

EAP Task Force



**FINANCING STRATEGY FOR URBAN AND RURAL WATER SUPPLY
AND SANITATION IN GEORGIA**



March 2009

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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LIST OF ABBREVIATIONS

| | |
|-----------|---|
| BDD | Basic Data and Directions |
| CAPEX | CAPEX=Total Expenditures-(O&M and Re-investments) |
| 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) |
| EU WI | Water initiative of the European Union |
| EUR | EUR |
| FEASIBLE | Financing for Environmental, Affordable and Strategic Investments that Bring on Large-Scale Expenditure (computerised tool) |
| FS | Financing Strategy |
| FTM | Fast-track Mechanism |
| GDP | Gross Domestic Product |
| GEL | Georgian Lari (national currency) |
| HH | Household |
| IBNET | The International Benchmarking Network for Water and Sanitation Utilities |
| IDA | International Development Association (in the World Bank group) |
| IFIs | International Financial Institutions |
| inh. | inhabitant |
| IWA | International Water Association |
| JMP | Joint Monitoring Programme |
| KfW | Kreditanstalt für Wiederaufbau (German bank) |
| lcd | litres/capita/day |
| LWWTF | Local Wastewater Treatment Facilities |
| MDF | Municipal development Fund |
| MDG | Millennium development goal |
| Mill. | Million |
| MoAF | Ministry of Agriculture and Food |
| MoE | Ministry of Environment |
| MoED | Ministry of Economic Development |
| MoF | Ministry of Finance |
| MoSA | Ministry of Social Affairs |
| MTEF | Medium Term Expenditure Framework |
| NEAP/REAP | National / Regional Environmental Action Plan |
| NGO | Non governmental organisation |
| NIS | Newly Independent States (republics of the FSU, except Baltic states) |
| NPMF | National performance measurement framework |
| NPMF | National Performance monitoring framework |
| NRW | Non- revenue water |
| NRW | Non revenue water |
| NWSS&AP | National Water Sector Strategy and Action Plan |
| OECD | Organization of Economic Cooperation and Development |
| PI | Performance indicators |
| PRSP | Poverty Reduction Strategy Paper |
| RG | Republic of Georgia |
| SG | Steering Group |
| SMART | Specific, Measurable, Affordable, Realistic, Time-bound (about targets) |
| SNiPs | Construction Norms and Rules |

EXECUTIVE SUMMARY

Project Context

FS 2005 In 2005, Georgia, with assistance from the OECD/EAP Task Force, developed a financing strategy for urban WSS (henceforth: EFS 2005). It was endorsed by members of the Steering Committee, in which virtually all key stakeholders in Georgia were represented. However, the strategy was not properly integrated into the budgeting process at national and regional levels. Furthermore, it did not provide an overview of the whole WSS sector in Georgia, as it addressed only urban water and sanitation infrastructure.

FS 2008 In 2006, Government of Georgia requested further assistance from the OECD/EAP Task Force to update the FS 2005 and include rural WSS into the analysis. With financial backing from OECD/EAP Task Force, COWI A/S has carried out such analysis using FEASIBLE, a model developed to elaborate alternative financing scenarios. FS 2008 concerns the period 2005-2025.

Executive Summary This Executive Summary is prepared as a stand-alone note which can be read separately from the report and contains main assumptions, findings and key recommendations of FS 2008.

Organisation It is organised as follows: Section 1.2 provides the findings of the Baseline Scenario assuming business-as-usual - that is, maintaining current coverage and service levels and supply of finance at current level. Section 1.3 provides the findings of the Development Scenarios concentrating upon the least ambitious and the most ambitious of these. Section 1.4 highlights the conclusions and recommendations of the Consultant.

Caveat It must be noted that analysis of baseline and development scenarios are based upon data obtained before the war actions in August 2008 between Georgian and Russian troops. This implies that presented estimated expenditure needs and financial gap analysis are rather conservative since the war, to certain extent, has negatively affected the state and condition of WSS infrastructure in some parts of Georgia.

Baseline Scenario

Purpose of Baseline Scenario

As a first step in the Financing Strategy development process, the Baseline Scenario has been assessed. The Baseline Scenario is typically used to understand existing situation in water and sanitation sector from two points of view:

- Technical conditions of existing infrastructure and corresponding level of services that customers are currently receiving.
- Ability of the sector to generate sufficient amount of cash inflow in order to cover all the necessary costs for sustaining the existing service levels.

Urban areas

Results of Baseline Scenario modelling for urban areas are presented in the table below¹:

| CATEGORY | COST |
|--|------------------|
| Total accumulated expenditure needs, 2005-2025 | GEL 5.44 billion |
| Total accumulated supply of finance, 2005-2025 | GEL 2.58 billion |
| Total accumulated financing gap, 2005-2025 | GEL 2.86 billion |

Source: FEASIBLE calculations

The Baseline Scenario supply of finance presumes that all the cash inflows available to the sector are at the current levels, namely; collection rates are at 44% of billed amounts for households and 77% from other customers; tariffs are at the levels where average household is spending about 1.5% of his income on water bill; budget expenditure is in the range of 0.2% of GDP or about 0.6% of consolidated public budget; and international financial assistance is fixed to the currently committed and disbursed funds.

As the table demonstrates, there is substantial financing gap even for the baseline scenario where the only objective is to sustain existing service levels. Total cumulative gap over 20 years is at GEL 2.86 billion, and if no specific measures are undertaken to increase cash flow into the sector, the infrastructure will deteriorate at increasing rates resulting in ever worsening levels of water supply and sanitation services to all customers.

Among such measures the following possible policy choices has been investigated and analysed:

- Increasing collection of billed revenues to 90% for all customer groups by 2011;
- Gradually increasing tariffs to account for 3.5% of average household income in 2020;²

Combination of these measures has increased total cumulative supply of finance to GEL 3.77 billion, hence reducing the financing gap of Baseline Scenario to GEL 1.67 billion over the same period. The analysis shows, that without increase in the public financing of the sector, even the baseline scenario gap is not possible to close. The remaining gap will be closed on a long term cumulative basis only if public budget contribution is increasing to 0.48% of GDP or 1.9% of consolidated budget on an annual basis.

Rural areas

Similar Baseline Scenario analysis has been carried out for the rural areas. The modelled estimation of the total rural water sector expenditure needs over the period 2006-2026 amounts to GEL 418 million or about GEL 21 million per year, of which 73 % is estimated to be for water supply and 27 % for sanitation.

Total accumulated supply of finance for rural WSS in the same period amounts to GEL 305 million. Consequently, total financing gap amounts to almost GEL 121 million. The analysis shows that this gap can be closed by:

¹ All the calculations for the report and this Executive Summary are made in fixed prices using year 2005 as the base year.

² The FS 2005 has operated with maximum level of affordability set at 2,5% of average household income. In this analysis this level has been increased to 3,5% primarily because of observed substantial economic growth and increased average household income.

- increasing share of rural population currently paying for water services from 50% to 90%; and
- increasing fixed household payment so that it reaches the level of 1% of average rural household income.

Baseline challenge

The Baseline Scenario demonstrates that just only sustaining existing service levels will be a major challenge for water and sanitation sector in Georgia. Lack of adequate cash flow both in urban and rural areas is apparent and if situation does not change the service levels will continue to worsen at an increasing speed. Already now levels of infrastructure maintenance and repair are much lower than estimated as necessary for normal asset replacement process. Such situation is unsustainable and will lead and already led to major water supply disruptions in medium and small cities. Urgent policy measures are called upon among which are the need for immediate increase in cash collections, tariffs increase, and additional public budget support.

Development Scenarios

New investments bring about savings in O&M costs

Going beyond Baseline Scenario goal of sustaining existing service levels and attempting to introduce service improvements would nominally prove to be even greater challenge for Georgia's water and sanitation sector. However, it is important to note, that any new investments, when well planned and targeted, would bring short to medium term savings in the form of reduced O&M costs keeping total cumulative expenditure over time at the same or even lower levels. This section discusses results of modelling number of Development Scenarios when more ambitious sector goals are pursued.

Four scenarios for urban areas

Table 1-1 below provides an overview of the four development scenarios for the urban WSS that has been modelled. Development Scenario 4 is the MDG scenario aiming at the achievement of the water related MDG targets in 2015. When moving from Development Scenario 4 to Development Scenario 1 the requirements for investments gradually increase. That is, additional interventions are added to improve the service level in the WSS sector. Development Scenario 1 is therefore the most ambitious.

Table 0-1 Development Scenarios, urban WSS

| | Scenarios | | | |
|--|------------------|----------|----------|----------|
| | 1 | 2 | 3 | 4 |
| Urban WSS | | | | |
| Increase coverage of centralized water and wastewater collection | x | x | | |
| Increase of coverage in order to meet MGD targets in WS and Sanitation | x | x | x | x |
| Rehabilitation and replacement of water and sewer network | x | x | x | x |
| Water loss reduction and reduction in water consumption | x | x | x | x |
| Rehabilitate and increase water and wastewater treatments | x | | | |
| Rehabilitate water and wastewater treatment plants | x | x | | |
| Rehabilitate water treatment plants | x | x | x | |
| Improve regularity of water and wastewater collection | x | x | | |
| Improve energy efficiency in WS and WW sectors | x | x | x | |

Table 1-2 below demonstrates the results of the scenario model runs using FEASIBLE and corresponding financing gap analysis on cumulative basis. Since the estimated total expenditure

needs are pretty close in each scenario, Table 1-2 shows the results for only least ambitious MDG scenario and most ambitious Scenario 1.

Table 0-2 Development Scenarios, urban areas, 2005-2025 (GEL billion)

| GEL billion | MDG, 20151 | Scenario 1, 20151 |
|---|------------|-------------------|
| Total Expenditure Needs | 5,00 | 5,13 |
| Current expenditure need | 3,96 | 3,88 |
| Capital expenditure need | 1,03 | 1,25 |
| Total Supply of Finance | 3,77 | 3,77 |
| Supply of finance for current expenditure | 2,82 | 2,82 |
| Supply of finance for capital expenditure | 0,94 | 0,94 |
| Total Financial Deficit(-)/Surplus(+) | -1,23 | -1,36 |
| Current supply of finance deficit/surplus | -1,14 | -1,06 |
| Capital supply of finance deficit/surplus | -0,09 | -0,30 |

Source: FEASIBLE calculations

Note: 1) MDG, 2015 implies that new investment programme for a given scenario is planned to be completed by 2015. Similarly for Scenario 1. The total expenditure needs however (in particular O&M and reinvestment) are assessed for the entire period under consideration, namely 2005-2025.

The supply of finance provided in the table is based on the levels corresponding to tariffs at 3.5% income of average household, 90% collection rate from all customers, public budget contribution in the amount of 0.2% of GDP which in 2007 was equivalent to approximately 0.75% of consolidated budget, and the international assistance only in the years when they have been committed.

Number of observations is apparent from the review of table results:

- All the scenarios show significant total cumulative financing gap;
- However, the most of the gap is in Current Expenditure needs;
- Capital Expenditure gap is relatively small and can be covered either via increased public budget support to the level of 0,85% for MDG and 1,0% for Scenario 1 of consolidated budget on an average annual basis or international investment assistance in the form of loans and grants in the amount of GEL 5 and GEL 16 million respectively on an average annual basis³. Both of such measures seem to be realistic; therefore, capital expenditure gap can be successfully closed even in the most ambitious Scenario 1⁴.
- Closing the Current Expenditure gap is the major challenge.

³ On an average annual basis implies that in some years, especially early years of investment programmes, the actual contribution can be higher, while in later years its levels can subside.

⁴ Various combinations of budget support versus international assistance is possible, depending on availability. For example, if the assumed international assistance is not available, then additional budget contribution will be necessary in the amount of 0,24% of consolidated budget on average annual basis over until 2015 when the capital investment programme is to be completed.

- Attempting to close via only tariff increase or collection rate increase does not seem to be feasible, as it will require that average household pays approximately 6-6,5% of household income for water services.
- The only alternative source of financing seems to be additional public budget and the respective calculations show that in order to close total financing gap in MDG and Scenario 1 public budget contribution needs to increase to 1.7 and 1.76% of consolidated budget on an average annual basis.

Three scenarios for rural areas

Table 1-3 overleaf provides an overview of the three development scenarios for the rural WSS. The rural scenarios consist of only three scenarios because Development Scenario 1 would imply the construction of new treatment plants, which are not assumed to be provided within rural WSS. Development Scenario 4 is the MDG scenario aiming at the achievement of the water related MDG targets in 2015. Development Scenario 2 assumes an increase in service levels through use of advanced water supply and sanitation technologies, hence is the most ambitious scenario for rural areas.

Table 0-3 Development scenarios for rural WSS

| Rural WSS | Scenario | | | |
|---|----------|---|---|---|
| | 1 | 2 | 3 | 4 |
| Upgrade 50% of existing WS and WW service level to the next one compared to the base year | na | x | | |
| Rehabilitation of water intakes and WS treatment plants | na | x | x | |
| Improve energy efficiency | na | x | x | |
| Reduce not-improved water supply from 40% to 16% | na | x | x | x |
| Reduce not-improved sanitation from 11 to 3 % | na | x | x | x |
| Change of technology in water and sanitary delivery | na | x | x | x |

Table 1-4 below provides the results of scenario model runs using FEASIBLE and corresponding financing gap analysis on a cumulative basis.

Table 0-4 Development scenario modelling for rural areas, 2005-2025, GEL million¹

| GEL million | MDG Scenario, Scenario 4 | Scenario 3, 15 years | Scenario 2, 15 years |
|---|--------------------------|----------------------|----------------------|
| Total Expenditure Needs | 428,09 | 770,17 | 1.148,26 |
| Current expenditure need | 419,27 | 565,09 | 734,55 |
| Capital expenditure need | 8,82 | 205,07 | 413,71 |
| Total Supply of Finance | 543,88 | 543,88 | 543,88 |
| Supply of finance for current expenditure | 419,54 | 419,54 | 419,54 |
| Supply of finance for capital expenditure | 124,34 | 124,34 | 124,34 |
| Total Financial Deficit(-)/Surplus(+) | 115,79 | -226,28 | -604,38 |
| Current supply of finance deficit/surplus | 0,27 | -145,55 | -315,01 |
| Capital supply of finance deficit/surplus | 115,52 | -80,73 | -289,37 |

Source: FEASIBLE calculations

Note: 1) MDG, 2015 implies that new investment programme for a given scenario is planned to be completed by 2015. The same applies with regard to Scenario 1. The total expenditure needs (in particular O&M and reinvestment) are, however, assessed for the entire period under consideration, namely 2005-2025

As it can be seen from the table, the assumptions made for closing the financing gap in Baseline scenario were sufficient for the case of MDG scenario. In this scenario no financing gap exists and if the service levels will be defined in terms of achieving MDG goals in rural area, no substantial lack of cash flow is forecasted.

The situation is different for Scenario 2, where the aim is to substantially improve service levels by introducing advanced water supply and sanitation technologies. In this case total cumulative gap of GEL 604,4 million exists, which is possible to cover only via increase public budget contributions or additional international grant support. This would imply additional 33,5 million on annual basis from the public budget and bring the total average annual public budget contributions (including urban at the level of Scenario 1) to approximately 2.2% of consolidated national budget.

Conclusions and recommendations

Crucial determinant

The Development Scenario to be pursued depends upon the supply of finance available. Thus, the supply of finance constitutes the crucial determinant.

"Doing nothing" not less expensive

One of the most interesting points of analysis is that cost of Baseline Scenario in total is approximately the same as the Development Scenarios.

From the technical standpoint this is not difficult to explain – the increased capital expenditure needs in development scenarios are compensated by savings in O&M gained via new investments.

From the institutional and political point of view this implies that “doing nothing” does not necessarily need to be less expensive. To sustain the existing service level would cost about the same as to implement well planned and targeted investment programme.

7 recommendations

The analysis carried out suggests that irrespective of the specific scenario selected the following policy measures will need to be enacted:

- Collection rates from households and other customer groups need to be increased rather drastically as soon as possible with the target level being at least 90-95% by 2011.
- Tariffs for water supply and sanitation services are low and do not cover costs of operation. Hence they will need to increase up to the level of 3.5% of average household income by 2020. Simultaneous a low-income family targeted assistance programme needs to be put in place to address the affordability problems that such tariff increase will cause for a number of urban households.
- Public budget support seems inevitable for the foreseeable future of sector development and it is evaluated that it might need to reach to as much as 2.2% of consolidated public budget on an average annual basis.

- Finally, international assistance has been relatively high during the last three years. To ensure that the level of international assistance is not drastically reduced it is recommended to prepare a Water Sector Strategy synthesising findings of FS 2008 and steps taken by the Government of Georgia to close the financing gap.
- However, none of the above measures solves the problem of the financing gap on its own. Only a combination of all the measures can lead to expected results.
- Therefore, it is strongly recommended that an investment/action plan and implementation programme is elaborated and properly integrated into the Medium Term Expenditure Framework.
- To implement the entire reform process, a set of coordinated actions need to be put in place which addresses various issues - ranging from the structural reform of the sector till making sure that needed tariff increases and budget support are actually implemented. Such coordinated actions can be implemented only by a government body at the national level that is established to support and oversee the reform process. Hence, there is a need of a government body (Water Commission, Agency or National Committee) that may play such role - preferably, established on the basis of already existing institutions. Depending on the stage of sector reform, such government body will itself evolve and take different functions at times (strategy implementation, procurement, monitoring, regulation, etc.).

Private sector service provision

It must be noted that current analysis did not consider possibilities and economic impacts of private sector service provision. If continued support of public budget for water sector in the amounts outlined in this report is deemed impossible, then considering wider involvement of private sector in water and sanitation services provision might become an option.

INTRODUCTION

FS 2005 In 2005 Georgia, with the help of the OECD/EAP Task Force, developed a financing strategy for urban water supply and sanitation (henceforth: FS-2005)⁵.

FS 2008 In 2006 it was decided to update the FS-2005 for urban WSS and to include rural WSS, thereby establishing a total overview of the WSS sector in Georgia and develop an environmental financing strategy under the preliminary title *"Promote achieving the Millennium Development Goals on Water Supply and Sanitation (WSS) in Georgia through extending the Financing Strategy for WSS to Rural Areas and Facilitating Related National Policy Dialogue"*. In this report this financing strategy is referred to as FS 2008.

The Project commenced on 16 March 2007 and an Interim Report was presented at the Steering Group Meeting 28 February 2008 covering the existing situation of the WSS in Georgia including rural WSS with the result of the baseline scenario 2005 to 2025 with preliminary possibilities to close the financing gap together with a proposal for 4 different development scenarios. The Interim Report is attached in Appendix 1.

Pursuant to the above four different development scenarios have been modelled in FEASIBLE for urban WSS for to different implementation period enabling to evaluate the cost when MDG in 2015 should be achieved. Three development scenarios for rural WSS have been modelled also using to different planning period.

The results of the modelling are presented in this draft final report. Moreover, a set of performance indicators for monitoring the implementation of the FS 2008 and a preliminary implementation plan are presented.

Conservative cost estimates

The calculations made when preparing the draft FS 2008 are based upon data obtained before the war actions in August 2008 in South Ossetia. It implies that cost estimates and expenditure profiles made are rather conservative since the war, to some extent, affected the infrastructure within the WSS sector.

⁵ The report can be accessed on <http://www.oecd.org/env/water>

DEVELOPMENT SCENARIOS

Overview of development Scenarios

Four development scenarios for urban WSS and three scenarios for rural WSS have been selected and related costs have been calculated with the FEASIBLE Model. The differences in the scenarios are shown in Table 0-1 and Table 0-2.

Urban Scenarios

All urban scenarios do cover water loss reduction and reduction in water consumption, as this is a precondition in any sustainable development scenarios. Scenario 4 is the MDG scenario aiming at the achievement of the MDG target in 2015 or 2025. From scenario 4 to scenario 1 the requirement for investments are increasing as additional interventions are added to improve service level in the WSS sector. Scenario 1 is therefore the most ambition scenario. However, do the assumption that reduction of water loss and water consumption will gradually be achieved over the planning period, capital investments, O&M and re-investments will be reduced owing to the declining requirements in water facility capacity.

Table 0-1 Development Scenarios for the Urban WSS

| | Scenarios | | | |
|--|-----------|---|---|---|
| Urban WSS | 1 | 2 | 3 | 4 |
| Increase coverage of centralized water and wastewater collection | x | x | | |
| Increase of coverage in order to meet MGD targets in WS and Sanitation | x | x | x | x |
| Rehabilitation and replacement of water and sewer network | x | x | x | x |
| Water loss reduction and reduction in water consumption | x | x | x | x |
| Rehabilitate and increase water and wastewater treatments | x | | | |
| Rehabilitate water and wastewater treatment plants | x | x | | |
| Rehabilitate water treatment plants | x | x | x | |
| Improve regularity of water and wastewater collection | x | x | | |
| Improve energy efficiency in WS and WW sectors | x | x | x | |

Source: Consultants assumptions.

Rural Scenarios

The rural scenarios consist of three scenarios only, as scenario 1 would include new treatment plants which are not assumed to be provided in rural WSS. The rural scenario 4 is the MDG scenario aiming at the achievement of the MDG target in 2015 by increasing access to improved water supply and access to basic sanitation. Scenario 2 assumes that the population in rural area improve their service level by choosing more advanced technology - thereby improving the service level.

Table 0-2 Development Scenarios for Rural WSS

| | Scenario | | | |
|--|----------|---|---|---|
| | 1 | 2 | 3 | 4 |
| Rural WSS | | | | |
| Upgrade 50% of existing WS and WW service level to the next one comparing to the base year | | x | | |
| Rehabilitation of water intakes and WS treatment plants | | x | x | |
| Improve energy efficiency | | x | x | |
| Reduce not-improved water supply from 40% to 16% | | x | x | x |
| Reduce not-improved sanitation from 11 to 3 % | | x | x | x |
| Change of technology in water and sanitary delivery | | x | x | x |

Source: Consultants assumptions.

Main Assumptions for Development Scenarios

General Assumptions

The general assumptions for the development scenario are as follows:

- Planning period: Generally a 20 years from 2005 to 2025 with 2005 as baseline year, but for calculating the cost to achieve the MDG in 2015 a planning period from 2005 to 2015 is adopted;
- Exchange rate - 2.3 GEL per EUR as constant exchange rate;
- Population assumed to be constant for the entire planning period; and
- GDP nominal rate at 8.5% growth in 2006, 6% annually from 2007-2009, and 5% annually from 2009-2025.

Costing and Technical assumption

A large number of technical assumptions have been adopted and a detailed description of the technical assumptions is described in Appendix 2 for both urban and rural WSS.

The expenditure estimated is base year 2005.

Assumption in calculation of expenditure profiles

The data entered into the FEASIBLE model covers the population covered by the sampling with the different types of technologies used for each of the sampled urban cities/towns and rural settlements. To cover the entire population for urban and rural population we have utilised a scaling-up approach, as follows:

- For **Urban** we have 84% of the population covered by a large number of cities/towns with different technologies: The scaling-up the expenditure profile is therefore based on scaling-up the calculated expenditure profile by FEASIBLE for the entered data covering 2 million people with a factor of 1.14 (2,310,400/2,033,160);
- For **Rural** we have for each of the zones estimated the equivalent number of settlements considering the type of technologies to cover the entire rural population within each zone; and

- Total urban population covered by the strategy is 2,310,400, and for rural 1,991,000 giving a total population of 4,301,400.

Correction of costing in FEASIBLE

The cost function used in the FEASIBLE model are based upon average Western European cost data and reflect the typical distribution to the main cost categories (equipment, materials, design, labour, energy, land, etc.) in European utilities and international tendering. Therefore, in FEASIBLE, each cost centre has its own cost correction coefficient which can be used to adjust the international cost levels to local price levels and cost structures. The cost functions in the urban model are using base year 1999, and rural cost function the base year 2005. In order to adjust the urban cost to the reporting base 2005 level correction factor for costing have been estimated for urban cost as shown in Table 0-3.

Table 0-3 gives an overview of the price assumptions and correction coefficients applied in the baseline scenario for both urban and rural expenditure calculation.

Table 0-3 Correction factor for costing used in FEASIBLE modelling

| Cost categories | Assumption of coefficient applied in model | Dimensions |
|------------------------|--|-------------------------|
| Land | 0 | Gel per m2 |
| Power | 0.07 | Gel per kWh |
| Fuel | 2.2 | Gel/litre |
| Labour | 2395 | Gel/year |
| Professional | 1923 | Gel/year |
| Urban Cost | | |
| Consumables | 43 | % of international cost |
| Equipment | 58 | % of international cost |
| Construction materials | 48 | % of international cost |
| Other costs | 38 | % of international cost |
| Rural Cost | | |
| Consumables | 27 | % of international cost |
| Equipment | 33 | % of international cost |
| Construction materials | 36 | % of international cost |
| Other costs | 24 | % of international cost |

Source: Data from Working Group and Consultant's own estimate.

For the correction of investment costs the most critical cost factors are the relative prices of WSS equipment and construction materials, whereas electricity, labour plays the most significant roles in operational costs.

Expenditure Profiles

Below is shown the expenditure profiles for the four scenarios for Urban WSS and three scenarios for Rural WSS compared to the baseline scenario for urban and rural separately and in total.

All urban scenarios have been analysed with the planning period 2005 to 2025, and for the MDG scenario the cost have also been analysed for from 2005 to 2015. For rural WSS the planning period is from 2006 to 2026, and for the MDG scenario the cost have also been analysed for from 2006 to 2015

Expenditure profile for Urban WSS

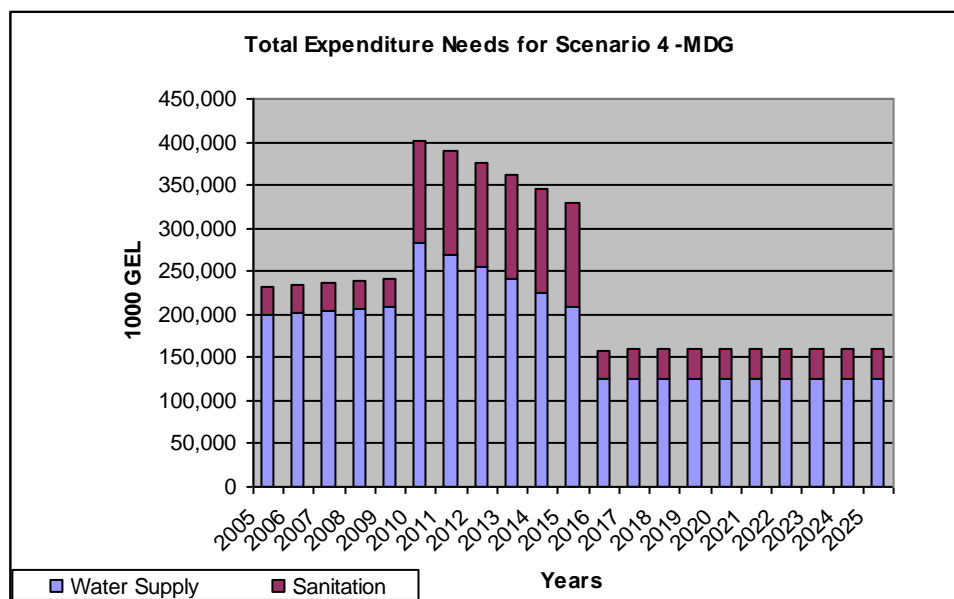
Urban 2015-MDG

Urban 2015 - MGD

In Figure 0-1 is shown the total annual cost for Scenario 4-MDG where all capital investments take place from 2010 to 2015. The total expenditure needs from 2005 to 2025 (21 years) is calculated to 5.0 billion Gel, or 238 million GEL per year corresponding to 2.160 GEL/cap or 103 GEL/cap/year.

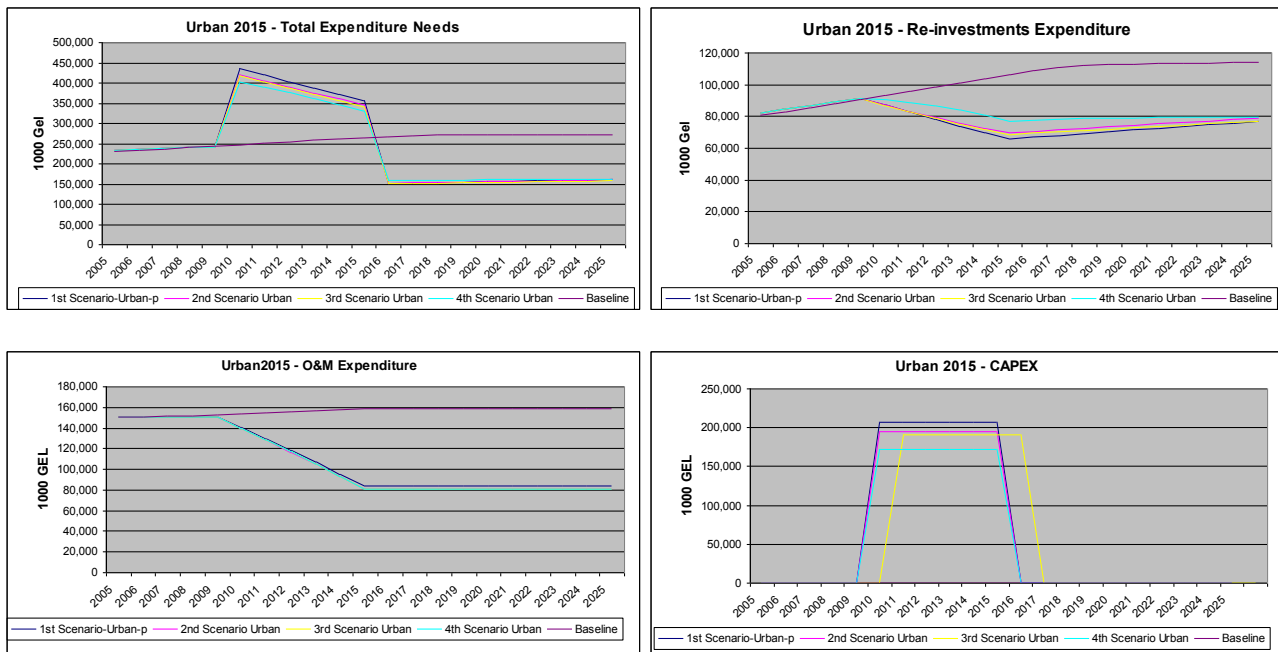
All capital investments (CAPEX) are assumed to take place over 6 years.

Figure 0-1 Total annual cost for the Scenario 4-MDG - Urban WSS



In Figure 0-2 is shown the difference in the expenditure needs for the four scenarios. The capital expenditures (CAPEX) for scenario 4 amounts to about 1.0 billion GEL or 172 million GEL per year over 6 years.

Figure 0-2 Comparison between the Four Scenarios

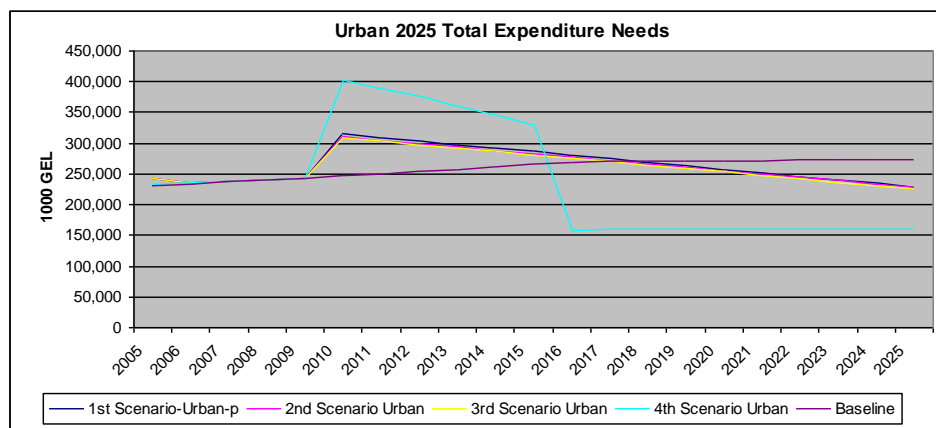


Urban 2025

Urban 2025 - Total Expenditure Needs

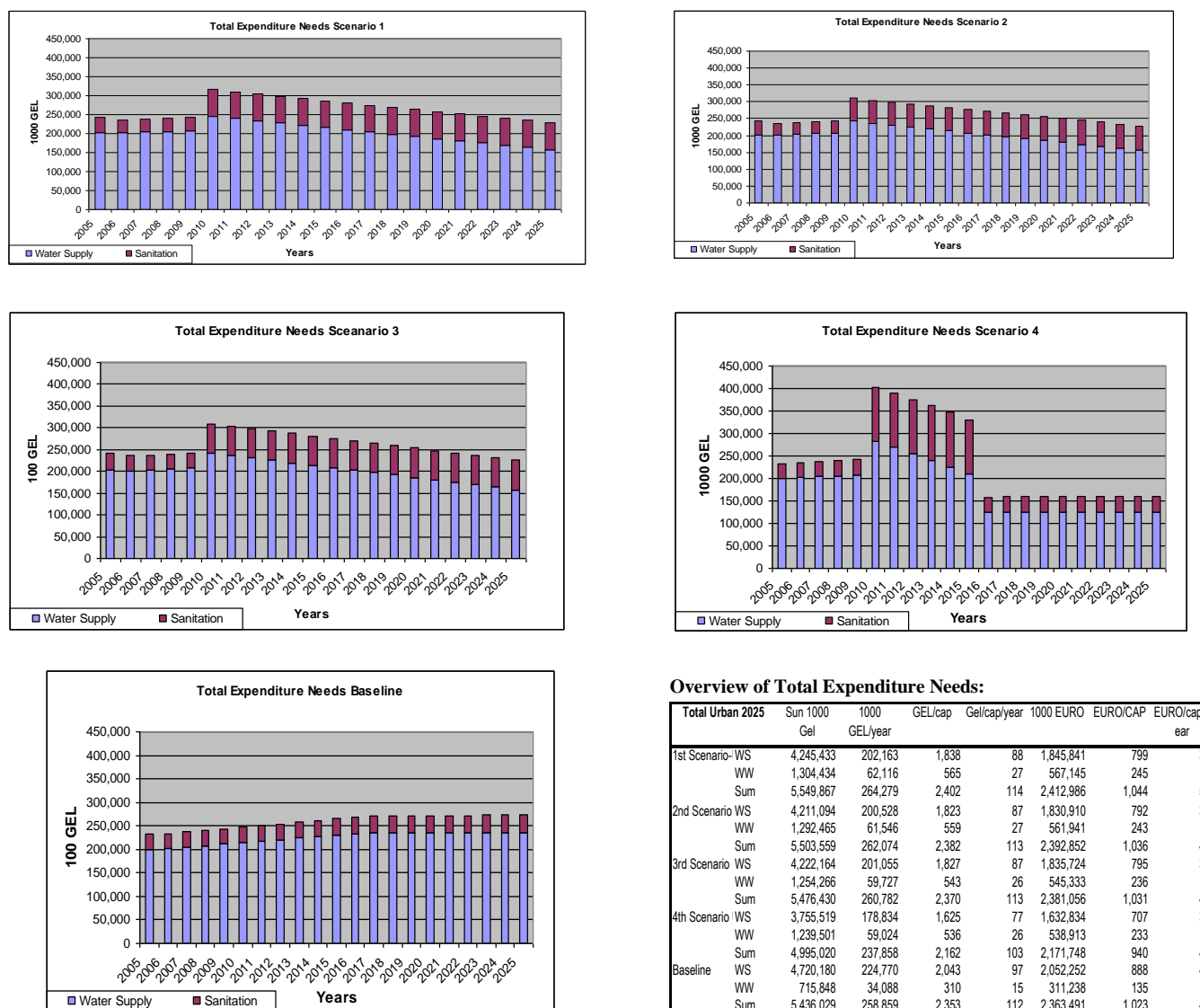
Below is shown the total expenditure needs profile with capital expenditure spread over 21 years from 2005 to 2025, except for scenario 4 - MDG, where the capital investments (CAPEX) are assumed to take place over 6 years -2010 to 2015.

Figure 0-3 Total Expenditure Needs for Urban 2025 for the Four Scenarios and Baseline



Source: COWI's assessments based upon FEASIBLE modelling.

Figure 0-4 Total Expenditure Needs for the Four Scenarios and Baseline with overview of unit cost in GEL and EUR



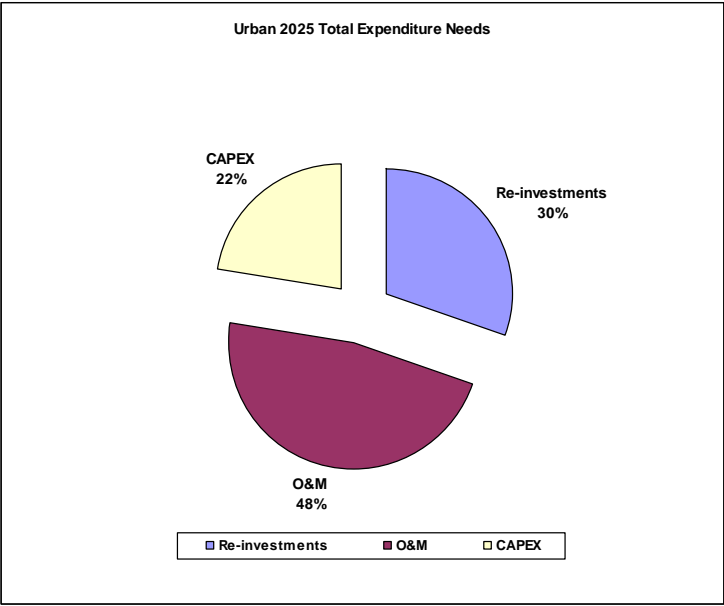
Source: COWI's assessments based upon FEASIBLE modelling.

Note: Although a rather large investment needs in Scenario 1 for mechanical wastewater treatment compared to Scenario 2 only small difference in total cost is the results of the feasible modelling. This will be investigated whether is it something with data input or some problems in Feasible.

According to the overview in Figure 0-4 the total costs is in the range of 5.0 to 5.5 billion GEL or 238 to 264 million per year resulting in expenditure needs of 103 to 114 GEL/cap/year. The small difference in total cost for baseline and the other scenarios are basically that the four development scenarios assume a reduction in water consumption and reduction in energy consumption as described in the model assumption in Appendix 2.

In Figure 0-5 is illustrated the percentage of expenditures for the WSS in Urban 20025 Sector. O&M amounts the major part of the total expenditure needs - close to 50%.

Figure 0-5 Expenditure Distribution by Type of Expenditures for WSS - Urban 2025 Total Expenditure Needs for Scenario 1

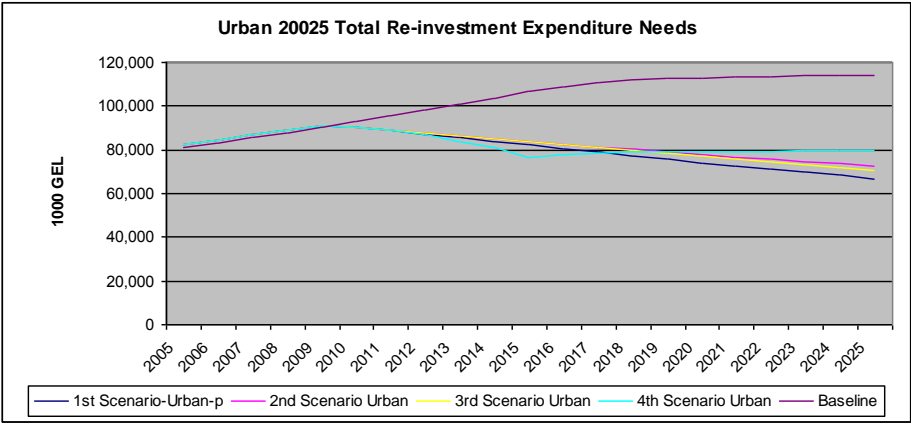


Source: COWI's assessments based upon FEASIBLE modelling.

Urban 2025 - Re-investment Expenditure Needs

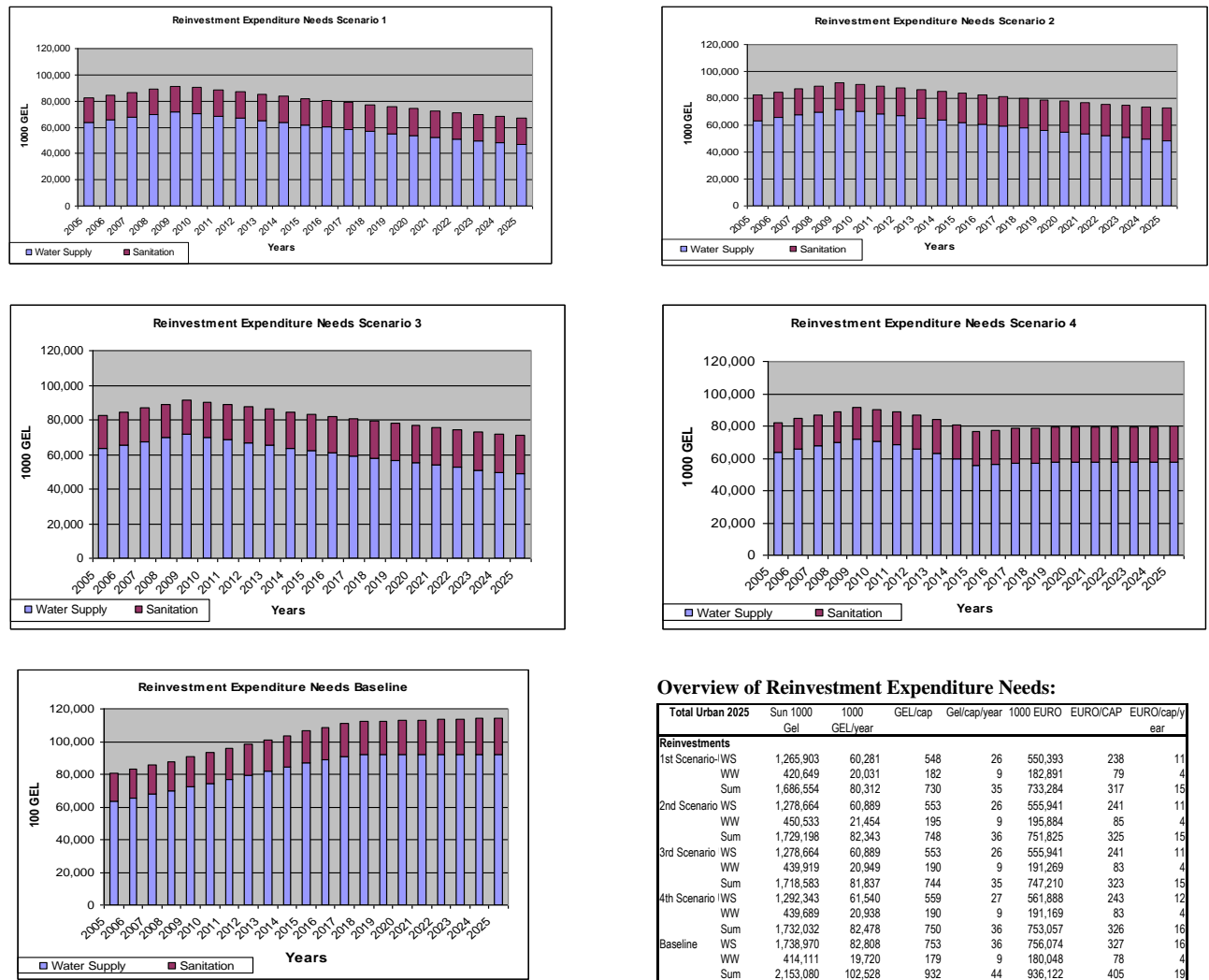
Below is shown the re-investment expenditure needs profile spread over 21 years from 2005 to 2025, except for the scenario 4 - MDG.

Figure 0-6 Re-investment Expenditure Needs for Urban 2025 for the Four Scenarios and Baseline



Source: COWI's assessments based upon FEASIBLE modelling.

Figure 0-7 Re-investment Expenditure Needs for the Four Scenarios and Baseline with Overview of Unit Cost in GEL and EUR



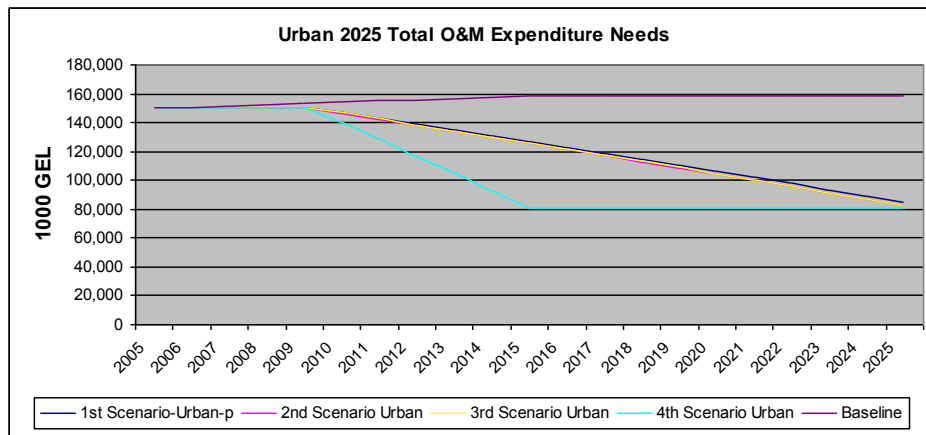
Source: COWI's assessments based upon FEASIBLE modelling.

According to the overview in Figure 0-7 the re-investment costs is in the range of 1.7 to 2.2 billion GEL or 80 to 103 million per year resulting in an expenditure needs of 35 to 44 GEL/cap/year.

Urban 2025 - O&M Expenditure Needs

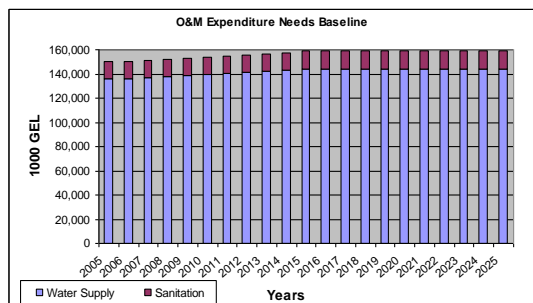
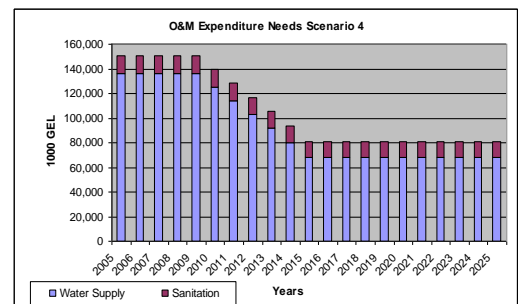
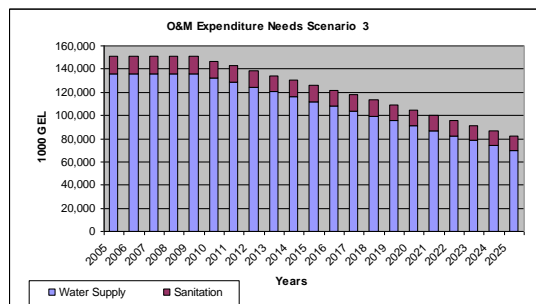
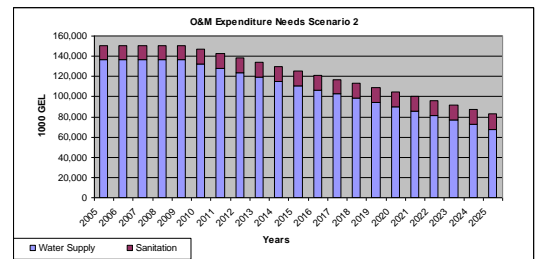
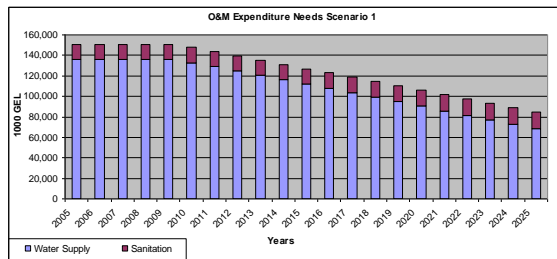
Below is shown the O&M expenditure needs profile spread over 21 years from 2005 to 2025, except for scenario 4 - MDG.

Figure 0-8 O&M Expenditure Needs for Urban 2025 for the Four Scenarios and Baseline



Source: COWI's assessments based upon FEASIBLE modelling.

Figure 0-9 O&M Expenditure Needs for the Four Scenarios and Baseline with Overview of Unit Cost in GEL and EUR



Overview of O&M Expenditure Needs:

| Total Urban 2025 | Sum 1000 | 1000 | GEL/cap | Gel/cap/year | 1000 EURO | EURO/CAP | EURO/caply |
|------------------|-----------|----------|---------|--------------|-----------|----------|------------|
| | Gel | GEL/year | | | | | ear |
| O&M | | | | | | | |
| 1st Scenario-WS | 2,295,886 | 109,328 | 994 | 47 | 998,211 | 432 | 21 |
| 0 WW | 321,618 | 15,315 | 139 | 7 | 139,834 | 61 | 3 |
| 0 Sum | 2,617,503 | 124,643 | 1,133 | 54 | 1,138,045 | 493 | 23 |
| 2nd Scenario WS | 2,284,896 | 108,805 | 989 | 47 | 993,433 | 430 | 20 |
| 0 WW | 307,944 | 14,664 | 133 | 6 | 133,889 | 58 | 3 |
| 0 Sum | 2,592,840 | 123,469 | 1,122 | 53 | 1,127,322 | 488 | 23 |
| 3rd Scenario WS | 2,304,080 | 109,718 | 997 | 47 | 1,001,774 | 434 | 21 |
| 0 WW | 292,024 | 13,906 | 126 | 6 | 126,967 | 55 | 3 |
| 0 Sum | 2,596,103 | 123,624 | 1,124 | 54 | 1,128,741 | 489 | 23 |
| 4th Scenario WS | 1,945,984 | 92,666 | 842 | 40 | 846,080 | 366 | 17 |
| 0 WW | 284,147 | 13,531 | 123 | 6 | 123,542 | 53 | 3 |
| 0 Sum | 2,230,131 | 106,197 | 965 | 46 | 969,622 | 420 | 20 |
| Baseline WS | 2,981,210 | 141,962 | 1,290 | 61 | 1,296,178 | 561 | 27 |
| 0 WW | 301,737 | 14,368 | 131 | 6 | 131,190 | 57 | 3 |
| 0 Sum | 3,282,948 | 156,331 | 1,421 | 68 | 1,427,369 | 618 | 29 |

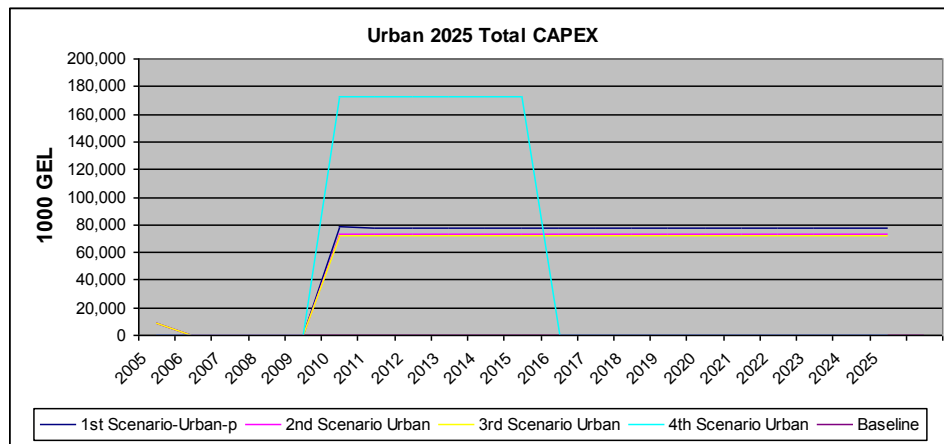
Source: COWI's assessments based upon FEASIBLE modelling.

According to the overview in Figure 0-9 the O&M costs are in the range of 2.2 to 3.3 billion GEL or 106 to 156 million per year resulting in a expenditure needs of 46 to 68 GEL/cap/year. The baseline is the most expensive scenario in respect to O&M cost.

Urban 2025 - CAPEX

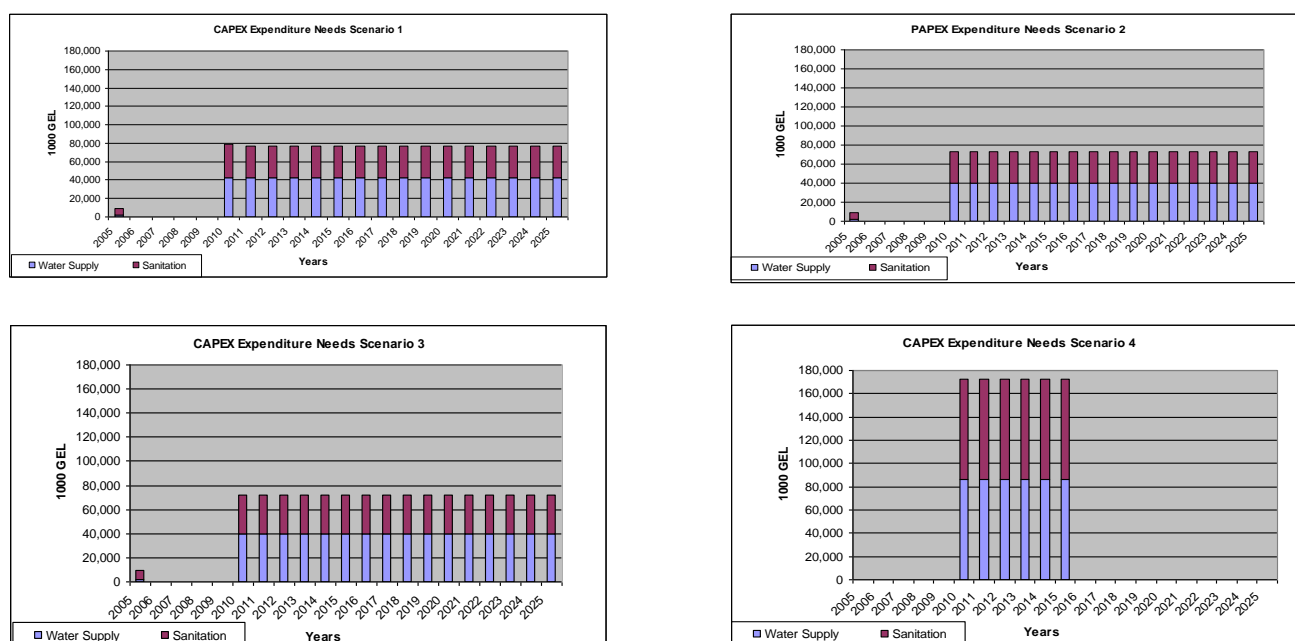
Below is shown the CAPEX expenditure needs profile with capital expenditure spread over 21 years from 2005 to 2025, except for scenario 4 - MDG, where the CAPEX is spread over 6 years.

Figure 0-10 CAPEX Expenditure Needs for Urban 2025 for the Four Scenarios and Baseline



Source: COWI's assessments based upon FEASIBLE modelling.

Figure 0-11 CAPEX Expenditure Needs for the Four Scenarios and Baseline with Overview of Unit Cost in GEL and EUR



No CAPEX in Baseline Scenario

Overview of CAPEX Needs:

| Total Urban 2025 | Sun 1000 | 1000 | GEL/cap | Gel/cap/year | 1000 EURO | EURO/CAP | EURO/caply |
|--|-----------|----------|---------|--------------|-----------|----------|------------|
| | Gel | GEL/year | | | | | ear |
| CAPEX=Total Expenditures-(O&M+Reinvestments) | | | | | | | |
| 1st Scenario- WS | 683,644 | 32,554 | 296 | 14 | 297,236 | 129 | 6 |
| 0 WW | 562,166 | 26,770 | 243 | 12 | 244,420 | 106 | 5 |
| 0 Sum | 1,245,810 | 59,324 | 539 | 26 | 541,656 | 234 | 11 |
| 2nd Scenario WS | 647,534 | 30,835 | 280 | 13 | 281,536 | 122 | 6 |
| 0 WW | 533,988 | 25,428 | 231 | 11 | 232,169 | 100 | 5 |
| 0 Sum | 1,181,521 | 56,263 | 511 | 24 | 513,705 | 222 | 11 |
| 3rd Scenario WS | 639,420 | 30,449 | 277 | 13 | 278,009 | 120 | 6 |
| 0 WW | 522,323 | 24,873 | 226 | 11 | 227,097 | 98 | 5 |
| 0 Sum | 1,161,743 | 55,321 | 503 | 24 | 505,106 | 219 | 10 |
| 4th Scenario WS | 517,192 | 24,628 | 224 | 11 | 224,866 | 97 | 5 |
| 0 WW | 515,665 | 24,555 | 223 | 11 | 224,202 | 97 | 5 |
| 0 Sum | 1,032,857 | 49,184 | 447 | 21 | 449,068 | 194 | 9 |
| Baseline WS | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 WW | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 Sum | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Source: COWI's assessments based upon FEASIBLE modelling.

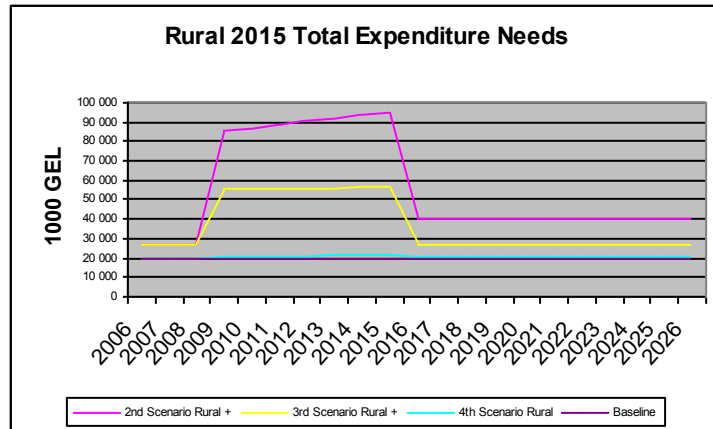
As it can be seen from the overview in Figure 0-11 the CAPEX are in the range of 1.3 to 1.3 billion GEL or 49 to 59 million per year resulting in expenditure needs of 21 to 26 GEL/cap/year.

Rural 2015

Rural 2015 - Total Expenditure Needs

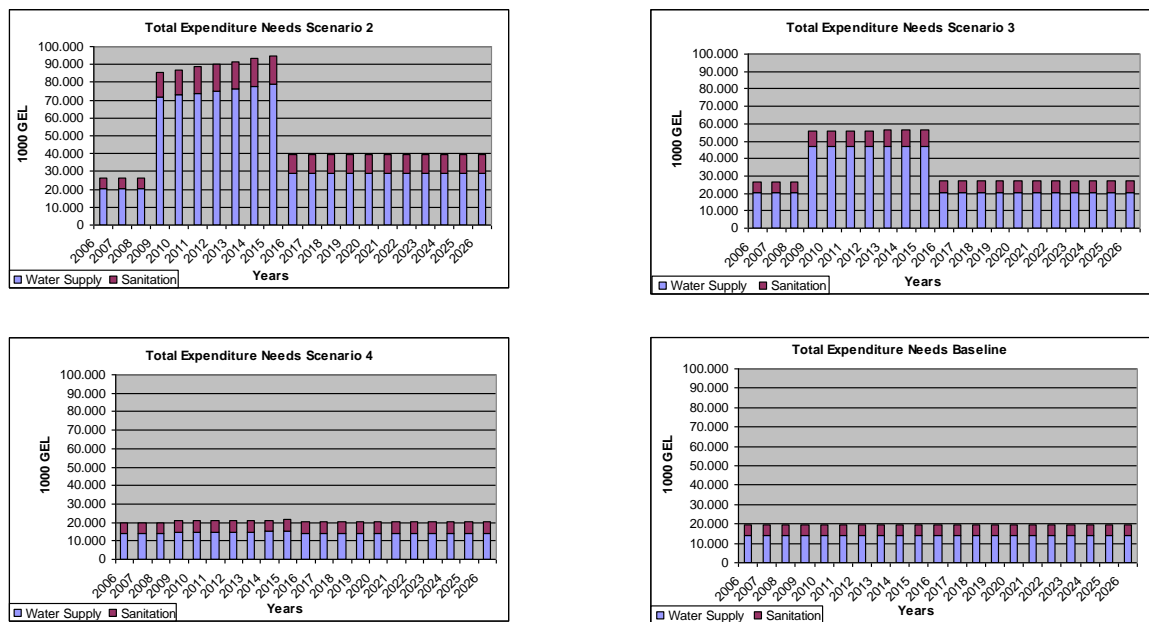
Below is shown the total expenditure needs profile spread over years from 2006 to 2015, except for scenario 4 - MDG.

Figure 0-12 Total Expenditure Needs for Rural-2015 for the Three Scenarios and Baseline



Source: COWI's assessments based upon FEASIBLE modelling.

Figure 0-13 Total Expenditure Needs for the Three Scenarios and Baseline with Overview of Unit Cost in GEL and EUR



Overview of Total Expenditure Needs:

| Rural 2015 | Total | Sum 1000 | 1000 | GEL/cap | Gel/cap/yea | 1000 EURO | EURO/CAP | EURO/cap/yea |
|--------------------|-------|-----------|----------|---------|-------------|-----------|----------|--------------|
| | | Gel | GEL/year | | r | | | |
| 2nd Scenario Rural | WS | 903,991 | 43,047 | 454 | 22 | 393,040 | 197 | 9 |
| | WW | 244,265 | 11,632 | 123 | 6 | 106,202 | 53 | 3 |
| | Sum | 1,148,257 | 54,679 | 577 | 27 | 499,242 | 251 | 12 |
| 3rd Scenario Rural | WS | 67,477 | 3,213 | 34 | 2 | 29,338 | 15 | 1 |
| | WW | 152,543 | 7,264 | 77 | 4 | 66,323 | 33 | 2 |
| | Sum | 770,162 | 36,674 | 387 | 18 | 334,853 | 168 | 8 |
| 4th Scenario Rural | WS | 301,859 | 14,374 | 152 | 7 | 131,243 | 66 | 3 |
| | WW | 126,226 | 6,011 | 63 | 3 | 54,881 | 28 | 1 |
| | Sum | 428,085 | 20,385 | 215 | 10 | 186,124 | 93 | 4 |
| Baseline | WS | 290,017 | 13,810 | 146 | 7 | 126,094 | 63 | 3 |
| | WW | 124,083 | 5,909 | 62 | 3 | 53,949 | 27 | 1 |
| | Sum | 414,100 | 19,719 | 208 | 10 | 180,043 | 90 | 4 |

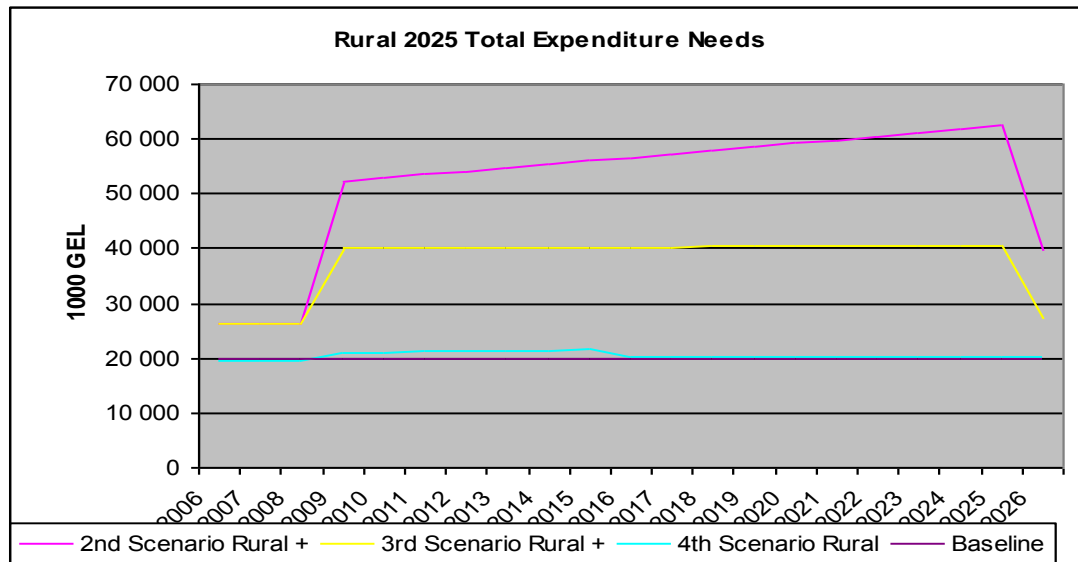
Source: COWI's assessments based upon FEASIBLE modelling.

According to the overview in Figure 0-13 the total costs is in the range of 0.4 to 1.2 billion GEL or 20 to 55 million GEL per year, resulting in expenditure needs of 10 to 27 GEL/cap/year.

Rural 2025 - Total Expenditure Needs

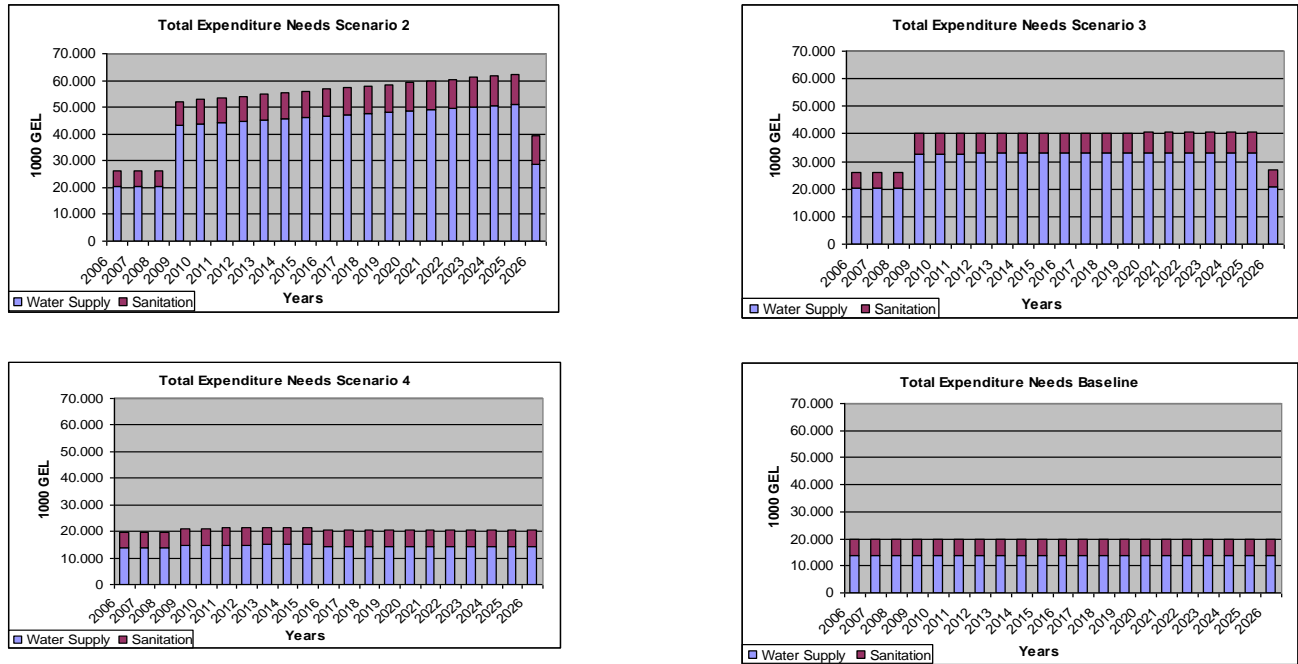
Below is shown the total expenditure needs profile spread over 21 years from 2006 to 2026, except for scenario 4 - MDG.

Figure 0-14 Total Expenditure Needs for Rural 2025 for the Three Scenarios and Baseline



Source: COWI's assessments based upon FEASIBLE modelling.

Figure 0-15 Total Expenditure Needs for the Three Scenarios and Baseline with Overview of Unit Cost in GEL and EUR



Overview of Total Expenditure Needs:

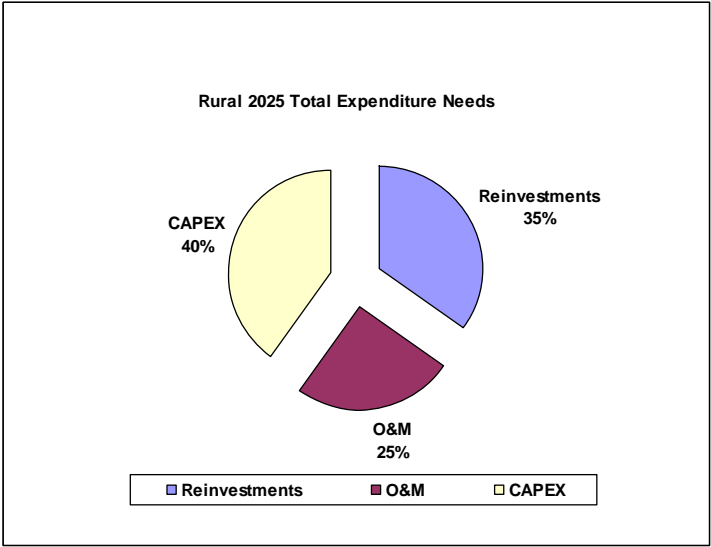
| Total | Rural | Sum | 1000 | GEL/cap | GEL/cap/yr | 1000 | EURO/ICA | EURO/cap/yr |
|-------------|-------|-----------|----------|---------|------------|---------|----------|-------------|
| 2025 | | 1000 | GEL/year | r | P | ear | | |
| 2nd Scen WS | | 888,687 | 42,318 | 446 | 21 | 386,386 | 194 | 9.24 |
| WW | | 203,557 | 9,693 | 102 | 5 | 88,503 | 44 | 2.12 |
| Sum | | 1,092,243 | 52,012 | 549 | 26 | 474,888 | 239 | 11.36 |
| 3rd Scen WS | | 642,557 | 30,598 | 323 | 15 | 279,373 | 140 | 6.68 |
| WW | | 148,632 | 7,078 | 75 | 4 | 64,623 | 32 | 1.55 |
| Sum | | 791,189 | 37,676 | 397 | 19 | 343,996 | 173 | 8.23 |
| 4th Scen WS | | 301,859 | 14,374 | 152 | 7 | 131,243 | 66 | 3.14 |
| WW | | 130,578 | 6,218 | 66 | 3 | 56,773 | 29 | 1.36 |
| Sum | | 432,438 | 20,592 | 217 | 10 | 188,017 | 94 | 4.50 |
| Baseline WS | | 290,017 | 13,810 | 146 | 7 | 126,094 | 63 | 3.02 |
| WW | | 128,219 | 6,106 | 64 | 3 | 55,747 | 28 | 1.33 |
| Sum | | 418,236 | 19,916 | 210 | 10 | 181,842 | 91 | 4.35 |

Source: COWI's assessments based upon FEASIBLE modelling.

According to the overview in Figure 0-15 the total cost is in the range of 0.4 to 1.1 billion GEL or 20 to 520 million per year resulting in a expenditure needs of 10 to 26 GEL/cap/year.

In Figure 0-16 is illustrated the percentage of total expenditures for the WSS in Rural 2025 Sector for Scenario 2. O&M amounts to close to 25% of the expenditures needs.

Figure 0-16 Total Expenditure Needs Distribution by Type of Expenditures for Rural WSS for Scenario 2

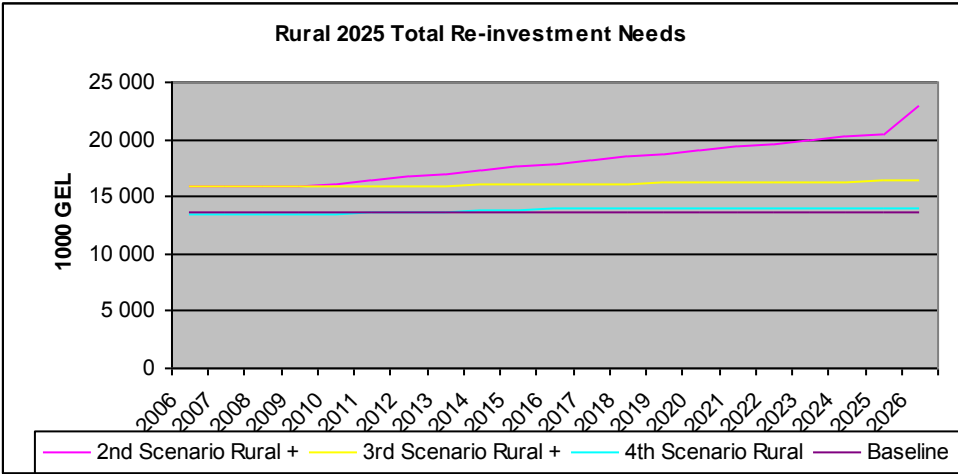


Source: COWI's assessments based upon FEASIBLE modelling.

Rural 2025 - Re-investment Expenditure Needs

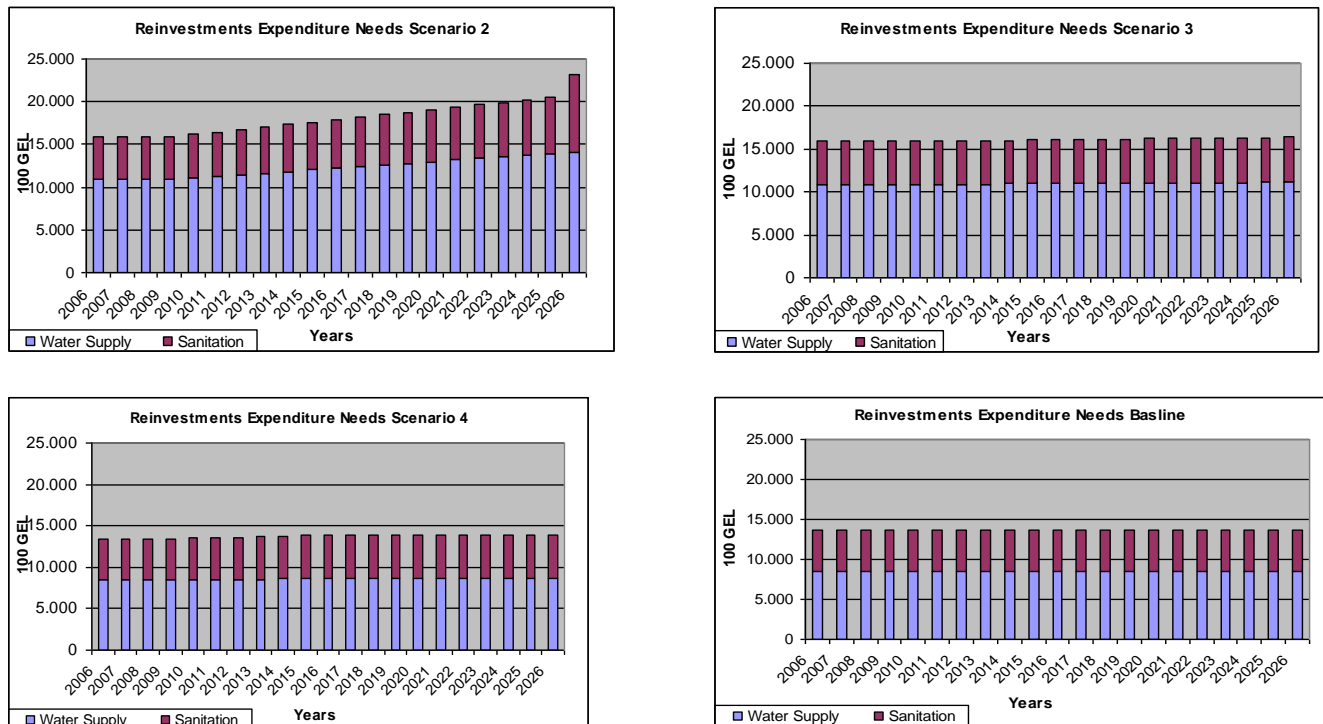
Below is shown the re-investments expenditure needs profile spread over 21 years, except for scenario 4 - MDG.

Figure 0-17 Re-investment Expenditure Needs for Rural 2025 for the Three Scenarios and Baseline



Source: COWI's assessments based upon FEASIBLE modelling.

Figure 0-18 Reinvestment Expenditure Needs for the Three Scenarios and Baseline with Overview of Unit Cost in GEL and EUR



Overview of Reinvestments Expenditure Needs:

| Reinvestment s | Sum 1000 GEL | 1000 GEL/year | GEL/cap | Gel/cap/year | 1000 EURO | EURO/cap P | EURO/cap/year |
|----------------|--------------|---------------|---------|--------------|-----------|------------|---------------|
| 2nd Scen WS | 257,753 | 12,274 | 129 | 6 | 112,067 | 56 | 3 |
| WW | 122,179 | 5,818 | 61 | 3 | 53,121 | 27 | 1 |
| Sum | 379,932 | 18,092 | 191 | 9 | 165,188 | 83 | 4 |
| 3rd Scen: WS | 230,570 | 10,980 | 116 | 6 | 100,248 | 50 | 2 |
| WW | 107,362 | 5,112 | 54 | 3 | 46,679 | 23 | 1 |
| Sum | 337,932 | 16,092 | 170 | 8 | 146,927 | 74 | 4 |
| 4th Scen: WS | 180,362 | 8,589 | 91 | 4 | 78,418 | 39 | 2 |
| WW | 108,488 | 5,166 | 54 | 3 | 47,169 | 24 | 1 |
| Sum | 288,850 | 13,755 | 145 | 7 | 125,587 | 63 | 3 |
| Baseline WS | 176,758 | 8,417 | 89 | 4 | 76,851 | 39 | 2 |
| WW | 108,559 | 5,169 | 55 | 3 | 47,200 | 24 | 1 |
| Sum | 285,317 | 13,587 | 143 | 7 | 124,051 | 62 | 3 |

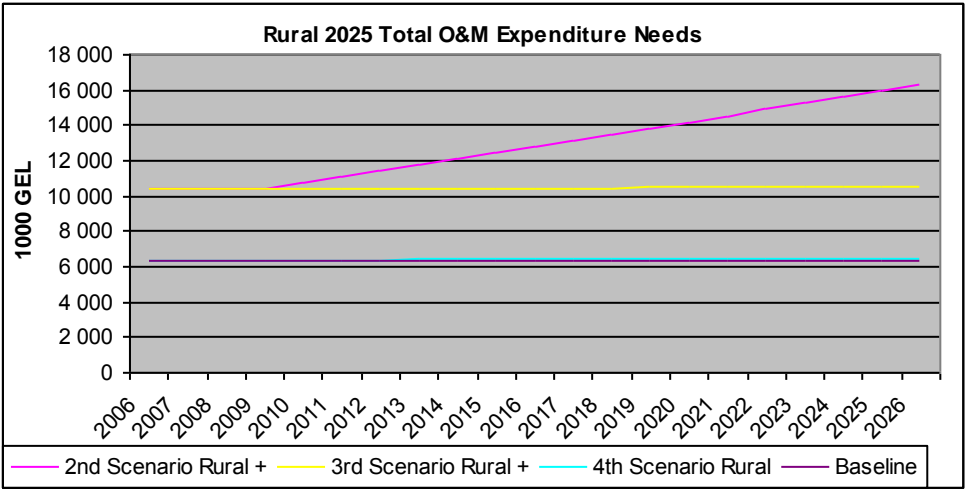
Source: COWI's assessments based upon FEASIBLE modelling.

According to the overview in Figure 0-18 the total cost is in the range of 0.29 to 0.38 billion GEL or 14 to 18 million GEL per year resulting in an expenditure needs of 7 to 9 GEL/cap/year.

Rural 2025 - O&M Expenditure Needs

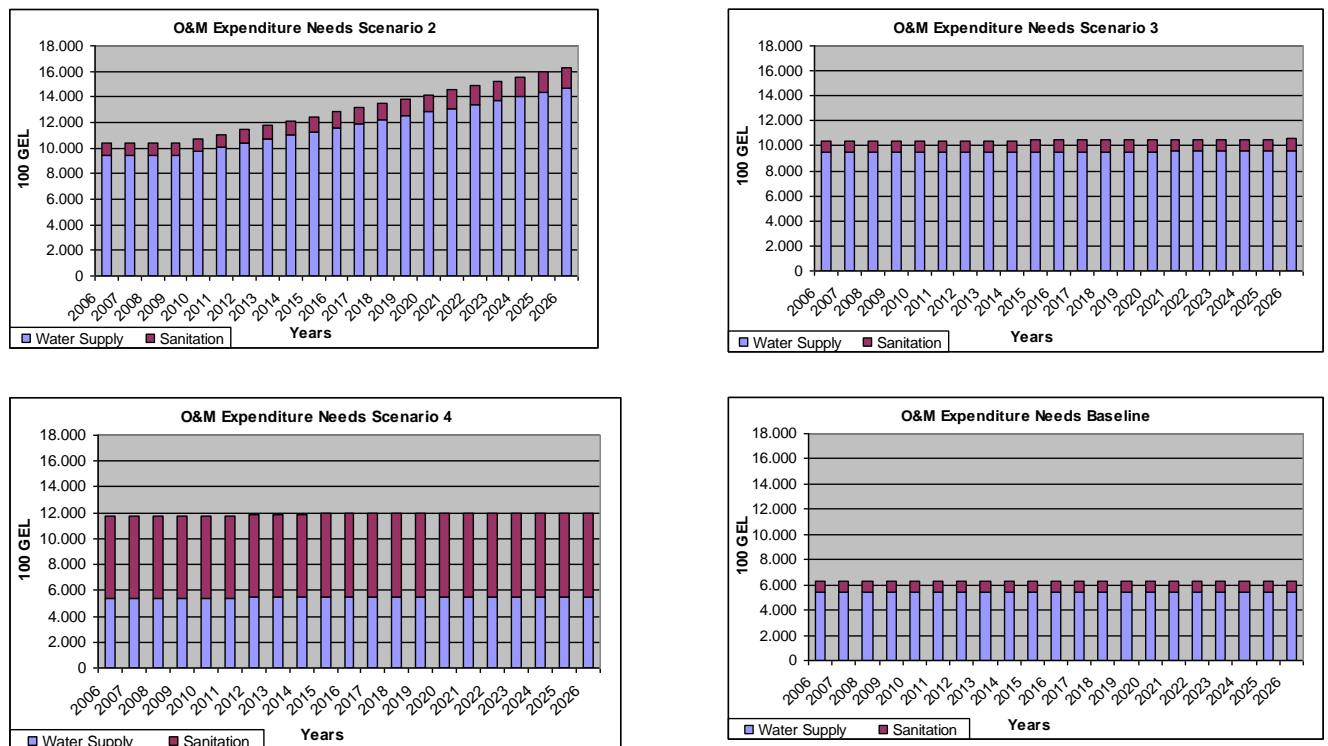
Below is shown the O&M expenditure needs profile spread over 21 years, except for scenario 4 - MDG.

Figure 0-19 O&M Expenditure Needs for Rural 2025 for the Three Scenarios and Baseline



Source: COWI's assessments based upon FEASIBLE modelling.

Figure 0-20 O&M Expenditure Needs for the Four Scenarios and Baseline with Overview of Unit Cost in GEL and EUR



Overview of O&M Expenditure Needs:

| O&M | Sum 1000 GEL | 1000 GEL/year | GEL/cap | Gel/cap/year | 1000 EURO | EURO/CA P | EURO/cap/year |
|-------------|--------------|---------------|---------|--------------|-----------|-----------|---------------|
| 2nd Scen WS | 245,258 | 11,679 | 123 | 6 | 106,634 | 54 | 2.55 |
| WW | 25,735 | 1,225 | 13 | 1 | 11,189 | 6 | 0.27 |
| Sum | 270,993 | 12,904 | 136 | 6 | 117,823 | 59 | 2.82 |
| 3rd Scen WS | 200,004 | 9,524 | 100 | 5 | 86,958 | 44 | 2.08 |
| WW | 219,442 | 10,450 | 110 | 5 | 95,410 | 48 | 2.28 |
| Sum | 17,753 | 845 | 9 | 0 | 7,719 | 4 | 0.18 |
| 4th Scen WS | 115,061 | 5,479 | 58 | 3 | 50,027 | 25 | 1.20 |
| WW | 19,639 | 935 | 10 | 0 | 8,539 | 4 | 0.20 |
| Sum | 134,701 | 6,414 | 68 | 3 | 58,566 | 29 | 1.40 |
| Baseline WS | 113,259 | 5,393 | 57 | 3 | 49,243 | 25 | 1.18 |
| WW | 19,659 | 936 | 10 | 0 | 8,547 | 4 | 0.20 |
| Sum | 132,919 | 6,329 | 67 | 3 | 57,791 | 29 | 1.38 |

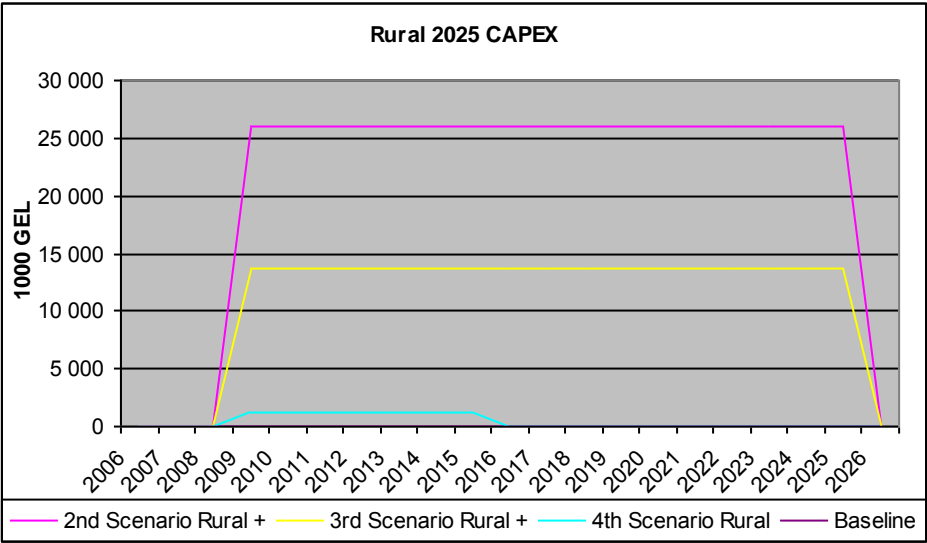
Source: COWI's assessments based upon FEASIBLE modelling.

According to the overview in Figure 0-15 the total cost is in the range of 0.13 to 0.27 billion GEL or 6 to 13 million per year resulting in expenditure needs of 3 to 6 GEL/cap/year.

Rural 2025 - CAPEX Expenditure Needs

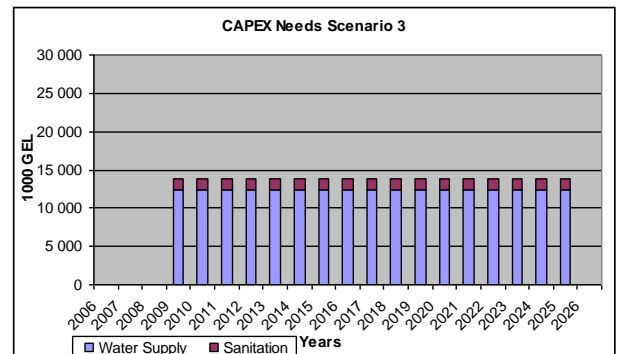
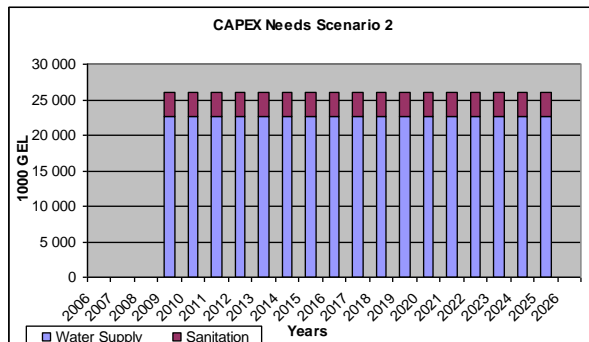
Below is shown the CAPEX expenditure needs profile spread over 21 years, except for scenario 4 - MDG.

Figure 0-21 CAPEX Expenditure Needs for Rural 2025 for the Three Scenarios and Baseline

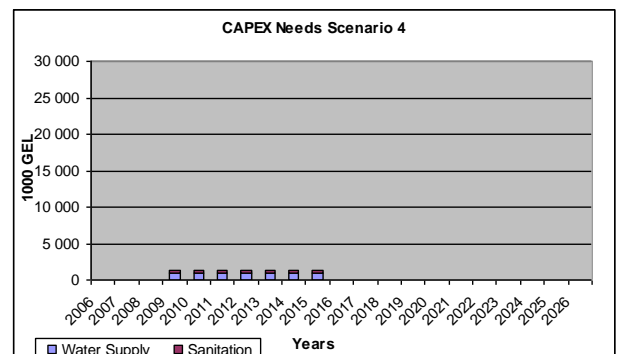


Source: COWI's assessments based upon FEASIBLE modelling.

Figure 0-22 CAPEX needs for the Three Scenarios and Baseline with Overview of Unit Cost in GEL and EUR



No CAPEX in Baseline Scenario



Overview of CAPEX Needs:

| CAPEX | Sum 1000 GEL | 1000 GEL/year | GEL/cap | Gel/cap/yea r | 1000 EURO | EURO/CA P | EURO/caply ear | |
|-------------|--------------|---------------|---------|------------------|-----------|--------------|-------------------|--|
| 2nd Scen WS | 385,676 | 18,366 | 194 | 9 | 167,685 | 84 | 4 | |
| WW | 55,643 | 2,650 | 28 | 1 | 24,193 | 12 | 1 | |
| Sum | 441,318 | 21,015 | 222 | 11 | 191,877 | 96 | 5 | |
| 3rd Scen WS | 211,983 | 10,094 | 106 | 5 | 92,167 | 46 | 2 | |
| WW | 21,832 | 1,040 | 11 | 1 | 9,492 | 5 | 0 | |
| Sum | 233,815 | 11,134 | 117 | 6 | 101,659 | 51 | 2 | |
| 4th Scen WS | 6,436 | 306 | 3 | 0 | 2,798 | 1 | 0 | |
| WW | 2,451 | 117 | 1 | 0 | 1,066 | 1 | 0 | |
| Sum | 8,887 | 423 | 4 | 0 | 3,864 | 2 | 0 | |
| Baseline WS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| WW | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Sum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

Source: COWI's assessments based upon FEASIBLE modelling.

According to the overview in Figure 3-22 the total cost are in the range of 9 million to 441 million GEL or 0.4 to 21 million per year resulting in a expenditure needs of 0 to 11 GEL/cap/year. Baseline has no CAPEX and Scenario 4 has very low CAPEX.

FINANCING GAP ANALYSIS

To conduct financial gap analysis for development scenarios, number of assumptions regarding supply of finance needs to be made which would show potential trend in funds availability from different sources. Prior to financing gap assessment, therefore, the next section presents supply of finance availability analysis. As discussed with local stakeholders, such analysis is based primarily on the experience of CEE countries which has been reforming their own water and sanitation sector in 1995-2002.

Supply of Finance Profile for Development Scenarios in Urban Areas

This brief review looks at supply of finance for Georgia water and sanitation sector and attempts to forecast availability of such financing from different sources. The main objective is to provide substantiated input with respect to possibilities of closing financing gap in development scenarios.

The current situation in Georgia is presented and this is done by looking at each individual source of financing. Furthermore, for each source of financing, relevant international experience is reviewed and used for forecasting. Where data has been available an attempt has been made to provide comparison with Central and Eastern European countries. These countries have undergone similar restructuring of water and sanitation sectors in the late 1990s, early 2000s. This is important to note as it explains the fact that in analysis below we have used data on external funds availability for the same period. While each country's experience is obviously unique, the averaged trends across all countries may serve as potential indicators for forecasting purposes.

User Charges

Current user charges in Georgia

As it has been presented in the baseline scenario analysis, current levels of tariffs in water sector in Georgia are not, with some exception, at the full-cost recovery levels. It is also not clear whether legislation requires that consumers pay the full cost of the services. No approved methods and procedures of calculation of water and wastewater tariffs exist. Each water company calculates its own water and sanitation tariff. Each city and district has its own tariff rates for all consumer categories. The tariff approval procedure starts from water utility calculating the implied tariff based on existing costs plus operating profit margin. The calculations are thereafter submitted to local municipal council, which, according to latest law on local self-governance is the sole body entitled to decide on water and wastewater tariffs. After calculations are discussed and approved at the municipal departments of municipality, the revised and updated version is submitted to the legislative assembly of municipality for approval. When the decision regarding tariffs is adopted it is published in the local press.

Metering is virtually non-existent or if it is present in larger cities the coverage by meters is very low. In rare cases when meters are installed payment is calculated based on meter reading. In all other cases payment for water supply services is calculated based on established normative.

Tariff levels vary significantly across urban settlements and in some, especially larger cities notable change in tariff levels has occurred in last 2 years (see table below for comparative analysis of tariff levels in 2005 and 2007). For example water tariff in Tbilisi was at the level of 0.05 GEL /m³ for households in 2005. During 2006 and early 2007 the tariff doubled and is currently at the level of 0.1 GEL /m³. Such increase, however, was not typical for all cities and towns. It is, generally,

difficult to note any underlying trend in the dynamics of tariff variations - in some cities it has been growing, in others decreasing, and yet in many of them stayed at the same level for the last 2-3 years. The example of Tbilisi has already been noted above. In Kutaisi the water tariff for households seemed to have gone down from the level of 0.25 to 0.20 GEL /m³. Yet in other cities such as Gori, Zugdidi, Marneuli no change has been observed from 2005 to 2007.

On the basis of year 2005 calculations, average water tariff for household in all covered cities (excluding Tbilisi) was around 0.2 GEL /m³ and wastewater household tariff is around 0,1 GEL /m³.

Based on the data collected on total amount of water and sanitation service billing by all included cities and towns, the billed potential revenue from all customer groups stand at GEL 52 million in 2005. Households account for 36% and other customers for 64% of that amount. Table below shows billed total water and sanitation amounts for selected cities. This amounts, however, shows only the potential revenues for water companies from user charges. It is the actual cash inflow that matters when refereeing to water utility's ability to cover expenditure needs. Actual cash inflow from user charges stands only at 65% of total billed amount for all customers. This reflects rather poor payment discipline. When separating bill payment practices for households and other customers, it is apparent that most of the problems come from regular non-payment by households. Average collection rate from households in covered cities stands at 45% while from other customers, including budgetary organisations, at 77%. This is very low compared to international benchmarks as well as collection rates in other comparable to Georgia countries.

To summarise the existing situation with user charges, the following table presents aggregate figures for supply of financing from user charges for water and wastewater companies in Georgia in 2005 based on the total billed amount for respectively water and sanitation service to households and other customers (commercial, industrial entities, and budget organisations).

Table 0-1 Supply of finance from user charges, 2005, GEL million

| Customers | GEL , million |
|-----------------|---------------|
| Total billed | 51,448 |
| water | 35,725 |
| wastewater | 15,723 |
| Households | 18,350 |
| water | 14,196 |
| wastewater | 4,155 |
| Other customers | 33,098 |
| water | 21,529 |
| wastewater | 11,569 |

Source: Data collected and COWI's assessments

Assumptions with respect to user charges in development scenarios

In terms of supply of finance from user charges in development scenarios, the assumptions will not differ much compared to baseline scenario analysis:

- Household income grows together with real income growth, hence, even with retaining fixed share of income for water and sanitation related services, absolute amount of cash availability will increase;
- Collection rates from households increase from 45% to 95% in 2011 and collection rate from other customers increase from 77% to 95% in 2011;

- Household water bill increase gradually to reach 3.5% of average household income; and
- The only variation from assumptions made in baseline scenario is that in all development scenarios coverage of households with water and sanitation services is increased from average of 68% in 2005 to average of 90% in 2015.

And it is important to note that applicability of experience of other countries is limited, as it is the maximum affordable share of income that is defining the upper level of household water and sanitation tariff and user charges increase.

Public expenditure - national/local budget financing

Current budget financing in Georgia

Types of the budget support for water and sanitation sector in Georgia include direct subsidies to water companies for covering their operation and maintenance expenses and capital funding contributions to co-finance investment projects. Direct budget subsidies, mostly via local budgets, have been provided to water utilities on an ongoing basis. As far as capital project financing, the volume has been limited until last two years. Since then government has developed number of programmes to significantly improve situation with water supply and sanitation and, respectively, increase budget contributions for capital expenditure in the sector.

While budget funds for financing recurrent expenditure are mostly provided via local budgets, the capital expenditure primarily originates from national budget, frequently via specifically established mechanisms such as, for example, Municipal Development Fund. Table below provides summary of total estimated budget financing for water and wastewater sector from both local and national budgetary sources. As it can be seen total average sector expenditure stands at around 1% of consolidated total budget. In recent years the trends of financing re-current and capital expenditure has reversed. If before re-current expenditure component has always exceeded capital allocations, data for 2006 and preliminary data for 2007 suggest that more funds are directed to investment projects rather than to subsidising water utilities.

Table 0-2 Financing from local and national budgets for water sector, GEL million

| Type of Funding | 2004 | 2005 | 2006 |
|--|-------|--------|--------|
| GDP at market prices | 9,800 | 11,600 | 13,800 |
| Consolidated budget expenditures (CBE), total | 1,630 | 2,619 | 3,823 |
| Local and national budget funding for water sector | 17 | 23 | 24 |
| of which, for re-current expenditure | 12 | 14 | 7 |
| capital expenditures | 5 | 9 | 17 |
| Local and national budget funding for water sector as share of GDP | 0,18% | 0,2% | 0,18% |
| of which, for re-current expenditure | 0,12% | 0,12% | 0,05% |
| capital expenditures | 0,06% | 0,08% | 0,13% |
| Local and national budget funding for water sector as share of CBE | 1.04% | 0.9% | 0.6% |
| of which, for re-current expenditure | 0.74% | 0.53% | 0.17% |
| capital expenditures | 0.31% | 0.27% | 0.43% |

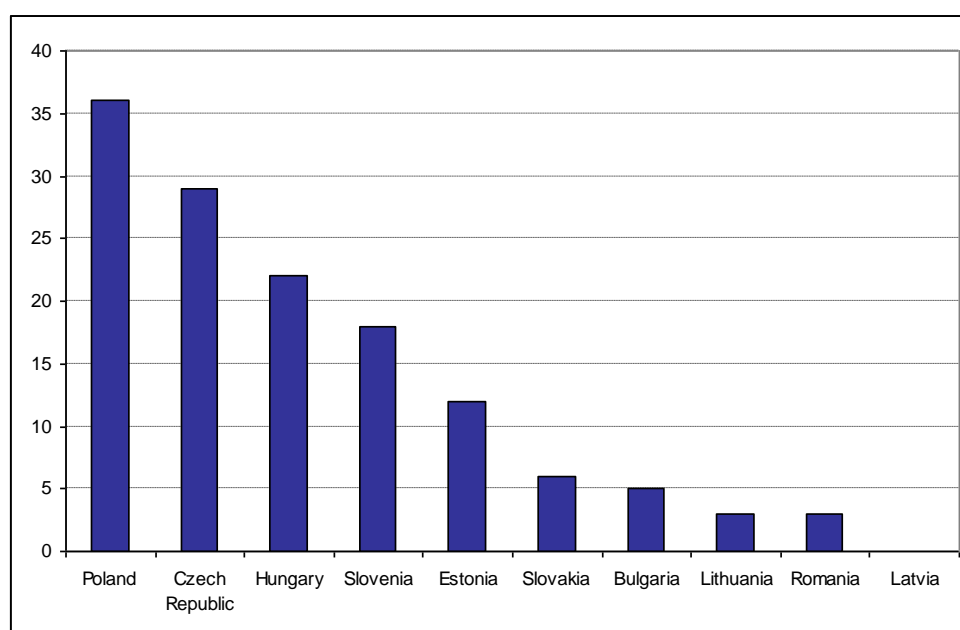
Source: Data collected and COWI's assessments

International experience with budget financing of water sector

The data above presents current situation in Georgia. To be able to forecast future budget funds availability the experience of CEE countries is briefly reviewed below and used as objective benchmarks for potential development of situation in Georgia.

Large number of information sources has been reviewed with respect to government funding of water infrastructure and services. They suggest that, on average, annually about EUR 17-20 billion are invested into water and sanitation infrastructure (not only CEE, but also including other developing countries). About EUR 11-14 billion of this amount or close to 70%-75% of total are provided by public sector. This fact on itself, already suggests that, despite of substantial amount of discussion regarding participation of private sector and IFI/donors in water sector financing, public sector still remains by far the largest provider of funds for these purposes. In CEE countries amount of public expenditure varies significantly, primarily depending on how the activity is organised in that particular country, what is the relative progress of privatising municipal environmental infrastructure services, and prioritised mechanisms of funding. If to assess the situation on average, then CEE countries spend about 0.55% of annual GDP for all environmental services. The actual monetary value differs substantially across the countries (see Figure 4-1 below).

Figure 0-1 Per capita environmental expenditure by public sector in Central and Eastern European countries, EUR/capita, year 2000 data



Source: EU, WB, own calculations.

Share of specific water and sanitation investment expenditure highly depend on the degree to which public sector in that particular country remained responsible for provision of the services. Substantial variation across countries exists. In many places significant part of the water and sanitation related services have been privatised. In other countries, while formal owner of networks remain the state, operation of water and sewerage networks have been outsourced to private domestic or international company.

Despite of this, however, the majority of public expenditure in all countries is in water and sanitation sector. By some estimates it accounts for almost 50% of all environmentally related public

sector expenditure in CEE region. Public sector in Poland, for example, spend about 83% of total public environmental expenditure on water, Hungary - 85%, Estonia - 79%, Czech Republic 49%.

In terms of trend over time, this expenditure pattern is also different in CEE countries. It have persistently increased in, for example, Bulgaria, Estonia, Hungary, while was falling over time in Czech Republic and fluctuating in Poland. It is, however, important to note that this countries where investment expenditure has downward trend have managed to develop sustainable alternative way for financing municipal environmental infrastructure, particularly through development of municipal credit market or through widespread participation of private sector. National budget and local budget financing have been gradually decreasing with the pace with which municipal credit markets or number of private operators has been increasing.

The main lesson from experience of CEE public sector involvement into water and sanitation investment funding is that government financing should be seen as an evolutionary process, rather than fixed measure or percentage of national budget to be invested every year. Direct provisions of funds to water sector normal operation, functioning, and maintenance are necessary to the point when alternative mechanisms have been developed to substitute them. Direct investment should be streamlined with other mechanisms of financing – private sector, municipal credit facilities, national guarantee schemes, state or non-state revolving investment funds, and others to increase private provision of resources. Our brief review of situation in CEE countries demonstrates that those countries which did not manage to do that have increased public share of investments from national and local budgets over time.

As shown above, review of international experience demonstrates varying pattern of budget support to water and sanitation sector. However, based on averaging trends, we will assume that about 0.5% of annual GDP needs to be spent on environmental services, of which about 65%-70% is for water and sanitation. That implies that we assume about 0.30% of annual GDP is spent for water and sanitation services in the form of national and regional budget support. The number is higher than current 0.2% of annual GDP, hence, in our estimation of supply of finance and later financing gap, we can experiment with several scenarios:

- Conservative scenario – where share of GDP is retained at 0.2%;
- Optimistic scenario – where share of GDP is retained at 0.3%; and
- Realistic scenario – where share of GDP rises to 0.3% of GDP then gradually falling to 0.25% of GDP in 2015 and 0.2% in 2021.

Financing from IFIs and donors

Current financing from IFIs and donors in Georgia

Financing from international community has always played an important role in development of water sector in EECCA countries. Georgia is not an exception from this point of view. The pace of international assistance, however, has only picked-up in recent years. IFI and donor funding increased dramatically, in particular due to resources provided by European Bank for Reconstruction and Development (EBRD), Municipal Development Fund (MDF), and Millennium Challenge Georgia (MCG).

A particular feature of the recent trend is that project financing becomes more complex as numbers of possible sources, sometimes up to 3-4 or even more are used to finance a single project. The key reason for this is affordability constraint as financing all the project cost via loan is not

feasible for Georgia. Therefore, substantial effort is put to attract external grant financing and where such is eventually not available local and national budget contributions are thought.

Detailed review of currently available financing has been carried out with purpose to identify structure and volumes of funds provided. It is assessed that, in total, about EUR 107 (GEL 240 million) million worth of water sector projects are currently being either under implementation or in the preparation phase. Of this, about EUR 27 million (GEL 60 million) are envisaged as loan financing from IFIs (primarily EBRD), while the rest will be financed via donor capital investment grant contributions and budget co-financing. Such amounts are unprecedented for Georgia as even just a couple of years ago volumes of investment works in water sector has been negligible. Therefore, taking such high levels of external fund availability as an indication of similar funds provision in the future will not be entirely correct. Most likely, the downward trend will soon be observed. To approximate to which levels such trend would converge, it is useful to look at the experience of CEE countries in attracting international financing at already later stages of their water sector reform. The next section attempts to do exactly that.

International experience with IFI and donor financing of water sector

We have reviewed large volume of available information regarding sector financing from international sources in late 1990s and early 2000. Reviewed sources include traditional IFIs as well as individual country funds channelled through national or international development assistance bodies. It is also important to note here, that, in addition to these sources, CEE region, particularly accession countries have significantly benefited from EU structural funds which will, mostly likely, not be available in the same amounts to Georgia – at least in the short to medium terms.

Funds through multilateral financial institutions accounted for the majority of the total international assistance provided to CEE countries. Amount of multilateral IFI provided funds have consistently increased in the period 1997-2001. It have included traditional lenders as World Bank and EBRD, which where later joined by the EU Structural fund mechanisms as well as European Investment Bank. These four institutions account for dominant majority of all the water and sanitation infrastructure related investment funds provided to the region. Table below represents summary of lending by all international financial institutions in the period 1994-2001. ISPA funds are the largest contributors and it is important to note that the mentioned amount of funds have been allocated in the period of two years only (2000 and 2001). These financing is mostly provided through grant mechanisms and requires local co-financing of around 25%. The rest of the funding shown in the table represents loan financing. Largest provider of loans is European Investment Bank, whose role in the region was gradually increasing from 1995. EIB have provided about 41% of total loan financing for the entire period, followed by EBRD 40%. Largest recipient countries, in terms of absolute amounts were Poland and Czech Republic, accounting for 29% and 13% of all allocated financing.

Table 0-3 Summary of Water and Sanitation sector investment project funding by Multilateral Financial Institutions in CEE countries, 1994-2001, EUR 000's

| Country | WB | ISPA | EIB | EBRD | Phare | NIB | NEFCO | Other |
|----------------|--|------------------|----------------|----------------|---------------|--------------|--------------|---------------|
| Bulgaria | 109,760 | 66,254 | 28,000 | 31,000 | - | - | - | - |
| Czech Republic | - | 56,976 | 220,000 | 52,500 | 14,200 | - | - | - |
| Estonia | 2,240 | 28,132 | - | 80,000 | - | - | - | - |
| Hungary | 2,240 | 63,868 | - | 13,125 | 20,100 | - | - | 3,400 |
| Latvia | - | 82,308 | 43,638 | 60,331 | - | 1,818 | 2,294 | - |
| Lithuania | 6,944 | 56,900 | 18,000 | 29,700 | - | - | - | 11,200 |
| Poland | 24,080 | 498,893 | 147,660 | 100,000 | - | - | - | - |
| Romania | 28,000 | 374,815 | 55,000 | 145,300 | - | - | - | 18,500 |
| Slovakia | - | 48,364 | 30,000 | - | - | - | - | - |
| Slovenia | - | 21,264 | 5,250 | 28,100 | - | - | - | - |
| TOTAL | 173,264 | 1,297,774 | 547,548 | 540,056 | 34,300 | 1,818 | 2,294 | 33,100 |
| EBRD | European Bank for Reconstruction and Development | | | | | | | |
| EIB | European Investment Bank | | | | | | | |
| ISPA | EU's Instrument for Structural Policies for pre-Accession facility | | | | | | | |
| KB SA | a Polish commercial bank | | | | | | | |
| NIB | Nordic Investment Bank | | | | | | | |
| NEFCO | Nordic Environment Finance Corporation | | | | | | | |
| Phare | EU programme | | | | | | | |
| WB | World Bank | | | | | | | |

Source: PSIRU database, IFI, EU, EIB, national data

Table below separates funding for years 2000 and 2001 only, on the basis of which it is possible to calculate per capita allocations, which could offer an interesting insight to the potential of international assistance funds in meeting sector expenditure needs. The largest per capita recipient appears to be Latvia. The lowest per capita recipient is Hungary with only EUR 2.3 in 2001.

Table 0-4 Annual total and per capita financing of water and sanitation investments in selected CEE countries by multilateral IFIs

| Country | Total | | Per Capita | |
|----------------|-------------|-------------|------------|-----------|
| | EUR million | EUR million | EUR/cap/y | EUR/cap/y |
| | 2000 | 2001 | 2000 | 2001 |
| Bulgaria | 63.5 | 33.7 | 7.8 | 4.2 |
| Czech Republic | 134.5 | 102.5 | 13.1 | 10.0 |
| Estonia | 15.2 | 13.0 | 10.7 | 9.1 |
| Hungary | 40.6 | 23.3 | 4.0 | 2.3 |
| Latvia | 89.4 | 44.6 | 37.4 | 18.7 |
| Lithuania | 52.9 | 45.3 | 14.3 | 12.2 |
| Poland | 293.3 | 398.0 | 7.6 | 10.3 |
| Romania | 183.7 | 241.8 | 8.2 | 10.8 |
| Slovakia | 9.1 | 39.2 | 1.7 | 7.3 |
| AVERAGE | | | 11.6 | 9.4 |

On average EUR 9-11 per capita per year is received by CEE countries. We could use this per capita data to calculate estimated availability of such funds for Georgia. However, data above needs to be treated with caution, given that half of the financing is provided through ISPA program. Hence, the more realistic scenario would be to use 60% of per capita funds availability in CEE countries for calculation of similar expected funds flow for Georgia. This approach has been taken in our estimation of funds for development scenarios, which results in about EUR 23.3 million (GEL 53.4 million) net of debt service cost being available for development scenarios. This amount will most likely decrease in the medium term when many large projects will already be financed; hence, we assumed reduction of per capita IFI funds availability to EUR 7 from year 2015.

Bilateral development funds

The second component of the overall international assistance is provided by developed countries and their respective institutions. This assistance have been increasing over time, however, represented only a fraction of funding provided by MFIs. Table below demonstrates total amount of bilateral funds provided for water and sanitation sector investments. The current trend is that availability of bilateral money is significantly reduced.

Table 0-5 Distribution of Bilateral ODA/OA for water and sanitation investments in CEE countries, 1997-2001, EUR thousands

| Year | 1997 | 1998 | 1999 | 2000 | 2001 | 1997-2001 |
|------------------|---------------|---------------|---------------|---------------|---------------|------------------|
| Albania | 16,934 | 14,616 | 1,546 | 58,576 | 13,586 | 105,258 |
| Bulgaria | 437 | 10,147 | 291 | 616 | 3,942 | 15,434 |
| Czech Republic | 45 | - | 34 | 526 | 907 | 1,512 |
| Estonia | 258 | 414 | 750 | 246 | 6,496 | 8,165 |
| Hungary | - | 22 | 336 | 358 | 258 | 974 |
| Latvia | - | 4,715 | 2,565 | 3,069 | 795 | 11,144 |
| Lithuania | 168 | 661 | 1,702 | 1,893 | 2,363 | 6,787 |
| Poland | 291 | 1,198 | 1,154 | 538 | 6,070 | 9,251 |
| Romania | 358 | 538 | 1,747 | 2,576 | 5,074 | 10,293 |
| Slovak Republic | - | - | - | - | 806 | 806 |
| CEES Unallocated | 22 | 56 | 67 | 11 | 2,027 | 2,184 |
| TOTAL | 18,514 | 32,368 | 10,192 | 68,410 | 42,325 | 171,808 |

Table below shows the main bilateral donors and amount of their contributions to water and sanitation sector in CEE.

Table 0-6 Bilateral ODA/OA donors allocating funds to water and sanitation investment projects in CEE countries, 1997-2001, EUR thousands

| Year | 1997 | 1998 | 1999 | 2000 | 2001 | 1997-2001 |
|----------------|---------------|---------------|---------------|---------------|---------------|----------------|
| Donor | | | | | | |
| AUSTRALIA | 0 | 0 | 0 | 0 | 0 | 0 |
| AUSTRIA | 560 | 0 | 952 | 5,062 | 1,400 | 7,974 |
| BELGIUM | 0 | 0 | 0 | 0 | 0 | 0 |
| CANADA | 202 | 403 | 179 | 1,243 | 448 | 2,475 |
| DENMARK | 0 | 1,579 | 0 | 168 | 16,800 | 18,547 |
| FINLAND | 0 | 0 | 1,982 | 2,912 | 0 | 4,894 |
| FRANCE | 482 | 0 | 67 | 11 | 672 | 1,232 |
| GERMANY | 15,501 | 14,392 | 56 | 25,278 | 12,051 | 67,278 |
| GREECE | 90 | 0 | 370 | 459 | 67 | 986 |
| IRELAND | 0 | 0 | 0 | 0 | 0 | 0 |
| ITALY | 0 | 11 | 280 | 28,392 | 1,680 | 30,363 |
| JAPAN | 986 | 10,763 | 2,330 | 1,389 | 45 | 15,512 |
| LUXEMBOURG | 0 | 0 | 0 | 0 | 0 | 0 |
| NETHERLANDS | 0 | 0 | 0 | 0 | 0 | 0 |
| NEW ZEALAND | 0 | 0 | 0 | 0 | 0 | 0 |
| NORWAY | 0 | 0 | 146 | 0 | 22 | 168 |
| PORTUGAL | 0 | 0 | 0 | 0 | 0 | 0 |
| SPAIN | 0 | 0 | 0 | 56 | 0 | 56 |
| SWEDEN | 202 | 4,850 | 3,427 | 2,139 | 6,619 | 17,237 |
| SWITZERLAND | 0 | 0 | 11 | 0 | 0 | 11 |
| UNITED KINGDOM | 493 | 370 | 78 | 426 | 347 | 1,714 |
| UNITED STATES | 0 | 0 | 314 | 862 | 2,184 | 3,360 |
| TOTAL | 18,514 | 32,368 | 10,192 | 68,398 | 42,336 | 171,808 |

Source: OECD DAC database, donors.

Table 0-7 Annual per capita Bilateral ODA/OA to water and sanitation sector in CEE countries, EUR per capita

| Year | 1997 | 1998 | 1999 | 2000 | 2001 | 1997-2001 |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Albania | 4.88 | 4.21 | 0.45 | 16.88 | 3.92 | 30.34 |
| Bulgaria | 0.05 | 1.25 | 0.04 | 0.08 | 0.49 | 1.90 |
| Czech Republic | 0.00 | - | 0.00 | 0.05 | 0.09 | 0.15 |
| Estonia | 0.18 | 0.29 | 0.53 | 0.17 | 4.56 | 5.73 |
| Hungary | - | 0.00 | 0.03 | 0.04 | 0.03 | 0.10 |
| Latvia | - | 1.97 | 1.07 | 1.28 | 0.33 | 4.66 |
| Lithuania | 0.05 | 0.18 | 0.46 | 0.51 | 0.64 | 1.83 |
| Poland | 0.01 | 0.03 | 0.03 | 0.01 | 0.16 | 0.24 |
| Romania | 0.02 | 0.02 | 0.08 | 0.12 | 0.23 | 0.46 |
| Slovak Republic | - | - | - | - | 0.15 | 0.15 |
| AVERAGE | 0.52 | 0.80 | 0.27 | 1.91 | 1.06 | 4.56 |

Source: OECD DAC database, donors.

The trend above shows that at the peak of reform process CEE countries were receiving 1.5 per capita on average in the form of grant co-financing for water and sanitation projects. Adding to this about EUR 3.5 per capita from multilateral grant sources (such as ISPA) results in total of estimated 5.0 per capita for sector as grants. Using such per capita estimate for Georgia leads to conclusion that EUR 21.5 million (GEL 49.5 million) is estimated to be available to the sector in the form of grant. This amount is most likely to decrease in medium term and we have assumed reduction to EUR 4 per capita from year 2015.

Summing up results of IFI and donor lending calculations, it seems that our results suggest approximately equal share of loan-grant co-financing availability for an average water and sanitation project. Current trend is that grant components are higher than loan components; however, going into the future, such trend will gradually subside. Therefore, it is probably a correct trend (suggested by experience of CEE countries) that about 50% of loan and 50% of grant will be a typical financing package for water and sanitation projects.

Summary of supply of finance availability

The review and analysis of supply of finance for development scenarios made number of assumptions regarding potential increase of funds from different sources. The qualitative assumptions made above have then been implemented in the FEASIBLE model to generate supply of finance profile to be further used in assessment of financing gap or financing surplus. This section presents the results of such calculations in the table and graphics format for all options of supply of finance with gradual implementation of all qualitative assumptions discussed above.

Baseline supply of finance

The baseline supply of finance is characterised by the following key assumptions:

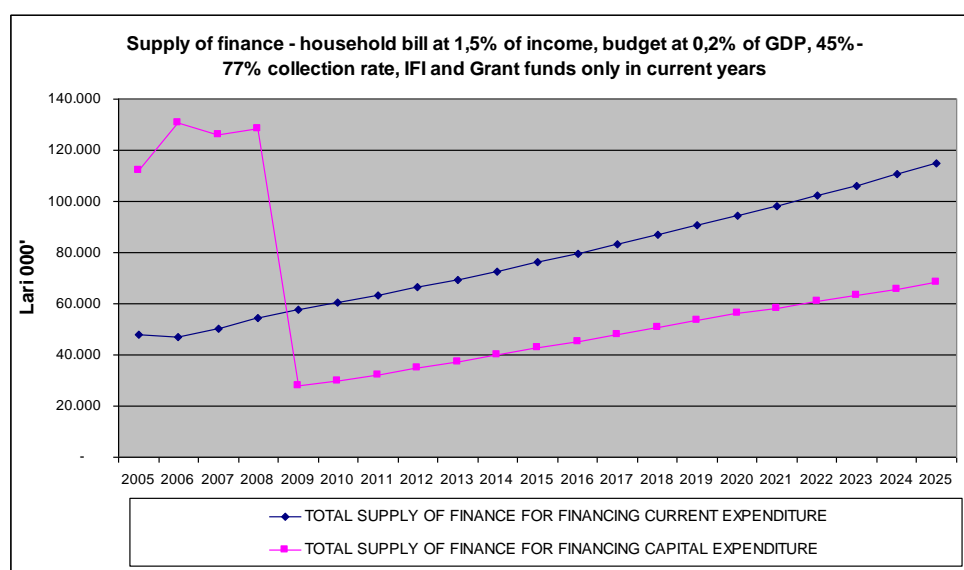
- Household bill is at 1.5% of average household income for all the forecasted period;
- Actual billing amount increases due to increase of household income along with real GDP increase;
- Budget contribution for current and capital expenditure is at constant 0.2% of real GDP;
- Collection rate from households is at 45% of billed amount for the entire period;
- Collection rate from other customers is at 77% of billed amount for the entire period;
- Funding from IFIs and donors is only available on the “known” basis that is only the confirmed funding is included into this scenario.

Resulting supply of finance profile is shown both in the table and graph below.

Table 0-8 Supply of finance- household bill at 1,5% of income, budget at 0,2% of GDP, 45%-77% collection rate, IFI and Grant funds only in current years

| GEL 000' | 2005-2025 | Average annual |
|---|------------------|----------------|
| User charges, HH billed | 762.572 | 36.313 |
| User charges, OTHERS billed | 1.171.954 | 55.807 |
| User charges, HH collected | 342.231 | 16.297 |
| User charges, OTHERS collected | 897.767 | 42.751 |
| Budget, current expenditure | 392.263 | 18.679 |
| Budget, capital expenditure | 891.815 | 42.467 |
| IFI loans | 222.370 | 10.589 |
| Donor grants | 197.864 | 9.422 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CURRENT EXPENDITURE | 1.632.262 | 77.727 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CAPITAL EXPENDITURE | 1.312.049 | 62.479 |
| TOTAL | 2.944.311 | 140.205 |

Figure 0-2 Supply of finance- household bill at 1.5% of income, budget at 0.2% of GDP, 45%-77% collection rate, IFI and Grant funds only in current years



Supply of finance with increased collection rate

The supply of finance for this option reflects an assumption of increased collection from all customer groups reaching 95% in 2011. Hence the option is characterised by the following set of key assumptions:

- Household bill is at 1.5% of average household income for all the forecasted period;
- Actual billing amount increases due to increase of household income along with real GDP increase;
- Budget contribution for current and capital expenditure is at constant 0.2% of real GDP;
- Collection rate from households increase from 45% to 95% in 2011 of billed amount;

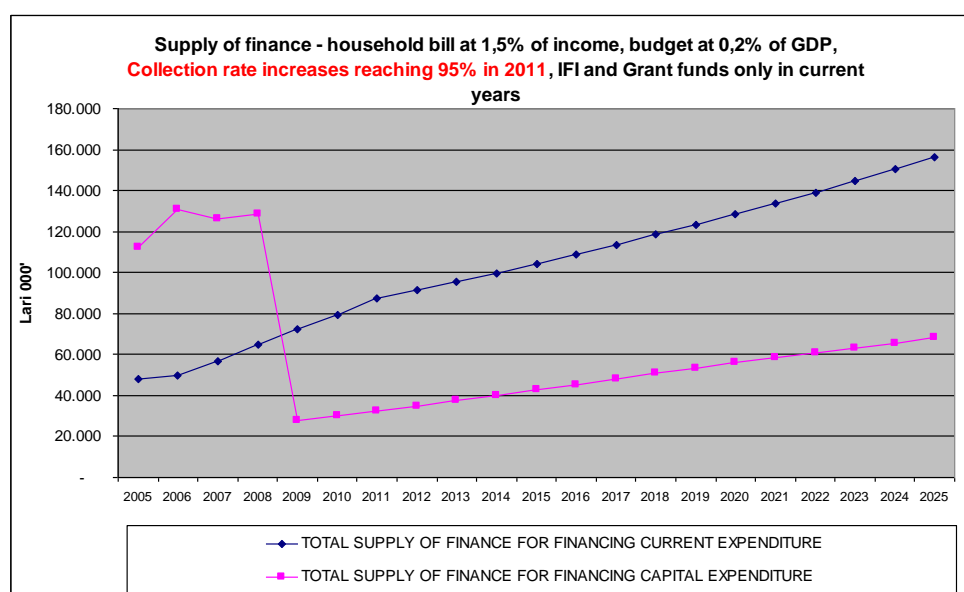
- Collection rate from other customers increase from 77% to 95% in 2011 of billed amount;
- Funding from IFIs and donors is only available on the “known” basis that is only the confirmed funding is included into this scenario.

Resulting supply of finance profile is shown both in the table and graph below.

Table 0-9 Supply of finance- household bill at 1,5% of income, budget at 0,2% of GDP, Collection rate increases reaching 95% in 2011, IFI and Grant funds only in current years

| GEL 000' | 2005-2025 | Average annual |
|---|-----------|----------------|
| User charges, HH billed | 762.572 | 36.313 |
| User charges, OTHERS billed | 1.171.954 | 55.807 |
| User charges, HH collected | 683.830 | 32.563 |
| User charges, OTHERS collected | 1.088.971 | 51.856 |
| Budget, current expenditure | 392.263 | 18.679 |
| Budget, capital expenditure | 891.815 | 42.467 |
| IFI loans | 222.370 | 10.589 |
| Donor grants | 197.864 | 9.422 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CURRENT EXPENDITURE | 2.165.064 | 103.098 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CAPITAL EXPENDITURE | 1.312.049 | 62.479 |
| TOTAL | 3.477.114 | 165.577 |

Figure 0-3 Supply of finance- household bill at 1.5% of income, budget at 0.2% of GDP, Collection rate increases reaching 95% in 2011, IFI and Grant funds only in current years



Supply of finance with increased collection rate and household bill reaching 3.5% of income

The supply of finance for this option reflects an assumption of increased collection from all customer groups reaching 95% in 2011 as well as assumes that household tariff will increase to the level where household bill accounts for 3.5% of average household income average. The increase is gradual and required level of 3.5% is achieved in 2020. Hence this option is characterised by the following set of key assumptions:

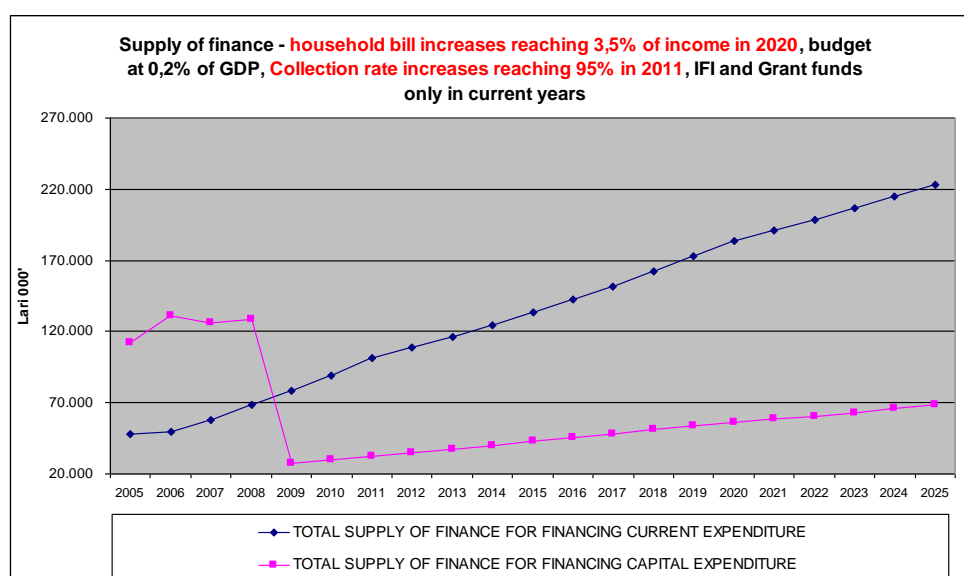
- Household bill increases from 1.5% in 2005 to 3,5% of average household income in 2020;
- Actual billing amount increases due to increase of household income along with real GDP increase;
- Budget contribution for current and capital expenditure is at constant 0,2% of real GDP;
- Collection rate from households increase from 45% to 95% in 2011 of billed amount;
- Collection rate from other customers increase from 77% to 95% in 2011 of billed amount;
- Funding from IFIs and donors is only available on the “known” basis that is only the confirmed funding is included into this scenario.

Resulting supply of finance profile is shown both in the table and graph below.

Table 0-10 Supply of finance- household bill increases reaching 3.5% of income in 2020, budget at 0.2% of GDP, Collection rate increases reaching 95% in 2011, IFI and Grant funds only in current years

| GEL 000' | 2005-2025 | Average annual |
|---|-----------|----------------|
| User charges, HH billed | 1.460.442 | 69.545 |
| User charges, OTHERS billed | 1.171.954 | 55.807 |
| User charges, HH collected | 1.342.482 | 63.928 |
| User charges, OTHERS collected | 1.088.971 | 51.856 |
| Budget, current expenditure | 392.263 | 18.679 |
| Budget, capital expenditure | 891.815 | 42.467 |
| IFI loans | 222.370 | 10.589 |
| Donor grants | 197.864 | 9.422 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CURRENT EXPENDITURE | 2.823.716 | 134.463 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CAPITAL EXPENDITURE | 1.312.049 | 62.479 |
| TOTAL | 4.135.766 | 196.941 |

Figure 0-4 Supply of finance- household bill increases reaching 3.5% of income in 2020, budget at 0.2% of GDP, Collection rate increases reaching 95% in 2011, IFI and Grant funds only in current years



Analysis of financing deficit

Development scenarios included into financial gap analysis

To analyse financing deficit or surplus in development scenarios, we first review the expenditure profiles for development scenarios. Two versions of development scenarios have been estimated:

- With time period of 21 years – in this version investment needs for MDG are implemented over 6 years (2010-2015), while investment needs for all other scenarios are implemented over 16 years (2010-2025). The graph illustrating capital expenditure and current expenditure profiles for all scenarios in this version are shown below:

Figure 0-5 Capital expenditure needs for version of 21 years for all scenarios

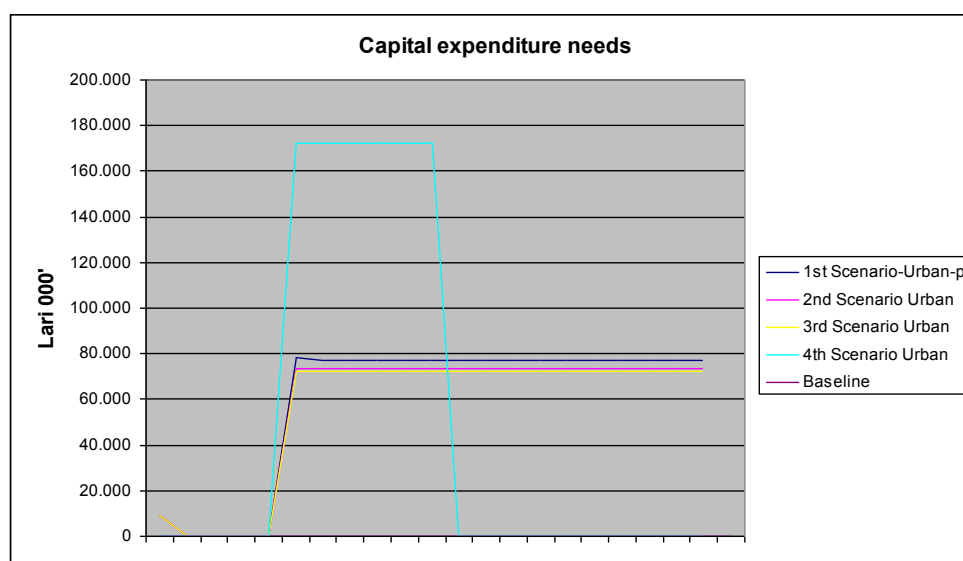
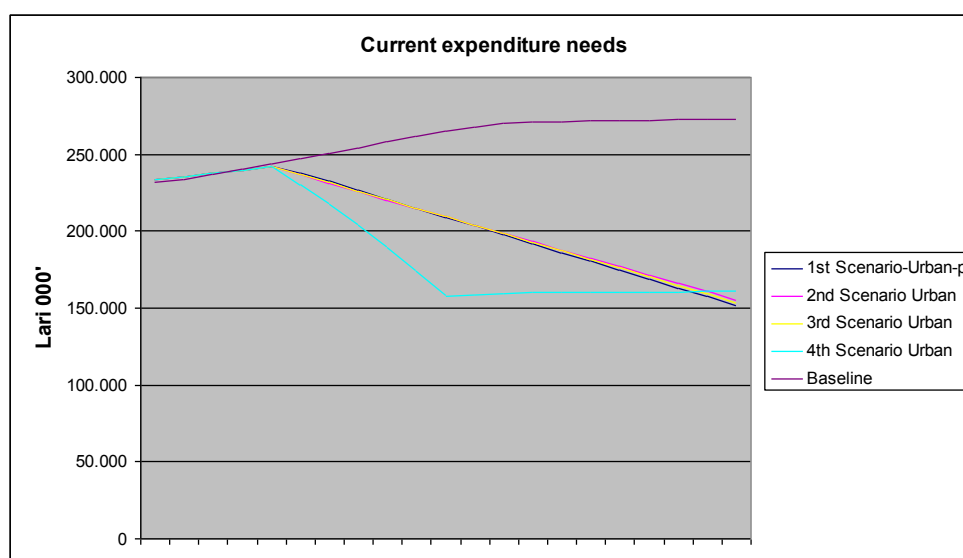


Figure 0-6 Capital expenditure needs for version of 21 years for all scenarios



With time period of 15 years – in this version investment needs for MDG are implemented over 6 years (2010-2015) and investment needs for all other scenarios are also implemented over 6 years

(2010-2015). The graph illustrating capital expenditure and current expenditure profiles for all scenarios in this version are shown below:

Figure 0-7 Capital expenditure needs for version of 15 years for all scenarios

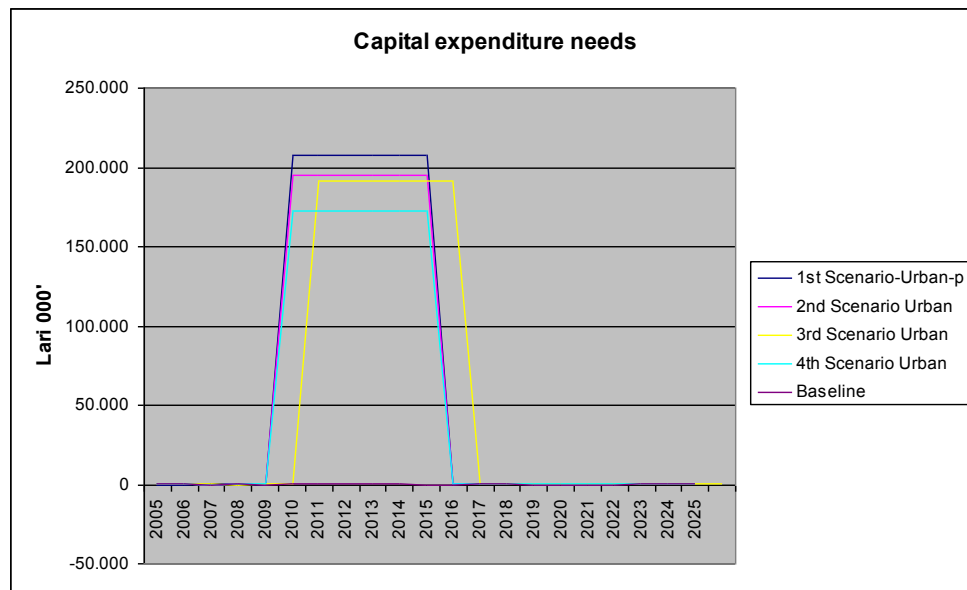
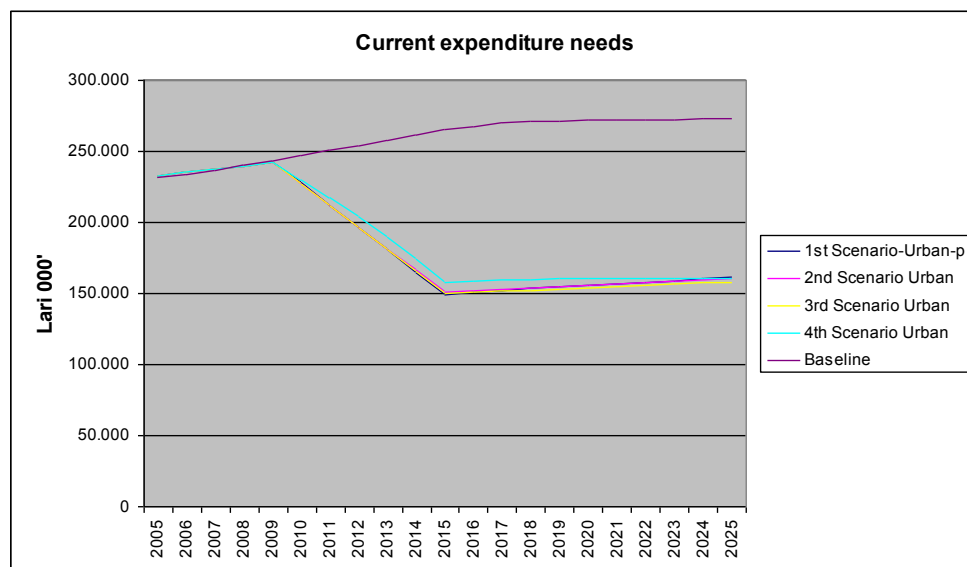


Figure 0-8 Current expenditure needs for version of 15 years for all scenarios



As it can be seen from graphs above, while MDG scenarios stands alone with respect to expenditure needs, the Scenarios 1, 2, and 3 represent rather similar expenditure profile. The difference between these scenarios 1, 2, and 3 are small, therefore, we can consider for the purposes of financing gap analysis only one of such scenarios. Therefore MDG scenario (Scenario 4) and Scenario 1, which is the most ambitious in terms of planned investments scope is considered further for financing gap assessment.

Financing gap for MDG scenario (Scenario 4)

Taking into consideration the supply of finance profile as shown in Figure 0-4 (that is with 3.5% of household income going for water and sanitation bill, collection rate increased to 95%, and systematic budget contributions in the amount of 0.2% of real GDP), and analysing the expenditure gap for both categories of current and capital expenditure the resulting gap assessment is as presented on the figure below.

Figure 0-9 Initial financing gap for MDG scenario

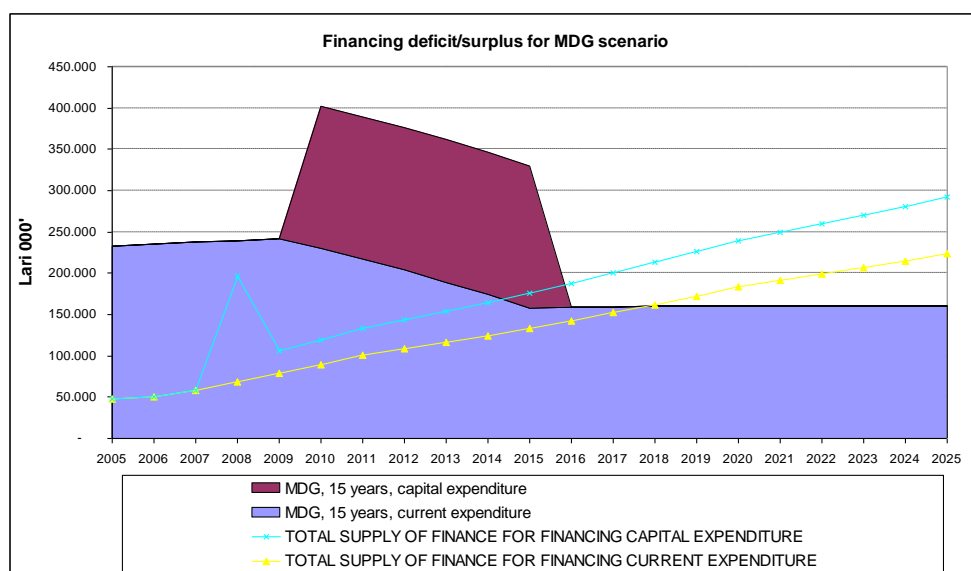


Table 0-11 Initial financing gap for MDG scenario

| | GEL 000' |
|---|-------------|
| MDG, 15 years, current expenditure | 3.962.203 |
| MDG, 15 years, capital expenditure | 1.032.943 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CURRENT EXPENDITURE | 2.823.716 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CAPITAL EXPENDITURE | 943.084 |
| CURRENT EXPENDITURE DEFICIT/SURPLUS | (1.138.486) |
| CAPITAL EXPENDITURE DEFICIT/SURPLUS | (89.858) |

It is apparent from the graph above that substantial financing gap exist. It is interesting to note, looking at the gap analysis table, that in terms of total cumulative amounts, main financing gap is for current expenditure needs. Supply of funds for capital investment almost matches MDG investment needs with a small cumulative gap of GEL 89 million. However, it needs to be remembered that this is a result of our assumption that 0.2% of GDP will be available as budget financing for water and sanitation sector, of which 70% for capital expenses. Small cumulative gap on capital expenditure needs can be misleading since exactly in the years when MDG investments need to be realised, substantial annual gap in capital investment exists. Net, cumulative financing deficit for MDG investment in the period 2008-2015 is about GEL 650 million. It seems that the only solution with respect to MDG goals in urban area is the combination of higher budget allocations in the same MDG investments period and additional IFI and grant sources for such investments.

If to assume that at least 50% of the capital expenditure deficit in 2010-2015, that is GEL 325 million, needs to be covered out of budget contributions, that implies that in those years public expenditure for water and sanitation need to reach level of 0.35% of annual GDP. It is not impossible,

especially given that number of CEE countries have spent more than that on the sector during accession process to EU.

The residual of GEL 325 million will have to be attracted in the form of IFI and donor financing. Here it needs to be reminded that in the profile of supply of finance above, IFI and donor funds were available only on the “known” basis, that is funds that has been either committed or allocated for specific projects. If to assume that similar level of funding will be retained, then potentially available IFI and donor funds will easily cover remaining deficit. This option of international borrowing becomes even more realistic if to remember that substantial surplus of funds for capital investment purposes will be available after 2015 from national budgets, and these future funds could be used to guarantee and repay the needed IFI loans.

Hence, in terms of meeting MDG goal related investment needs in urban areas, it appears that forecasted supply of finance will be sufficient to meet required expenditure needs. The key assumptions driving such conclusion are:

- Budget support of investment projects at the level of 0.35% of GDP in the period 2010-2015 when MDG related investments will be implemented, and it can later go down to level of 0.2% of GDP;
- Availability of international assistance funds in the form of loan and grants in the period of 2010-2015, in the cumulative amount of GEL 325 million or average annual of GEL 54 million (EUR 24 million).

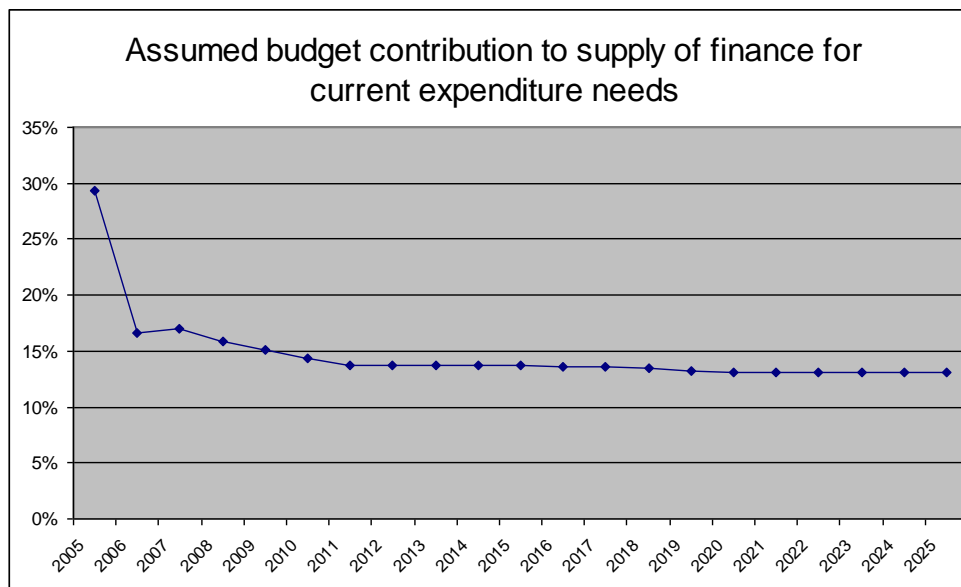
The situation is more difficult with current expenditure. Total cumulative deficit of current expenses is GEL 1.34 billion. As the figure above suggests, most of this deficit occurs in early years of forecasted period, when collection rate and tariff levels are still low.

If to assume that collection rates for all customers will increase to 95% much faster than 2011, that is starting from 2008, then the current expenditure deficit reduces only by GEL 22 million, leaving still a large deficit of GEL 1.12 billion cumulative.

If to further assume that the current expenses deficit will be covered via tariffs, that would imply that average household will have to pay 6.5% of income for water and sanitation services (presuming that tariffs for other customers will also increase one-to-one to household tariff increase).

The only alternative source for covering current expenditure needs are national and regional budget sources. Budget already contributes to current supply of finance approximately average of 13.4% over forecasted period (see Figure 4-10 below).

Figure 0-10 Budget contribution to current expenditure financing



Therefore, it will be quite unrealistic to assume any further increase in budget support in this respect, especially remembering that substantial budget support funds has been assumed for financing capital expenditure.

Hence, the main conclusions from MDG scenario analysis are:

- Meeting MDG related urban investment (as estimated based on 2005 needs) does not seem to be a major problem, provided that budget support will be along the lines of internationally benchmarked levels of budget allocations and average of EUR 24 million from external sources will be provided to Georgia.
- The key issue remains financing of current expenditure, where substantial cumulative deficit remains irrespective of assumed household bill increase to 3.5% of income, respective one-to-one increase in tariffs for other customers, collection increase for all customers to 95%. Total remaining cumulative gap after all these measures is at GEL 1.34 billion.
- The only tariff levels that support coverage of that deficit is the one that leads to water and sanitation bill at 6.5% of household income with corresponding increase of tariff and bill for other customers.
- Hence, no realistically applied measure is able to cover needed current expenditures. This implies that, without proper maintenance, existing infrastructure will deteriorate, and the actual capital expenditure needs for reaching MDG goals might increase substantially and become non-feasible.
- The only other alternative measure that can ensure reduction of existing current expenditure gap is further reduction in operating cost.

Financing gap for Scenario 1, over 15 years period

The Scenario 1 is the most ambitious from investment projects implementation point of view. In order to understand the scope of investment activities included in it, table below provides comparison of specific interventions for all scenarios.

Table 0-12 Scope of improvements for each modelled scenario

| Urban WSS | 1 | 2 | 3 | 4 |
|--|---|---|---|---|
| Increase coverage of centralized water and wastewater collection | x | x | | |
| Increase of coverage in order to meet MGD targets in WS and Sanitation | x | x | x | x |
| Rehabilitation and replacement of water and sewer network | x | x | x | x |
| Water loss reduction and reduction of demand | x | x | x | x |
| Rehabilitate and increase water and wastewater treatments | x | | | |
| Rehabilitate water and wastewater treatment plants | x | x | | |
| Rehabilitate water treatment plants | x | x | x | |
| Improve regularity of water and wastewater collection | x | x | | |
| Improve energy efficiency in WS and WW sectors | x | x | x | |

The level of ambition for Scenario 1 is apparent from table above. Therefore, we would expect that investment requirements will be higher than for any other scenario.

With respect to current expenditure needs (operation, maintenance, and re-investments), the resulting expected effect is hard to predict:

- on one side, large number of new facilities will require additional maintenance cost; and
- on the other side, comprehensive investment programme replacing most of the outdated assets should lead to considerable cost savings.

The results of Scenario 1 modelling and related financing gap analysis is presented below. It is important to keep in mind that investment projects for Scenario 1 consider here are implemented during 6 years period, 2010-2015. Scenario 1 with longer investment programme implementation period will be discussed later.

Figure 0-11 Initial financing gap for Scenario1, 15 years

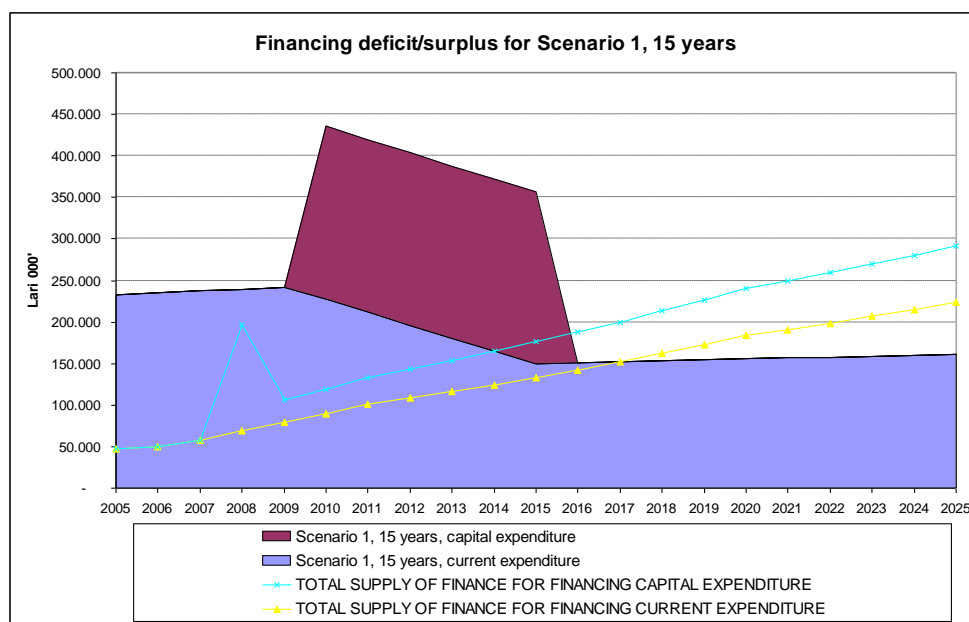


Table 0-13 Initial financing gap for Scenario1, 15 years

| | GEL 000' |
|---|-------------|
| Scenario 1, 15 years, current expenditure | 3.880.796 |
| Scenario 1, 15 years, capital expenditure | 1.245.734 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CURRENT EXPENDITURE | 2.823.716 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CAPITAL EXPENDITURE | 943.084 |
| CURRENT EXPENDITURE DEFICIT/SURPLUS | (1.057.080) |
| CAPITAL EXPENDITURE DEFICIT/SURPLUS | (302.650) |

It can be seen that investment requirements for Scenario 1 are 21% more than in MDG scenario and stands at the cumulative level of GEL 1.25 billion over 2010-2015. Therefore, all the argumentation related MDG scenario gap analyses are also applicable here:

- Financing gap with respect to capital expenditure is relatively is GEL 302 million on a cumulative basis over the entire forecasted period; substantial gap exists on annual basis in the period 2010-2015 (cumulative GEL 873 million over 6 years) or average of GEL 146 million each of that year;
- To close such gap additional funds will need to be identified in years 2010-2015 and they can come from two potential sources:
 - Increased budget contributions to capital projects in the amount of 0.4% of GDP over investment period – that would cover about GEL 400 million of existing deficit;
 - External financing in total amount of GEL 473 (EUR 206 million) million over 6 years, or GEL 79 million (EUR 34 million) annually;
- The only alternative to above two measures would be to spread investment implementation period to longer years, thus reducing average annual deficit of capital funds (this option of Scenario 1 with 15 years of implementation period and its implications will be discussed further below).

In terms of current expenditure, we can see that absolute cumulative deficit is smaller than in MDG scenario. Hence, the tradeoffs we mentioned above (new maintenance cost vis-à-vis cost savings) have been in favour of more cost savings. However, even in such case, substantial deficit remains in the total cumulative amount of GEL 1.06 billion over forecasted period.

To cover such expenditure gap, household tariffs need to increase to the level where water and sanitation bill accounts for 6% of average household income, which is unrealistic.

Other sources of potential additional finance are budget contribution. But, as we have seen earlier, increases from the current level of contribution of 13.5% to current expenses is also quite unrealistic.

Financing gap for Scenario 1, over 15 years period

The key reason for development of model for the same Scenario 1, but over 15 years period is to increase investment implementation period and, hence, to reduce absolute amount of annual investment related financing gap.

As we have seen in the analysis of Scenario 1 with 15 years implementation substantial gap in 2010-2015 exists, which is possible to cover only with combination of 0.4% of GDP contribution by budget and EUR 34 million annual contribution by IFIs and donors.

The figure and table below present Scenario 1 financing gap analysis with 15 years of implementation period. As it is expected that cumulative result in terms of capital expenditure needs remain almost the same as in Scenario with 15 years implementation period – cumulative financing gap with regards to capital expenditure needs is GEL 294 million.

However, the key difference is that such deficit is now spread over longer period of 16 years (2010-2025) and the average annual gap in that period is only GEL 28 million. This basically implies, vis-à-vis with conclusions of Scenario 1 with 15 years that:

- No additional increase in budget allocations over 0.2% of GDP is necessary;
- All the annual deficit can be covered via external sources (IFI and donors) provided availability of such funds will be at least at the level of 50% of current availability; and
- It is important to remember that borrowing over 16 years period to finance investments will also imply additional repayment costs beyond year 2025.

As we can see, spreading investments for ambitious Scenario 1 makes it more feasible over longer period of time. All in all, it looks like with sufficient attention to the sector, allocating sufficient investment funds should not be a major issue.

Figure 0-12 Initial financing gap for Scenario 1, 15 years implementation period

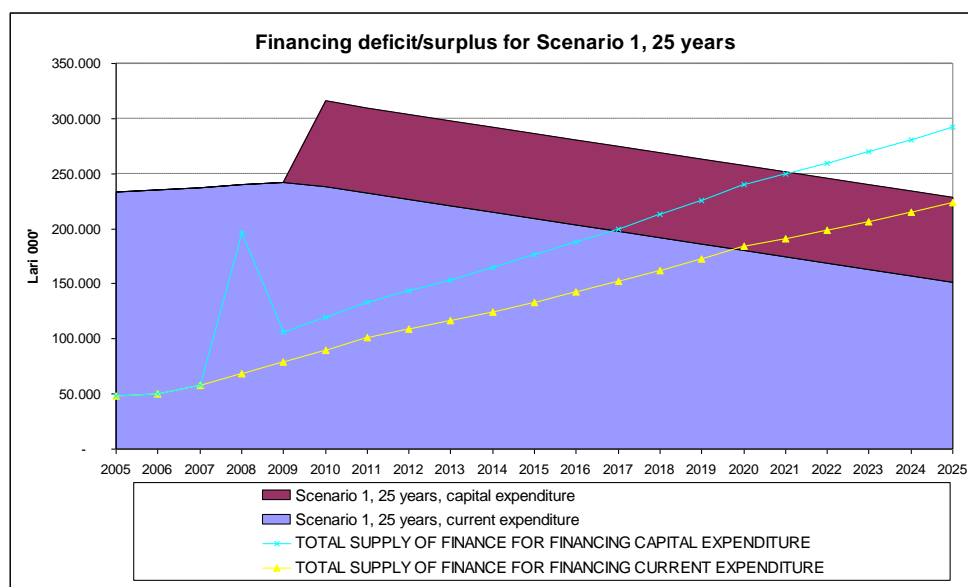


Table 0-14 Initial financing gap for Scenario 1, 15 years

| | GEL 000' |
|---|-------------|
| Scenario 1, 15 years, current expenditure | 4.304.055 |
| Scenario 1, 15 years, capital expenditure | 1.236.806 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CURRENT EXPENDITURE | 2.823.716 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CAPITAL EXPENDITURE | 943.084 |
| CURRENT EXPENDITURE DEFICIT/SURPLUS | (1.480.338) |
| CAPITAL EXPENDITURE DEFICIT/SURPLUS | (293.722) |

The key problem, as in the previous scenarios as will, will be financing of current expenses. We can see from table above that amount of financing deficit for this category of expense have even increased compared to Scenario 1, 15 years. The reason is that since investment programme takes longer to implement, more maintenance is required to sustain existing old assets. Total cumulative gap for this case is GEL 1.5 billion and, as we have seen in the discussions of previous scenarios, covering such gap via tariffs or additional budget sources does not seem to be feasible.

Supply of Finance Profile for Development Scenarios in Rural Areas

Baseline supply of finance

The analysis of baseline scenario supply of finance in rural areas has shown that in Georgia structure of rural financing for water sector is similar to urban in terms of sources. User charges, budget contributions and external IFI and donor financing constitute almost all funds availability. Private sector, community funds, local banking, or capital market related contributions are very limited and almost non-existent.

The average payment in rural areas for water and sanitation services (primarily water services) was shown to be at 3 GEL/capita/year. Similarly, the estimated budget expenditure was at 2.5 GEL/capita/year and investment expenditure stand at 26 GEL/capita/year. This information has been used in Baseline scenario to upscale the sample data for the entire Georgia rural population using the above per capita derived funding from different sources:

- GEL 6.2 million annually from entire rural population as user charges; and
- GEL 5.0 million annually from budget sources of all levels as sector subsidy.

In terms of investment projects in rural areas, it has been shown to be primarily implemented by MDF, with some exception. Large number of investment projects has been implemented by MDF with total value of about GEL 40 million over the last 4-5 years. Hence, based on this information the assumption for the baseline scenario supply of investment funds for rural area has been set at:

- Average of GEL 9 million in investment expenditure for the entire rural water and sanitation infrastructure over the three years when the investments were known to have taken place 2005-2007; and
- Or, average of GEL 3 million in investments in rural area annually;

It is important to note that substantial part of budget subsidies to rural water supply shown above are also implemented via MDF. Hence the 3 million GEL shown as MDF financing is only reflecting funds from external sources.

Table below provides summary of funds availability for the baseline scenario in rural areas. Table 4-15 Supply of finance in rural areas, baseline scenario

| | GEL 000' |
|-----------------------------|----------|
| Payment from user | 6,200 |
| Budget subsidies | 5,000 |
| Other sources - IFI, grants | 3,000 |

Source: Data collected and COWI's assessments.

User charges represented estimated funds availability from customers in base year 2005. It was further assumed in the baseline that these funds will increase in line with tariff increase to the level of 1% of household income.

Budget sources represented estimated funding from national and local budgets in 2005 and were kept at the same for the entire forecasted period in Baseline.

Funds availability from other sources was assumed to be on a factual basis that is no assumption regarding further availability of such funds in the future was made.

Supply of finance assumptions for rural area

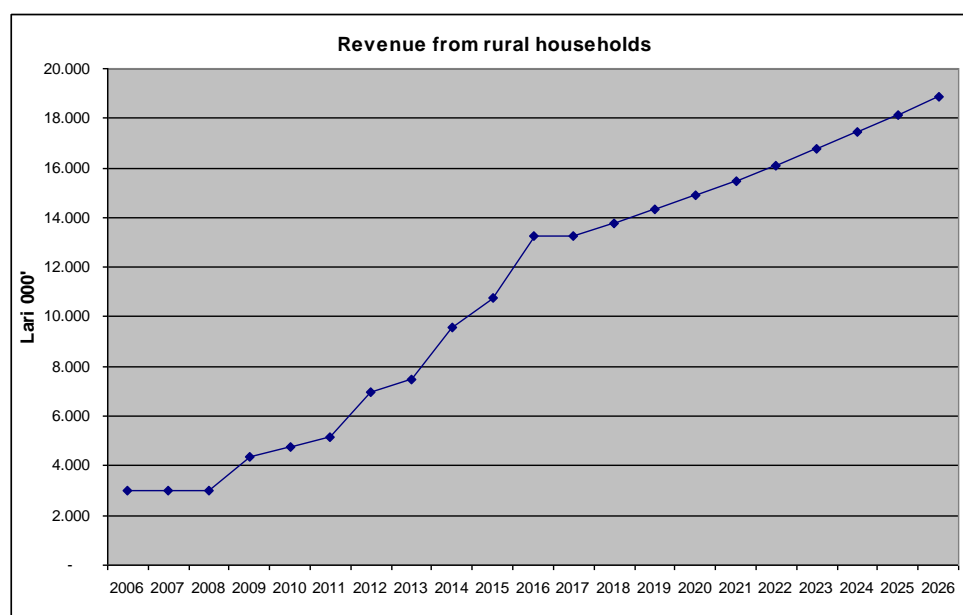
As reviewed in the section above user charges for baseline scenario has been fixed at the level of **GEL 3** per capita per year. Coverage of rural population by water and sanitation services was at 91%, although not all sources of water supply and wastewater removal could be considered adequate.

Furthermore, as the survey of households on the basis of limited sample have show, payment mechanism did not exist in all the rural settlements, and only 50% of population pays for services.

In development scenarios, numbers of additional assumptions are made:

- Both in MDG and Scenario 2, substantial improvement of existing technologies will take place, which would lead to better quality services;
- As a result we assume that population would be willing to pay more and payment discipline would also increase;
- For modelling purposes we assumed that payment collection would increase to 95% of covered population and annual fixed payment would reach GEL 7 per capita per year (for comparison purposes the payment in urban areas in 2015 will reach almost GEL 50 per capita per year); and
- The resulting dynamics of payment from rural households is shown on the graph below.

Figure 4-13 Revenue from rural households in development scenarios



Budget expenditure for rural water supply in baseline scenario were at GEL 5 million annually. It constitutes 0.04% of GDP. For the development scenarios we will assume that budget expenditure will increase only slightly to 0.05% of GDP and it will also increase with the real GDP growth.

Finally, the existing levels of investment funds of GEL 3 million annually will kept at the same level, and he needed increase will be analysed on the basis of identified financing gap.

Rural development scenarios and financing gap

Similar to urban, two versions of development scenarios has been estimated for rural areas:

- With time period of 21 years – in this version investment needs for MDG are implemented over 6 years (2010-2015), while investment needs for all other scenarios are implemented over 16 years (2010-2025). The graph illustrating capital expenditure and current expenditure profiles for all scenarios in this version are shown below; and
- With time period of 15 years – in this version investment needs for MDG are implemented over 6 years (2010-2015) and investment needs for all other scenarios are also implemented over 6 years (2010-2015). The graph illustrating capital expenditure and current expenditure profiles for all scenarios in this version are shown below.

As in the case of urban we will use only the MDG scenario and the most ambitious scenario (in case of rural Scenario 2) for assessment of financing gap.

Graph and table below present financing gap for MDG scenario.

Figure 4-14 Financing gap for MDG scenario, rural

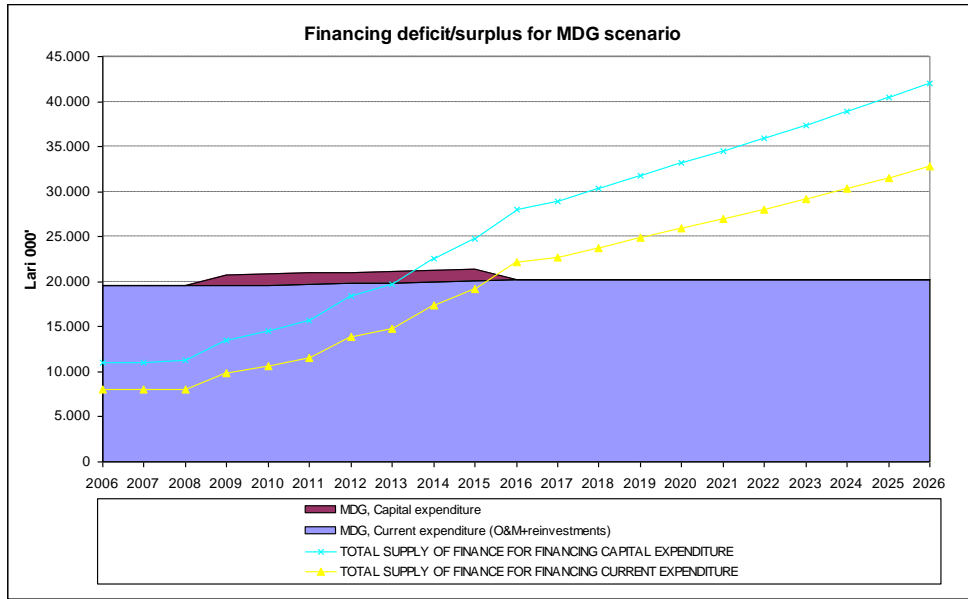


Table 4-16 Financing gap for MDG scenario, rural

| | GEL 000' |
|---|----------|
| MDG, Current expenditure (O&M+reinvestments) | 419.274 |
| MDG, Capital expenditure | 8.815 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CURRENT EXPENDITURE | 419.542 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CAPITAL EXPENDITURE | 124.339 |
| Current expenditure deficit/surplus | 268 |
| Capital expenditure deficit/surplus | 115.524 |

It is apparent that in MDG scenario, there is no financing gap. Investment needs are small, since most of the existing water sources and sanitation is adequate. And supply of finance from households and budget subsidies for operating expenses covers all necessary current expenditure needs.

Figure and table below show the situation with financing gap for Scenario 2, 15 years. In this scenario substantial financing gap, both in terms of current and capital expenditure exists. Total cumulative gap with respect to current expenditure is GEL 315 million or GEL 12.5 million on average annual basis. Total cumulative gap with respect to capital expenditure is GEL 289 million or GEL 11.5 million on average annual basis.

Compared to forecasted level of average annual supply of finance for current expenditure needs of GEL 16 million, additional GEL 12.5 million would be difficult to allocate, since it would mean substantial increase in user charges and budget financing.

Figure 4-15 Financing Gap for Scenario 2, rural

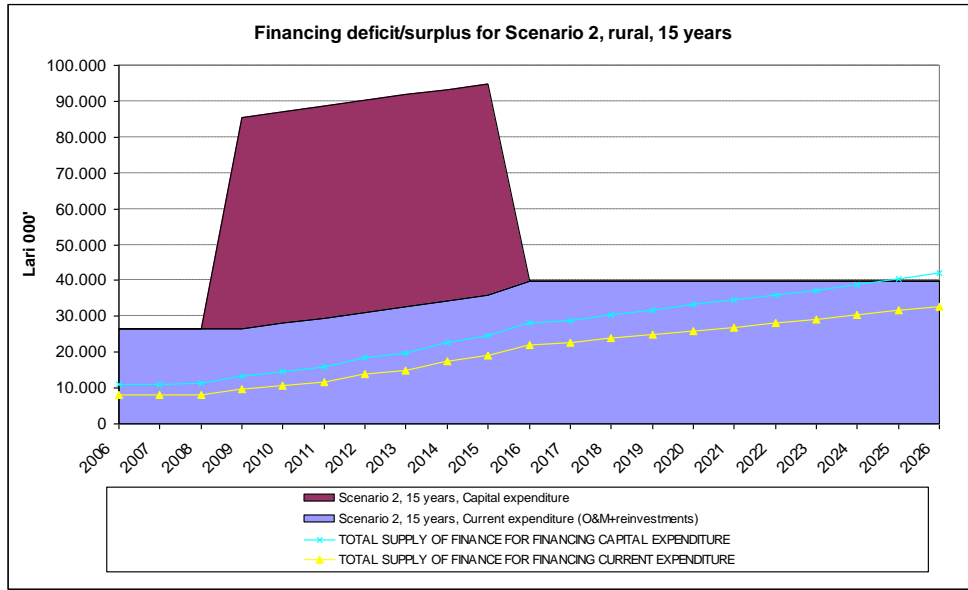


Table 4-17 Financing Gap for Scenario 2, rural

| | GEL 000' |
|---|----------|
| Scenario 2, 15 years, Current expenditure (O&M+reinvestments) | 734.549 |
| Scenario 2, 15 years, Capital expenditure | 413.712 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CURRENT EXPENDITURE | 419.542 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CAPITAL EXPENDITURE | 124.339 |
| Current expenditure deficit/surplus | -315.007 |
| Capital expenditure deficit/surplus | -289.373 |

Figure and table below show the situation with financing gap for Scenario 2, 15 years implementation period. The main reason for running the option of 15 years, as in urban areas, was to spread investment needs over longer period of time, thus reducing absolute capital investment need on an annual basis. However, even in such case, we can see that substantial financing gap, both in terms of current and capital expenditure remains. Total cumulative gap with respect to current expenditure is GEL 231 million or GEL 9.5 million on average annual basis. Total cumulative gap with respect to capital expenditure is GEL 317 million or GEL 13 million on average annual basis.

Figure 4-16 Financing Gap for Scenario 2, rural, 15 years implementation period

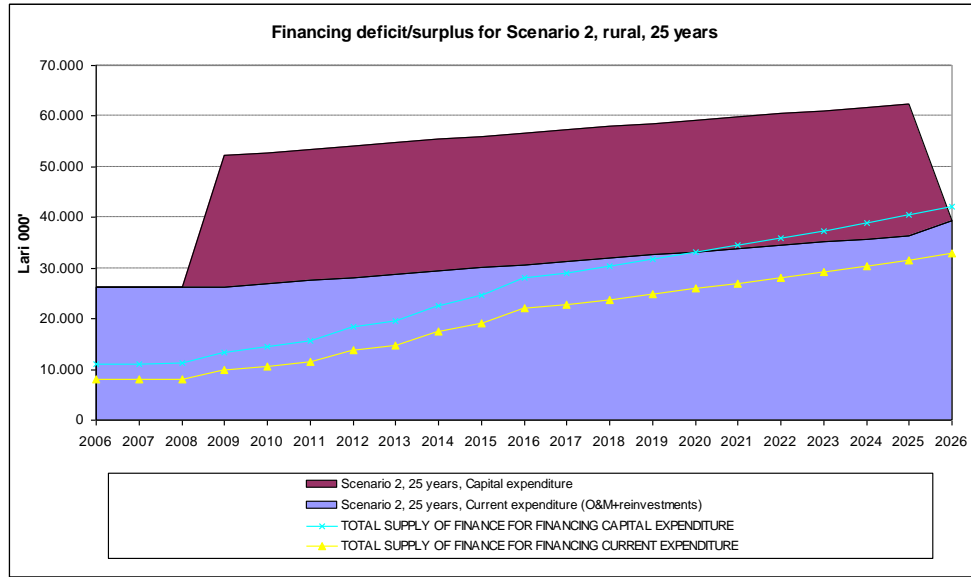


Table 4-18 Financing Gap for Scenario 2, rural, 25 years

| | GEL 000' |
|---|----------|
| Scenario 2, 25 years, Current expenditure (O&M+reinvestments) | 650.925 |
| Scenario 2, 25 years, Capital expenditure | 441.319 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CURRENT EXPENDITURE | 419.542 |
| TOTAL SUPPLY OF FINANCE FOR FINANCING CAPITAL EXPENDITURE | 124.339 |
| Current expenditure deficit/surplus | -231.383 |
| Capital expenditure deficit/surplus | -316.980 |

STRATEGIC PLANNING AND BUDGETARY FINANCING OF WSS SECTOR IN GEORGIA

Good Starting Point

BDD In the wake of the Rose Revolution in 2003 the whole public budgeting process - especially, at the national level - has been considerably improved in Georgia. Many years of practice of operating without a "master plan", without strategic planning, was reversed in 2006 with the adoption of the Basic Data and Directions (BDD) document. It provides the medium-term strategy and priorities of action of the Government of Georgia in the period 2007-2010.

MTEF The BDD introduced strategic planning (or medium-term planning) in the public budgeting process in order to increase efficiency and transparency and provide for a more coherent and result-oriented public budgeting process. The strategic planning applied is based upon the Medium-Term Expenditure Framework (MTEF). In fact, the MTEF constitutes an important part of the BDD and the BDD process. This process has not yet taken its final shape. However, it stipulates that ministries, including the Ministry of Economic Development, formulate their medium-term priorities on an annual basis so that these may be incorporated into the annual budgeting process.

The BDD provides a form to be filled in by individual ministries and submitted to the Ministry of Finance. The ministries are to provide not only their priorities and amount of funds requested but also needs assessments and justifications for their priorities and proposed actions, information about expected results and indicators for monitoring success and effectiveness. But virtually all ministries have been having difficulties in providing the requested input. They need to build capacity in order to contribute to and make use of the BDD process.

Fundament

Nevertheless, the fact that the MTEF has been introduced in Georgia implies that there is a fundament to build upon when comes to the translation of FS 2008 into implementation - not least, because funding out of the national budget is foreseen to play a major role with regard to FS 2008 financing.

Integration of FS 2008 into the MTEF

2010 The FS 2008 should be integrated into the MTEF as soon as it has been approved by the Government of Georgia, including the Ministry of Economic Development, in order to secure budgetary financing of the WSS sector in Georgia in the short to medium term. That is, it should be fully integrated into the MTEF beginning 2010.

Steps The steps to be taken by the key stakeholders in Georgia, foremost the Ministry of Economic Development, include, at least, the following:

- The Ministry of Economic Development should - in close cooperation with the Ministry of Finance - finalise the FS 2008. That is, firm agreements regarding the following issues should be made:
 - Preferred development scenario. The development scenario to aim at should be chosen.

- Supply of finance. The supply of finance profile should be agreed upon. Most important is the need to lay down exactly the envisaged budgetary financing (as per cent of GDP), level of tariffs and collection rates. The possibility of increasing budgetary financing for the WSS sector up to 0.35% of GDP should be seriously considered.
- Consequently, the Ministry of Economic Development should disseminate the FS 2008 and agreements made to stakeholders throughout Georgia.
- Performance indicators aimed at monitoring the FS 2008 should be prepared by the Ministry of Development and agreed upon with other stakeholders. These should be prepared with a view to the BDD process and also the Poverty Reduction Strategy Paper (PRSP) of Georgia (for an outline of such a system of performance indicators, please refer to Chapter 6). When the performance indicators are in place a monitoring, evaluation and reporting system should be developed and implemented.
- A detailed implementation plan should be prepared by the Ministry of Development and agreed upon with other stakeholders. Areas of actions included in this may subsequently be further developed. No doubt, one area of actions that will need to be further developed is the investment programme; FS 2008 only provides overall guidance for this programme. Most important is that the implementation plan provides all stakeholders - both national and international - with a solid overview of all areas of actions (for a very first draft implementation plan, please refer to Chapter 7).
- A specially designed task force consisting of experts from, among others, the Ministry of Economic Development and Ministry of Finance should be formed with the purpose of directing, supporting and monitoring the whole process of integrating the F 2008 into the MTEF. It may launch separate capacity building activities, development projects or seminars. Furthermore, it may propose changes in national legislation and working procedures within the Ministry of Economic Development and Ministry of Finance regarding budget and capital investment planning in the WSS sector.

BDD process It is worth emphasising that the integration of FS 2008 into the MTEF will contribute to the further development of the BDD process in Georgia, thereby providing substantial assistance to the Ministry of Finance in its efforts to improve the public budgeting process and overcoming current problems.

INDICATORS FOR MONITORING THE IMPLEMENTATION OF THE FS AND THE DEVELOPMENT IN THE WATER SECTOR

Level of Monitoring

There are two level of monitoring of the water sector:

- at national level monitoring the implementation of the FS and related sector interventions for both urban and rural areas; and
- at utility level monitoring the performance of the water utilities.

The nature of these different systems is very different, requiring completely different sets of indicators. At national level the performance system needs to be established by an appropriate regional or national body to arrive at a complete picture of the sector. At utility level the present reporting system to IBNET can be used. The indicators should be specific and well defined, measurable and relevant for monitoring purposes.

National Level

At national level PIs should be utilised for monitoring the overall progress of targets for agreed action plans for the implementation of a financing strategy and reporting the status of the MDG, benchmarking at regional level and also against other countries.

The national benchmarking should at least consist of indicators for:

- Status for implementation of WSS sector plans;
- Water sector investment allocation and actual spending;
- MDG indicators for fulfilling MDG for improved water supply and sanitation - coverage data; and
- Water sector benchmarking covering urban (selected PIs from the IBNET data) and rural water and sanitation.

Utility Level

At utility level the different urban utilities are already benchmarked in the corporation with IBNET⁶.

⁶ IBNET, the International Benchmarking Network for Water and Sanitation Utilities, was started to link performance information from utilities around the world and to provide support to new and existing benchmarking schemes. The initiative was started by the World Bank in the late 1990s when it developed a suite of software tools and guidance documents to help utilities compile and share performance information. IBNET facilitates the sharing of cost and performance information between

Performance indicators for utilities are required to monitor and assess the status of the infrastructure, operating efficiency and financial performance of utilities; and they should also help to assess the degree to which operating and financial targets are being met.

For the indicators to be effective and useful, they should be well defined based on data that can be collected with a reasonable reliability, and expressed as percentages or as a unit value (metric benchmarking), so that performance can be directly compared with other utilities and to establish and revise sector targets. A number of these indicators have been developed by WB and IWA and are used in the IBNET benchmarking of the Georgian urban water sector. For more detailed description of the PIs at utility level reference is made to WB, IBNET and IWA. In Table 0-1 is shown some important main indicators for Georgia - Country Profile.

Table 0-1 IBNET Country Profile for Georgia

| Indicator | 2001 | 2002 | 2003 | 2004 | 2005 |
|--|--------|--------|--------|--------|--------|
| 1.1 Water Coverage (%) | 76.5 | 84.4 | 86.6 | 86.5 | 86.9 |
| 2.1 Sewerage Coverage (%) | 58.3 | 65.8 | 68.5 | 67.0 | 67.7 |
| 4.1 Total Water Consumption (l/person/day) | 600.9 | 565.8 | 569.8 | 604.7 | 560.5 |
| 4.7 Residential Consumption (l/person/day) | 540.4 | 508.3 | 513.8 | 538.7 | 498.9 |
| 6.1 Non Revenue Water (%) | 42.6 | 42.7 | 42.5 | 43.6 | 44.0 |
| 6.2 Non Revenue Water (m3/km/day) | 121.18 | 123.73 | 122.88 | 113.32 | 109.67 |
| 8.1 % Sold that is Metered (%) | 5.7 | 7.5 | 8.4 | 9.3 | 10.1 |
| 11.1 Operational Cost W&WW (US\$/m3 water sold) | 0.058 | 0.066 | 0.077 | 0.084 | 0.097 |
| 12.3 Staff W/1000 W pop served (W/1000 W pop served) | 2.51 | 2.49 | 2.33 | 2.70 | 2.41 |
| 18.1 Average Revenue W&WW (US\$/m3 water sold) | 0.040 | 0.044 | 0.057 | 0.072 | 0.084 |
| 23.1 Collection Period (Days) | 935.0 | 816.4 | 779.3 | 872.0 | 914.5 |
| 23.2 Collection Ratio (%) | 54.9 | 60.3 | 52.1 | 63.0 | 65.4 |
| 24.1 Operating Cost Coverage (ratio) | 0.703 | 0.699 | 0.765 | 0.870 | 0.890 |

Source: IBNET (<http://www.ib-net.org/IBNetProduction/CountrySearch.aspx>)

A large number of reports for Georgia can be generated from the IBNET database benchmarking water utilities utilising a large number of performance indicators. In Table 0-2 is illustrated one indicator for Georgia stored in the IBNET database.

utilities and between countries by creating a network of linked websites, through global partnership efforts. The development of IBNET is now supported by the DfID and the World Bank (www.ib-net.org)

Table 0-2 Indicator 6.2 Non Revenue Water (m3/km/day)

| City | Utility | 2005 |
|----------------|---|------------|
| Abasha | Abasha water and wastewater | |
| Batumi | Batumi water and wastewater | 164 |
| Borjomi | Borjomi water and wastewater | 48 |
| Gori | Gori water and wastewater | 50 |
| Gurdzhaani | Gurdzhaani water and wastewater | 12 |
| Kaspi | Kaspi Water and Wastewater | 11 |
| Khashuri | Khashuri wastewater | |
| Khashuri | Khashuri water | 33 |
| Kobuleti | Kobuleti water and wastewater | 18 |
| Kutaisi | Kutaisi Water and Wastewater | 138 |
| Kvareli | Kvareli water and wastewater | 12 |
| Marneuli | Loal communal company Marneuli water and wastewater | 28 |
| Oni | Oni water and wastewater | 6 |
| Ozurgheti | Ozurgheti water and wastewater | 5 |
| Poti | Poti water and wastewater | 20 |
| Rustavi | Rustavi wastewater | |
| Rustavi | Rustavi water | 17 |
| Samtrediya | Samtredia wastewater | |
| Samtrediya | Samtredia water | 32 |
| Senaki | Senaki water | 6 |
| Tbilisi | Tbilisi water and wastewater | 159 |
| Telavi | Telavi water and wastewater | 36 |
| Terzhola | Terzhola water and wastewater | 1 |
| Tkibuli | Tkibuli water and wastewater | 5 |
| Tskhaltubo | Tskhaltubo Water and Wastewater | 4 |
| Zestafoni | Zestafoni water and wastewater | 3 |
| Zugdidi | Zugdidi water and wastewater | 20 |
| Average | | 109 |

Source: IBNET data for Georgia.

Monitoring at National Level

To monitor the progress of the implementation of an agreed financing strategy and related agreed sector interventions, a set of indicators is recommended to be established at national level. Below is outlined example of recommendable indicators supporting different reporting purposes with the overall objectives to monitor the implementation of national interventions for improving the water sector.

To monitor and report a decentralised task group should be established under a "National Performance Measurement Framework" (NPMF), who will work closely together with governmental organisations involved in data collection and processing of water related data incl. data sent to IBNET.

The indicators should be designed with some flexibility to accommodate changes during implementation. Indicators are often multidimensional, and involve financial and physical

components that evolve over time attempting to measure the results of policy and managerial actions to improve performance of sector institutions.

Status for implementation of sector plans

To initiate water sector improvements at national level a number of strategies need to be prepared and approved and implemented. In Table 0-3 is shown some key sector reports required for initiation of sector improvements. The mentioned Water Sector Strategy and Action plan is envisaged to include assessment of investment policies and potential financing mechanism to support the sector improvements. The mentioned plans should of course be linked to other national plans like IWRM plans etc.

Table 0-3 Selected Indicators for Sector Plans Preparation and implementation

| Indicator | Unit of PI | Purpose | Target |
|---|-----------------------------|--|---|
| FS approved | Y/N Date | To start sector interventions | Approved date xxx Implementation start date xx Finalisation date xx |
| Water Sector Strategy and Action Plan prepared | Y/N Date | To establish a detailed targeted strategy for the waters sector, and to initiate "fast track" sector improvements. | Approved year xxx Implementation start date xx Finalisation date xx |
| Programme for monitoring of sector implementation prepared (NPMF) | Y/N Date | To establish the tool for monitor and reporting sector progress. | Approved year xxx Implementation start date xx Finalisation date xx |
| Fast-track mechanism | Y/N Type Date | The significantly accelerate the implementation of the national water sector improvements | Date of approval Implementation start date xx Finalisation date xx |
| Annual sector performance review report | Y/N Date | To monitor and publication of the progress in water sector improvements | Annual publication |

Source: Consultant

Water sector investment allocation

One of most important part to monitor is the funding of the sector improvements from all sources, and that the allocation is in accordance with the plans and that the intended impacts are achieved. In Table 0-4 is shown some key sector reports required for monitoring sector investment allocations.

Table 0-4 Selected Indicators for monitoring Water Sector Investment Allocation

| Indicator | Unit of PI | Purpose | Target |
|---|--|------------|---------------|
| Public spending in water sector, urban | % of total public spending in all economic sectors | Monitoring | xx % per year |
| Public spending in water sector, urban | % of total spending in urban water sector | Monitoring | xx % per year |
| Public spending in water sector, rural | % of total spending in rural water sector | Monitoring | xx % per year |
| Public spending in water sector, urban water supply | % of total spending in urban water supply | Monitoring | xx % per year |
| Public spending in water sector, rural sanitation | % of total spending in rural sanitation | Monitoring | xx % per year |

Source: Consultant

MDG indicators for fulfilling MDG for improved water supply and sanitation

There are two main indicators for fulfilling the MDG - the coverage of population with access to improved water and coverage to sanitation. These two indicators are first level indicators, and are based on the second level indicators covering the number of urban and rural population with access to safe water supply⁷ and basic sanitation, divided into the different technologies defined in MDG as improved water supply and sanitation. The second data level is based upon detailed data collection on regional basis for summarising the country status for achieving the MDG goal. In Table 0-5 is shown some key sector reports required for monitoring MDG status.

⁷ Definition of safe water supply should be well defined.

Table 0-5 MDG First level Indicators

| Indicator- Water Supply | Unit of PI | Purpose | Target |
|--|-------------------|---|---------------|
| Total population | Number | Used as basis for calculation | - |
| Total Urban population | Number | Used as basis for calculation | - |
| Total Rural population | Number | Used as basis for calculation | - |
| Urban WS coverage with improved WS | % | To report MDG status - coverage is based on detailed data collection. | XX % |
| Rural WS coverage with improved WS | % | To report MDG status - coverage is based on detailed data collection. | XX % |
| Total urban pop. covered by piped WS | % | Coverage is based on detailed data collection. | - |
| Total urban household connection to WS | % | Coverage is based on detailed data collection. | - |
| Total rural household connection to WS | % | Coverage is based on detailed data collection. | - |
| Indicator - Sanitation | Unit of PI | Purpose | Target |
| Urban sanitation coverage with improved WS | % | To report MDG status - coverage is based on detailed data collection. | XX % |
| Rural sanitation coverage with improved WS | % | To report MDG status - coverage is based on detailed data collection. | XX % |
| Total urban pop. covered by piped sanitation system | % | Coverage is based on detailed data collection. | - |
| Total urban household connection to piped sanitation | % | Coverage is based on detailed data collection. | - |
| Total rural household connection to piped sanitation | % | Coverage is based on detailed data collection. | - |

Source: Consultant

Water sector benchmarking

At national level selected key PIs is recommended to be established based upon the data collected at national, regional and utility level. Such data should not be detailed as the data as at utility level, but give an overview of the status and development of the sector. In Table 0-6 is illustrated a few PIs for monitoring and benchmarking purposes.

Table 0-6 Water Sector Benchmarking

| Indicator, Economic and Financial | Unit of PI | Purpose | Target |
|---|--|---|-----------------------------------|
| Average investment cost per beneficiary in water sector | GEL/cap./year | Monitoring at beneficiary level | xxx Gel/cap./year |
| Household expenditure for water services | % of household income | Monitoring affordability | - |
| Indicator, Technical | Unit of PI | Purpose | Target |
| Average urban water consumption | lcd/cap | Monitoring demand management and efficiency in resource utilisation | xxx lcd/cap |
| Total urban water production | m ³ /year | Monitoring demand management and efficiency in resource utilisation | - |
| Indicator, Organisational and institutional | Unit of PI | Purpose | Target |
| Number of staff in urban water sector | Number of staff /m ³ consumed | Monitoring and efficiency in water management | xx staff/ m ³ consumed |
| Number of private operated water utilities | % population served by private operators | Monitoring change in ownership and management of urban utilities | - |

Source: Consultant

IMPLEMENTATION STRATEGY

Introduction

In the Interim Report (attached in Appendix 1) is mentioned some main core problems and related challenges in the water sector based on a very draft problem analysis of the water sector in Georgia and based upon the consultants experience with strategic planning of water sectors in EECCE countries.

The main future challenges are:

- *Reinstating the operational safety of the water systems due to inferior and deteriorating service delivery in terms of reliability, constancy of drinking water, quality, and safety of water services to the Georgian population - primarily in urban areas; and*
- *Establishing of reliable overview of the situation in rural areas, especially in terms of access to safe water supply and basic sanitation.*

The inferior service delivery has significant social, environmental and economic impacts. Consumers suffer a major welfare loss in not having ready access to safe water and wastewater services. The population is also suffering from health impacts as outbreaks of water related epidemics have been seen recently. Problems of environmental pollution are worsening and non-compliance with current environmental standards.

The problem complex can be divided into a set of *external factors* which impact negatively on the technical, financial and capacity situation at the *service provider level* to provide good quality water services, such as (not in a prioritised order):

- Institutional/Policy reform;
- Social constraints/affordability, and not least; and
- Reliable data/information of the water sector especially the rural population (for the urban the Association of WSS utilities are taking positive step to improve the information gap).

And *external factors* as service providers:

- Technical condition of the facilities;
- Low capacity/performance of the operation; and
- Insufficient financial capability.

NWSS&AP

A financial strategy will not solve all of the above obstacles and challenges alone - the FS will outline the financial gap based on different scenarios, but it will not give specific interventions on how to prioritise the scarce financial resources in order to achieve the planned target within the planned period. To determine the "what next to do" a *National Water Sector Strategy and Action Plan* (NWSS&AP) is therefore highly required to support the financing strategy. Part of the NWSSAP is an

assessment of investment policies and potential financing mechanism to support the sector improvements.

The NWSSAP will propose a prioritised action plan including requirements in institutional changes which will support the long-term improvements in the water sector.

Objective of National Water Sector Strategy

The overall development objective for the National Water Sector Strategy and Action Plan (NWSS&AP) can be:

- Improved hygiene, health and living conditions of the population of Georgia and improved environmental conditions achieved through more cost effective and sustainable water sector service improvements and service provision.

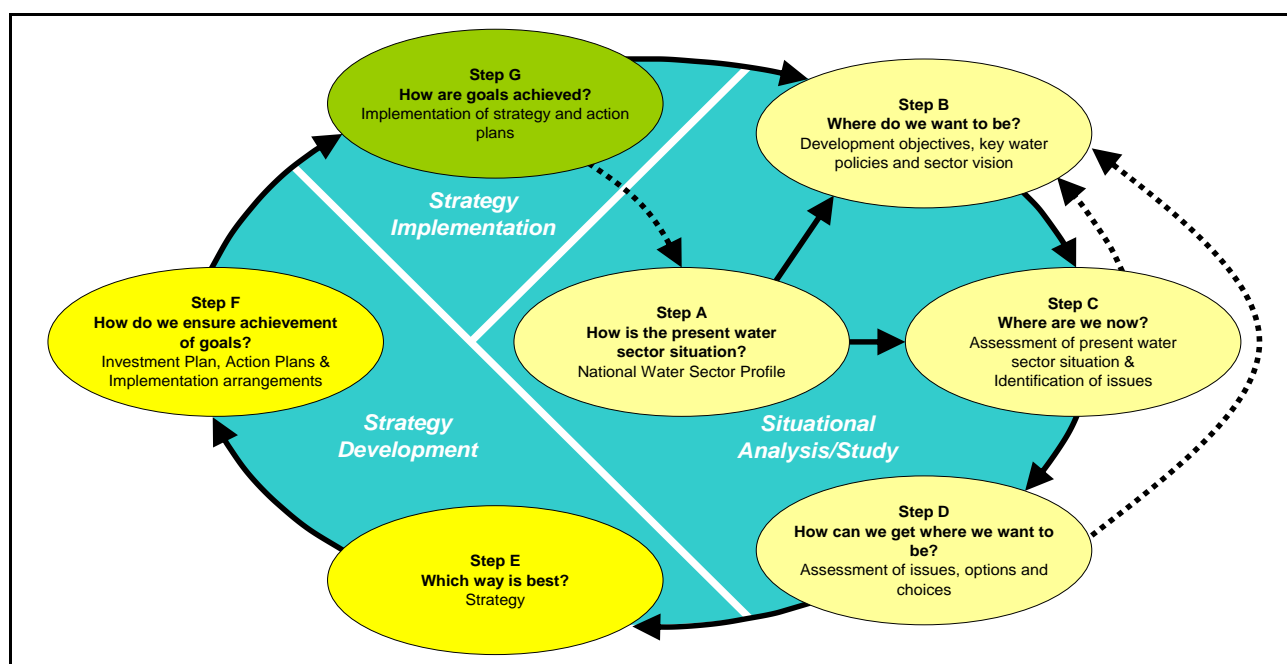
The immediate objectives for the project are:

- To support Georgian Government in development of a national strategy and action plan;
- To strengthen Georgian Government to provide advice on utility institutional models; and
- To support Georgian Government in identifying prioritised framework and action plan for sector investments; and
- To support Georgian Government in identifying a national performance monitoring framework.

Strategic Process

The process of developing a National Water Sector Strategy and Action Plan is underway through different initiatives. A possible strategic process is visualised in Figure 0-1.

Figure 0-1 The National Water Sector Strategy and Action Plan - Strategic Process



Source: COWI

The process is divided into a first set of activities that focus on understanding basic development goals and the challenges and opportunities facing the sector in achieving its goals. The second set of activities represents the actual development of the strategy for overcoming the challenges to achieve the goals, and finally the third set comprises the actual implementation of the strategy.

Step A Lack of a comprehensive overview of the water sector especially in rural areas necessitated an update of factual data on the current water supply and wastewater situation summarising the current situation with respect to a broad range of policy, institutional, legal, technical, financial and management issues.

Step B Definition and agreement of development goals, programmes and policies for the sector need to be established, and will provide inputs to **Step C**. A *sector vision* of the desired future situation in the water and wastewater sector is essential for a focused, coherent, and consistent development of the sector. The formulation of the sector vision, therefore, should begin early in the strategy formulation process in order to guide the identification of strategic areas and actions.

Step C Utilising the factual data collected in the Step A, an analysis of the problems and challenges currently facing the sector and outline key issues/problem areas to be dealt with. The purpose is to gain an understanding of where the sector is today in terms of the nature and extent of the problems it is facing. The thinking is that only by understanding the nature of the problems today are we able to identify realistic options to overcome them and achieve the goals of the future. Therefore, a key output of Step C is the problem analysis and a problem tree. A number of problem areas are identified and delineated.

Step D is the analysis of a number of issues, options and choices to address the problem areas identified in Step C and link them to the output from **Step B**.

Step E The assessment of issues and options in **Step D** forms a basis for deciding in **Step E** on the strategic interventions for the sector. Results of the assessment of options will be reviewed and specific strategic interventions will be proposed. In addition to the assessments in Step D, the proposal for strategic interventions will be based on their coherence and consistence in pulling in the same direction to achieve the sector development goals.

Step F The Strategy will be supported by Action Plans to ensure the achievement of the set goals. The link to sector finance availability is a particular feature of the present strategic formulation process. The interlinkages to the sector financing study makes it possible to readily calculate the financial requirements and financial viability of the strategic interventions considered (update of FS). Much of the groundwork for assessing financial viability has already taken place during the assessment of options in Step D, but a consolidated financial assessment will be performed in Step F. On this basis investment plans that observe existing resource availability will be developed. Finally, Step F also elaborates on more detailed Action Plans to implement the strategic interventions, including the establishment of implementation and monitoring mechanisms - NPMF.

Step G The final step **Step G** is the actual implementation of the Strategy and Action Plans. As shown in Figure 0-1 the strategic process is circular, requiring feed-back from the implementation to a possible reformulation of goals and adjustment of the Strategy and Action Plans.

Guiding Principles

A number of *Principles* shall guide the development and implementation of the strategy, i.e.:

- Cost recovery and financial viability of service providers;

- Sustaining an affordable service level;
- Cost effective utilisation of scarce resources; and
- Customer service orientation,

Further, the roles of the public and private sector in service delivery need to be elaborated. Also, the water sector strategy shall encompass the entire population i.e. both urban and rural areas and both centralised and non-centralised systems.

The water sector *Vision* and the list of *Guiding Principles* are key milestones in the development of the NWSS&AP as it will guide the development of the plan.

Fast-track Mechanism

To accelerate access to sustainable water supply and sanitation in Georgia a number of urgent initiatives need to be considered to be implemented through a - Fast Track Mechanism (FTM). The aim of the FTM to significantly accelerate the implementation of the national water sector improvements, and should be implemented in parallel with the development of a National Strategy and Action Plan for the water sector in Georgia. The FTM may cover interventions as follows:

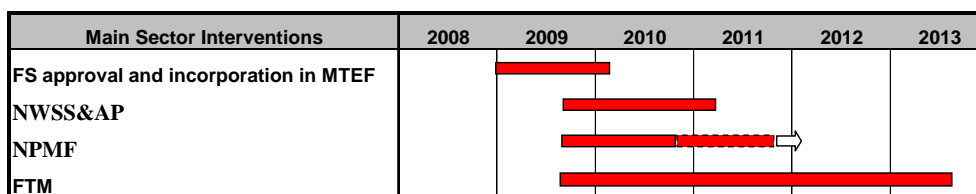
- Develop a national NRW strategy, and start a pilot project;
- Initiate an energy saving campaign for a few selected dedicated utilities/municipalities with replacement of pumps as a pilot project. 40 to50 % of the energy consumption can be saved and the payback period is no more than 3 years; - start a pilot project; and
- For rural area: Implement smaller projects, with the participation of beneficiaries, to extend and sustain rapid coverage of water supply and sanitation services to rural areas, and promote technologies that are appropriate, based on beneficiaries' consensus as to acceptable levels of services, ease of implementation, local skills and knowledge for their operation and maintenance, - start a pilot project.

Implementation Plan

In Figure 0-2 is shown a very preliminary implementation plan for the interventions supporting the improvements of the water sector. The FS 2008 is assumed to be approved and incorporated in the MTEF beginning 2010, and a decision is taken to implement the MESS&AP in 2009 and to be finalised medium 2011. NPMF is assumed to be established in 2009/2010 and continue to monitor the water sector improvements.

The Fast-track mechanism is indicating to be prepared in 2009 and approved and implemented over 4 -5 years.

Figure 0-2 Preliminary Implementation Plan



ANNEX 1. BACKGROUND INFORMATION

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TABLE OF APPENDICES

Appendix 1 Data Collection

EXECUTIVE SUMMARY

Background

In 2005 Georgia, with the help of the OECD/EAP Task Force has developed a financing strategy (FS) for **urban water supply and sanitation (WSS)** (hereafter called FS 2005. The result of the FS 2005 is shown in table below comprising of three Scenarios:

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;

Scenario 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; and

Scenario 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.

| | Scenario 1 | Scenario 2 | Scenario 3 |
|--|--------------|--------------|--------------|
| Capital investment over 2006-2015 (Mill. GEL) | 417.5 | 170.8 | 445.0 |
| Capital investment, annual basis (Mill. GEL) | 47.5 | 15.9 | 49.7 |
| Capital investment per head per year unit (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 |

The table above 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 and sanitation, education, transport, health, etc.), 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.

FS 2007

In 2006 it was decided to update the EFS-2005 for urban WSS and to include rural WSS, to establish a total overview of the WSS sector in Georgia and develop an environmental financing strategy under the name *“Promote achieving the Millennium Development Goals on Water Supply and Sanitation (WSS) in Georgia through extending the Financing Strategy for WSS to Rural Areas and Facilitating Related National Policy Dialogue”*.

The Project commenced on 16 March 2007 and is planned to be finalised in May 2008. This Interim Report presents the:

- Reporting of the existing situation of the WSS in Georgia including rural WSS; and
- Preparation of the baseline scenario for the WSS sector in the period 2005 to 2025, and the preliminary possibilities to close the financing gap.

Baseline scenario

The baseline planning period is 20 years from 2005 to 2025 with 2005 as baseline year. The main key assumptions in the calculation of the expenditure profile in the baseline scenario are:

Technical assumption

- Business as usual" with O&M and re-investments to avoid further deterioration;
- The expenditure profile is based on the collected data for urban WSS in 2004 with update financial data for 1.930 mill people and scaled up to 2.3 million people; and
- The expenditure profile is based on the collected data for rural WSS in 2007 with financial data for about 46,000 people in 25 settlements and scaled up to 1.991 million people.
- To adjust cost function used in the FEASIBLE model the Working Group and the Consultant have assessed and estimated the correction factors to scale the International/Western European cost data and reflect local condition in Georgia.

Financial assumption

Urban supply of finance

To model baseline scenario and supply of financing potentially available for water and sanitation sector in the period 2005-2025 the following macroeconomic assumptions have been made.

- Exchange rate - 2.3 Lari per EURO as constant exchange rate;
- Population assumed as constant;
- GDP nominal rate at 8.5% growth in 2006, 6% annually from 2007-2009, and 5% annually from 2009-2025; and
- Income growth is assumed to change along with GDP nominal growth rate.

Forecast of user charges in urban area has been based on the following assumptions:

- Collection rate from households remain at the same rate as in the base 2005 year - that is 45% of billed amount.
- Collection rate from other customers remain at the same rate as in the base 2005 year - that is 77% of billed amount.
- Coverage of households by water and sanitation services is unchanged during the entire forecasted period; and
- Monthly water bill per capita will increase only slightly to account for 1.5% of average monthly per capita income as opposed to the current level of 1.4% of income.

National budget contribution has been calculated and assumed at the level of GEL 23 million for baseline scenario for both water and sanitation in urban and rural areas.

Finally, estimates for funds availability from other sources has been made for use in the baseline scenario. In doing this we have taken into account only those projects that has been approved or are under implementation. Therefore, total amount of loan availability for the sector was estimated at about Lari 45 million and grant contributions about Lari 40 million. These funds have been distributed across 3 years mostly because actual implementation period for projects is not known.

Based on all above assumptions, the baseline supply of finance in urban areas is presented in the table below.

Table 0-1 Summary of supply of finance from different sources in the baseline

| Lari million | Water | Water, % | Wastewater | Wastewater, % |
|---------------------|-------|----------|------------|---------------|
| User charges | 35.7 | 33% | 15.7 | 31% |
| Budget contribution | 14.0 | 13% | 9.0 | 18% |
| IFIs Loans | 31.5 | 29% | 13.5 | 27% |
| Grants | 28.0 | 26% | 12.0 | 24% |
| TOTAL | 109.2 | 100% | 50.2 | 100% |

Rural supply of finance

Estimation of the supply of finance for rural area is based on assumption on user charges as well as funding availability from other sources.

The average payment in rural areas for water and sanitation services (primarily water services) is 3 Lari/capita/year. Similarly, the estimated budget expenditure is 2.5 Lari/capita/year and investment expenditure stand at 26 Lari/capita/year. This information has been used to upscale the sample data for the entire Georgia rural population and the assumed finance availability are:

- GEL 6,200,000 annually from entire rural population as user charges; and
- GEL 5,000,000 annually from budget sources of all levels as sector subsidy;

Investment projects in rural areas are primarily implemented by MDF, with some exception, and more that 100 villages has already been subject to interventions of different extent. Many of investment has been small in size, however, about 32 relatively larger investment projects has been implemented with total value of about Lari 40 million over the last 4-5 years. Hence, based on this information the assumption for the baseline scenario supply of investment funds to rural area has been set at:

Average of Lari 9 million in three years period 2005-2007 in investment expenditure for the entire rural water and sanitation infrastructure;

Table below provides summary of funds availability for the baseline scenario in rural areas.

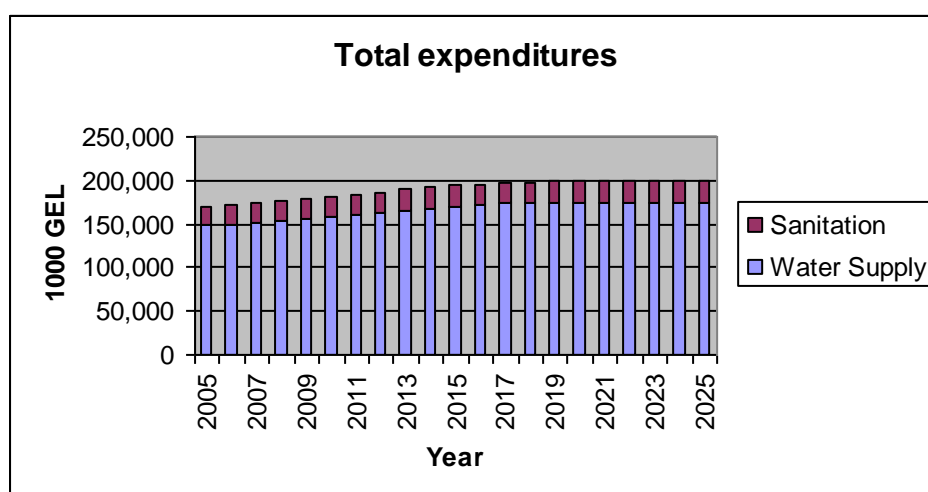
Table 0-2 Supply of finance in rural areas, baseline scenario

| | GEL |
|-----------------------------|-----------|
| Payment from user | 6,200,000 |
| Budget subsidies | 5,000,000 |
| Other sources - IFI, grants | 9,000,000 |

Expenditure profile

The expenditure profile for the baseline scenario for urban and rural WSS is shown in Figure 0-1. The total estimated expenditure for the planning period (20 years) is 4.4 billion GEL or an average annual cost of 220 mill. GEL - an average of 51 GEL per capita per year or 23.3 Euro per capita per year.

Figure 0-1 Baseline expenditure profile for urban and rural WSS



Baseline Cost per capita

In Table 0-3 is shown the total average cost for the baseline scenario per capita per year for urban and rural WSS sector.

Table 0-3 Total average cost per capita per year for baseline scenario

| Total average cost per capita per year | GEL/capita/year | Euro/capital/year |
|---|------------------------|--------------------------|
| Rural Cost | 11 | 4.8 |
| Urban Cost | 86 | 39.2 |
| Total Cost | 51 | 23.3 |
| Rural water supply | 7 | 3.0 |
| Rural sanitation | 4 | 1.9 |
| Urban water supply | 75 | 34.3 |
| Urban sanitation | 11 | 4.9 |

Financing GAP with baseline assumption

The modelled estimation of the total urban water sector expenditure needs over 20 years planning period amounts to GEL 3.985 billion or about 200 mill. GEL per year, of which 87 % is estimated to be for water supply and 13 % for sanitation in the urban sector. This is equal to GEL 1725 (750 Euro) per capita for a population of 2.31 mill people in the 20 years, or GEL 86 (38 Euro) per capita per year.

Total accumulated supply of finance for urban WSS for the period 2005-2025 is at GEL 1.70 billion. Thus, the total financing gap will be almost GEL -2.29 billion.

The modelled estimation of the total rural water sector expenditure over a 20 years planning period amounts to GEL 426 mill or about 21 mill per year, of which 73 % is estimated to be for water supply and 27 % for sanitation in the rural sector. This is equal to GEL 214 (93 Euro) per capita for a population of 1.991 million people over 20 years, or GEL 11 (4.7 Euro) per capita per year.

Total supply of finance for 2005-2025 will reach about GEL 305 mill. The total financing gap will be almost GEL -121 million.

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

Set of measures aimed at WSS sector financing increase and costs saving:

To close the financing gap in baseline scenario following measures has been simulated:

1. Increase in collection rate of the billed charges for WSS services
2. Increase in WSS services payments, tariff (in baseline year prices) along with increased collection rates

Increase of urban collection rate

Assumptions regarding increased collection rate were made as follows:

- Collection from households increase from 45% in 2005 to 95% in 2011 gradually;
- Collection from other customers increase from 77% in 2005 to 95% in 2010 gradually; and

- Since the rural user charges are subject to entirely different payment mechanism the increase of collection rate does not apply there and the new financing gap is shown only for urban areas.

As a result of increase collection rate the financial gap decreased by only 17% of the initial total gap.

Increase collection rate and share of income payment

The next policy measure simulated to increase supply of finance was tariff increase. Here we have assumed that households will pay 3.5% of income in the long term. Increase to that level has been assumed in the model to be gradual reaching the target level of 3.5% in 2020.

Additional cash inflow, however, helped to reduce initial total financing gap by 38% only.

Hence, while both of the policy measures resulted in significant increase in supply of finance, a substantial funding gap remains. This implies that additional funding will need to come from budget sources of all levels to if the sector is to cover at least its operating and maintenance cost.

Potential measures to close the financial gap

Such increase in additional financing can come from variety of sources. Preliminary analysis has shown that:

Financial Measurers

- Potential doubling of public budget funding for capital investments will reduces the remaining financing gap by further 30% on cumulative basis;
- Combination of both - increase public budget and increase in user charges - to the maximum affordable level of 3,5% by 2015 allows to decrease the remaining financing gap by 38% only,
- Hence, assumed substantial increase in two key financing sources does not cover even 50% of the remaining gap;
- Further funding can be provided by additional external sources (grants and loans). However, compared to remaining total cumulative gap of GEL 896 million after assumed public budget and user charges increase, it is very unlikely that such amount of external funds will be possible to attract;
- Other financial instruments such as private sector participation are also possible to contribute to sector financing. However, the level of information regarding private sector interest is limited and cannot be used for quantitative estimation;
- Therefore, calculation of development scenarios requires detailed discussion and answers to the following issues:
 - What is the realistic level of public financing for the entire forecasted period for both urban and rural sectors?
 - What is the realistic level of user charges for the entire forecasted period for both urban and rural sectors - it is important to discuss not only the maxim level of

affordability, but also the time profile over which such affordable level will be reached?

- What is the realistic level of external financing for the entire forecasted period for both urban and rural sectors?
- If discussion of these policy measures results in substantial remaining financing gap then the only further option to reduce financing gap will be reduction of service levels and correspondingly cost reduction.

Technical

The obvious technical measure to help reducing the remaining financing gap is reducing the operation and maintenance cost by:

- Initiating cost reduction programme, such as:
 - reduction of water losses, which will reduce the energy consumption, reduce potential pollution of drinking water, increase constancy of water;
 - reduction in overall energy consumption by replacing pumping equipment with more efficient pumping systems (initial screening shows that replacement of submersible pumps will have pay-back period of 3-4 years);
 - gradual reduction of staffing along with the improvement of the operations and reduced requirements for maintenance; and
 - increase operating efficiency by the introduction of a performance based operation/management (even in Denmark it has been assessed that the water sector can be 20% more effective). **ISSUE FOR DISCUSSION: What is the realistic level of savings by a cost reduction programme for the entire forecasted period for both urban and rural sectors?**
- Replacement of the most deteriorated water and wastewater networks to reinstate the operational safety of the network to improve constancy of service and improve water quality of drinking water and reduce pollution of the environment from wastewater pipe. **ISSUE FOR DISCUSSION: What is the realistic level pipe network to be rehabilitated or replaced for the entire forecasted period for both urban and rural sectors?**

The above measures to reducing the O&M cost and reinstate the operational safety of the systems are obvious components in any potential development scenarios to deal with in improving the present service level or just maintain the present service levels.

Other cost reduction programmes could be:

- To "decrease" the present service level by changing to a lower service level e.g. from house connection to public standpipes or reducing the present coverage. None of these possibilities can be seen as a major instrument to reduce the remaining financial gap as it may only generate little savings and may be "politically" not acceptable; at least not in the existing serviced urban areas. **ISSUE FOR DISCUSSION: Will it be possible to introduce a lower service level than the present one in existing areas?**

- To rehabilitate only the existing wastewater treatment plants by reinstating the operational safety for mechanical treatment only in environmental sensitive areas. **ISSUE FOR DISCUSSION: Will it be political acceptable to introduce this policy?**

INTRODUCTION

Project context

In 2005 Georgia, with the help of the OECD/EAP Task Force has developed a financing strategy (FS) for **urban water supply and sanitation (WSS)** (hereafter called FS-2005⁸).

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 48%⁹ of the population living in rural areas, the challenges of the rural water sector will be similar, if not more serious.

The strategy has shown that even in urban areas achieving the Millennium Development Goals (MGDs) on water supply and sanitation will be a challenging task that would require difficult political choices, incl. scaling down the level of WSS infrastructure in some cases (stand pipes providing quality water 24 hours per day, rather than in-house taps providing poor quality water few hours per day).

The baseline scenario demonstrated 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 should be developed, in order to identify additional policy measures that would go beyond those in the baseline scenario.

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

Scenario 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

⁸ The report can be accessed on <http://www.oecd.org/env/water>

⁹ Yearbook 2006

Scenario 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.

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 and sanitation, education, transport, health, etc.), 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.

| | Scenario 1 | Scenario 2 | Scenario 3 |
|--|------------|------------|------------|
| Capital investment over 2006-2015 (Mill GEL) | 417.5 | 170.8 | 445.0 |
| Capital investment, annual basis (Mill. 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: OECD from FS 2005

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

In 2006 it was decided to update the EFS-2005 for urban WSS and to include rural WSS, to establish a total overview of the WSS sector in Georgia and develop an environmental financing strategy.

In December 2006 the Consortium of Moscow Representative Office of COWIconsult Int. Ltd and COWI A/S (Denmark) won the tender for Consultancy Services hold by OECD EAP Task Force Secretariat for implementation of the Tacis financed Project “*Promote achieving the Millennium Development Goals on Water Supply and Sanitation (WSS) in Georgia through extending the Financing Strategy for WSS to Rural Areas and Facilitating Related National Policy Dialogue*”

The Project commenced on 16 March 2007 and is planned to be finalised in May 2008. The main project tasks and outputs contain an Inception Phase and three main stages and include the preparation of:

| Stages | Main Tasks | Main Sub-tasks |
|-----------------|---|---|
| Inception Phase | Setting a Steering group and an inception mission | <ul style="list-style-type: none"> - Data collection - Establish Working Group - Steering Committee - Preparation of Inception Report |
| Stage 1 | Updating data on urban WSS and collecting data on rural WSS, simulation of the baseline scenario and facilitating on this basis the National policy dialogue on achieving MDGs on water supply and sanitation in rural and urban areas in Georgia | <ul style="list-style-type: none"> - Preparation of baseline scenario - Undertake ability-to- pay analysis - Preparation of Interim report - Assist OECD to organise a multi-stakeholder meeting in Tbilisi. |
| Stage 2 | Developing a FEASIBLE Financing strategy for achieving the MDGs on WSS in urban and rural Georgia and related policy recommendations, further facilitating the policy dialogue | <ul style="list-style-type: none"> - Prepare scenarios of achieving the MDGs on WSS in urban and rural Georgia, and calculate the financing gap, and prepare a draft Final report presenting the agreed scenarios for the WSS sector - Assist OECD to organise second multi-stakeholder meeting in Tbilisi, and assist OECD in developing a set of Develop performance indicators (PIs) for the WSS and in preparing the final Policy Paper |
| Stage 3 | Promote implementation of the Financing strategy by assisting the Georgian authorities in integrating the strategy into the PRSP and MTEF | <ul style="list-style-type: none"> - assist OECD with organise a multi-stakeholder meeting in Tbilisi to discuss the findings and recommendation of the draft final EFS and to assist in drafting a Policy Document; and - assist OECD in developing set Develop performance indicators (PIs) for the WSS and in preparing the final Policy Paper |

Source: OECD and Terms of Reference

Project objective

The main objective of this assignment is to strengthen the capacity of national institutions in carrying out activities that are aimed towards achieving the water-related Millennium Development Goals (MDGs).

Such overall objective will be achieved via implementation of the following specific tasks:

- Extending of the financing strategy, which was developed in 2005 for urban water, to rural areas;

- Conducting national policy dialogue with regards to FEASIBLE scenarios for updated strategy.
- Evaluating current affordability constraints and structure the new strategy to address the needs of low-income families; and
- Developing all the necessary arguments to ensure that updated strategy implementation process is reflected in national budgeting process as well as used as a basis for other strategic sector development framework documents.

Data Collection and processing

The data collection for updating the FS from 2005 and the preparation of FS for WSS in rural areas covered:

- Data update of supply of finance for urban WSS; and
- Collection of technical and financial data to prepare the FS for rural WSS.

Enabling the data collection to update the FS and include the rural WSS, a Working Group of local experts was established, appropriately instructed and supplied with specially developed questionnaires for FEASIBLE model rural part.

The data collection is described in the Inception report and relevant parts attached in the Annex 1.

The present report presents the key project outputs based on the data collected and modelling a baseline scenario utilising the FEASIBLE model.

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.

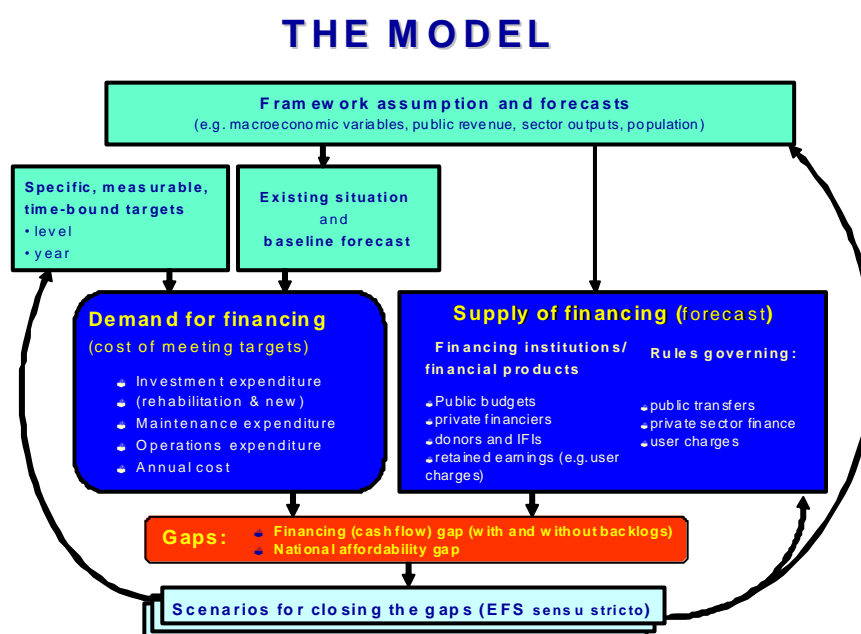
FS tools include a computerised model, *FEASIBLE*¹⁰, which makes it possible to assess the current expenditure required to maintain and operate existing and new water supply and sanitation infrastructure, including expenses for capital and current repairs, as well as new capital investment and scheduled 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.

¹⁰ 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 in Figure 0-1.

Figure 0-1 EFS Methodology



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.

Main Steps in Financial Strategy Preparation

- The *collection and assessment of detailed data* on WSS organisational and legal structure, the technical structure and 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. Identification and analysis of actions that will help close the financing gap, i.e. to balance the demand, modify the tariff policy, increase financing, energy saving (operating cost), etc.;
- *Data collected are inserted in the FEASIBLE model* covering technical, economic and financial data including correction factors for scaling international prices to local cost level;
- Development of a *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; and

- Development of realistic WSS sector development scenarios based on SMART targets for WSS infrastructure rehabilitation and/or development, and design realistic (FEASIBLE) scenario(s) to achieve the targets, appropriate for attracting financing, including the Millennium Development Goals (MDG) related to the WSS sector. The main issue is when defining the development scenario - *"where is Georgia today in relation to MDG and what do Georgia want to achieve and can they effort this"*.

Millennium Development Goals

The MDG Millennium Declaration Goal 7, *"Ensure environmental sustainability"* - and Target 10, which specifically covers water supply and sanitation is:

"Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation".

and the related indicators set the framework for the EF 2007 to achieve this for Georgia:

Indicator 30: Proportion of population with sustainable access to improved water source - urban and rural; and

Indicator 31: Proportion of population with access to improved sanitation - urban and rural.

In Table 0-1 (as defined by JMP). However, improved water supply is not just a matter of choose of technology but also the quality of water and constancy of access to the water etc.

Table 0-1 MDG definition of target 30 and 31

| | PI 30: Water supply | PI 31: Sanitation |
|----------------|--|---|
| "Improved" | Household connection Public standpipe Borehole Protected dug well Protected spring Rainwater collection | Connection to a public sewer Connection to septic system Pour flush latrine Simple pit latrine Ventilated Improved Latrine |
| "Not improved" | Unprotected well Unprotected spring Vendor-provided water Bottled water Tanker truck-provided water | Service (or bucket) latrines (where excreta are manually removed) Public latrines Open / uncovered latrines (referring to the hole not to a lack of superstructure) |

Source: JMP

The above definitions provide a formal delineation between standard water and sanitation technologies into categories according to their "believed" ability to deliver improved water and provide access to basic sanitation. A more deliberation of the MDG definitions are made in Chapter 0.

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 identification of a number of major obstacles for improvement of the sector, such as:

- Defining the *sustainable level of services* in the sector will promote allocation of limited financial resources to the most effective and prioritised investment projects;
- Demonstrating 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);
- Analysis of various actions promoting the sector to *overcome identified obstacles and challenges in the sector* by highlighting key-issues within the sector which need to be addressed; and not least
- Promote and prepare a *Water Sector Strategy and Action* plan supporting the findings and recommendation in the FS to promote the implementation of waters sector improvements.

Acknowledgements

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The project team would like to express their appreciation and thanks to the members of the steering committee for fruitful discussions and contributions to the project.

Special thanks is given to the highly valued work formed by the working group of local experts (WGE), consisting of Gulua Dzhumber – water and waste water specialist, Kvernadze Grigori – financial specialist, Dzhologua Sergo - water and waste water specialist; Bostashvili Nana – institutional specialist and the local project coordinator Mr. Merab Kandelaki (Gruzvodocanal LLC), who have made the substantially contributed to the works implementation. Moreover we would like to all other experts contribution with data and advise on local conditions within the WSS sector in the Republic of Georgia.

The project team would also like to thank everyone who was involved and helped with the development of this Interim Report for the financing strategy for the water and wastewater sector in Georgia.

Content of this report

The structure of this report is designed to lead the reader from the existing institutional organisation of the water sector, the technical situation of the urban and rural water and sanitation, over the socio-economic and financial situation towards the development of the baseline scenario. The results of the analysis of the baseline scenario are then discussed before assessing the implications for realistic development policies and targets to be investigated further using the FEASIBLE model.

- Chapter 3 Assessment of the existing situation in the Georgian WSS sector
- Chapter 4 Baseline scenario
- Chapter 5 Main obstacles and challenges in the Water Sector

The opinions presented in this report 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.

ASSESSMENT OF THE EXISTING SITUATION IN THE GEORGIAN WSS SECTOR

Background

The Republic of Georgia is a Eurasian country situated in the Caucasus located at the east coast of the Black Sea, 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 420 mm.

Georgia is rich in water resources with an estimated obtainable resource of fresh ground water in Georgia about 2,400 m³ per capita per year. Although this fortune, the water sector faces a number of challenges to improve the service level up to international standard for safe drinking water supply and a sustainable sanitation environmental safety and health of the people of Georgia, and a considerable effort is required just to fulfil the MDG for improved water supply and sanitation.

In the following chapters a brief description of the WSS sector in principal divided into the urban (towns / settlement with a population of above 5000 people) and rural areas with towns below 5000 people.

Brief description of the Institutional Arrangement of the Water Sector

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 water 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 based 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 Fund 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.

Rural Area

In order to improve the existing situation, in 2003 the Management Agency was established on the basis of the Ministry of State Property Management under the Ministry of Economy, Industry and Trade which property is under state ownership, but this Agency is only responsible for individual issues of planning and economic activities, while the main responsibility for normal functioning and development of water utilities is placed upon local administrations which, however, don't fulfill these responsibilities.

At present time the general responsibility for WSS sector belongs to Department for Construction and Urban Development of Ministry for Economic Development, which has been founded in year 2004 as a successor of Ministry for Industry and infrastructure, which has been dismissed.

Department for Construction and Urban Development presently develops the models of institutional systems management based on recommendations gained from the latest researches and experience.

Institutional Challenges in the WSS 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 WSS 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 WSS 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 WSS 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 WSS 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 WSS 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 Vodocanal 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 WSS utilities are operating.

Today there are no incentives or regulative and information reasons for private sector involvement in the Georgian WSS 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 brief description of the organizational, legal and institutional arrangement of the WSS sector in Georgia, as well as on Georgian Government policy in this sector, is given in Annex 2.

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 WSS utilities in particular.

Brief description of the Water Sector

Below is given a brief description of the water and sanitation in urban and rural areas based upon the collected data and other available information. The urban description is based the EFS-2005 and rural description is based upon the data collected in 2007.

Water resources

Georgia is rich in water resources. Surface water and ground water resources include numerous thermal and mineral springs. Many snow- and glacier-fed rivers drain the mountains and substantial limestone aquifers are present in the Greater Caucasus.

Surface water

The total water volume of Georgian rivers is 65.8 km³. 56.5 km³ of water per year is formed on the territory of Georgia - the transit flow being 9.3 km³. On average, 810 thousand m³ of water is generated on 1 km² per year.

Georgia's water resources are unevenly distributed. West Georgia receives very high amounts of precipitation (up to 4000 mm/year), whereas East Georgia is much drier (at some places less than 300 mm). In West Georgia 1.340 thousand m³ of water are generated on 1 km², and in East Georgia only 370 thousand m³ per km².

A natural division between these two regions coincides with the drainage basins of the Black Sea (Rioni, Inguri, Churokhi rivers) and the Caspian Sea (Mtkvari/Kura, Alazani rivers) respectively.

There are more than 26 thousand rivers in Georgia most of them quite small less than 25 km. Their total length is about 59 thousand km

The largest river of the country is the Mtkvari (Kura), which comes from Turkey, passes the towns of Tbilisi and Rustavi and enters Azerbaijan. It drains about 23% of the country towards the Caspian Sea, Second largest river is the Rioni, draining into the Black Sea, covering about 20% of Georgia.

Georgia has more than 860 lakes and reservoirs with a total water surface area of about 170 km². The biggest lakes are Ritsa, Paravani, Paliastomi, Sagamo, Tabatskuri (74% of total storage). There are 43 reservoirs in Georgia (35 in East Georgia, 8 in West Georgia), mostly used for irrigation and hydropower.

Ground water

Ground water resources are abundant, especially in the lower slopes (karst limestone) of the Greater Caucasus and in the lava plateau of Akhalkalaki and Mameuli.

The estimated obtainable resource of fresh ground water in Georgia is around 10.6 km³ (East Georgia - 4.2 km³ - 39.5%, West Georgia - 6.4 km³ - 60.5%), or about 2400 m³ per capita.

In most cases water salinity is low (0.2-1.0 g/l) and ground water can be used for drinking water supply.

Abstraction

About 450-500 mill.m³ of drinking water are delivered to the population including industrial consumption and water losses in the distribution network every year. 90% of this quantity is consumed by the urban population and 10% by the rural population.

The ground water is the main source of drinking water. It contributes around 80% of the total amount of water feeding the centralised water-supply networks and is mainly distributed to the customers without or limited.

Surface and ground water quality

Lowland water courses in Georgia are heavily polluted by agricultural chemicals, industrial waste and sewage. Serious problems are evident at most locations for many parameters.

The largest polluter of surface water is municipal wastewater (about 80% of the overall wastewater). Less than 10% of industrial wastewater is treated prior to discharge, and even the adequacy of this small percentage varies substantially. The major source of industrial pollution is the heavy industry (oil products, phenols, heavy metals).

The quality of surface water resources is also affected by agricultural practice, in particular the use of fertilisers and pesticides.

Municipal waste disposal sites, scattered domestic waste disposal sites and industrial landfills are considered diffuse polluters of surface waters, because most of them do not have a legalised location. Virtually none of these sites meet surface and ground water protection requirements. Many of them are located on river banks. In many cases hazardous waste is not separated from domestic waste.

There is no account of ground water pollution from agricultural or industrial activities, including landfills. Investigations and monitoring of this re and sporadic to provide any answer

Brief Technical characteristic of the Georgian urban and rural water and sanitation sector

Water Supply 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 about 3.1 mill. m³ per day.

The total length of water mains and water distribution networks in 85 cities is about 9,500 km. The total water supply network in urban and rural areas is in 2006 reported to be about 38,000 km¹¹.

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. 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

¹¹ Report to IBNET 2006

water losses and contamination of the receiving and ground water bodies. The average water losses in Georgia reach 30-50% of the volumes supplied to the networks.

Most of the settlements of Georgia receive portable water on an irregularly basis. There is no accurate metering of water produced and consumed. The situation is worsened by a lack of laboratory water quality control, which means that supplied water often does not comply with existing normative for portable water (State Standards) or sanitary and epidemiological requirements.

In the rural areas only about 30 % are covered by centralised water supply systems through gravity schemes. In case pumping is used water is only delivered 3-4 hours a day. The remaining rural population is mainly supplied with drinking water from dug wells and hand pumps, protected spring and tap.

Portable water supplied to the customers through the centralized water supply systems is not always safe for the health and often does not correspond to microbiological, safety or other existing standards. As was indicated before, the main reasons is absence of monitoring as well as dedicated inspection laboratories and institutional structures which can continuously provide monitoring and quality control service for rural territories.

Wastewater

Wastewater discharge systems operate in 41 cities (out of 84) and districts, 30 of which have wastewater treatment plants with a total design capacity of 1.6 mill. m³ per day (including regional treatment facilities in the Gardabansky district with a capacity of 1.0 mil. m³ per day serving Tbilisi and Rustavi).

The length of wastewater networks and sewers in 41 cities are reported to be 4,000 km. The total reported sewer pipes are reported to be about 18,000 of which a considerable is not in use.

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 water and wastewater facilities of the country. The technological processes were interrupted, the micro-organisms used for biological treatment were lost, and pipes and conduits sewerage collectors were clogged up. Therefore most of the wastewater treatment facilities have become disabled and the wastewater is discharged untreated or after simple mechanical treatment 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.

In rural areas centralized wastewater collection system is not presented in most of the selected settlements with a population less than 5000 as well as in municipalities beyond the sampled list. The most commonly used solution for rural areas are a Simple Pit Latrine and more seldom use of the Ventilated Pit Latrine.

The above mentioned problems are strongly linked to the lack of attention and financial resourced for the longer period, poor management and institutional capacity in the WSS sector (see below).

State of repair of the urban and rural water and sanitation facilities

Basis for the technical assessment of the WSS sector

The data from WSS 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. The data collection for the urban and the rural areas are described below.

Both in the FS 2005 and in the present financial strategy two provinces/areas are excluded from the data collection as agreed with the Steering Committee Group - these provinces are Abkazia and Tskhinvali region.

The basis for the assessments and the preparation of the baseline scenario are based on data collection for the:

- Urban (FS 2005): 20 "settlements" covering about 1.9 mill people; and
- Rural (FS 2007): 25 settlements covering about 46,000 people.

Urban Basis The urban WSS within the framework of this financing strategy covers the settlements with a population above 5,000 inhabitants. To assess the condition of the urban water and wastewater a total of 20 settlements were selected under FS 2005, with a total population of 1.9 mill. 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 collected data served as a basis for preparation of summary tables which reflect the key performance parameters of WSS utilities. Data from these tables was used as background information to be entered into the FEASIBLE model.

Table 0-1 Summarized water supply data for urban settlements - Year 2004

| Group | City/town | Total populati on in the baseline year | Abstracted from | | Total volume of water abstracted | Reported share of population served by centralized water supply system | Water consumpt ion by househol ds | Water supply regularit y |
|----------------------|--|---|----------------------------|--------------------|---|---|---|-----------------------------------|
| | | | Undergr ound sources | Surface sources | | | | |
| | | people | % | % | 1,000 m3/year | % | l/c/d | hour/day |
| 1 | Large cities (above 140,000 people) | | | | | | | |
| | 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 |
| 2 | Resort towns of the Black sea coastal zone | | | | | | | |
| | 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 |
| 3 | Other settlements | | | | | | | |
| | 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 0-2 Summarized wastewater data for urban settlements - Year 2004

| 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 | % |
| 1 | Large cities (above 140,000 people) | | | | | |
| | 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% |
| 2 | Resort towns of the Black sea coastal zone | | | | | |
| | 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% |
| 3 | Other settlements | | | | | |
| | 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% |
| | Zestaponi | 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

Rural Area Basis

Data collection of WSS related data for the rural areas is based on a geographical division¹², defined by similar situation and conditions in water supply and sanitation sectors, namely: Western, Eastern, Mountain and Southern areas. Adjara province is grouped under the Western zone. The zoning is illustrated in Figure below.

In the zoning the Abkhazia and Tskhinvali region was excluded and will not be considered in the FS 2007.

¹² The approach in rural data collection was agreed with the Steering Committee.

The rural WSS sector is assessed based on data collected from 25 settlements in 10 provinces covering 12 Rayons with a population from 173 to almost 5000 inhabitants. The total number of population living in the selected settlements is equal to about 46,000 inhabitants, which represent 12 % of the rural population in the district selected for the data collection.

The descriptions of the four zones are shown in Table 0-3 and main figures from the settlements are shown in Table 0-4.

Figure 0-1 Zoning for Rural Data Collection



Source: COWI's assessment

Table 0-3 Description of Zoning for Data Collection

| | |
|---|--|
| Zone 1 Western Territory with high availability of water resources | The Western part of Georgia is characterized by high availability of water resources due to high ground water level, availability of watercourses etc. and consequently use of simplified water production methods (dug wells). Furthermore, the majority of rivers flow into the Black Sea that explains that they are quite polluted with wastewaters discharged up-stream. |
| Zone 2 Mountain Mainly surface water sources | The mountain part of Georgia is characterized with lack of possibility to use dug wells and boreholes for drinking purposes due to low ground-water level as well as lack of water-bearing rock strata. For example, in this part of Georgia mountain rivers, springs and other steams appearing as a result of snow melting are used as potable water sources. Such water is distinguished by specific chemical composition and increased turbidity that requires additional water treatment based on precipitation followed by filtration of raw water. Moreover, different elevations require using pumping equipment sometimes with several pumping lifts. |
| Zone 3 Eastern Water scarcity territory | The Eastern part of Georgia is characterized with scarcity of water supply sources as well as by low quality of water. Some settlements are supplied with water from cisterns and water-carriers. |
| Zone 4 Southern Developed WS infrastructure | The Southern part of Georgia is characterized by location of cities (Tbilisi, Rustavi), high density of population, developed industry and therefore availability of water and wastewater infrastructure. Mountain rivers, water storages and ground water sources are used as sources of water supply supported by water treatment and transmission water mains and pumping for the long distances. Thus rural settlements are supplied with water also from transmission water mains. |

Source: COWI assessment

Table 0-4 Data Collection in the Four Rural Zones -Year 2007

| Zone | Geographical location | Total zone population | Districts (Rayons) | Sampled population and % of population in district | | Total population in district | Total population in selected Rural districts | Share of total population in selected Rural districts of total zone population |
|-------|---------------------------|-----------------------|--|--|----------------------------|---------------------------------|--|--|
| | | | | inh. | % | inh.. | inh. | % |
| 1 | Western | 774,000 | Khobski Zestafonski | 3202 1956 | 9.0 3.9 | 35636 50453 | 86089 | 11,2 |
| 2 | Mountain | 158,600 | Borgomski, Ambrolaurski Onski Tsaregerski | 2445 1163 901 1000 | 20.3 8.6 15.2 6.8 | 12050 13534 5935 14661 | 46180 | 29,1 |
| 3 | Eastern and South-Eastern | 633,400 | Marneulski Lagodekhski Khashurski | 3651 10407 6680 | 3.9 23.6 27.4 | 94526 44191 24381 | 163098 | 25,7 |
| 4 | Central | 424,900 | Akhalkalaki Adigenski Mtskhetski | 8881 1092 4219 | 17.4 5.9 32.3 | 51173 18404 13049 | 82626 | 19,4 |
| Total | | 1,991,000 | | 45.597 | 12 | 377,993 | 377,993 | 19 |

Source: Data collection 2007

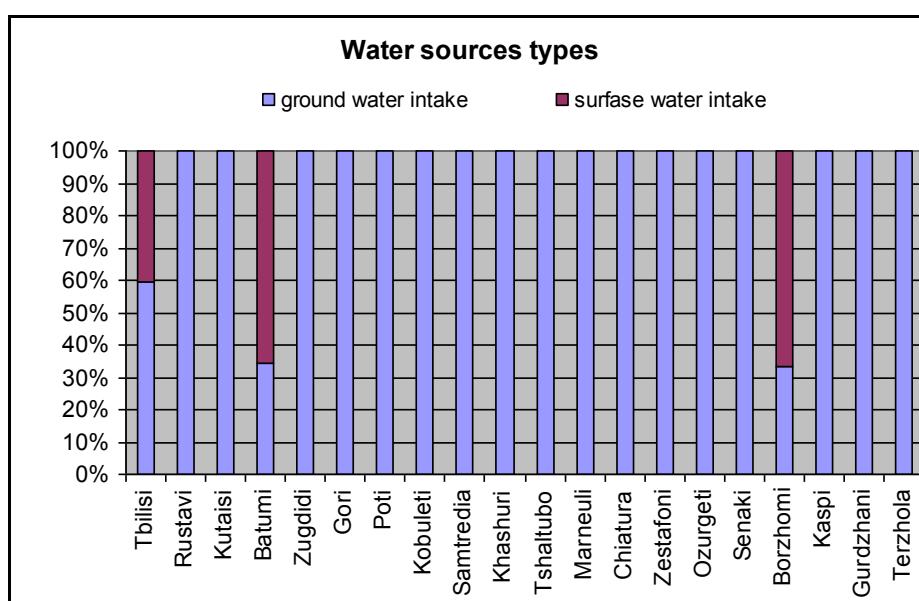
The data from WSS utilities and entities responsible for WSS in rural areas selected for the project analysis was collected by means of technical and financial questionnaires to be filled in with detailed information on the situation in the settlement selected.

The existing situation of 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 0-2 Water supply sources in Georgia Year 2004



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 - with liquid chlorine in most cases, or with sodium hypochlorite. Water from surface sources (used in Tbilisi, Borjomi and Batumi) is flocculated, filtered, and chlorinated.

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.

Coverage of urban 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 0-5 Average coverage with water supply and wastewater collection services by groups of urban cities - Year 2004

| 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

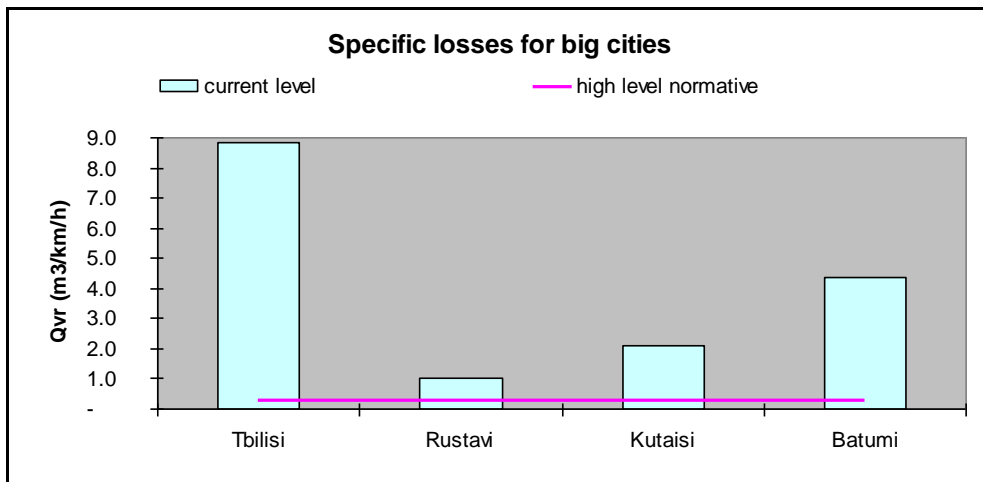
Water distribution and water services quality

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 real water losses in networks. The non-revenue water (NRW) reaches about 50 to 60% of the total volume of water delivered to the network, which is at least 4-5 times higher than "normal" non-revenue water registered in adequately operated utilities Western Europe. The real water losses in the networks are not fully known. However, data from IBNET and based on data delivered by utilities show a non-revenue water of 44 % in 2005, equal to 110 m³/km/day or equal to 4.5 m³/km/hour.

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

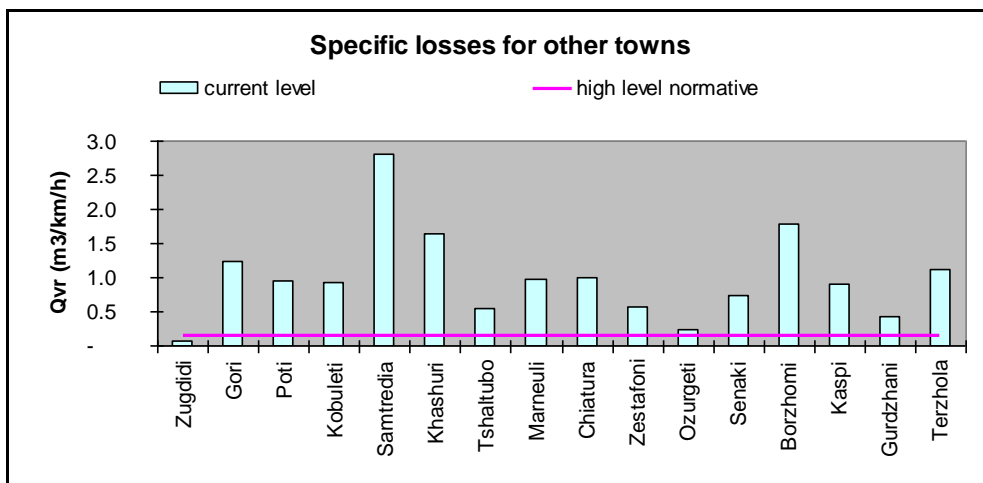
Figure 0-3 Non-revenue water for cities with a population of over 100,000 inhabitants- Year 2004



Source: COWI estimations

The existing NRW 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 0-4 Non-revenue water for cities with a population of over 100,000 inhabitants - year 2004



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 0-6 NRW / Water losses in the water networks per 1 km of pipe

| Location | Population, inhabitants | Loss in m ³ /km/h | "Guiding" level of real water loss |
|------------|-------------------------|------------------------------|--|
| Tbilisi | 980,000 | 8.8 | 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 | 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 a bad condition or the commercial losses (water not billed or taken illegal is very

high). Nevertheless NRW reduce the viability of the utilities and hamper the long-term sustainability of the waters sector.

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

Table 0-7 Specific water losses in Western European countries

| Country/city/utility | Real Water loss | |
|---|------------------------|-------------------------|
| | 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 |

Source: COWI estimation from various reports

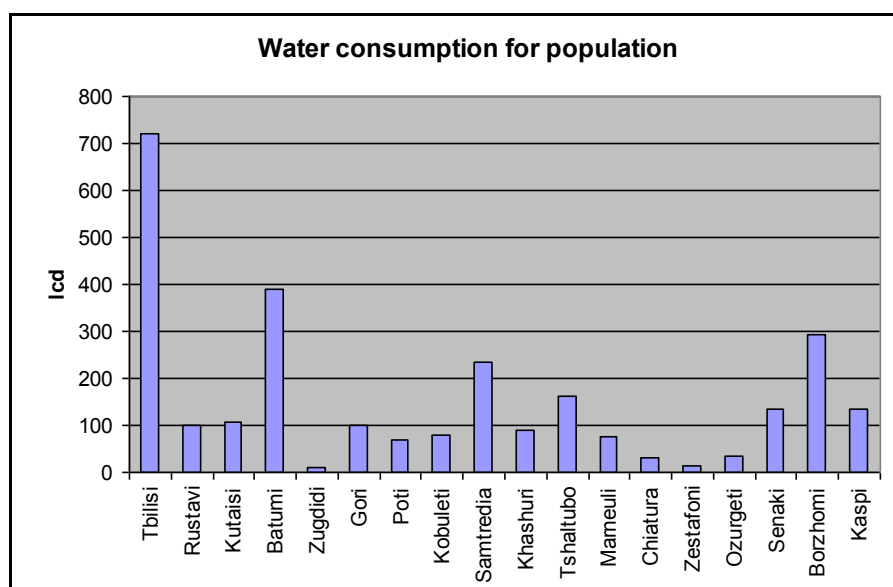
Note: 1) Including consumer connections; 2) Excluding consumer connections

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 0-5 Estimated specific water consumption by population in the selected settlements - Year 2004



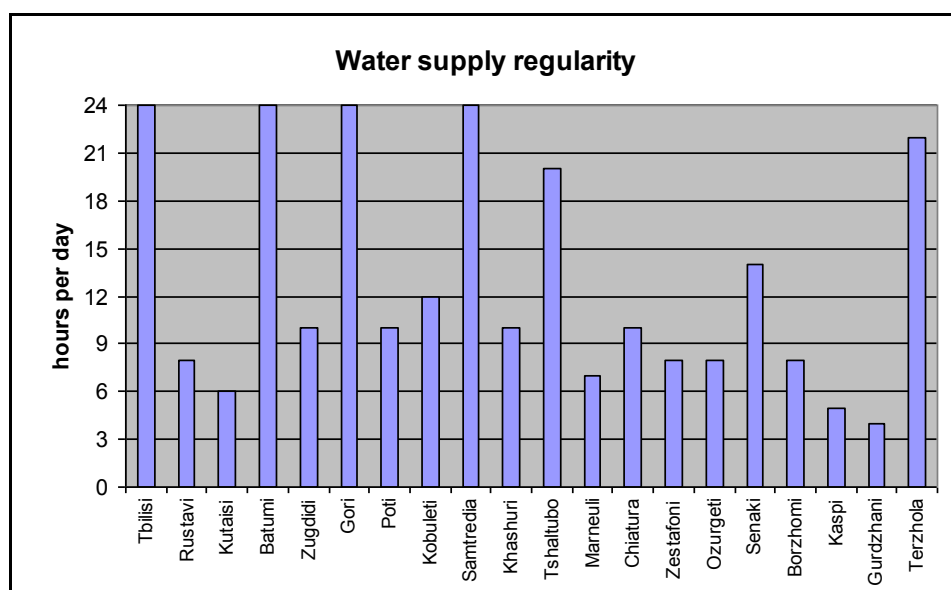
Source: COWI assessment based upon questionnaires

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). However, scheduled supply normally gives high water consumption. The reported unit consumption is correct it also indicates that the real water loss is huge.

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 0-6 Water supply regularity - Year 2004



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; and
- 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

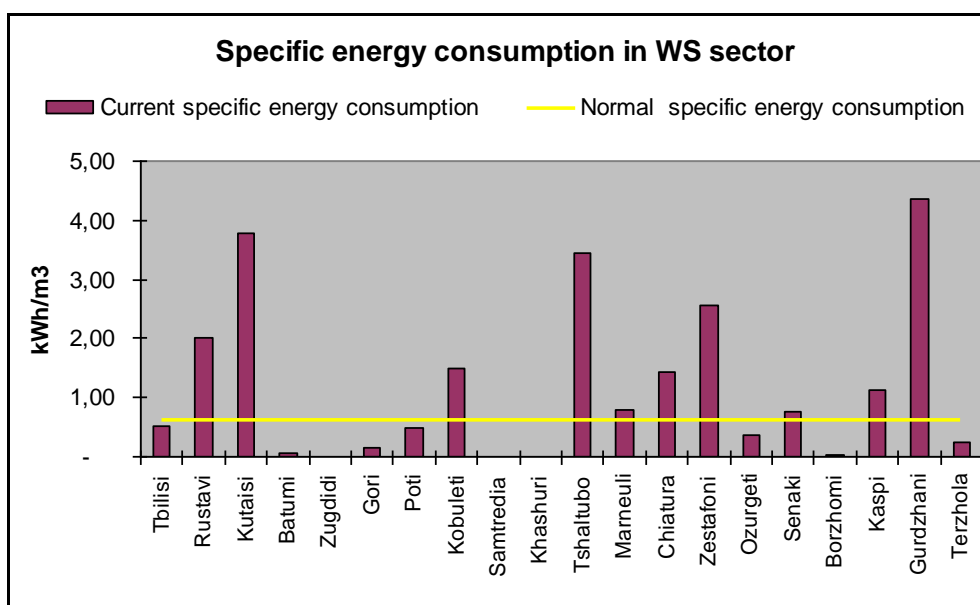
The main electric power consumer in the sector is pumping equipment which is used for water abstraction, treatment and delivery. The currently used pumps are outdated and not very efficient. Distribution networks were designed and constructed in the first part of 20th century. Pumps and other equipment were selected and designed on the basis of water consumption changes foreseen at that time - that means to a high future water demand. 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 a realistic water demand and the lack of applying of modern design principals and considering whole life cycle cost (80 to 90% whole life cost is operation and maintenance costs), and to some extend lack of hydraulic networks modelling causes higher energy consumption.

The internationally recognized average energy consumption for water supplied under normal conditions are equal to 4-5Wh or say 0.4-0.5 kWh/m³ with a total system pumping head of 100 meter. For wastewater treatment plants energy consumption of about 0.6 kWh/m³ (50 kWh/PE), and for wastewater collection and 0.2 kWh/m³ for a pumping head of 30 meters are reasonable figures. The similar indicators in Georgia are the following:

Figure 0-7 Specific energy consumption in the water supply sector, kWh/m³ - Year 2004



Source: Data from the utilities and COWI estimations.

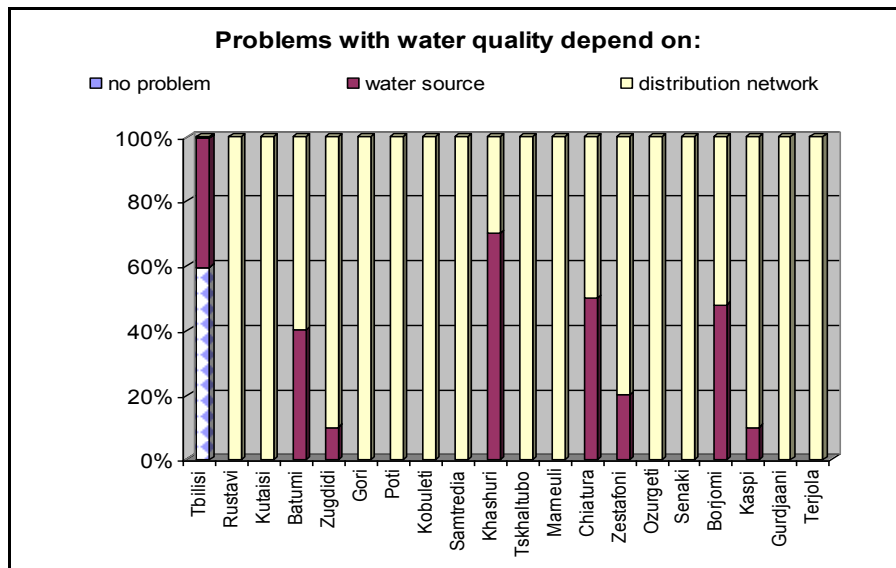
Substantial, specific energy consumption in some settlements may be partly explained by the specificity of the relief (mountainous landscape) and existence of several water lifts.

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 0-8 Reasons for poor water quality - Year 2004



Source: Data from the utilities and COWI assessments

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.

Assessment of Sustainable Access to Safe Water Supply

Table 0-8 Urban population access to sustainable and safe water supply in 1990 and 2003 (estimated using complementary and composite indicators)

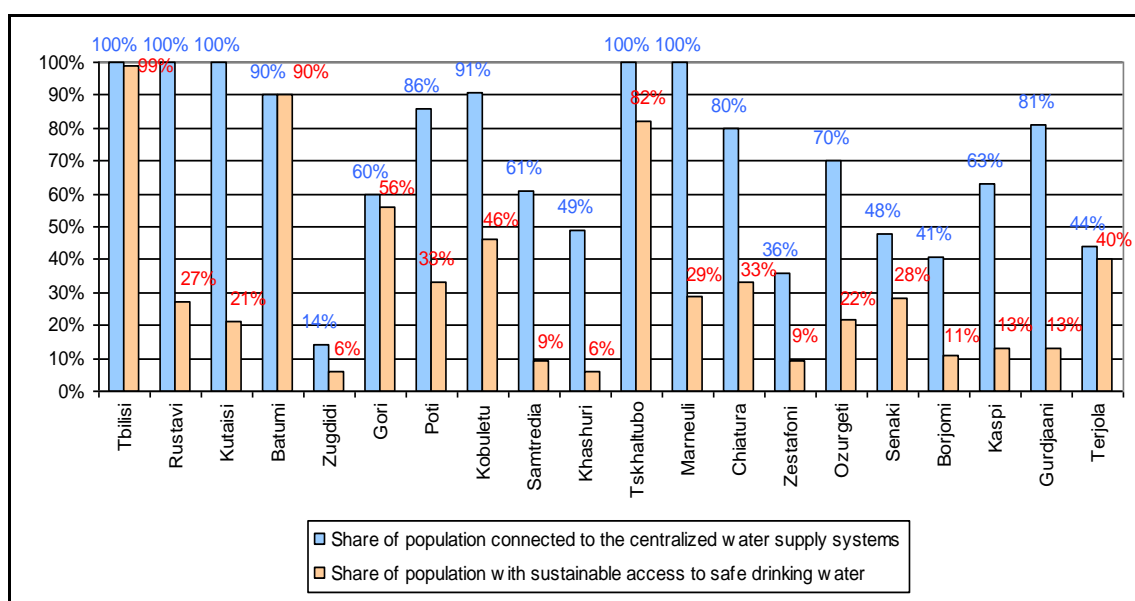
| Cities/Towns | Share of population connected to the centralized water supply systems in 1990 | Water supply regularity in 1990 | Water supply regularity factor, 1990 | Share of drinking water samples not complying with sanitary and bacteriological norms, 1990 | Share of population with sustainable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

Source: Questionnaires and COWI calculations

As the MDG "only" deals" with the choice of technology when defining the access to improved and not improved water and sanitation, an assessment has been to describe the situation in urban water supply by combining the share of people with access to centralised systems, regularity and quality of water¹³.

In Table 0-9 is presented an estimation of the access of urban population in Georgia to sustainable and safe water considering regularity and water quality as important parameters for complementary and composite indicator "sustainable access to safe drinking water" for the year 2003.

Figure 0-9 Access of urban population in Georgia to sustainable and safe water supply in 2003
(estimated using complementary and composite indicators)



Source: COWI estimations

Existing situation of urban wastewater collection and treatment

Wastewater is collected through centralized municipal sewerage systems, and in most cases, due to relief peculiarities, flow to the treatment facilities by gravity. The total length of the wastewater networks and sewers is about 4,000 km.

Theoretically centralised sewerage systems exist in 45 towns of Georgia, but the condition of the systems is very poor. Wastewater treatment facilities exist in 33 towns with a total capacity of 1,640,200 m³ /day. Traditional biological treatment plants are present in 26 towns with a total theoretical capacity of about 1.6 mill m³/day (including regional treatment facilities in the Gardabansky District with a capacity of 1.0 mil. m³/day, serving Tbilisi and Rustavi). Treatment plants with mechanical treatment only are present in 7 residential areas with a total capacity of about

¹³ EF2005 - complementary and composite indicators based on World Bank approach: The share of the urban population with sustainable access to the safe water supply shall be equal to: $ACs = AC \times r \times q$, 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; and **q** – *quality (safety)*, e.g. a share of drinking water samples corresponding to sanitary standards by chemical, organoleptic and bacteriological indicators.

165 thousand m³/day. The treatment plants were put into practice in the period of 1972-1986. None of the biological treatment plants are operating today. The mechanical treatment plants work to a certain degree in Tbilisi-Rustavi, Kutaisi, Tkieuili, Gori and Batumi, but most of the treatment plants are not fully functioning or out of order.

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 0-2 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 micro-organisms 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 10. Picture 0-1 Sand traps and primary sedimentation tanks on Gardabani WWTP in operation



Source: COWI picture

Picture 0-2 Rehabilitated screens



Source: COWI picture

Picture 0-3 Primary radial sedimentation tank in operation. Overflow



Source: COWI picture

Assessment of Improved and Not improved Wastewater in relation to MDG Definition

Table 0-9 Urban population access to sustainable wastewater discharge in 1990 and 2003 (estimated using complementary and composite indicators)

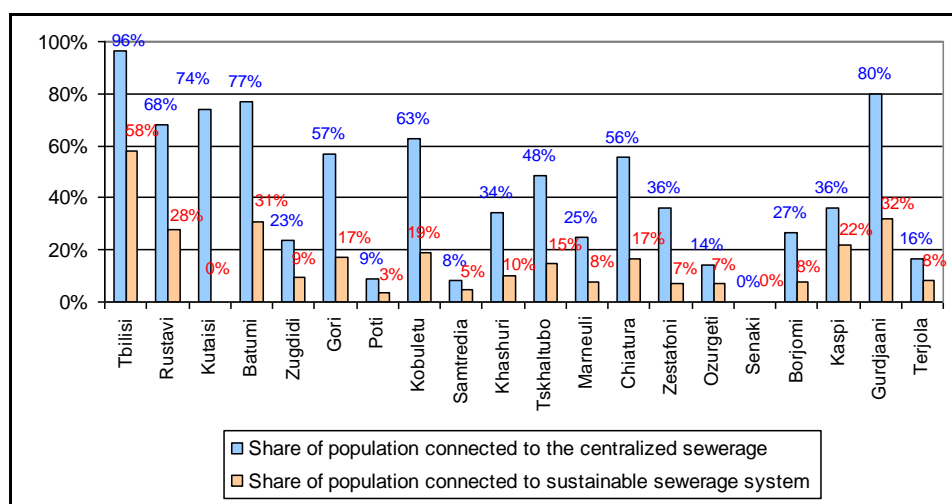
| Cities/towns | Share of population connected to the centralized sewerage in 1990 | Networks which required urgent replacement in 2003 | Share of population connected to sustainable sewerage system in 1990 | Share of population connected to the centralized sewerage in 2003 | Networks which required urgent replacement in 2003 | System reliability factor, 2003 | Share of population connected to sustainable sewerage system in 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: Questionnaires and COWI calculations.

As the MDG "only" deals" with the choice of technology when defining the access to improved and not improved water and sanitation, an assessment has been to describe the situation in urban wastewater by combining the share of people with access to centralised systems and the share of the network system reliability factor (share of sewerage network which does not need replacement) ¹⁴.

In Figure 0-11 is shown the coverage of access to centralised sewerage system for selected cities/towns and the estimated "sustainable access to effective centralised sewerage network.

Figure 0-11 Access of urban population in Georgia to sustainable wastewater discharge in 2003 (estimated using complementary and composite indicators).



Source: COWI estimations

The existing situation in rural water supply

General information

In spite of the fact that Georgia has considerable amount of water resources of an adequate quality, the rural areas at present moment suffer without reliable water supply. The lack of capacity and bad technical condition of water-related equipment and facilities is the main problem in sector of rural water supply and sanitation.

Before year 1998 there were 843 centralized rural waterworks in Georgia. Only 20% of rural settlements (out of 4488) had centralized water supply systems. Out of this figure, 170 rural territorial waterworks are under the supervision of the Water Supply Department of the Ministry of Agriculture. These rural centralised waterworks supply about 550.000 inhabitants, industrial enterprises, institutional entities and commercial organization. The remaining part of waterworks has been operated as standalone without any centralized supervision. Most part of the water utilities are not operated in accordance with existing standards and norms. No water quality control and monitoring as well as water treatment and disinfection are provided. The existing water-related equipment did not receive the proper maintains and service for the long time. So, at present moment most of facilities are

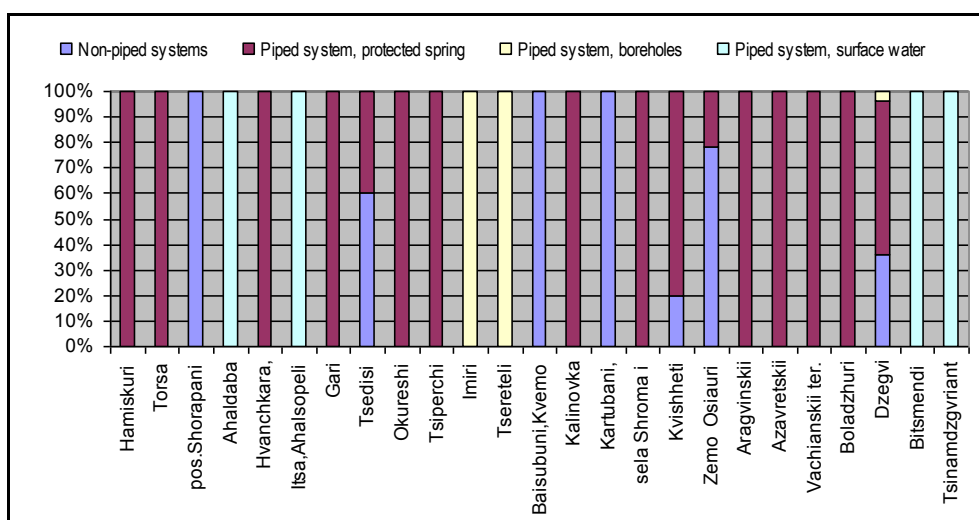
¹⁴ EF2005 - complementary and composite indicators based on World Bank approach: The share of the urban population with sustainable access to the effective centralised sewerage shall be equal to: $AC_{eh} = AC \times d$, where **AC** – share of population with access to centralized sewerage systems; **d**– composite indicator of the facilities' deterioration (e.g. based on a share of a sewerage network which requires replacement).

completely worn out and deteriorated. Thus, it is not possible to supply customers with reliable and safe portable water without rehabilitation of WSS systems which requires considerable amount of investments.

Water sources and quality

Portable water in rural settlements is abstracted from ground sources, protected streams and sometimes from surface water intakes. Type of the water source as well as water quality differs from zone to zone.

Figure 0-12 Water supply sources in rural areas Year 2007



Source: Data from the utilities

In general, raw water from existing sources is of acceptable quality except municipalities in province Mtskhetski and Onski. The major share of water abstracted from ground sources has stable composition, good organoleptic, chemical, toxicological and microbiological properties and comply with national and WHO requirements. However surface water, especially in Mountain areas, contains considerable amount of mineral suspended solids.

Water treatment

Water abstracted from ground sources in Georgia is usually delivered to the distribution network without any treatment and disinfection. In case of surface water and especially the mountain areas or rivers/streams with considerable amount of sediments the application of water treatment technologies is needed. So, simple filtering on sand gravity filters is commonly used. The disinfection of treated or untreated surface water, supplied to distribution network, in most cases is not used due to absence or high operational costs of disinfection facilities.

There is a lack of sanitary inspection laboratories, which provide continuous control of portable water quality and parameters delivered to the customers in Georgia. Thus such service is available only for big cities and there is now reliable water quality information available for rural settlements.

Connection coverage

The connection coverage to centralized water supply system¹⁵ is around 30% (weighted average) and there is no big difference between four selected zones. In case if no centralized WS service available population use simple solutions as dug wells, hand pumps and natural or protected springs with or without distribution tap.

¹⁵ There are 2 main groups divided by type of technology used of water supply; namely *Non-piped systems* with public access and *Piped system* with public access, which is here called centralized system. All other domestic customers which are not connected to centralized water supply solutions, use individual methods, meaning that only one household has access to water source (eg. dug well located in the yard). In case of individual solution the owner provides operation and maintains works for its own individual water source, while in case of centralized water supply systems, customers pay monthly payment to the authority which maintains the water source with public access.

Table 0-10 Connection coverage to centralized water supply system - Year 2007

| Zone | Districts (Rayons) | Village/settlement | Total sampled population in the baseline year | Coverage of centralized WS service | Share of sampled population supplied by | |
|------|--------------------|--|---|------------------------------------|---|---------------|
| | | | | | Non-piped systems | Piped systems |
| | | | inh. | % | % | % |
| 1 | | Western | | | | |
| | Khobski | Hamiskuri | 1 762 | 35.3 | 0 | 100 |
| | | Torsa | 1 440 | 28.0 | 0 | 100 |
| | Zestafonski | Shorapani | 1 956 | 27.0 | 13 | 87 |
| | | Average in the group | | 30.1 | | |
| 2 | | Mountain | | | | |
| | Borgomi | Ahaldaba | 2 445 | 30.7 | 0 | 100 |
| | Ambrolaurski | Hvanchkara, Chordzho | 990 | 41.3 | 0 | 100 |
| | | Itsa, Ahalsopeli | 173 | 100.0 | 0 | 100 |
| | Onski | Gari | 521 | 28.6 | 0 | 100 |
| | | Tsedisi | 380 | 56.3 | 60 | 40 |
| | Tsagersky | Okureshi | 665 | 47.5 | 0 | 100 |
| | | Tsiterchi | 335 | 41.5 | 0 | 100 |
| | | Average in the group | | 39.0 | | |
| 3 | | Eastern | | | | |
| | Marneulski | Imiri | 1 445 | 33.3 | 0 | 100 |
| | | Tsereteli | 2 206 | 33.3 | 0 | 100 |
| | Lagodehskii | Baisubani, Kvemo mshalgori, Zemo mshalgori | 3 065 | 36.8 | 100 | 0 |
| | | Kalinovka | 1 800 | 39.8 | 0 | 100 |
| | | Kartubani, Natsiskvilari, Bolokiani. | 3 140 | 42.8 | 100 | 0 |
| | | Shrama, Kavshiri | 2 402 | 40.5 | 0 | 100 |
| | | Kvishheti | 4 880 | 0.0 | 20 | 80 |
| | Khashurski | Zemo Osiauri | 1 800 | 8.5 | 78 | 22 |
| | | Average in the group | | 26.7 | | |
| 4 | | Southern | | | | |
| | Akhalkalaki | Aragvinskii | 2 277 | 15.9 | 0 | 100 |
| | | Azavretskii | 3 258 | 26.9 | 0 | 100 |
| | | Vachianskii | 3 346 | 27.3 | 0 | 100 |
| | Adigenski | Boladzhuri | 1 092 | 77.8 | 0 | 100 |
| | Mtskhetski | Dzegvi | 3200 | 34.4 | 36 | 64 |
| | | Bitsmendi | 567 | 51.3 | 0 | 100 |
| | | Tsinamdzhvris kari | 452 | 47.1 | 0 | 100 |
| | | Average in the group | | 32.5 | | |

Source: data from questionnaires.

Water distribution

The term *Non-centralized water supply* assumes that water is not taken from water mains from water sources or from distribution network. The division of population shares connected to centralized WS systems by technologies are shown in Table 0-11.

Table 0-11 Division of population shares connected to centralized WS systems by technologies

| Types of Technologies | Zone 1 | Zone 2 | Zone 3 | Zone 4 |
|---|--------|--------|--------|--------|
| Not connected to centralized WS systems | 59.9 | 61.0 | 73.3 | 67.5 |
| Connection coverage to centralized WS systems | 30.1 | 39.0 | 26.7 | 32.5 |
| a. Non-piped systems | 4,4 | 6,0 | 46,9 | 8,6 |
| b. Piped systems | 95,6 | 94,0 | 53,1 | 91,4 |

Source: COWI calculation based upon data from questionnaires.

In Table 0-12 and Table 0-13 are shown the different type of water supply systems commonly used in the 4 zones, calculated as the weighted average for respective groups, connected to different technologies of non-piped systems.

Table 0-12 The share of technology used in non-piped water supply systems - Year 2007

| Type of Technologies | Zone 1 | Zone 2 | Zone 3 | Zone 4 |
|---|--------|--------|--------|--------|
| Share of customers with non-piped systems in % | 4.4 | 6.0 | 46.9 | 8.6 |
| Rain water collection | - | - | - | - |
| Dug well and hand pump | 26.2 | - | 30.1 | 4.6 |
| Protected spring and tap | 7.9 | 10.0 | 2.8 | 19.2 |
| Borehole and handpump | - | - | 14.6 | - |

Source: COWI calculation based upon data from questionnaires.

In case of *centralized water supply* in most settlements non-pumping technologies are used. Mainly water is supplied to customers by gravity from water source, through storage reservoir or elevated tank and then distributed via network to yard taps or/and house connections. Only few municipalities in Zone 3 and 4 use stand posts for water distribution to end customers. The share of the population supplied with water from different technologies from piped systems is shown in Table 0-13, calculated as the weighted average for respective groups, connected to different technologies of piped systems.

Table 0-13 Share of population served by piped water supply systems using different technologies in %
- Year 2007

| Type of Technologies | Zone 1 | Zone 2 | Zone 3 | Zone 4 |
|--|--------|--------|--------|--------|
| Share of customers connected to piped systems in % | 95.6 | 94.0 | 53.1 | 91.4 |
| <i>Piped system, protected spring, gravity pipe, reservoir</i> | 66.0 | 51.1 | 31.1 | 79.5 |
| - Standpost | - | - | 2.2 | 7.5 |
| - Yard Tap | 49.4 | 31.9 | 13.7 | 48.2 |
| - House connection | 16.6 | 10.5 | 17.4 | 33.4 |
| <i>Piped system, boreholes, pumps</i> | - | - | 13.3 | 1.0 |
| - Standpost | - | - | - | - |
| - Yard Tap | - | - | 13.3 | - |
| - House connection | - | - | - | 23.9 |
| <i>Pipe system, boreholes, pumps, reservoir</i> | - | - | 8.7 | - |
| - Stand post | - | - | - | - |
| - Yard Tap | - | - | 8.7 | - |
| - House connection | - | - | - | - |
| <i>Piped system, surface water, gravity, reservoir</i> | - | 42.9 | - | 4.6 |
| - Standpost | - | - | - | - |
| - Yard Tap | - | 20.0 | - | 4.2 |
| - House connection | - | 22.9 | - | 0.5 |
| <i>Piped system, surface water, pumps, reservoir</i> | 29,6 | - | - | 6,3 |
| - Standpost | - | - | - | 0,1 |
| - Yard Tap | 3,9 | - | - | 5,9 |
| - House connection | 30,1 | - | - | 0,3 |

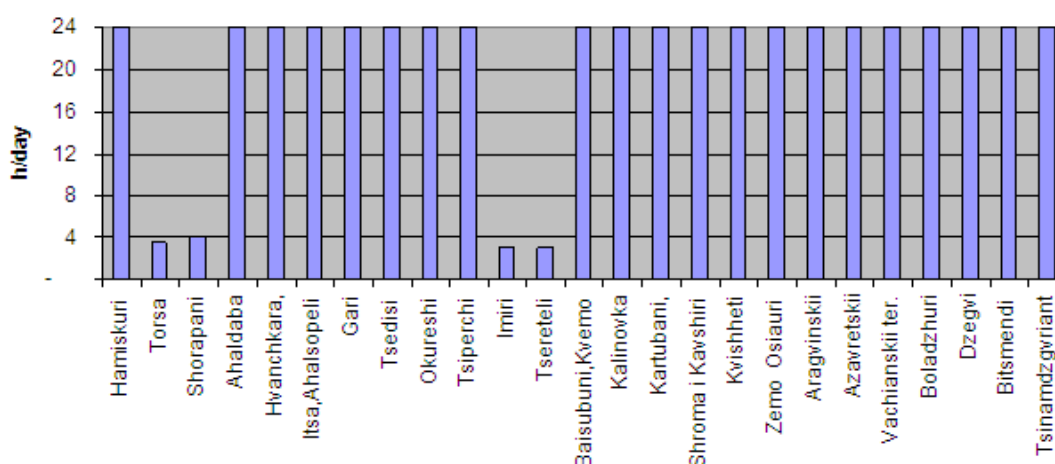
Source: COWI calculations based upon data from questionnaires.

Some villages receive portable water from big transmission mains (Gari, Shroma, Kavshiri, Kalinovka, Zemo Osiauri, Boladzhuri) which are used for water transportation for the long distance to other, normally, urban municipalities and passing by selected villages. In this case there are no any costs on water abstraction, treatment, disinfection and pumping carried out by such rural settlements. Depending on situation and agreements between water producer and municipality, settlements may pay for water taken from the transmission main or are not paying.

The quality of services

In rural area water is in most cases delivered to the customers directly from boreholes or springs without any treatment. In case of surface water sources (streams and rivers) – water is delivered after simplified treatment (filtering and clarification) or without any treatment. In all settlements where water from the source transported by gravity, regularity is equal to 24hours per day, but in case if pumping is used for water abstraction (Shorapani, Imiri, Tsereteli) the average regularity does not exceed 3-4 hours per day. This is caused by high electricity prices and limited municipality budgets. Moreover the technical condition and remaining assets value is very low. This fact reflects the lack of financing of operation and maintains works in WSS infrastructure and facilities for a long period. Most of water intake facilities, transmission mains, distribution networks and pumping equipment worn out and need to be rehabilitated or replaced. The average assets value for all 4 zones is equal to 39%.

Figure 0-13 Water supply regularity in selected settlements - Year 2007



Source: Data from questionnaires

Water losses and unaccounted for water

It's not possible to assess the present level of losses in the system and unaccounted for water volume as no production meters and water metering equipment at the consumer's side are used.

The sanitary and hygienic condition of the rural water supply

Portable water supplied to the customers through the centralized water supply systems is not always safe for the health and often does not correspond to microbiological, safety or other existing standards. As was indicated before, the main reasons for that are:

- Absence of monitoring as well as dedicated inspection laboratories and institutional structures which can continuously provide monitoring and quality control service for rural territories.
- Absence of sanitary zones for water intake.
- Absence or inadequate treatment of raw water and so on.
- Deteriorated transmission pipes and distribution network, which could be a one of the reason of secondary contamination of portable water.

So, the establishing of centralized water quality control and monitoring institutional structure as well as some sort of coordination centre for WSS sector for rural and urban areas is a question of utmost necessity.

Assessment of Improved and Not improved Water Supply in relation to MDG Definition

Centralised water supply system is per MDG definition improved system regardless if it is not 24 hours supply (people may have storage tanks) and if the water qualities do not comply with the standard 100%.

Based upon the data collected and COWI's own assessment based on experience with other assessments in EECCA countries, it is estimated that about 25% (weighted average of population in

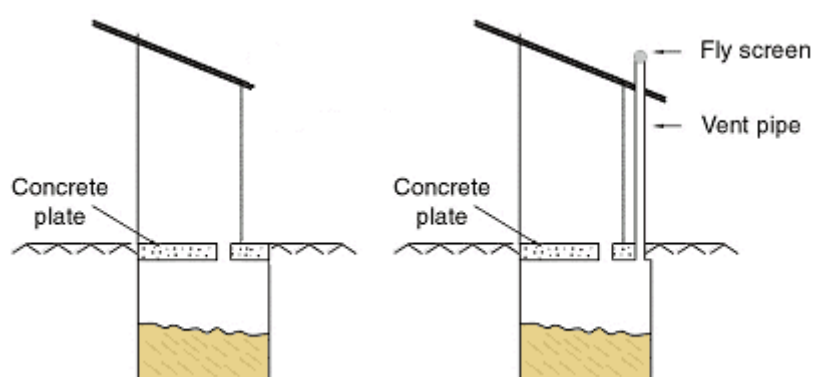
the sampled settlements) of the non- centralised water supply does not have access to safe water, mainly due to problems with water quality irregularities in supply. Of the centralised systems it is estimated that about 15 % has not access to safe water. Thus, about 40% has not access to "sustainable access to safe water supply".

Wastewater collection and treatment – Existing situation

Wastewater collection methods and coverage

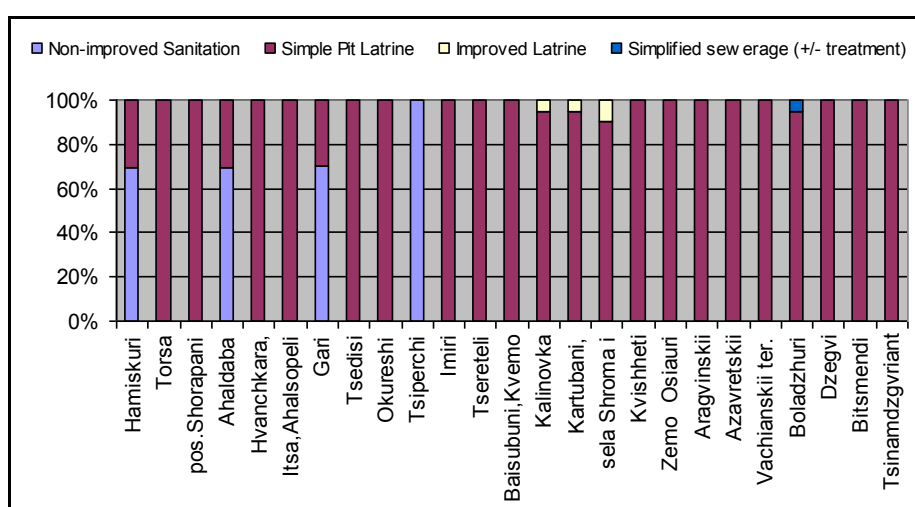
Unfortunately centralized wastewater collection system is not presented in most of selected settlements with number of population less than 5000 as well as in municipalities beyond the sampled list. The most commonly used solution for rural areas is a Simple Pit Latrine (more often use) and Ventilated Pit Latrine (more seldom use).

Figure 0-14 Simple Pit Latrine (left) and ventilated pit latrine (right)



The breakdown of technologies used in sampled municipalities for human excreta disposal system and waste water discharge is presented in Figure 0-15. As it can be seen most settlements have only pit latrines.

Figure 0-15 Main wastewater disposal technologies - Year 2007



Source: Data from questionnaires.

Wastewater treatment

There is no treatment of wastewater. Even in case when simplified sewerage system is used for wastewater removal the collected wastewater is discharged to water bodies or filtration lagoons without treatment.

Condition of facilities

The condition of the wastewater facilities are reported to have an assets value of about 50-60 % based on the data collection

Assessment of Improved and Not improved Sanitation in relation to MDG Definition

Based upon the data collected and COWI's own assessment based on experience with other assessments in EECCA countries, it is estimated that about 11% (weighted average of population in the sampled settlements) of the rural sanitation which do not have access to sustainable sanitation. There is no centralised sanitation system in the rural area.

Existing situation with the Supply of Finance for urban and rural areas

To analyse whether expenditure needs for sustaining existing service levels can be met, they need to be compared with current levels of supply of finance to water and sanitation sector from all financing sources. This section provides overview of such financing sources and estimates, on the basis of available data, total amount of financing for water and sanitation sector.

Main financing sources typically include:

- User charges;
- Financing from national and local budgets;
- External financing from international donor and IFI community.

Before proceeding to presentation of financing from each source, it is necessary to note that data has been gathered and analysed on the basis of presumption that year 2005 is the base year for all further analysis in the report. Hence, most of the basic data are that of year 2005. Where more recent information has been available or collected, comparative review of such data with basis year has been provided.

User charges

User charges are the most important source of revenue for the operators of water and wastewater services. In principle, in order for the current expenditure levels or any other future investments to be sustainable user charges must cover the full costs of operating and maintaining the systems.

Current levels of tariffs in water sector in Georgia are not, with some exception, at the full-cost recovery levels. It is also not clear whether legislation requires that consumers pay the full cost of the services. No approved methods and procedures of calculation of water and wastewater tariffs exist. Each water company calculates its own water and sanitation tariff. Each city and district has its own tariff rates for all consumer categories. The tariff approval procedure starts from water utility calculating the implied tariff based on existing costs plus operating profit margin. The calculations are thereafter submitted to local municipal council, which, according to latest law on local self-governance is the sole body entitled to decide on water and wastewater tariffs. After calculations are

discussed and approved at the municipal departments of municipality, the revised and updated version is submitted to the legislative assembly of municipality for approval. When the decision regarding tariffs is adopted it is published in local press.

Metering is virtually non-existent or if it is present in larger cities the coverage by meters is very low. In rare cases when meters are installed payment is calculated based on meter reading. In all other cases payment for water supply services is calculated based on established normative.

Tariff levels vary significantly across urban settlements and in some, especially larger cities notable change in tariff levels has occurred in last 2 years (see table below for comparative analysis of tariff levels in 2005 and 2007). For example water tariff in Tbilisi was at the level of 0.05 Lari/m³ for households in 2005. During 2006 and early 2007 the tariff doubled and is currently at the level of 0.1 Lari/m³. Such increase, however, was not typical for all cities and towns. It is, generally, difficult to note any underlying trend in the dynamics of tariff variations - in some cities it has been growing, in others decreasing, and yet in many of them stayed at the same level for the last 2-3 years. The example of Tbilisi has already been noted above. In Kutaisi the water tariff for households seemed to have gone down from the level of 0.25 to 0.20 Lari/m³. Yet in other cities such as Gori, Zugdidi, Marneuli no change has been observed from 2005 to 2007.

On the basis of year 2005 calculations, average water tariff for household in all covered cities (excluding Tbilisi) was around 0.2 lari/m³ and wastewater household tariff is around 0,1 Lari/m³. The actual tariffs vary substantially and such variation is frequently explained by the level of operating costs (primarily electricity cost) which can also vary depending on geographical location of the urban settlement. In case a settlement is situated on the plane, it has gravity water networks, and the cost of services provided is far less than in the settlements where water is pumped incurring high energy expenditure.

Table 0-14 Household water and wastewater tariffs, Lari/m3

| No. | Utility | 2005 | | 2007 | |
|-----|---------------------|-------|------------|-------|------------|
| | | Water | Wastewater | Water | Wastewater |
| 1 | Tbilvodocanal | 0.04 | 0.01 | 0.1 | - |
| 2 | Gruzvodocanal | - | 0.014 | - | 0.014 |
| 3 | Batumivodocanal | 0.025 | 0.03 | 0.22 | 0.28 |
| 4 | Gorivodocanal | 0.05 | 0.05 | 0.05 | 0.05 |
| 5 | Khashuritskali | 0.08 | - | 2,63 | 0.4 |
| 6 | Borjomivodocanal | 0.04 | 0.02 | 0.04 | 0.02 |
| 7 | Marneulivodocanal | 0.55 | 0.3 | 0.55 | 0.13 |
| 8 | Chiaturavodocanal | 0.2 | 0.13 | 0.2 | 0.13 |
| 9 | Kutaisivodocanal | 0.25 | 0.04 | 0.20 | 0.04 |
| 10 | Kobuletivodocanal | 0.05 | 0.06 | 0.28 | 0.153 |
| 11 | Zugddivodocanal | 0.3 | 0.25 | 0.3 | 0.25 |
| 12 | Zestefonivodocanal | 0.27 | 0.11 | 0.28 | 0.12 |
| 13 | Rustavcanal | - | 0.12 | 0.35 | 0.4 |
| 14 | Samtrediacanal | - | 0.2 | - | 0.17 |
| 15 | Samtrediatskali | 0.08 | - | 0.08 | - |
| 16 | Gurdjaanitskali | 0.5 | - | 1.0 | - |
| 17 | Kaspivodocanal | 0.08 | 0.02 | 0.2 | 0.4 |
| 18 | Ozurgetivodocanal | 0.23 | 0.2 | 0.35 | 0.26 |
| 19 | Khashuri | - | 0.66 | 2.63 | 0.4 |
| 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 | 0.18 | 0.02 |
| 23 | Rustavtskali | 0.073 | - | 0.35 | 0.4 |
| 24 | Senakitskali | 0.31 | - | 0.55 | - |

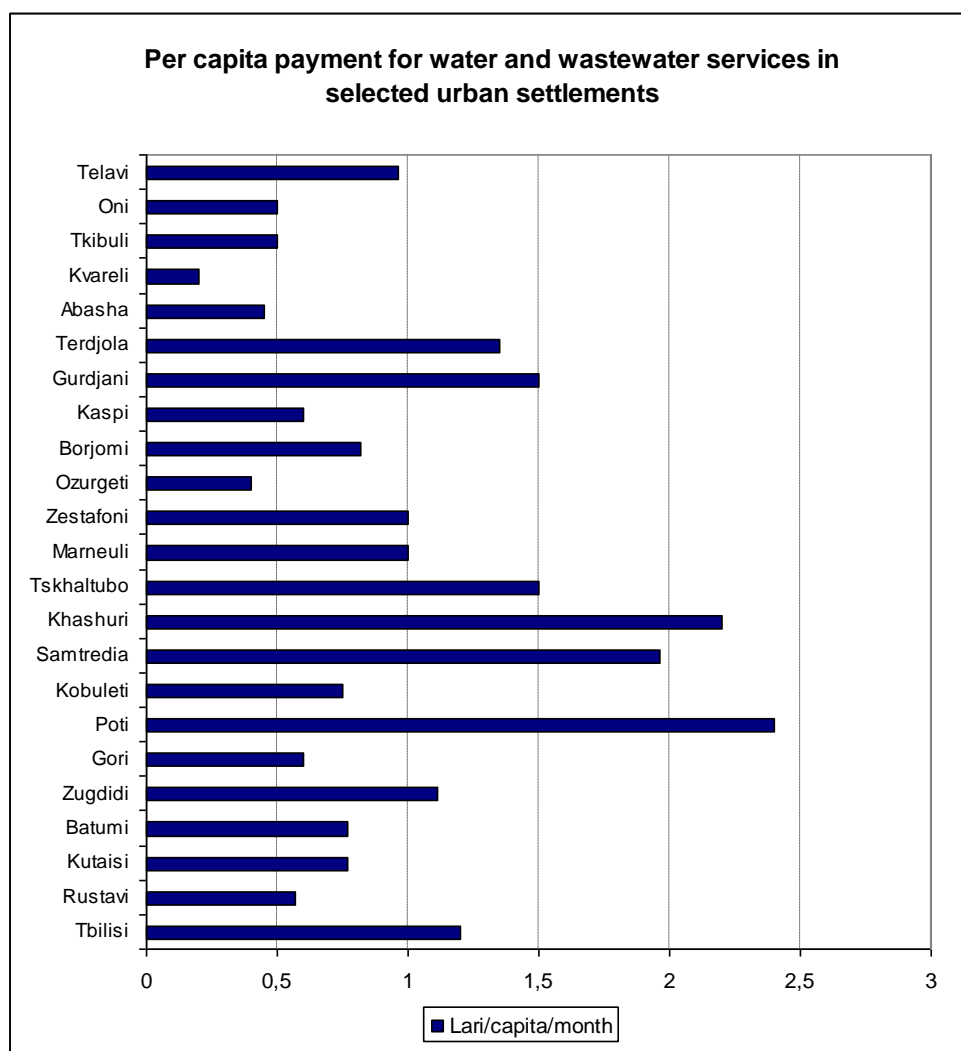
Source: Data collected and COWI's assessments.

Due to lack of metering, as noted above, actual household payments are calculated on the basis of normative consumption values. Such normative can also vary significantly. For example the level of water consumption norm for Tbilisi is at 800 lcd, while in Zugdidi it stands around 75 lcd.

On the basis of approved tariffs and normative consumption, monthly charges per capita for population are calculated and used as a basis for billing. Other customers are billed in accordance with actual metered water consumption based on tariff per m3 of water consumed and wastewater discharged.

Figure below shows per capita household monthly payments in selected urban settlements.

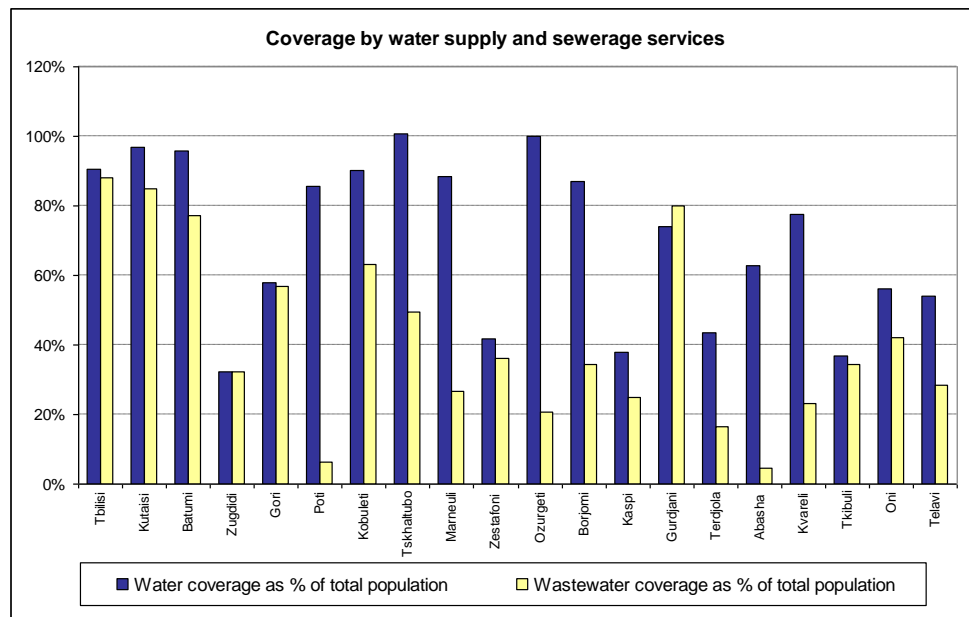
Figure 0-16 Per capita household monthly payments in selected urban settlements, Lari/capita/month, 2005



Source: Data collected and COWI's assessments

Based on per capita calculated payment, households that are covered by water company services are billed on monthly basis. Household coverage rate varies across settlements and is in the range of 37-90% for water and 6-88% for wastewater collection services. Figure below demonstrates service coverage in selected cities and is a useful reference in estimating future potential of user charges increase by extending the coverage to the part of population currently not receiving centralised water and sanitation services.

Figure 0-17 Service coverage in selected cities, 2005, in % of total population in cities and towns



Source: Data collected and COWI's assessments

Based on the data collected on total amount of water and sanitation service billing by all included cities and towns, billed potential revenue from all customer groups stand at Lari 52 million in 2005. Households account for 36% and other customers for 64% of that amount. Table below shows billed total water and sanitation amounts for selected cities.

Table 0-15 Total billing for services, 2005, in Lari

| Cities | Total billing | Total billing, households | Total billing, other customers | Total billing, households | Total billing, other customers |
|--------------|-------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|
| Tbilisi | 39,193,820 | 12,815,442 | 26,378,378 | 33% | 67% |
| Rustavi | 2,837,204 | 522,961 | 2,314,243 | 18% | 82% |
| Kutaisi | 3,254,142 | 2,152,029 | 1,102,113 | 66% | 34% |
| Batumi | 2,615,451 | 568,901 | 2,046,550 | 22% | 78% |
| Zugdidi | 94,891 | 31,140 | 63,751 | 33% | 67% |
| Gori | 270,137 | 122,000 | 148,137 | 45% | 55% |
| Poti | 808,800 | 564,312 | 244,488 | 70% | 30% |
| Kobuleti | 184,986 | 54,000 | 130,986 | 29% | 71% |
| Samtredia | 271,240 | 121,831 | 149,409 | 45% | 55% |
| Khashuri | 141,072 | 95,620 | 45,452 | 68% | 32% |
| Tskhaltubo | 333,890 | 201,720 | 132,170 | 60% | 40% |
| Marneuli | 529,000 | 495,000 | 34,000 | 94% | 6% |
| Zestafoni | 137,179 | 84,692 | 52,487 | 62% | 38% |
| Ozurgeti | 41,000 | 30,500 | 10,500 | 74% | 26% |
| Borjomi | 76,590 | 31,750 | 44,840 | 41% | 59% |
| Kaspi | 91,195 | 55,998 | 35,197 | 61% | 39% |
| Gurdjani | 199,410 | 180,000 | 19,410 | 90% | 10% |
| Terdjola | 23,154 | 12,000 | 11,154 | 52% | 48% |
| Abasha | 44,389 | 20,320 | 24,069 | 46% | 54% |
| Kvareli | 32,700 | 32,700 | - | 100% | 0% |
| Tkibuli | 89,766 | 48,204 | 41,562 | 54% | 46% |
| Oni | 22,900 | 10,100 | 12,800 | 44% | 56% |
| Telavi | 155,400 | 99,000 | 56,400 | 64% | 36% |
| TOTAL | 51,448,316 | 18,350,220 | 33,098,096 | 36% | 64% |

Source: Data collected and COWI's assessments

While table above shows the potential revenues for water companies from user charges, it is the actual cash inflow that matters when refereeing to water utility's ability to cover expenditure needs. Actual cash inflow from user charges stands only at 65% of total billed amount for all customers. This reflects rather poor payment discipline. When separating bill payment practices for households and other customers, it is apparent that most of the problems come from regular non-payment by households. Average collection rate from households in covered cities stands at 45% while from other customers, including budgetary organisations, at 77%. This is very low compared to international benchmarks as well as collection rates in other comparable to Georgia countries. Table below shows the amounts of actually collected cash proceeds. Total amount stands at Lari 34 million with population (households) accounting for about 25%. This implies that financial standing of water companies can be substantially improved by merely improving payment discipline.

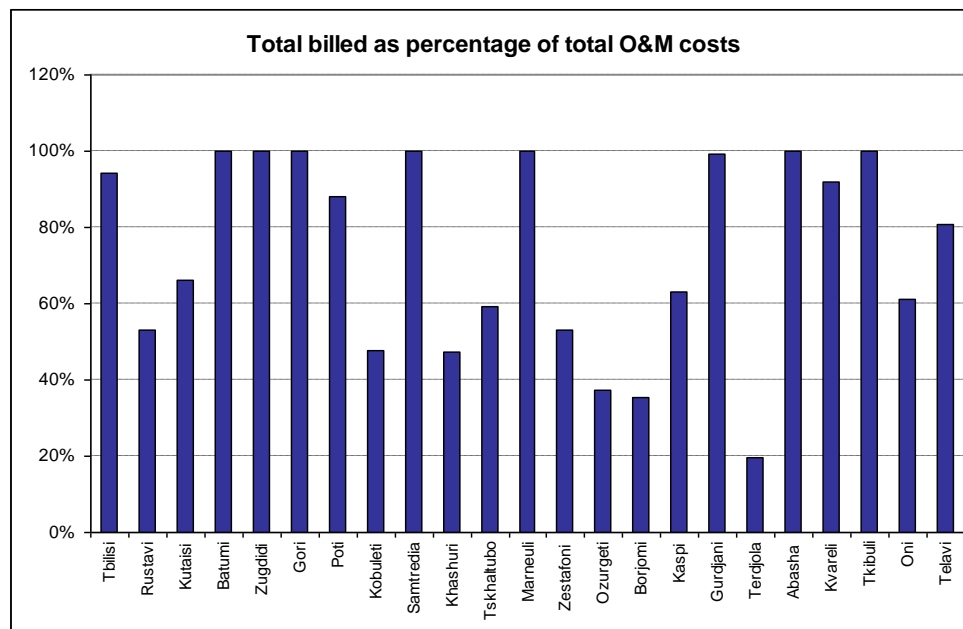
Table 0-16 Collection rate from households and other customers, 2005, in Lari

| Cities | Total collection | Total collection, households | Total collection, other customers | Collection Households | Collection Other customers |
|--------------|-------------------|------------------------------|-----------------------------------|-----------------------|----------------------------|
| Tbilisi | 26.954.758 | 6.920.339 | 20.034.419 | 54% | 76% |
| Rustavi | 855.730 | 62.755 | 792.975 | 12% | 34% |
| Kutaisi | 1.115.904 | 516.487 | 599.417 | 24% | 54% |
| Batumi | 2.615.451 | 102.402 | 2.513.049 | 18% | 100% |
| Zugdidi | 87.318 | 1.557 | 85.761 | 5% | 100% |
| Gori | 196.647 | 31.720 | 164.927 | 26% | 100% |
| Poti | 542.900 | 242.654 | 300.246 | 43% | 100% |
| Kobuleti | 138.586 | 18.900 | 119.686 | 35% | 91% |
| Samtredia | 130.809 | 18.275 | 112.534 | 15% | 75% |
| Khashuri | 105.687 | 33.467 | 72.220 | 35% | 100% |
| Tskhaltubo | 198.561 | 70.602 | 127.959 | 35% | 97% |
| Marneuli | 209.340 | 59.400 | 149.940 | 12% | 100% |
| Zestafoni | 96.559 | 27.948 | 68.611 | 33% | 100% |
| Ozurgeti | 41.000 | 15.250 | 25.750 | 50% | 100% |
| Borjomi | 28.416 | 4.763 | 23.654 | 15% | 53% |
| Kaspi | 29.361 | 12.320 | 17.041 | 22% | 48% |
| Gurdjani | 57.227 | 18.000 | 39.227 | 10% | 100% |
| Terdjola | 23.154 | 10.800 | 12.354 | 90% | 100% |
| Abasha | 15.490 | 3.048 | 12.442 | 15% | 52% |
| Kvareli | 32.700 | 29.430 | 3.270 | 90% | - |
| Tkibuli | 46.149 | 16.871 | 29.278 | 35% | 70% |
| Oni | 16.341 | 5.454 | 10.887 | 54% | 85% |
| Telavi | 51.800 | 12.870 | 38.930 | 13% | 69% |
| TOTAL | 33.589.888 | 8.235.312 | 25.354.576 | 45% | 77% |

Source: Data collected and COWI's assessments

In terms of cost recovery of user charges, none of the water companies, with minor exception, is able to recover all operating and maintenance costs even if to compare the actual billed amounts to that of total O&M cost of individual water companies (see figure below).

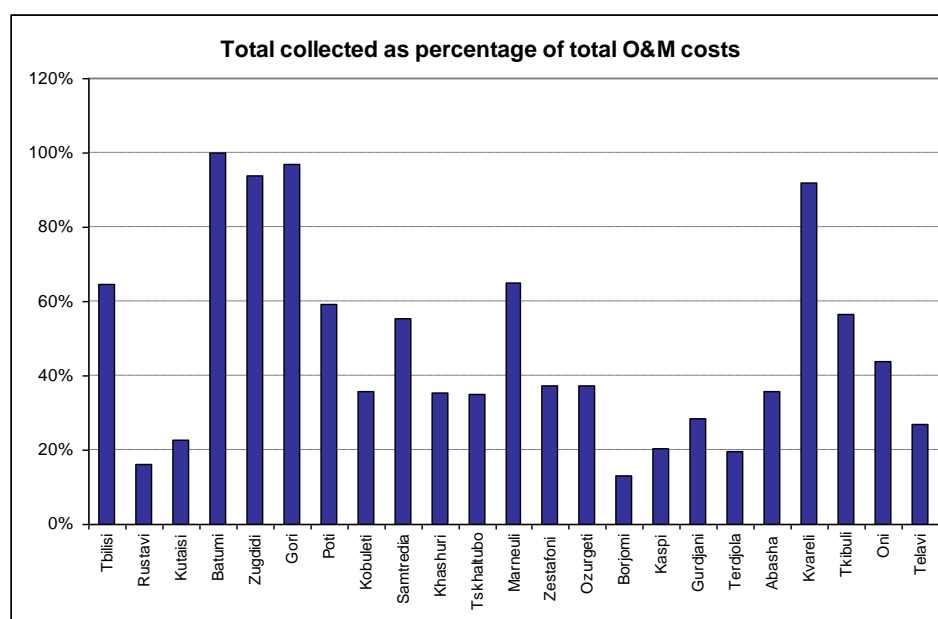
Figure 0-18 Billing as percentage of O&M costs, 2005, in %



Source: Data collected and COWI's assessments

If to compare similarly total costs with actually received cash receipts on annual basis the picture is even more vivid, as most of the water companies are unable to meet even half of the O&M expenditure out of user charges proceeds (see figure below).

Figure 0-19 Collection as percentage of O&M costs, 2005, in %



Source: Data collected and COWI's assessments

Substantial part of total O&M costs of most of the water utilities are personnel costs and electricity costs. Numbers of companies operating with gravity flow are able to reduce their costs by avoiding high energy costs. Number of such water utilities, however, is limited, partially due to old designs when relief of the location has not been taken into account during laying the water and sewerage networks and even those settlements that could potentially benefit from gravity flows are paying high electricity cost. Tables below show total costs for selected water utilities.

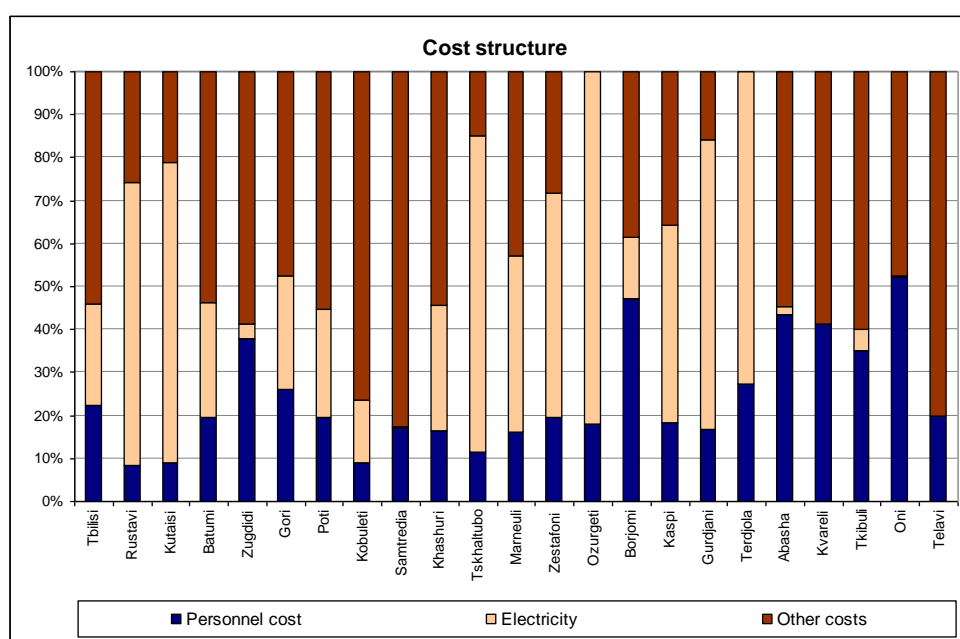
Table 0-17 Cost of services, 2005, in Lari

| Cities | Personnel cost | Electricity | Other costs | Total |
|------------|----------------|-------------|-------------|------------|
| Tbilisi | 9,313,000 | 9,841,000 | 22,467,000 | 41,621,000 |
| Rustavi | 443,772 | 3,513,435 | 1,375,956 | 5,333,163 |
| Kutaisi | 436,453 | 3,452,200 | 1,036,647 | 4,925,300 |
| Batumi | 509,070 | 702,305 | 1,404,076 | 2,615,451 |
| Zugdidi | 35,078 | 3,360 | 54,462 | 92,900 |
| Gori | 53,098 | 53,471 | 96,431 | 203,000 |
| Poti | 179,800 | 231,200 | 507,519 | 918,519 |
| Kobuleti | 35,078 | 56,500 | 295,714 | 387,292 |
| Samtredia | 40,069 | 997 | 195,653 | 236,719 |
| Khashuri | 49,535 | 86,445 | 162,751 | 298,731 |
| Tskhaltubo | 65,022 | 416,552 | 83,897 | 565,471 |
| Marneuli | 52,300 | 131,832 | 138,712 | 322,844 |
| Zestafoni | 50,674 | 135,250 | 72,688 | 258,612 |
| Ozurgeti | 19,800 | 89,600 | - | 109,400 |
| Borjomi | 101,727 | 30,532 | 83,365 | 215,624 |
| Kaspi | 26,746 | 66,211 | 51,807 | 144,764 |
| Gurdjani | 33,586 | 135,607 | 31,853 | 201,046 |
| Terdjola | 32,216 | 85,092 | - | 117,308 |
| Abasha | 18,860 | 760 | 23,763 | 43,383 |
| Kvareli | 14,700 | - | 20,800 | 35,500 |
| Tkibuli | 28,661 | 4,031 | 49,126 | 81,818 |
| Oni | 19,450 | 100 | 17,806 | 37,356 |
| Telavi | 38,000 | - | 154,000 | 192,000 |

Source: Data collected and COWI's assessments

In terms of cost structure, the situation is also significantly different in water companies. As noted earlier, for those water utilities which use extensive pumping for delivery of water and removal of wastewater, electricity consumption can be significant and account for as high as 60-80% of total operating costs (for example Rustavi, Kutaisi, Tskhaltubo, Ozurgeti). For those water utilities that rely on gravity, electricity cost is respectively negligible and cost of personnel is typically the single largest component in the cost structure. In some cases, however, it is important to be cautious when interpreting low energy consumption cost. For some water companies this does not necessarily imply gravity fed services, but rather low service regularity.

Figure 0-20 Structure of operating and maintenance costs, 2005, in %



Source: Data collected and COWI's assessments

To summarise, the following table presents aggregate figures for supply of financing from user charges for water and wastewater companies in Georgia in 2005 based on the total billed amount for respectively water and sanitation service to households and other customers (commercial, industrial entities, and budget organisations).

Table 0-18 Supply of finance from user charges, 2005, Lari million

| Customers | Lari, mill. |
|------------------------|---------------|
| Total billed | 51,448 |
| water | 35,725 |
| wastewater | 15,723 |
| Households | 18,350 |
| water | 14,196 |
| wastewater | 4,155 |
| Other customers | 33,098 |
| water | 21,529 |
| wastewater | 11,569 |

Source: Data collected and COWI's assessments

National and local budgets

Accurate amount of national and local budget allocations to water and wastewater sector is difficult to assess since range of different level subsidies exist and number of items are allocated off-budget for example national co-financing contributions for projects prepared within Municipal Development Fund structure. Certain information can be derived on the basis of government budget analysis. However most of the information provided herein and used as estimation of budget funds availability for baseline scenario are derived from data provided by the Ministry of Finance.

Type of the budget support include direct subsidies to water companies for covering their operation and maintenance expenses and capital funding contributions to co-finance investment projects, primarily undertaken by IFIs. Direct budget subsidies, mostly via local budgets, have been provided to water utilities on an ongoing basis, since, as already mentioned before, user charges hardly covered even 50% of operating costs and additional funding was required to sustain existing service levels. As far as capital project financing, the volume has been limited until last two years, when government has developed number of programmes (with involvement of range of donors and IFIs) to significantly improve situation with water supply and sanitation.

While budget funds for financing recurrent expenditure are mostly provided via local budgets, the capital expenditure primarily originates from national budget, frequently via specifically established mechanisms such as, for example, Municipal Development Fund.

For allocation of re-current expenditure subsidies formal procedure exists whereby size of local budget subsidy depends on the forecasting of potential billing and collection during that year. Based on the amount of potential cash receipts, required budget subsidy is calculated and certain provision in local municipal budgets is made for a given amount.

As already mentioned before, data regarding such subsidies are incomplete, frequently exists only in aggregated form, and sometimes contradictory. In estimating local and national budget contributions for the baseline scenario we have used combination of data provided by the Ministry of Finance, data collected from other relevant sources (MDF, local budgets, etc.), as well as information contained in the FS-2005. Table below provides summary of total estimated budget financing for water and wastewater sector from both local and national budgetary sources. As it can be seen total average sector expenditure stands at around 1% of consolidated total budget. In recent years the trends of financing re-current and capital expenditure has reversed. If before re-current expenditure component has always exceeded capital allocations, data for 2006 and preliminary data for 2007 suggest that more funds are directed to investment projects rather than to subsidising water utilities. The trend is clearly reflecting:

- Overall government prioritisation of water and sanitation sector; and
- A renewed approach by the government and local municipalities in enforcing full-cost recovery payments from customers (hence lower operational subsidies).

Table 0-19 Financing from local and national budgets for water sector, Lari million

| Type of Funding | 2004 | 2005 | 2006 |
|--|-------|-------|-------|
| Consolidated budget expenditures, total | 1,630 | 2,619 | 3,823 |
| Local and national budget funding for water sector | 17 | 23 | 24 |
| of which, for re-current expenditure | 12 | 14 | 7 |
| capital expenditures | 5 | 9 | 17 |
| Local and national budget funding for water sector | 1.4% | 0.9% | 0.6% |
| of which, for re-current expenditure | 0.95% | 0.53% | 0.17% |
| capital expenditures | 0.46% | 0.27% | 0.43% |

Source: Data collected and COWI's assessments

Financing from international donor and IFI community

In recent years activity of donor and IFI community in Georgian water sector has been notable, especially that of European Bank for Reconstruction and Development (EBRD). Funding from such

international sources increased dramatically and number of rehabilitation projects is already under implementation and several of them are in the preparation stage.

A particular feature of the recent trend is that project financing becomes more complex as number of possible sources, sometimes up to 3-4 or even more can be used to finance a single project. The key reason for this is affordability constraint as financing all the project cost via loan is not FEASIBLE for Georgia. Therefore, substantial effort is put to attract external grant financing and where such is eventually not available local and national budget contributions are thought.

While such complexity is clearly an advantage, it becomes a problem when trying to separate individual contributions of donors, IFIs, and budget co-financing. In evaluating available funding following key potential contributors has been identified which have in one or the other way participate in water sector investment project financing:

- EBRD;
- World Bank/GEF;
- European Commission EuropeAid Cooperation Office (EuropeAid);
- Millennium Challenge Georgia (MCG);
- National and Local budgets – direct contribution;
- National and local budgets - via MDF structure;
- German Development Bank (KfW);
- Swedish International Development Cooperation Agency (SIDA);
- Dutch Government's Development-Related Export Transactions Program (ORET); and
- British Petroleum (BP) within the framework of "Beyond Petroleum".

Detailed review of current financing has been carried out with purpose to identify structure and volumes of funds provided. Structurally, the main driving forces have been identified to be MDF, EBRD, and recently an MCG. Most of identified large infrastructure water related projects are identified and prepared in cooperation of these entities. Contributions from other sources are mostly used as co-financing of project prepared within this framework. While number of smaller projects also exists, the following table shows the largest projects that have been prepared and are under implementation or are being currently prepared for implementation.

Table 0-20 Funding from IFI and donors of selected water and sanitation projects

| Name of Projects | Status | Year | EURO million | | | Lari million | | |
|--------------------------------------|----------------------|-----------|--------------------|-------------|---------------------|--------------------|-------------|---------------------|
| | | | Total project cost | Loan | Grant and Subsidies | Total project cost | Loan | Grant and Subsidies |
| Poti Water Supply Project | Under implementation | 2005-2006 | 8,0 | 3,5 | 4,5 | 17,7 | 7,7 | 10,0 |
| Kutaisi Water Project | Under implementation | 2006 | 11,0 | 3,0 | 8,0 | 24,2 | 6,6 | 17,6 |
| Kobuleti Water | Approved | 2007 | 18,1 | 1,5 | 16,6 | 39,8 | 3,3 | 36,5 |
| Tbilisi Water Supply | Approved | 2007 | 25,0 | 15,0 | 10,0 | 55,0 | 33,0 | 22,0 |
| Rustavi Water Supply Rehabilitation | Pending | 2007 | 20,0 | 2,0 | 18,0 | 44,0 | 4,4 | 39,6 |
| Borjomi Water and Wastewater Project | Pending | 2007 | 13,5 | 1,5 | 12,0 | 29,7 | 3,3 | 26,4 |
| Tskaltubo Water and Wastewater | Pending | 2007 | 12,0 | na | na | 26,4 | na | na |
| TOTAL | | | 107,6 | 26,5 | 69,1 | 236,8 | 58,3 | 152,1 |

Source: Data collected and COWI's assessments

As can be seen from the table, total of about EURO 107 (Lari 240 million) million are being currently either under implementation or in the preparation phase with financing structure of the project either approved or pending. Of this, about EURO 27 million (Lari 60 million) are envisaged as loan financing from IFI's (primarily EBRD), while the rest will be financed via donor capital investment grant contributions and budget co-financing.

The amounts are unprecedented for Georgia as even just a couple of years ago volumes of investment works in water sector has been negligible.

Supply of finance in rural areas

To calculate supply of finance in rural areas, separate financial questionnaire has been distributed along with technical data collection questionnaire. Requested information included, apart from the demographic data, also water and wastewater payments schemes, if any; unit of payment; amount and frequency of payment; local or national subsidies to village water supply and sanitation; capital investment projects and their financing source.

The resulting responses, in terms of financing, are summarised in table below.

Table 0-21 Summary of supply of finance information collected via questionnaires in rural areas

| Settlements | Population | Households | Payment unit | Payment, Lari | Total annual income, Lari | Budget subsidies, Lari | Investments, Lari |
|---|---------------|---------------|---------------------|---------------|---------------------------|------------------------|-------------------|
| Agmashenebeli | 1,470 | 490 | per person per year | 12.0 | 17,640 | - | - |
| Ahaldaba | 2,425 | 750 | per HH per year | 12.0 | 9,000 | 18,000 | 196,556 |
| Ambrolaurskij | 1,000 | 403 | no payment | - | | - | - |
| Ambrolaurskij-2 | 168 | 84 | no payment | - | | - | - |
| Aragvinskij | 2,297 | 366 | per person per year | 3.0 | 6,891 | 40,000 | - |
| Azavret, Godomer, Burnashet, Lamaturtsh | 3,510 | 926 | per HH per year | 3.0 | 2,778 | 40,000 | 210,783 |
| Baisubun | 3,080 | 1,137 | no payment | - | | - | - |
| Bitsmend | 560 | 290 | no payment | - | | - | 64,000 |
| Boladzhuri | 1,092 | 294 | per HH per year | 3.6 | 1,058 | - | 151,258 |
| Dzegvi | 3,150 | 1,100 | no payment | - | | - | 303,000 |
| Gari | 534 | 152 | no payment | - | | - | - |
| Hamiskuri | 1,762 | 622 | per person per year | 7.2 | 12,686 | - | - |
| Imiri | 1,445 | 481 | per person per year | 12.0 | 17,340 | - | - |
| Kalinovka | 1,814 | 720 | per person per year | 3.6 | 6,530 | - | - |
| Kartubani | 3,144 | 1,345 | no payment | - | | - | - |
| Kvishhet | 4,880 | 706 | no payment | - | | - | - |
| Okureshi | 616 | 315 | no payment | - | | - | - |
| Shroma | 2,400 | 972 | per person per year | 3.6 | 8,640 | - | - |
| Torsa | 1,439 | 403 | per person per year | 7.2 | 10,361 | - | - |
| Tsedisi | 400 | 216 | no payment | - | | - | - |
| Tsereteli | 2,206 | 735 | per person per year | 12.0 | 26,472 | - | 105,000 |
| Tsinamdgvriant Kari | 447 | 213 | no payment | - | | - | - |
| Tsiperchi | 334 | 133 | no payment | - | | - | - |
| Vachiani, Murzhahedi, Chamdura | 3,372 | 923 | per person per year | 3.0 | 10,116 | 40,000 | 83,000 |
| Zemo Osiauri | 1,800 | 600 | per person per year | 2.6 | 4,734 | - | - |
| Zestafonskij | 1,967 | 529 | per person per year | 6.0 | 11,802 | - | 118,000 |
| TOTAL | 47,312 | 14,905 | | | 146,049 | 138,000 | 1,231,597 |

Source: Data collected and COWI's assessments

Based on the collected information above and sample coverage of rural population in Georgia, the average payment in rural areas for water and sanitation services (primarily water services) is 3 Lari/capita/year. Similarly, the estimated budget expenditure is 2.5 Lari/capita/year and investment expenditure stand at 26 Lari/capita/year.

Share of income spent on water and sanitation service related payments (affordability)

As it has been shown before the average per capita payment per month in urban Georgia for water and sanitation services is around 1.1 Lari or 13.2 Lari per year (EURO 6 per year). Based on the average per capita income data as shown in the tables below, the water and wastewater services account for about 1.4% of per capita income in urban area. In rural area, where estimated payment is 3 Lari per capita per year, the respective payment accounts for about 0.05% of the average per capita income.

Table 0-22 Average monthly per capita income in Georgia (including rural and urban area), cash and non-cash, in Lari

| Lari | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|-------------|-------------|-------------|-------------|-------------|
| Cash income and transfers | 34.0 | 40.8 | 45.9 | 50.3 | 59.7 |
| Wages | 13.7 | 15.4 | 16.1 | 17.8 | 23.3 |
| From self-employment | 6.3 | 7.7 | 8.6 | 9.7 | 10.5 |
| From selling agricultural production | 5.6 | 7.7 | 8.2 | 9.1 | 8.5 |
| Property income (leasing, interest on deposit etc.) | 0.4 | 0.3 | 0.4 | 0.6 | 0.9 |
| Pensions, scholarships, assistances | 3.2 | 3.3 | 2.2 | 4.1 | 6.8 |
| Remittances from abroad | 2.2 | 2.9 | 4.9 | 3.3 | 3.7 |
| Money received from kin and friends | 2.5 | 3.4 | 5.4 | 5.7 | 6.0 |
| Non-cash income | 24.2 | 24.8 | 23.5 | 23.1 | 21.1 |
| Income, total | 58.2 | 65.5 | 69.3 | 73.4 | 80.8 |
| Other cash inflows | 4.8 | 11.9 | 11.1 | 11.3 | 11.5 |
| Property disposal | 1.8 | 2.4 | 2.2 | 2.5 | 1.4 |
| Borrowing and dissaving | 3.0 | 9.5 | 8.9 | 8.8 | 10.1 |
| Cash inflows, total | 38.8 | 52.7 | 57.0 | 61.6 | 71.2 |
| Cash and non-cash inflows, total | 63.0 | 77.4 | 80.4 | 84.7 | 92.3 |

Source: Data collected and COWI's assessments

Figure 0-21 Average monthly per capita income by urban and rural area, Lai

| Lari | 2004 | | | 2005 | | |
|--|-------------|-------------|-------------|-------------|-------------|-------------|
| | Urban | Rural | Total | Urban | Rural | Total |
| In-kind income | 8.0 | 37.6 | 23.1 | 7.2 | 34.3 | 21.1 |
| <i>Other cash – total</i> | 13.5 | 9.2 | 11.3 | 14.1 | 9.0 | 11.5 |
| <i>Sale of assets</i> | 4.3 | 0.7 | 2.5 | 1.9 | 0.9 | 1.4 |
| <i>Debt or use of savings</i> | 9.2 | 8.5 | 8.8 | 12.1 | 8.1 | 10.1 |
| Cash – total | 73.9 | 49.8 | 61.6 | 87.9 | 55.3 | 71.2 |
| Cash and non-cash means – total | 81.8 | 87.4 | 84.7 | 95.0 | 89.6 | 92.3 |

Source: Data collected and COWI's assessments

BASELINE SCENARIO

Baseline assumption

General Assumptions

The general assumptions for the baseline scenario are as follows:

- Planning period is 20 years from 2005 to 2025 with 2005 as baseline year;
- Exchange rate - 2.3 Lari per EURO as constant exchange rate;
- Population assumed to be constant; and
- GDP nominal rate at 8.5% growth in 2006, 6% annually from 2007-2009, and 5% annually from 2009-2025.

Technical assumption

Assumption in calculation of expenditure profiles

The data entered into the FEASIBLE model covers the population covered by the sampling with the different types of technologies used for each of the sampled urban cities/towns and rural settlements. To cover the entire population for urban and rural population we have utilised a scaling-up approach, as follows:

- For **Urban** we have 84% of the population covered by a large number of cities/towns with different technologies: The scaling-up the expenditure profile is therefore based on scaling-up the calculated expenditure profile by FEASIBLE with a factor of 1.2; and
- For **Rural** we have for each of the zones estimated the equivalent number of settlements considering the type of technologies to cover the entire rural population within each zone.

In Table 0-1 is shown the basis for the scaling-up the total expenditure needs based upon the sampling population.

Table 0-1 Scaling-up cost based on population in the 4 zones

| | | Sampling population | Total pop. in area/zone | Total population | Scaling-up factor |
|-------------|----------|---------------------|-------------------------|------------------|-------------------|
| Urban | | 1,930,215 | 2,310,400 | 2,310,400 | 1.2 |
| Rural | Sum | 45,597 | | 1,991,000 | |
| Zone 1 | Western | 5,158 | 774,100 | | 150 |
| Zone 2 | Mountain | 5,509 | 158,600 | | 29 |
| Zone 3 | Eastern | 20,738 | 633,400 | | 31 |
| Zone 4 | Southern | 14,192 | 424,900 | | 30 |
| Grand total | | | | 4,301,400 | |

Source: COWI's sampling and Yearbook 2006

Definition of Baseline Scenario

The key objective of the Baseline Scenario for the whole planning period (2005-2025) is the maintenance of WSS systems and services at the level of Baseline Year 2005.

In terms of technical parameters this means that the volume of abstracted water, the technologies of water abstraction and distribution in all settlements will stay on the same level as described in the existing situation sections for the baseline year. Population coverage of centralized water supply and sanitation systems, as well as methods of wastewater removal will not change for the whole planning period for all sampled municipalities. Thus, the Baseline can be referred to as a "no developments" or "business as usual" scenario. The main key assumptions for the baseline scenario are presented below.

- The present (base year) water supply and sanitation systems are properly maintained over the entire planning period. The major repair means rehabilitation and replacement of fixed assets required to maintain existing infrastructure and services level. Moreover all currently undertaken project are implemented (e.g. increase of WS system connection coverage in Tbilisi);
- The volume of services provided to the customers changes accordingly to connected population growth rate - in baseline population is constant;
- No expansion of WSS system connection coverage is expected (except of connection coverage increase in the city of Tbilisi); and
- No renovation works which can increase current remaining assets value of WSS objects and infrastructure are expected within the planned period.

Key technical performance indicator/parameters

In Table 0-2 and Table 0-3 are shown the average key technical parameters to be utilized in the project to estimate the expenditure profile. Some of these data has not been used in the Baseline scenario, but will be utilized in the scenario development to achieve the MDG goal in 2015. When utilizing FEASIBLE no average figures will be used, but average figures are used to evaluate potential scenarios.

Table 0-2 Key technical performance indicator as basis for the FEASIBLE modelling for Urban WSS

| | Performance indicator/parameters | Units | |
|----|----------------------------------|-------|-----|
| WS | Coverage by centralized system | % | 94% |
| | Water demand | l/cd | 186 |
| | Constancy of water supply | % | 19 |
| | Compliance to water quality | % | 39 |
| WW | Coverage by centralized system | % | 75 |
| | Constancy of access to system | % | 12 |
| | % WW treated | % | 15 |

Source: Data collected and COWI's assessments

Table 0-3 Key technical performance indicator as basis for the FEASIBLE modelling for Rural WSS

| | Performance indicator/parameters | Units | |
|----|----------------------------------|-------|----|
| WS | Coverage to centralised system | % | 30 |
| | Compliance to water quality | % | 21 |
| WW | Coverage to centralised system | % | 0 |

Source: Data collected and COWI's assessments

Correction of costing in FEASIBLE

The cost function used in the FEASIBLE model are based upon average Western European cost data and reflect the typical distribution to the main cost categories (equipment, materials, design, labour, energy, land, etc.) in European utilities and international tendering. Therefore, in FEASIBLE, each cost centre has its own cost correction coefficient which can be used to adjust the international cost levels to local price levels and cost structures. Table 0-3 gives an overview of the price assumptions and correction coefficients applied in the baseline scenario for both urban and rural expenditure calculation.

Table 0-4 Correction factor for costing used in FEASIBLE modelling

| Cost categories | Assumption of coefficient applied in model | Dimensions |
|------------------------|--|-------------------------|
| Land | 0 | Gel per m ² |
| Power | 0.07 | Gel per kWh |
| Fuel | 2.2 | Gel/litre |
| Labour | 2395 | Gel/year |
| Professional | 1923 | Gel/year |
| Consumables | 27 | % of international cost |
| Equipment | 33 | % of international cost |
| Construction materials | 36 | % of international cost |
| Other costs | 24 | % of international cost |

Source: Data from Working Group and Consultant's own estimate.

For the correction of investment costs the most critical cost factors are the relative prices of WSS equipment and construction materials, whereas electricity, labour plays the most significant roles in operational costs.

Baseline supply of finance assumptions

Urban supply of finance

To model baseline scenario and supply of financing potentially available for water and sanitation sector in the period 2005-2025 the following macroeconomic assumptions has been made.

- Exchange rate - 2.3 Lari per EURO as constant exchange rate;
- Population assumed as constant;

- GDP nominal rate at 8.5% growth in 2006, 6% annually from 2007-2009, and 5% annually from 2009-2025; and

Income growth is assumed to change along with GDP growth rate.

- Forecast of user charges in urban area has been based on the following assumptions:
- Collection rate from households remain at the same rate as in the base 2005 year - that is 45% of billed amount;
- Collection rate from other customers remain at the same rate as in the base 2005 year - that is 77% of billed amount;
- Coverage of households by water and sanitation services is unchanged during the entire forecasted period; and
- Monthly water bill per capita will increase only slightly to account for 1,5% of average monthly per capita income as opposed to the current level of 1.4% of income.

National budget contribution forecast has been based on the information provided earlier regarding sector financing from local and national budgets of urban water and sanitation services. As we have seen earlier, about 23 million Lari has been available to water and sanitation sector annually during last three years. For the baseline scenario modelling, it has been assumed that total consolidated budget expenditure will follow the GDP growth rate. If to also assume that share of water sector expenditure in consolidated budget will be fixed for the entire forecasted period, then the budget allocations for the sector will also have to follow the GDP growth rate. In terms of breakdown of available budget financing into capital and re-current expenditure, taking into account new trend of more funds for capital it has been assumed that 60% of allocated funds will be provided for capital investments and 40% for re-current expenditure subsidies.

Table 0-5 Local and national budget financing for urban area in baseline scenario, Lari million

| | Capital funding | Re-current expenditure funding |
|--------------|-----------------|--------------------------------|
| Water supply | 9.0 | 5.0 |
| Wastewater | 4.8 | 4.2 |

Source: Data collected and COWI's assessments

Finally, estimates for funds availability from other sources has been made for use in the baseline scenario. In doing this we have taken into account only those projects that has been approved or are under implementation. Therefore, total amount of loan availability for the sector was estimated at about Lari 45 million and grant contributions about Lari 40 million. These funds have been distributed across 2 years for loans (2006 and 2007) and 3 years for grants (2005-2007) mostly because actual implementation period for projects is not known. Majority of projects address water supply rather than wastewater infrastructure and the breakdown (based on the limited project information) is 70% to 30% respectively. Contributions of budget financing have been already accounted in the national and local budget analysis section. It is important to note, that projects listed above cover relatively large cities of Georgia, hence, it is likely that similar amount of loan and donor financing will not be available on a consistent basis, because rehabilitation needs of other cities will be smaller.

Based on all above assumptions, the baseline supply of finance in urban areas is presented in the table below. Budget contributions will stay the same over the entire period. Financing from other sources, such as IFI funding and international grants are assumed to be available on a factual basis - namely they are inputted into the FEASIBLE model only in the year they are provided. No additional assumption regarding such funds availability in the future is made.

Table 0-6 Summary of supply of finance from different sources in the baseline

| Lari million | Water | Water, % | Wastewater | Wastewater, % |
|---------------------|-------|----------|------------|---------------|
| User charges | 35.7 | 33% | 15.7 | 31% |
| Budget contribution | 14.0 | 13% | 9.0 | 18% |
| IFIs Loans | 31.5 | 29% | 13.5 | 27% |
| Grants | 28.0 | 26% | 12.0 | 24% |
| TOTAL | 109.2 | 100% | 50.2 | 100% |

Source: Data collected and COWI's assessments

Rural supply of finance

Estimation of the supply of finance for rural area is based on assumption on user charges as well as funding availability from other sources.

As we have seen earlier, the average payment in rural areas for water and sanitation services (primarily water services) is 3 Lari/capita/year. Similarly, the estimated budget expenditure is 2.5 Lari/capita/year and investment expenditure stand at 26 Lari/capita/year. This information has been used to upscale the sample data for the entire Georgia rural population using the above per capita derived funding from different sources:

- Lari 6,200,000 annually from entire rural population as user charges; and
- Lari 5,000,000 annually from budget sources of all levels as sector subsidy;

Investment projects in rural areas are primarily implemented by MDF, with some exception, and more that 100 villages has already been subject to interventions of different extent. Many of investment has been small in size, however, about 32 relatively larger investment projects has been implemented with total value of about Lari 40 million over the last 4-5 years. Hence, based on this information the assumption for the baseline scenario supply of investment funds to rural area has been set at:

- Average of Lari 9 million in investment expenditure for the entire rural water and sanitation infrastructure over the three years when the investments are known to have taken place 2005-2007;

Table below provides summary of funds availability for the baseline scenario in rural areas.

Table 0-7 Supply of finance in rural areas, baseline scenario

| | Lari |
|-----------------------------|-----------|
| Payment from user | 6,200,000 |
| Budget subsidies | 5,000,000 |
| Other sources - IFI, grants | 3,000,000 |

Source: Data collected and COWI's assessments

User charges represent estimated funds availability from customers in base year 2005. It is further assumed in the baseline that these funds will increase in line with tariff increase to the level of 1% of household income.

Budget sources represent estimated funding from national and local budgets in 2005 and will stay the same for the entire forecasted period.

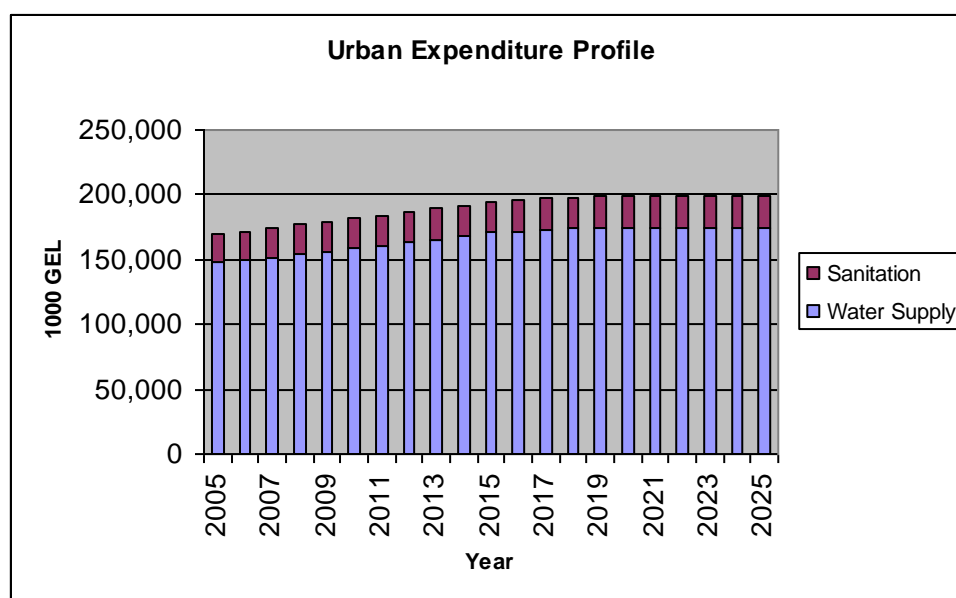
Funds availability from other sources is assumed to be on a factual basis that is no assumption regarding further availability of such funds in the future is made.

Expenditure profile in the baseline scenario

Expenditure profile for urban WSS

The total annual urban expenditure in the baseline scenario is indicated in Figure 0-1.

Figure 0-1 Total Urban expenditure for WSS per year



Source: COWI's assessments based upon FEASIBLE modeling.

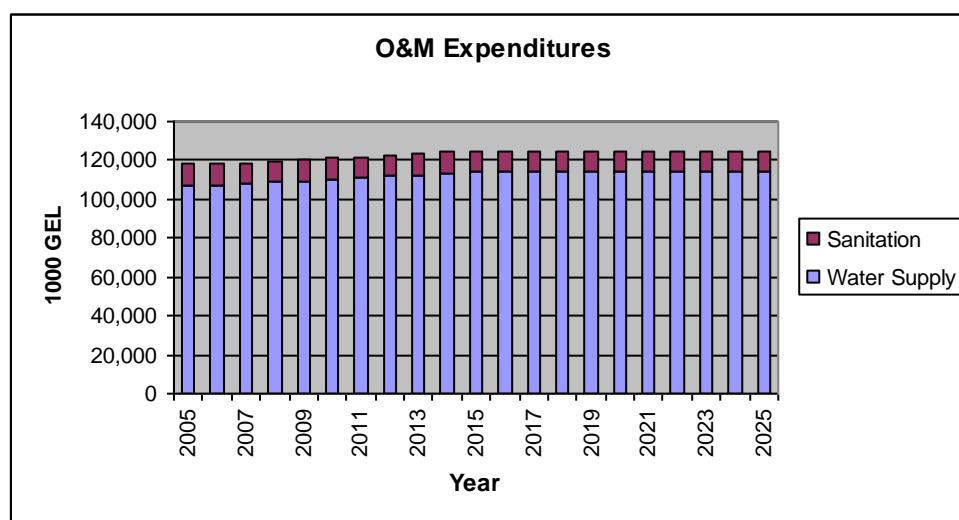
The total cost of the baseline scenario is 4.0 billion over 20 years or 1725 GEL (750 Euro) per capita for the planning period or 86 GEL (38 Euro) per capita per year for an urban population of 2.31 million.

Of the total cost 87% is for water supply and only 13 % is for wastewater as very few wastewater treatment plants are included and the length of wastewater network is lower than for water supply network. Also data availability of wastewater data can influence on the cost.

In Figure 0-2 and Figure 0-3 are shown the total annual O&M cost and the total re-investment cost for urban WSS. The average annual O&M cost calculated by FEASIBLE is 123 million GEL for a population of 2.31 million people. In Table 0-17 is shown the cost of services (=O&M cost) of in 2005 of about 60 million GEL for the urban utilities covering a population of 1.93 million people.

The O&M cost calculated by FEASIBLE is therefore about 40 million GEL higher than the actual O&M cost when scaled down to 1.93 million people. This indicates that insufficient amount of maintenance takes place considering that a large amount of water is lost due high water loss and thereby high energy cost.

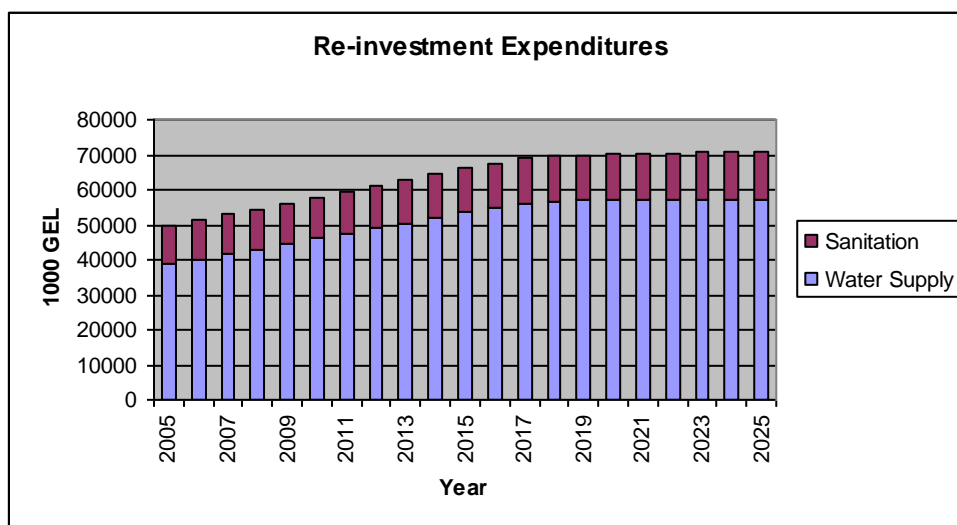
Figure 0-2 Total O&M for Urban WSS per year



Source: COWI's assessments based upon FEASIBLE modeling.

The annual reinvestment (or replacement) costs are a function of the infrastructure replacement value and age.

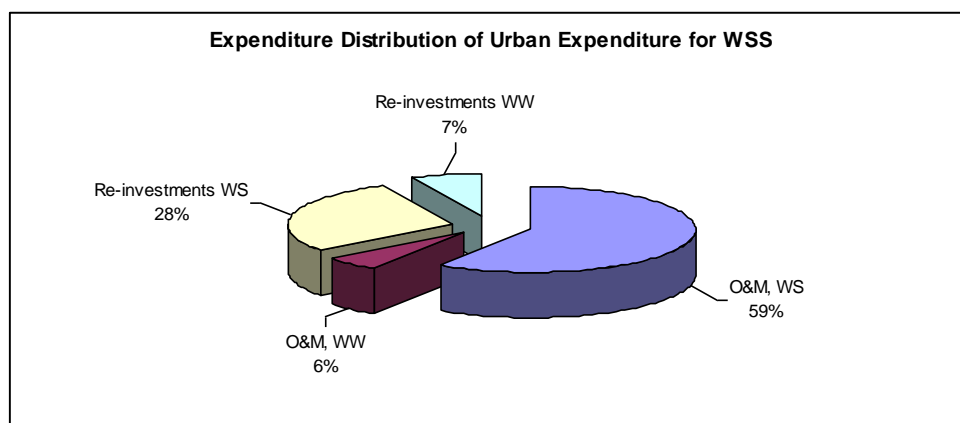
Figure 0-3 Total Re-investment cost for Urban WSS per year



Source: COWI's assessments based upon FEASIBLE modeling.

In Figure 0-16 is illustrated the percentage of expenditures for the WSS in urban Sector. O&M amounts to close to 60% of the expenditures in the baseline scenario.

Figure 0-4 Expenditure distribution by type of expenditures for WSS

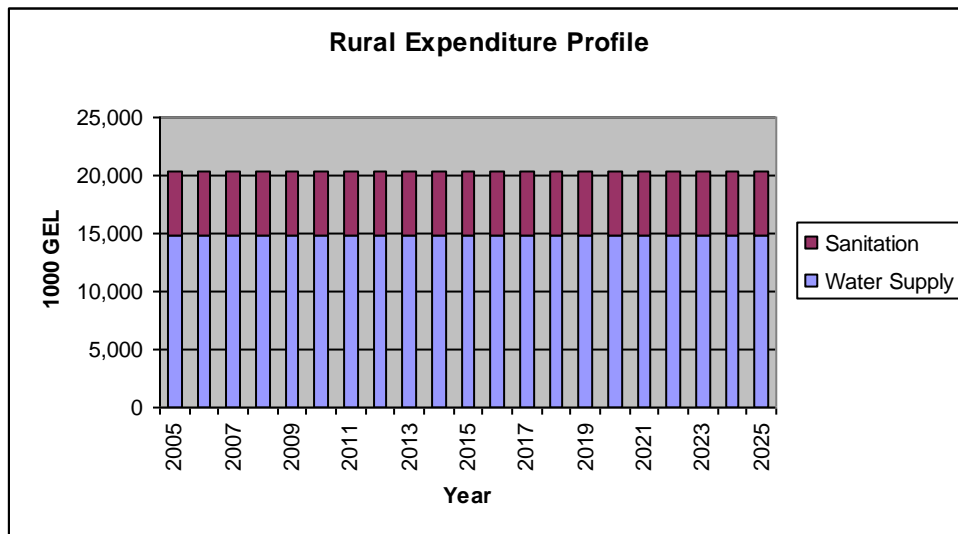


Source: COWI's assessments based upon FEASIBLE modeling.

Expenditure profile for Rural WSS

The total annual rural expenditure of the baseline scenario is indicated in Figure 0-5.

Figure 0-5 Total Rural expenditure profile per year

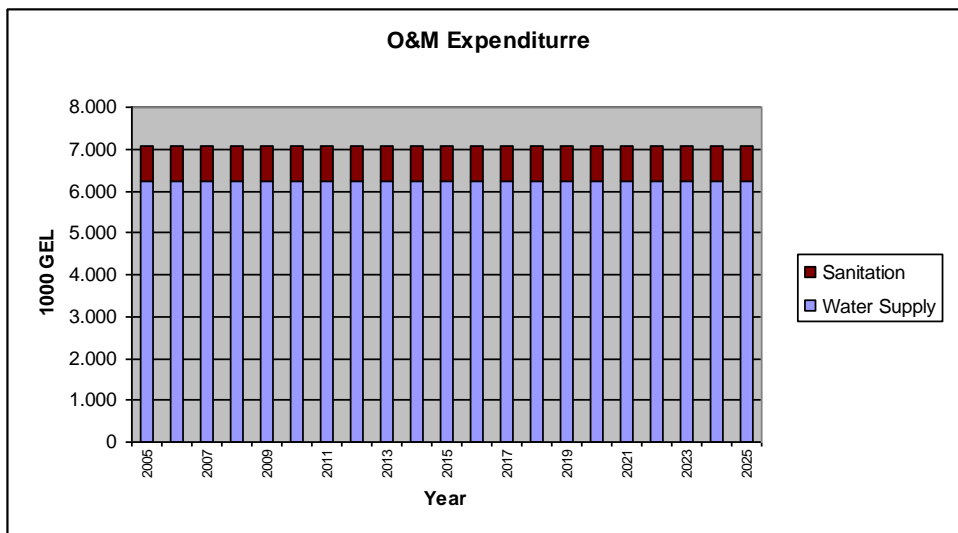


Source: COWI's assessments based upon FEASIBLE modeling.

The total cost of the baseline scenario is 426 mill. GEL over 20 years - 73% of this is for water supply - or 214 GEL (93 Euro) per capita for the planning period or 11 GEL (4.7 Euro) per capita per year for a rural population of 1.991 million.

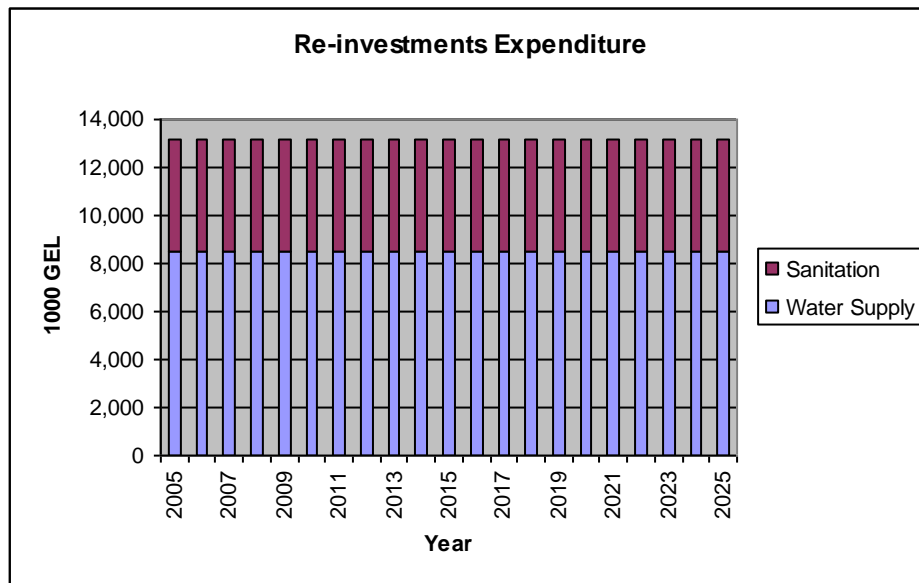
In Figure 0-6 and Figure 0-7 are shown the total annual O&M cost and the total re-investment cost for urban WSS.

Figure 0-6 Total O&M for Rural WSS per year



Source: COWI's assessments based upon FEASIBLE modeling.

Figure 0-7 Total Re-investment cost for Rural WSS per year

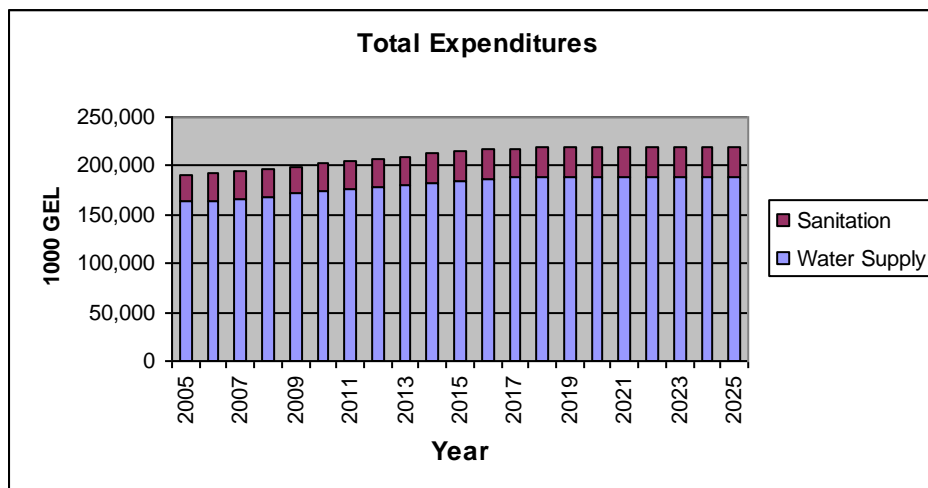


Source: COWI's assessments based upon FEASIBLE modeling.

Total expenditure profile for urban and rural

The total estimated expenditure for the planning period is 4.4 billion GEL or an average annual cost of 220 mill. GEL or an average of 1.026 GEL per capita or 426 Euro per capita equivalent to 51 GEL or 22 EURO per capita per year.

Figure 0-8 Total expenditure profile for Urban and Rural WSS



Source: COWI's assessments based upon FEASIBLE modeling.

Estimations for the baseline scenario

Urban Sector The expenditure needs for the planning period is based on an urban population of 2.310 million people, as described under the baseline key assumptions. In Table 0-8 is shown the estimated expenditure and financing needs for the urban sector with the corresponding financial gap.

**Table 0-8 Expenditure needs and Financing needs for the Urban WSS sectors for the period 2005-2025
– assessment in FEASIBLE of the baseline scenario, in 2005 prices**

| Urban WSS Sector | Total 1000 GEL 2005 to 2025 |
|-------------------------|--------------------------------|
| Total Expenditure needs | 3,985,751 |
| WS | 3,484,675 |
| Sanitation | 501,076 |
| Supply of Finance | 1,695,025 |
| WS | 1,137,375 |
| Sanitation | 557,650 |
| Financial Gap | -2,290,727 |
| WS | -2,347,300 |
| Sanitation | 56,574 |

Source: FEASIBLE calculations

The modelled estimation of the total urban water sector expenditure needs over 20 years planning period amounts to GEL 3.985 billion or about 200 mill. GEL per year, of which 87 % is estimated to be for water supply and 13 % for sanitation in the urban sector. This is equal to GEL 1725 (750 Euro) per capita for a population of 2.31 mill people in the 20 years, or GEL 86 (38 Euro) per capita per year.

Total accumulated supply of finance for urban WSS for the period 2005-2025 is at GEL 1.70 billion. Thus, the total financing gap will be almost GEL -2.29 billion.

Rural Sector

The expenditure needs for the rural WSS in the planning period is based on a total rural population of 1,991million people, as described under the key assumptions. In Table 0-9 is shown the estimated expenditure and financing needs for the rural sector with the corresponding financial gap.

Table 0-9 Financing needs for the Rural WSS sectors for the 2005-2025 – assessment in FEASIBLE of the baseline scenario, in 2005 prices

| Rural WSS Sector | Total 1000 GEL 2005 to 2025 |
|-------------------------|--|
| Total Expenditure needs | 426,062 |
| WS | 309,744 |
| Sanitation | 116,319 |
| Supply of Finance | 304,773 |
| WS | 304,773 |
| Sanitation | 0 |
| Financial Gap | -121,289 |
| WS | -4,971 |
| Sanitation | -116,319 |

Source: FEASIBLE calculations

The modelled estimation of the total rural water sector expenditure over a 20 years planning period amounts to GEL 426 mill or about 21 mill per year, of which 73 % is estimated to be for water supply and 27 % for sanitation in the rural sector. This is equal to GEL 214 (93 Euro) per capita for a population of 1.991 million people over 20 years, or GEL 11 (4.7 Euro) per capita per year.

Total supply of finance for 2005-2025 will reach about GEL 305 mill. The total financing gap will be almost GEL -121 million.

Total Urban and Rural

Table below summarises financing gaps for both urban and rural sectors.

Table 0-10 Financing needs for the Urban and Rural WSS sectors for the 2005-2025 – assessment in FEASIBLE of the baseline scenario, in 2005 prices

| Urban and Rural WSS Sector | Total 1000 GEL 2005 to 2025 |
|-----------------------------------|--|
| Total Expenditure needs | 4,411,813 |
| Supply of Finance | 2,852,673 |
| Financial Gap | -1,559,140 |

Source: FEASIBLE calculations

Unit cost per capita

In Table 0-11 is shown the total average cost for the baseline scenario per capita per year for the urban and rural WSS sector.

Table 0-11 Total average cost per capita per year for the baseline scenario

| Total average cost per capita per year | GEL/capita/year | Euro/capital/year |
|--|-----------------|-------------------|
| Rural Cost | 11 | 4.7 |
| Urban Cost | 86 | 38 |
| Total Cost | 51 | 22.3 |
| Rural water supply | 8 | 3.4 |
| Rural sanitation | 3 | 1.3 |
| Urban water supply | 75 | 32.8 |
| Urban sanitation | 11 | 4.7 |

Source: FEASIBLE calculations

Financing GAP

In Figure 0-9 and Figure 0-10 are illustrated the financing gap for Urban and rural WSS sector.

Figure 0-9 Urban Financing GAP- Baseline scenario

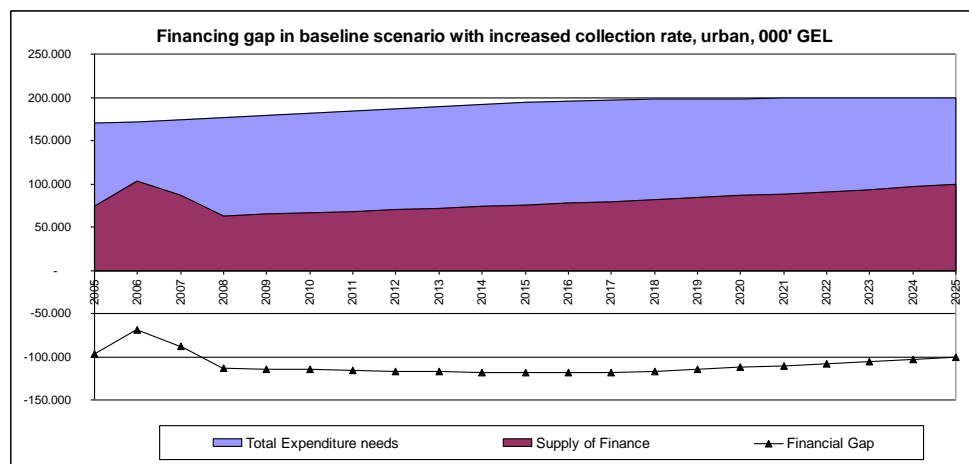
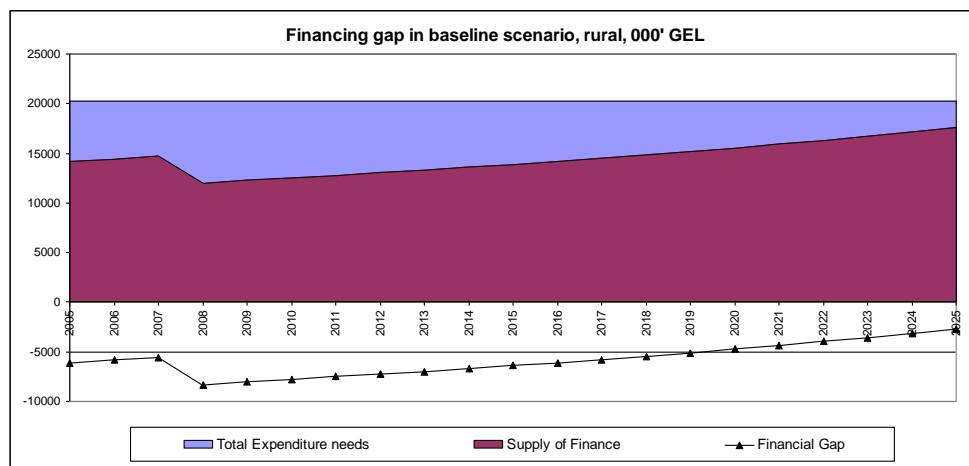


Figure 0-10 Rural Financing Gap- Baseline scenario



Possibility of gradual elimination of the financing gap

Number of measures can be undertaken to reduce or close the large financing gap shown above. The range of such measures is wide starting from increased collection rate until service level reduction. However, for the purposes of the baseline scenario gap analysis service level reduction is not fully justified, since we define baseline as "business as usual". Therefore, from the potentially large number of policy measures the two most applicable for financing gap reduction in baseline scenario are:

- Increase in collection rate of the billed charges for WSS services;
- Increase in WSS services payments; or
- Combination of both.

In our analysis below first, the collection rate increase assumption is applied and the corresponding financing gap is calculated. Second, the payment increase assumption is applied along with increased collection rate and corresponding financing gap is calculated.

Increase of collection rate

One of the approaches in closing the large financial gap shown above is to increase collection from all customers. We have made the following assumptions to evaluate potential supply of finance increase in such case. Those assumptions are:

- Collection from households increase from 45% in 2005 to 95% in 2011 gradually;
- Collection from other customers increase from 77% in 2005 to 95% in 2010 gradually; and
- Since the rural user charges are subject to entirely different payment mechanism the increase of collection rate does not apply there and the new financing gap is shown only for urban areas.

The estimated increase in the amount of user charges from households is shown on the figure below.

Figure 0-11 Increase in household user charges when collection rate increases to 95% of billed amount

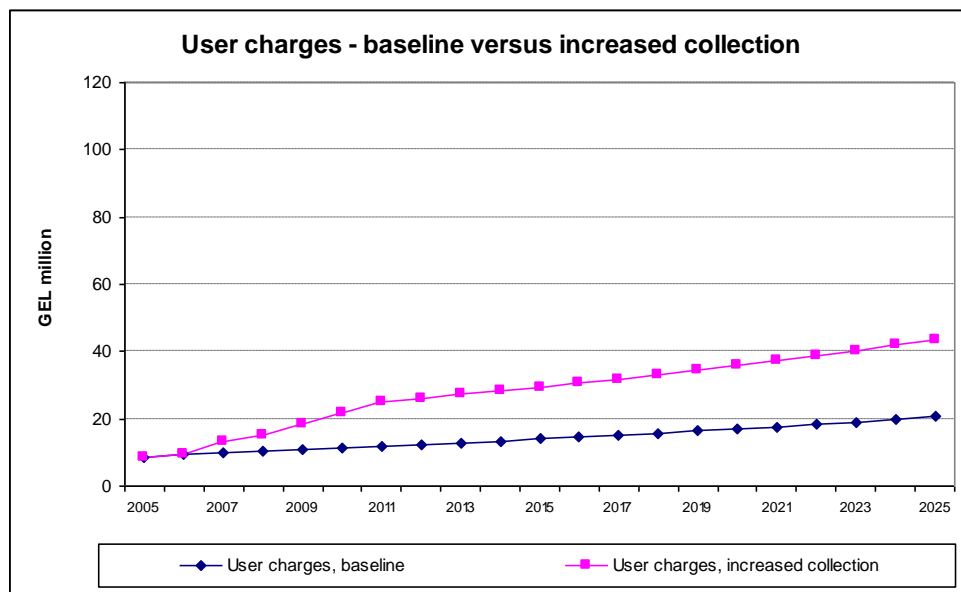


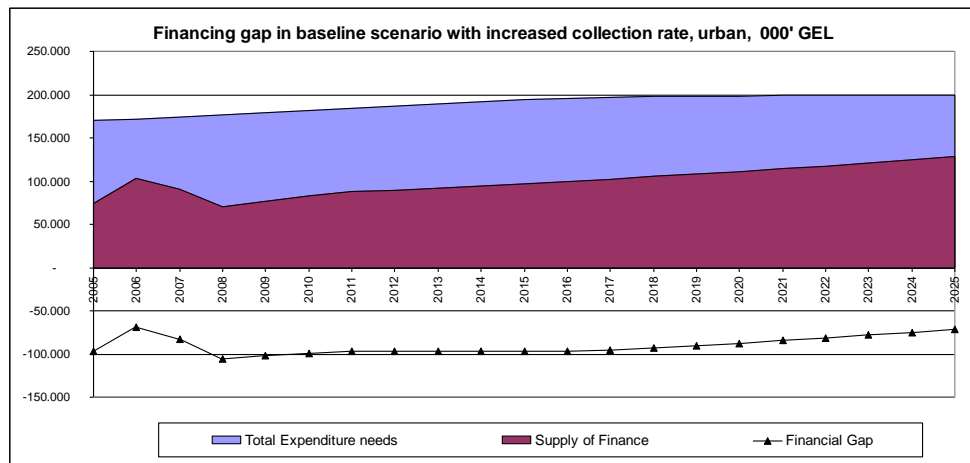
Table and figure below show the new results of the financing gap calculation for increased urban collection rate. The financial gap decreased by only 17% of initial gap.

Table 0-12 Expenditure needs and Financing needs for the Urban WSS sectors for the period 2005-2025 – assessment in FEASIBLE of the baseline scenario with increased collection rate, in 2005 prices

| Urban WSS Sector | Total 1000 GEL 2005 to 2025 |
|-------------------------|--------------------------------|
| Total Expenditure needs | 3,985,751 |
| WS | 3,484,675 |
| Sanitation | 501,076 |
| Supply of Finance | 2,091,748 |
| WS | 1,431,255 |
| Sanitation | 660,493 |
| Financial Gap | -1,894,004 |
| WS | -2,053,421 |
| Sanitation | 159,417 |

Source: FEASIBLE calculations

Figure 0-12 Increase in urban collection rate for all customers



Increase collection rate and service payments

The next policy measure to increase supply of finance is tariff increase. Here we have assumed that households will pay 3.5% of income in the long term on top of already increased collection rate. Increase to that level has been assumed in the model to be gradual reaching the target level of 3.5% in 2020. The estimated increase in the amount of new cash flow available to water utilities is shown on the figure below.

Figure 0-13 Increase in user charges at 3.5% of household income in the long term

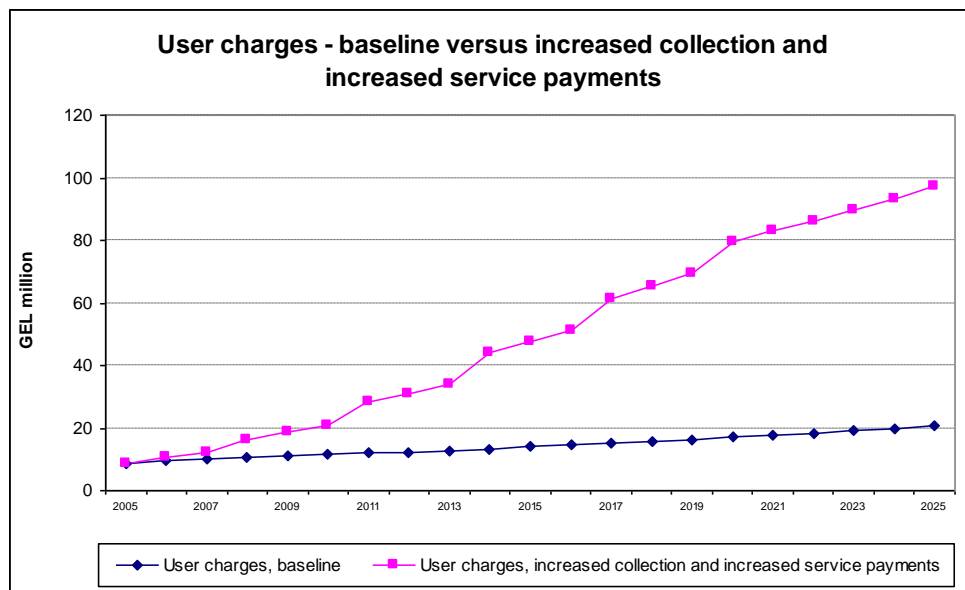


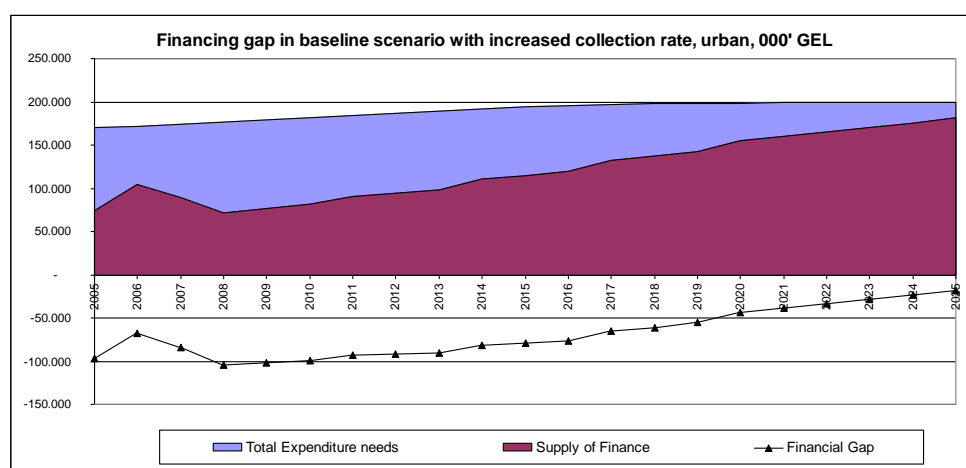
Table and figure below show the result of financing gap analysis with increased collection and higher threshold of affordability limit. The analysis suggests that combination of this policy measures will reduce initial financing gap by only 37%.

Table 0-13 Expenditure needs and Financing needs for the Urban WSS sectors for the period 2005-2025 – assessment in FEASIBLE of the baseline scenario with increased collection rate, in 2005 prices

| Urban WSS Sector | Total 1000 GEL 2005 to 2025 |
|-------------------------|--------------------------------|
| Total Expenditure needs | 3,985,751 |
| WS | 3,484,675 |
| Sanitation | 501,076 |
| Supply of Finance | 2,547,900 |
| WS | 1,784,148 |
| Sanitation | 763752 |
| Financial Gap | -1,437,851 |
| WS | -1,700,528 |
| Sanitation | 262,676 |

Source: FEASIBLE calculations

Figure 0-14 Increase in urban collection rate and user charges at the level of 3.5% of household income in 2020



As can be seen both of the policy measures resulted in some increase in supply of finance, however, substantial funding gap remains. That implies that substantial funding will need to come from budget sources of all levels to cover just the operating and maintenance cost of infrastructure.

Conclusions on baseline financing gap analysis and potential development scenarios

As we have analysed above substantial reduction in financing gap from the baseline scenario is possible by implementing collection rate increase and service payment increase at the maximum affordability level. As a result of the combination of both measures the cumulative financing gap for the period 2005-2025 decreased by 37%. However, substantial financing gap remains.

Therefore, it is necessary to discuss and propose additional policy measures that will address remaining gap. Below we propose set of such policy measures for further discussions.

Financial Measures

In this section we discuss potential set of financial measures as well as briefly estimate their potential impact on the remaining financing gap. Set of such measures discussed below will include increased public budget for capital expenditure, increasing user charges to the maximum affordability limit of 3,5% of income faster than in 2020, and additional increase in external financing.

- One of the possible sources of additional financing of water sector is public budget funding. Since it is difficult to assess potential increase in the budget expenditure, we have assumed as one of the development scenario simulation assumption that public budget funding for capital investments will double on annual basis. Evaluating the impact of such increase shows that remaining financing gap can be reduced by further 30% on cumulative basis.
ISSUE FOR DISCUSSION: What is the realistic level of public financing for the entire forecasted period for both urban and rural sectors?
- Further possible scenario is the possibility to increase user charges for households to maximum affordability limit of 3.5% of income sooner than in 2020. We assume that household bill will reach 3.5% of income by 2015. This assumption is simulated along with the earlier assumption of increased budget financing. Combination of both measures allows decreasing the remaining financing gap by 38% only. Hence, already assumed substantial increase in two key financing sources does not cover even 50% of the remaining gap.
ISSUE FOR DISCUSSION: What is the realistic level of user charges for the entire forecasted period for both urban and rural sectors - it is important to discuss not only the maxim level of affordability, but also the time profile over which such affordable level will be reached?
- Further funding can be provided by additional external sources (grants and loans). However, compared to remaining total cumulative gap of GEL 896 million after assumed public budget and user charges increase, it is very unlikely that such amount of external funds will be possible to attract. **ISSUE FOR DISCUSSION: What is the realistic level of external financing for the entire forecasted period for both urban and rural sectors?**
- Other financial instruments such as private sector participation are also possible to contribute to sector financing. However, the level of information regarding private sector interest is limited and cannot be used for quantitative estimation.
- Hence the only further option to reduce financing gap is reduction of service levels and correspondingly cost reduction.

Technical Measures

The obvious technical measure to help reducing the remaining financing gap is reducing the operation and maintenance cost by:

- Initiating cost reduction programme, such as:
 - reduction of water losses, which will reduce the energy consumption, reduce potential pollution of drinking water, increase constancy of water;
 - reduction in overall energy consumption by replacing pumping equipment with more efficient pumping systems (initial screening shows that replacement of submersible pumps will have pay-back period of 3-4 years);

- gradual reduction of staffing along with the improvement of the operations and reduced requirements for maintenance; and
- increase operating efficiency by the introduction of a performance based operation/management (even in Denmark it has been assessed that the water sector can be 20% more effective). **ISSUE FOR DISCUSSION: What is the realistic level of savings by a cost reduction programme for the entire forecasted period for both urban and rural sectors?**
- Replacement of the most deteriorated water and wastewater networks to reinstate the operational safety of the network to improve constancy of service and improve water quality of drinking water and reduce pollution of the environment from wastewater pipe. **ISSUE FOR DISCUSSION: What is the realistic level of pipe network to be rehabilitated or replaced for the entire forecasted period for both urban and rural sectors?**

The above measures to reducing the O&M cost and reinstate the operational safety of the systems are obvious components in any potential development scenarios to deal with in improving the present service level or just maintain the present service levels.

Other cost reduction programmes could be:

- To "decrease" the present service level by changing to a lower service level e.g. from house connection to public standpipes or reducing the present coverage. None of these possibilities can be seen as a major instrument to reduce the remaining financial gap as it may only generate little savings and may be "politically" not acceptable; at least not in existing serviced urban areas. **ISSUE FOR DISCUSSION: Will it be possible to introduce a lower service level than the present one in existing areas?**
- To rehabilitate only the existing wastewater treatment plants by reinstating the operational safety for mechanical treatment only in environmental sensitive areas. **ISSUE FOR DISCUSSION: Will it be political acceptable to introduce this policy?**

MILLENNIUM DEVELOPMENT GOALS

Millennium Development Goals (MDGs) for WSS sector

In September 2000 189 UN-members accepted the Millennium Development Goals (MDG), having established clear time-bound objectives, achievement of which will promote the progressive development. Georgia is one of the countries which signed Millennium Declaration, and thus undertook to integrate the Millennium Development Goals into the national development strategies, as well as to report periodically on the goals achievement progress.

In pursuance to the undertaken obligations, in August 26 2003 the Georgian Government Decree on Establishment of a Governmental Commission for Preparation of 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, equality of men and women. The working groups included representatives of ministries and agencies, as well as experts from NGO and international institutions. After the Revolution of November 2003, a new Georgian Government renewed the Commission's and assigned it's activity the permanent basis (Governmental Resolution No. 7, March 31 2004).

One of the Millennium Development Goals is the so-called Goal 7 - Sustainable Environmental Development. This goal includes the Target 10: *Before 2015 to halve the population without sustainable access to improved water source and access to improved (basic) sanitation compared to the Baseline Year 1990.*

A tremendous lot of efforts have been made to estimate the cost of achieving the above Target 10 both worldwide and at national level¹⁶ resulting in a wide range of estimates depending on the assumptions, but the wide range of cost estimates stems from the various interpretation in the defining Target 10. Below is highlighted some issues in relation the to MDG definitions for Target 10.

Deliberation of the MDG Definitions

The MDG definition is not extremely specific, and therefore they represent a range of possible service levels unless a specific interpretation has been made. It use "safe" drinking water without defining it making it difficult to measure/assess the actual number with access to safe water. Thus, official statistics - JMP and others¹⁷ - focuses on water delivery and not particularly on water quality. Furthermore, "safe" water differ between countries and culture, and also standard of acceptable service are not he same in Africa as in Georgia, meaning that there could be differences across regions and countries as to what level of target can constitute an acceptable service level - it is not likely that walking 1000 m for getting 20 litre of water would be an acceptable service level in Georgia - even in the rural areas.

The implications for the assessment of the costs of achieving the MDG in Georgia are the following:

¹⁶ Costing MDG Target 10 on Water Supply and Sanitation: Comparative analysis, obstacles and recommendations, World Water Council/Word Water Forum, March 2006.

¹⁷ JMB, <http://www.devinfo.info/mdginfo2007/>

- the most basic service level might not provide acceptable health standards, due to the fact that the population used to have a slightly higher service level, especially in the urban areas, and
- it might be difficult to get commitment to see a basic service level which are lower than the present one as an acceptable political target.

The approach to dealing with these issues entails the use of scenarios. Based upon the status of achieving the MDG goals from official statistics and the assessed status 2007 incorporating other indicators as regularity and quality of water etc., are described below.

Present status of WSS in relation to MDG

Below is summarised the present findings of the status of achieving the MDG based upon the official statistics and the Consultant's own estimates on the status incorporating other indicators as regularity and quality of water etc.

The status of the rural area in 1990 is assumed to be as the official statistics under COWI estimates.

The main issue here is what is the most realistic status today for urban and rural areas in achieving the MDG? **ISSUE FOR DISCUSSION: What is the status today in achieving the MDG according to MDG definition for improved water and sanitation?**

Table 0-1 MDG status by Official Statistics and COWI assessments

| | | Official Statistics | | COWI Estimates | | |
|--------------|-------|---------------------|------|----------------|-------|-------|
| | | 1990 | 2004 | 1990 | 2003 | 2015? |
| Water Supply | Total | 80 | 82 | - | - | - |
| | Urban | 91 | 96 | 79 1) | 68 1) | 90? |
| | Rural | 67 | 67 | 67 | 60 | 84? |
| Sanitation | Total | 97 | 94 | - | - | - |
| | Urban | 99 | 96 | 60 1) | 36 1) | 80? |
| | Rural | 94 | 91 | 94 | 89 | 97? |

Source: MDG Info 2007 - <http://www.devinfo.info/mdginfo2007/>, and COWI assessment in EF 2005

Note: 1) Weighted average with population ref. Table 3.8 and 3.9.

MAIN OBSTACLES AND CHALLENGES TO IMPROVEMENTS IN THE WATER SECTOR

This Chapter presents a very draft problem analysis of the water sector in Georgia. The analysis takes its entry point at the existing situation as described in this Interim Report and knowledge from other strategic planning in EECCE countries.

Core sector problem - Urban

The core problem of the urban water sector is the prevalence of *inferior and deteriorating service delivery* in terms of reliability, constancy of drinking water, quality, and safety of water services to the Georgian population. Coverage is low with only 68% of the population having access to centralised water systems and about 37% of the population having access to centralised wastewater systems. There are problems with respect to constancy of supply, as 78 % of the population served by centralised water supplies does not receive continuous 24 hours water supply. The water quality is deteriorating, and about 10-30% of the water does not comply with current standards.

Core sector problem- Rural area

A major aspect of the inferior service level is related to the rural population. About 48% of the population lives in rural areas and settlements with less than 5,000 inhabitants, and about 30% this population is served by centralised water systems. The main part of the rural population is not served by centralised water supply systems and is using ground water without treatment. Reportedly, the groundwater is of a good quality, however, no monitoring and water quality testing takes place of the groundwater or the drinking water at the customer taps.

Impact of core problem

The inferior service delivery has significant social, environmental and economic impacts. Consumers suffer a major welfare loss in not having ready access to safe water and wastewater services. The population is also suffering from health impacts as outbreaks of water related epidemics have been seen recently. Problems of environmental pollution are worsening and non-compliance with current environmental standards. Finally there are significant economic costs associated with a poor-performing water sector in the form of foregone economic investments and the economic costs associated with the environmental and social impacts mentioned.

Problem complex

The following descriptions present an overview of relations between the problems that have been found to lead to inferior and deteriorating water service delivery in the water sector.

The problem complex can be divided into a set of *external factors* which impact negatively on the technical, financial and capacity situation at the *service provider level* to provide good quality water services, such as (not in a prioritised order):

- Institutional/Policy reform;
- Social constraints/affordability, and not least;
- Reliable data/information of the water sector especially the rural population (for the urban the Association of WSS utilities are taking positive step to improve the information gap).

And *external factors* as service providers:

- Technical condition of the facilities;
- Low capacity/performance of the operation; and
- Insufficient financial capability.

The main obstacles and challenges to improvements in the water sector, which were analysed in this project and a number of other reports described the water sector in Georgia calls for a more specific and detailed discussion of a number of issues, options and choices.

Key Issues

Twelve Key Issues have been tentatively been identified, which necessitated a further discussion:

- Key Issue No. 1: Deteriorated Water and Wastewater Facilities;
- Key Issue No. 2: Insufficient treatment of water and wastewater
- Key Issue No. 3: Excessive Water Use;
- Key Issue No. 4: Insufficient Funding;
- Key Issue No. 5: Excessive Energy Use;
- Key Issue No. 6: Existing Institutional Framework does not meet the Development Needs of the Water Sector;
- Key Issue No. 7: Low Operational Effectiveness / Productivity of Water Utilities;
- Key Issue No. 8: Lack of Business / Commercial Management Capacity;
- Key Issue No. 9: Regulation and Regulatory Relationships;
- Key Issue No. 10: Strengthening of Legal Framework;
- Key Issue No. 11: Lack of Public Support/affordability; and
- Key Issue No. 12: Challenges in allocating financial resources and establish an implementation to meet the MDG.

A financial strategy will not solve all of the above obstacles and challenges alone - the FS will outline the financial gap based on different scenarios, but it will not give solution to all of the above listed Key Issues. A *national Water Sector Strategy and Action Plan* is therefore highly required to support the financial strategy.

Key issue 3 and 4 are of paramount important to be dealt with in order to initiate a sustainable and viable waters sector in Georgia. To reduce water consumption and reduce energy consumption will enable at least the urban utilities to break the vicious circle, and reduce the capital investment (or at least defer the capital investments) and to reduce the operating costs. A Total Water Management concept should be used when dealing with these issues.

As a substantial part of the water consumption are real physical losses a substantial waste of energy is related to these losses. According to IBNET data for Tbilisi the water losses is about 746 l per capita per day and real estimated consumption is 832 lcd - metering level is only 13%. However, to reduce water losses are expensive due to need to rehabilitate pipe network, but a NRW strategy should be prepared.

Thus, an urgent need is to (in parallel with the development of a National Strategy and Action Plan for the water sector in Georgia):

- Develop a national NRW strategy, and start a pilot project; and
- Initiate an energy saving campaign for a few selected dedicated utilities/municipalities with replacement of pumps as a pilot project. 40 to 50 % of the energy consumption can be saved and the payback period is no more than 3 years.

APPENDIX 1

Data Collection on Rural WSS

As a result of the first Steering Group Meeting the approach for data collection method has been discussed and selected. The consultant had prepared three possible ways for data collection method, namely:

1. Representative selection – 10% out of 4500 rural settlements that amounts to approx 450 municipalities;
2. Administrative division, based on selection of 2-3 municipalities from each of 10 (12) existing province with stable political situation; and
3. Geographical division, based on selection of 20-30 typical rural settlements from four areas defined by similar situation and conditions in water supply and sanitation sectors, namely: Western, Eastern, Mountain and Southern areas.

The first approach has been recognised as a very time - and resource consuming one, and therefore not recommendable taking into consideration time schedule and budget of the current project.

The second approach has been recognised as politically limited and the one which can not guaranty representational data sample.

The last approach has been assessed as the most appropriate, because it allows the covering the territory of the whole country in spite of political division and makes sampling process based on differences of areas in water resources, sources of water supply, rivers catchments areas, similarity in waste water management problems and other complex criteria. Thus this approach could be scaled up to the whole country with minimal deviation.

Data analysis and consultations with local experts supported by SG allowed the conclusion that it is expedient to divide Georgia into zones by territorial and topographic characteristics which result in similarity of the WSS systems used.

The zoning is illustrated in Figure A1-1 below.

Figure A1-1 Zoning for Rural Data Collection



Hence the following 4 zones were identified:

Table A1-1

| | |
|---|--|
| Zone 1 Western Territory with high availability of water resources | The Western part of Georgia is characterized by high availability of water resources due to high ground water level, availability of watercourses etc. and consequently use of simplified water production methods (dug wells). Furthermore, the majority of rivers flow into the Black Sea that explains that they are quite polluted with wastewaters discharged up-stream. |
| Zone 2 Mountain Mainly surface water sources | The mountain part of Georgia is characterized with lack of possibility to use dug wells and boreholes for drinking purposes due to low ground-water level as well as lack of water-bearing rock strata. For example, in this part of Georgia mountain rivers, springs and other steams appearing as a result of snow melting are used as potable water sources. Such water is distinguished by specific chemical composition and increased turbidity that requires additional water treatment based on precipitation followed by filtration of raw water. Moreover, different elevations require using pumping equipment sometimes with several pumping lifts. |
| Zone 3 Eastern Water scarcity territory | The Eastern part of Georgia is characterized with scarcity of water supply sources as well as by low quality of water. Some settlements are supplied with water from cisterns and water-carriers. |
| Zone 4 Southern Developed WS infrastructure | The Southern part of Georgia is characterized by location of cities (Tbilisi, Rustavi), high density of population, developed industry and therefore availability of water and wastewater infrastructure. Mountain rivers, water storages and ground water sources are used as sources of water supply supported by water treatment and transmission water mains and pumping for the long distances. Thus rural settlements are supplied with water also from transmission water mains. |

Geographical division: For its size Georgia is a complex geography of mountains, rivers and low-lying plains. In simple terms the country is bounded to the north and south by high mountain ranges with another central north-south ridge that generates two major water systems one draining east to Azerbaijan and the other draining west to the Black sea. These two divides would be fundamentally too large and further sub-division must be considered. The Western plain between the three mountain areas could be taken separately as well as the Eastern higher plateau while the southern and northern mountain areas could be considered separately. However this cuts across cultural differences as well as divides between upstream and downstream areas of rivers.

Thus the country delineation for geographical zones has been made taking into consideration the following main criteria

Table A1-2

| | |
|---|---|
| Geographical | Territories similarity by availability and types of sources for water supply purposes (streams, rivers, lakes etc.), high water availability and other main characteristics. Type of territorial shape. Catchment areas of the main rivers. |
| Technical | Availability of water sources and similarity of used technologies for water production and water distribution, as well as collection and removal of waste water. |
| Politically-territorial or administrative | Availability of total 10 (12) provinces. Equal distribution of sample settlements for the whole country. |
| Institutional | Absence or presence of institutions responsible for water supply and sanitation sector in selected rural settlements. Water supply and sanitation infrastructure availability. |
| Socio-economical | Socio-economical development level of selected areas: level of area's urbanization, industrial development level, density and income level of population and as result – ability to pay |

Based on the above list of criteria, a preliminary list of provinces and rural settlements in provinces has been identified in consultation with local consultants. The preliminary list is presented in the table below.

Table A1-4 Plan for data collection

| No. | Name of the province | Zone | Amount of the settlements | Date of visit | |
|-----|----------------------|------|---------------------------|---------------|----------|
| | | | | Start | End |
| 1. | Akhalkalaki | 4 | 2 | 07.05.07. | 11.05.07 |
| 2. | Ahhaltsikhe | 1 | 2 | 14.05.07 | 18.05.07 |
| 3. | Borzhomi | 1 | 2 | 21.05.07 | 25.05.07 |
| 4. | Mtskheta | 4 | 2 | 28.05.07 | 01.06.07 |
| 5. | Ambrolauri | 2 | 2 | 04.06.07 | 08.06.07 |
| 6. | Gori | 4 | 2 | 11.06.07 | 15.06.07 |
| 7. | Zestafoni | 1 | 2 | 18.06.07 | 22.06.07 |
| 8. | Marneuli | 4 | 2 | 25.06.07 | 29.06.07 |
| 9. | Telavi | 3 | 2 | 02.07.07 | 06.07.07 |
| 10 | Gurdjaani | 3 | 2 | 09.07.07 | 13.07.07 |
| | Total | | 20 | | |

Data collection from rural settlements above will ensure coverage of all likely water supply and sanitation technologies across the country. This information will then be scaled up to provide calculations of expenditure needs for the entire rural water and sanitation sector.

In addition to information from direct data collection, indirect data collection will be used primarily utilising Municipal Development Fund (MDF) project base. MDF has carried out a number

of investment projects in Georgia villages and is in possession of infrastructure and economic data from those villages. To the extent that MDF data will fit to the structure of FEASIBLE data requirements, MDF data will be gathered and used in addition to regular data collection. This will help to double check the correctness of scaling up approach and, most importantly, will be used for adjustments in FEASIBLE rural component default values, hence increasing precision of final calculations.

Data to be collected is outlined in questionnaires. The main elements of questionnaire has been presented and approved during the SGM. The entire questionnaires has been discussed in details and agreed with local consultants. Field missions are being carried out by local consultants where data is collected directly from the village representatives. Data collection is planned to be completed by July 15, 2007. It is important to note that depending on the level of cooperation from rural settlement representatives, composition of rural settlements included in list above might change. However, the adequate replacement will be made in accordance with proposed criteria, thus preserving the initial idea of adequate coverage of water supply and sanitation technologies in a given zone.

APPENDIX 2

ORGANIZATIONAL, INSTITUTIONAL AND LEGAL STRUCTURE OF WATER AND WASTEWATER (W&WW) SECTOR OF GEORGIA. GEORGIAN GOVERNMENT POLICY IN WSS 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 WSS 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:

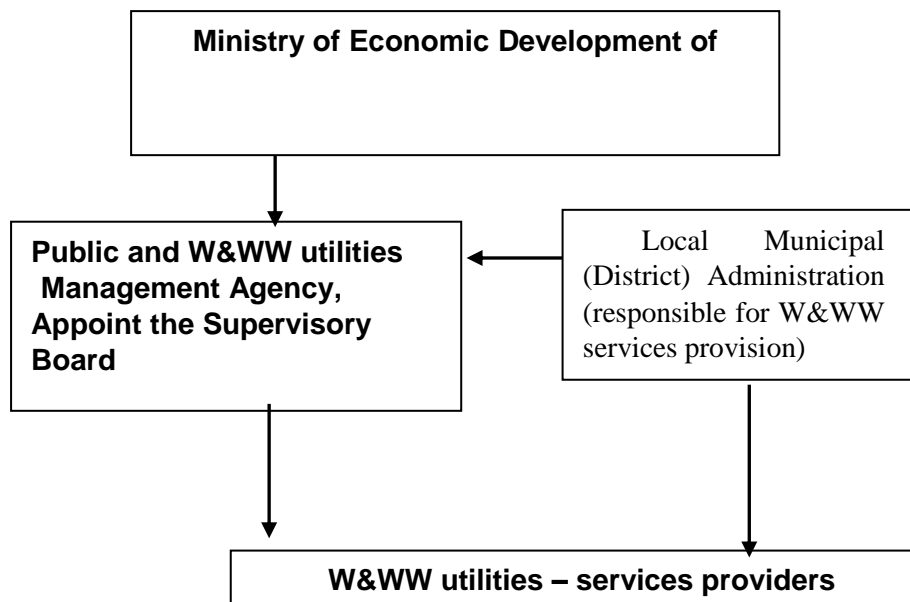
- Rules of technical operation of water and wastewater systems in settlements of Georgia, valid since 1 April 2001 (Order of the Ministry of Urbanization and Construction of Georgia No. 70 of 25 December 2001 agreed with the Chief Sanitary Doctor of Georgia, Ministry of Environment and registered by 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); and
- Water Law of Georgia. Minister of Public health and social protection Order Nr 308 and 05.11.2002 «About approval of the rules and limitations of water consumers' rights in special cases».

Legislative acts for last 5 years

- Resolution of Georgian Government Nr 137 from 11.08.2005 «About approval of conditions and issue of permissions on water withdraw from surface water objects and wastewater discharge to surface water bodies»;

- Resolution of Georgian Government Nr 30 from 15.02.2007 «About state commission on Water supply and sanitary security policy development»; and
- The President of Georgia decree Nr 98 from 30.01.2003 «About State consultative comity on water resources protection and sustainable use in Georgia ».

Figure A2-1 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.

1.4 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 mill. 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 has 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).

1.5 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 Gardabani operated by Gruzvodocanal LLC are in the state ownership. Key assets of W&WW sector in all cities and towns of Georgia are operated based on the operation and maintenance agreements.

1.6. 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.

1.5. 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 Procurement.

APNNEX 2 MAIN ASSUMPTIONS

1 Assumptions for MDG Scenario for WSS sector

Population

The population covered in this FS is assumed to be constant over the total planning period up to 2015/2025. The urban population covered is 2.31 million people and in the rural area a population of 1.99 million is assumed - covering a population of 4.3 million people.

Achievement of Scenario 4 -MDG

This scenario implicates the achievement of the Millennium Development Goals for the urban and rural water and wastewater sectors covering the population of 4.3 million people. This goal includes the following aspects: before 2015 a number of populations without sustainable access to safe drinking water and «basic sewerage» should be reduced to a half. The way to assess the access to sustainable and safe water supply and basic sewerage is discussed in the Interim Report, and serves 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 a half of 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 1990 level;

2) $(50\% - 27\%) = 23\%$ - this difference reflects decrease of 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 MDG-Goal 7 water related for Georgia it is necessary:

- to provide drinking quality water for the consumer through distribution networks of the centralized water supply system for the whole planned period; and
- to provide access to the centralized water supply system for the consumers, who have not had it so far.

The Scenario 4 -MDG covers the interventions as description in table presented below.

Description of development scenarios for urban WSS services

| Urban WSS | 1 | 2 | 3 | 4 |
|--|---|---|---|---|
| Increase coverage of centralized water and wastewater collection | x | x | | |
| Increase of coverage in order to meet MGD targets in WS and Sanitation | x | x | x | x |
| Rehabilitation and replacement of water and sewer network | x | x | x | x |
| Water loss reduction and reduction of demand | x | x | x | x |
| Rehabilitate and increase water and wastewater treatments | x | | | |
| Rehabilitate water and wastewater treatment plants | x | x | | |
| Rehabilitate water treatment plants | x | x | x | |
| Improve regularity of water and wastewater collection | x | x | | |
| Improve energy efficiency in WS and WW sectors | x | x | x | |

Source: COWI's assessments.

In order to comply with goals listed above it is necessary to perform overhauling and rehabilitation of the pipelines to supply 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 - increasing the coverage.

Rehabilitation of pipelines is planned in the amount of 8.1% per year for WS and WW networks for 1st and 2nd group (big and costal zone cities) and 6.9% per year for other cities (50% and 40% out of total networks length correspondingly for the period from the baseline up to target year 2015, and 5.6% for 1st and 2nd group and 5.0% for 3rd group for the period from the baseline up to target year 2025 correspondingly. During the calculation Feasible model assumes 2.5% replacement out of the total network length every year which is included into the above mentioned figures.

Table 0-1 Share of Networks to be Constructed and Rehabilitated within Planned Period.

| Group | Name of municipality | Length of WS network in baseline year, 2005 | Length of WW network in baseline year 2005 | Additional length of WS network to be constructed by the target year | Additional length of WW network to be constructed by the target year | Share of rehabilitated network by the target year |
|--------------|-----------------------------|--|---|---|---|--|
| | | km | km | km | km | |
| 1 | Tbilisi | 3,353 | 2074 | 10 | 348 | 50% |
| | Rustavi | 330 | 138 | 67 | 74 | 50% |
| | Kutaisi | 419 | 231 | 102 | 95 | 50% |
| 2 | Batumi | 320 | 160 | 14 | 74 | 50% |
| | Borzhomi | 56 | 14 | 11 | 10 | 40% |
| | Tshaltubo | 149 | 34 | 1 | 8 | 40% |
| | Poti | 182 | 32 | 31 | 35 | 50% |
| 3 | Kobuleti | 55 | 36 | 7 | 13 | 50% |
| | Zugdidi | 204 | 95 | 39 | 36 | 50% |
| | Gori | 68 | 38 | 19 | 39 | 50% |
| | Samtrediya | 48 | 48 | 19 | 15 | 40% |
| | Hashuri | 73 | 25 | 20 | 18 | 40% |
| | Marneuli | 50 | 26 | 14 | 15 | 40% |
| | Chiatura | 50 | 25 | 12 | 13 | 40% |
| | Zestafoni | 95 | 42 | 14 | 15 | 40% |
| | Ozurgeti | 61 | 16 | 10 | 11 | 40% |
| | Senaki | 155 | 0 | 12 | 14 | 40% |
| | Kaspi | 44 | 15 | 8 | 7 | 40% |
| | Gurdzhaani | 74 | 18 | 7 | 6 | 40% |
| | Terzhola | 60 | 1 | 2 | 3 | 40% |

Source: Data collected and COWI's assessments.

Note: 1& 2 group of municipalities modern, long life pipes (up to 50 years of lifetime) have been assumed for rehabilitation and new construction. In case of cities of 3rd group – normal pipes (with 25 years lifetime).

Table 0-2 Estimation of a Target Access of Urban Population in Georgia to Safe and Sustainable Water Supply and Sanitation.

| | Share of population with sustainable access to safe water in 1990 | Share of population with sustainable access to safe water in 2003 | Water supply coverage to be achieved by 2015 | Share of population connected to the centralized sanitation systems in 1990 | Share of population connected to the centralized sanitation systems in 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% |
| Samtrediya | 46% | 9% | 73% | 7% | 5% | 54% |
| Hashuri | 40% | 6% | 70% | 31% | 10% | 65% |
| Tshaltubo | 83% | 82% | 92% | 44% | 15% | 72% |
| Marneuli | 58% | 29% | 79% | 23% | 8% | 61% |
| Chiatura | 75% | 33% | 88% | 50% | 17% | 75% |
| Zestafoni | 33% | 9% | 67% | 32% | 7% | 66% |
| Ozurgeti | 29% | 22% | 65% | 13% | 7% | 56% |
| Senaki | 40% | 28% | 70% | 0% | 0% | 50% |
| Borzhomi | 35% | 11% | 68% | 24% | 8% | 62% |
| Kaspi | 33% | 13% | 66% | 32% | 22% | 66% |
| Gurdzhaani | 45% | 13% | 73% | 72% | 32% | 86% |
| Terzhola | 46% | 40% | 73% | 15% | 8% | 57% |

Source: Data collected and COWI estimations

Having determined the target coverage with sustainable water and sanitation services the objectives are converted to specific technical measures for the scenario modelling in FEASIBLE.

This report presents an option of MDG achievement for W&WW sector of Georgia. In the proposed scenario 4 it was assumed that the main technical measure / investment activity for the goals achievement in all cities will be reconstruction and extension of the existing water and wastewater networks and construction of the new ones.

Besides, in case necessary, water abstraction and water treatment facilities will be re-constructed and extended. It' also assumed that the recommended measures concerning reduction of water losses and unaccounted-for water, water meters installation and tariffs increase will be implemented in Tbilisi as well as in other cities.

The domestic water consumption in all cities will be reduced in target year:

- For Tbilisi City – down to 250 lcd (Tbilisi);

- For cities of Black Sea costal zone – down to 130 lcd (Rustavi, Kutaisi ,Batumi, Borjomi, Tskhaltubo, Poti, Kobuleti); and
- For other cities – down to 100 lcd (Samtredia, Khashuri, Zugdidi, Marneuli, Chiatura, Zestaphoni, Ozurgeti, Senaki, Gori, Kaspi, Gurdjaani, Terdjola)

Decrease in unit water consumption of domestic customers and reduction in NRW are proposed for **all scenarios except for the baseline**. This assumption is based upon the implementation of a demand management strategy which shall be an obligatory precondition for any investment in the WSS sector.

If unit water consumption remains on the level of the baseline year, the extension of the centralized water supply and sanitation networks coverage, will lead towards necessity of much higher volume of water production comparing to the base year. This again will require increased investments in new water facilities.

The reduction in water use (consumption and water loss) is due to following assumptions:

- Tariff growth for WSS services,
- Replacement of outdated retro fittings with water saving ones;
- Increased customer metering
- Rehabilitation of distribution networks; and
- Proactive NRW reduction, etc.

In the process of calculations the length of new pipes, it is assumed that the population density for 1 km of the pipelines will be 500 persons for districts with high-rise buildings and 200 persons for those with low-rise buildings (private houses).

The main technical assumptions for Scenario-4 MDG are presented in the table below.

Table 0-3 Technical parameters for Scenario 4

| | Share of population with sustainable access to safe water in base year | Share of population connected to the centralized sanitation systems in base year | Target WS connection coverage in target year | Target sanitation connection coverage in target year | Additionally connected population to sustainable water supply | Additionally connected population to sustainable sanitation system | Length of WS network in baseline year | Length of WW network in baseline year | Additional length of WS network by the target year | Additional length of WW network by the target year |
|------------|--|--|--|--|---|--|---------------------------------------|---------------------------------------|--|--|
| | inh | inh | inh | inh | inh | inh | km | km | km | km |
| Tbilisi | 1,692,200 | 566,832 | 1,080,000 | 1,008,504 | 10,800 | 383,832 | 3,353 | 2074 | 11 | 384 |
| Rustavi | 38,169 | 39,344 | 105,375 | 113,433 | 67,206 | 74,088 | 330 | 138 | 67 | 74 |
| Kutaisi | 40,401 | - | 142,470 | 94,980 | 102,069 | 94,980 | 419 | 231 | 102 | 95 |
| Batumi | 124,200 | 42,394 | 138,000 | 116,693 | 13,800 | 74,299 | 320 | 160 | 14 | 74 |
| Zugdidi | 9,042 | 6,552 | 48,125 | 42,371 | 39,083 | 35,819 | 204 | 95 | 39 | 36 |
| Gori | 37,234 | 11,337 | 56,355 | 50,156 | 19,121 | 38,819 | 68 | 38 | 19 | 39 |
| Poti | 22,946 | 2,436 | 53,667 | 37,741 | 30,720 | 35,305 | 182 | 32 | 31 | 35 |
| Kobuleti | 9,828 | 4,082 | 16,785 | 16,924 | 6,957 | 12,841 | 55 | 36 | 7 | 13 |
| Samtrediya | 2,740 | 1,494 | 21,896 | 16,121 | 19,156 | 14,627 | 48 | 48 | 19 | 15 |
| Hashuri | 1,976 | 3,302 | 22,400 | 20,954 | 20,424 | 17,651 | 73 | 25 | 20 | 18 |
| Tshaltubo | 11,118 | 1,975 | 12,467 | 9,762 | 1,349 | 7,787 | 149 | 34 | 1 | 8 |
| Marneuli | 8,283 | 2,130 | 22,483 | 17,395 | 14,200 | 15,265 | 50 | 26 | 14 | 15 |
| Chiatura | 7,500 | 3,753 | 19,688 | 16,880 | 12,188 | 13,127 | 50 | 25 | 12 | 13 |
| Zestafoni | 2,316 | 1,800 | 16,667 | 16,550 | 14,351 | 14,750 | 95 | 42 | 14 | 15 |
| Ozurgeti | 5,093 | 1,610 | 14,854 | 12,949 | 9,761 | 11,339 | 61 | 16 | 10 | 11 |
| Senaki | 7,758 | - | 19,600 | 14,000 | 11,842 | 14,000 | 155 | 0 | 12 | 14 |
| Borzhomi | 2,005 | 1,503 | 12,758 | 11,704 | 10,752 | 10,201 | 56 | 14 | 11 | 10 |
| Kaspi | 1,979 | 3,283 | 10,070 | 10,062 | 8,091 | 6,779 | 44 | 15 | 8 | 7 |
| Gurdzhaani | 1,505 | 3,840 | 8,700 | 10,320 | 7,195 | 6,480 | 74 | 18 | 7 | 6 |
| Terzhola | 2,218 | 451 | 4,010 | 3,156 | 1,792 | 2,705 | 60 | 1 | 2 | 3 |

Assumptions for Scenario 3

The proposed Scenario 3 implies a number of interventions described in the above Scenario 4 and continue further development of the WSS systems. The main difference between Scenario 3 and MDG Scenario 4 is the rehabilitation of water intakes and water treatment facilities in selected cities according to the scenarios description in the table presented below.

Table 0-4 Description of development scenarios for urban WSS services

| Urban WSS | 1 | 2 | 3 | 4 |
|--|---|---|---|---|
| Increase coverage of centralized water and wastewater collection | x | x | | |
| Increase of coverage in order to meet MGD targets in WS and Sanitation | x | x | x | x |
| Rehabilitation and replacement of water and sewer network | x | x | x | x |
| Water loss reduction and reduction of demand | x | x | x | x |
| Rehabilitate and increase water and wastewater treatments plants | x | | | |
| Rehabilitate water and wastewater treatment plants | x | x | | |
| Rehabilitate water treatment plants | x | x | x | |
| Improve regularity of water and wastewater collection | x | x | | |
| Improve energy efficiency in WS and WW sectors | x | x | x | |

The rehabilitation of water intakes and water treatment facilities should be completed by the target year and the remaining value of such facilities should be increased from current level up to 100%.

Table 0-5 Changes of remaining values of water intakes and treatment facilities for Urban water Supply sector.

| Name of municipality | Remaining assets value, base year | Renovation need as % of replacement value | Remaining assets value. Target year. |
|----------------------|-----------------------------------|---|--------------------------------------|
| Tbilisi | 50% | 50% | 100% |
| Rustavi | 50% | 50% | 100% |
| Kutaisi | 40% | 60% | 100% |
| Batumi | 50% | 50% | 100% |
| Zugdidi | 50% | 50% | 100% |
| Gori | 80% | 20% | 100% |
| Poti | 50% | 50% | 100% |
| Kobuleti | 35% | 65% | 100% |
| Samtrediya | 50% | 50% | 100% |
| Hashuri | 40% | 60% | 100% |
| Tshaltubo | 60% | 40% | 100% |
| Marneuli | 35% | 65% | 100% |
| Chiatura | 40% | 60% | 100% |
| Zestafoni | 40% | 60% | 100% |
| Ozurgeti | 50% | 50% | 100% |
| Senaki | 40% | 60% | 100% |
| Borzhomi | 20% | 80% | 100% |
| Kaspi | 50% | 50% | 100% |
| Gurdzhaani | 50% | 50% | 100% |
| Terzhola | 50% | 50% | 100% |

Source: Data collected and COWI estimations

Assumptions for Scenario 2

Scenario 2 is a complementary one containing the full list of interventions included into the above described scenarios 4 and 3 as shown the table below.

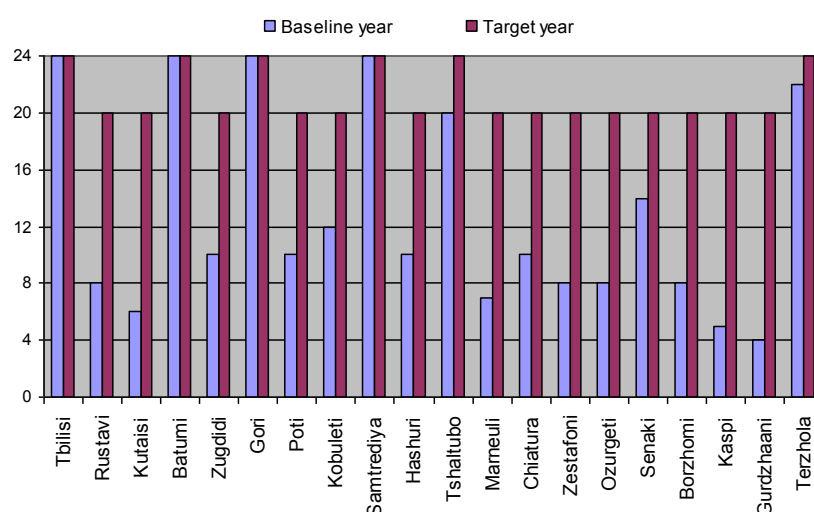
| Urban WSS | 1 | 2 | 3 | 4 |
|--|---|---|---|---|
| Increase coverage of centralized water and wastewater collection | x | x | | |
| Increase of coverage in order to meet MGD targets in WS and Sanitation | x | x | x | x |
| Rehabilitation and replacement of water and sewer network | x | x | x | x |
| Water loss reduction and reduction of demand | x | x | x | x |
| Rehabilitate and increase water and wastewater treatments plants | x | | | |
| Rehabilitate water and wastewater treatment plants | x | x | | |
| Rehabilitate water treatment plants | x | x | x | |
| Improve regularity of water and wastewater collection | x | x | | |
| Improve energy efficiency in WS and WW sectors | x | x | x | |

As an addition – Scenario 2 contains set of measures directed towards:

- Extension of centralized water supply and sanitation system connection coverage by construction of new networks;
- Reconstruction and rehabilitation of existing waste water treatment facilities and increase their remaining value up to 100% (mechanical-biological treatment in Tbilisi and only mechanical treatment in other cities where WW treatment existed);
- Pumping system efficiency increase with target unit consumption of 0,6 kWh/m³ in WS and 0,4 kWh/m³ in WW sector; and
- Increase of regularity in water supply up to 20-24 h/day.

Changes in water supply regularity, included in this Development Scenario, are presented on the following figure.

Figure 0-1 Changes in water supply regularity



Assumptions for Scenario 1

Scenario 1 contains all measures included in the Scenario 2 and assumes the additional interventions such as:

- construction of mechanical WW treatment plants in all cities covered by selection and full treatment of all waste water volume collected by centralized WW collection networks; and
- rehabilitation of water intakes and construction of water supply treatment plants in municipalities where the quality of portable water delivered to the distribution system was below existing standards or where there was no any treatment at all.

Table 0-6 Description of development scenarios for urban WSS services.

| Urban WSS | 1 | 2 | 3 | 4 |
|--|---|---|---|---|
| Increase coverage of centralized water and wastewater collection | x | x | | |
| Increase of coverage in order to meet MGD targets in WS and Sanitation | x | x | x | x |
| Rehabilitation and replacement of water and sewer network | x | x | x | x |
| Water loss reduction and reduction of demand | x | x | x | x |
| Rehabilitate and increase water and wastewater treatments plants | x | | | |
| Rehabilitate water and wastewater treatment plants | x | x | | |
| Rehabilitate water treatment plants | x | x | x | |
| Improve regularity of water and wastewater collection | x | x | | |
| Improve energy efficiency in WS and WW sectors | x | x | x | |

At present, by various reasons, non of the existing wastewater treatment facilities is able to ensure the designed effluents quality. Biological treatment isn't employed anywhere. At best only mechanical treatment is applied. Thus, in most cases the wastewater goes through treatment facilities (if any) without any treatment or directly discharged to water bodies also without treatment and disinfection.

Table 0.7 Objectives of wastewater sector in resort cities and towns

| Name of municipality | Type of wastewater treatment facility baseline year | WW Treatment facility remaining value in baseline year | Renovation need by the target year | Type of WW treatment to be established by the target year |
|----------------------|---|--|------------------------------------|---|
| Tbilisi | M | 85 | 15 | MB |
| Rustavi | M | | | M |
| Kutaisi | M | 70 | 30 | M |
| Batumi | | | | M |
| Zugdidi | | | | M |
| Gori | M | 80 | 20 | M |
| Poti | | | | M |
| Kobuleti | | | | M |
| Samtrediya | | | | M |
| Hashuri | M | 80 | 20 | M |
| Tshaltubo | | | | M |
| Marneuli | | | | M |
| Chiatura | | | | M |
| Zestafoni | | | | M |
| Ozurgeti | | | | M |
| Senaki | | | | M |
| Borzhomi | | | | M |
| Kaspi | | | | M |
| Gurdzhaani | | | | M |
| Terzhola | | | | M |

Rehabilitation of the proposed wastewater treatment plants will considerably reduce a negative environmental impact on water streams, small rivers, watercourses, the Kura River being the drinking water source for some downstream settlements, both in Georgia and in Azerbaijan, as well as to improve the environmental conditions in the Black Sea resort area and thus to increase its attractiveness for tourists, which will promote social and economic development and improvement of living conditions of the population in the region.

2 Rural WSS

Assumptions for Scenario 4 (MDG)

Scenario 4 for rural area is based on similar assumptions as for urban areas - by the year 2015: decrease the number of inhabitants without sustainable access to safe drinking water and basic sanitation. From the technical point of view applied to rural WSS this means that it's required to decrease by 2 times number share of population which uses non-improved water supply and sanitation services comparing to level of year 1990. According to definition presented in "MDG Handbook":

- *for water supply – source of water should be located not far than 1000 m from household, quality of water in the source do not allow to use it for drinking purposes without additional treatment, water for drinking purposes is delivered with helps of cisterns or trucks, the bottled water is used for drinking purposes and so on.*
- *for sanitation – absence of safe waste water removal, as well as hygienic isolation of excreta from contacts with human, animals or insects.*

Thus, in order to achieve Millennium Development goals for rural WSS it's required to provide the population living in these areas with corresponding services in compliance with assumptions listed above.

The measures to be implemented within current Scenario include reduction of non-improved water supply from 40% down to 16% and for sanitation – reduction of non-improved sanitation from 11% down to 3% (as a weighted average).

All these improvements of water supply and sanitation methods automatically assume upgrade to the next technological level.

Table 0-8 The description of proposed Scenarios for Rural WSS.

| | Scenario | | | |
|--|----------|---|---|--|
| | 2 | 3 | 4 | |
| Rural | | | | |
| Upgrade 50% of existing WS and WW service level to the next one comparing to the base year | x | | | |
| Rehabilitation of water intakes and WS treatment plants | x | x | | |
| Improve energy efficiency | x | x | | |
| Reduce not-improved water supply from 40% to 16% | x | x | x | |
| Reduce not-improved sanitation from 11 to 3 % | x | x | x | |
| Change of technology in water and sanitary delivery | x | x | x | |

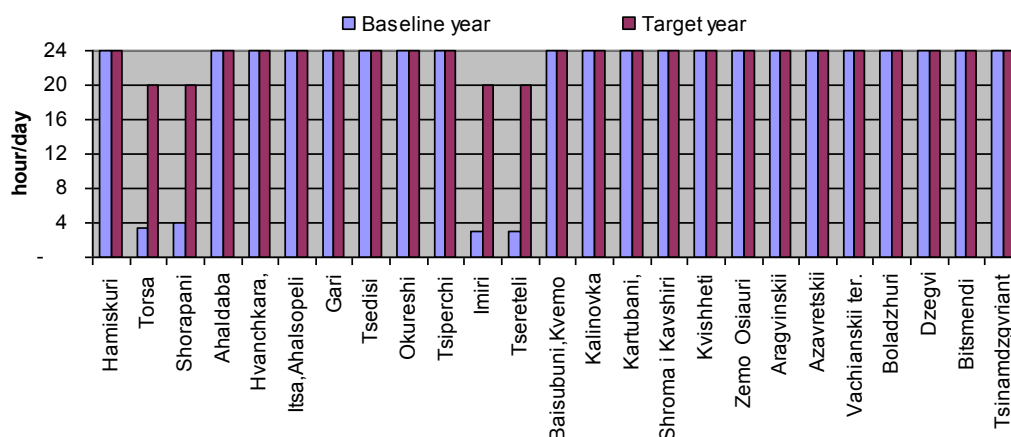
Assumptions for Scenario 3

Scenario 3 besides all measures included in Scenario 4 (MDG), but in addition assumes restoration of centralized water supply systems in all settlements where such measures are appropriate. Specifically for areas where ground centralized water supply sources are used the rehabilitation and new construction of new water treatment plants and for surface water supply sources – construction or rehabilitation of simplified water treatment plants. Such approach will significantly improve the quality of source water, and reduce the share of population without sustainable access to safe drinking water caused by low water quality.

The reconstruction of water supply facilities will fully ensure of population living in target areas with safe drinking water by the target year.

Besides this it's assumed that thanks to replacement of pumping equipment with efficient one the unit power consumption calculated per 1 m³ of produced water will go down. The supposed efficiency of pumping equipment (pump + electric motor) will be not lower than 60%. In those settlements where the pumping was used for water delivery the regularity will be increased as an average from 3 hours up to 20 hours.

Picture 0-1 Changes of water supply regularity in selected settlements



This Scenario will not assume any significant changes in sanitation system.

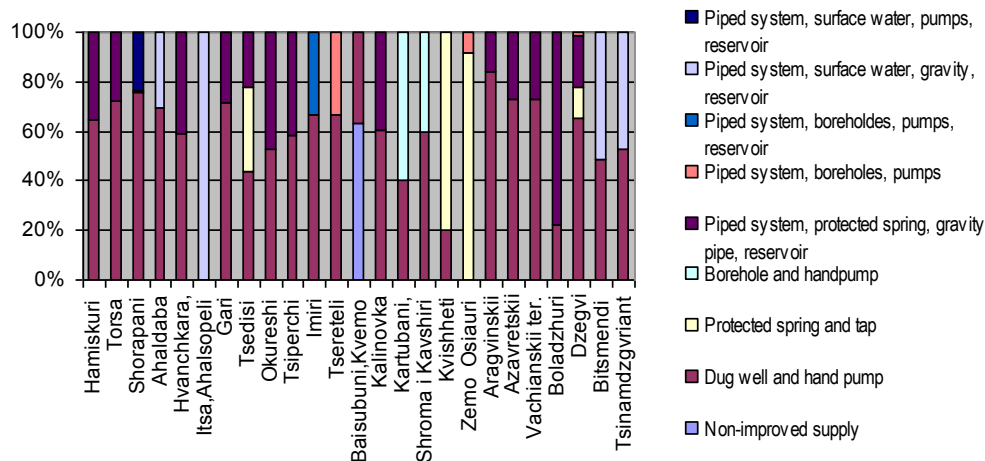
Table 0-9 Description of proposed Scenarios for Rural WSS.

| | Scenario | | |
|--|----------|---|---|
| | 2 | 3 | 4 |
| Rural | | | |
| Upgrade 50% of existing WS and WW service level to the next one comparing to the base year | x | | |
| Rehabilitation of water intakes and WS treatment plants | x | x | |
| Improve energy efficiency | x | x | |
| Reduce not-improved water supply from 40% to 16% | x | x | x |
| Reduce not-improved sanitation from 11 to 3 % | x | x | x |
| Change of technology in water and sanitary delivery | x | x | x |

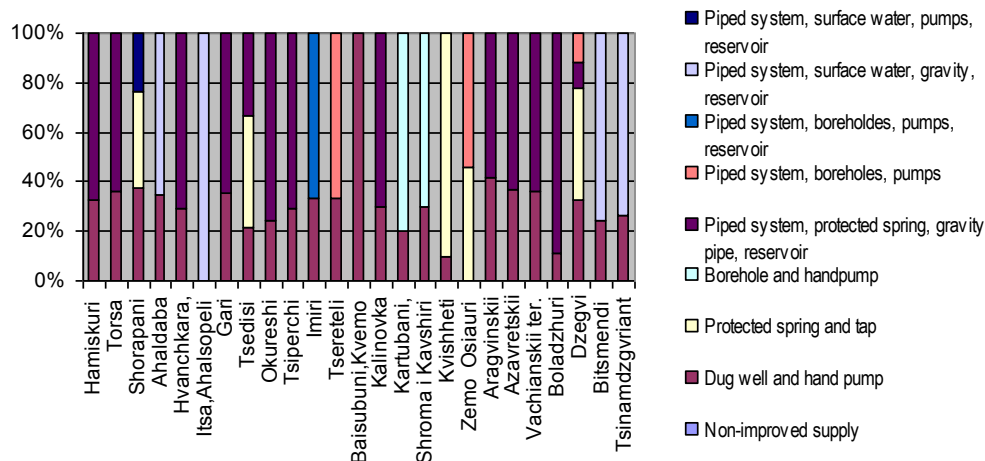
Assumptions for Scenario 2

As an addition to measures included to prior Scenario, this Scenario assumes the upgrading of centralized water supply and sanitation systems by shifting of 50% of existing facilities to the next technological level. The development of applied technologies in base and target year is presented on the following charts.

Picture 0-2 Current used of WS technologies in rural areas in Baseline year.



Picture 0-3 Proposed WS technologies in Target year.



Besides these the increase of water supply facilities remaining value is assumed as well as introduction of 100% water treatment for the surface and ground water sources (including the spring water) with help of simplified filtration. As regards to sanitation the upgrading of 50% of existing and the most commonly used pit latrines up to improved pit latrines with ventilation. Fro the settlements where simplified centralized waste water collection system is used, the increase of coverage is assumed. All proposed improvements will require new construction and extension of existing centralized WSS systems.

The development of changes in applied technologies in WSS systems for base and target year is presented overleaf.

Table 0-10 Breakdown of changes in waste water collection technologies

| Municipality name or group of municipalities | Baseline year | | | | Target year | | | |
|--|----------------------------|--------------------|--|--|----------------------------|--------------------|--|--|
| | Non-improved sanitation | Simple pit latrine | Simple pit latrine with ventilation | Simplified sewerage (+/- treatment) | Non-improved sanitation | Simple pit latrine | Simple pit latrine with ventilation | Simplified sewerage (+/- treatment) |
| Hamiskuri | | 100 | | | | 50 | 50 | |
| Torsa | | 100 | | | | 50 | 50 | |
| Shorapani | 20 | 80 | | | 0 | 55 | 45 | |
| Ahaldaba | 69,3 | 30,7 | | | | 59 | 41 | |
| Hvanchkara, Chordzho | | 100 | | | | 50 | 50 | |
| Itsa,Ahalsopeli | | 100 | | | | 50 | 50 | |
| Gari | 70 | 30 | | | | 59,6 | 40,4 | |
| Tsedisi | | 100 | | | | 50 | 50 | |
| Okureshi | | 100 | | | | 50 | 50 | |
| Tsiperchi | 100 | | | | | 50 | 50 | |
| Imiri | | 100 | | | | 50 | 50 | |
| Tsereteli | | 100 | | | | 50 | 50 | |
| Baisubuni,Kvemo | | 100 | | | | 50 | 50 | |
| Mshalgori,Zemo | | | | | | | | |
| Mshalgori, Patara | | | | | | | | |
| Gora | | | | | | | | |
| Kalinovka | | 95 | 5 | | | 55 | 45 | |
| Kartubani, | | 95 | 5 | | | 45 | 55 | |
| Natsiskvtlari, | | | | | | | | |
| Belokiani | | | | | | | | |
| Shroma i Kavshiri | | 90 | 10 | | | 45 | 55 | |
| Kvishheti | | 100 | | | | 50 | 50 | |
| Zemo Osiauri | | 100 | | | | 50 | 50 | |
| Aragvinskii | | 100 | | | | 50 | 50 | |
| ter.organ | | | | | | | | |
| Azavretskii | | 100 | | | | 50 | 50 | |
| ter.organ | | | | | | | | |
| Vachianskii ter. | | 100 | | | | 50 | 50 | |
| okrug | | | | | | | | |
| Boladzhuri | | 94,9 | | 5,1 | | 47,4 | 31,6 | 21 |
| Dzegvi | | 100,0 | | | | 50 | 50 | |
| Bitsmendi | | 100,0 | | | | 50 | 50 | |
| Tsinamdzyvriant | | 100,0 | | | | 50 | 50 | |
| Kari | | | | | | | | |