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ASSESSMENT AND DEVELOPMENT OF MUNICIPAL WATER AND WASTEWATER TARIFFS AND EFFLUENT CHARGES IN THE DANUBE RIVER BASIN.

Volume 2: Country-Specific Issues and Proposed Tariff and Charge Reforms: Bulgaria – Case Study

WORKING FOR THE DANUBE AND ITS PEOPLE

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PREFACE

The Danube Regional Project (DRP) consists of several components and numerous activities, one of which was "Assessment and Development of Municipal Water and Wastewater Tariffs and Effluent Charges in the Danube River Basin" (A grouping of activities 1.6 and 1.7 of Project Component 1). This work often took the shorthand name "Tariffs and Effluent Charges Project" and Phase I of this work was undertaken by a team of country, regional, and international consultants. Phase I of the UNDP/GEF DRP ended in mid-2004 and many of the results of Phase I the Tariffs and Effluent Charges Project are reported in two volumes.

Volume 1 is entitled *An Overview of Tariff and Effluent Charge Reform Issues and Proposals*. Volume 1 builds on all other project outputs. It reviews the methodology and tools developed and applied by the Project team; introduces some of the economic theory and international experience germane to design and performance of tariffs and charges; describes general conditions, tariff regimes, and effluent charges currently applicable to municipal water and wastewater systems in the region; and describes and develops in a structured way a initial series of tariff, effluent charge and related institutional reform proposals.

Volume 2 is entitled *Country-Specific Issues and Proposed Tariff and Charge Reforms*. It consists of country reports for each of the seven countries examined most extensively by our project. Each country report, in turn, consists of three documents: a case study, a national profile, and a brief introduction and summary document. The principle author(s) of the seven country reports were the country consultants of the Project Team.

The authors of the Volume 2 components prepared these documents in 2003 and early 2004. The documents are as up to date as the authors could make them, usually including some discussion of anticipated changes or legislation under development. Still, the reader should be advised that an extended review process may have meant that new data are now available and some of the institutional detail pertaining to a specific country or case study community may now be out of date.

All documents in electronic version – Volume 1 and Volume 2 - may be read or printed from the DRP web site (www.undp-drp.org), from the page Activities / Policies / Tariffs and Charges / Final Reports Phase 1.

We want to thank the authors of these country-specific documents for their professional care and personal devotion to the Tariffs and Effluent Charges Project. It has been a pleasure to work with, and learn from, them throughout the course of the Project.

One purpose of the Tariffs and Effluent Charges Project was to promote a structured discussion that would encourage further consideration, testing, and adoption of various tariff and effluent charge reform proposals. As leaders and coordinators of the Project, the interested reader is welcome to contact either of us with questions or suggestions regarding the discussion and proposals included in either volume of the Project reports. We will forward questions or issues better addressed by the authors of these country-specific documents directly to them.

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UNDP/GEF Danube Regional Project

Strengthening the Implementation Capacities for Nutrient Reduction and Transboundary Cooperation in the Danube River Basin

Assessment and Development of Municipal Water and Wastewater Tariffs and Effluent Charges in the Danube River Basin

Project Components 1.6 and 1.7:

Output 1.6 Policy reform and legislation measures for the development of cost-covering concepts for water and wastewater tariffs, focusing on nutrient reduction and control of dangerous substances

Output 1.7 Implementation of effective systems of water pollution charges, fines and incentives, focusing on nutrients and dangerous substances

Volume 2: Country-Specific Issues and Proposed Tariff and Charge Reforms: Bulgaria - Case Study

September, 2004

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List of Abbreviations:

ASTEC Model	Accounts Simulation for Tariffs and Effluent Charges Model
BE	Budget Entities (category of service users)
BGN	Local currency: Bulgarian leva after denomination since 1999
BOD_5	Biological Oxygen Demand after 5 days
CEE	Central and Eastern Europe
CoM	Council of Ministers
EBRD	European Bank for Reconstruction and Development
HH	Households (service users category)
I&A	Industry and Agriculture (service users category)
ING	Internationale Nederlanden Group
ISPA	Instrument for Structural Policies for Pre-Accession
mln	million
MoEW	Ministry of Environment and Waters
MoRDPW	Ministry of Regional Developments and Public Works
MU	Management Unit
NEPF	National Environmental Protection Fund
NSI	National Statistical Institute
OLP	Basic Central Bank Interest Rate
RIOS	Regional Inspection for Environment Protection
RWSSC	Regional Water Supply and Sewage Company
SNT	Sewage without treatment as opposed to sewage with treatment (ST)
SPLTD	Sole Proprietorship, Limited Liability Company
SS	Suspended Solids
SU	Service User
USD	US dollar
VAT	Value Added Tax
W	Water, usually referred to the type of service provided
WB	World Bank
WSc	Water Supply and Sewage as composite goods
WW	Wastewater, usually referred to the type of service provided
WWTP	Wastewater Treatment Plant

1 Introduction

1.1 Purpose of the Case Study

The aim of this case study is with an example to summarize and synthesize the information we have gathered on the structure and functioning of the water supply and sewage sector in Bulgaria. We will not only show how a typical water supply and sewage company operates in Bulgaria but also analyze how its situation (financial, operational, etc.) and influence on the environment and community can be improved through a system of appropriate tariffs and charges and other measures, e.g. reduction of leakage applied to a set of different scenarios. Our task will be using the spreadsheet model developed as part of the project to find practical solutions for existing problems of a particular water supply and sewage company – Pleven SPLTD.

The scenarios will help us to clarify the various aspects of the financial data available for the company and the possibilities for future policy developments with respect to the existing problems. In the text that will follow, we present four different scenarios that capture the most pressing issues for the company and possible ways to solve them. The first problem is the need for investment in new equipment and modernization of the existing network. Our findings showed that with the present level of tariffs and charges and collection rate of receivables the self-financing option would not be feasible. How an introduction of a two-part tariff could possibly change that situation would be part of our reform proposal that have to do with that particular issue. The second dilemma, how to reduce leakage (to what extent) and at the same time avoid unnecessary investment will be also analyzed. In addition we will also try to examine how the improved collection of receivables will benefit both the company and the community it serves. All these scenarios will be accompanied by careful examination of the data gathered and analysis of the company operations for the last six years for which information was available.

In the reform proposals section we will summarize the basic findings and evaluate their possible impact on Pleven RWSSC and its current situation. The feasibility and efficiency factor of such reforms would also be an issue of consideration in view of the ongoing reforms in the Bulgarian water sector. We will also show what would be the overall effect of each reform with regard to consumption and income burden to the existing categories of service users. We will mainly concentrate on those recommendations that are applicable to the Bulgarian water sector given the local conditions and based on experts' opinions that we have gathered.

1.2 Case Selection and Data Collection

At the beginning of our discussion which water supply and sewage company to choose for our case study, the availability of data seemed the most plausible and important criteria since at many Bulgarian water companies good quality accounting and financial information is difficult to access. Later on, however, we have reexamined our arguments and come to the conclusion that it should be such a company that have not only significant relevance to the project target - Danube river, but is a representative for a typical water service provider as well. That is why we have selected Pleven RWSSC. First, Pleven region is directly linked with the Danube river basin. The major city Pleven is situated in the Danube valley, 40 km from the river and 70 km from the Balkan mountain. There are three rivers of importance as sources of water supply and channels for taking away the wastewaters – Vit, Ossum (both flow into the Danube) and Tutchenitsa, which flows into Vit. The latter one goes through the city but is contaminated by the wastewaters from households. The wastewaters are directly discharged into the river and that is why it can be used as a source for potable water only after a high level of treatment. That the region has significant impact for the Danube water pollution is indicated by a study conducted for World Bank in 1990 on the Vit river catchment. According to that study, Vit

was responsible for only 0.2% of the Danube river flow but for about 4% of the load of BOD_5 and 0.5% of the SS load. Nutrient reduction is therefore a key concern in the region. In short, the applicability of the Pleven case to the target group of water companies suitable for the project topic seems high and that was one of the reasons why we have chosen it.

The second reason why we have chosen Pleven RWSSC is that it is a typical (representative) for Bulgaria regional water services management unit of a middle size (slightly above the average by scope of service and financial results), with the state acting as an owner (Ministry of Regional Development and Public Works). The fact that it is a regional company, a specific feature for Bulgaria, means that there are also some smaller companies (branches) under its control in the framework of the regional administrative and territorial division of the country. So the following municipalities are represented in the water service sector by the respective branches of Pleven RWSSC: Pleven, Dolni Dabnik, Dolna Mitropolia, Belene, Iskar, Kneza, Levski, Nikopol, Pordim, Cherven Briag and Guliantzi.

Of course, the availability of data remained an important factor and in a way, we were lucky with finding all the relevant information because the World Bank has already settled a loan with Pleven RWSSC. That required a complete financial picture and analysis of the company and its operations and the World Bank consultants had already done it. Moreover the range of the data is for the last five years including some of the most recent (2003) developments and plans. The sources of the data so far are: the water management unit reports, the World Bank reports, the Ministry of the Regional Development and Public Works, the Ministry of Environment and Waters, some basic financial reports published on yearly basis in the Bulgarian Enterprises Information System, the National Statistical Institute, the State newspaper and other relevant information that can be found on internet. We have verified the consistency of the information and tried to separate the ambiguous items or emphasize their uncertainty.

One example for such ambiguity was the calculation of the annual depreciation figure.[1] It was an important estimate since the company had used it as one of the cost items to justify the tariff levels. What we found out was that fixed assets had been re-valued three times in the '90s. In 1991 with Decree #179 of the Council of Ministers when the water supply and sewage companies were transformed from state owned public companies to trading holdings. That led to an increase in the capital of the water companies that have to be registered in the trading register. The second revaluation was in 1997 (Decree #238 of the CoM) and was forced by the recent inflationary processes. The last revaluation is a result of the introduction of the international accounting standards in Bulgaria. Only fixed assets that are not state (public) or municipal property will be re-valued according to the Water Law. That will mean that the entire water supply and sewage network and the connected equipment will be left aside. With this in mind we decided to replace the figure in our spreadsheet model with the annual investment.[2]

[1] Depreciation is a monetary allowance to allow for actual wear and tear on long-lived plant and equipment over time. Depreciation can be based on estimates of actual wear and tear (useful for management decisions) or a standard schedule used for tax or rate setting purposes. Depreciation is not amortization. Despite the common use cognates of amortization to mean depreciation in many CEE language vocabularies, in English amortization is a financial term that refers to the payments designed to pay off a debt. As such, it may have little or nothing to do with the physical depreciation of an asset; amortization is determined by the terms under which debt, which may have been used to purchase an asset, is financed.

[2] More on this issue will be discussed in the scenario evaluation section.

2 Case Settings

In this section we will introduce the management unit – RWSSC Pleven SPLTD. We will try to develop a dynamic perspective of the company by showing its development within a five-year period of time and by analyzing its current place in the water service sector in Bulgaria. The scope of service and the financial results from operations will be part of the comparison criteria. Another part would be the technical efficiency aspect like leakage control and the financial efficiency (collection of receivables) of the company. However, before going into this analysis let me first present you with brief information about the area that Pleven RWSSC serves.

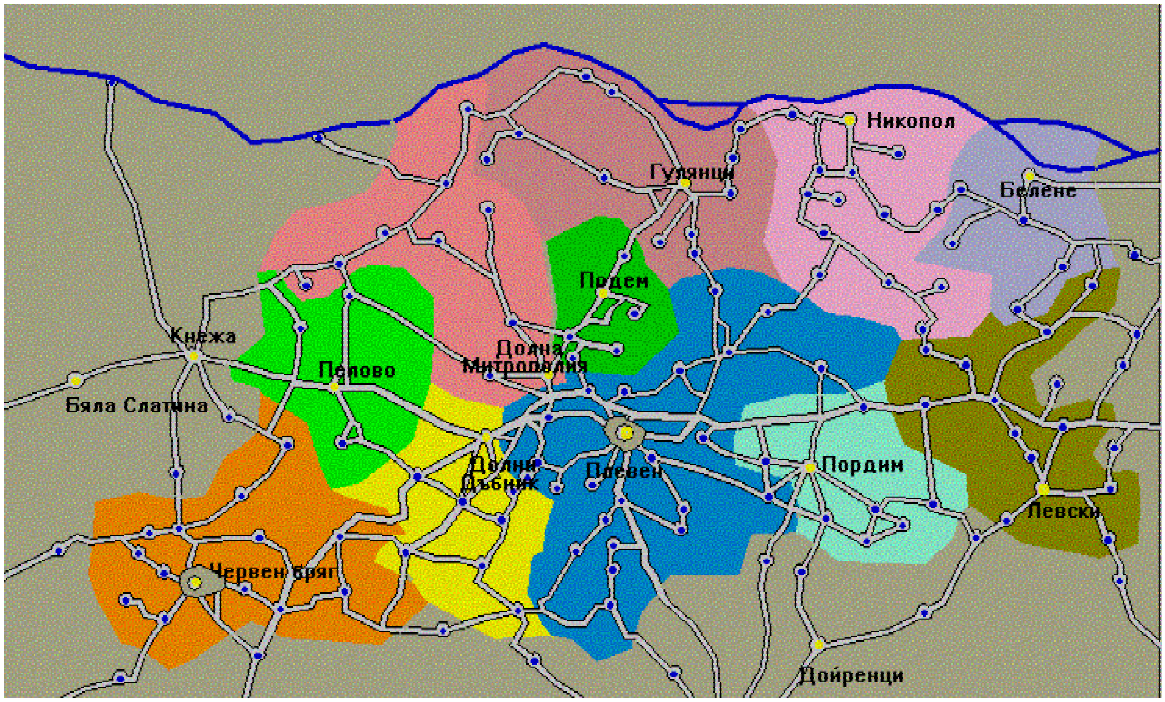
2.1 Pleven Region – General Information

Figure 1 Administrative Division of the Republic of Bulgaria (regional).

Geographical location: Pleven region is situated in the Central part of Northern Bulgaria, in the middle of the Danube Plain and it stretches from the Belene Lowlands and the middle flow of the Ossum River to the East up to the Iskar River – to the West, and from the Danube River in the North as far as the Balkan Range to the South. Within this area the region occupies 3.9% of the territory of Bulgaria. It is a sloping land from South to North. The climate is moderate continental. The Iskar, Vit, Ossum and the Danube River flow through its territory. There are also a number of dams built there. The region has got a very good infrastructure, which is suitable for servicing the economical and social sphere. It includes about 200 km of railroads, ensuring the connection to the Black Sea, the Danube River and to the capital city of Sofia, as well as 1300 km of motorways. There function 4 ports at the Danube River. The following municipalities are within Pleven region: Pleven, Dolni Dabnik, Dolna Mitropolia, Belene, Iskar, Kneza, Levski, Nikopol, Pordim, Cherven Briag and

Guliantzi.

Figure 2 Municipalities within Pleven Region.



Economy: This region is rich in natural resources of good quality such as refractory clay, quarry material, raw materials for the cement industry, crude oil and gas. The humus soil is a good prerequisite for the development of agriculture and food industry. The knitwear industry is traditional for this region. On the territory of Pleven district there are about 155 state-owned, municipal, and co-operative companies, enterprises and institutes. The main fields of production are: machine-building and metal-processing industry, electro-technical and electronic industry, chemical and petrol refining industry, construction materials industry, timber-processing industry, glass industry, leather and leather-clothing and footwear industry, textile industry, etc. The range of production comprises of: lubricants, oils, petrol, motor and electric fork trucks, hydraulic presses, min-compressors, dye-casting and pressure-casting machines, steel and iron-castings, aluminium; castings for machine-building, electronic and automobile industries; heat-exchangers, central heating facilities, wines, alcoholic drinks; beer, milk and milk products, meat and sausages, canned fruit and vegetables, knitwear and ready-made garments, tailoring and auxiliary fabrics.

First of all let me note that 1996 and 1997 were turbulent years for the Bulgarian economy. The local currency (Bulgarian Lev) went down from 130 leva per dollar (as of June 1996) to 500 leva per dollar at the end of the same year. 1997 developments were even worse. The 3,000 leva per dollar limit was almost reached in February and the introduction of the currency board seemed to be the only plausible solution for the moment. Since July 1, 1997 Bulgaria has been under a Currency Board Regime (lev was fixed to German mark) and the currency stabilized around the 1,800 leva per dollar till 1999 when the lev was denominated (three zeros were dropped). Following the economic crisis in 1996/97 with negative real GDP growth, the currency board arrangement has helped to stabilize the economy and to achieve real GDP growth of close to 4% on average since 1998. Inflation came down from above 1,000% on average in 1997 to 9.8% on average since then.[3]

Water Resources: The water currents and water areas take up 3.6% of the territory of Pleven region

[3] Data taken from Bulgarian National Bank Reports and the Commission of the European Communities "2002 Regular Report on Bulgaria's Progress Towards Accession".

compared with 2% for the country. This is due to the Danube River and its tributaries Iskar, Vit and Ossum as well as to the artificial water reservoirs such as the dams Telish and Gorni Dabnik. In the district there are 56 micro dams, which are owned by the municipality, and 12 dams, which are property of the association "Irrigation systems" and whose area is insufficient and hinders their management. The irrigation systems created in the past are almost not functioning because of the high price of water, the changes in the land property and the neglecting of the equipment. Outside of the territory of the district – on the territory of Lovech District- are the water basins "Cherni Ossum", "Steneto" and "Zlatna Panega". Frequent deviances from the standard of the water provided to Pleven are observed. One solution of the problem is the building of "Additional water supply to Troyan, Lovech and Pleven from dam "Cherni Ossum".

2.2 The Company – RWSSC Pleven SPLTD

The activity of RWSSC Pleven SPLTD is spread over the territory of 11 municipalities, including 13 towns and 105 villages with population about 320 000 people. In technical aspect the water supply is provided by 19 groups (workshops for technical assistance, repair and calibration of water meters) with 3059 km water-conduit net. The main pump stations are 130, and the hopper ones – 222. The total installed capacity is 19,401 kilo-Watts/h. In 5 towns there are built up sewerage systems with total length of the net 294 km. The purifying of the refuse waters in Pleven and some of the nearby enterprises is accomplished by the purifying station, nearby the village of Bozhuritsa, let under operation in 1991 with maximal capacity for purifying of 1850l/sec. for the first stage. Another five municipalities use industrial wastewaters treatment plants.

On the next page a detailed table (Table 1) with relevant company information is presented. Note that due to the high inflation and currency devaluation, the 1996 and 1997 figures from Table 1 below should be treated with caution when costs or other financial indicators are compared. These two years are included for information purposes mainly and the analysis will concentrate on the rest of the available data. On first glance the most distinct developments for the period in question are the high energy costs for 2001 (38% of total operating costs) and the increase in receivables as a percentage of total operational revenue from 1998 onwards (from 9% to 18%). Water-produced had a decrease of 25% between 1998 and 2001 but total operational costs and revenue remain almost unchanged (unit costs and tariffs went up). There is a noticeable reduction in water losses from 58% in 1997 to less than 52% in 2001. More detailed comments on the operational and financial trends and developments of Pleven RWSSC will follow in the section after the table.

Table 1 Summary Information for RWSSC Pleven SPLTD (end of year data, 1996 – 2001).

Service Information	1996	1997	1998	1999	2000	2001
Total Population	346,000	346,000	327,000	322,000	319,000	315,000
Water connections	77,016	77,138	77,250	77,343	77,415	77,468
Sewage connections	12,123	12,546	12,642	12,679	12,718	12,762
Total number of staff	1,053	1,070	1,068	1,068	1,076	1,062
Total operating cost ('000 USD)	3,446	4,300	7,247	7,775	7,365	7,143
Cost of hired services ('000 USD)	190	271	748	828	631	515
Other Materials ('000 USD)	657	895	1,517	1,586	1,657	1,585
Personnel cost ('000 USD)	1,521	2,160	3,325	3,702	3,189	3,008
Energy cost ('000 USD)	936	902	1,065	1,010	1,247	2,731
Total fixed assets ('000 USD)	2,556	7,325	9,332	8,603	7,981	9,311
Water supply coverage (%)	100%	100%	100%	100%	100%	100%
Water produced ('000 m^3)	44,329	44,987	44,640	37,625	36,437	33,566
Water billed ('000 m^3)	24,066	18,899	19,897	18,701	18,344	16,178
Number of repair bursts per year	3,580	3,276	4,323	5,015	5,202	4,287
Sewage billed ('000 m^3)	19,570	15,008	14,270	14,992	12,604	11,435
Treated in WWTP ('000 m^3)	0	0	0	13,319	10,946	9,949
Unaccounted for water ('000 m^3)	20,263	26,088	24,743	18,924	18,093	17,388
Unaccounted for water (%)	45.70%	58.00%	55.40%	50.30%	49.66%	51.80%
Metering (% of quantity billed)	90%	92%	95%	98%	95%	95.50%
Personnel cost/Total operating cost	44%	50%	46%	48%	43%	42%
Energy cost/Total operating cost	27%	21%	15%	13%	17%	38%
Average tariff (water supply, USD/m^3)	0.10	0.19	0.28	0.32	0.31	0.34
Average charge (sewage + treatment) (USD/m^3)	0.06	0.10	0.15	0.15	0.12	0.15
Unit operational cost (USD/m^3 water billed)	0.14	0.23	0.36	0.42	0.40	0.44
Receivables ('000 USD)	595	543	654	972	1,228	1,338
Operational revenue ('000 USD)	3,161	4,870	7,683	8,271	7,359	7,249
Receivables/Operational revenue (%)	19%	11%	9%	12%	17%	18%
Number of months due	2.3	1.3	1.0	1.4	2.0	2.2
Collection efficiency	82%	90%	92%	90%	88%	85%

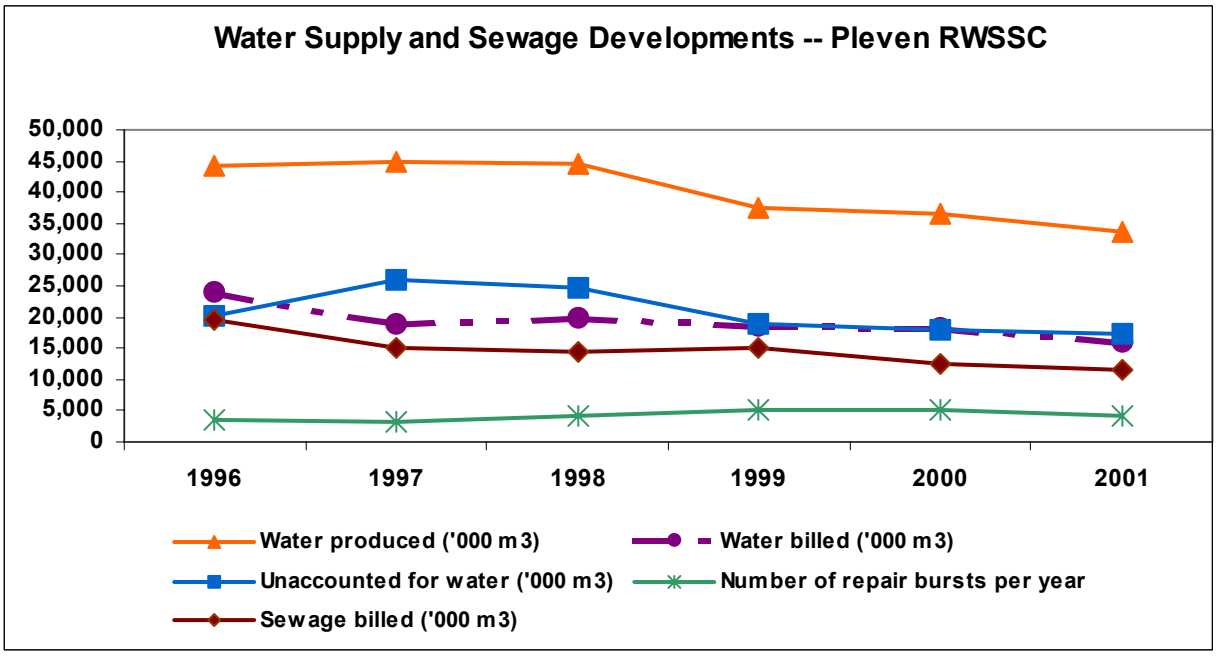
Source: World Bank Loan Program Reports, MRDPW.

2.2.1 Financial and Operational Developments

Operational Trends: If we are to track the developments in the operations of Pleven RWSSC several trends are dominating the picture. For the period in question (1996 – 2001) the total amount of water supplied had decreased with approximately 10 million m^3 (from 44.3 mln to less than 34 mln). At the same time the water billed to customers went down from 24 to 16 million m^3 but the percentage of water losses increase from 46% in 1996 to 52% in the year 2001. However, the present positive efforts of the management to solve the problem should be noted. If we look at the trend from 1997 onward, the water losses had decreased from 26.1 mln cubic meters to 17.4 mln cubic meters. The decrease is especially noticeable after 1998. It was a result of the management's efforts and investment financed through government agreement with World Bank loan that targeted the repair and replacement of water supply network and improved water metering.

It is worth noting that the situation of Pleven RWSSC is not much different from the national average, which is 49% (see Table 3) as indicated from the most recent data we have for 2002. However, this remains a high number. There are many reasons behind. One of them could be that leakage does not decrease together with water consumption due to constant pressure along the pipelines and the state of the available network that needs reconstruction and repair. Other reasons are the insufficient funds for replacement of the old network and investment in new equipment, the negative demographic trends and the decreased purchasing power of the consumers, which lead to lower consumption, the lack of legal enforcement mechanism how to collect the receivables outstanding and the last but not the least, the down turn in industrial activity in the region (big state-owned factories were closed or work with minimum capacity).

Figure 3 Water and Sewage Production and Water Losses

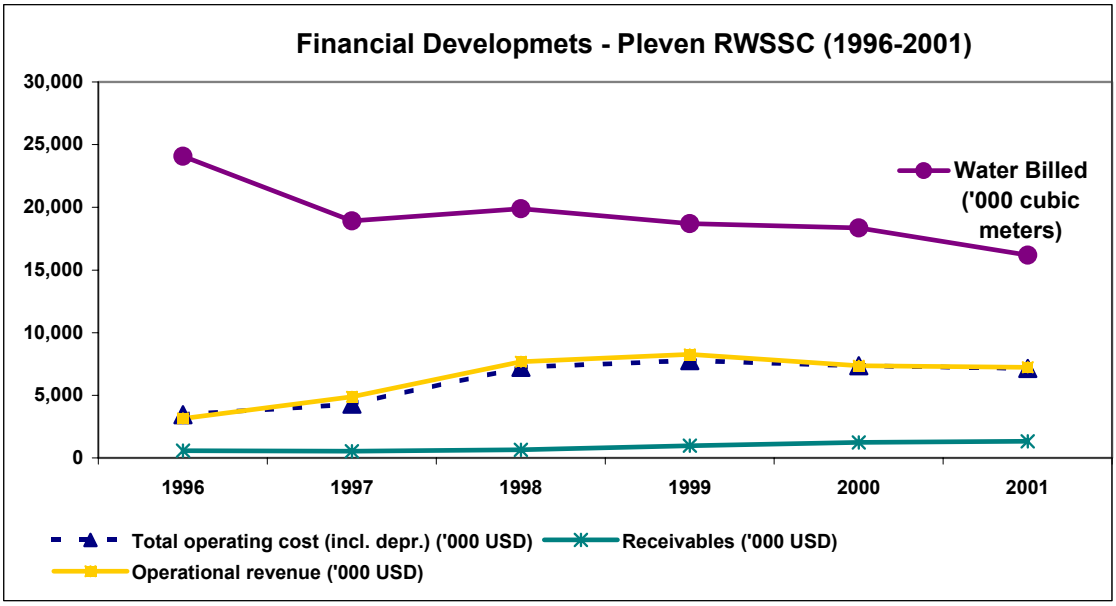


Another finding from Table 1 and later confirmed in Table 3 is the number of employees as compared with the population in the region that uses the services of the water company. The data for 2002 indicates that Pleven RWSSC serves 4% of the population in Bulgaria but account for 7.7% of the total staff in the sector. While there could be a reasons for that beyond our knowledge, the finding deserve attention whenever the efficiency of the enterprise's structure and management is considered.

Financial developments: From the graph below (Figure 4) it is clear that with operational cost moving

together with operational revenue funds were not internally available to make many required improvements beyond those made using the World Bank loan. Moreover, it appears that the revenues in excess of operating costs were only marginally sufficient for the system maintenance as we can see from the deterioration of selected technical parameters. The increase in water losses as compared to the water billed to service users for the last three years mark one of the biggest challenges for the management of the company. Nevertheless, by 2001, the company has reconstructed with internal financing and the help of World Bank 6,300 metres of water mains. The total amount of the investments was BGN 1.7 million. The money was used for reconstruction of nine projects in Pleven district.

Figure 4 Operating Costs, Revenue and Collection of Receivables



Another key financial issue is the collection of the receivables outstanding. In February 2002 the amount of the unpaid fees from the subscribers of Water Supply and Sewerage-Pleven was BGN 1.7 million.[4] The total amount of the unpaid bills for water was BGN 900 000. The legal entities owed BGN 500,000, the budget structures – BGN 300,000. The company had initiated 25 court cases against the biggest debtors. Some of the companies have paid their debts immediately; others had reached agreements with the company for rescheduling of the payments.

Of course there are objective reasons that lay outside of the scope of the current management of the company. We have to note that Pleven RWSS was initially constructed and designed to be part of a huge national network with enormous for the size of the country capacity that was supposed to serve past heavy industrial demand. Because of that in the Pleven and other cases Bulgarian water systems have ended up with overcapacity that increases costs for any given level of consumption.

Another part of the problem also inherited from the past was that water services companies did not have to take any financial or strategic decisions by themselves. Every action with regard to tariff setting, investment or operating decisions were centrally planned and just locally executed. As a result cost recovery or sustainable investment were never concerns of the local management. The joint social management in the water services sector continues nowadays as well. Even if the manager would like to increase prices to improve the long-run efficiency of service provision, the ministry or the municipality on which territory the company operates will object to such changes if not "appropriately" justified by law.

[4] Source: BTA (Feb 14, 2002).

2.2.2 Scope of Service, Customer Categories and Ownership Structure

Pleven RWSSC as most such companies in Bulgaria has almost 100% of the water supply and more than 60% of the sewage network in place. However, for the sewage network there is a large discrepancy between the situation in the villages and that in cities. More than 95% of the water billed to consumers is metered. The general division of service users in Bulgaria is applicable for the Pleven case as well: population, industry and agriculture and budget entities. There are additional subcategories of use, that we have added in our ASTEC spreadsheet model and that reflects the form of water supply (through gravity or mixed, gravity and pump systems) and the availability of sewage network and the treatment of the wastewaters.

The company is entirely owned by the state through the Ministry of Regional Development and Public Works. If the management decides to set a new price for its services it has to justify its decision for the Ministry. From this year (2004) there will be a special governmental commission that will handle specifically that issue. In 1999 the existing "Methodology for setting the water prices" was abandoned, and the way tariffs were set was liberalized. Till the implementation of the Law for Regulating the Water Supply and Sewage Services, a temporary methodology concerning all new tariffs and charges will be developed. As already mentioned in the National Profile, the existing way for that procedure is that all water supply and sewage companies that are of limited liability type should defend their proposals for price changes of their services in front of the Ministry of Regional Development and Public Works.

In most (or all) cases, however, the cost for future investments is not included in the calculations. Which means that the investment has to be done from the sales of services revenue. To continue further, the management of the WSSCs in Bulgaria work deliberately with lower net revenue margins than the allowed 12% above the production and operating expenses. That may have resulted in sacrifice of service quality and further increase in investment needs for network repair and replacement purposes.

2.2.3 Water and Wastewater Tariffs

The water tariff depends entirely on the technology and costs of water extraction and delivery - pumps, gravity or mixed and on the electricity and other costs incurred by the company. However, if we look at the ratio of the "gravity water" to the total amount supplied, we will see that it is between 1-2%. The total amount of produced drinking water for 2002 was 30,551,000 cubic meters (m^3). From it 17,743,000 m^3 was extracted through pumps, 12,372,000 m^3 was bought (imported) and just 436,000 m^3 came through gravity supply. For that reason and to avoid further complication with increasing the number of service users categories we have neglected the gravity category in our ASTEC spreadsheets.

The sewage tariff is calculated on the same basis as the water supply one. On the basis of all costs that are relevant to the provision of the service. The company splits its wastewater charge in two parts: for taking the water away to the main city collector plus a charge for water treatment when there is a wastewater treatment plant (WWTP). Service users do not have to pay for treatment if their WW is released without treatment. It should be noted that all industrial companies are obliged to have their own WWTP on the territory of the enterprise. The treatment there is till some limits prescribed by the Ministry of Environment and Waters and then there is additional treatment in the city WWTPs to the extent that allows wastewaters to enter into the accepting water basin.

It should be noted that instead of single wastewater tariff, Pleven WSSC (and all the rest WSSCs in Bulgaria) uses tariff differentials to charge for its wastewater services. In 2001 for example, the households had to pay BGN 0.07 per cubic meter while the other consumers (mainly industry) had three different tariffs based on the BOD_5 levels per litre. When the BOD_5 content was up to 200 mg/l the price of sewage collection and treatment was BGN 0.40 leva/m^3 (without VAT). For levels

between 200 and 600 mg/l the tariff was BGN 0.49 leva/m^3. For levels above 600 (up to 1000) the service users had to pay BGN 0.58 leva/m^3. If that last limit (III Category) is surpassed then a 25% increase above the last tariff is calculated.

Besides BOD_5 other indicators are also monitored. Some of them are the content of suspended solids, pH, fats and oil product with certain characteristics. Three degrees of contamination exist based on levels of the above indicators and the tariffs are the same as set for the BOD_5 example. When different degrees for each of the indicators have been measured, the pricing is based on the highest degree for all the effluent released into the system by the service user. In the region some of the companies with III Category of discharged wastewaters are the brewery "Kamenitza" AD, "Gamza 1992" AD (wine producer), couple of meat processing factories, the local heating company, etc.

In addition, when the limits set are surpassed, the MoEW or the Regional Inspection for Environment Protection (RIOS) levies certain fines and sanctions on the polluter. The income from those fines is split as follows: 70-80% for the state budget, 20-30% for the MoEW and 10% for the municipality on which territory the industrial plant is located. The fines are usually imposed on companies that use chemicals and other polluting substances in the production process such as oil refinery, textile, meat processing and others.

2.2.4 Recent Developments

World Bank Loan: There is a recent investment of about USD 1.7 mln undertaken by Pleven RWSSC. This investment has been for rehabilitation of the water supply network. It was financed by 30 % governmental contribution (15% granted by the Ministry of Regional Development and Public Works and 15% provided by the water company) and the balance through a 10-year load of USD 1.4 mln loan from the World Bank to the government of Bulgaria but earmarked for the Pleven RWSSC. The loan has to be repaid in the year 2012. The loan is guaranteed by the state and it is part of the 1995 Loan Agreement (for USD 45 mln) between the Bulgarian government and EBRD-World Bank. The company has to repay it from July 2002, on semi-annual instalments with interest calculated based on the Basic Central Bank interest rate (OLP[5]) plus three percent (3%). The management of Pleven RWSSC has estimated that the interest repayments alone will amount to approximately USD 100,000. During the first three years of utilization the company enjoyed a grace period and no repayment had to be made.

The funds were used in 1999, 2000 and 2001. Of the total of USD 1.4 mln, USD 597,000 were used for purchase and delivery of water-meters, stop and pressure valves, leak detection equipment and more than USD 36,000 were for technical and project assistance and supervision. The rest of the funds were intended to repair and replacement of the water supply network. The aim of the management was to reduce leakage by tightening the control and measurement accuracy of the water produced and water billed to consumers. As we saw it has been very successful: Table 1 shows sharp declines leakage. The same table also shows that, even with sharply declining consumption, leakage as a percentage of produced and imported water dropped from 58% in 1997 to 52% in 2001.

Table 2 Recent Investment by Sources and Use of Funds

Funds Provider	In million USD	**Use of WB Loan**	In million USD
World Bank Loan	1.40	Equipment (Leakage)	0.60
Government	0.15	Technical Assistance	0.05
Pleven RWSSC	0.15	Water supply network, etc.	1.05

[5] OLP moves close to 2.5% for the first ninth months of 2003, source Bulgarian National Bank.

Decreased tariff levels: Another recent change as of May 2003 is that Pleven RWSSC lowered the water tariffs from BGN 0.98 leva/m^3 to BGN 0.93 leva/m^3 for all service users. The change was due to the negative impact of the price increase between 2001 and 2002 (29%) on the volume of sales given the low income levels and economic activity in the region. The drinkable water consumption dropped from 133 l/i/d (litres per inhabitant per day) in 1991 to 93 l/i/d in 2002. Besides the population in the region decreased from 358,355 to 311,985 for the same period. The decrease in tariffs was also aiming to eliminate an existing discrepancy between the estimated level of costs, the volume of sales and the unit production cost.[6]

2.3 The Place of Pleven RWSSC in the National System

In this section we will try to compare Pleven RWSSC with the rest of the sector in Bulgaria by taking into account several indicators and the figures for the total sector and industry averages. Below is a short summary table (Table 3) with our findings. The data is one year later than the one used in the previous section analysis so we can also add more recent trends for the company development.

Having in mind that there are 29 such companies, we can say that Pleven RWSSC is above average in size. It serves 4% of the population but accounts for 6.5% of the "net revenues" from the sector. Also shown by the high margin ratio 2.143% compared to 1.52%. What is worth mentioning is the collection efficiency ratio, which in our case is 84% versus national average of 79%. So despite of the increase in receivable, Pleven RWSSC is among the companies with high collection efficiency when compared to the rest of the country. The level of the tariffs is close to the average but the charges for sewage are higher. One of the reasons is that in Pleven region there is high concentration of water polluting industries (brewery, chemical and food industries, etc.). Another finding is the relatively high number of employees (7.7% from the total in the sector) as compared to the percentage of population served (4.02%). While this could be a result of the complexity of operations of Pleven WSSC, it could be also a potential organizational issue that is worth attention.

[6] Source: Pleven RWSSC - "Explanatory note for change of the drinkable water tariff for settlements with mixed water supply as of May 1, 2003".

Table 3 Pleven vs. the Average of the Bulgarian Water Service Sector (year 2002).

Indicator	For the country	For RWSSC Pleven	As a %
Population served	7.845 mln	0.315 mln	4.02%
Revenue from activity	242 mln BGN	15.164 mln BGN	6.27%
Costs	238.4 mln BGN	14.839 mln BGN	6.22%
Accounting net revenue margin	3.638 mln BGN	0.235 mln BGN	6.46%
Net revenue margin (%)	1.52	2.143	141%
Fixed assets	396.537 mln BGN	25.641 mln BGN	6.94%
Annual depreciation	31.238 mln BGN	1.193 mln BGN	3.82%
Investment in mln BGN	23.244 (74% of amort.)	1.081 (91% of amort.)	4.65%
Average water loss	49.06 %	50.82%	
Water produced	797 mln m^3	30.2 mln m^3	3.79%
Water billed	406 mln m^3	14.9 mln m^3	3.67%
Water Tariff (no VAT)	1.41 to 0.50 BGN/ m^3	0.98 BGN/m^3	
Sewage before treatment	0.04 BGN/ m^3	0.07 BGN/m^3	175.00%
Sewage + treatment	0.38 BGN/ m^3	0.07 up to 0.69 BGN/m^3	
Receivables total	72.543 mln BGN	3.234 mln BGN	4.46%
Receivable HH	41.040 mln BGN	2.253 mln BGN	5.49%
Receivables budget ent.	15.851 mln BGN	0.929 mln BGN	5.86%
Receivables other	15.652 mln BGN	0.013 mln BGN	0.08%
Collection efficiency	79%	84%	106.33%
Debts	56 mln BGN	2.117 mln BGN	3.78%
Debts electricity	19 mln BGN	0.669 mln BGN	0.35%
Number of employees	13,551	1,044	7.70%
Average salary	325 BGN/month	324 BGN/month	

Source: MRDPW.

3 Issues and Challenges

If we take into account the overall situation in the water service sector in Bulgaria, Pleven despite its problems could be classified among the better-performing entities in the country. It has relatively high net revenue and collection efficiency and a bank loan to support its short-term investment. The new regulations for tariff setting gives certain freedom in the management hands to justify a tariff increase based on proved operational costs. Despite that freedom and the above average net revenue margin, Pleven RWSSC is not able to self-finance the required long or even medium-term investment. There are also ways to additionally reduce the water losses and collect the receivables outstanding. The current data and mechanism for calculating and setting tariffs do not allow for proper allocation of costs among users thus cross-subsidizing could possibly emerge. These and similar issues will be addressed in the sections to follow.

3.1 Water Losses and Investment Needs

The high amounts of water losses for the Bulgarian water service companies in general are due to several reasons. The surpassed depreciation dates of the water supply network (built in the ’60 and ‘70s of the last century), the low quality of the materials used in its construction, the imprecise measurements during the planning and implementation process and the inefficient use and maintenance during the years. That reasoning is also valid for Pleven WSSC. Despite of the significant improvements made after the World Bank loan utilization the water losses are still high.

Expert’s opinion about how to address this issue in Bulgaria can be summarized in the following objectives:

- Replacement of the old water supply network that would result in reduced leakage;
- Installing pressure regulators in the high pressure zones;
- Cutting of the illegal connections to the network, laying fines and prosecuting the responsible for those actions;
- Limiting the use of drinkable water for agricultural needs;
- Actions related to the modernization of the existing water metering system and equipment.

All those actions could be part of a strategy that has a goal to keep the company running at its present state with efficiency enhancements from operational and financial points of view. However, they tell us little about how the replacement of the old network will be financed or where the modernization of equipment will come from. There is obviously the need for a long-term scenario how to solve this problem. Before jumping into conclusions, there are several factors that need consideration.

First, we should bear in mind that large difference between the amount of water entering water supply system and water consumption reflects not only leakage. It is also due to the fact that no reliable methodology and equipment exists for measuring water before distribution, e.g. for surface water the measurement is based on depth of water, and for ground water – on capacity of the pumps. There are no water meters for water mains. In addition, because of lack of appropriate control of water distribution, part of water is distributed to unknown users and is not covered by consumption statistics.

Second, to address the problem of leakage needs not only strategic vision on the part of the management for overall control and supervision of the network coupled with prompt reaction in emergency cases (bursts) but also significant investments for improvement and replacement in certain cases of the existing system of water supply and sewage. The government or local banks could not

always and forever provide these funds since the financial conditions of the company (Pleven RWSSC and others) do not allow for repayment of significant amounts of loans. Other alternatives such as concession and privatization may have to be considered. These options will be discussed in a later section.

When looking at Table 3 or other statistical data from the water service sector in Bulgaria, one of the first things that draw our attention is the low net revenue margin of these companies. Although by law water companies could operate with net revenue margin between 12% and 30%, none of them have even achieved 12%. It appears that net revenues are deliberately kept low because price of water is a political and social issue with high sensitivity in Bulgaria. In the past (20 years ago) the tariffs comprised a negligible amount of the average household income, which resulted in over-consumption and use of drinkable water for irrigation and other side purposes. That totally discouraged savings and efficient use of water. Today already the portion of income each family spends on water and energy consumption is higher and though the levels of consumption had decreased the general population still does not regard water as a commodity that has to be used wisely.

3.2 Collection of Receivables Outstanding

Table 3 gives us year 2002 data of uncollected bills for Pleven RWSSC. The total amount of receivables outstanding is BGN 3.2 mln. From this, BGN 2.3 mln belong to households and industry and BGN 0.9 to budget entities. By the middle of 2003, the picture is the following: BGN 3 mln are due by households and BGN 1.5 mln by public entities. The biggest unpaid bill is that of the local hospital, BGN 0.44 mln. The company had started 300 court procedures against the debtors.[7]

Table 4 Collection Efficiency

Service Information	1996	1997	1998	1999	2000	2001	2002
Receivables ('000 USD)	595	543	654	972	1,228	1,338	1,617
Revenue ('000 USD)	3,161	4,870	7,683	8,271	7,359	7,249	7,582
Receivables/Revenue	19%	11%	9%	12%	17%	18%	21%
Number of months due	2.3	1.3	1	1.4	2	2.2	-
Collection efficiency	82%	90%	92%	90%	88%	85%	84%

Using Table 1 and Table 3, we can extract the data for receivables and revenue of Pleven RWSSC over time. Their proportion is growing over time from 9% in 1998 to 21% in 2001. We have to keep in mind, however, that the payment of those bills is not permanently avoided but rather postponed in time. The collection period can vary from 1-2 months to a year and more. However, we cannot say how much of this debt will be "written off" as not collectable. So far the company cannot disconnect a user from the system because of unpaid bills. That is why the debts are kept accumulating and the only steps the management of Pleven RWSSC could undertake is to start a legal procedure in order to settle that payments. There was a case cited in the same *24 Hours* newspaper article (Aug.14, 2003, p.9) about a household user who had not paid his bills since 1998 and had accumulated more than BGN 2,000 debt to the water company. What the companies are doing in such cases besides trying to solve the issue through court is to reschedule payments and establish a somewhat mutual acceptable scheme (timetable) for settling the debt when this is possible of course.

[7] Published in "24 Hours" newspaper, p.9, Aug.14, 2003: "100,000 people are two days without water because of dam repairs in the middle of the summer" (the title of the article does not refer to Pleven RWSSC case).

3.3 Tariff Calculations Do Not Reflect the Economic Cost of Capital

As discussed in previous section the methodology for tariff calculations of the water supply and sewage services does not only suffer from social policy implications but is inefficient in the sense that it does not capture the true costs of capital involved in the process of water extraction and delivery to the final consumers. Besides the usual cost items as Materials, Energy and Fuels, Personnel, Financial and other expenses there is also the item Depreciation, which should reflect the replacement coat of fixed assets. However, due to many reasons (accounting, economic, management) it is not the case. Having in mind that in Bulgaria most of the infrastructure was built 30-40 years ago and not properly maintained, we could easily imagine that the life of the significant part of the present equipment and network should be over by now. As a result the depreciation figure might not reflect the real situation of the fixed assets of the company and in many cases it is worse than it appears on the balance sheet of the company. In addition, new investment requirements, water losses above 25% and uncollected receivables are not included in current tariff calculations. Moreover, the cost allocation estimates are assessed against water billed to consumers not total amount of produced water. In the scenarios development process we have tried to suggest alternative ways how Pleven RWSSC could include most of these costs in the tariff setting. Our task is to assess what would be the impact on the service prices and overall situation of the company in regard to consumption levels, operational and financial performance indicators. The issue of accurate costs estimation and allocation among users will be an important factor of consideration when future reform proposals are considered.

4 Scenarios Settings

4.1 Scenarios – Description and Summary

The following is a short description of each scenario we will address in this study:

Baseline:

- ***Baseline 1A***: scenario using current tariffs and charges, average investment figure for three consecutive years (1999-2001) including the WB loan; costs of non-payers are not covered; no cost recovery, no marginal cost pricing.
- ***Baseline 1B***: full cost recovery scenario with average investment; costs of non-payers are not covered; single commodity charge, no marginal cost pricing.

Sustainable:

- ***Sustain 2A***: same as *Baseline 1B* plus BGN 3.5 mln additional investments (60/40 to DW and WW) estimated to fully replace the system on an on-going basis (which means leakage at 22% of production); single commodity charge. Payment enforcement strategy at the cost of 15% of original non-payment, 20% improved payment for budget entities, 50% improvement for all others. Remaining non-payment covered by payers.

Long-term:

- ***Upgrade 3A***: same as *Sustain 2A* plus restructuring of household service users categories, as there is increased WW network collection and treatment. New WW network (financed by grant) and WWTP (financed by loan) investments, and related increase of fixed and variable costs.

Scenario descriptions are summarized below in Table 5. As one can notice through the gradual new investments we have tried to improve the operational developments in order to address the existing problems of the company. Leakage reduction, collection of receivables, increase in wastewaters treatment efficiency and others are weighted through the cost-revenue analysis and calculations of the spreadsheet model. Particular attention is placed on the tariff changes as we expect that they would be affected most by the proposed scenarios. Besides it was the intention to suggest a better way of tariff estimation that would include greater part of the costs incurred by Pleven RWSSC in the process of providing its services.

Of course the main objective remains to assess how these developments and results would affect Pleven RWSSC and the quality of its service. By comparing the current situation to the one that could provide sustainable steady state, we ask what the level of the new tariffs has to be in order to generate enough revenues that offset the additional investment needs to attain that sustainability. The upgrade steady state further explores that question by adding a proposed investment for increased wastewaters treatment and pollution reduction of the effluent. Last but not the least, our objectives would be without much consequence if we do not estimate what would be the additional burden of all those scenarios for households service users as the most vulnerable category.

Table 5 Main Features of the Scenarios

Name / Scenario Description	Baseline 1A	Baseline 1B	Sustain 2A	Upgrade 3A
Cost recovery	No	Yes	Yes	Yes
Marginal cost pricing	No	No	No	No
Cost of non payers – covered	No	No	Yes	Yes
New connections or change in SU accounts distribution	No	No	No	Yes (transfer of HH accounts to WW with treatment cat.)
Investment into the WWTP	No	No	No	Yes
Improved collection of receivables	No	No	Yes	Yes
Leakage reduction	No	No	Yes (30%)	Yes (30%)

Before presenting the findings we would like to make some clarifications regarding the scenario settings and the abbreviations we have used in the tables. First, we have divided the service users of RWSSC Pleven SPLTD into the following categories:

- Household A1 or also referred to as "Households (WSc-SNT)" are households users (HHs) with water supply and sewage delivered as composite goods (sewage is 80% of the water consumed) and without treatment of wastewaters;
- Households A2 or also referred to as "Households (WSc-ST)" are those HHs are just the same as the above category but they have sewage treatment added;
- Households B or Households (W) are HHs with only water supply and no sewage at all;
- Budget entities (WSc-SNT) are the budget service users who have both water supply and sewage (not treated) as composite good (sewage is 90% of the water consumption);
- Budget entities (W) are those budget entities that receive only water from Pleven RWSSC;
- Industry and agriculture (SNT) refers to the industrial companies with non-treated sewage;
- Industry and agriculture (ST) are the industrial users that have sewage treatment as well;
- Industry and agriculture (W) are the industrial users that have access to the water supply network.

Initially separate scenarios treating marginal cost pricing options were developed. Finding from some of them will be presented in a separate appendix. In general those scenarios seem to encourage consumption for most SU categories and as a result lead to slightly higher negative net revenue results for Pleven RWSSC. If the company considers that increased consumption could in other ways be beneficial effects, then the use of two-part tariff could be again reconsidered. Also scenarios that were simply a variation of each other with costs of non-payers covered for example in one of them, we have decided to exclude the one that does not have significant influence on the analysis and the specific objectives we have set.

Another note concerns the interpretation of the balance of accounts results. Please have in mind that this figure includes the receivables that were not collected by the company. So in case when we have a negative net results but we have asked the model to calculate cost recovery, the negative figure is the amount due by service users plus minus the precision error (1%). As mentioned earlier, the major criteria for evaluation of the various scenarios will be their impact on the tariffs paid by service users and the balance of accounts of Pleven RWSSC as well as on the potential environmental benefits or losses. We would be also looking at the change in consumption levels as well but in general the higher the tariff the lower the consumption will be.

The main issue of concern when developing our ASTEC scenarios will be the effect of different investment and system changes on tariff levels. Tariffs, net revenues, consumption (discharge in the case of wastewater) will be the exogenous (unknown) variables, which we want to optimise. While various costs, discount rate, elasticity of demand, value added tax rates and other input data will be our given or endogenous variables.[8] While most of the data were available from company reports, statistical institutes and financial organizations, the elasticity of demand figure is based on rough estimates due to the problems with metering, water losses and other factors that affect the precision of calculations.[9]

As a last point before going into the scenario description section, it is probably worth mentioning that the wastewater treatment plant of the town of Pleven was designed during the period 1975 – 1986 and was put into exploitation in 1990. The regime of present operations corresponds to the low magnitude of the loads of the main purification equipment along the way of the water and the sludge. The WWTP is running at less than half of its capacity (in comparison to the designed parameters). That is why no expansion of the already existing capacities is expected. It is necessary, however, that the equipment of the aeration system be replaced in order to achieve greater effectiveness of the activated sludge tanks. That coupled with the need for replacement and expansion of the existing sewage network determines the investment requirements and the setting for our upgrade scenario.

[8] For more elaborations on the ASTEC model methodology and detail description of input and output data see "Appendix 1 – The ASTEC Model Users Guide" in *Volume 1: Executive Summary and Overview of Tariff and Charge Reform Issues and Proposals*.

[9] Nevertheless, the 20% elasticity of demand used is a relatively reliable estimate for the most recent years with available data (2001-2002). The 6% decline in average daily consumption (from 99 l/i/d to 93 l/i/d), correspond to the 29% (from BGN 0.75 to BGN 0.98) water tariff increase for the same period (Source: Pleven RWSSC reports).

4.2 Scenarios Results

The calculations are based on company and World Bank reports for the year 2001 since that was the year with the most complete and accurate data available.

Table 6 Water and Wastewater Service Tariffs (in BGN)

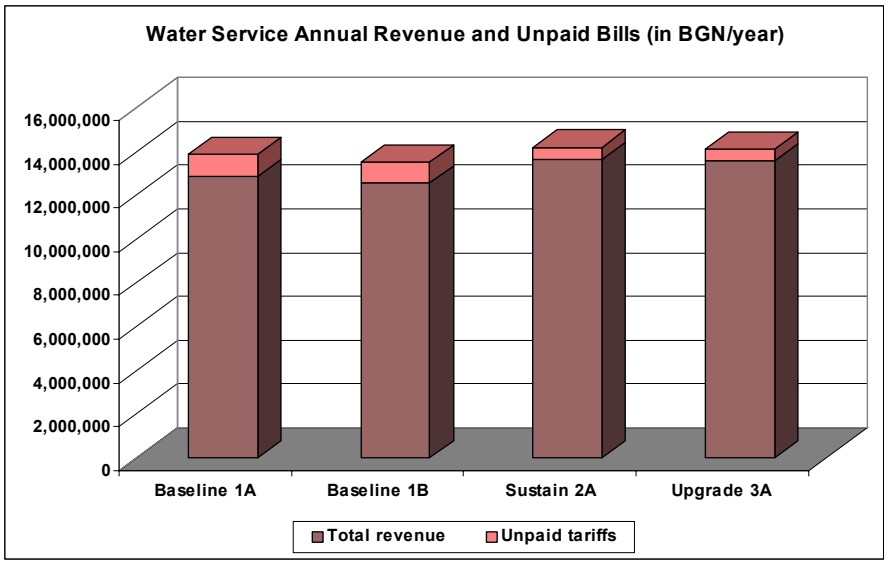
		Water				Wastewater			
Service user category	**Number of Accounts**	**Baseline 1A**	**Baseline 1B**	**Sustain 2A**	**Upgrade 3A**	**Baseline 1A**	**Baseline 1B**	**Sustain 2A**	**Upgrade 3A**
Households A1 (WSc-SNT)	13,669	0.75	0.73	0.80	0.81	0.07	0.10	0.20	0.33
Households A2 (WSc-ST)	54,012	0.75	0.73	0.77	0.78	0.12	0.13	0.28	0.39
Households B (W)	73,973	0.75	0.73	0.79	0.80				
Budget entities A (WSc-SNT)	261	0.76	0.73	0.79	0.80	0.07	0.08	0.20	0.33
Budget entities B (W)	673	0.76	0.73	0.81	0.82				
Industry and agriculture A1 (SNT)	628					0.07	0.08	0.20	0.33
Industry and agriculture A2 (ST)	4,013					0.52	0.23	0.38	0.41
Industry and agriculture B (W)	6,912	0.76	0.73	0.80	0.81				
Total:	154,141								

Table 7 Separate Balance of Accounts (in BGN) for Water and Wastewater Services

		Water				Wastewater			
Service user category	Number of Accounts	Baseline 1A	Baseline 1B	Sustain 2A	Upgrade 3A	Baseline 1A	Baseline 1B	Sustain 2A	Upgrade 3A
Households A1 (WSc-SNT)	13,669	-65,540	-80,235	-35	44	-47,780	-8,769	-37	69
Households A2 (WSc-ST)	54,012	-96,475	-159,263	-572	457	-334,234	-23,347	-217	465
Households B (W)	73,973	-265,664	-349,317	313	-286	0	0	0	0
Budget entities A (WSc-SNT)	261	-40,701	-117,248	-84	166	-151,940	-11,755	-118	262
Budget entities B (W)	673	-91,815	-152,269	230	-198	0	0	0	0
Industry and agriculture A1 (SNT)	628	0	0	0	0	-19,750	-2,624	247	-526
Industry and agriculture A2 (ST)	4,013	0	0	0	0	1,397,368	-152,119	137	-305
Industry and agriculture B (W)	6,912	-62,438	-90,684	104	-93	0	0	0	0
Total:	**154,141**	**-622,634**	**-949,017**	**-44**	**90**	**843,664**	**-198,615**	**11**	**-35**

Figure 5 Water Service Revenues and Unpaid Tariffs per Scenario

Figure 6 Water Service Costs Breakdown per Scenario



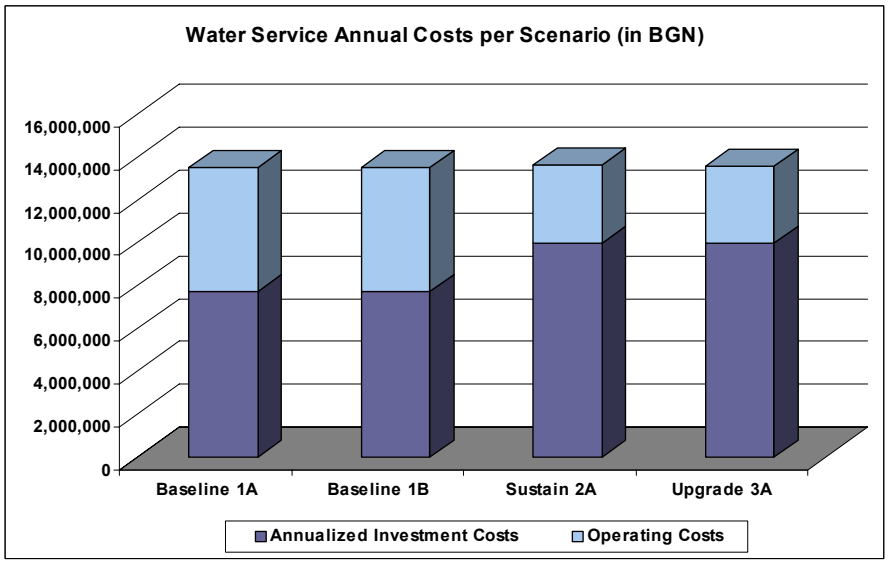
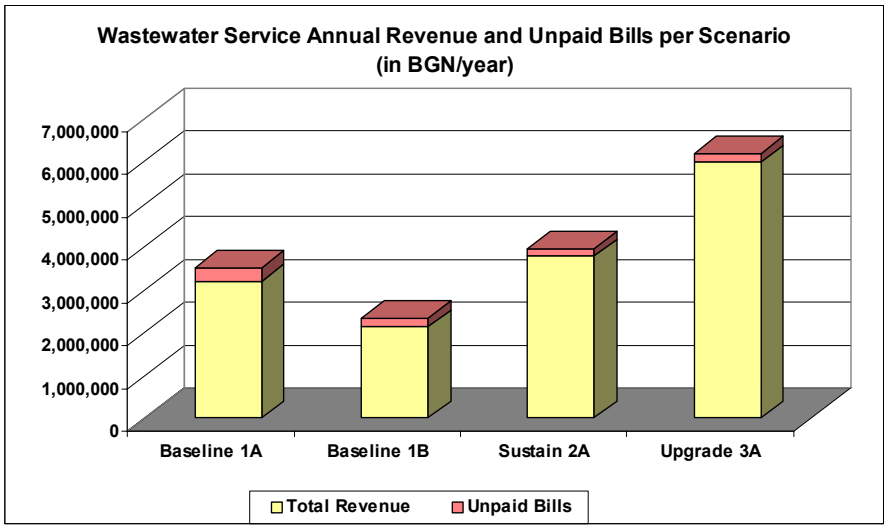


Figure 7 Wastewater Service Revenues and Unpaid Tariffs per Scenario

Figure 8 Water Service Costs Breakdown per Scenario



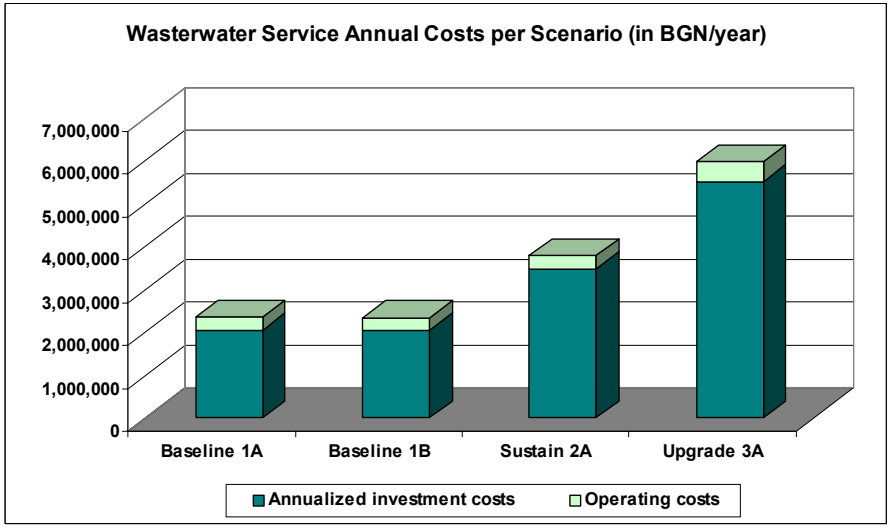


Table 8 Balance of Accounts for Water and Wastewater Services Together (in BGN)

Service user category	Number of Accounts[10]	Baseline 1A	Baseline 1B	Sustain 2A	Upgrade 3A
Households A1 (WSc-SNT)	13,669	-113,321	-89,004	-73	113
Households A2 (WSc-ST)	54,012	-430,709	-182,610	-789	922
Households B (W)	73,973	-265,664	-349,317	313	-286
Budget entities A (WSc-SNT)	261	-192,642	-129,003	-202	428
Budget entities B (W)	673	-91,815	-152,269	230	-198
Industry and agriculture A1 (SNT)	628	-19,750	-2,624	247	-526
Industry and agriculture A2 (ST)	4,013	1,397,368	-152,119	137	-305
Industry and agriculture B (W)	6,912	-62,438	-90,684	104	-93
Total:	**154,141**	**221,030**	**-1,147,631**	**-32**	**55**

[10] The distribution of service user accounts for the *Upgrade 3A* scenario is different but the total number remains unchanged.

Table 9 Total Water Consumption and Wastewater Discharge by Category of Service Users (in cubic meters per year)

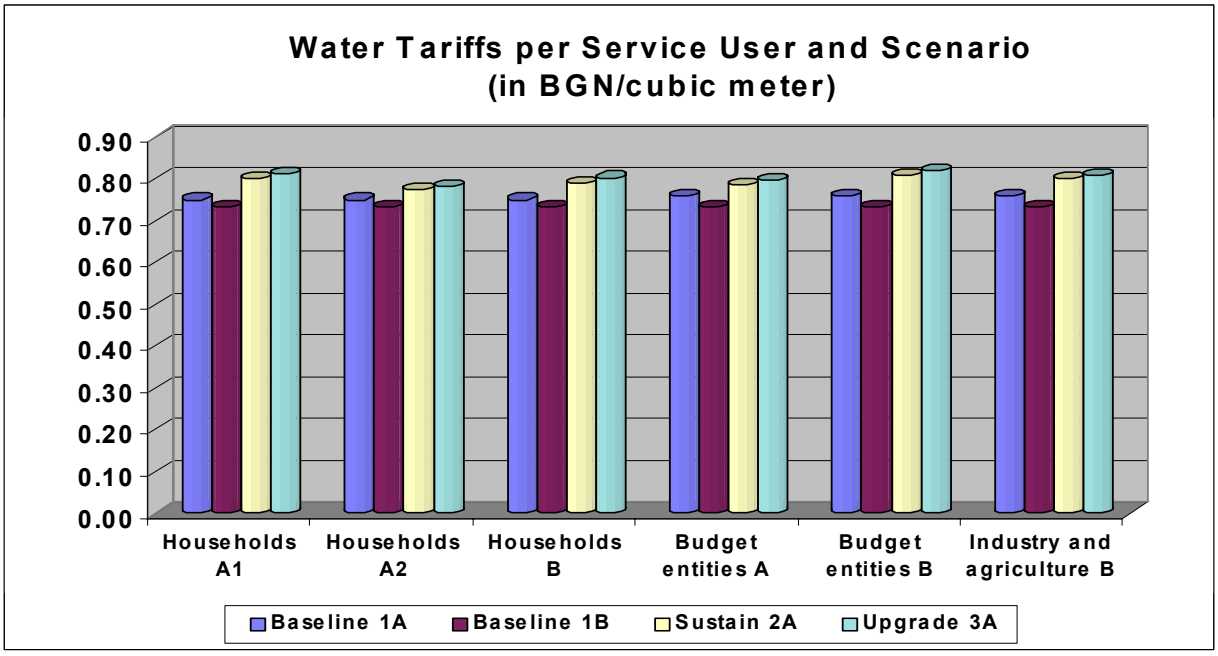
		Water				Wastewater			
Service user category	**Number of Accounts[10]**	**Baseline 1A**	**Baseline 1B**	**Sustain 2A**	**Upgrade 3A**	**Baseline 1A**	**Baseline 1B**	**Sustain 2A**	**Upgrade 3A**
Households A1 (WSc-SNT)	13,669	1,096,673	1,094,992	1,058,376	931,499	877,339	875,994	846,701	745,199
Households A2 (WSc-ST)	54,012	4,333,421	4,339,955	4,192,936	5,909,227	3,466,737	3,471,964	3,354,349	4,727,382
Households B (W)	73,973	5,934,906	5,963,091	5,874,373	4,098,462	0	0	0	0
Budget entities A (WSc-SNT)	261	3,189,000	3,202,857	3,088,385	3,014,899	2,870,100	2,882,571	2,779,547	2,713,409
Budget entities B (W)	673	2,581,755	2,600,870	2,549,204	2,543,348	0	0	0	0
Industry and agriculture A1 (SNT)	628	0	0	0	0	349,926	336,984	267,766	237,654
Industry and agriculture A2 (ST)	4,013	0	0	0	0	5,445,000	6,682,728	5,881,323	5,779,594
Industry and agriculture B (W)	6,912	1,230,000	1,239,103	1,217,394	1,214,602	0	0	0	0
Leakage		17,388,000	17,388,000	4,563,000	4,563,000	0	0	0	0
Total:	154,141	**35,753,755**	**35,828,868**	**22,543,669**	**22,275,038**	**13,009,102**	**14,250,241**	**13,129,686**	**14,203,238**

5 Scenario Findings and Conclusions

After presenting some detailed output of the spreadsheet model calculations we will try describe interpret these results. Several observations should be already obvious. First, it is clear that using the present (year 2001) levels of tariffs, Pleven RWSSC is not able to generate sufficient revenues that would enable the company to cover its costs and save enough reserves for necessary investment projects (Table 8). Moreover with water losses at almost 50% of the total consumption and the uncollected bills (BGN 1.3 mln) suggest that the positive BGN 0.22 mln balance would quickly turn into a loss once these costs are accounted for. That is what our *Baseline 1B* scenario shows.

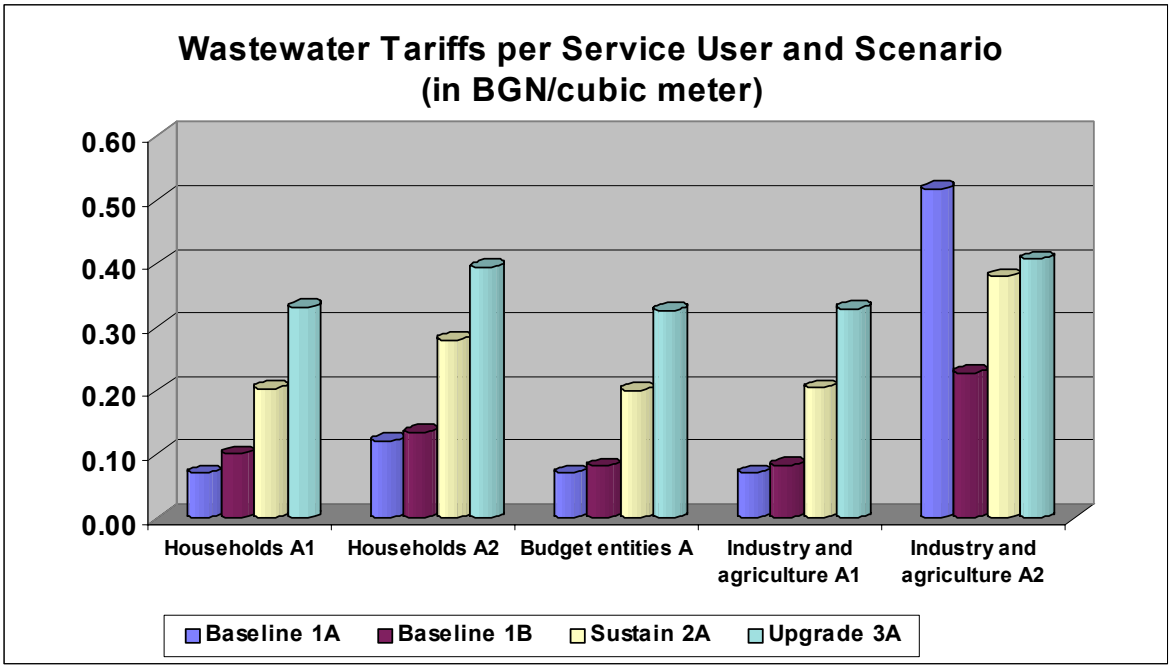
Second basic finding is that even when we raised levels of investment to reduce leakage and improve receivables collection in the *Sustain 2A* scenario, Pleven RWSSC ended up with enough revenue to nearly offset the investment needs (Table 8). Though significant investments were made, it seems that tariffs did not rise substantially. The topic will be further discussed in the next chapter where burden estimates will be analysed. For now let us note that while tariffs for water remained close to the original (Figure 9) those for wastewater went up for households, budget entities and industrial users with sewage without treatment. On the other hand the service prices for industrial users with treated sewage decreased even in the upgrade scenario. The overall results reflect the cost savings associated with water production and less leakage associated with increase in capital investment.

Figure 9 Water Service Tariff Developments per Service User Category and Scenario



Third, the impact on tariffs of possible costs changes and investment strategies were the main target for scenario development. We wanted to find out the minimum service prices that would be sufficient to cover all costs and avoidance of payment in order to secure the sustainable and later upgraded operations of Pleven RWSSC. As a result there is no substantial net revenue in any scenario. The small revenue from the first one turned into loss when cost recovery was performed and the unpaid bills were added into the calculations. In fact all scenarios but the first two include full cost recovery in the calculations. In addition, the break-even results in the sustainable and upgrade developments reflect the precision of estimation and the fact that we have specified costs of non-payers to be covered by the model. If the company would like to gather additional reserves besides the investment projects specified in the spreadsheet scenarios then it could possibly start by making the necessary calculations and estimating the new level of tariffs required to finance that reserves.

Figure 10 Wastewater Tariff Developments per Service User and Scenario



As seen from the figure above (Figure 10), there are substantial changes in the wastewater service prices due to new investments and cost allocation among service users. Initially we assumed that the higher tariffs industrial users with sewage treatment have to pay was due to the much higher level of pollution and associated treatment. However, cross subsidizing should not be excluded from the picture. The difficulty to conclude that there is such, stems from the fact that we do not have enough information how separate cost items should be allocate in order to reflect the real costs of providing the service to different users. The task would be quite non trivial though having in mind the scope of the service (regional company) and complexity of network. Despite of that obstacle we had enough information that allowed us to differentiate costs among service users with treated wastewater service and those without. How that affected the overall company operations and financial performance will be elaborated upon in the sections to follow.

5.1 Basic Scenarios (*Baseline 1A* and *Baseline 1B*)

5.1.1 Replicating the Original Company Data for 2001

The recent developments captured in the first scenario include the present state of the company operations or in other words, scenarios where no reforms or changes to improve the present condition beyond the current WB and internally financed investments are done. Our goal was to establish a baseline so that we know where Pleven RWSSC really stands in terms of current budget balance given the current costs and tariffs. We can see the difference when comparing them with the cost recovery scenario where the tariffs are set in a way to cover the "full costs"[11] of operation.

[11] "Full Cost recovery" in this case takes into account all costs that we have included in the model. However, there might be some costs that are left aside. For that reason we cannot speak about "full cost recovery" in the

Nevertheless, *Baseline 1A* scenario captures adequately the net balance for both water and wastewater services and reports a figure of BGN 0.22 mln that is close to the actual we have for 2001 of BGN 0.23 mln. In this initial model my goal was to see whether the actual financial statements of the company could be replicated by using our spreadsheet model. Since original tariffs are used and we have not asked for full cost recovery we cannot say anything about the sustainability or efficiency of the system. Besides neither water losses nor collection of receivables issues could be brought to discussion yet. The end result is that we have not only realistic revenue and cost estimates but such that allow the separation of financial and operational results among users and type of service (water and wastewater).

5.1.2 Introducing Cost Recovery

More interesting changes occur when in the next, *Baseline 1B* scenario we have asked the model to calculate full cost recovery. First, the net revenue turned into loss of BGN 1.1 mln (Table 8). As mentioned before, the difference represents the avoided tariff payments not reflected in the P&L account of the company. Besides, in order to reflect the actual cost of replacement of the old equipment and the utilization of the funds associated with the World Bank loan agreement, we have used the average investment instead of the annual amortization figure.

The tariff levels for water went down with 3% (from BGN 0.75 to BGN 0.73) for households (HH) and 4% (from BGN 0.76 to BGN 0.73) for budget entities (BE) and industry (Figure 9 and Table 6). At the same time, tariffs for wastewater without treatment increased with 43% (from BGN 0.07 to BGN 0.10) for HH and remain almost the same (BGN 0.08 from BGN 0.07) for BE and industry. The last is also true for the price of sewage with treatment service for HH (BGN 0.13 from BGN 0.12) while for the industrial and agricultural users (I&A) with the same service it decreased with 56% (from BGN 0.52 to BGN 0.23). While the latter finding could reflect the particular cost allocation in ASTEC among users, it could also indicate the existence of cross subsidizing.

Cross subsidizing is an issue of policy consideration and it will be discussed in the reform proposal section. For now it should be noted that the spreadsheet model allows the allocation of costs to be distributed in various ways among SU categories and as a consequence we end up with different tariff levels. Placing equal weight among users allows us to see the average tariff for the service. If there are sufficient reasons (socially vulnerable groups, disproportional costs) for another way of cost distribution then the management of the company could reflect that fact and find the appropriate balance via the necessary adjustments in the spreadsheet model.

5.1.3 Baseline Developments – Scenarios Summary

The aim of cost recovery scenarios is not to show that the company operates on a loss or to confirm its positive net revenue. It attempts to answer the question: are the current tariffs really reflecting the cost structure of the company[12]. It is also a rather simple way, in which management can quickly calculate what is the lower tariff beyond which they would probably incur losses no matter how well the other things are going. Cost recovery scenarios are especially efficient if we know the present value of our fixed assets and have included all possible costs in our calculations. On the other hand this type of scenarios does not differentiate between fixed and variable costs and they could not solve the problem of cross subsidizing among service user categories.

However, what cost recovery could help us achieve is to eliminate some of the drawbacks of the present methodology for setting tariffs. One example could be that we can include the cost of water losses in our calculations. In the existing broadly used way for tariffs setting all cost items are weighted based on the amount of water and wastewater billed to consumers. So the cost of leakage is

sense that all possible costs are included in the tariff calculations but rather that the tariffs are set in such a way so that to cover all costs input in the model.

[12] Since price setting in water sector in Bulgaria for such companies like Pleven RWWSC should be justified in front of the Ministry of Regional Development and Public works based on all the cost incurred in the process of providing the service.

not taken into account. Only costs for water losses not more than 25% are allowed to enter the tariff calculations under "Material Expenditure" according to the Water Law, Article 193 (3) from July 2002.

5.2 Sustainable Scenario

The sustainability of Pleven RWSSC operations will require the resolution of the issues emphasized in the previous chapters. It should be clear that with the present level of uncollected bills and the current water losses any investment that ignores these two areas could not significantly improve the operational and financial efficiency of the company. That is why before going into issues related to water pollution reduction and toxic substances control we have targeted those two objectives in the medium-term scenario section. There are several developments that we have taken into consideration when dealing with leakage reduction and control of receivables outstanding. First, the amount of new investment that will be required to undertake such steps in efficiency enhancement. Second the possible effect on different costs items that will probably lead to the introduction of new costs. Third, the effect on tariff levels when all incurred costs are to be covered.

5.2.1 Cost of Non-Payers are Covered

My cost recovery scenario would not be full if we have not asked the model to calculate cost of payment avoidance. In order to do that we have tried to estimate how much the tariffs should rise in order to cover the costs incurred by non-payers. That is why *Sustain 3A* scenario includes that specification. The implication would be that instead of contributing to the loss in the net balance figure, the cost of unpaid bills would increase tariffs. Since tariff levels and their setting are issues of particular interest that would be a desirable outcome. Moreover given the initially set objectives we would like to know what would be the implication of various cost structure on company net revenue margin as well as on service prices.

Also in the present method used generally by the companies in the sector for tariff calculations no consideration is given to the debt that is not collected by the company. Though the percentage of receivables is growing every year it seems that there is no solution how that problem could be incorporated into the tariffs setting calculations. To give a relative measure of that burden to the system we have included that feature in *Sustain 3A* scenario where the costs of avoided payments are borne by regular payers.

5.2.2 Improved Payments of Uncollected Receivables

There are also new operational developments that lead to lower water losses and level of receivables. For example the scenario envisaged that as a consequence of management efforts and legal procedure enforcement, the avoidance of payments has decrease with 20% for budget entities and 50% for all other categories. This would come as a result from the increased quality of service, better communication with users and strict attitude toward those who avoid payment or attempt to illegally connect to the network. All these will find its reflection in increased cost for water service, as we would expect. The cost of this reduction could be 15% of the total non-payments.

5.2.3 Water Losses Reduced to 22%

To improve the collection of payments is of great importance but the issue concerning leakage control and reduction remains. Though cost recovery scenario could model and cover these amounts of water losses, it is of no great benefit for anybody if Pleven RWSSC just raises tariffs to cover the loss and does nothing to improve the situation. In the last five years of the period in question (1999-2001), the management achieved significant progress in that sphere reducing the figure from 25 to 17 mln m^3. That improvement serves as a basis for the current scenario calculations regarding the new target of 22% we have set as part of the sustainable scenario.

Assuming that BGN 1.2 mln were invested solely for the purpose of leakage reduction, we can estimate that the necessary additional investment for meeting the 22% target should be around BGN 3.5 mln. That figure requires cautious treatment and the assistance of Pleven RWSSC is required in order to come up with a more precise number that reflect all possible costs and reduction implications. Moreover, we have to keep in mind that similar investments should take into account a proper cost-benefit analysis and the targeted level of reduction should not lead up to a negative result when all related expenses and potential benefits are summed up. In some cases the state of the network and metering equipment would probably not allow us to decrease water losses below certain level.

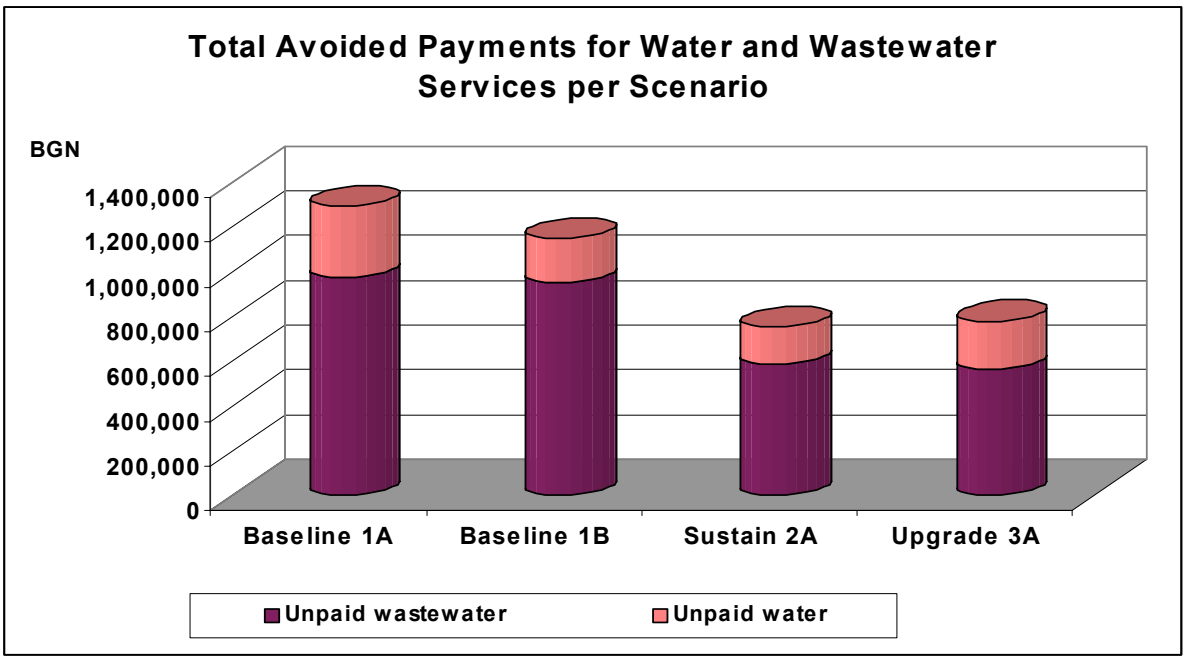
In the additional scenarios we have run leakage was assigned per responsibility in percentage for each type of service users (Appendix II). Due to the complexity of the network that has to reach every subscriber, the fact that it is user's responsibility to maintain the pipes once they have entered his property and not on the last place because of the higher number of illegal connections, we have created number of scenarios where households are responsible for three times more leakage than the rest of the categories. As a consequence HH users end up with higher tariffs for water services, which discourages consumption and improves net revenue through decrease in uncollected receivables.

Even if such distribution of leakage responsibility would probably reflect the real situation it should not serve as a final decision on the subject. The prime result we receive after such allocation is that the tariff for households would go up and this is not always the objective or viable policy consideration especially if there are strong reasons for conducting "social policy" in the region. Also the allocation of water losses to the entities responsible for this could be non-trivial task.

5.2.4 Sustainable Scenario – Summary Findings and Conclusions

The results from the sustainability scenario is that water service tariffs went up slightly (between 3% and 7%) as compared with the original levels of *Baseline 1A* and reached levels of BGN 0.77 – BGN 0.81 (from BGN 0.75 – BGN 0.76). The new wastewater tariffs (BGN 0.20 to BGN 0.28) are more than twice higher for all service users except industry when compared to the previous *Baseline 1B* scenario (BGN 0.08 – BGN 0.13). The results reflect the part of the new investment allocated under WW. Again industrial users with treated WW have lower tariff (BGN 0.38) than original (BGN 0.52 in *Baseline 1A*) but higher with 65% when compared to the cost-recovery *Baseline 1B*. While it may be true that Bulgaria has among the lowest wastewater service tariffs in the region, the proposed increase especially for households should be analyzed by estimating the additional burden it would place on the service users. That would be dealt with in the chapters to follow.

Figure 11 Amount of Receivables Outstanding for Water and Wastewater Service per Scenario



As seen from the figure above (Figure 11) the reduction of avoided payments is more than significant in the sustainable scenario as compared to the initial data. The actual overall decrease is about 41% (from BGN 1.29 mln to BGN 0.76 mln). When compared to the previous cost recovery scenario, the *Sustain 2A* results of BGN 0.76 mln represent 34% decrease (from BGN 1.15 mln). The targeted decrease in avoided payments (20% for budget entities and 50% for all other users) may seem rather ambitious but given the good track record of the company in the past (1997, 1998, 1999) in collection efficiency (90% and higher) it seems realistic and attainable.

To recapitulate, the sustainability scenario objectives could be met without significant increase in tariff levels. Both parameters, leakage reduction and collection of outstanding debt due by service users have improved significantly and that could be a substantial guarantee that the overall operation and financial efficiency of the company is stabilized to levels that will allow the smooth and continued provision of services. Moreover there would probably be sufficient time for Pleven RWSSC to build enough reserve after the new investment (BGN 3.5 mln) is in place and the required financing for maintenance and replacement of existing network decreases.

5.2.5 The Introduction of a Two-Part Tariff

Initially we have considered including in the study two-part tariff scenarios. The merit of the two-part tariff is that economically it may be more efficient than a single, commodity charge tariff when a system has excess capacity. such as in the case of Pleven RWSSC. However, fixed costs allocation is arbitrary and only operating costs are treated as marginal cost. That is why the company could further explore the allocation of fixed costs if it wants two-part tariff to protect certain, economically vulnerable customers.

We decided not to include strict marginal cost pricing scenarios in our analysis for couple of reasons. First, the results showed a clear tendency for overall increase in consumption. That deteriorated net revenue figures because of the increase in variable costs and the avoided payments. No other significant changes were identified. Second, the introduction of such a tariff would be new for Bulgaria and it would probably require serious considerations on both planning and executive (operational) level. Marginal cost pricing may not be beneficial for service users who have relatively lower consumption levels in general if fixed costs are allocated equally to all customers. The reason is that the fixed part of the tariff that covers fixed cost could be greater than their previous payment levels (based on cubic meters consumed only) when no two-part tariff existed. Third, the estimation of relative burden for two-part tariff scenarios is not so simple to compare with other scenarios where marginal cost pricing (two-part tariffs) is not used.

5.3 Upgrade Scenario

We have called the forth scenario upgrade not only because it envisaged significant investment in enhancement the efficiency of existing network and equipment. It is an upgrade in terms of service provision as well, since we have tried to address issues after leakage reduction and improved receivables collection are achieved. We have tried to capture features that lead to improvement of toxic substance control and pollution reduction in the effluents. As direct results of the investment projects assumed in our scenario there are additional service users with treated sewage and the treatment itself is improved due to the increase efficiency of the WWTP. As one could see that scenario is also a continuation from the previous set of scenarios and we have already assumed that the objective from the medium term are met. This means that leakage is decreased to 22% of water produced and imported, collection of receivables improved (20% for BE and 50% for the rest) and we have invested BGN 3.5 mln for repair and maintenance that will achieve the targeted water loss levels. The cost of non-payers is also covered.

5.3.1 Improvement in Wastewater Network Collection and Treatment As Well As Investment in the WWTP Efficiency and Modernization

Additional developments that we have targeted in the upgrade developments are the investment in increase wastewater collection and treatment. If the objective is met there would be a transfer of households' accounts 30% from households with water service only and 10% from HH with not treated sewage to the sewage with treatment category. That is eventually achieved as a result of a governmental grant financing (BGN 6 mln), which will come from the state effort to stabilize and revitalize the sector.

In fact the *Upgrade 3A* scenario envisage the above mentioned developments to be part of a possible ten years investment program of the company that will also include the repair and modernization of the existing WWTP. For that last investment we have selected a tentative figure of around BGN 10 mln.[13] Since most of the industry and big budget enterprises have their own treatment plants we would expect the project as a whole and the improved capacity and quality efficiency of Pleven WWTP in particular to handle primarily the domestic wastewater discharge problem and possible increase in the level of standards (grades) set for industrial pollution.

Naturally as a consequence of the above new investment initiatives the cost structure for the wastewater services will change as well for both fixed and variable costs. That is why we have added besides the 10 mln BGN fixed investment and BGN 6 mln grant, one new variable costs for Pleven RWSSC that attempt to capture the improved treatment requirement for the plant.

5.3.2 Scenario Summary Findings and Conclusions

After so many changes and new costs added one would expect that the net revenue of the company would deteriorate significantly or if not that the tariffs and charges would become sky-high to compensate for the expenses on the WWTP renovation. What we showed is that this is not the case. The upgrade scenario is both possible and feasible. Due to model specifications of full cost recovery scenarios, the more important changes happened at the tariffs level. The water tariffs remain virtually unchanged (BGN 0.01 increase) since no new costs items were added to the system. Wastewater tariffs increased as expected 65% for service users with sewage but no treatment and 3% to 40% for those with treated wastewaters. The unequal changes are due to costs allocation specification in ASTEC where we asked the model to distribute new investment equally among users. Similar scenario with only different BGN 10 mln loan allocation, laying 70% weight on industry with treated sewage and 30% on households with treated sewage produced tariffs closer to the original distribution. In that *Upgrade 3B* case, Pleven RWSSC ended up with three times higher (than in *Baseline A1*) sewage tariffs for all users except industry with treated wastewater. For those last users, the new tariff was still below the original (BGN 0.49 as compared to BGN 0.52). All the other results remain as in *Upgrade 3A*.

Whether the new higher payments would represent a substantial burden for service users is a question that deserves special attention particularly in the case of households as the most vulnerable to adverse price changes category. The answer of this question will be a priority for the chapter to follow.

[13] The actual investment needs figure for through rehabilitation of the systems is probably much higher. However, we have tried to specify investment that is attainable through small adjustment of tariff levels and at the same time have positive impact on Pleven RWSSC operations.

Table 10 Annual Water Expenditure per Type of Service, User and Scenario (no VAT)

	Water Service				Wastewater service			
Service user category	Baseline 1A	Baseline 1B	Sustain 2A	Upgrade 3B	Baseline 1A	Baseline 1B	Sustain 2A	Upgrade 3B
Households A1	60.17	58.67	61.96	62.15	4.49	6.39	12.58	14.54
Households A2	60.17	58.85	60.07	59.39	7.70	8.62	17.37	23.73
Households B	60.17	59.04	62.69	63.36	0.00	0.00	0.00	0.00
Budget entities A	9,285.98	8,988.14	9,300.70	9,311.43	769.76	894.70	2,130.88	2,460.88
Budget entities B	2,915.50	2,830.73	3,067.29	3,087.33	0.00	0.00	0.00	0.00
Industry and agriculture A1	0.00	0.00	0.00	0.00	39.00	43.67	87.05	96.34
Industry and agriculture A2	0.00	0.00	0.00	0.00	701.13	379.26	556.38	671.82
Industry and agriculture B	135.24	131.31	140.93	141.85	0.00	0.00	0.00	0.00

For now we would like to summarize that the proposed upgrade scenario developments though significant and investment demanding seem not to have that highly unfavourable effect on tariff structure for the majority of service users. On the other hand they target areas of improvement that have lasting impact on Pleven RWSSC operational efficiency. Wastewater collection and treatment is upgraded in both capacity and efficiency of treatment that will have major effect on water pollution and toxic reduction. At the end we have more sewage that has been treated and more service users who are connected to it. Neither consumption levels nor payment collections are negatively affected. As noted before, the last, upgrade scenario assumes the new investment to be done gradually and the burden for service users to be spread within a period of ten years. That is one of the reasons why the tariff levels did not go that high. Also it is clear that state and financial institutions support will be necessary to achieve much more ambitious scenarios (requiring higher investments) than our upgrade.

We believe that the goal set by the current government for creating a special investment fund for the water sector in the amount of BGN 6.788 billion[14] will be implemented and carried out by this and next governments. From those funds around BGN 3.376 billion are needed for replacement of the old network and BGN 1.1 billion for building and upgrading sewage in the towns above 10,000 inhabitants. The financing (more than BGN 1 billion) is about to come from tariffs, taxes collected for concessions or contracts for private management of the current water supply and sewage companies. The state budget is also to contribute in the amount of BGN 103 mln and BGN 737 mln are planned to come from the EU ISPA program. The strategy envisaged the main investments (BGN 2.016 billion for replacement of pipes and leakage reduction) to be carried out by the year 2010.

[14] "Trud" newspaper as of Aug. 19, 2003 citing the minister of Regional Development and Public Works, Mr. Valentin Tserovsky on the future of the water supply and sewage sector in order to make it compatible with the EU standards. The money should be invested by 2015.

6 Burden Indices Estimation

This chapter provides estimates of how much would be the financial burdens on the average household based on the calculated tariffs from each scenario discussed so far. What we will try to find is whether service users would be burdened to pay their increased bills, especially the wastewater component. The chapter will start with general discussion of the topic and in the second part will focus on the scenario results and estimates.

6.1 Ability of Service Users to Cope with Increasing Tariff Levels

As can be seen from the tables of the National Statistical Institute, the share of the food, beverages and tobacco in the total composition of Bulgarian households' expenditures is above 40%, while in the advanced countries it is 13-16%, and in the CEE countries - 25-30%. The share of electricity, gas and water expenditures were between 10-15%. Bulgaria is below the poverty level standards of the European Union. Average per capita income is low at only 28% of the EU average (in purchasing power standards). However Bulgaria made good progress in the catching-up to EU income levels.[15]

The employment rate of the working-age population fell from 54.5% in 1997 to 50.7% in 2001. The unemployment rate increased from 13.7% of the labour force to 19.9%. More than 60% of the unemployed are long-term unemployed. Regional income differences are small, ranging from 23% to 28% of the EU average, with the exception of the Southwest region, which includes Sofia, where the figure is 36.5% (data for level-2 statistical regions in 1999). Regional differences in unemployment are more pronounced. While in the Southwest region the unemployment rate was 9.7%, in all other regions it was above 20%, reaching up to 32.8% in the Northwest (data for level-2 statistical regions in 2001).

The low-income levels constraint poses limitation of the flexibility of tariffs as a tool to improve net revenue margin. For example the household affordability criterion adopted in the World Bank's restructuring and rapid assessment studies was that water and sewerage charges should not exceed five percent (5%) of a single pensioner's income. The average pension is approximately BGN 80 (Euro 40) per month. Pleven's water supply and sewage tariffs with the VAT amount to approximately one BGN/m^3 (BGN 0.99 for 2001). If a pensioner consumes 4 m^3/month, he/she spends 4.9% of his or her income on water and sewerage (without treatment) services. That is already close to the household affordability criteria mentioned above.

There is, however, a recent optimistic trend in consumer spending and available income analysis with increase in both the access of Bulgarians to money (either increased current income or better access to borrowed money) and their willingness to spend it.[16] Latest (January-July 2003) data on Bulgaria shows a 10.6% increase in nominal gross household income, and 9.5% in real terms. The structure of income remains largely unchanged. There is, however, a slight increase in wage income, at the expense of decreases in non-wage labor income, unemployment benefits and social assistance, and own production. While these changes are not significant enough to justify conclusions yet, combined with the decrease in drawing from savings and a net increase in credits and loans (almost 75% in nominal terms) it may well mean that there is an emerging trends towards expansion of consumption and living on credit.

[15] Data taken from Bulgarian National Bank Reports and the Commission of the European Communities "2002 Regular Report on Bulgaria's Progress Towards Accession".
[16] The conclusion is taken from ING Bank, Sofia "Bulgaria Monthly" report as of November 2003 and more specifically the section about consumer confidence.

Table 11 Total Average Annual Income / Expenditures per Family's Person

Year	1995	1996	1997	1998	1999	2000	2001	2002
1000 BGL = 1 BGN (since 1999)								
Total Expenditure	**121 489**	**213 285**	**1 751 281**	**2 895 383**	**3 221**	**3 438**	**3 496**	**3 915**
Consumer expenditure	**98 971**	**177 948**	**1 449 301**	**2 376 420**	**2 695**	**2 860**	**2 963**	**3 335**
Structure in %								
Total Expenditure	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Consumer expenditure	**81.5**	**83.4**	**82.8**	**82.1**	**83.7**	**83.2**	**84.7**	**85.2**
Food	39.7	43	45.6	41	37.8	38.4	39.8	37.6
Alcohol and tobacco	3.9	3.7	3	3.2	4	3.7	3.6	3.8
Cloths and shoes	8.4	6.9	6.7	6.7	5.9	4.5	3.9	4
Water, electricity, gas	7.8	10.1	10.6	11.6	13.3	13.6	13.3	14.5
Furniture and house expenses	4.9	3.9	3.2	3.6	3.7	3.2	3.1	3.3
Healthcare	2.1	2.1	2.4	2.7	3.2	4	4.3	4.5
Transport	7.1	6.8	5.3	5.9	6.4	5.8	5.8	5.7
Communications	0.9	1	1.3	1.5	2.3	2.8	3.7	4.7
Leisure time	3.4	2.7	2.1	2.9	3.7	3.6	3.5	3.6
Other goods and services	3.3	3.2	2.6	3	3.4	3.6	3.7	3.5
Taxes	6.5	5.8	6.2	6	4.8	4.1	3.4	3.3
Private household activities	4.4	4.1	4.6	4.4	3.5	3.3	3.4	3.3
Others	7.6	6.7	6.4	7.5	8	9.4	8.5	8.2

NSI, 2003.

At this point, however, it is not clear whether this is a long-term trend, or a short-lived deviation. Future dynamics will be governed by a complex interplay of several factors – ranging from obvious ones (e.g., world growth which stimulates Bulgarian exports and thus increased income; local economic stability and continued growth of domestic demand to compensate for insufficient exports; appropriate government policies regarding the widening current account deficit; continued stability of the banking system and deepening of the financial intermediation; etc.) to less obvious ones (such as whether changes in tax policy, contract registration requirements and other government policies will succeed in reducing the size of the shadow economy, and whether that would be a good thing for the actual rather than reported incomes; whether the current growth in consumer spending is the result of optimal forward-looking rational thinking, or a temporary illusion, etc).

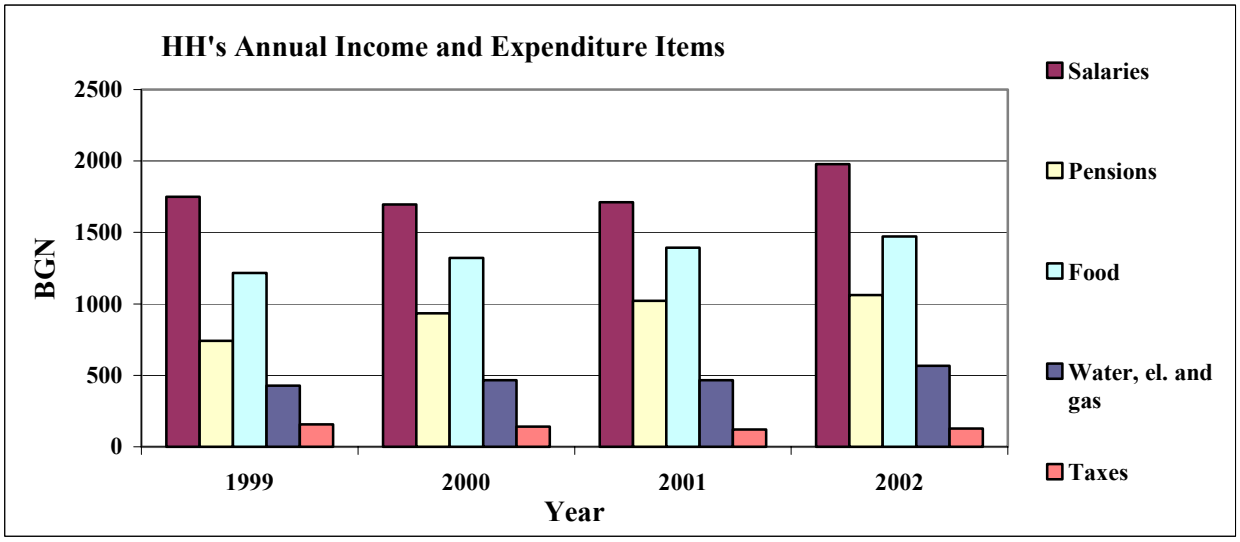
6.2 Overview of Households Income and Expenditure in Bulgaria

As already mentioned, the average household income in Bulgaria did not grow in real terms for the last five years. The income from salaries went up just recently since 2002 while the level of the pensions remained almost unchanged if compared to the growth in food expenditure (Figure 12 and Table 12 below). From *Appendix 1* we can take the average household income from salaries and pensions and the amount of expenditures for water, electricity and gas. Particularly for the year 2002, there is a clear tendency for upward movement of the spending related to water, electricity and gas as a portion of the total expenses indicating both the lower real income trend and the increased cost for providing the services.

Table 12 Structure of Household's Expenditure in % from Total

Year	1995	1996	1997	1998	1999	2000	2001	2002
Total Expenditure	100	100	100	100	100	100	100	100
Consumer expenditure	81.5	83.4	82.8	82.1	83.7	83.2	84.7	85.2
Food	39.7	43	45.6	41	37.8	38.4	39.8	37.6
Water, electricity & gas	7.8	10.1	10.6	11.6	13.3	13.6	13.3	14.5
Taxes	6.5	5.8	6.2	6	4.8	4.1	3.4	3.3

Figure 12 Household's Annual Income and Expenditure per Item.



The data from the table and the graph above and the more detailed ones in *Appendix 1* reveals some important features regarding the income and expenditure structure of the average Bulgarian family[17]. First, the high portion of food expenditure (close to 40%) and almost constant annual salary income (less than 1,000 euros) for three consecutive years (1999 – 2001). Second, the growing share of the water, electricity and gas items. Third, the sudden drop in 2002 in food expenditure in 2002. The last factor combined with the more than one percent increase in water, electricity and gas item could indicate that families are forced to give up some of their consumptions on basic necessities as food in order to cover for the increasing prices of the utility and other services.

On the other hand we have the recent ING Bank report (Nov., 2003) where there is an increase in both the access of Bulgarians to money (either increased current income or better access to borrowed money) and their willingness to spend it. Those are interpreted as indicators for that households are fairly optimistic about the future and prefer to take advantage of some form of credit and buy a better product rather than to wait for the future or make do with a cheap lower-quality alternative. That leads me to conclude that probably 2002 was not the year to indicate a downturn in Bulgarian economy and

[17] We are primarily concerned with the last four years of the period shown (1999 – 2002) since due to the high inflationary processes in 1998 and 1997 the data for those years looks distorted. The currency stabilization in 1999 with the introduction of the new lev (BGN) and the currency board a year earlier lead to lower inflation and overall economic stability. The inflation rate for the period 1999 – 2002 was kept in the limits between 4% and 6%. For our analysis, the inflation adjustment is not that crucial since from Table 16 we can see the structural breakdown of average household's expenses.

deterioration of household income but rather a difficult year, the consequences of which were overcome in the next 2003.

Nevertheless the growing portion of utility expenditure and insecure future income trends coupled with the deteriorating fixed assets and equipment of almost all water companies in the country requires immediate attention from government side and that of the management of the utility companies alone. The measures that should be taken may be require a bit of more painstaking approach but one which could lead to a sustainable improvement in their operations. Our scenarios suggest some possible ways from where to start. However, before incorporating them into a strategic reform proposal it is worth trying to show that all of them are realistic and would not provide unbearable burden for the population, especially the most vulnerable part of it – the pensioners.

6.3 Scenarios Burden Index Estimations

The low-income levels constraint poses limitation of the flexibility of tariffs as a tool to improve balance of accounts. For example the household affordability criterion adopted in the World Bank's restructuring and rapid assessment studies was that water and sewerage charges should not exceed five percent (5%) of a single pensioner's income. The average pension is approximately BGN 85 (Euro 46) per month. Pleven's water supply and sewage tariffs with the VAT amount to approximately 1.00 (one) BGN/ m^3 (BGN 0.99 for 2001). If a pensioner consumes 4 m^3/month, he/she spends 4.6% of his or her income on water and sewerage (without treatment) services. That is already close to the household affordability criteria mentioned above.

Table 13 compares the new scenarios tariffs burden with the original, Baseline A1, using the average household income from pensions (BGN 85/month) and the same consumption as in the example above (4 for water supply and 80% of that or 3.2 m3/month wastewater discharge). We have selected that part of household's income because it captures the most socially vulnerable part of the population and is also highly sensitive to price changes. Though probably the pensions will be actualised and increased once Bulgaria becomes member of the EU, the price level and cost of leaving will also change probably more than that. Besides due to general problems with the "pay-as-you-go" system of social insurance with the aging of population, the country will face additional problems in that area that would not allow the level of pensions to grow that much.

Table 13 Monthly payment burden on the average pensioner income (VAT included).

Service user category	Baseline 1A	Baseline 1B	Sustain 2A	Upgrade 3B
Households A1	4.6 %	4.6 %	5.4 %	5.7 %
Households A2	4.8 %	4.7 %	5.6 %	6.2 %
Households B	4.2 %	4.1 %	4.5 %	4.5 %

The sustainability scenario marks a turning point in Pleven RWSSC operations. Not only the loss of more than BGN 1.1 mln from the previous *Baseline 1B* scenario is covered but also we have introduced investments that substantially reduce leakage and improve collection of receivables. With all those changes going on it is not surprising that *Sustain 2A* is the scenario with higher burden estimates than the previous ones. It is, however, not substantially above the 5% reference level. Additional observation from the above table is that the total investment and improvements done in the system would almost not affect the households (pensioners') with water supply service only. Even for the investment intensive *Upgrade 3A* scenario the burden remained three points above the original and less than 5% of their income. On the other side, pensioners with water supply and treated sewage will have to spend around BGN 0.7 more per month[18] (from BGN 4.06 to BGN 4.77) to) for their bills.

[18] That amounts to additional BGN 8.5 per year.

Table 14 examines burden payments changes but this time for the average household, not the most vulnerable part of the population. Based on the consumption and tariffs estimates (ASTEC's scenarios) that most affected by the proposed investments category of service users (with both water supply and treated sewage) will have to bear approximately 22.5% higher annual payment burden as shown below. The increase from about BGN 82 to BGN 100 per year reflects decreased consumption levels as well (from 80 to 76 m^3/year). For some households probably the increase tariffs will represent bigger consumption reduction.

Table 14 Annual payment for households with water supply and treated sewage (with VAT).

Scenario	Households A1 (water supply and non-treated sewage)	Households A2 (water supply and treated sewage)	Households B (water supply service only)
Baseline 1A	77.59 BGN	**81.44 BGN**	72.12 BGN
Upgrade 3B	92.03 BGN	**99.74 BGN**	76.03 BGN

Still that amount of almost BGN 100 (with VAT) for water and wastewater services account for just 2.8% of the average year 2001 income level (BGN 3,600). It is an acceptable burden given the past trends and the significant improvements in the quality of service provision and efficiency of operations, which saves enormous resources for the community that would have been otherwise wasted. The fact that it may represent more than 6% of the average pensioner's income could also mean that pensions in Bulgaria are substantially lower and that probably they need to be more adequately updated to reflect the increasing prices.

From the presented results we cannot conclude that if Pleven RWSSC adopts one of the above scenarios as a strategy for future developments it will alter the 2001 expenditure for average household user with no more than 23% percent (for HH A2 with water supply and treated sewage). That expenditure is still below 3% of the average household's income and would probably not incur unbearable burden for them. On the other hand, pensioners would have to allocate at least 6.2% (instead of 4.8%) on average from their incomes in order to meet the new tariffs. Whether this increase would represent a significant burden for them is an issue to be resolved. For that purpose regulatory bodies can adopted a 5% target level for water related expenses per pension income as proposed by the World Bank studies or any other measure justified by the local conditions.As shown from the tables even the original tariffs were creating a burden close to the 5% barrier. Additional clarifications regarding the difference between pensioners' household consumption and average family household have to be made in order to assess the appropriateness of the figures and for the sake of the present comparative analysis.

Besides even if for the purpose of our analysis this 6.2% of income is acceptable increase on that expenditure item, if we want to be more precise, we should have constructed a forecast for the expected trend on the average household income and expenditure. Then having in mind the inflationary expectations we could have said "yes, the new tariffs would not cause additional burden on excess of 5% of the average pension five or ten years from now and the expected increase in income would allow that additional percent of expenditure if all the estimations were correct". However, we have doubts that the creation of such a forecast is really justified. The reason why this is the case is that in our model the scenario input can be updated any time to reflect the present terms of any future developments such as inflation prediction or any changes in the cost structure of the company. That is why the management can react quickly at least by estimating what tariff strategy to pursue to reflect sudden negative or positive trends in the overall economic indicators and in the household income developments in particular. Beyond the scope of our analysis remain the issue concerning the level of the pensions in Bulgaria and the need for their actualisation.

7 Reform Proposals

Having argued about the feasibility of the proposed strategic scenarios, we would now proceed with the particular reform proposals and recommendations for action plans that Pleven RWSSC can adopt to solve its financial and efficiency problems.

7.1 Overall Country Developments in the Water Sector

There are three major events that will shape the future developments in the water sector in Bulgaria. First, the introduction of the European standards in all spheres of the economy and water services included. The quality of waters and the norms for treatment of wastewaters will be affected especially. The second event is the acceptance of the last corrections of the Law for Modification and Addition to the Water Law. That modification should clarify the property rights for exploitation of the water supply and sewage networks, according to whether they serve one or more municipalities. As a result, we will have water companies that are only managing units, and that only operates the water supply and sewage systems. The third event is the expected adoption (end of 2003) of the Strategy for Managing and Development of the Water Supply and Sewage in Bulgaria.

The strategy suggests the adoption of a new Regulation Law for Water Supply and Sewage Services that will solve the issues related to property rights over the WS&S companies and regulate the tariff changes and quality of the services. It also proposes the creation of National Regulatory Commission (as part of the Council of Ministers) for all water supply and sewage service activities. What the strategy prescribes is state regulation over the tariffs and charges, quality and standards in the water sector, periodic control and monitoring of water service units' operations and reports. To a lesser extent is explains the different models of service management and private sector participation. Some of the forms of management mentioned are contract for operation and service, management contract, concession contract, BOT (build, operate and transfer) contract or the mixed (public-private) holdings. However, the role of the private sector is far from clear so far.

7.2 Case Specific Reform Proposals

It is not an easy task to formulate reform proposals concerning a water company coincident with so many forthcoming changes in the water sector legislation. However, there are five major conclusions that can be drawn from the analysis so far:

- The recent (2001) situation of Pleven RWSSC (small net revenue and low receivables collection) does not allow sufficient investments in the repair and efficiency improvements;
- Our scenarios suggest that if Pleven raises levels of investment to reduce substantially water losses and unpaid bills it gets enough revenue to nearly fully offset those investments;
- Third, the most significant changes in tariffs take place in the wastewater service section as sewage collection and treatment are among the issues of priority when new investment needs are considered;
- Fourth, the overall burden of water and wastewater service payments for households was already high in 2001 (4.8 of the average pension income for HH with water supply and treated sewage). The additional scenario development (including the upgrade) did not rise that burden higher then 6.2% of the average pension. However, that could be unacceptable given the fact that the much-cited 5% affordability criterion for environmental protection will be.

- For the average households (with annual income of BGN 3,600 as of 2001) even the highest estimated tariff levels for users with both water supply and treated sewage (in the upgrade scenario) would not cause a burden in excess of 3% of their income.

Having in mind these four conclusions, we will now examine the issues developed in *Chapter 3* and addressed with the scenario analysis performed so far.

7.2.1 Tariffs Setting Calculations

The tariff calculation methodology received its consideration throughout every scenario setting. The first *Baseline 1B* cost recovery scenario showed what are the minimum tariffs the company should charge if it wants to cover the full costs of its operations. One of the basic implications to follow was that we used cost recovery as a way to assess our new investments and proposed changes in the system. The analysis presented in the scenarios chapters compared the impact of different investment developments on tariff settings. We have tried to find out a way in which investment costs could be included in the calculations and what could be the impact of their allocation. We demonstrated that allocation could have implication of tariff levels, i.e. the higher the costs assigned to a specific user category, the greater its tariffs. Based on the scenarios analysis, we could conclude that costs distribution among service users could play a critical role for tariff justification.

The negative net result in *Baseline 1B* (BGN 1.1 mln loss) raised another issue of concern – the collection of outstanding payments. In order to have a better picture of real costs and include them in tariff calculation the avoidance payments should also be considered. We have done that in the sustainability, upgrade and other scenarios some of which are shown in the appendixes. The overall effect was increased tariffs. Nevertheless, these costs are an important factor when the burden of non-payers on the system has to be estimated.

7.2.2 Receivables and Debt Collection

Our proposals for investment programs and strategic decisions would prove in vain if we did not take into account the problem with accumulating debt. As shown in *Chapter 3* the percentage of receivable from total revenue grew substantially (from 9% to 21%) for the period 1998 – 2002. Though we should distinguish between receivables and avoidance of payments, both figures had increased at present. Unfortunately there is no a short cut or a possible scenario that could show us how to deal with that problem. We believe that the management of the company is well aware of the options that can help improve the situation. What was our task within the scenario developments and related to that particular issue is to show what burden those avoided payments could pose on the system. To what extent the improvements in debt collection could release resources for investment and alter the tariff setting and financial results (*Upgrade 3A* scenario). As mentioned before the negative final balance in the cost recovery cases and partly the tariff increase in the "cost of non-payers covered" scenarios was due mainly to the portion of uncollected debt.

Another part is a moral side of the issue as well. The socially disadvantage groups and those with big amount of debt should probably receive some special treatment or conditions that would allow them to use water for their daily needs despite of their limited ability to pay. When we have asked the model to calculate by how much the tariff of "regular payers" should increase to cover the ones who avoided payment, the results were not encouraging.[19] The tariffs for water went up with almost 8% for all user categories and the increase for wastewater service was more than 10%. The outstanding debt deteriorated further. So covering non-payers could only signal how much burden such avoidance cause to the regular users. That is why we have added in scenario *Sustain 2A* additional cost item related to expenses incurred for improvement of receivables collection. We have estimated that cost to be around

[19] Additional scenarios in Appendix II.

15% (or BGN 0.17 mln) of the original avoidance of payments. The result was 34% decrease in outstanding debt (or approximately BGN 0.39 mln). We believe that such an investment strategy is always worth pursuing as long as the benefits of it offset its costs (as it is in our case).

7.2.3 Leakage Reduction

Another investment strategy that proved its positive net effect was the leakage reduction program proposed in the *Sustain 2A* scenario. That is one of the two things generally missing in their full part in the tariff calculations apart from avoided payments. We have tried to address the former in the leakage scenarios and find out how the tariffs should look like if management efforts to reduce water losses continue further and are targeted to achieve substantial improvement to reach 22% of water produced and imported[20]. The need for new investments in addition to the funds associated with the World Bank loan would be relatively substantial and we have estimated them to BGN 3.5 mln. However, the fact that we ended up with more than 12.8 mln cubic meters of recovered water losses seems to justify such an investment. At 2001 household water service tariffs (without VAT) this is approximately BGN 9.6 mln.

While household might experience additional burden during the period necessary for the sustainable developments to take place, the effect of leakage reduction on Pleven RWSSC operational and financial results would be more than beneficial. Water loss control with be set in desirable levels and tariffs will be substantial enough to cover the required investments. The raise in wastewater tariffs especially for households and budget entities would probably encourage them to save water and to improve water use efficiency (repair pipes, not use drinking water for irrigation or other purposes, discourage illegal connections in case the penalty is set high enough). In addition, the new investment would ensure that Pleven RWSSC had improved leakage monitoring and control.

If planned and executed properly, the *Sustain 2A* scenario will not only increase the operating efficiency and save water resources but also will improve the financial situation of the company and ensure its sustainability. Issues for consideration in similar reform proposals would be to what extent to reduce water losses so that the required investment does not offset the benefits from the reduction itself. And second, the importance to convey the improved water supply management by lowering tariffs for service users at least after the savings and efficiency improvements take place. That would be a sign that their money had not gone in vain and that the initially higher tariffs had proved their purpose. Third strategic issue for consideration will be naturally the sources of funds for that future investment and their repayment.

7.2.4 Future Investment Needs and Available Sources

It is difficult if not impossible for Pleven RWSSC to self-finance its operations with the present state (2001) of operations and net revenue margin. Moreover, the network probably requires structural improvements and replacements that need substantial provision of funds. In that study we have not aimed to find out what are the exact channels with the help of which Pleven RWSSC could solve its capital deficiencies though government support and possible ISPA financing were mentioned. Our goal was to check if given that funds are available through the normal sources like infrastructure improvement state programs, banks, grants and others, the possible investment decisions could be supported by the system and the repayment could be ensured through appropriate tariff settings.

We have tried to point out some examples with investment like the World Bank Loan, governmental grants and company own investment sources. If the objectives are met and the final results of these investments programs are similar to what we have modeled with the help of ASTEC scenarios than we

[20] The 22% figure is estimated given that the original level of consumption (16.2 mln cubic meters for year 2001) is preserved. In that case the new water produced and imported amount would have to be 20.7 mln cubic meters (not 33.6 mln cubic meters).

have more than positive developments in leakage reduction, financial efficiency (cost allocation and recovery), wastewater treatment plant and equipment improvements and more users who utilize the treatment facilities of the company. That additionally would have a beneficial effect on water pollution reduction and overall environmental protection. On the tariff side, the additional burden (less than 3% on its highest) for the average household would probably be in the acceptable norm but average pensioners could be adversely affected by the proposed changes (6.2% of his/her income have to be dedicated to water and sewage payments).

The last but not the least proposal concerning the insufficient investment resources and the need for improved quality and efficiency of wastewaters treatment facilities is in the case when external funding is hard to obtain. When self-financing is the only feasible option for a company, it is through a well defined (planned and balanced) investment decision whose impact is reflected in tariffs calculation through the use of "full cost recovery", that will allow reserves to be build in order to finance timely interim decisions. Persistency and publicity of management actions and achieved results could be tools that additionally enhance the sustainability of the system. The financing possibilities also include the consideration for concession and privatization options or other means for raising additional capital (bond issuance or selling shares to the stock market). The capital market in Bulgaria though not so developed allow for certain options that can be utilized in the case of Pleven RWSSC and other water companies.

7.2.5 Timing of Reforms

My last point would be not a reform proposal in its normal sense but a general recommendation for any reform proposal listed so far. We would argue that timing of the reforms is as important as the reforms themselves. For example we cannot start by introducing a two-part water tariff without first considering what the level of that tariff should be. And to do that we need to start by assessing how all the costs that Pleven RWSSC incurs in the process of its activities are reflected into that tariff. The old methodology for price setting is abandoned for more than three years but the company (and most of the others in the sector) is still using it. What else could the management do to improve the efficiency of its financial planning? One possible solution is to introduce the method of full cost recovery in the calculations for water and wastewater tariffs. By doing this, the financial analyst would probably consider the cost of leakage and that of non-payers in the overall system. Ambiguity that arises from depreciation expense calculations could also be avoided if we think of replacement costs and ignore sunk cost in our calculations. All that reflected in careful costs allocation and appropriate tariff settings could possibly improve the evaluation process for new investment and other strategic decisions.

8 Appendix I. Household Income and Expenditures (1995 – 2002)

8.1 Average Households Income by Sources

Year	1995	1996	1997	1998	1999	2000	2001	2002
1,000 BGL = 1 BGN								
Income	**119 474**	**199 935**	**1 807 392**	**2 960 359**	**3 321**	**3 530**	**3 601**	**4 029**
Salaries	65 833	104 143	963 646	1 583 359	1 749	1 695	1 711	1 978
Additional	5 079	9 346	74 008	122 271	218	228	217	224
Entrepreneurship	5 098	12 004	90 689	171 152	182	194	179	226
Property	967	2 352	11 380	30 988	35	33	30	34
Unemployment compensations	701	993	11 485	17 751	41	49	50	43
Pensions	24 975	43 077	405 272	684 086	741	934	1 022	1 061
Children Allowances	2 409	3 403	31 181	39 292	37	35	29	26
Other SS	1 737	2 400	26 952	38 208	46	51	56	86
Private household activities	6 483	11 244	110 126	129 505	115	117	116	120
Sales of property	1 574	1 684	12 814	12 425	12	20	19	25
Others	4 618	9 289	69 839	131 322	145	174	172	206
Structure in %								
Income	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Salaries	55.1	52.1	53.3	53.5	52.7	48	47.5	49.1
Additional	4.3	4.7	4.1	4.1	6.6	6.5	6	5.6
Entrepreneurship	4.3	6	5	5.8	5.5	5.5	5	5.6
Property	0.8	1.2	0.6	1	1	0.9	0.8	0.9
Unemployment compensations	0.6	0.5	0.7	0.6	1.2	1.4	1.4	1.1
Pensions	20.9	21.6	22.4	23.1	22.3	26.5	28.4	26.3
Children Allowances	2	1.7	1.7	1.3	1.1	1	0.8	0.6
Other SS	1.5	1.2	1.5	1.3	1.4	1.5	1.6	2.1
Private household activities	5.4	5.6	6.1	4.4	3.5	3.3	3.2	3
Sales of property	1.3	0.8	0.7	0.4	0.4	0.6	0.5	0.6
Others	3.8	4.6	3.9	4.5	4.3	4.8	4.8	5.1

Since 1999 the new lev or BGN was introduced (1 BGN equals 1,000 BGL).

Source: NSI.

8.2 Average Household Expenditure by Item

Year	1995	1996	1997	1998	1999	2000	2001	2002
1000 BGL = 1 BGN (since 1999)								
Total Expenditure	**121 489**	**213 285**	**1 751 281**	**2 895 383**	**3 221**	**3 438**	**3 496**	**3 915**
Consumer expenditure	**98 971**	**177 948**	**1 449 301**	**2 376 420**	**2 695**	**2 860**	**2 963**	**3 335**
Food	48 205	91 649	799 136	1 179 618	1 216	1 321	1 393	1 471
Alcohol and tobacco	4 808	7 831	52 084	92 890	130	127	124	148
Clothes and shoes	10 161	14 635	117 920	194 560	190	154	137	158
Water, electricity, gas	9 482	21 476	185 016	337 122	428	466	465	566
Furniture and house expenses	5 962	8 377	55 893	105 369	119	109	110	129
Healthcare	2 582	4 417	41 991	78 233	104	139	150	176
Transport	8 590	15 246	93 249	170 423	206	198	204	222
Communications	1 098	2 036	21 847	44 586	75	98	128	182
Leisure time	4 116	5 565	36 959	86 014	119	124	124	141
Other goods and services	3 967	6 716	45 206	87 605	108	124	128	142
Taxes	7 852	12 356	109 115	171 884	156	142	120	128
Private household activities	5 383	8 654	81 156	128 644	112	113	118	128
Others	9 283	14 327	111 709	218 435	258	323	295	324
Structure in %								
Total Expenditure	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Consumer expenditure	**81.5**	**83.4**	**82.8**	**82.1**	**83.7**	**83.2**	**84.7**	**85.2**
Food	39.7	43	45.6	41	37.8	38.4	39.8	37.6
Alcohol and tobacco	3.9	3.7	3	3.2	4	3.7	3.6	3.8
Cloths and shoes	8.4	6.9	6.7	6.7	5.9	4.5	3.9	4
Water, electricity, gas	7.8	10.1	10.6	11.6	13.3	13.6	13.3	14.5
Furniture and house expenses	4.9	3.9	3.2	3.6	3.7	3.2	3.1	3.3
Healthcare	2.1	2.1	2.4	2.7	3.2	4	4.3	4.5
Transport	7.1	6.8	5.3	5.9	6.4	5.8	5.8	5.7
Communications	0.9	1	1.3	1.5	2.3	2.8	3.7	4.7
Leisure time	3.4	2.7	2.1	2.9	3.7	3.6	3.5	3.6
Other goods and services	3.3	3.2	2.6	3	3.4	3.6	3.7	3.5
Taxes	6.5	5.8	6.2	6	4.8	4.1	3.4	3.3
Private household activities	4.4	4.1	4.6	4.4	3.5	3.3	3.4	3.3
Others	7.6	6.7	6.4	7.5	8	9.4	8.5	8.2

Source: NSI

9 Appendix II. Additional Scenario Developments Including Marginal Cost Pricing

The results are presented for information purpose only and should not be compared with the scenarios analyzed in the main text since input parameters and model specifications may differ.

9.1 Scenarios Description

Short-term:

- ***S1-Basic***: scenario without amortization or investment figure – current tariffs and charges used; cost of non-payers are not covered; no cost recovery, no marginal cost pricing.
- ***S2-Basic.Invest*** scenario with average investment for the last three years – current tariffs and charges; cost of non-payers are not covered; no cost recovery, no marginal cost pricing.

Medium-term:

- ***S3A-CR***: cost recovery scenario. No marginal cost pricing. Costs of non-payers are not covered.
- ***S3B-CR.MCP*** is also a cost recovery scenario but this time with marginal cost pricing added; costs of non-payers are not covered.
- ***S3C-CR.NonPayers*** is a full cost recovery scenario. No marginal cost pricing. Costs of non-payers are covered.
- ***S4A-Leakage*** is a leakage scenario – households (HH) are responsible for 3 times more leakage. Costs of non-payers are not covered. Cost recovery, no marginal cost pricing.
- ***S4B-L.CR.MCP*** addresses leakage as well – HH 3 times more leakage. Cost recovery with MC pricing; costs of non-payers not covered.
- ***S4C-L.Reduction***: Leakage scenario (30% less water losses due to new investment, no MC pricing). New connections to water and sewage with treatment transferred from existing water service and water and sewage without treatment accounts. No change in the number of service users accounts assumed.

Long-term:

- ***S5-LongTerm***: WWTP investment scenario. Leakage – decreased to 36% of water produced; collection of receivables improved by 50%; MC pricing; FC recovery; non-payers are not covered; new fixed and variable costs for water and wastewater services. New accounts to the water and sewage with treatment category. No change in the number of service users accounts assumed.

9.2 Summary Results

Table 15 Water Service Tariffs (in BGN)

Service user category	Number of Accounts	S1-Basic	S2-Basic. Invest	S3A-CR	S3B-CR.MCP FT[21]	S3B-CR.MCP VT[22]	S3C-Non Payers	S4A-Leakage	S4B-L.CR.MCP FT	S4B-L.CR.MCP VT	S4C-L. Reduction	S5-Long-Term FT	S5-Long-Term VT
Households A1 (WSc-SNT)	13,669	0.75	0.75	0.65	28.02	0.29	0.70	0.77	31.82	0.34	0.66	29.09	0.30
Households A2 (WSc-ST)	54,012	0.75	0.75	0.65	28.28	0.29	0.70	0.77	31.82	0.34	0.65	28.95	0.30
Households B (W)	73,973	0.75	0.75	0.66	28.14	0.29	0.70	0.77	31.82	0.34	0.64	29.20	0.30
Budget entities A (WSc-SNT)	261	0.76	0.76	0.66	4261.86	0.29	0.75	0.48	3,378.27	0.22	0.67	4428.34	0.30
Budget entities B (W)	673	0.76	0.76	0.66	1345.50	0.29	0.75	0.46	1,055.08	0.21	0.66	1397.29	0.30
Industry and agriculture A1 (SNT)	628												
Industry and agriculture A2 (ST)	4,013												
Industry and agriculture B (W)	6,912	0.76	0.76	0.66	62.37	0.29	0.71	0.47	49.43	0.21	0.66	64.78	0.30
Total:	154,141												

Table 16 Wastewater Service Tariffs (in BGN)

Service user category	Number of Accounts	S1-Basic	S2-Basic. Invest	S3A-CR	S3B-CR.MCP FT[23]	S3B-CR.MCP VT[24]	S3C-Non Payers	S4A-Leakage	S4B-L.CR.MCP FT	S4B-L.CR.MCP VT	S4C-L. Reduction	S5-Long-Term FT	S5-Long-Term VT
Households A1 (WSc-SNT)	13,669	0.07	0.07	0.17	7.97	0.04	0.19	0.17	7.79	0.04	0.17	10.72	0.04
Households A2 (WSc-ST)	54,012	0.12	0.12	0.17	8.05	0.04	0.18	0.17	7.79	0.04	0.17	10.66	0.07
Households B (W)	73,973	-	-	-	-	-	-	-	-	-	-	-	-
Budget entities A (WSc-SNT)	261	0.07	0.07	0.17	1,364.33	0.04	0.19	0.17	1,434.13	0.04	0.17	1,833.40	0.04
Budget entities B (W)	673	-	-	-	-	-	-	-	-	-	-	-	-
Industry and agr. A1 (SNT)	628	0.07	0.07	0.18	66.91	0.04	0.19	0.18	66.80	0.04	0.21	90.44	0.04
Industry and agr. A2 (ST)	4,013	0.52	0.52	0.18	268.57	0.04	0.20	0.18	268.12	0.04	0.20	262.22	0.14
Industry and agriculture B (W)	6,912	-	-	-	-		-	-	-	-	-	-	-
Total:	154,141												

[21] FT means Fixed Tariff.
[22] VT means Variable Tariff.
[23] FT means Fixed Tariff.
[24] VT means Variable Tariff.

Figure 13 Comparison between Total Unpaid Tariffs and Balance of Payments for Water and Wastewater Services

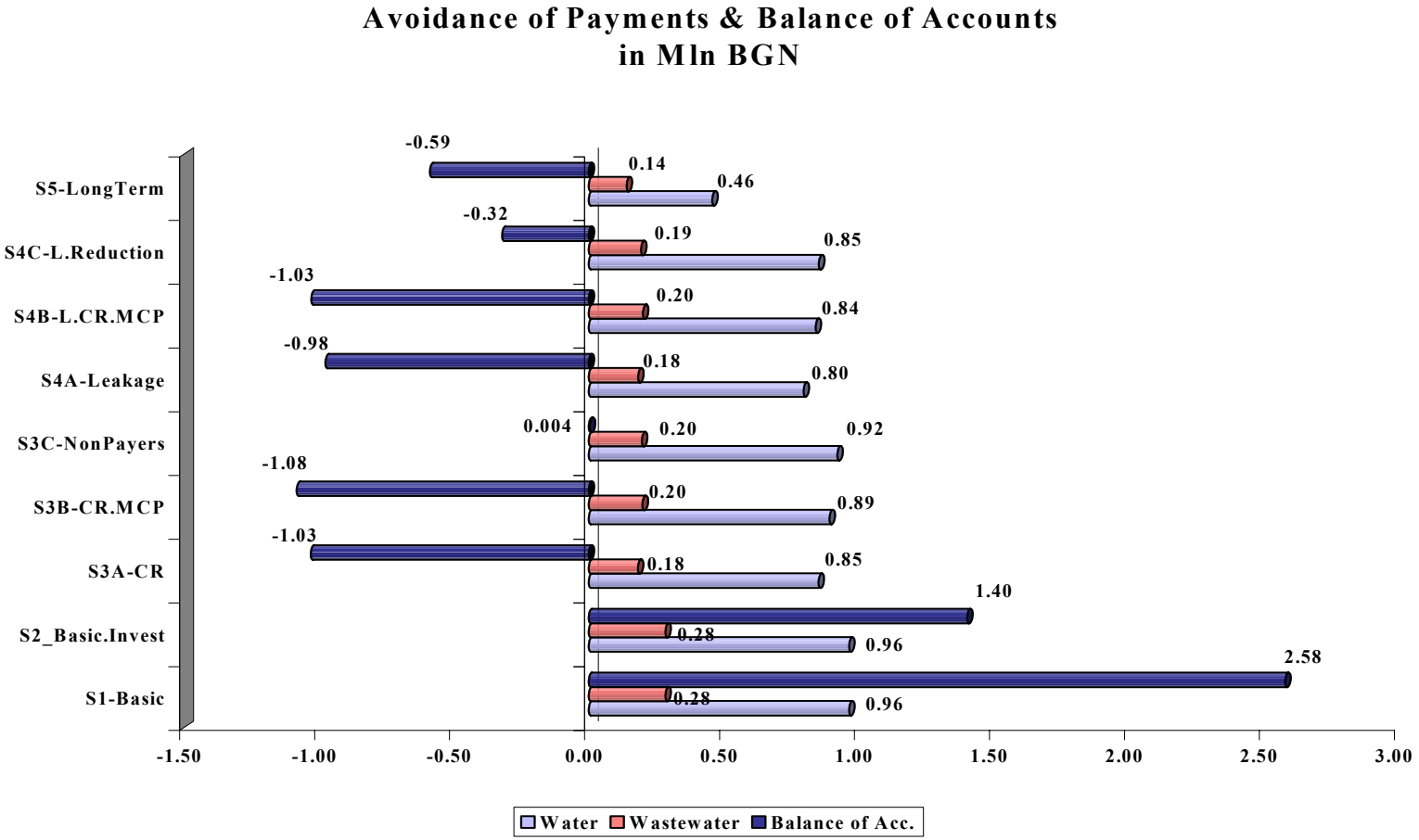


Figure 14 Annual Water and Wastewater Payments per Household (no VAT)

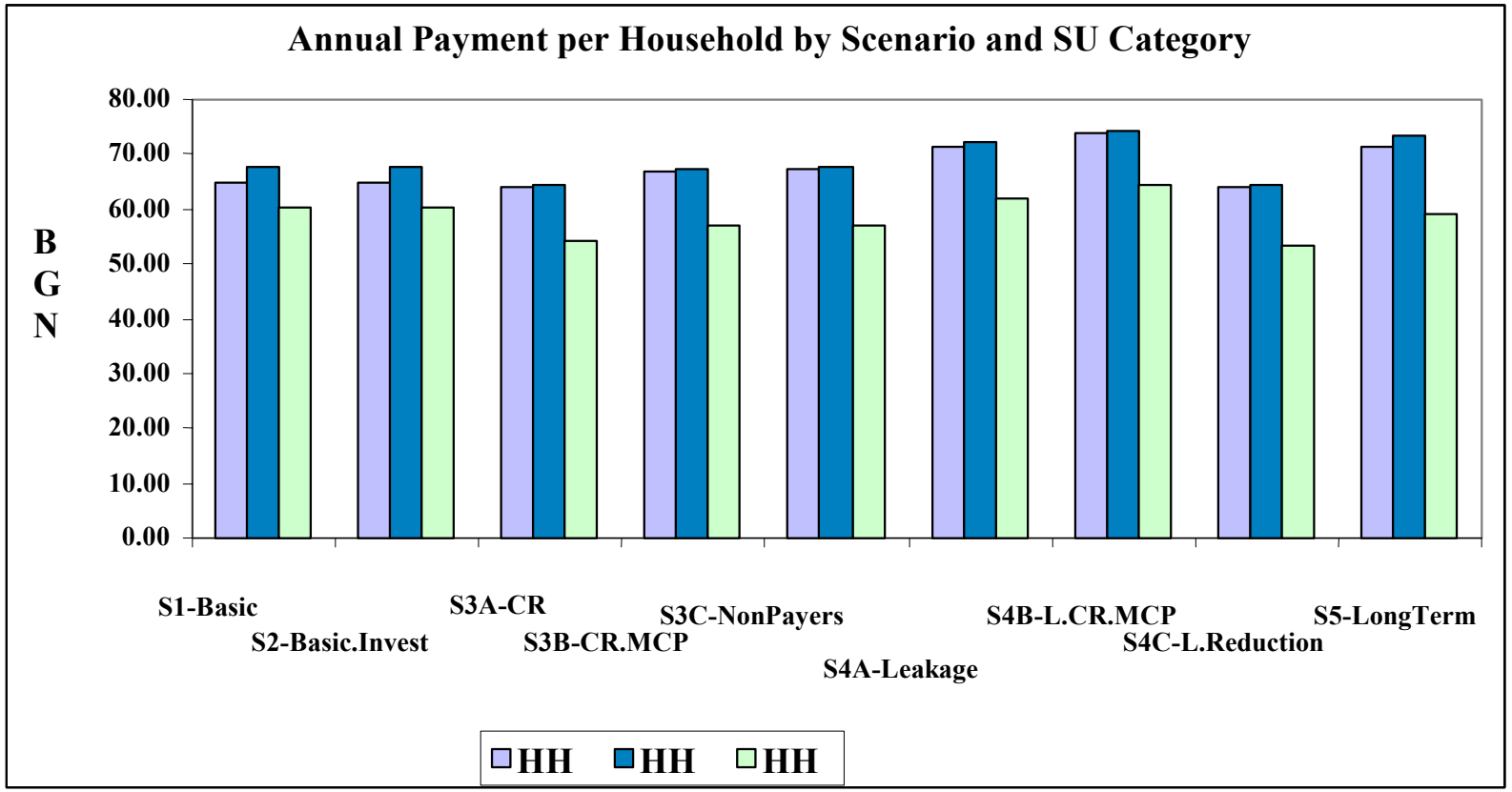


Figure 15 Scenario Breakdown for Total Water Consumption by Category of Service Users (in cubic meters per year)

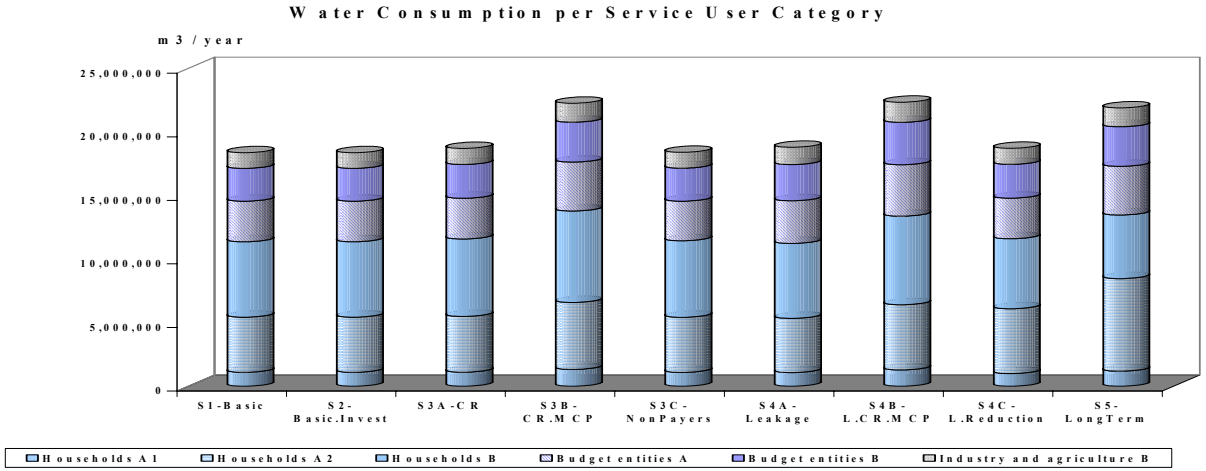


Figure 16 Total Sewage Discharge per Scenario and SU Category.