construction of waste water treatment plants (mechanical treatment with deep sea outfalls)

Project costs:

To be identified.

Studies undertaken to date:

To be developed.

Project title:

"Rehabilitation of sewerage collector Zhinvali-Tbilisi"

Sector: Waste water

Country: Georgia

Municipality: Tbilisi

Project background and justification:

Rehabilitation of sewerage collector Zhinvali-Tbilisi to prevent pollution of water receiving facilities of Tbilisi water-supply system serving population of Tbilisi city (980 thous. inhabitants) and 34 more towns and settlements.

Overall objective:

Provision of Tbilisi city and other towns and settlements with safe drinking water.

Social benefits of the project:

Improvement of sanitary and epidemiological situation of water-supply system of Tbilisi city and other towns and settlements.

Environmental and natural resource benefits of the project:

Reduction of pollution of river Aragvi, which is a water-supply source for a number of cities and towns.

Key investment components:

Repair works and partial replacement of sewerage collector with total length 48 km.

Project costs:

About $6 mln.

Studies undertaken to date:

Feasibility study.

Project title:

"Reconstruction of centralized water-supply in Zugdidi"

Sector: Water Supply

Country: Georgia

Municipality: Zugdidi (70,000 inhabitants)

Project background and justification:

Water supply of the Zugdidi city (Georgia), before Abkhazia runaway from being under jurisdiction of Georgia, was carried out from three water sources. The main water source is located on the territory of Abkhazia and it is not functioning at the present time. As a result of this, Zugdidi city is short of drinking water and water-supply is only 6-8 hours per day.
In addition, such a difficult situation is redoubled because of Abkhazia refugee concentration on the territory of Zugdidi city. Reported share of population served by centralized water supply system was 14.5% as in year 2004.
To improve the situation with water-supply, it is considered as necessary to construct a new gravity-flowing water main from the Ingury hydroelectric dam to the city reservoir as well as to construct a water treatment plant.

Overall objective:

Construction of water pipe and water treatment station to rehabilitate centralized water-supply system of Zugdidi city.

Social benefits of the project:

Recovery of twenty-four-hour drinking water-supply for population of the city. Increase of population share served by centralized water-supply system.

Environmental and natural resource benefits of the project:
Minor energy consumption.

Key investment components:

Construction of water pipe D 600 mm with total length about 42 km as well as water treatment station with total capacity 500 liters/second.

Project costs:

To be estimated.

Studies undertaken to date:

To be developed.

Project title:

"Provision of uninterrupted sustainable water-supply through optimization of water-supply infrastructure and energy consumption reduction"

Sector: Water Supply

Country: Georgia

Municipality: Poti

Project background and justification:

At the present time water-supply of Poti city (70,000 inhabitants) is carried out through the water main, total length of which is 45 km. Water-supply source is located in Senaki district. However, Poti city is short of drinking water because of there are many branches on the two water pipes. Branches are located along Senaki and Khobi districts route.

It is suggested to construct a gravity water main (42 km) based on the Growl sources of Martvilj district. It would result in release of electric energy consumed now by three-lifts pumping stations. Also it would provide the city with uninterrupted water-supply.

Overall objective:

Provision of uninterrupted sustainable water-supply through optimization of water-supply infrastructure and energy consumption reduction

Social benefits of the project:

Increase of regularity of drinking water-supply for population of the city. Potential for tariffs decrease due to electric energy costs savings.

Environmental and natural resource benefits of the project:

Reduction of load and operation optimization of water source located in Senaki district.

Key investment components:

Construction of water intake with total capacity 500 liters/sec and water pipe with total length 42 km.

Project costs:

About $ 6-7 mln.

Studies undertaken to date:

Feasibility study was not completed due to lack of funding.

Project title:

"Increase of water-supply regularity of Avtozavodskoy district through enhancement of underground water intake"

Sector: Water Supply

Country: Georgia

Municipality: Kutaisi

Project background and justification:

Water-supply of Kutaisi city is originated from 4 sources – three of which are underground and one is surface. Total capacity of water production facilities is 272 thous. m^3/day, however, this capacity is not sufficiently for twenty-four-hour water-supply of the city as a whole. Water supply regularity in the city is far from the required and amounts to 6 hours a day (data of 2004).

Enhancement of one of existing underground water-intakes due to boring of additional wells to achieve total capacity of 20,000 m^3/day, will provide Avtozavodskoy district (45,000 inhabitants) with drinking water. Also this will increase provision of water and regularity of water-supply for other districts of the city.

Overall objective:

Provision Avtozavodskoy district of Kutaisi city with the round-the-clock water-supply and increase of water-supply regularity in the city as a whole.

Social benefits of the project:

Increase of water-supply regularity what means improvement of servicing quality.

Environmental and natural resource benefits of the project:

Key investment components:

Boring of additional wells and construction of water treatment station, total capacity of which is 20,000 m^3/day. Installation of highly efficient pumps.

Project costs:

About $1 mln.

Studies undertaken to date:

Feasibility study.

Project title:

"Increase of water-supply sustainability in Ozurgeti city"

Sector: Water Supply

Country: Georgia

Municipality: Ozurgeti

Project background and justification:

At the present time water-supply of Ozurgeti city (23,000 inhabitants) is carried out through pressured water mains. Water facilities include horizontal drainage galleries and mineshafts. Most of the water pipelines and pumping equipment are worn out and require replacement, but the needs for replacement have not been supported financially for many years. Water supply regularity in Ozurgeti amounts to only 8 hours per day (2004 data).

It is suggested to construct a new underground water-intake and gravity water main (10 km). Also it would result in significant electric energy costs savings and increase sustainability of water-supply in the city.

Overall objective:

Ensuring of round-the-clock sustainable water-supply. Increase of financial sustainability of water utility due to savings of energy costs.

Social benefits of the project:

Increase of regularity of drinking water-supply for population of the city.

Environmental and natural resource benefits of the project:

Reduction of energy consumption due to use of gravity water main (specificity of the relief (mountainous landscape) and existence of several water lifts).

Key investment components:

Construction of underground water intake with total capacity of 100 liters/sec and gravity water main with total length of 10 km.

Project costs:

About $ 4 mln.

Studies undertaken to date:
Feasibility study.

Project title:

"Introduction of organic fertilizer production at the Gardabani Waste Water Treatment Plant"

Sector: Waste Water

Country: Georgia

Municipality: Tbilisi

Project background and justification:

Gardabani WWTP was constructed as normal mechanical-biological treatment plant with total capacity of 1 mln.m^3/day. At the present time, Gardabani WWTP treats the waste water transported from two largest cities in Georgia – Tbilisi (980 thous. inhabitants) and Rustavi (141 thous. inhabitants) by the sewer collector (42km). In addition, a number of smaller towns are connected to this collector as well. The total inflow of waste water is equal to 600 thous. m^3/day.

Only mechanical treatment of wastewater is carried out presently, and no biological treatment anymore. During operation of the processing line (including biological treatment) the substantial amount of excess sludge was accumulated on sludge beds which are located on territory of the WWTP. So, presently the total area filled with well stabilized sludge is around 20 ha and 1-1.5 meter high. This sludge could be used as fertilizer in agriculture. Number of tests performed by the sanitary inspectorate confirmed that the mentioned sludge did not contain heavy metals and could be utilized as a fertilizer in agriculture.

Overall objective:

Establishing of an organic fertilizer production at the Gardabani WWTP.

Social benefits of the project:

Sludge utilization for agricultural purposes.

Environmental and natural resource benefits of the project:

Accumulated sludge removal.

Key investment components:

Procurement of equipment for fertilizer production.

Project costs:
To be identified.

Studies undertaken to date:
Preliminary estimates.

Project title:

"Increase of water-supply sustainability in Marneuli city"

Sector: Water Supply

Country: Georgia

Municipality: Marneuli

Project background and justification:

At the present time in Marneuli city (30,000 inhabitants) water is lifted from boreholes by submersible pumps. Through the well pumps water is supplied to water reservoir, and where-from, water is pumped to the city reservoirs. There are five water reservoirs total capacity of which are 4,750 m^3. Most of the water pipelines and pumping equipment are worn out and require replacement, but the needs for replacement have not been supported financially for many years. Water supply regularity in Marneuli amounts to only 7 hours per day (data of 2004 year).

It is suggested to construct a new underground water-intake and gravity water main. Also it would result in significant electric energy costs savings and increase sustainability of water-supply in the city.

Overall objective:

Ensuring of round-the-clock sustainable water-supply. Increase of financial sustainability of water utility due to savings of energy costs.

Social benefits of the project:

Increase of regularity of drinking water-supply for population of the city.

Environmental and natural resource benefits of the project:

Reduction of energy consumption due to use of gravity water main (due to specificity of the relief (mountainous landscape) and existence of several water lifts).

Key investment components:

Construction of underground water intake with total capacity 100 liters/sec and gravity water main.

Project costs:
About $ 3-3.5 mln.

Studies undertaken to date:
Feasibility study.

Project title:

"Increase of water-supply regularity in one district of Zestafoni city"

Sector: Water Supply

Country: Georgia

Municipality: Zestafoni

Project background and justification:

Water-supply in Zestafoni city (25,000 inhabitants) is carried out using several pumping stations. Water supply regularity in Zestafoni amounts to only 8 hours per day (data of 2004 year). Water supply regularity in one of the city districts is even lesser, and the district can be regarded as not connected to the centralised water-supply system.

The energy crisis which started after the collapse of the Soviet Union and the resultant significant growth of tariffs for electricity influenced on searching the ways to improve the situation without enhancement of energy consumption.

To increase water-supply regularity in one district of Zestafoni city it is suggested to construct a new underground water-intake (20 liters/sec) and gravity water main.

Overall objective:

Ensuring of round-the-clock sustainable water-supply in one of the city districts.

Social benefits of the project:

Increase of regularity of drinking water-supply for population of the city district.

Environmental and natural resource benefits of the project:

Use of gravity flow will result in increase of population share served by centralized water-supply system without usual energy consumption.

Key investment components:

Construction of underground water intake with total capacity 20 liters/sec and gravity water main.

Project costs:

To be identified.

Studies undertaken to date:
To be developed.

Project title:

"Decrease of Gardabani WWTP dependence on external power suppliers through construction of law-capacity hydroelectric power station"

Sector: Waste Water

Country: Georgia

Municipality: Tbilisi

Project background and justification:

Gardabani WWTP was constructed as normal mechanical-biological treatment plant with total capacity of 1 mln.m^3/day. At the present time, Gardabani WWTP treats the waste water transported from two largest cities in Georgia – Tbilisi (980 thous. inhabitants) and Rustavi (141 thous. inhabitants) by the sewer collector (42km). In addition, a number of smaller towns are connected to this collector as well. The total inflow of waste water is equal to 600 thous. m^3/day. Current energy consumption of Gardabani WWTP is equal to 70 MWh per year. At present situation when electricity cost is the urging issue, the treatment technology at the WWTP is extremely costly. Mechanically treated waste water is discharged directly to river Kura which is used as a source of water supply for some down stream settlements
Construction of a low-capacity hydroelectric power station would decrease dependence of the WWTP on external energy suppliers. Additionally, it would improve financial sustainability of the enterprise and allow enterprise to accumulate financing for rehabilitation activities. The total amount of water which could be used for electricity generation is 6.9 m^3/sec (discharge from WWTP) and 42 m^3/sec (discharge from other source). Possible water levels difference is 2.4-3 meters.

Overall objective:

Decrease of Gardabani WWTP dependence on external power suppliers through construction of law-capacity hydroelectric power station

Social benefits of the project:

Decrease of load on national electricity network.

Environmental and natural resource benefits of the project:
Increase of sustainability of waste water mechanical treatment.

Key investment components:
Construction of low-capacity hydroelectric power station at the discharge channel of Gardabani WWTP.

Project costs:
To be identified.

Studies undertaken to date:
To be developed.

ANNEXES TO VOLUME II

ANNEX 1

Table A1 Average monthly household expenditures, Tbilisi and other cities 2003-2015, inflated by nominal GDP forecasts.

Year	Tbilisi	Other cities
2003	420	355
2004	480	406
2005	532	449
2006	592	500
2007	659	557
2008	731	617
2009	804	679
2010	882	744
2011	976	824
2012	1078	910
2013	1195	1009
2014	1324	1118
2015	1469	1241

Source: State Department for statistics of Georgia and COWI

Table A2 Household expenditure on WSS services as a percentage of total expenditures, Variant 1, Tbilisi and other cities, 2003-2015

Tbilisi	Less than 2.5%	2.5 to 5%	5 to 10%	More than 10%	Total
Tbilisi					
2003	94.9%	4.6%	0.4%	0.1%	100.0%
2004	95.1%	4.5%	0.4%	0.1%	100.0%
2005	94.9%	4.6%	0.4%	0.1%	100.0%
2006	94.9%	4.6%	0.4%	0.1%	100.0%
2007	95.1%	4.5%	0.4%	0.1%	100.0%
2008	95.1%	4.5%	0.4%	0.1%	100.0%
2009	94.9%	4.6%	0.4%	0.1%	100.0%
2010	94.9%	4.6%	0.4%	0.1%	100.0%
2011	95.1%	4.5%	0.4%	0.1%	100.0%
2012	94.9%	4.6%	0.4%	0.1%	100.0%
2013	95.0%	4.5%	0.4%	0.1%	100.0%
2014	95.0%	4.5%	0.4%	0.1%	100.0%
2015	95.0%	4.5%	0.4%	0.1%	100.0%
Other cities	Less than 2.5%	2.5 to 5%	5 to 10%	More than 10%	Total
2003	94.9%	4.0%	0.8%	0.3%	100.0%
2004	94.9%	4.0%	0.8%	0.3%	100.0%
2005	95.2%	3.7%	0.7%	0.3%	100.0%
2006	94.9%	4.0%	0.8%	0.3%	100.0%
2007	95.0%	4.0%	0.8%	0.3%	100.0%
2008	95.1%	3.8%	0.7%	0.3%	100.0%
2009	95.0%	4.0%	0.8%	0.3%	100.0%
2010	95.1%	3.9%	0.7%	0.3%	100.0%
2011	95.1%	3.8%	0.7%	0.3%	100.0%
2012	95.0%	3.9%	0.7%	0.3%	100.0%
2013	95.0%	3.9%	0.8%	0.3%	100.0%
2014	95.0%	3.9%	0.7%	0.3%	100.0%
2015	95.0%	3.9%	0.7%	0.3%	100.0%

Note: The percentage of households paying more than 2.5% of their total household expenditures does not add up to exactly 5.0% of the population due to rounding of the price per person per month to nearest tetri. (1 GEL = 100 Tetri)

Source: State Department for statistics of Georgia and COWI

Table A3 Household expenditure on WSS services as a percentage of total expenditures, Variant 2, Tbilisi and other cities, 2003-2015

Tbilisi	Less than 2.5%	2.5 to 5%	5 to 10%	More than 10%	Total
Tbilisi					
2003	86.8%	11.8%	1.1%	0.2%	100%
2004	90.8%	8.5%	0.6%	0.1%	100%
2005	93.6%	5.8%	0.5%	0.1%	100%
2006	90.7%	8.6%	0.7%	0.1%	100%
2007	82.1%	15.8%	1.9%	0.2%	100%
2008	84.5%	13.8%	1.5%	0.2%	100%
2009	86.2%	12.4%	1.2%	0.2%	100%
2010	89.2%	9.8%	0.8%	0.2%	100%
2011	92.2%	7.2%	0.5%	0.1%	100%
2012	94.4%	5.1%	0.5%	0.1%	100%
2013	95.9%	3.7%	0.4%	0.0%	100%
2014	97.1%	2.6%	0.3%	0.0%	100%
2015	98.0%	1.7%	0.2%	0.0%	100%
Other cities	Less than 2.5%	2.5 to 5%	5 to 10%	More than 10%	Total
2003	98.1%	1.4%	0.3%	0.2%	100%
2004	98.5%	1.1%	0.2%	0.2%	100%
2005	98.9%	0.8%	0.2%	0.2%	100%
2006	98.8%	0.8%	0.2%	0.2%	100%
2007	98.7%	0.9%	0.2%	0.2%	100%
2008	98.8%	0.8%	0.2%	0.2%	100%
2009	98.9%	0.8%	0.3%	0.1%	100%
2010	99.1%	0.6%	0.3%	0.1%	100%
2011	99.2%	0.5%	0.3%	0.0%	100%
2012	99.4%	0.3%	0.2%	0.0%	100%
2013	99.5%	0.2%	0.3%	0.0%	100%
2014	99.6%	0.2%	0.2%	0.0%	100%
2015	99.6%	0.2%	0.2%	0.0%	100%

Source: State Department for statistics of Georgia and COWI

ANNEX 2

Table A4 List of categories and benefits

Category	Type of benefits
Invalids of the second World War, invalids of the armed actions on the territories of other states and for the territorial integrity, freedom and independence of Georgia. Persons equalled with the invalids of the second World War	Provision of pensions – GEL 45, communal – 100%; transport benefits, spa treatment, medical benefits, exemption from taxes, installation of telephone at home out of turn at the state expense, ritual service, medical insurance for deprived persons, exemption from land rent; seasonal benefit for the consumed electricity payment: winter period – 250 kW/h (32,35L), summer period – 150 kW/h (19,35L).
Participants of the second World War, participants of the armed actions on the territory of other states and for the territorial integrity of Georgia, its independence and freedom	Provision of pensions – GEL 14, communal – 50%; 50% exemption from transport, spa treatment, medical benefit, state taxation, seasonal benefit for the consumed electricity: winter period – 125 kW/h (16,13 L), during summer period – 75 kW/h (9,68 L).
Social protection of the members of families of the invalids and participants of the second World War, those who died in the armed actions on the territory of other countries and for the territorial integrity, freedom and independence of Georgia, among them of those who are missing after the period of war, of the veterans and persons equalled with them	Provision of pensions – according to the legislation, communal – 50%; after dismissal from transport, resort, military service provision with the lump sum, preferential state duties, ritual service; seasonal benefit for the payment of the consumed electric energy : during winter period – 125 kW/h (16,13 L), summer period – 75 kW/h (9,68 L).
Veterans of the armed forces	Provision of pension – according to the legislation, communal – 50%; after dismissal from transport, resort, military service provision with the lump sum, preferential state duties, ritual service; seasonal benefit for the payment of the consumed electric energy : during winter period – 125 kW/h (16,13 L), summer period – 75 kW/h (9,68 L).
Social protection of the members of families Members of family: Parents (despite their age); Wives (if they have not married for the second time); Under age children; Those under age children of families, who were dependant on the deceased person.	Provision with pension – GEL 14, issuing help, communal – 100%; preferential right to get a flat, installation of telephone out of turn, lump sum and monthly payment from the executive authorities of Georgia; seasonal benefits for the consumed electricity: seasonal benefit for payment of the electric energy: in winter -125 kW/h (16.13 L), summer period – 75 kW/h (9,68 L).
Members of families of the persons who died after the massacre of the peaceful meeting	Provision with pension – GEL 14, communal – 100%; medical, transport, resort, employment preferential right, preferential right for getting land plot for construction of the residential flat; 50% benefit for the consumed electric energy
Persons who became disabled after dispersion of mass-meeting	Provision with a pension – GEL 35, communal – 100%; medical, transport, resort, preferential right to get employment; 50% benefit for the consumed electric energy.
Persons who got wounded, received contusion, damage or were poisoned with chemical substances during dispersion of the mass-meeting	Provision with a pension – GEL 35 (after reaching pensioners age), communal – 50%; medical, transport, resort; 50% benefit for the consumed electric energy.
Persons disabled during accident elimination	Provision of pension – GEL 45, obligatory medical insurance, spa treatment within the limits of medical and social programme appropriations, transport and communal benefits (in accordance with the decision and funding of relevant local administrative bodies (in Tbilisi 100%); consumed electricity benefits (30 kW/h – 3,87l); in the case of two or more disabled persons in the family 45 kW/h (5,80L)

Category	Type of benefits
Persons taking part in the elimination of accident	Provision of pension – GEL 14 (after achieving pensionable age), obligatory medical insurance, transport, communal benefits (according to the decision of local administrative organs and by their funding (in Tbilisi 100%); consumed electricity benefits (30 kW/h – 3,87l); in the case of two or more disabled persons in the family 45 kW/h (5,80L)
Members of a family of a person who died during accident elimination or due to the received sickness, among them children born after the accident	Provision of pension – GEL 14, obligatory medical insurance, spa treatment within the limits of medical and social programme appropriations, communal benefits (in accordance with the decision and funding of relevant local administrative bodies (in Tbilisi 100%); consumed electricity benefits (30 kW/h – 3,87l); in the case of two or more disabled persons in the family 45 kW/h (5,80L)
Personal pensioners	Benefits: communal – 50%, transport, spa treatment, benefit for the consumed electricity (30 kW/h per month free (3,87l); in the case of two or more disabled members of the family 45 kW/h (5,80l)
Person recognized to be a victim of political repressions, who was sent to the place of imprisonment, in special settlements, in psychiatric clinics, in exile, after the death of such person his wife of pension age, parent, child (adopted child)	Provision of pension – GEL 45, communal – 50%; obligatory medical insurance at the state expense transport free legal service (in connection with being recognized victim of repression), privilege to maintain working place during reduction of staff; consumed electricity benefits (30 kW/h – 3,87l); in the case of two or more disabled persons in the family 45 kW/h (5,80L)
Pensioners living alone	Provision of pension, allowance GEL 22, communal benefits (according to the decision of the relevant local administrative bodies and by their financing (in Tbilisi –for removal of domestic refuse 100%, water and domestic gas 50% (20 m^3)
Pensioner's family (>=2 members)	Provision of pension (according to the law), allowance GEL 22, communal benefits (according to the decision of the relevant local administrative bodies and by their financing (in Tbilisi –for removal of domestic refuse 100%, water and domestic gas 50% (20 m^3)
Invalids of the I group with the eyesight problems	Allowance GEL 22, communal benefits (according to the decision of the relevant local administrative bodies and by their financing (in Tbilisi 100%)
Orphan children having no father and mother	Allowance GEL 22, communal benefits (according to the decision of the relevant local administrative bodies and by their financing (in Tbilisi 100%)
Families having many children (3 and more up to 18 year old)	Allowance GEL 35, communal benefits (according to the decision of the relevant local administrative bodies and by their financing (in Tbilisi 100%)
Disabled children	Allowance GEL 22, communal benefits (according to the decision of the relevant local administrative bodies and by their financing (in Tbilisi 100%)
Forcibly displaced families from Abkhazeti and Samachablo, also 1000 families from Kazbegi region and 20 families from Shatili	Allowance GEL 11-14 , communal benefits (according to the decision of the relevant local administrative bodies and by their financing (in Tbilisi for removal of domestic refuse 100%)
I group disabled persons	Provision of pension (as per law), communal benefits
Honourable citizens of Tbilisi	Communal benefit 100%
Those working in psychiatry branch	Communal benefit 50%
Lonely mothers	Communal benefit (Tbilisi, removal of domestic refuse 100%)

Source: Desription of Georgian Social Security System, April 2004. Tbilisi

Financing Strategy for the Urban Water Supply and Sanitation Sector in Georgia

Water supply and sanitation (WSS) infrastructure in Eastern Europe, Caucasus and Central Asia is often critically deteriorated, involving significant risks for human health and the environment. Achieving the Millennium Development Goals on water supply and sanitation is therefore a serious challenge in many countries of the region. Georgia, one of the poorest countries in the region, faces particularly difficult challenges, as extensive but deteriorated water supply and sanitation infrastructure inherited from the Soviet Union will be difficult to rehabilitate with local financial resources alone (*i.e.*, user charges and public budgets). This book assesses the costs of achieving the Millennium Development Goals on water and sanitation in Georgia in different WSS infrastructure development scenarios and compares this with available resources from user charges and public budgets. It also discusses affordability constraints, in particular for households, and the policy measures to protect the poor that would need to be set in place. It identifies a challenging trade-off that Georgian policy makers will have to consider between providing better water for some, or some water for all. This work has provided the basis for an extended policy dialogue on WSS sector development in Georgia.

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