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REGIONAL
PROJECT

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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 – National Profile

WORKING FOR THE DANUBE AND ITS PEOPLE

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REGIONAL
PROJECT

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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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Abbreviations

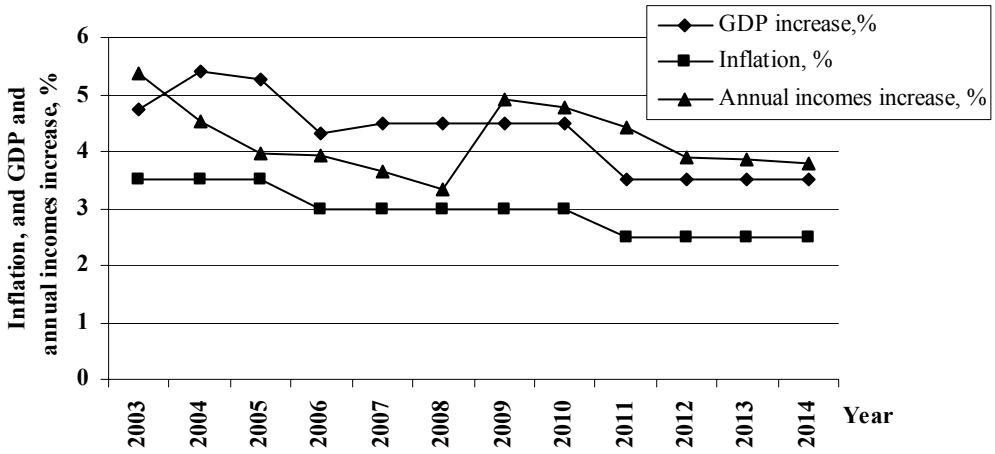
BGN	Local currency: Bulgarian leva after denomination since 1999
BOD_5	Biological Oxygen Demand after 5 days
BOT	Build, Operate, Transfer
Budget Organizations	
COD	Chemical Oxygen Demand
CA	Commercial Act
CoM	Council of Ministers
dka	Dekar or an area of 0.1 ha
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EMEPA	Enterprise for Management of Environmental Protection Activities
EWSRC	Energy and Water State Regulatory Commission
GDP	Gross Domestic Product
IBRD	International Bank for Reconstruction and Development
ISPA	Instrument for Structural Policies for Pre-Accession
IWWTP	Industrial Wastewater Treatment Plant
LTPSMC	Law for Transformation and Privatization of State and Municipal Companies
LSGLAA	Local Self-government and Local Administration Act
MAF	Ministry of Agriculture and Forests
MoEW	Ministry of Environment and Water
MoH	Ministry of Health
MoRDPW	Ministry of Regional Development and Public Works
MU	Management Unit
NEPF	National Environmental Protection Fund
NSI	National Statistical Institute
NRW	Non Revenue Water
O&M	Operation and Maintenance
USD	US dollars
UWWTP	Urban Wastewater Treatment Plant
PE	Population Equivalent
PWTP	Potable Water Treatment Plant
SCWC	Supreme Consultative Water Council
SS	Suspended Solids
VAT	Value Added Tax

WB	World Bank
WSSC	Water Supply and Sewerage Company
WWTP	Wastewater Treatment Plant

Exchange Rates

No.		1999	2000	2001	2002
1.	GDP:				
1.1.	in BGN	2898	3274	3754	4108
1.2.	in USD	1577	1542	1718	1978
2.	Exchange rate: BGN for 1 USD	1.838	2.124	2.185	2.077
3.	Exchange rate: BGN for 1 Euro	1.95583	1.95583	1.95583	1.95583

Since July 1, 1997, Bulgaria is under a Currency Board Regime and the currency stabilized around the 1800 leva per USD till 1999 when the lev was redenominated (three zeros were dropped).



Inflation, and GDP and annual incomes increase

1. Introduction

1.1. Purpose of the National Profile

This report is a compilation of information and data that describe the institutions and conditions that shape and characterize the provision of drinking water and wastewater service in Bulgaria. The purpose of this compilation is to provide background and inspiration for proposals to reform both the current system of water supply and wastewater tariffs and effluent charges and proposals to adjust or modify the legal and regulatory system within which these tariffs and effluent charges function in Bulgaria. The aim of the reform proposals is to improve the water supply and sewerage management in Bulgaria generally, including protection of water resources from nutrient loading and toxic substances originating from municipal wastewater systems.[1]

For most of Bulgaria the operation and management of local water and wastewater service is carried out by Water Supply and Sewerage Companies (WSSCs). The provision of water supply and sewerage services, associated investment planning, and implementation of those plans are their obligation

The trends in the organization of the water sector reflected the same divergent pressures experienced by the rest of Bulgarian society. For the last 50 years, the State invested in building water services. [2] Social developments since 1989 can be seen as a process of devolution both in the transfer of power from national to local (municipal) government, and, in reduction of State support for, and influence on, local budgets.

1.2. Overview

The Republic of Bulgaria is situated in the northeastern part of the Balkan Peninsula between latitudes $41^0$14' and $44^0$13' North and longitudes $22^0$21' and $28^0$36' East. Its longitudinal extent defines the climate of the country as a transitional between the typical oceanic climate of Western Europe and the typical continental climate of the Eurasian land mass. Droughts are a characteristic feature of Bulgaria's climate. Of highly varying duration and frequency, they strongly affect water run off, as well the population's way of life and activities (Raev at al., 2003).

The total area of Bulgaria is 110993.6 km^2 (land area – 110630.9 km^2, frontier river and sea islands areas – 101.3 km^2 and territorial waters of frontiers rivers – 261.4 km^2). Administratively, the country is divided into 6 planning regions, 28 districts and 262 municipalities.

[1] A municipal water system includes those regional water systems whose service area includes multiple municipalities and often also served industrial and commercial customers in that region. As discussed below, the larger, regionally oriented systems are particularly prominent in Bulgaria.

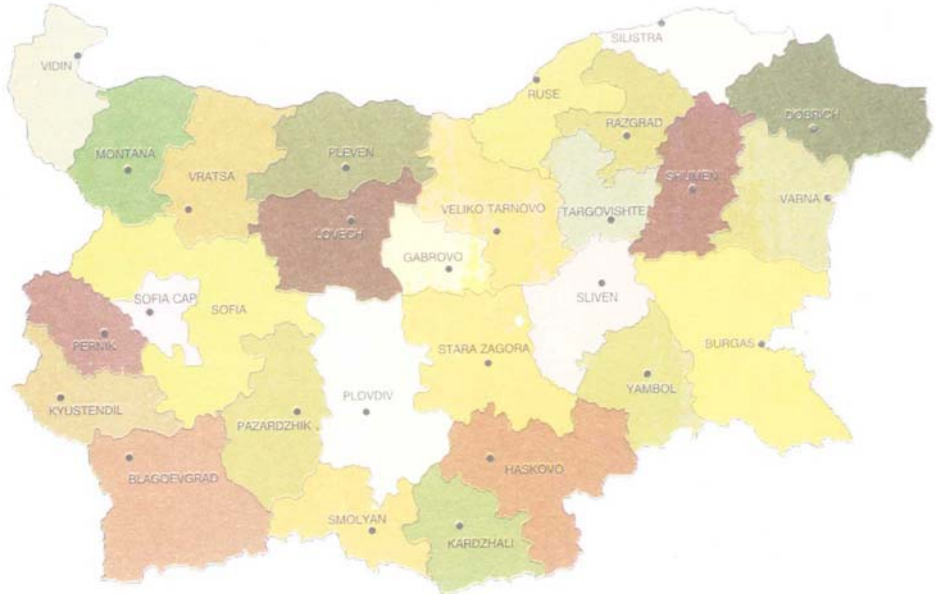


Figure 1. Administrative – Territorial Division of the Republic of Bulgaria – 28 Districts

(North – West region: district of Varna,Vratsza, Montana; North Central region: district of Veliko Tarnovo, Gabrovo, Lovech, Pleven, Ruse; North-East Region: district of Varna, Dobrich, Razgrad, Silistra, Targovishte, Shumen; South-East region: district of Burgas, Sliven, Yambol; South Central region: district of Kardzali, Pazardzhik, Plovdiv, Smolyan, Stara Zagora, Haskovo; South-West region: district of Blagoevgrad, Kyustendil, Pernik, Sofia and Sofia capital).

The population's decrease was 12.3% for the period 1985-2002 and was due mostly to emigration of young people. Most of the population is concentrated in urban areas (64.8% in 1985 and 69.7% in 2002). The average density of the population decreased from 80.6 to 70.7 persons/km^2 for the same period of time.

Table 1. Population at the End of the Year (December 31)

No.	**Indices/year**	**1985**	**1992**	**2000**	**2001**	**2002**
1.	Total population, thousands, of which:	8948.6	8487.3	8149.5	7891.1	7845.5
1.1.	Urban	5799.9	5704.5	5576.9	5473.0	5469.6
1.2.	Rural	3148.7	2782.7	2572.6	2418.1	2375.9
2.	Density per km^2	80.6	76.5	73.4	71.1	70.7

Source: NSI

The population's forecast is for continued decline: from 7,785,091 inhabitants in 2003 to 7,323,708 inhabitants in 2014 e.g. 6% decrease of population (MoEW, 2003).

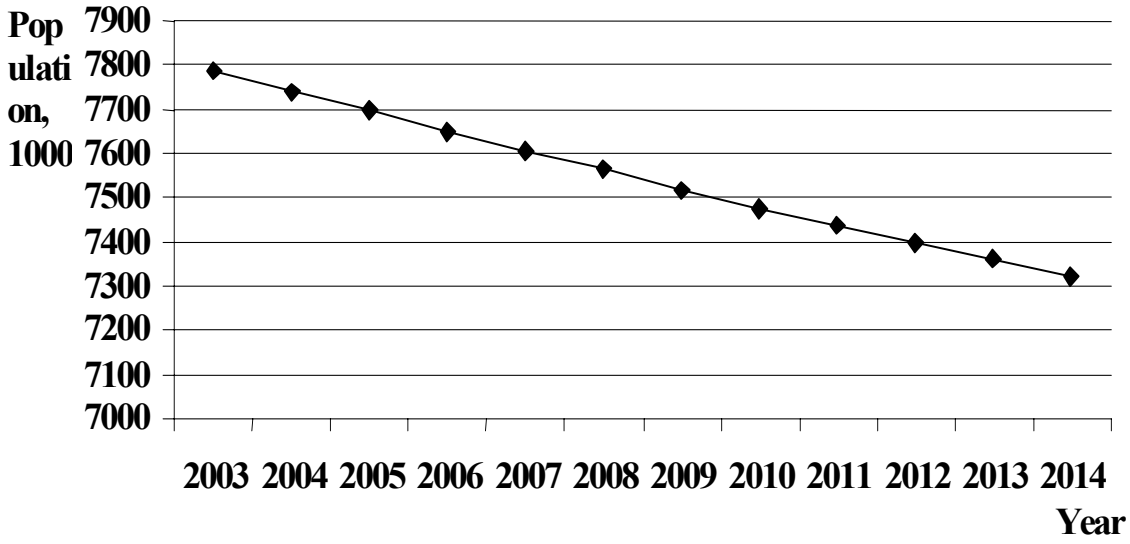
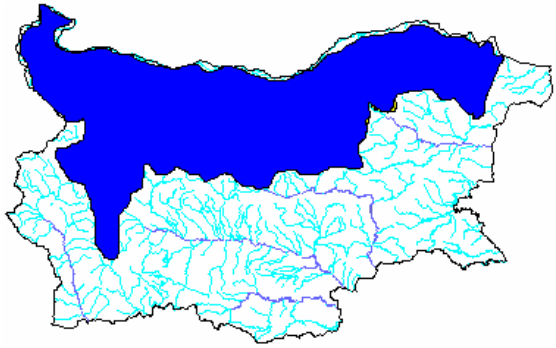


Figure 2. Population Forecast for Bulgaria (MoEW, 2003).

The most urbanized parts of the country are: Sofia, with 1,192,031 inhabitants; Plovdiv, – 713,060 inhabitants; and Varna 459,931 inhabitants (2002). Unemployment was 16.8% in 2002 and ranged from 11.8% in the South-West region to 22.8% in the North – West region.

According to art. 152, item 1 of the Water Act, the territory of Bulgaria is divided into four river basins: Danube River Basin, Black Sea River Basin, West Aegean River Basin and East Aegean River Basin. The Danube River Basin has its administrative centre in Pleven and covers the water catchment areas of the rivers Iskar, Erma, Nishava, Ogosta and; to the west of the Ogosta river, Vit, Osam, Yantra and Roussenski Lom, and the territory west of the groundwater watershed of the malm aquifer. The Danube River Basin covers about 43% of the country and most of northern Bulgaria. Bulgaria ratified the Convention on the Cooperation for the Protection and Sustainable Use of the Danube River and implemented it on April 6, 1999.



Bulgaria is a formerly socialist country striving to enter the EU. It has experienced macroeconomic stability and positive growth rates since a major economic downturn in 1996 led to the fall of the socialist government. Bulgaria has already adopted most of the basic regulations that are meant to ensure compliance with EU environmental directives.

1.3. Overview of the Origins and Status of the Municipal Water and Wastewater Industry

The national level water management is exclusively the right of the Council of Ministers, performed by the Ministry of Environment and Water (MoEW). The basin level management within one or several catchment areas is done by Basin Directorates for River Management, which are bodies to the above-mentioned Ministry and Basin Councils. The Basin Council is a state public consultative commission for supporting the activities of the Basin Directorate. The Basin Council includes representatives of the state administration, the municipal administration, the water users and the environmental organizations within the range of the basin as well as representatives of the scientific organizations connected with the water issues. For their activity the members of the Basin Council do not receive remuneration.

The Supreme Consultative Water Council (SCWC) provides expert consultation to the Ministry of Environment and Water. It was established on the basis of a Regulation issued by the MoEW. It has representatives of the Ministry of Environment and Water; Ministry of Regional Development and Public Works; Ministry of Agriculture and Forestry; Ministry of Industry, Ministry of Transport, Ministry of Health; Ministry of Finance; Civil Defense; Ministry of Power Engineering and Energy Resources; many institutes of the Bulgarian Academy of Sciences, municipalities, and NGOs directly related to waters.

State responsibilities related to the operation, construction, reconstruction and modernization of water systems and facilities owned or partially-owned by the state are presently allocated to Ministries of the National Government as follows:

1. The Ministry of Regional Development and Public Works (MoRDPW) – water supply and sewerage systems and facilities of the settlements, protection of the population from the water harmful impact within settlements;

2. The Ministry of Agriculture and Forests (MAF) – irrigation systems and facilities; protection of the population from the water harmful impact beyond the settlement boundaries;

3. The Ministry of Energy and Energy Resources – water energy systems;

4. The Ministry of Environment and Water (beside the above mentioned functions) – water abstraction facilities for mineral water, public state property.

For municipally-owned water and wastewater systems the operation, construction, reconstruction and modernization of the water supply and sewerage systems is the responsibility of the municipal mayor.

There are currently 29 Regional WSSCs responsible for providing most water and sanitation services throughout Bulgaria. The State exercises its prerogatives in the state-owned WSSCs according to a Regulation adopted by Decree of the CoM No 7/1994 and amended several times since then. According to this Regulation, the rights of the State as owner of a companies that is either wholly state-owned or where the State has a share are exercised by the Minister responsible for the economic sector in which the company is active.

The WSSCs have the status of Commercial Companies under the Commercial Act (CA). The prerogatives of the municipality as owner of WSSCs are exercised under the Local Self-government and Local Administration Act (LSGLAA). According to Art.21, p.9 of the LSGLAA, the Municipal Council takes decisions for the creation, transformation and cessation of commercial companies with municipal participation. The Municipal Council also nominates the representatives of the municipality for a place on the governing bodies (Boards of Directors) of these companies. The Boards of Directors of the WSSCs have the power to decide on choices of management or privatization for their companies. In the Limited Companies, the municipalities are shareholders and have a vote through the Boards of Directors in proportion to the percentage (%) of their ownership (according to the Commercial Law).

In the case of companies that are wholly or majority state-owned, the decision to privatize would be taken by the Minister of Regional Development and Public Works, following consultation with the municipalities served by the water companies.

Most dams and surface water reserves are exclusive state property, but WSSCs can use them based on a contract with the CoM. The water supply and wastewater services assets infrastructure are owned by the WSSCs. Though different WSSCs may own different parts of local water networks. The WSSCs may be privatized under the Law for Transformation and Privatization of State and Municipal Companies (LTPSMC) only through concession, or contracts for lease, management, or 'build, operate, and transfer" (BOT).

1.4. Future Directions

Bulgaria aspires to join the EU and works to harmonize the EU water-related legislation. Bulgaria has received international technical assistance to support the legislative and institutional reform related to the water sector and is in the process of transforming this sector, including its organization and tariff setting process. The future direction will be outlined in the new Water Act that will be proposed by the MoEW at the end of 2004. It is envisaged that full ownership of the WSSCs will be transferred to the municipalities and the WSSCs future will be determined by them. This includes possibly granting concession contracts to run the WSSCs.

The Government of Bulgaria has often expressed its interest in the evaluation of private sector participation (PSP) options in the operation, management and financing of their water supply and wastewater services in order to:

- increase the cost-efficiency of operations and development of the cities' water supply and sewerage systems and introduce current managerial and technical practices;
- reduce contingent liabilities for the municipal governments, by having the private sector contribute capital (if applicable) and share risks and incentives;
- increase consumer satisfaction and willingness to pay through the provision of a higher quality, more responsive service;
- better delineate the role of the municipalities as regulator and representative of the customer's interests and separate the municipalities from the day-to-day management of the WS&WW companies;
- make tariff decisions more transparent by introducing an arms-length relationship between the regulator and management.

Under the World Bank (WB) Project "Water Loan" a new study was initiated to examine private sector participation in the water sector in Bulgaria. The Dutch consulting firm ARCADIS prepared the concession bidding documents for the WSSCs of Varna and Shumen and the pre-qualification for prospective bidders was completed. The next steps would be solicitation of bids and selection of a winning concessionaire. For the time being, however, MoRDPW has stopped the process because of objections by some members of the tender committee. These members are the mayors of the affected municipalities they are presently opposed to the award of a private concession.

The Management and Development Strategy for Water Supply and Sewerage Sector in the Republic of Bulgaria, recently adopted by the Council of Ministers, aims to improve the management of the water supply and sewerage sector and increase the quality of services (MoRDPW, Annex 1, p. 69 .). This strategy would:

- establish a new law on water supply and sewerage;
- introduce an integrated approach to private sector participation, taking into account public interest and identifying preferred management models for private sector participation;

- application of a structured management approach, taking into account regional planning and ensuring economies of scale;
- elaboration of a regulatory act for water pricing.

An Act for Regulation of the Water Supply and Sewerage Services has been drafted. According to the Art.5 (1) of the act a new Energy and Water State Regulatory Commission (EWSRC) will be responsible for the quality of water services and for the establishment and control of water tariffs beginning January 1, 2005 (MoRDPW, Annex 2 p. 70). Under this draft, there are many aspects of a WSSC's performance that would be regulated. Drinking water quality and discharge wastewater quality, would continue to be regulated by the relevant Ministries (MoH and MoEW), with regular consultation with the EWSRC.

In the official EC No. CONF 13/01 position of the Republic of Bulgaria the transition period for the Directive 91/271/EC is proposed as follows as:

- to 01.01.2011 - construction of sewerage systems and WWTPs for settlements with more than 10000 PE;
- to 01.01.2015 - construction of sewerage systems and WWTPs for settlements with 2000-10000 PE.

2. Legal and Institutional Setting

2.1. National Laws and Regulations Governing Provision of Municipal Water and Wastewater Service

2.1.1. Common Provisions

Legislation, relevant to levels of services and required to be respected includes the following:

1. Water Act (SG 67/1999, in force since 28.01.2000, as amended in 2000 and 2003);
2. Environment Protection Act (SG 91/25.09.2002);
3. CoM Decree No 169/2003 for Regulation Determining and Impose the Penalties for Pollution over the Permission Norms;
4. National Standardization Act (SG No. 55/1999 in force since 1999);
5. Act for Limitation of Harmful Impact of Waste on the Environment (SGNo 86/1987);
6. Norms for Designing of Water Supply Systems since 1987;
7. Technical &Building Norms to Control Outbreaks of Fire (SG No33/1994);
8. Regulation No. 11 for the Design and Use Requirements of Waste Treatment Facilities (SG No. 152/1998);
9. Regulation No. 1 on the Study, Use and Protection of Groundwater (SG No. 57/2000);
10. Regulation No. 2 of Protection of Water against Pollution Caused by Nitrates from Agriculture Sources (SG No. 87/2000);
11. Regulation No. 3 on Sanitary Protection Zones (SG No. 88/2000);
12. Regulation No. 4 on the Quality of Water for Fish and Shellfish (SG No. 88/2000);
13. Regulation No. 5 on the Operation of Water Monitoring System (SG No. 95/2000);
14. Regulation No. 6 on the Emission Limit of Substances in Wastewater Discharged into Water Bodies (SG No. 97/2000);
15. Regulation No. 7 on Wastewaters Discharged into Sewer Systems (SG No. 98/2000);
16. Regulation No. 8 on the Quality of Coastal Sea Waters (SG No. 10/2001);
17. Regulation No. 9 on the Quality of Water intended for Drinking and Domestic Purposes (SG No. 30/2001 and on the Use of Water Supply and Wastewater Systems, 16.03./2002;
18. Regulation No. 10 on Discharge Permits;
19. National Standards 17.13.02-82; 17.13.03-83; 17.13.04-84; 17.13.05-85; 17.13.06-85; 17.13.07-85; 17.13.08-86, obligatory one year after the enforcement of the National Standardization Act.

These acts and regulations are listed above in rough order of importance. All of them are in accord with the EU directives.

The Water Act, approved in 1999 by the 38th National Assembly, has undergone numerous amendments and addenda in the period 2000-2001. An Amendment of and Addendum to the Water Act was passed by the National Assembly in 2002. Analyses of 1999 legislation and its application have shown some problems:

- In general, no distinction is made between water as a common national and indivisible natural resource and the use of water for water economic activities and provision of water services;
- The rules of protection of waters and water ecosystems are not explicitly defined. Many of the imperative regulations in the by-laws on water protection in actual fact develop further the Water Act and that is inadmissible;

- Three years after the enforcement of the Water Act, the provisions regulating the depreciation of the capital stock and the requirements for submission of information by other institutions and municipalities for the purposes of setting up an information system (data base) on water management have not been fulfilled;
- The issues related to the ownership rights and joint ownership rights on water infrastructure and facilities are not adequately regulated;
- The basic public relations with respect to the provision of water supply and sewerage as a public service in human settlements and settlement clusters are not regulated;
- The criteria for use of surface waters and water facilities are not adequately regulated and their linking to public interest remains to be a matter of wishful nature;
- After the approval of the 1999 Water Act other laws have been approved, which:
  - (i) give new definition of notions, which are an integral part of the Water Act, and that in actual fact changes the sense of the notion;
  - (ii) settle in a new way issues of the ownership rights, thus blocking the application of certain dispositions of the Water Act related to water management;
  - (iii) settle in a different way the water economy activities, which are in principle an integral part of the subject matter of the Water Act.

The recent passage of the EU Water Framework Directive (WFD) required still further harmonization than was possible by The Amendment and Addendum to the 1999 Water Act. As noted above, the Ministry of Environment and Water has drafted a new Water Act in 2004. It is expected that the new legislation, including full transposition of the WFD into the national legislation, will be adopted by the end of 2005.

The responsibility for the implementation of the WFD lies with the MoEW Water Directorate, and, for the associated economic analysis, the MoEW Strategy, European Integration and International Cooperation Directorate. The economic analysis, part of each WFD-mandated river basin management plan, will most probably be performed by external consultants selected according to the procedures of the Public Procurement Law. It is envisaged that the supporting information needed for the analysis will be collected and managed by the Basin Directorates. These four directorates will also provide guidance as to the source and availability of useful information. It still has to be decided how the data provided by the directorates will be organized.

2.1.2. Service Area

The service area of WSSCs corresponds to the administrative regions in the country. As noted above, there are 29 regional WSSCs set up in Bulgaria. 13 of these companies are 100% state owned, and 16 are jointly owned (51% by the state and 49% by the municipality). Besides these 29 WSSCs, there are additional 20 municipal water companies serving only small areas and populations (Table 2.). These 20 municipal companies are not typical of Bulgaria. They were established due to the lack of investments from the state (central budget). These municipalities used local financial resources to provide basic infrastructure to their citizens.

Table 2. Water Supply and Sewerage Companies with Different Ownership in Bulgaria

№	100% state ownership	51% state and 49% municipal	100% municipal ownership
1.	Blagoevgrad	Varna	Batak
2.	Burgas	Vratza	Belovo
3.	Vidin	Gabrovo	Berkovitsa
4.	Dobrich	Dimitrovgrad	Botevgrad
5.	Pazardjik	Isperih	Bratsigovo
6.	Pleven	Kardjali	Breznik
7.	Plovdiv	Kjustendil	Velingrad
8.	Razgrad	Lovech	Dupnitsa
9.	Smolyan	Montana	Kresna
10.	Sofia-district	Pernik	Kovachevtsi
11.	Stara Zagora	Russe	Kubrat
12.	Haskovo	Silistra	Panagyurishte
13.	Yambol	Sliven	Petrich
14.		Targovishte	Peshtera
15.		Shumen	Rakitovo
16.		Veliko Tarnovo	Sandanski
17.			Svishtov
18.			Sevlievo
19.			Sofia-city – concession
20.			Strelcha
21.			Troyan

Source:MoRDPW

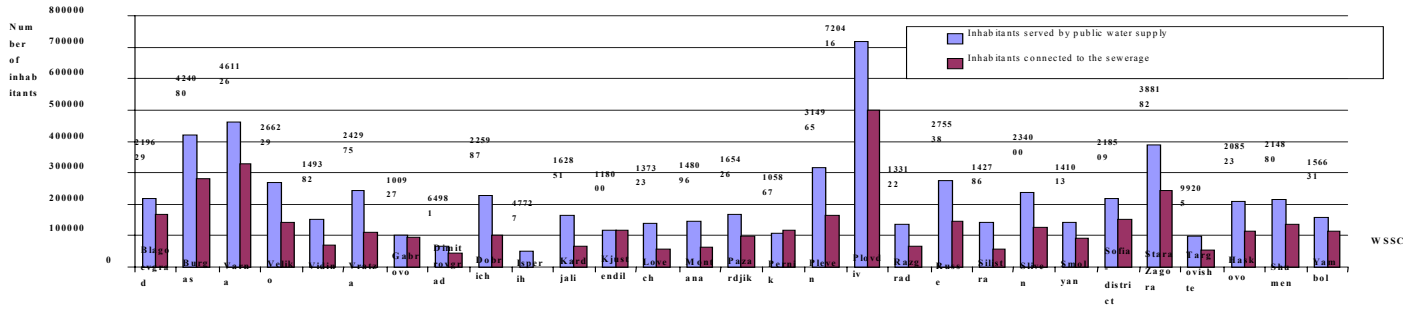


Figure 3. Inhabitants Served by Water Supply & Sewerage Companies with State Share

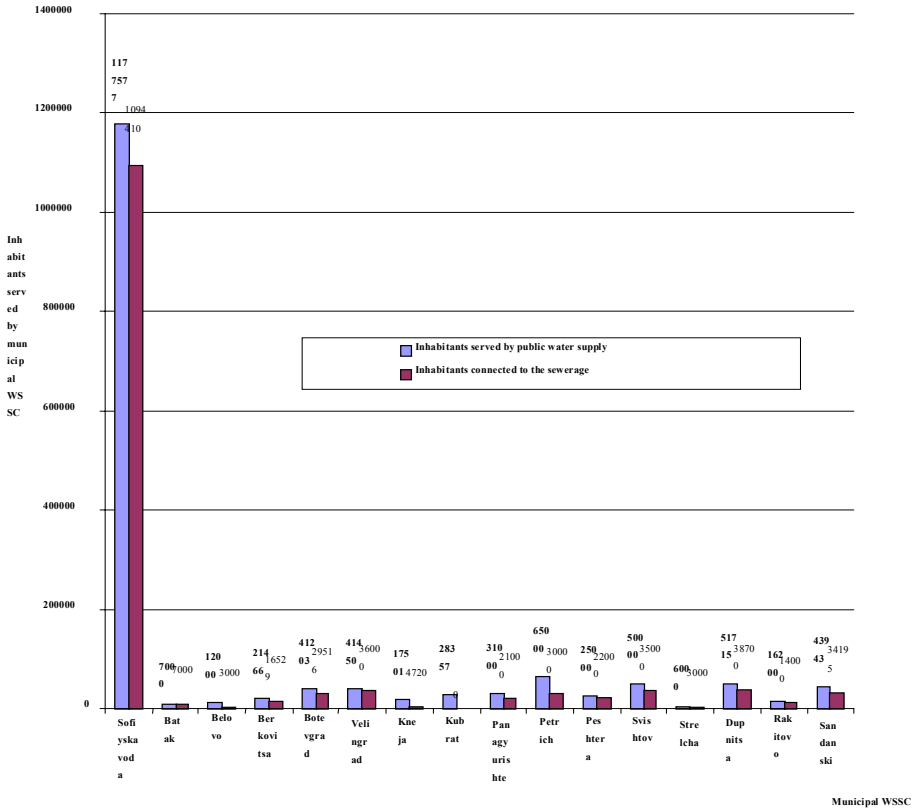


Figure 4. Inhabitants Served by Municipal Water Supply& Sewerage Companies

In a singular example of privatization, in 1999 the foreign firm "International Water" signed a 25 year concession for the water supply and sewerage services with the municipality of Sofia. In 2000 "International Water" and the municipality of Sofia registered a joint stock company, Sofiyska Voda AD, for water supply and sewerage management.

2.1.3. Conditions of Service

The regional WSSCs are responsible for producing and distributing drinking water and receiving and treatment of wastewater for all their private and public customers. Conditions of services provided by WSSCs are specified and defined in the 1999 Water Act and its implementing Regulations. All consumers shall be supplied with a minimum water pressure 2 bars in the towns and villages, measured at customers` connection at the time of maximum daily and hourly peak demand. In the areas with multi-dwelling houses, the minimum pressure shall not be less than 3.4 bars and maximum water pressure shall not exceed 6 bars.

The WSSCs are responsible for maintaining the distribution network and provide connections at the request from customers. Also, WSSCs are responsible to ensure inspection, repair, and/or replacement of consumer meters. The proper functioning of water meters is ensured by establishing an action program. As a result there is a very high percentage of connections to the drinking water supply network (98%) and the very high percentage of customers connected to the network with meters (85% to 90%). There is no "connection" charge. But the cost of monitoring a connection's conditions is recovered by each WSSC (MoRDPW, 2004). The municipal street cleaners are responsible for maintaining the municipality's storm sewers, but the WSSC is responsible for maintaining and cleaning the link between the storm sewer and street's wastewater sewer.

When the user hinders the checking of the water meter the water tariff is based on the continuously water consumption with water velocity 1.5 m/s (MoRDPW, 2004). In the rare cases when there is not

possibility to install a water meter the water consumption is calculated on the basis if the number of persons served by the connection. Here are some other "rules of thumb" for calculating monthly water quantity (MoRDPW, 2004):

- 6 m^3 water consumed per person in heated flat and 5 m^3 for an unheated flat;
- 0.15 m^3 water per m^2 cultivated area;
- 0.1 m^3 per m^3 of offices, tourist house, villa etc.;
- 0.5 m^3 per m^3 of buildings during construction.

In drought periods the WSSC informs the regional administration that it is putting into operation water restrictions to limit the quantity of the water consumed.

There are three tariff components: water supply, sewerage, and water treatment services. There usually are two rate schedules in regard to these tariffs: one for households and one for non-household customers. The WSSC has to announce a new water tariff in a popular newspaper for a three days period (MoRDPW, 2004).

The standards of water services are similar across Bulgaria, with little, if any, variation locally or regionally. These standards do not vary with a customers' ability to pay for service.

WSSCs are supposed to try to keep the required service levels and quality in order to comply with the regulations. WSSCs are also supposed to establish tariffs for given time periods to reflect efficient levels of operation, all with due regard to the affordability of the tariff.

Customers should receive a bill based on the metered consumption every month. If there is not regular access to the meters during the year, for example in a villa area, the billing cycle may be longer but should not be longer than a year.[2]

In multi-apartment buildings the meter reading is done one a month, and the payment is made on the basis of the reported figures. The difference between the amounts registered on the main (block) water meter and the sum of the individual apartment's meters is the value of water loss in the block of flats. To recover all costs, this is divided among the apartments in proportion to the number of inhabitants of the apartment and added to the amount of water registered on the meter.

For the purpose of reducing the amount of non-revenue water (NRW) produced by the WSSC, all WSSCs have to establish teams to investigate the reasons for water losses. NRW arose due to physical and administrative conditions including: illegal connections, bursts, non-metered water quantities, and lack of pressure reduction valves in the lower zones. [3]

There are also investigations into the water loss per km of water supply pipe above a certain diameter (Dimitrov, Trichkov, 2001).

According to the 1999 Water Act the control of water sector is made by different ministries, basin directorates and municipalities. The main assignments are as follows:

The mayor of the municipality shall control: the construction, maintenance and the proper operation of the sewerage networks and of the installations for treatment of household wastewaters; the construction, maintenance and operation of the water systems; the construction and the registration of the wells for individual water use from the ground waters on the territory of the municipality.

The Minister of Health shall control: the quality of the water, designated for drinking-communal needs; the quality of the mineral water, designated for drinking or used for prophylactic, healing and hygienic purposes, including the bottled mineral waters in the retail trade network; the quality of the water, designated for bathing.

The Minister of Regional Development and Public Works, the Minister of the Agriculture and Forests, and the Minister of Power Engineering and Energy Resources shall control the state of the water bodies, the water systems and installations in the scope of their competence.

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[2] Villas are, in this case, usually temporary summer residences in a country setting.

[3] The definition for non-revenue water percentage is: (total volume distributed water-total volume billed water)/total volume distributed water x 100 (%) per annum, or semi-annual period.

The total water loss percentage is defined as: (total volume of water loss during transport/ Total volume of produced water in distribution system) x100 (%) per annum (NSI, 2004).

The Minister of Environment and Water issues: methodologies for control of the water resources; preparation of the water balances of the water sources and the National Water Balance; distribution of the waters from the dams and for use of the water resources; determining of the operational resources of the ground waters.

The Ministry of Environment and Water shall control: the quantity and the emission status of the waters; the observance of the requirements of the permit for water use when it is issued by the MoEW; the observance of the conditions under the concession contracts for waters, which are exclusive state property; the design parameters of the water installations and systems, elements of which are the complex and important dams, the condition of their control and measuring devices, the condition of the networks for quantitative and qualitative characteristics of the waters; the observation of the prescribed regime for use of the waters of the complex and important dams.

The Director of the Basin Directorate shall: establish the boundaries of the waters and the water systems which are public state property, together with the technical services cadastre services of the municipalities; organize the preparation of the management plans for the respective basin; issue the permits; realize the activity of the National Water Monitoring System at a basin level; keep and maintain the water and water infrastructure cadastre and the registers of the issued permits; collect the fees for the permits which he issues; control the observation of the conditions and the requirements of the issued permits and of the conditions of the granted concessions; carry out supervision over the control and measurement devices of the hydro-technical installations and the systems for monitoring of their safety; carry out supervision over the state of the water systems and installations, issue prescriptions and controls their observation; manage the waters which are exclusive state property and were not granted as concession; manage the installations for ground waters, which are public state property.

The Basin Directorates shall control: the condition and the flow capacity of the river beds and of the discharging installations into the water recipients; the condition and the proper operation of:

a) the water intake installations, the installations for use of the surface and the ground waters and the facilities for measuring the water quantities;
b) the treatment installations for wastewaters;
c) the sewerage systems;
d) the network for own monitoring of the waters;
e) the control and measuring devices of the hydro-technical installations, the tailings ponds, the slag ponds, the solid waste deposits and the systems for control of their safety;
f) the implementation of the requirements of the issued permits;
g) the emission status of the waters in the water bodies;
h) the maintenance of the minimum admissible run-off in the rivers;
i) the pollution of the water recipients and the ground waters during emergency situations and volley discharges; and
j) the wastewater treatment plants.

The Minister of Defense shall control the preparation of the emergency plans and the implementation of their requirements.

2.1.4. Reporting Requirements

All State owned MSSCs, joint State/Municipal owned MSSCs, and Sofia City have the capacity to provide regulatory data as, in most cases, the systems are already in place to provide data to the MoRDPW and/or the World Bank. Annually, the regional (national or partly nationally owned) WSSC managers report to the MoRDPW financial data including income, expenditure, cash flow, and calculation of tariffs. Technical reports must be submitted that provide data on water produced, water billed, water losses, wastewater quality, quantity of discharged wastewaters including charges and penalties paid in respective year. There is a special department in the MRDPW dealing with state owned utility companies (not only WSSCs) where these reports are submitting and checked. The State, through MoRDPW, has majority ownership and could impose new reporting requirements on

the MSSCs without resort to legislation. The public access to these annual WSSC reports is very difficult.

The smaller, municipal companies, although making up over 40% of the total number of water companies, only provide services to about 5% of the population served. They are not required to supply the same information to the MoRDPW and therefore do not necessarily have in place the systems of data gathering to provide this information.

Some data are available in a special publication "Environment", printed by National Statistical Institute. The 2002 water data were published on January 30, 2004. All managers of WSSCs provide the annual questionnaire of the National Statistical Institute with data on produced and consumed water quantity, water quality, water tariffs etc. Information collected by the National Statistical Institute does not differentiate between expenditure by the public sector, the private sector and specialized producers according to the Eurostat definitions (NACE 90). Nor does it provide enough information on foreign financial sources, for example, if the sources are loans or grants, etc. There is a considerable discrepancy in the data published by the NSI, the Ministry of Environment and Water, regarding foreign donors.

2.1.5. Self-Service of Water and Wastewater

Self service is allowed in accordance with the relevant Acts and Regulations, such as: Water Act, Regulation No. 9 and the Territory Development Act. The self services include wells, septic tanks, and public taps. Most of the industrial plants and/or factory utilize self-water supply, from surface or groundwater sources, but for technological and process purposes only. If the quality meets the requirements for drinking purpose, then the water could be used for that purpose.

Permission by the regional authorities of the Ministry of Health (Regional Hygienic Epidemically Inspectorates) and regional authorities of the MoEW (Regional Inspectorate of Environment and Water) is required in advance of any construction of a water or wastewater service installation.

Independent provision of water and wastewater service is widely used in the villas areas, villages, in the areas with water rationing, and villages without sewerage systems that rely on septic tanks. The water quality of self service systems should meet the standard requirements in accordance with the Regulation No. 9 on the Quality of Water intended for Drinking and Domestic Purposes (SG No. 30/2001 and on the Use of Water Supply and Wastewater Systems, 16.03./2002. Households might use water from their individual wells without any limitation.

Most of the water used by industry is self-supplied – 5,098,693.10^3 m^3 (Table 3.). The lower bound on the quantity of self-supplied water is implied by the data for 2000, a drought year in Bulgaria. There are no limitations on water quality when used for industrial process purposes, but there may be quantity limits (see below).

Table 3. Water Used from Self-Supply, 1000 m^3

No.	Water used	1998	1999	2000	2001	2002
1.	Total	6,316,688	5,169,618	3,999,534	4,282,911	5,119,585
1.1.	Agriculture, hunting and forestry (incl. fishing)	28,033	22,588	18,722	10,332	8,176
1.2.	Industry	6,269,079	5,125,240	3,963,853	4,257,629	5,098,693
1.3.	Domestic sector (other activities)	19576	21,790	16,959	14,951	12,716

Source: NSI, 2004.

According to the Art. 43. (2) of the 1999 Water Act the owner or the user of an immovable property has the right to gratuitous water use of the surface or groundwater or under the property in quantity not

more than 10 m^3 per 24 hours. Apart from these cases, for the individual use of waters the user should pay a water systems fees determined by the Council of Ministers. No fee is paid for water use for anti-fire needs as well as for water use from surface waters out off the own property for irrigation of individual farms with area up to 2 dka (0.2 ha) in quantity not bigger than 300 m^3 monthly (Art. 194. (2)). For industrial factories and plants there is a "water fee" for withdrawal quantity. The permission is given from the MoEW in accordance with the technological needs of the user.

2.2. Management Units

Since 1989 much reorganization of the water supply and sewerage system has been undertaken:

- 1989 : the "Vodokanalproject" was changed by "Vodokanalinvest" (responsible for investment functions) and "Vodokanalengineering" (for water supply and sewerage design). In this year the right of municipalities to establish municipal firms for water supply and sewerage was approved by the Council of the Ministers;
- 1991 : the Council of the Ministers stopped the establishment of municipal firms for water supply and sewerage but "grandfathered" the existing municipal WSSCs;
- 1995: there were 29 state regional and 14 municipal WSSCs;
- 1995 : according to the signed Water Loan with World Bank the state should transfer 49% of their shares to the municipalities that received investment financing based on the loan;
- 1995 – 1999 : 22 companies involved in the Water Loan of World Bank were scheduled for transfer from state companies to state-municipal companies with 51% state shares and 49% municipal shares. The allocation of the shares among municipalities was done according to population. The first stage finished with establishment of 16 state-municipal companies. The aim of this transition period is the penetration of the municipalities into the water management sector and all management responsibilities to be taken by the municipalities before transferring of other 51% state shares to them in the near future;
- 1999 : the foreign firm International Water signed a 25-year concession for water supply and sewerage services with the municipality of Sofia capital;
- 2000 : International Water and the municipality of Sofia registered the joint stock company "Sofiyska Voda AD" for water supply and sewerage management in the city of Sofia;
- 2000-2001 : the Council of Ministers stopped the transfer of the water shares from the state to the municipalities. The water management of three regional water supply and sewerage companies in the towns of Veliko Tarnovo, Burgas and Sliven was transferred to private companies and water associations;
- 2003 : the 2003 Amendment and Addendum to the Water Act suspended the contracts of Veliko Tarnovo, Burgas and Sliven WSSCs because their activities had been nontransparent and deemed contrary to the interests of consumers, the state and the municipalities. This unfavorable privatization, made by former directors of these three WSSCs, showed the need for a transparent privatization process.

The MoRDPW is responsible for the State owned WSSCs and acts as a majority shareholder in the jointly owned WSSCs. It is the general beneficiary of international projects, funded by EU, WB etc. and its main functions, according to the legislation, include: preparation and realization of the State policy and conduct of State property in water supply & sewerage companies, overseeing the activities of WSSCs and appointment of managers of state owned WSSCs, and assignment of concession contracts.

The executive bodies in the MoRDPW are: the Trade Enterprises Directorate (where the managers submit their reports) and Water Supply and Sewerage Department.

Finally, the MoRDPW oversees investment planning and implementation, as well as provision of water and sanitation services. Under its umbrella are all 29 WSSCs, where the managers submit the annual and semi-annual accounts and incomes and expenditure sheets and the balance of the entities. Also here, the managers are obligated to announce and defend the new tariff proposals for the WSSC.

The new tariffs need to be supported by calculations. Beginning in January 2005 a new water tariff methodology is expected to be established by the new regulatory body, EWSRC.

The 16 Ltd WSSCs are directed by Boards of Directors, and the managers are appointed by these Boards. The Minister of Regional Development and Public Works directly appoints the managers in the 13-SPLtd WSSCs. Besides appointing a manager, the Board of Directors of the Ltds has the power to appoint a controller, the owner's (minister's) representative, and an expert-accountant.

Through management contracts, the Boards of Directors and MoRDPW give a wide managerial freedom to the 29 regional WSSCs` managers. The WSSC managers can define the internal structure of their Companies, technical management, marketing and business development policy and financial management (up to a certain delegated limit). These contracts define the obligations of the managers vis a vis the MoRDPW: elaboration of a strategic development program, preparation of a program for technical upgrading, with a secure financing plan, financial reporting, profit and profitability increases.

It is important to observe that in the management contracts there is a clause that sets manager remuneration as a function of the reduction of water leakages in the service area of the WSSCs. This is in accordance with their business plans and the World Bank requirements for the Sub-Loan Agreement. If the managers don't succeed in implementing and/or completing the water leakages reduction program, they will receive less salary. Such a provision also applies to the salaries of other management staff.

For the whole-owned municipal WSSCs the managers are appointed by the Municipal Councils and approved by the mayors. As noted above, they are not required to submit the annual/ semi-annual reports to the ministry.

The manager is directly responsible for the financial-economic status of the entity; its prospective running; the profit and profit abilities, receivables, or paying duties, personal salaries, the running and future investments and construction and reconstructing policy, and so on. According to the manager's order, the senior staff may organize and provide bids and conclude contracts for fulfillment of works, supply of goods, consultant services, while properly observing the laws. The implemented project should be technically feasible, financially affordable and economically viable. In addition to effective leakage management, strategic planning and operational control of the water supply and distribution network are used to measure the skills of management and staff of the WSSC.

The Administrative Units of WSSCs are: managers, senior engineers, chief accountant, departments' chiefs, cashier, and as well as the chiefs of the regions (situated on the municipal territories, served by that WSSC). All staff is appointed by the manager himself, in accordance with the Labor Code in Bulgaria.

The World Bank Loan and WSSC Reorganization

In 1995 Bulgarian Government signed a Loan Agreement with the World Bank for USD 45 million The Bulgarian public contributions was 30% (15% by the MoRDPW and 15% by the participated WSSCs). The total amount of the investment pool was therefore USD 60 million. 21 WSSCs signed sub-loans with the MoRDPW. The first condition for the loans was that they be restructured from 100% state-owned to 51% state owned and 49% municipal own WSSCs. Municipal ownership was to be in proportion to the population served by the WSSC in each municipality. That is why 16 regional WSSCs were restructured as Ltds, in accordance with the Trade Law.

The permission for this restructuring was given by the Council of Ministers. The WB Project was successfully closed at the end of April 2003. The Implementation Competition Report (ICR) to the WB Directors was completed.

In most of the cases the WSSCs are parts of physically integrated systems, encompassing all the municipalities in the service area. The Operating Units within the MSSC are organized around specific activities, such as: pumping stations (PS), distribution network, sewerage, WWTP, PWTP, incasso system, NRW reduction program, illegal connections, water-meter reading, workshops (for calibration and test of water meters, mechanical, electrical), elimination of bursts, public services, replacement of depreciated pipes, water meters assembly and so on.

In accordance with the last amendment of the 1999 Water Act all government assets of the water distribution and wastewater collection infrastructure with the exceptions of those that serve the territory of more than one municipality will be municipal property. The state retains the right to most of the water bodies and water supply and water and flood control infrastructure (1999 Water Act, esp. Ch. 2).

At the conclusion of a concession contract for waters, water systems, water infrastructure and facilities - municipal ownership, the municipal council determines:

1. the places for common use of waters and water bodies;
2. the existing rights for use of the waters in the water reservoir.

2.3. Service Users

2.3.1. Classification of Users

The classification of water users varies from institution to institution. According to the National Statistical Institute, the classification is as follows as:

- agriculture (incl. irrigation), hunting, forestry (incl. fishing);
- industry (mining and quarrying; manufacturing industry- food processing industry, textiles, paper and paper production, chemicals, refined petroleum, basic metals, transport equipment; electricity, gas, steam and hot water supply incl. cooling, construction);
- domestic sector (households, other activities).

The Ministry of Regional Development and Public Works, classifies service users as:

- households;
- budgetary organizations,
- public sector.

According to the draft Act for Regulation of Water Supply and Sewerage Services, the users are:

- all legal and physical persons which are owners of property or flats supplied with water;
- enterprises, using the water from the public water supply network;
- enterprises which treat the water and use their own water supply system to distribute not drinkable water.

All special legal considerations by user are described in Regulation No9/ / 16.03.2002, Territory Development Act (SG1/2001and amendments: No41 and 111/ 2001; No 43/2002; No20/2003 and the last one No65/2003) and 1999 Water Act (SG No067/1999, in force since 28.01.2000, as amended in 2000 and the last in 2003).

During the drought periods the drinking water supply used for households has preference when water is rationed. There are some water quantity limits for industry supplied by a public water supply system during a drought period. This is one of the reasons for construction of wells by industry and agriculture farms; it reduces dependence on the less reliable supply of the WSSC.

2.4. Regulatory Units

2.4.1. Environmental Regulation

According to Art. 116. of the 1999 Water Act, all waters and water bodies are preserved from depletion, pollution, and damage with objective of maintaining the quantity and quality of waters necessary for a healthy environment, preservation of the ecosystems, preservation of the landscape,

and prevention of economic damages. The waters and the water bodies are preserved from pollution and damage through:

- prohibition of discharge of dangerous substances in quantities threatening the life and the health of people and biological diversity of water bodies;
- restriction the discharge of harmful substances;
- determining sanitary – protection zones around the water sources and the facilities for drinking and household water supply and around the sources of mineral waters;
- construction of water treatment stations for wastewaters;
- establishing of a regime for use and preservation of the flooded strips along the banks;
- regulating prohibitions for depositing wastes and dangerous substances at places where could happen pollution of waters;
- determining measures for not admitting artificial mixing of ground waters with different qualities.

For these purposes the programs for categorization of surface and ground waters, and programs for decrease of the pollution of the waters have been developed. The persons who produce wastewaters are obliged to construct the necessary treatment facilities in accordance with the requirements for discharge into the water body when there is no public sewerage system. The discharge of wastewater, containing hazardous substances into the ground waters is forbidden or restricted depending on the degree of danger that they create. The storage of pesticides; the depositing and treatment of wastes; the construction of cattle-breeding farms; the construction of economic and housing buildings; the washing and maintenance of transport vehicles and equipment; and the planting of perennial vegetation with shallow root system is forbidden on river banks and in coastal areas.

The national water management institutions are the Council of Ministers and the Minister of Environment and Water. The water management bodies at a basin level are the Directors of the Basin Directorates.

1. The Council of Ministers:
   - approves the National Water Economic Plan;
   - grants concessions for waters which are exclusive state property;
   - approves national programs in the sphere of protection and sustainable use of waters;
   - permits the use of waters for the purposes of the defense and the security of the country;
   - determines restrictions in the use of waters, in exclusive cases, concerning different districts of the country;
   - determines the quantity of mineral waters, used by public health care institutions at a grounded proposal by the Minister of Health; and
   - determines the tariffs for the fees, collected on the grounds pointed out in the 1999 Water Act.

2. The Minister of Environment and Water:
   - elaborates the policy of the state in the field of the use and protection of the waters and the protection from their harmful impact;
   - elaborates the National Water Economic Plan;
   - approves the river basin management plans;
   - develops national programs in the sphere of protection and sustainable use of waters;
   - prepares the water and water economic balances of the country;

- issues permits for water use and/or use within the scope of the cases provided for in the present law;
- determines the order and the way for use of the waters of the complex and important dams, determined in appendix No 1 of the 1999 Water Act;
- establishes the necessary organization, ensure the financing and make proposal for granting of concessions;
- organizes the maintenance of the water and water economic cadastre;
- organizes and manages the National Water Monitoring System;
- elaborates the state policy for bilateral and multilateral cooperation in the field of use and protection of waters;
- publishes a periodical bulletin about the status of the water resources of the Republic of Bulgaria;
- approves the design parameters and schemes for the water infrastructure and installations;
- coordinates the starting of procedures for granting of concessions for water infrastructure and installations, which are public state property; and
- approves the exploitation resources and the project obtaining of the ground waters, including the mineral waters.

2.4.2. Economic Regulation

The financial organization and economic regulation for the use, protection and restoration of the waters and water infrastructure is guided by the 1999 Water Act in Art 192 is as follows:

1. such organizations and regulations should be devoted to protection of the interests of the population in their use of water for drinking-communal purposes and mineral waters for drinking, healing - prophylactic and recreation purposes;
2. payment for water and wastewater service depending on the volume, the quantity and the quality of the used and discharged waters;
3. the offender pays for the incurred damages, disruptions, pollution and other to the waters and the water bodies;
4. economic incentives for rational use, protection and restoration of the waters and water bodies.

The implementation of this guidance is changing, however, as new legislation directed at the regulations of water and water management is, as was noted above, being developed.

The elements of economic regulation include:

- a new organization of WSSCs
- a new Energy and Water State Regulatory Commission. Its aims are to offer new measures for water sector development and restructuring in order to guarantee effectiveness of all kind of services in the field of water supply continuity of services and the services quality;
- economic instruments (tariffs, fines, charges, etc) ;
- economic analysis;
- water tariffs set up, using profitability (12% or to 30%);
- methodology for cost recovery tariffs and possibilities for capital investments to be included;
- annual adjustment of tariffs, which will be done by EWSRC;
- institutional strengthening and capacity building program in the WSSCs;
- investment planning and realization of the year program;

- NRW reduction program;
- renewing the assets.

Water and Wastewater Tariffs

Until 1991, the same water tariff applied for the domestic sector of all country. Before 1991 the tariff of drinking water for industry via public water supply system was 2-3 times higher than households' drinking water. Now, each WSSC defines the water tariff according to the methodology adopted with Decree No. 194/1995 issued by the Council of Ministers and promulgated in the SG No. 40/10.05.1996, amend. SG No. 60/ 02.07.1999. This methodology not refers to geothermal waters used for heating and greenhouses, for the water used for heating and for the water used for irrigation. There are other institutions' methodologies for calculation of these types of water supply.

The water tariff setting for different types (i.e. pure, sewage and treated) is based on the rules of: 1999 Water Act, Act for Protection of Users and for Trade Rights (Ordinance No. 85/1999 of the Bulgarian President), Accountant Act, National Accountant Standards, and Regulation for Water Supply & Sewerage Systems Use in Populated Sites. The water tariffs are meant to cover their operational expenses, depreciation, and a certain "profit".[4] The drinking water "profit" shall not exceed 12% for the population and for the business needs and shall not exceed 30% in the cases when it has been proven that funds are needed for financing an investment program for rehabilitation of the water or wastewater distribution network and facilities. The water tariff is set on the basis of 1 m^3 the three classes of billed water: water supplied, wastewater collected, and wastewater treated.

WSSCs and municipal councils set tariffs for drinking water and wastewater services. The tariffs are lower for households and cross-subsidized by other consumers. Currently, the drinking water supply tariffs vary substantially with the technology of water extraction and delivery – pumps, gravity or mixed systems and on the associated electricity and other costs incurred by the operator. The wastewater tariff is calculated on the same basis as the water supply tariff. Usually, the operator splits its wastewater charge into two parts: for taking the water away to the main city collector and the charge for wastewater treatment (if the WWTP is installed). The WSSC includes into the wastewater tariff the costs of any effluent charge. The WSSCs make individual contracts with the local factory's administration and the quantity and quality of wastewaters impact on the costs of wastewater service.

Twenty days after the end of each annual quarter the WSSCs send their report of actual expenditures for the water services to the MoRDPW. The items that go into the calculation of the experience-based final tariff are shown in Table 4.

[4] The term profit is put in quotations here because it is very doubtful that these rules are guided by the concept of economic profit. The concept of "profit" here is more likely some net-revenue concept but without a clear understanding of prevailing accounting rules we can't say more precisely what this net revenue represents despite the elaboration of some accounting elements below.

Table 4. Calculation of Water Tariff According to the Adopted Methodology

No.	Item	Report for the current year	Proposal for the next year	% of increase
1.	Expenditures, thousands BGN of which for:			
1.1.	Materials (right for withdrawal water, buying of water, raw materials and materials for production, spare parts of long-term assets)			
1.2.	Electricity and fuels			
1.3.	Outside services incl. repairs			
1.4.	Depreciation (depreciation of physical and non physical long-term assets according to the Accountant Act and to the Guideline for applying of Decree No. 56 for business activity)			
1.5.	Salaries			
1.6.	Social insurances			
1.7.	Others (business trips, capacity building courses, exhibitions and fairs participations etc.)			
1.8.	Subsidiary activity (workshop for repairs, water meters workshop, water quality laboratories, protection of sanitary zones around water withdrawal sources etc.)			
1.9.	Organization and management			
1.10.	Incasso (collection of the water bills)			
1.11.	Payment of loans interests and insurances			
2.	Water consumed, thousands m^3			
3.	Total expenditures for production and realization (cost), BGN/m^3			
4.	Profit, %			
5.	Water tariff, BGN/m^3			

Source: 1999 water tariff methodology

Present tariffs levels are inadequate to cover the full cost of service provision, including maintenance and capital costs e.g. the Art. 193 (1) of the 1999 Water Act "the tariff of water supply, collection and treatment services includes coverage of expenditures for construction, operation, maintenance and reconstruction of the installations and the systems, necessary for the provision of the respective services" doesn't work. This is a main reason for economic and regulatory overhaul of the water services sector that is currently underway.

Water Fees

The fee for the right of use of water and water body, named "water fee", was adopted in 2000 and implemented in 2001. The user of water and water body shall pay a fee for the use of the natural resource. Access to water in exchange for the fee is guaranteed whether for both natural and legal persons. A differentiation of fees with respect to the purposes for which the water or water body is used. The possible fee categories for water use are: for drinking and household needs; for irrigation; for cooling; for recreation and water sports; for industrial needs, for the production of electric power by a hydroelectric power plant; for other needs. The fees for the use of mineral water are classified separately, as follows: for medical treatment, rehabilitation, prophylactics and for drinking; for sports, recreation, household and hygiene necessities.

Possible fee categories for water bodies are: for recreation and water sports; for fish-breeding, production and reproduction of aquacultures and other biological recourses (duckweed, shell organisms etc.); for the production of sand, ballast and other activities disturbing the regime of the water body.

A specific "water fee" may be determined for each of the purposes in levs (BGN) per cubic meter of consumed water or in levs (BGN) per square meter of the area of the used water system. There may also be a correction coefficient. The correction coefficient indicates the category of the water in the water body, the correspondence between the category and the purpose for which the water body is used, and the suitability of the water for reuse. The coefficient is "penal" when water of a "higher" category is used for a "lower category" purpose. The correction coefficient provides an economic incentive to use water of lower quality for purposes that need water of higher quality.

The administering of the water use fees is connected to the license regime stipulated by the 1999 Water Act. Permit for use is required in all cases except when water is used not more than 10 m^3 per 24 hours for own needs. All information necessary for the calculation of the fee is contained within the license for water use and use of a water body.

Before 2002 the holders of licenses transferred the fees to a special account of the National Environmental Protection Fund (NEPF) – Ministry of Environment and Water.

The Enterprise for Management of Environmental Protection Activities

The Enterprise for Management of Environmental Protection Activities (EMEPA) is proposed as the full successor to the NEPF. EMEPA is a legal and state-owned entity. It is not a commercial venture; it is a not-profit organization and does not pay out dividends. EMEPA collects:

- the fees for water use and/or use of the water bodies;
- the fees for issuing of permits under the 1999 Water Act;
- the fees for services; the receipts from the repayment of expenditures;
- the fines, imposed for violating the provisions of the present act; funds, provided under international agreements and programs;
- donations by local and foreign individuals and corporate bodies;
- receipts from interest;
- indemnifications, received by individuals and corporate bodies for damages caused by them; and
- other receivables on the basis of a normative act.

The collected funds have to be spent by EMEPA for:

- the construction, maintenance and operation of the National Water Monitoring System;
- the elaboration and the updating of the National Water Economic Plan and of the river basin management plans;
- the activities for control over the waters, water bodies, water infrastructure and installations;

- studies and applied scientific investigations according to themes within the scope of the effect of the 1999 Water Act;
- direct financing or co-financing of capital costs for acquiring of material long-term assets and for non tangible long term assets and for major repair, related to activities and measures within the scope of the effect of the 1999 Water Act;
- direct financing or co-financing of activities or measures within the scope of the effect of the 1999 Water Act, which are not capital costs;
- construction of installations for improving the drinking-communal water supply to the population, for collection and treatment of the communal wastewaters;
- payment for services of scientific and technical character, expert statements and assessments, assigned by the competent bodies;
- supporting of the operational costs of the Basin Directorates, as well as the costs, related to the material-technical ensuring and the current activities of the Basin Councils.

Effluent Charges

The effluent charges are set by the Regional Inspectorates of Environment and Water at the MoEW on wastewater discharged into the river body. The effluent charges apply when the water quality is over the permissible degree of pollution of Categories I, II and III of surface flowing waters. The fines depend on the exceedance of concentration limits, wastewater quantity and duration of pollution.

An amendment to the Environment Protection Act in September 2002 stimulates the protection activities of commercial and legal persons. There is a 10% effluent charge reduction after implementation of protection measures in accord with the MoEW investment programs.

3. Production Quantity and Quality

Water quality monitoring is done by the National Ecological Monitoring System at the Ministry of Environment and Water (253 monitoring stations for surface water and 203 monitoring stations for groundwater). The main groundwater pollutants are: nitrates, sulphates, chlorides, iron, manganese and some heavy metals. Generally, the industrial restructuring has improved the quality of surface waters and surface water quality problems are mainly confined to drought periods (Raev et al., 2003).

3.1. Water Production, Distribution and Consumption

16% of the fresh water abstracted was used for public water supply in 2002 (Table 5.). 65% of the public water supply is produced by pumps (groundwater abstraction).

Table 5. Fresh Water Abstraction by Source, thousand m^3

No.	Fresh water abstraction	1998	1999	2000	2001	2002
1.	Total fresh water abstraction:	7,905,216	6,818,096	6,132,242	5,832,947	6,588,684
1.1.	by fresh surface water	7,112,105	6,232,965	5,558,249	5,307,572	6,095,939
1.2.	by fresh groundwater	793,111	585,131	573,993	525,375	492,745
2.	Public water system abstraction:	1,186,349	1,204,136	1,177,971	1,075,444	1,057,107
2.1.	by fresh surface water	609,320	794,065	768,025	695,603	691,822
2.2.	by fresh groundwater	577,029	410,071	409,946	379,841	365,285

Source: NSI, 2004

392,700 thousand m^3 of water was consumed by customers from the public distribution network in 2002 from 10,200 different water sources (Figure 5). The water distribution loss is about 68% (Table 6.).

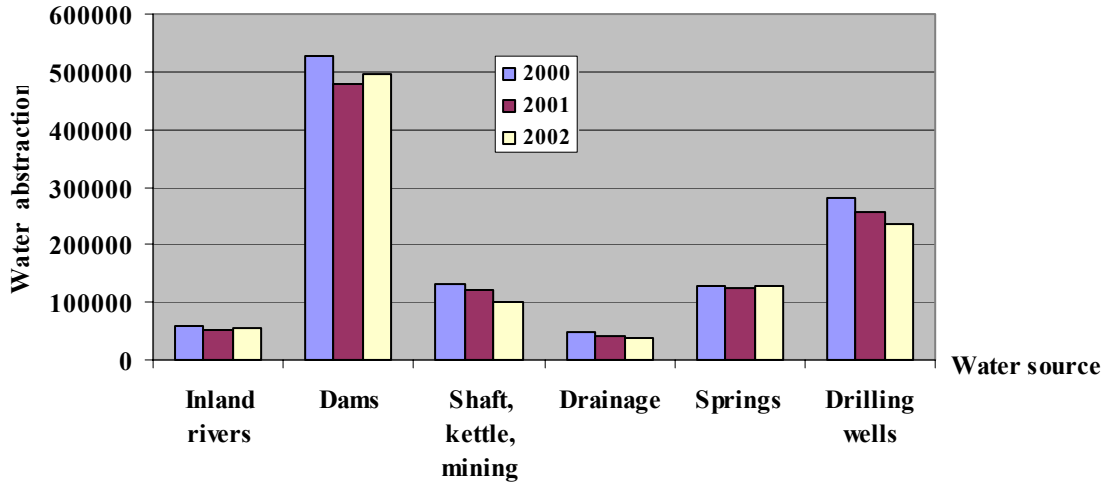

Figure 5. **Water Abstraction (1000 m^3/year) for Public Water Supply by Surface and Groundwater Sources in Bulgaria.**

Table 6. Public Water Supply in Bulgaria, 1000 m^3/year

No.	Water / year	2000	2001	2002
1.	Total water abstraction for public water supply	1,177,971	1,075,444	1,057,107
2.	Water in distribution network	1,118,543	1,028,210	1,009,651
3.	Water consumed	468,000	424,114	392,700
	of which: was drinking water quality	446,183	407,949	376,864
3.1.	For households	294,053	273,042	255,411
	of which : was drinking water quality	293,952	273,042	255,411
3.2.	For industry	83,990	69,982	70,183
	of which : was drinking water quality	62,569	55,900	54,496
3.3.	For agriculture	1,819	1,656	1,786
	of which : was drinking water quality	1,699	1,541	1,684
3.4.	For other consumers	88,138	79,434	65,320
	of which : was drinking water quality	87963	77466	65273
4.	Total water loss during transport	731508	668112	684715
5.	Water treatment before using:			
5.1.	By disinfection	674,009	628,909	611,664
5.2.	By mechanical treatment and disinfection	13,841	10,817	9,900
5.3.	By drinking water treatment plants	487,322	437,654	436,736

Source: NSI, 2004

The part of population served by public water supply works is 98.8 %, lived in 5031 settlements. The population receiving centrally supplied drinking water in the cities and towns is 100%. The population served in the villages is lower – 83.5%. There isn't any clear definition of a town and village. The part of population served by public drinking water treatment plants is 38.3%. The number of drinking water treatment plants is 42. Table 7. shows the public water supply consumption by different users.

Table 7. Water Used from Public Distribution Network by Supplied Category, 1000 m^3/year

No.	Water use by supply category	1998	1999	2000	2001	2002
1.	Agriculture, hunting and forestry (incl. fishing)	4,889	4,188	1,819	1,656	1,786
2.	Industry	120,721	108,575	83,990	69,982	70,183
3.	Domestic sector, of which:	390,045	371,492	382,191	352,476	320,731
3.1.	Households	301,962	282,788	294,053	273,042	255,411
3.2.	Other activities	88,083	88,704	88,138	79,434	65,320
4.	Total	515,655	484,255	468,000	424,114	392,700

Source: NSI, 2004

Table 8. Water Consumed by Population per Capita (l/cap/day)

1998	1999	2000	2001	2002
101	95	99	95	90

Source: NSI, 2004

In 2002 the water consumed in some towns is higher than country average value – Kresna 180 l/cap/d; Black Sea towns (Primorsko 193 l/cap/d; Sozopol 154 l/cap/d; Nessebar 153 l/cap/d etc.); Sandanski 139 l/cap/d; Sofia 128 l/cap/d etc (Table 9.).

Table 9. Public Water Supply by Regions and Towns in 2002

Region	Average water consumed, l/cap/d	Maximum water consumed, l/cap/d	Minimum water consumed, l/cap/d	Part of population served by public water supply, %	Part of population on water supply restrictions, %
North - West region	84	120 (Chiprovci)	39 (Yakimovo)	97.8	36.9
North Central region	90	126 (Ivanovo)	61 (Gabrovo)	99.5	6.5
North-East Region	75	107 (Vetrino)	39 (Omurtag)	99.6	13.6
South-East region	88	193 (Primorsko)	46 (Kotel)	99.7	9.9
South Central region	80	126 (Strelcha)	43 (Ardino, Chernoochene)	97.6	16.5
South-West region	111	180 (Kresna)	52 (Petrich)	98.8	10.1
Total	90	193	39	98.8	13.4

Source: NSI, 2004.

The continuity of water supply during the day is one of the most important consumer rights. The part of the Bulgarian population on water restrictions (lack of water quantity) was 13.4% in 2002. This percentage is 100% for the population of the towns of Kneja, Dobrich, Rakitovo, Madan, Nedelino, Zemen and Chavdar. These communities were totally dependent on surface water sources for the public water supply.

3.2. Wastewater Production, Collection and Discharge

The discharged wastewater is shown in Table 10.

Table 10. Discharged Wastewater in 2002

No.	Discharged wastewater	1000 m^3	%
1.	Total discharged wastewater, of which:	746,446	100% total
	- untreated wastewater	229,612	31% of total
	- primary treatment (mechanical stage of treatment)	101,368	13.5% of total
	- secondary treatment (biological stage of treatment)	415,466	55.5% of total
1.1.	Discharged wastewater from economic units*, of which:	182,119	24.4% of total
	- untreated	57,459	31.6% of 1.1.
	- primary treatment	88,905	48.8% of 1.1.
	- secondary treatment	35,755	19.6% of 1.1.
1.2.	Discharged wastewater from public sewerage, of which:	500,697	67.1% of total
	- untreated	108,523	21.7% of 1.2.
	- primary treatment	12,462	2.5% of 1.2.
	- secondary treatment	379,712	75.8% of 1.2.
2.	Discharged wastewater from households not connected to urban wastewater collecting system	63,631	8.5% of total

Source: Estimation on the base of NSI information.

*Economic unit is an enterprise with more than 36000 m^3 water consumed per year.

The part of population served by public sewerage collection systems is 68.4% and by WWTPs is 38.6%. Of the 38.6 percent of the population whose sewerage is treated by WWTPs, 37.7% of them are served by WWTPs that have biological treatment technology. The number of active UWWTPs is 55 for 67 settlements of which 43 plants have biological treatment. The design capacity of UWWTPs with biological treatment is 1893.10^3 m^3/d but the actual utilization is 1056.10^3 m^3/d e.g. the WWTPs work at about 56% of their capacity (Table 11.). The WSSCs have to meet the requirements for discharges as defined in the permit issued by the Ministry of Environment and Water (MoEW).

Table 11. Number of Wastewater Treatment Plants and Part of Served Population

No.	Indices	1998	1999	2000	2001	2002
1.	Active WWTPs, number	51	50	51	55	55
1.1.	Mechanical treatment, number	14	10	10	11	12
1.2.	Biological treatment, number	37	40	41	44	43
2.	Part of population served by wastewater treatment plants,%	36.7	36.9	37	38.2	38.7
2.1.	By WWTP, %	35.9	36.2	36.5	38.1	38.6
2.1.1.	with mechanical treatment, %	0.9	0.7	0.7	0.9	0.9
2.1.2.	with biological treatment, %	35.0	35.5	35.8	37.3	37.7
2.2.	By industrial wastewater treatment plants (IWWTP), %	0.8	0.7	0.5	0.1	0.1
3.	Design capacity of existing WWTPs, 1000 m^3/d	1,886	1,919	1,904	1,933	1,933
4.	Capacity utilization of WWTPs, 1000 m^3/d	1,174	1,158	1,113	1,045	1,079
5.	Number of settlements served by WWTP	59	60	63	67	67

Source: NSI, 2004

Danube River Basin

The Danube watersheds have 22% of the WWTPs, 45.5% of total wastewater collected by public sewerage systems, and 50% of collected wastewater connected to WWTPs (Table 12.).

Table 12. Wastewater (1000 m^3), Connected to Public Sewerage in 2002

No.	Total or by watershed	Number of UWWTP	Wastewater connected to public sewerage	Wastewater connected to UWWTP	Mechanical treatment in UWWTP	Biological treatment in UWWTP	Discharges of treated wastewater
1.	Total for the country	55	502,205	394,626	13,311	380,371	393,118
2.	Danube watersheds	12	228,537	197,412	6771	189,717	196,428
2.1.	Iskur	6	146,805	142,453	1814	139,991	141,805
2.2.	Osum	-	6605	-	-	-	-
2.3.	Yantra	2	19,078	12,983	4090	8893	12,963
2.4.	Rusenski Lom	1	17,839	6751	0	6751	6751
2.5.	Vit	1	22,451	22,410	0	22,410	22,410
2.6.	Ogosta	2	15,759	12,815	867	11,672	1,2499

Source: NSI, 2004

The surface water quality of the Danube tributaries in 2002 is shown in Table 13. On the base of expert estimation the Danube basin nutrient load (N and P) is 7030 t/year. This is 39% of the country's estimated total nutrient load to waters of 18000 t/year (2002).

Table 13. Surface Water Quality in 2002, mg/l

No.	Danube tributaries	BOD_5	COD	SS	NH_4 - N	NO_2-N	NO_3-N	PO_4
1.	Ogosta River							
1.1.	Max value	3.8	4.1	49	0.17	0.060	3.30	1.21
1.2.	Average Value	1.8	2.7	22	0.04	0.025	1.98	0.47
2.	Iskur River							
2.1.	Max value	6.5	15.3	40	2.93	0.140	4.00	1.81
2.2.	Average Value	2.5	5.9	22	0.46	0.047	1.80	1.09
3.	Vit River							
3.1.	Max value	4.7	57.0	30	0.60	0.160	5.94	2.64
3.2.	Average Value	2.9	10.5	21	0.17	0.082	1.54	1.05
4.	Osum River							
4.1.	Max value	5.7	13.3	50	1.56	0.070	2.40	1.16
4.2.	Average Value	2.7	5.3	24	0.20	0.040	1.25	0.54
5.	Yantra River							
5.1.	Max value	6.1	12.3	104	0.37	0.080	2.72	0.69
5.2.	Average Value	3.8	6.7	43	0.09	0.037	1.61	0.40
6.	Rusenski Lom River							
6.1.	Max value	87.8	73.7	2854	1.48	3.580	8.00	1.15
6.2.	Average Value	29.5	22.9	336	0.38	0.575	3.21	0.60

Source: Executive Agency for Environment, www.moew.government.bg

According to the Draft National Program for Some Dangerous Substances the total annual load of dangerous substance emissions in the Danube River Basin is as follows as:

- Zn : 102011 kg discharged to the receiving waters, and 624.9 kg discharged to the sewerage network;
- Cu : 1275.5 kg discharged to the receiving waters and 420.3 kg discharged to the sewerage network;
- Ni : 119.9 kg discharged to the receiving waters and 109.2 kg discharged to the sewerage network;
- Cr : 202.1 kg discharged to the receiving waters and 301.2 kg discharged to the sewerage network;
- Pb : 313.1 kg discharged to the receiving waters and 22.2 kg discharged to the sewerage network;
- As : 8374.8 kg discharged to the receiving waters.

Table 14. Permitted Concentration of Dangerous Substances in the Wastewaters Discharged to the Sewerage Network, mg/l (Regulation No. 7/1986)

Zn	Cu	Pb	Ni	As	Cr^{VI} / Cr^{III}
5.0	1.0	1.0	1.0	0.5	0.5 / 2.5

Table 15. Permitted Concentrations of Dangerous Substances Discharged to the Three Categories of Flowing Surface Waters, mg/l (Regulation No. 7/1986)

Flowing Surface Water Category	Zn	Cu	Pb	Ni	As	Cr^{VI}/Cr^{III}
I	1	0.05	0.02	0.05	0.02	0.02
II	5	0.1	0.05	0.2	0.05	0.05
III	10	0.5	0.2	0.5	0.2	0.1

The last categorization of the surface flowing waters into the three categories has been done by Order 272/23.05.2001 of the Minister of Environment and Water. The existing water quality monitoring is more oriented to mechanical and chemical parameters of water quality. There are many finance and capacity building problems to implement the ecological monitoring of water bodies according to the Annex V of the EU WFD.

4. Economic Data

4.1. Tariffs

The water tariffs of municipal WSSCs are lower than the tariffs of WSSCs with over of 50% state ownership (Table 16.).

Table 16. Water Tariffs of Different WSSCs (31 December)

No.	Indices	1998	1999	2000	2001
1.	Tariff of treated drinking water (without VAT), BGN/m^3				
1.1.	in WSSCs with state participation	0.4	0.54	0.65	0.74
1.2.	in municipal WSSCs, of which:	0.29	0.35	0.43	0.52
1.2.1.	Sofiyska Voda	0.31	0.38	0.4	0.5
2.	Tariff of treated wastewater (without VAT), BGN/m^3				
2.1.	in WSSCs with state participation	0.11	0.13	0.14	0.17
2.2.	in municipal WSSCs, of which:	0.03	0.04	0.05	0.07
2.2.1.	Sofiyska Voda	0.07	0.09	0.09	0.10
3.	Investments, thousand BGN				
3.1.	in WSSCs with state participation	16034	22328	32466	54549
3.2.	in municipal WSSCs, of which:	351	419	793	28147
3.2.1.	Sofiyska Voda	0	0	0	27300

Source: Estimation on the base of MoRDPW information.

The average tariffs for public drinking water by Bulgarian districts in 2002 are between 0.36-1.33 or average BGN 0.68 /m^3 (Euro 0.35/m^3) without VAT (Table 4.1.2). The price of public drinking water for households with VAT is between 0.42-1.61 or average BGN 0.78 /m^3 (in Euro: between 0.21-0.82 or average Euro 0.40 /m^3). The public water supply by surface water (City of Sofia by Iskur dam) is cheaper than pumping groundwater (Razgrad, Dobrich, Haskovo) (Table 17.).

Table 17. Average Tariff of 1 m^3 Drinking Water, Supplied by Public Water Supply in 2002

No.	Price	Industry with VAT, BGN	Industry with VAT, Euro	Households with VAT, BGN	Households with VAT, Euro
1.	Maximum	1.63 (Haskovo) 1.56 (Dobrich) 1.44 (Razgrad)	**0.83 (Haskovo)** **0.8 (Dobrich)** **0.74 (Razgrad)**	1.61 (Razgrad) 1.44 (Dobrich) 1.38 (Haskovo)	**0.82 (Razgrad)** **0.74 (Dobrich)** **0.71 (Haskovo)**
2.	Minimum	0.47 (Sofia cap.)	**0.24 (Sofia cap.)**	0.42 (Sofia cap.)	**0.21 (Sofia cap.)**
3.	Average for country	0.83	**0.42**	0.78	**0.40**

Source: NSI, 2004.

Some drinking and wastewater tariffs in 2003 are shown in Annex 3 (p.71) and Table 18.

Table 18. Tariffs for Drinking Water and for Water of Non-Drinkable Quality (BGN/m^3), Distributed by WSSCs in Bulgaria, (31 December 2003) (without VAT)

No.	Item	Gravity water from Surface Source	Pumping water from a Groundwater Source	Mixed (Surface and Groundwater with Gravity and Pumped Sources)
1.	**Drinking water**			
1.1.	**Households**	0.22 (Kardjali)- 0.95 (Bobov dol)	0.55 (Pazardjik, Blagoevgrad)- 1.47 (Isperih)	0.58 (Montana)- 1.05 (Gabrovo)
1.2.	**Budgetary organizations**	0.22 (Kardjali)- 1.02 (V.Tarnovo)	0.55 (Pazardjik, Blagoevgrad)- 1.47 (Isperih)	0.65 (Pernik, Smolyan)- 0.96 (Montana)
1.3.	**Public sector**	0.22 (Kardjali)- 1.02 (V.Tarnovo)	0.55 (Pazardjik)- 1.60 (Haskovo)	0.65 (Smolyan)- 1.18 (Dimitrovgrad)
2.	**Water with non-drinkable quality**	0.22 (Kardjali)	0.54 (Razgard)	0.60 (Montana)

Source: Estimation on the base of MoRDPW information.

In 2003 the average tariff (without VAT) for wastewater collection for the households was BGN 0.059/m^3 and for the public service users BGN 0.09 /m^3. Tariffs for wastewater collection and treatment in 2003 were:

- households BGN 0.17 (from 0.07 to 0.47) /m^3;
- industry:
    - BGN 0.35 (0.13-0.70) /m^3 for BOD_5 < 200 mg O_2/l;
    - BGN 0.45 (0.22-0.9) /m^3 for BOD_5 from 200 to 600 mg O_2/l;
    - BGN 0.7 (0.3-1.35) /m^3 for BOD_5 > 600 mg O_2/l, and
    - BGN 1.70 /m^3 for BOD_5 > 1000 mg O_2/l.

4.2. Sales

More than 90% of customers have water meters measuring of their water consumption**.** Thus, in principle, the basis for pricing and invoicing based on actual water consumption is in place. However, there are many types of water meters and variations in accuracy and reliability across these types is one of the reasons that the accuracy of water quantity measurements is suspect at the level of both individual accounts and in the aggregate. The amount of sales by WSSCs with state shares is shown in Table 19. and Table 20.

Table 19. Sales by WSSCs for the Period 1998-2001

No.	Indices	1998	1999	2000	2001
12.	**Volume of water billed, 1000 m^3**	420099	389065	367993	326682
13.	**Sales (total WSSC's services billed), 1000 BGN**	19676	28706	45333	55747
13.1.	**of which :water sales**	16298	25573	35510	44438
14.	**Profitability ratio, %**	4.92	5.36	4.45	2.01
15.	**Collection efficiency, %**	89.03 (98.23 V.Tarnovo; 65.2 Stara Zagora)	86.68 (100 Vratza; 63.5 Stara Zagora)	82.9 (98.24 V.Tarnovo; 57.4 Stara Zagora)	79.7 (98 Kyustendil; 42.72 Haskovo)

Source: MoRDPW

Table 20. Water Services Billed by WSSCs with State Ownership Participation in 2002 (1000 BGN)

No.	Item	**2002**
1.	Total water services billed:	72,543
1.1.	households	41,040
1.2.	budget entities	15,851
1.3.	others	15,652

Source: Pleven Case Study

4.3. Costs and Purchased Inputs

Cost of water services differs based upon the source of water produced and type of wastewater treatment facility. The water cost for industry charged by the Pchelina dam in 2000 was 0.110 BGN/m^3 (Euro 0.056/m^3). This comprised 90% of the resulting water tariff (Table 21.).

Table 21. Costs of Water Production for Industry by the Pchelina Dam in 2000

No.	Item	
1.	**Expenditures in BGN for:**	
1.1.	**Depreciation**	25,920.00
1.2.	**Materials**	7,836.00
1.3.	**Fuels**	1,200.00
1.4.	**Electricity**	4,5000.00
1.5.	**Outside services**	12,000.00
1.6.	**Salaries**	14,400.00
1.7.	**Insurances**	8,400.00
1.8.	**Others**	15,000.00
1.9.	**Reconstructions**	94,476.00
1.10.	**Organization**	13,368.00
2.	**Cost, BGN**	237,600.00
3.	**Invoiced water volume, m^3**	2,160,000.00
4.	**Cost per m^3, BGN/m^3**	0.110
5.	**Water tariff, BGN/m^3**	0.122

Source: WSSC of Pernik town

Generally, the estimations are based on the cost data for the invoiced water volumes in a calendar year and the projected expenses and revenues for the next year. The O&M cost appears to be very low (Halcrow, 2002).

In addition to production costs the WSSC must pay: withdrawal fee and effluent charge. The withdrawal fee (named "water fee") depends on the method of abstraction, specifically groundwater, dams, surface water (Table 22.).

$T = E \times W \times K$

where:

T- annual fee, BGN;

E – fee in BGN for 1 m^3, according to the usage;

W – the annual volume of withdrawal water, m^3;

K – correction coefficient, according to the category of surface flowing waters.

Table 22. Withdrawal Fee

No.	Type of usage	E, BGN/m^3	K for I Category	K for II Category	K for III Category
1.	**Drinking water**	0.02	1	0.5	0.3
2.	**Irrigation**				
2.1.	**surface waters**	0.001	5	1.5	1
2.2.	**groundwater**	0.005	5	1.5	1
3.	**Waters for cooling**	0.0001	4	2	1
4.	**For recreation and sports**	0.4	1	0.5	0.3
5.	**Industry**	0.008	5	1.5	1
6.	**Others**	0.01	5	3	2

Source: Regulation No. 154/28.07.2000 in State Gazette No. 65/2000. The categorization of the surface flowing waters is done by Regulation No. 7/ 1986 (State Gazette No. 96/1986).

Every user is required to have a permit from the MoEW for withdrawing for different uses.

As noted in Chapter 2 (2. Legal and Institutional Setting), the effluent charges are triggered by effluent levels in excess of permitted levels for at least one pollutant. According to the regulation for determination of fines for exceeding the effluent limits (SG No. 69/05.08.2003), the fine for 1 kg pollutant in BGN/Euro is shown in Table 23.

Table 23. Fine for 1 kg Pollutant in Excess of Permitted Level

No.	Pollutant	BGN	Euro
1.	**BOD_5, COD**	0.45	0.23
2.	**NH_3-N**	1.50	0.77
3.	**NO_3-N**	0.15	0.08
4.	**NO_2-N**	34	17.4
5.	**Total nitrogen**	0.5	0.26
6.	**PO_4**	1.40	0.72
7.	**H_2S**	20	10.2
8.	**Suspended solids**	0.15	0.08
9.	**Hydrocarbons**	52	26.6
10.	**pH (for one unit)**	0.05	0.03
11.	**CN**	27	13.8
12.	**Hg**	2000	1022
13.	**Cd**	200	102
14.	**Pb**	41	21
15.	**Cu**	4.5	2.3
16.	**Ni**	10	5.1
17.	**Zn**	0.6	0.31
18.	**Mn**	7	3.6
19.	**Fe**	1.4	0.7
20.	**Cr^{6+}**	41	21
21.	**Cr^{3+}**	4.5	2.3
22.	**As**	41	21
23.	**Phenols**	27	13.8
24.	**Detergents**	1.40	0.7
25.	**Extractible compounds**	0.60	0.31
26.	**Formaldehyde**	2.80	1.43
27.	**Caprolactam**	1.40	0.72
28.	**Phtalic acid**	1.40	0.72

The effluent charges are paid mainly by the industry. In 2002, the collected amount of fines is BGN 455,000 or Euro 232,737 by 267 factories.

The total planned income to EMEPA in 2004 is BGN 81 million (Euro 41.4 million) of which BGN 20 million (Euro 10.2 million) is expected to be from water charges and fines.

Some WSSCs purchase water from a neighboring WSSC. The quantity is different and depends on the needs and the available water and the water demand. For example, for 2002 the total purchased amount is 74,602,000 m^3. This is less than 10 % of total drinking water production. The purchase price is a matter of negotiation.

Table 24. Purchased Water Quantity by WSSC

WSSC	Purchased water, 1000 m^3
Varna	31,991
Lovech	75
Gabrovo	2700
Pleven	3059
Vratza	18,322
Vidin	165
Plovdiv	1155
Targovishte	7500
Isperih	6
Razgrad	56
Russe	11
Pernik	507
Stara Zagora	3773
Sofia-region	5055
Dimitrovgrad	295
Total	74,602

4.4. Grants, Subsidies and Transfers

Grants to water systems have come from Japan, EC, EBRD (through the ISPA and PHARE programs), WB, and Swiss Trust Eco Fund (Debt against the Environment). The funds are designated for use in paying for consultant services, technical assistance, projects design, preliminary studies, and administration.

As introduced above, the Bulgarian Government recently used a USD 45 million loan from the World Bank for the Water Companies Restructuring and Modernization Project. This included 30% co-financing by the country: 15% by the MoRDPW and 15% by the 21 WSSCs. The Loan is guaranteed by the Government. The loan was completed on 31.05.2003 and the Project's Implementation Completion Report has been submitted to the WB Board of Directors.

Pre-accession funds are distributed by EU through EBRD, European Investment Bank, UNDP and so on. These require Bulgaria to co-finance part of each supported project. The percent of co-financing is from 25-50%. The projects cover rehabilitation of infrastructure and construction of new WWTPs.

More recently, the EC has been a source of water sector grants by PHARE and ISPA programs (Table 25.). These are meant to ease the costs of conforming to EU water sector directives. A major administrative problem has been the inability to co-design projects that meet ISPA grant criteria.

Table 25. List of ISPA Projects in Bulgaria, Approved by ISPA Management Committee

Project	Total budget, million Euro	ISPA grant, million Euro	Signed in	Expire date	First disbursement, million Euro
2000/BG/16/P/PE/003 WWTPs StaraZagora & Dimitrovgrad	43	32.5	December 2000	31 December 2005	3.25
2001/BG/16/P/PE/005 WWTP Gorna Oriahovitsa	16.6	12.4	December 2001	31 December 2006	
2001/BG/16/P/PE/006 WWTP Pazardjik	19.1	12.4	December 2001	31 December 2006	
2001/BG/16/P/PE/008 WWTP Blagoevgrad	12.6	8.8	November 2001	31 December 2006	
2002/BG/16/P/PE/009 Waster Collection and Treatment in Bourgas-Meden Rudnik	10.2	7.7	December 2002		
2002/BG/16/P/PE/010 Wastewater Collection and Treatment in Targovishte	15.2	11.4	December 2002		
2002/BG/16/P/PE/011 Wastewater Collection and Treatment in Lovech	18.4	13.8	December 2002		
2002/BG/16/P/PE/012 Wastewater Collection and Treatment in Montana	16.74	12.6	December 2002		
2002/BG/16/P/PE/014 Wastewater Collection and Treatment in Sevlievo	14	10.5	December 2002		
2002/BG/16/P/PE/015 Wastewater Collection and Treatment in Popovo	11.9	8.9	December 2002		

Project	Total budget, million Euro	ISPA grant, million Euro	Signed in	Expire date	First disbursement, million Euro
Total	177.74 million Euro	131 million Euro			3.25 million Euro

Source: European Union, Delegation of the European Commission to Bulgaria, ISPA-Bulgaria, 5.02.2003.

There are currently funds provided by the state through MoRDPW for rehabilitation of water system infrastructure. These rehabilitation projects include replacement of water supply pipes, completion of sewers, rehabilitation and upgrading of WWTPs. There is currently no state or municipal policy for directly subsidizing current O&M cost of the WSSCs. However, subsidies for investment by the public water supply and sewerage sector during 1998-2001 were considerable. These include subsidies from the State Budget and favorable financing backed with sovereign guarantees such as the World Bank's Water Companies Restructuring and Modernization Project (Table 26.).

Table 26. Subsidies and Credit for Water Supply & Sewerage Sector in 1998-2001, BGN

No.	Indices	1998	1999	2000	2001
1.	**Total**	15,858,470	18,621,882	40,606,037	148,785,769
1.1.	**Subsidy from the State Budget**	15,858,470	18,621,882	23,534,495	131,785,175
1.2.	**Credit with sovereign guarantees**			17,071,542	17,000,594

Source: MoRDPW

The only form of operating subsidy currently affecting WSSCs is the cross-subsidy between industry and domestic sectors. Some plan that future domestic tariffs should cover both expenses and a reasonable profitability element. Cross subsidies among customers may continue to be one of the features of the tariff structure.

A policy of cross subsidizing water services for poor customers was discussed by Halcrow (2002). The criteria for defining the poor is given in the Social Assistance Act, and there are existing Regulations for using that Act. According to the Social Assistance Act, there are different income groups and different levels of Social Assistance. The Ministry of Labor and Social Policy may manage the subsidy process as part of other Social assistance.

5. Infrastructure of Municipal Water and Wastewater Services

5.1. Production and Processing of Municipal Water

The most relevant element in the water demand and supply study is the renewable freshwater resource. Due to the lack of melting glaciers in Bulgaria, precipitation is the main source of raw freshwater both for the surface and the groundwater (Figure 6).

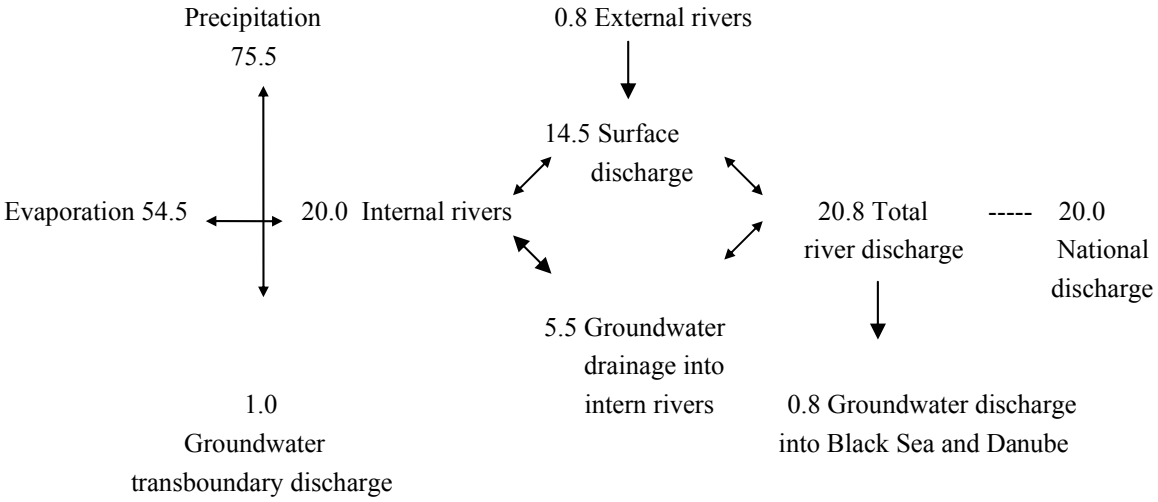

Figure 6. Water Resource Distribution for a Long - Term Annual Mean Situation (50 years) in km^3/year

The available water resources are 2430 m^3 per inhabitant. From 6 billion m^3 per year fresh groundwater only 4.9 billion m^3 per year is useable. The annual distributed water is 10-12 billion m^3: drinking water supply 8-10%; irrigation 5-35%, industry 20-26% and production of energy 15-35% (MoRDPW).

The water supply and consumption balance estimated for the year 2020 is shown in Table 27.

Table 27. Future Fresh Water Supply and Demand in km^3 – 2020 [reference situation - average dry year, excl. Hydro Power Plant (HPP) and Nuclear Power Plant (NPP)]

No.	Water supply according to the sources	Self supply	Supplied public water supply	Water irrigation systems**	Total excl. HPP and NPP
1.	**Surface water**	1.707	0.969	2.625	5.301
1.1	**Danube**	0.116	-	-	0.116
1.2	**Inland rivers**	0.298	0.404	0.745	1.447
1.3	**Dams**	0.813	0.565	1.880	3.258
1.4	**Lakes and other**	0.480	-	-	0.480
2.	**Groundwater**	0.982	0.640	-	1.622
3.	**Other (marine)**	0.007	-	-	0.007
4.	**TOTAL SUPPLY**	2.696	1.609	2.625	6.930
5.	**Water demand**				
5.1	**Households**	-	0.504	-	0.504
5.2	**Services**	-	0.599	-	0.599
5.3	**Losses**	-	0.415	-	0.415
5.4	**Agriculture**	0.269	-	2.271	2.540
5.4.1	**Irrigation**	0.152	-	2.271	2.423
5.4.2	**Livestock**	0.117	-	-	0.117
5.5	**Industry***	2.427	0.091	0.354	2.872
5.5.1	**Potable**	0.347	0.091	-	0.438
5.5.2	**Non potable**	2.080	-	0.354	2.434
6.	**TOTAL DEMAND (excl. HPP and NPP)**	2.696	1.609	2.625	6.930

Source: Experts investigation

* Industry includes fresh water demand for Thermal Power Plant (TPP), including for cooling

** Possible future privatization of Irrigation Systems Company (ISC)

The total amount of drinking water produced in 2001 is 1,141,162.10^3 m^3 of which 80,096.10^3 m^3 (7.02%) was from flowing surface water, 543,516.10^3 m^3 (47.63%) from groundwater and 517,550.10^3 m^3 from impoundments behind dams (MoRDPW). A list of the dams is shown in Table 28.

Table 28. Dams for Water Supply in Bulgaria

№	Dam	Water supplied settlement	Volume, million m^3
1.	Christo Smirnenski	Gabrovo	18.7
2.	Yovkovci	Veliko Tarnovo	92.2
3.	Borovitsa	Kardjali	27.3
4.	Assenovec	Sliven	28.2
5.	Kamchya	Burgas and Varna	228.5
6.	Srecehska bara	Montana and Vratza	16.5
7.	Yasna polyana	South Black Sea	34.7
8.	Novo Panicharevo	South Black Sea	1.8
9.	Studena	Pernik	25.2
10.	Iskur	Sofia	670
11.	Bely Iskur	Sofia city	15.3

Source: MoRDPW

The ecological NGOs and many academician experts oppose building new dams without further careful consideration of future water demand. The dam experts and some decision makers are very supportive of further dam construction. They don't support alternative water supply or conservation strategies (reduction of water losses, development of other potential water sources, establishment of water saving programs etc.). Development of deep groundwater is not very attractive because of the costs of pumps and energy to run them. The situation calls for a more any formal and complete analysis for the different water development and water saving alternatives.

The water supply system is 70,620 km long of which: 51,771 km (73.3%) asbestos-cement pipes, 10,271 km (14.5%) steel pipes, 1800 km (2.5%) cast iron pipes, 1464 km (2.1%) PVC pipes and 5314 km (7.5%) other pipes. Most asbestos cement pipes are more than 25-30 years old.

Investigations of water losses during distribution in recent years showed them to be considerable, totaling 30% (small settlements) to 70% (big settlements) of the average daily water use. The total water loss during transport is 68% in 2002 e.g. the total produced water in distribution network is $1{,}009{,}651.10^3$ m^3 and the total water loss during transport is $684{,}715.10^3$ m^3 of which: external water loss $67{,}764.10^3$ m^3 (main pipes) and internal water loss (in buildings) $616{,}951.10^3$ m^3 (NSI, 2004). The amount of water loss estimated to be 225 m^3/km/day shows that the quantity of distributed water is 2-3 times higher than quantity of water consumed (Dimitrov, Trichkov, 2001).

The average NRW value of regional WSSCs with WB Sub-loan is 54.05% in 2002 (Table 29.).

Table 29. Percentage of Non Revenue Water

WSSC	Date of	2000		2001		2002	
	WB Sub-loan	Goal	Actual	Goal	Actual	Goal	Actual
Gabrovo	27.11.96	49.00%	45.34%	48.00%	45.34%	47.00%	
Dobrich	20.11.96	76.00%	76.00%	75.00%	78.83%	74.00%	80.41%
Kjustendil	29.11.96	64.50%	64.45%	64.00%	67.87%	63.00%	66.87%
Lovech	03.12.96	25.00%	25.89%	24.00%	24.88%	23.00%	24.57%
Varna	23.12.97	60.00%	59.81%	60.00%	65.50%	60.00%	68.78%

WSSC	Date of	2000		2001		2002	
	WB Sub-loan	Goal	Actual	Goal	Actual	Goal	Actual
Isperih	09.01.98	60.00%	59.49%	59.00%	58.31%	58.00%	61.00%
Vratca	16.02.99	72.00%	69.19%	70.00%	69.37%	68.00%	71.27%
Dimitrovgrad	18.02.99	68.00%	64.95%	61.00%	73.07%	59.00%	59.16%
Kardjali	18.02.99	41.00%	40.74%	40.00%	39.97%	39.00%	39.10%
Sliven	18.02.99	49.00%	46.12%	48.00%	48.35%	47.00%	21.00%
St.Zagora	18.02.99	63.50%	63.37%	62.00%	65.78%	60.00%	67.53%
Shumen	22.03.99	49.50%	49.51%	49.20%	49.56%	49.00%	48.65%
Vidin	08.10.99	58.00%	49.99%	57.00%	46.93%	56.00%	47.44%
Montana	14.10.99	26.00%	23.83%	25.00%	24.48%	24.00%	27.93%
Pernik	12.10.99	53.00%	52.88%	51.00%	48.10%	50.00%	53.00%
Pleven	13.10.99	50.00%	49.66%	49.00%	51.80%	48.00%	51.36%
Russe	20.10.99	51.50%	52.34%	50.50%	50.99%	49.50%	47.06%
Silistra	20.10.99	61.00%	61.50%	60.00%	61.50%	58.00%	61.00%
Smolyan	14.10.99	49.50%	49.16%	48.00%	49.87%	46.00%	50.03%
Targovishte	13.10.99	72.00%	67.88%	71.50%	69.77%	70.00%	70.62%
Yambol	08.10.99	65.50%	70.37%	64.00%	66.84%	63.00%	64.31%
Average		55.43%	54.40%	54.10%	55.10%	52.93%	54.05%

Source: WB

The large difference between the amount of drinking water produced and consumed reflects not only leakage. Some of the difference is due to the lack of reliable method and equipment for measuring water before distribution. There are no water meters for water mains. For example, surface water production is estimated based on depth of water, and for groundwater production is estimated based on the capacity of the pumps. In addition, because of the lack of measured control of water distribution, some water is distributed to unknown users and is not covered by consumption statistics.

There are 6087 wells, 3560 pumping stations with capacity 768,219.10^3 m^3 and 6087 water supply reservoirs with total volume 2,613,735 m^3. The annual used energy for drinking water treatment is 30,584.10^3 kWh. There are 42 potable water treatment plants with annual capacity of 480,505.10^3 m^3 or 42.1% of total distributed water. The total capacity of the existing drinking water plants is not fully utilized because they have been designed to handle consumption over than 200 l/cap/day.

The recent decline in water consumption by public water supply service users is due to the higher water tariffs, installation of water meters by customers, and restructuring of industrial production. The expert opinion is that an increase in the number of self-service water supplies by households, agriculture and, mainly, industry using groundwater wells has also reduced consumption of public water supply services.

5.2. Collection, Processing and Discharge of Municipal Wastewater

Collection and treatment of urban and industrial wastewaters defined according to Art. 13 of Directive 91/271/EC is as follows (MoEW, 2003):

- annual discharged wastewaters to water bodies are 878,555.10^3 m^3 or 2,407,000 m^3/d.
- 1,478,000 m^3/d are collected by public sewerage systems of which
  - 76% are treated by WWTPs and the volume of untreated wastewaters discharged by public sewers is 355,367 m^3/d;
- 1,122, 663 m^3/d are treated wastewaters,
  - of which 31,315 m^3/d mechanically treated wastewaters and 1,081,838 m^3/d biologically treated;
- 66.8% of population is connected to the sewerage systems;

Wastewater Treatment Plants

There are 61 WWTPs for 40% of population which is equal at 5,282,360 PE. Only 21 of are in good condition and don't need any reconstruction and modernization. 40 WWTPs work but some of them are due for reconstruction and others need both reconstruction and modernization.

12 new WWTPs have been constructed to serve 2% of the population. At the same time there is a need for finishing the 35% sewerage system that would supply the WWTPs.

19 settlements with 1,782,887 PE have been involved in the National Program for WWTPs Construction. The Program plans to use ISPA, Phare and national funds for construction of these WWTPs. 80% of their feeder sewerage systems are ready.

For settlements with population > 10000 PE some 55 WWTPs serving 1,730,960 PE need further planning. 40% of the sewerage system for these WWTPs has to be finished;

For 283 settlements (1,107,757 PE) with population from 2000 PE to 10000 PE WWTPs would be needed under the mandates of Directive 91/271/EC. Also, the percentage of existing sewerage systems for these settlements is very small - 25%.

The percentage of population equivalent (PE) with different stage of WWTPs execution is shown in Figure 7

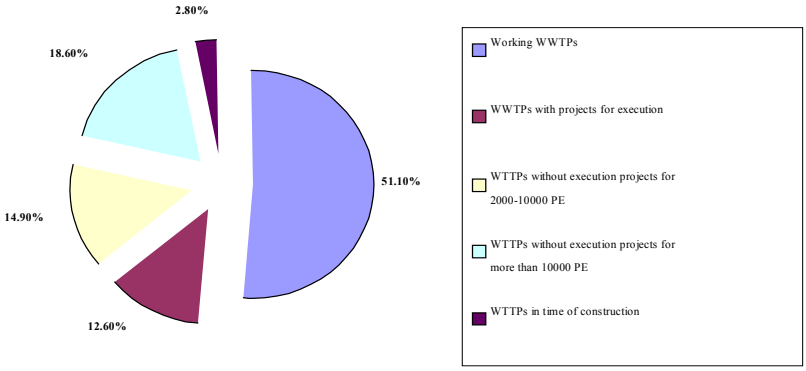

Figure 7. Percentage of Population Equivalent (PE) with Different WWTPs

The Black Sea region has many WWTPs: Varna district – 16 and Burgas district 11. There aren't any WWTPs in the districts of Blagoevgrad, Vidin, Kardjali, Lovech, Russe, Pazardjik, Haskovo and Yambol.

Twenty three industrial enterprises would be covered by Art. 13 of the Directive 91/271/EC. Twelve of these don't have permits for discharge of wastewaters to water bodies.

Urban Sewerage Systems

The number of the towns with a public sewerage network is 167 or 70.2 % of the total. Only 2.1% of the villages have public sewerage network.

There aren't any choices about the separation of sewerage for rainwater and for urban wastewater.

The length of the sewers is 9013 km. The total number of sewer connections is 321,983

The sewers are mostly of a gravity type, being constructed with combinations of concrete and steel/concrete pipes. Bulgarian experts estimated that 20% of the sewerage collection networks need urgent rehabilitation. Over 40% of them were constructed in the period of 1960-65 (ISPA Strategy, MoEW, 2002).

The amount of industrial wastewater initially collected, lost in collection, treated, and/or discharged by WSSCs is not known accurately because these flows are rarely metered or measured with accuracy.

The sewerage system of Sofia was originally constructed around 1897 and has been extended at intervals, corresponding to the town development to its present state. There are 1550 km of sewers with total length of the main collector sewers of 423 km, which service approximately 85% of the city's population.

6. Management Units

6.1. Types and Numbers of Management Units

The institutional organization of the water supply and sewerage sector was shown above in Chapter 2 (2. Legal and Institutional Setting.)

The WSSCs are purely water supply and sewerage service providers, and do not undertake any other business activities. The main institution responsible for WSSCs with state shares in Bulgaria is the MoRDPW but each WSSC has an independent budget.

Distribution by size			Comments
Large (> 100 000 inhabitants)	Medium (25 000 – 100 000 inhabitants)	Small (< 25 000 inhabitants)	
- 27	- 12	- 11	- - 29 regional Water Supply& Sewerage Companies : 13 of these companies are 100% state owned, and 16 are jointly owned (51% by the state and 49% by the municipality) - - 20 municipal water companies serving only small area and population - - in 2000 the concessionaire "International Water" and the municipality of Sofia registered the shareholder company Sofiyska Voda AD for the water supply and sewerage services of Sofia capital.

Source: MoRDPW

A matrix of water supply and sewerage problems is shown in Annex 4 (p.75.) The main problems are as follows as:

- the water supply networks are obsolete and dilapidated resulting in high levels of water loss during distribution;

- 67% of the towns are provided with sewerage networks. Around 20% need reconstruction and modernization;

- the current water resources are sufficient for normal water supply if they are properly managed and effectively utilized;

- the number of population (about 1.4 million inhabitants) which are not supplied with water 24 h per day in drought periods is too high;

- lack of enough in reservoirs to cover drought periods;

- there is a need of construction of a great number of sewerage networks and wastewater treatment plants.

Demand for water and wastewater services in WSSCs is often overestimated (demand adjusted to increased tariffs) and capacity designs are too big. The WSSCs haven't shown serious interest to saving water e.g. their interest seems to be to sell much more water. The new projects frequently do not produce revenues or reduce other costs enough to cover their costs. Under current conditions, reducing water loss to 25% according to 1999 Water Act is not realistic until 2010 or later.

Trends in Formation and Consolidation of the MUs

The transposition of the EU WFD, the new water supply and sewerage strategy and the new act for water supply and sewerage services is designed to better coordinate all water management units. The

short- and long-term responsibility of each institution and enterprise is clear (see the Action plan for the period 2003-2015 in Annex 5 (p.77). The linkage between different institutions has to be improved.

6.2. Financial Conditions of the MUs

Contracts are established between MUs – WSSCs and wholly owned municipal water systems - and suppliers of raw materials, oil, pipes, water-meters adjustment, with post-offices for payment of the bills, maintenance of hard/software, in accordance with the Law of Public Commissions.

Service contracts between MUs and households are not currently used. It is supposed that such contracts will established when the new water law establishing EWSRC is promulgated. There are proper contracts with WSSCs and industrial consumers - factories, plants and budget organizations. All kind of obligations are placed in these contracts, including the water discharged volume, water quality limits, water tariffs, effluent charges etc..

The key financial outcomes of WSSCs with over of 50% state shares (state participation) are shown in the Table 30. These state or state/municipal WSSCs supplied 249 municipalities with 6,422,041 inhabitants.

Table 30. Economic Status of WSSCs with State Participation for the Period 1998-2002

No.	Indices	1998	1999	2000	2001	2002
1.	**Income, thousand BGN**	182016	210500	231734	254848	242042
2.	**Expenditure, thousand BGN**	173423	199369	221575	249872	238404
2.1.	**of which: depreciation**	14043	19379	21466	25231	31238
3.	**Accounting profit (+) Loss (-), thousand BGN**	8593	11131	10159	4976	3638
4.	**Balance of "profit" (+) Loss (-), thousand BGN**	5342	7269	6342	2135	1486
5.	**Fixed assets, thousand BGN**	318918	332622	356454	409481	396537
6.	**Long term assets, thousand BGN**	318804	331623	352722	397121	
7.	**Received long term loans, thousand BGN**	10084	18490	34160	49151	
8.	**Received short term loans, thousand BGN**	438	312	870	776	
9.	**Average tariff of treated drinking water (without VAT), BGN/m^3**	0.43	0.54	0.65	0.74 (0.5-1.41)	0.68* (0.41-1.33)
10.	**Average tariff of treated wastewater (without VAT),**	Households 0.11	Households 0.13	Households 0.14	Households 0.17	Households 0.17

No.	Indices	1998	1999	2000	2001	2002
	BGN/m^3					
11.	**Water losses, %**	56.8 (29.57 Blagoevgrad; 77 Dobrich)	57.89 (29.33 Blagoevgrad; 79 Dobrich)	57.53 (41 Kardjali; 76 Dobrich)	57.37(39.98 Kardjali; 79 Dobrich)	67.8*
12.	**Liabilities (debts), thousand BGN**	20233	22788	32165	48149	56076
13.	**WSSCs with profit, number**	28	29	28	24	27
14.	**WSSCs with loss, number**	1	0	1	5	2
15.	**Average monthly salary, BGN**	215	229	286	303	325
16.	**Staff, number**	15335	15314	14849	14208	13551
17.	**Investment, thousand BGN**	16034	22328	32465	54549	23244

*Source: MoRDPW for 1998, 1999, 2000, 2001, 2002; *NSI.*

27 Regional WSSCs reported positive net revenue and 2 (Dobrich and Haskovo) reported loss in their activities in 2002. The investments in municipal WSSCs (with 1,616,925 water supplied inhabitants and 1,389,070 inhabitants connected to the sewerage network) are very small.

No.	**Indices**	**1998**	**1999**	**2000**	**2001**
1.	Investments in municipal WSSCs, thousand BGN; of which:	351	419	793	28147
1.1.	Sofiyska Voda*	0	0	0	27300

Source: MoRDPW; *1,150,000 water supplied inhabitants and 1,094,410 inhabitants connected to the sewerage network of Sofiyska Voda.

Planned investments for the water supply and sewerage sector are shown in Table 31. and Annex 5 p. 77. Main financing sources are expected to be EC accessions grants, concessions, national budget etc.

Table 31. Investments Needed for Water Supply & Sewerage

Purpose of investments	Investments needed	Responsible institutions	Implementation terms	Possible investment sources
	(million BGN /Euro)			
Rehabilitation of water supply networks and decrease of water loses	3376 / 1726	MoRDPW and municipalities	2002-2015	Concessions, accession funds (ISPA), National budget
Construction of new and completion of already started facilities	1676 / 857	M0RDPW and municipalities	2002-2015	BOT, concessions, National Budget
Construction of sewerage networks	1100 / 562	MOEW, MRDPW and municipalities	In compliance with the National Program on Sewerage Networks	ISPA, National Budget
Construction of Wastewater Treatment Plans – I phase	636 / 325	MOEW and municipalities	In compliance with the National Program on Wastewater Treatment Plants	ISPA, National Budget

Source: MoRDPW

Collection of Debt Owed to WSSCs.

During the period of economic collapse many factories as well as some residential customers were debtors of the WSSCs. The WSSCs were forced to use lawsuits to collect these debts. Since March 2004, 3 years prison or tax of BGN 15000 is possible for misappropriated actions of water users (water theft, water meters decreased data etc.).

7. Regulatory Units

7.1. National, Basin and Local Planning and Permitting

National Investment Planning

The Action plan in Annex 5 (p.77) estimates the high cost of meeting EU water -related directives and funding sources to finance investments needed in the water sector. The capacity building at the ministries is not sufficient to respond to the actions planned. Also, the managers of WSSCs are political appointees, often without a proper background for determining or executing needed investments.

Municipal Investment Planning and Regulation

Besides national planning, municipalities themselves establish development plans that include all public infrastructures. Many representatives of municipalities may not yet have sufficient experience with issues related to the operation and financing of public services or facilities. This makes it difficult for them to agree on and execute a common policy. In addition, local officials and private operators of water companies have a natural tendency to try to retain the most profitable parts of water systems. Water bureaucracies, on the other hand, encourage large investments that involve high costs even of they also generate low revenues.

Many water management plans and regulations are unknown to most of water decision makers as well as many WSSCs administrations. The level of administration and water system management quality control is not very effective. Some WSSCs and enterprises have various financial links to the regulatory institutions. Sometimes, for example, permits are issued that don't effectively assure reduction in water pollution. There are many economic incentives (tariffs, fees and charges etc.) but their implementation often depends on the water service provider.

Public-Private Partnerships to Improve Management and Financing

There are alternative management models of the water supply and sewerage with private sector participation. Service contracts, management contracts, concession contracts and BOT, and joint management companies are summarized below (Table 32.).

Table 32. Management Options for Water Supply & Sewerage Sector

Option	Advantages	Disadvantages
Service contract	**a**. It is applied to solve specific problems when: a good management is already achieved; decrease of loses; billing; management of Wastewater Treatment Plants , etc.	a. It can not solve the problems of the non-effective management b. It can not improve the bad repayment of expenditures c. It is concluded for a short term
Management contract	a. They can quickly improve the technical capacity and financial indicators b. A good effectiveness is achieved for specific tasks c. The responsibility for operation and maintenance is transferred to the operator	a. Short term of effect b. It does not ensure capital investments
Lease	a.Via it a good profit is achieved if the management is improved b. The operator is responsible for the effectiveness of operation c. Longer operational period	a. It does not ensure investments b. For planning of capital costs responsible remains the owner

Option	Advantages	Disadvantages
Concession and BOT	a. The whole activity is transferred to the operator b. Improved is the effectiveness of the management c. Improved are the qualities of services d. Long-run contracts - over 25 years e. It Ensures investments for long-run development f. The new facilities under construction and the improved existing facilities remain for the owner of the infrastructure	a. If the management during the contract period if not good, then the risk is higher.
Joint companies	a. Private sector participation is restricted to the extent as identified in the contract . b. If there is a good public-private partnership, an increase of the effectiveness and improvement of the management could be achieved. c. They are of long standing nature d. Capital investments are ensured for the development of infrastructure	a. A part of the responsibilities and risks are retained by the owner b. In some cases the owner and the regulatory body are the same state body which make the management more complicated
Privatization	a. All responsibilities are transferred to the operator b. Effectiveness and management are improved	a. The sell of assets is carried out. b. A very high extent of regulation is required c. Risk for the protection of public interests

Source: MoRDPW

7.2. Economic Instruments and Regulations

Tariff Setting

WSSCs face significant levels of non-payment. This results in concern for the financial viability of the WSSCs and pressure by WSSCs and their management to introduce higher drinking water and wastewater tariffs. There is a need for a new approach to setting and collecting waste and wastewater tariffs. The establishment of new water tariff methodology will be the first obligation of the Energy and Water State Regulatory Commission.

It can be seen that in the all cases the nominal "profitability" is below 30%, including those companies receiving loans from the World Bank Project described above. In accordance with the international practice and the suggestions made by the consulting firm Halcrow in 2002, it is necessary that debt service and a normal return on the long-term assets be included in the water service provider accounting calculations. It is necessary that international experts be involved because the question of pricing the water services is directly linked with the repayment of the capital invested in the WSSCs under the World Bank loan.

Operating Subsidies

Direct O&M Subsidies are not offered in Bulgaria. There is no consistent information at hand related to the extent of cross-subsidy between agriculture, industry, and households.

Investment Subsidies

The Bulgarian Government and European Union allocate investment subsidies. Unfortunately, the absorption of the ISPA funds has proven to be a problem. For example, in 2003 about Euro 40 million preliminarily allocated for 2 WWTPs – Stara Zagora and Dimitrovgrad – has been "lost" due to failure to reach agreement on project terms and conditions. The managers of WSSCs are not involved in the process of firm selection for distribution of these investment subsidies. Sometimes the urgent need of one settlement is a drinking water treatment plant, not a WWTP. A more balanced and integrated approach has to be implement in the water supply and sewerage sector, starting by source of water to the end – discharge to water bodies.

Water Use Fees

The payers of the fees are only holders of licenses for water use and/or use of water bodies, in accordance with the 1999 Water Act. The income of the water fees in 2002 to NEPF is BGN 21,664,400 or USD 10,430,621 (Euro 11,076,831). The absolute amount of the fees at present is low. The main cause for the limitation is the economic sensitivity of the residential and commercial customers. The revenues from fees that will be received by the NEPF (later EMEPA) from the fees for the right of water use and/or use of water bodies are to be used in accordance with the provisions of the Water Act.

Effluent Charges

Industry as well as some WSSCs have had effluent charges levied by the Regional Inspectorates of Environment and Water when wastewater treatment plants don't work well. The design of these effluent charges and associated fines is described in detail in the next section.

Effluent charges are paid mainly by the industry. In 2002, the collected amount of fines is BGN 455,000 or Euro 232,737 by 267 factories.

The income from the fines, collected by the Regional Inspectorates of Environment and Water, is split as follows: 80% for the respective municipal budget and 20% for the Enterprise for Management of Environmental Protection Activities (EMEPA).

Managers of WSSCs frequently argue that a part of fees and of effluent charges should go directly to the water sector for renovation.

Direct Regulation

There is an expectation that the new Energy and Water State Regulation Commission will effectively manage all economic issues as well as water tariffs of WSSCs.

7.3. Environmental Regulations and Restrictions

Under the 1999 Water Act the Minister of Environment and Water is able to order compulsory administrative measures, in the cases of:

1. emergency or disaster situations, caused by the action or inaction of water users and/or users in the process of water use and/or use of the water body and the operation of the water infrastructure and installations;
2. arising of immediate danger from pollution, damage or destruction of the environment, of people or property of the state, the municipalities, individuals or corporate bodies as a result of the action or inaction of water users and/or users of water bodies (Art. 199. (1)).

This power has been used when WWTPs didn't work well.

Effluent Charges and Associated Fines for Non-compliance

The effluent charge schedule for individual, corporative body, WSSCs etc. which effluents in excess of permitted levels is as follows (Art. 200. (1) of 1999 Water Law):

1. uses waters without the necessary justification or in detraction from the provided conditions and requirements in the permit or the contract: a) for quantity up to 1 l/s - from 150 to 1000 BGN; b) for quantity from 1 l/s to 10 l/s - from 500 to 5000000 BGN; c) for quantity from 10 l/s to 100 l/s - from 1000 to 10000 BGN; d) for quantity over 100 l/s - from 10000 to 25000 BGN;

2. use of water infrastructure and systems or constructs such without the necessary justification, or in violation of the provided conditions and requirements in the permit - from 1000 to 10000 BGN;

3. pollutes the waters, destroys the water beds or the river banks in violation of the bans- from 5000 to 15000 BGN;

4. violates the rules for declaring, accounting and control during the implementation of the water use - from 150 to 1000 BGN;

5. breaks water and hydro-metric installations and devices or violates the proper operation and the regulated regimes of their operation - from 500 to 5000 BGN;

6. discharges wastewaters into the water bodies and the sewerage system violating the emission and/or the emission standards and requirements - from 1000 to 5000 BGN;

7. uses the lands adjacent to the water bodies or the lands of the flooded coastal or river bank areas not for their designation - from 2000 to 10000 BGN;

8. misrepresents information about emergency situations in the water bodies - from 500 to 5000 BGN;
9. misrepresents design documentation about the facilities which can affect the natural state of the waters - from 5000 to 10000 BGN;

10. does not provide access of the control bodies for carrying out measurements and analyses - from 150 to 500 BGN;

11. destroys or counterfeits data and information - from 1000 to 10000 BGN;

12. does not execute an obligation to inform the control bodies about circumstances being important for the water protection - from 200 to 2000 BGN;

13. damages or destroys points or stations from the national monitoring networks - from 10000 to 25000 BGN;

14. does not execute the obligation for announcing the restrictions and the bans - from 200 to 2000 BGN;

15. does not execute the prescriptions - from 500 to 5000 BGN;

16. for all remaining cases of violation of bans or non-execution of obligations under the present law - from 150 to 1500 BGN.

With the penalty of para 1 also is punished the individual or the representative of the corporate body ordered or assigned the carrying out of activities of para 1 when the activities themselves represent an administrative violation. When the violation of para 1, items 2,3, 7 and 13 is construction, the fine or the sanction is from 10000 to 25000 BGN. For a second violation of para 1 and 2 the fine or the sanction is from 1000 to 50000 BGN.

Many enterprises prefer to pay the penalties rather than renovate or built the wastewater treatment plants. Sometimes the control institutions are not so strong.

Drinking Water Quality Standards

The Ministry of Health is responsible for setting and enforcing hygienic limits of drinking water. The same pollutants levels as required by the EU Drinking Water Directive are regulated by Regulation No. 9/16.03.2003. There is transition period for certain chemical indicators, and the standards should be achieved by the latest January 2005 and January 2007, respectively.

8. Service Users

8.1. Water System Customers

It is evident that the difference in the water tariffs between different customers is not big. The difference of the water tariff depends mainly on the type of water source and water quality. The high water tariff doesn't correspond to the high level of water services. pumping groundwater is more costly for all users.

There are some possibilities for different water tariffs based on the volume of water consumed and linked to the socio-economic status of the people. For example, wealthy households have swimming pools, gardens etc. and their water consumption is often relatively high.

8.2. Self-Service Users

There isn't any effective control for the real amount of industrial and agricultural self supply by wells. This fact decreases the number of public supply users and finally increases the water tariff per consumer as existing fixed costs must be covered by fewer customers

Households that are not connected to the public sewers use individual septic systems. This kind of self-service is typical in rural and tourist areas, and small towns. These septic systems are a source of groundwater pollution by nutrients and bacteria. The water quality monitoring of private wells is not on-going. There aren't any plans for wastewater treatment for small populated areas with less than 2000 PE.

9. Reform Proposals connected to Tariffs and Charges

9.1. State Reform Proposals

The EU accession goal provides a strong motivation and context for reform of Bulgarian water policy. The initial milestone was reached by the adoption of the Water Act in 1999. Some of the short term measures mentioned in the Action Plan for the period of 2003-2015 will, depending on implementation, have an impact the level, design, and setting of tariffs and, perhaps, on effluent charges as well. Some measures are listed in Table 33. and an elaborated listing by MoRDPW is provided in Annex 5 (p.77).

Table 33. Main Short-Term Measures Planned for Water Supply and Sewerage Sector

No.	Measure	Funding source	Initiation
1.	Development of business plans for water and sewerage companies in compliance with the new WSSCs strategy	Water Supply & Sewerage Companies	31.03.2004
2.	Development of Act for Regulation of the Water Supply and Sewerage Services	National financing	30.09.2005
3.	Taking out the infrastructure assets of the water and sewerage companies and their conversion into public property	Water Supply & Sewerage Companies	31.12.2004
4.	Development of pricing methodology	National financing within MoRDPW	30.06.2004
5.	Development of standards for the levels of services	National financing within MoRDPW	31.12.2004
6.	Establishment of Water Supply Fund	National financing within MoRDPW	31.12.2004

Source: MoRDPW

Energy and Water State Regulatory Commission

The financial support for the new EWRSC will raise the tariff for one cubic meter of public supply water by BGN 0.001 (Euro 0.0019). This new annual "Water Supply & Sewerage Regulation" charge will start in January 2005 and will be paid by all water operators (WSSCs).

The Council of the Ministers is expected to approve an ordinance for "Regulation of the Tariffs of Water Supply & Sewerage Services", including establishment of the EWRSC. This ordinance will include support for the cost recovery principle and will discourage cross-subsidies across different water and sewer users. The EWRSC will be given responsibility to set the maximum water tariffs and determine proper levels of revenue. Water tariffs actually charged would not be higher than the maximum tariffs. WSSCs that set non-approved water tariffs will pay a fine of BGN 20,000-50,000 (Euro 10,226-25,564).

Under this ordinance it would be the duty of each WSSC to send to the EWRSC an annual business plan and financial and audit reports. If this duty is performed in time the imposed fine is BGN 10,000-30,000 (Euro 5113-15,339). Monitoring will be done by EWRSC's employees or by selected experts.

A special web page on the "National Information System" of the EWRSC will provide the public with all data collected from WSSCs.

Investment Targets

Generally, infrastructure requirements will put pressure on WSSCs to raise the level of water tariffs to support investment over the period 2004-2014. The financial forecast of investment for development of water supply and sewerage activities in Bulgaria is 6931 million Euros (Table 34.).

Table 34. Financial Forecast for Development of Water Supply& Sewerage Sector in Bulgaria, million Euro

Year	Bulgarian sources of investment financing				Foreign sources of investment financing			Total per year
	Water Supply& Sewerage Companies	State budget	State enterprise for infrastructural projects	Total	EC (ISPA, Phare, Cohesion funds)	Int. banks (EBRD,EIB,WB)	Total	
1	2	3	4	5	6	7	8	9
2004	30	5	20	55	5		5	60
2005	30	8	50	88	12	10	22	110
2006	80	10	70	160	65	30	95	255
2007	100	12	80	192	427	55	482	674
2008	200	15	80	295	506	70	576	871
2009	250	20	80	350	560	70	630	980
2010	300	20	80	400	670	80	750	1150
2011	300	25	90	415	445	90	535	950
2012	300	25	90	415	420	50	520	935
2013	250	20	90	360	281	50	381	741
2014	200	15	90	305	-	-	-	305
Total	2040	175	820	3035	3391	505	3896	6931

Source: MORDPW.

Foreign finances:

- EBRD: Euro 60 million for WSSCs;
- EIB: Euro 23.5 million for Haskovo UWWTP and Euro 150 million for WSSCS;
- Other sources: Euro 20 million;
- ISPA: Euro 32.5 million for Stara Zagora and Dimitrovgrad UWWTPs and Euro 320 million for WSSCs;
- Cohesion fund: Euro 154.3 million (2007), Euro 177.4 million (2008), Euro 204 million (2009), Euro 234.6 million (2010), Euro 222.8 million (2011) , Euro 211.7 million (2012), Euro 190.5 million (2013).

The investment needed for construction of WWTP with biological treatment was estimated by MoEW as follows as (MoEW, 2003):

- for the settlement with population equivalent from 2000 to 10000 PE – 335 Euro/PE;
- from 10000 to 15,000 PE – 231 Euro/PE;

- from 15,000 to 150,000 PE– 137 Euro/PE;
- > 150,000 PE – 79 Euro/PE.

The investment needed for 100% connection of population to the sewerage system is calculated on the basis of multiplication of three parameters: number of inhabitants, 9.2 m sewerage per inhabitant for small settlement and fewer meters than 9.2 m per inhabitant for bigger settlement, and 150,000 Euro per km (MoEW, 2003).

The total financial expenditures for construction of WWTPs and sewerage systems to meet Directive 91/271/EC is estimated to be Euro 2218 million (MoEW, 2003). The needed national financial support is from 0.15% to 0.42% of GDP. The biggest of this expenditure is in 2009, 2010 and 2012 – 0.42% of GDP (MoEW, 2003).

The time schedule of the WWTPs construction by different kind of settlements is shown in Table 35. (MoEW, 2003).

Table 35. WWTPs Forecast for the Period 2003-2014

No.	Number of projects started in the shown year incl. the fulfillment of the projects started in the previous years	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1.	determination of the projects	10	14	19	18	13	7	0	0	0	0	0	0
2.	New WWTPs > 10000 PE	1	2	7	22	43	53	48	33	0	0	0	0
3.	New WWTPs for 2000-10000 PE	0	0	0	0	0	19	87	129	177	196	154	87
4.	WWTPs for completion	6	8	7	9	8	5	2	2	0	0	0	0
5.	WWTPs for reconstruction and modernization	6	16	18	29	30	32	20	23	4	2	0	0
6.	Sewerage projects in build up WWTPs	2	2	3	4	6	8	8	7	6	3	0	0
7.	**Total**	**25**	**42**	**54**	**82**	**100**	**124**	**165**	**194**	**187**	**201**	**154**	**87**

9.2. Reform Proposals

Management improved and capacity building

The strategy for improving the quality and scope of Bulgarian water and wastewater services to European levels and standards are as follows as:

- good conditions for efficient management of the sector by introduction of economic acceptable integrated approach;

- private sector participation while taking into account public interests.

There is a need of a change in the incentive structure so that WSSCs are managed to control costs and keep service levels and water tariffs compatible with the demands of their customers. The concept of integrated water management has to be introduced. The EU principles for economic analysis and public participation would be translated and disseminated. Water tariffs decisions and investments needs have to be taken from both the bottom up (from local places to ministries levels) and from the top down. Key stakeholders should be involved in the investment and water pricing process from the beginning.

Less Costly Alternatives

Full implementation of the national investment programs for sewerage and wastewater treatment is not realistic. The wastewater treatment plants for 430 settlements are planned, of which 121 are for plants serving more than 10000 PE. Bulgarian experts are concerned about finding the best way to make investments. Demand is often overestimated (demand adjusts to increased tariffs) and this can result in designs whose capacity is too big. Such projects frequently do not achieve cost recovery at the originally projected tariffs. For small towns and villages in particular, cost recovery is not feasible for the lower income groups. Our main conclusion is that low income limits the level of water and wastewater tariffs and any increase in the current tariffs should be very gradual and investments must be well-planned and consistent with these tariff limitations.

Costs can be lowered (and tariff increases avoided) by using cheaper alternatives for drinking water and wastewater treatment - implementation of affordable, lowest cost systems. The secondary/tertiary wastewater treatment is not affordable for villages and small towns in Bulgaria. As incomes rise affordability increases, so more costly schemes can be introduced later. By combining tariffs on water and wastewater users and charges on beneficiaries we can achieve cost recovery in a more equitable way.

Construction of new dams will raise the water tariff. Other alternatives could be investigated before starting of each new project.

Affordability

Affordability is missing in water legislation. There is a possibility to adopt two part or more generally, multipart tariffs. For example, one affordable tariff for 3 m^3 per capita per month and two/three times higher tariff for over than 3 m^3/cap./month. Such social protection is needed to ensure adequate water availability to poor households.

Information

There is a need to standardize information to meet NACE 90. The sources of environmental finance including water finance should be set in three groups: own funds, loans and grants. *Columns of "Expenditure by Source"* could be as follows:

1. Expenditure/ code of expenditure
2. Total
3. Entity's own funds
4. Loans
   - 4.1. bank loans
   - 4.2. bonds
   - 4.3. national environmental funds
     - Enterprise for Environmental Activities Management
     - National Trust Eco Fund
     - others ("Agriculture", etc.)
   - 4.4. pre-accession funds
     - ISPA
     - PHARE
     - SAPARD
   - 4.5. other loans from residents
   - 4.6. other loans from non-residents

5. Grants
   5.1. state budget
   5.2. municipal budgets
   5.3. national environmental funds
      - EMEPA
      - National Trust Eco Fund
      - others ("Agriculture", etc.)
   5.4. pre-accession funds
      - ISPA
      - PHARE
      - SAPARD
   5.5. other grants from residents
   5.6. other grants from non-residents

The annual information for "Fines and Sanctions" should be expanded with information on environmental charges paid by legal entities and could have the following columns:

1. Code
2. Product charges
3. Consumer charges
   3.1. solid municipal waste
   3.2. water supply, sewerage, wastewater treatment
4. Natural resource charges
   4.1. the right for water use and/ or using water body
   4.2. according to the Medicinal Herbs Act
   4.3. concessions
   - forests
   - mineral water
   - mineral wealth
   - others
5. Fines and sanctions paid off according to Environmental Protection Act, article 3
   - for water, for air, for soil, for waste, for noise, others
6. Other fines and sanctions paid off
   - for water, for air, for soil, for waste, for noise, others

Classification of expenditure by economic activity units. Information published by the NSI does not differentiate between expenditure by the public sector, the private sector and specialized producers (NACE 90), as well as between the central and local authorities. The tables should have separate columns/ rows for the special producers (NACE 90) and for the public sector with sub-columns for central authorities and local authorities.

Water glossary and Tool Box

There is a need of extend water glossary, including the socio-economic terminology and of a “tool box” with good practices for water supply & sewerage companies management.

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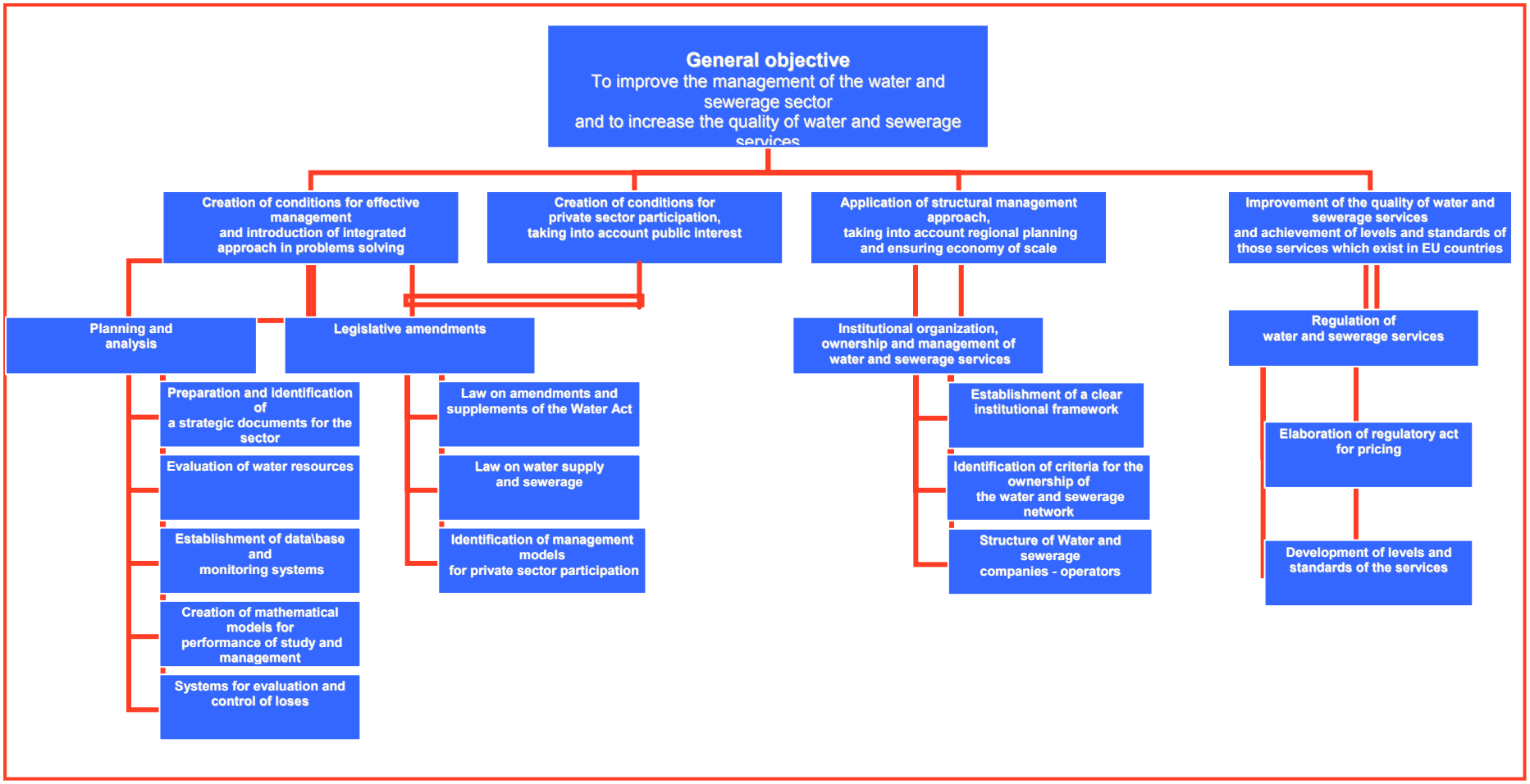
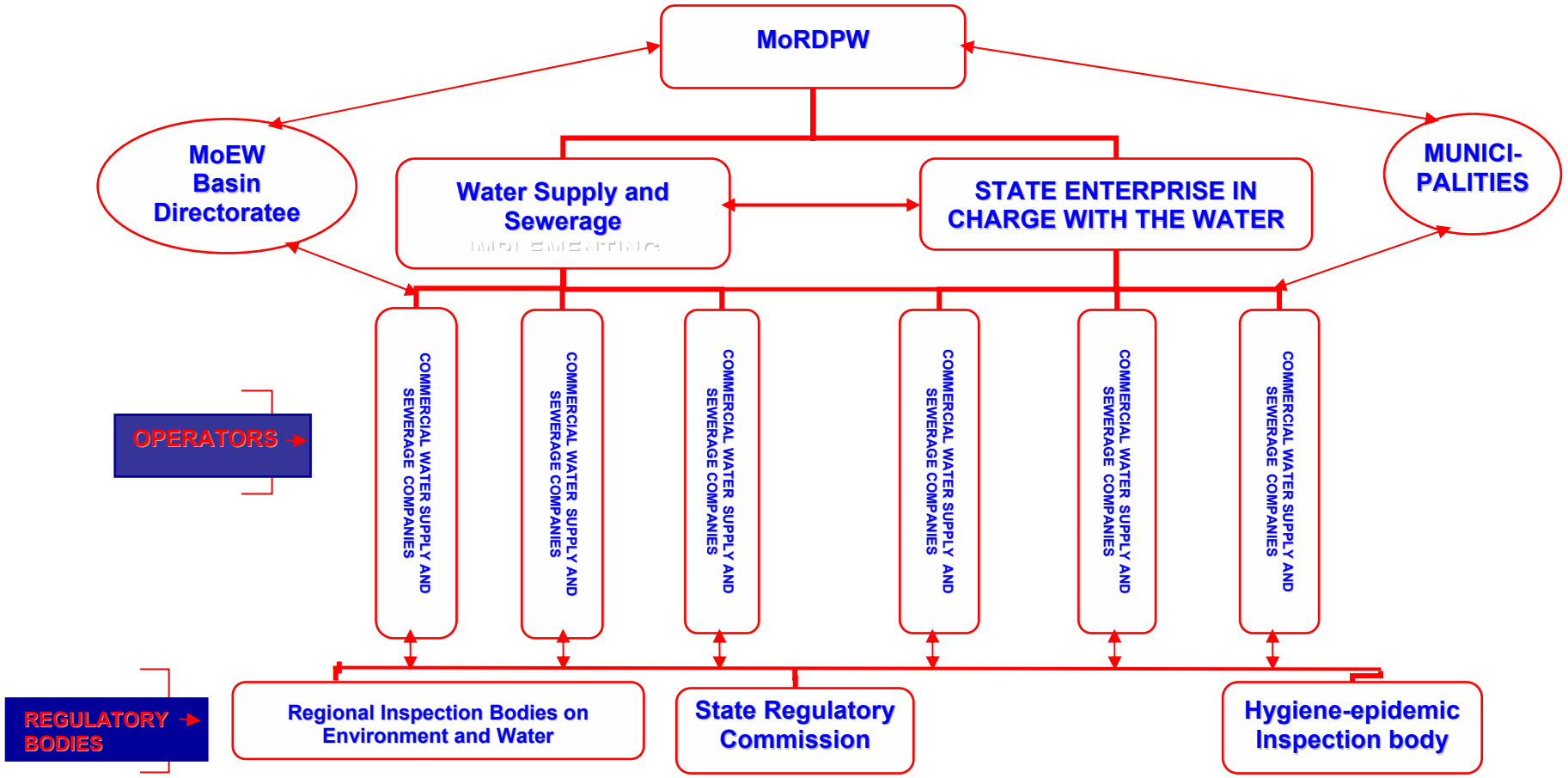
Annex 1: Objectives of The Strategy and Implementation Measures



Annex 2 Institutional Organization of the Water Supply and Sewerage Sector



Annex 3: Water Tariffs of Water Supply&Sewerage Companies in 2003

(without VAT)

BGN/m^3

No.	Water Supply&Sewerage Company	Drinking water			Not clean water	Sewerage		Treated Wastewater			
		Households	Budget organizations	Public sector		Households	Public sector	Households	BOD < 200 mg O_2/l	BOD_5 from 200 to 600 mg O_2/l	BOD_5 > 600 mg O_2/l
1		3	4	5	6	7	8	9	10	11	
1.	***Blagoevgrad***										
	Blagoevgrad region – gravitary water	0.45	0.45	0.50	-	0.05	0.05	-	-	-	-
	Gotze Delchev region – gravitary water	0.42	0.42	0.55	-			-	-	-	-
	Razlog region- gravitary water	0.38	0.38	0.50	-			-	-	-	-
	Pumping water	0.55	0.55	0.75	-			-	-	-	-
2.	***Burgas***										
	Pumping water	0.72	0.78	0.78	-	0.10	0.14	0.30	0.37	0.43	0.58
3.	***Varna***										
	Gravitary water	0.70	0.78	0.78	-	0.14	0.14	0.23	0.23	0.40	0.76
4.	***Veliko Tarnovo***										
	Gravitary water	0.90	1.02	1.02	-	0.08 0.13 (for V. Tarnovo town)	0.08		0.46	0.59	0.80
5.	***Vidin***										
	Pumping water	0.94	0.94	0.94	-	0.14	0.21/0.25	-	-	-	-
	Gravitary water	0.66	0.66	0.66	-	0.11	0.11	-	-	-	-
6.	***Vratza***										
	Pumping water	0.85	0.98	0.98	0.40	0.10	0.10	0.12	0.49	0.55	0.66
	Gravitary water	0.40	0.58	0.58							

No.	Water Supply&Sewerage Company	Drinking water			water	Sewerage		Treated Wastewater			
			Budget organizations	Public sector		Households	Public sector	Households	BOD_5 < 200 mg/l	BOD from	> 600 mg/l
1	2	3		5	6	7	8	9	10	11	12

No.	Water Supply&Sewerage Company	Drinking water			Not clean water	Sewerage		Treated Wastewater			
		Households	Budget organizations	Public sector		Households	Public sector	Households	BOD < 200 mg O_2/l	BOD_5 from 200 to 600 mg O_2/l	BOD_5 > 600 mg O_2/l
1		3	4	5	6	7	8	9	10	11	
7. Gabrovo											
	Mixed water (pumping and gravitary)	1.05	1.05	1.30	1.10	0.13	0.13	0.20	0.70	0.90	1.35 1.70 (> 1000 mg/l)
8. Dimitrovgrad											
	Mixed water	0.93	0.93	1.18	-	0.11	0.11	-	-	-	-
9. Dobrich											
	Pumping water	1.22	1.30	1.30	-	0.07	0.07	0.07	0.15	0.25	0.30
	Gravitary water	0.50									
10. Isperih											
	Pumping water	1.47	1.47	1.47	-	-	-	-	-	-	-
11. Kardjali											
	Pumping water and by Borovitza dam	0.85	0.85	0.85	0.22	0.04	0.04	-	-	-	-
	Gravitary water	0.22	0.22	0.22							
12. Kjustendil											
	Kjustendil	0.85	1.25						0.40		
	Bobov dol	0.95	0.95	0.95	-	0.10	0.10	-	-	-	-
	Trekliano	0.85	1.25	1.25							
	Nevestino	0.85	0.85	0.85							
	Bobochevo	0.80	0.80	0.80							
	Rila	0.62	0.62	0.62							
	Kocherinovo	0.80	0.80	0.80							
	Sapareva bania	0.55									
13. Lovech											
	Mixed water	0.80	0.80	0.90	-	0.08	0.08	-	-	-	-
14. Montana											
	Mixed water (pumping and gravitary)	0.58	0.96	0.96	0.60	0.16	0.16				
	Pumping	0.88	0.96	0.96							
	Gravitary	0.42	0.45	0.45							

	Water Supply&Sewerage Company	Drinking water			water	Sewerage		Treated Wastewater			
		Households	Budget organizations	Public sector			Public sector	Households	BOD < 200 mg/l	BOD_5 from	BOD_5 > 600 mg/l
1	2	3	4	5	6	7	8	9	10	11	12
15. Pazardjik											
	For municipality Pazardjik Pumping water Gravitary water for water supply group "Debrachica"	0.55 0.30	0.55 0.30	0.55 0.30	-	0.10	0.10	-	-	-	-
	For Septemvri and Lesichovo municipality High pumping Low pumping Water supply "Dinkata-Charkovo-Pamidovo"	1.00 0.60 0.80	1.00 0.60 0.80	1.00 0.60 0.80	-			-	-	-	-
16. Pernik											
	Gravitary water	0.45				0.07	0.07				
	Pernik region Pumping and mixed water	0.65	0.65	0.70				0.20	0.35		
	Radomir and Tran region Mixed and pumping water	0.70	0.70	0.75							
17. Pleven											
	Mixed water	0.93	0.93	0.93	-	0.07	0.07	0.07 0.47	0.47	0.57	0.68
	Gravitary water	0.40	0.40	0.40							
	Pumping water	0.60	0.60	0.60	-	0.05	0.05		0.60 0.40 (<25 mg/l)	0.80	1.00
	Gravitary water	0.48									
19. Razgrad											
	Pumping water	1.40	1.40	1.40	0.54	0.062	0.062	0.07	0.13	0.22	0.4
	Gravitary water	0.79	0.79	0.79							

No.	Water Supply&Sewerage Company	Drinking water			Not clean water	Sewerage		Treated Wastewater			
		Households	Budget organizations	Public sector		Households	Public sector	Households	BOD_5 < 200 mg/l	BOD_5 from 200 to 600 mg/l	BOD_5 > 600 mg/l
1	2	3	4	5	6	7	8	9	10	11	12
20. Russe											
	Pumping water	0.70	0.70	0.80	-	0.04	0.06	-	-	-	-
21. Silistra											
	Pumping water	1.25	1.25	1.25	-	0.06	0.06	-	-	-	-
22. Sliven											
	Pumping water	0.92	0.92	0.92	-	0.08	0.08	0.31	0.30	0.32	0.34
	Gravitary water	0.45	0.45								
	Chervenakovo water supply system for Stara Zagora	0.144									
23. Smolyan											
	Pumping water	0.95	0.95	0.95	-	0.05	0.05				
	Mixed water	0.65	0.65	0.65	-			0.45			
	Gravitary water	0.65	0.65								
24. Sofia district											
	I group /gravitary/	0.45	0.45	0.65	-	0.15	0.15				
	II group /mixed/	0.65	0.65	0.90	-			0.40			
	III group /pumping/	0.80	0.80	1.10	-						
25. Stara Zagora											
	Pumping and mixed water	1.02	1.02	1.05	-	0.05	0.05	0.15	0.50		
	Gravitary water	0.57	0.57	0.71							
26. Targovishte											
	Pumping water	1.25	1.25	1.36	-	0.08	0.08	-	-	-	-
	Gravitary water	0.60	0.60	0.60	-			-	-	-	-
27. Haskovo											
	Pumping water	1.25	1.25	1.60	-	0.5	0.5	-	-	-	-
	Gravitary water	0.25	0.25	0.25	-			-	-	-	-
28. Shumen											
	Pumping water	1.13	1.13	1.13	-	0.10	0.10	0.12	0.20	0.35	0.55
	Gravitary water	0.42	0.42	0.42	-						
	Mixed puping water	0.84	0.84	0.84	-						
29. Yambol											
	Pumping water	1.00	1.00	1.00	-	0.083	0.083	-	-	-	-

Source: Ministry of Regional Development and Public Works

Annex 4: Matrix of the Water Supply&Sewerage Problems in Bulgaria

Matrix of the Water Supply&Sewerage Problems in BulgariaProblem	Consequences	Reasons				Level of significance
		Management	Technical	Legislative	Financial	
1. Non-effective functioning of the water supply networks	High % of water losses	Lack of a system for registration of emergency situations and of a system for management of water losses; Lack of a digital cadastre map of the constructed networks; Bad planning; Not covered consumers; Water theft; Frequent change of a management staff; The management staff is not trained at a sufficient level.	Emergency cases and leakage due to depreciated networks, to buildings with deviations and to facilities; Not precise measurement.	Contradictory and not completed legislation Lack of a regulator for water supply and sewerage services, including imperfect methodology for pricing and lack of standards for the definition of the levels of services. Lack of sanctions for the operators Lack of sanctions for the consumers	Lack of enough funds	3
	Non scheduled interruptions of the water supply	Lack of digital models of the networks	Emergency cases and leakage			
	Regime of water supply	Non-effective management of the water resources	High % of water losses; Not sufficient volumes for water accumulation;			
	Low level of tariff's collection by Water and Sewerage Companies	Bad organized billing				
2. Uncompleted construction of water supply networks	Public water supply system does not meet the quality requirements of Regulation №9/ 16.03.2001	Bad planning		Lack of legislation aimed at promotion of private investments	Lack of enough funds	2
3. Lack of Waste Water Treatment Plants	Wastewater does not meet the requirements of Regulation №7/ 1986 for quality of flowing surface waters			Lack of legislation aimed at promotion of private investments	Lack of enough funds	2

4. Non-effective operation of the sewerage networks	Contamination of groundwater and groundwater sources and of river valleys. High infiltration and ex-filtration	Frequent change and not sufficient level of the management staff. Bad planning.	Bad construction; Hard sewerage links.	Lack of legislation aimed at promotion of private investments	Lack of enough funds	2
5. Uncompleted construction of sewerage networks	Contamination of groundwater and groundwater sources and of river valleys.			Lack of legislation aimed at promotion of private investments	Lack of enough funds	2
6. Not enough number of Urban Waste Water Treatment Plants according to the requirements of Regulation №6/2000	Contamination of groundwater and groundwater sources and river valleys			Lack of legislation aimed at promotion of private investments; Lack of models for construction and operation of Urban Waste Water Treatment Plants for big and small settlements.	Lack of enough funds	2
7. Lack of coordination of the investment process in water and sewerage sector	Not enough effectiveness of the investments that have been done	The investments are concentrated in various institutions and there isn't any coordination between them.				1

Ranging of the problems according to their importance

1 – could be overcome, it requires improvement of the management and fairly small amount of investments
2 – difficult to be overcome, it requires improvement of the management, average amount of investments and
3 – very difficult to be overcome, it requires a lot of time, funds and amendments in legislation

Source: MoRDPW

Annex 5: Water Supply&Sewerage Action Plan for the period 2003 – 2015 in Bulgaria

No.	Measure	Required funds, thousand BGN/ thousand Euro	Fund source	Term	Responsible institution
A.	*Short term measures*				
1.	Planning and analyses				
1.1.	Development of methodology for evaluation and management of water losses	10 / 5.11	MoRDPW	31.12.2003	MoRDPW
1.2.	Development of business plans for water and sewerage companies in compliance with the new WSSCs strategy		Water Supply&Sewerage Companies	31.03.2004	MoRDPW
1.3.	Establishment of a digital cadastre of water supply and sewerage networks	150 / 76.7	Water Supply&Sewerage Companies	31.12.2004	MoRDPW
2.	Legislation				
2.1.	Adoption of Water Act amendments and supplements by the Parliament		National financing	31.12.2003	MoEW/ MoRDPW
2.2.	Development of act for the water regulatory body		World bank	30.09.2003	MoRDPW
2.3.	Development of Act for Regulation of the Water Supply and Sewerage Services		National financing	30.09.2005	MoRDPW
2.4.	Approximation of the state and municipality property act with the water legislation		National financing	30.09.2005	MoRDPW
2.5.	Approximation of the accounting and corporate withholding tax act with the water legislation		National financing	30.09.2005	MoRDPW
2.6.	Approximation of the regulation on design,constraction and operation of water supply and sewerage networks and facilities with the EU standards			30.09.2004	MoRDPW
3.	Institutional				
3.1.	Taking out the infrastucture assets of the water and sewerage companies and their conversion into public property		Water Supply&Sewerage Companies	31.12.2004	MoRDPW
4.	Economic				
4.1.	Development of pricing methodology		National financing within MoRDPW	30.06.2004	MoRDPW/ Regulatory body

No.	Measure	Required funds, thousand BGN/ thousand Euro	Fund source	Term	Responsible institution
4.2.	Development of standards for the levels of services		National financing within MoRDPW	31.12.2004	MoRDPW/ Regulatory body
4.3.	Establishment of Water Supply Fund		National financing within MoRDPW	31.12.2004	MoRDPW
B.	*Long term measures*				
1.	Planning and analyses				
1.1.	Development of hydraulic models of water supply and sewerage networks for settlements with over 10000 inhabitants	1000 / 511	Water Supply&Sewerage Companies	31.12.2015	MoRDPW
2.	Programs and projects				
2.1.	Completion and construction of new dams for water supply	500000 / 255646		31.12.2015	MoRDPW
2.2.	Construction of Waste Water Treatment Plants	350000 / 178952		31.12.2015	MoRDPW
2.3.	Reconstruction of water supply networks	1700000 / 869196		31.12.2015	MoRDPW
2.4.	Completion and construction of new sewerage networks for settlements with population:				
2.4.1.	over 10000 inhabitants	402486 / 205788	ISPA, Cohesion Fund, National Financing	31.12.2010	MoRDPW/MoEW
2.4.2.	from 2000 to 10000 inhabitants	879705 / 449786	ISPA, Cohesion Fund, National Financing	31.12.2015	MoRDPW/MoEW
2.5.	Completion, reconstruction and construction of new Urban Waste Water Treatment Plants for settlements with population:				
2.4.1.	over 10000 inhabitants	550383 / 281406	ISPA, Cohesion Fund, National Financing	31.12.2010	MoRDPW/MoEW
2.4.2.	from 2000 to 10000 inhabitants	375583 / 192032	ISPA, Cohesion Fund, National Financing	31.12.2015	MoRDPW/MoEW
2.6.	Development of a program and model for public awareness campaign		National financing within MoRDPW		MoRDPW
	Total required investments	4759317 / 2433400			

Source: Ministry of Regional Development and Public Works

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DANUBE
REGIONAL
PROJECT

September 2004

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

UNDP I GEF
DANUBE
REGIONAL
PROJECT

AUTHORS

Dimitar Tropchev

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

Prepared by:
Dimitar Tropchev

Table of Content:

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.

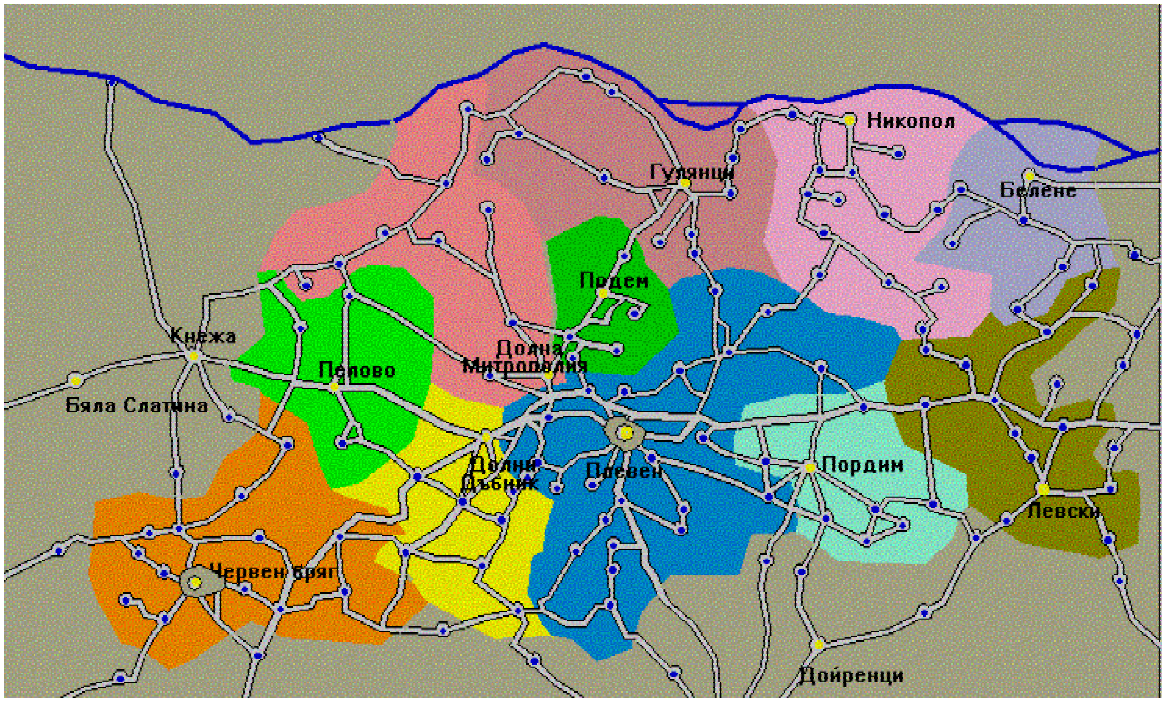
2.1 Pleven Region – General Information

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%

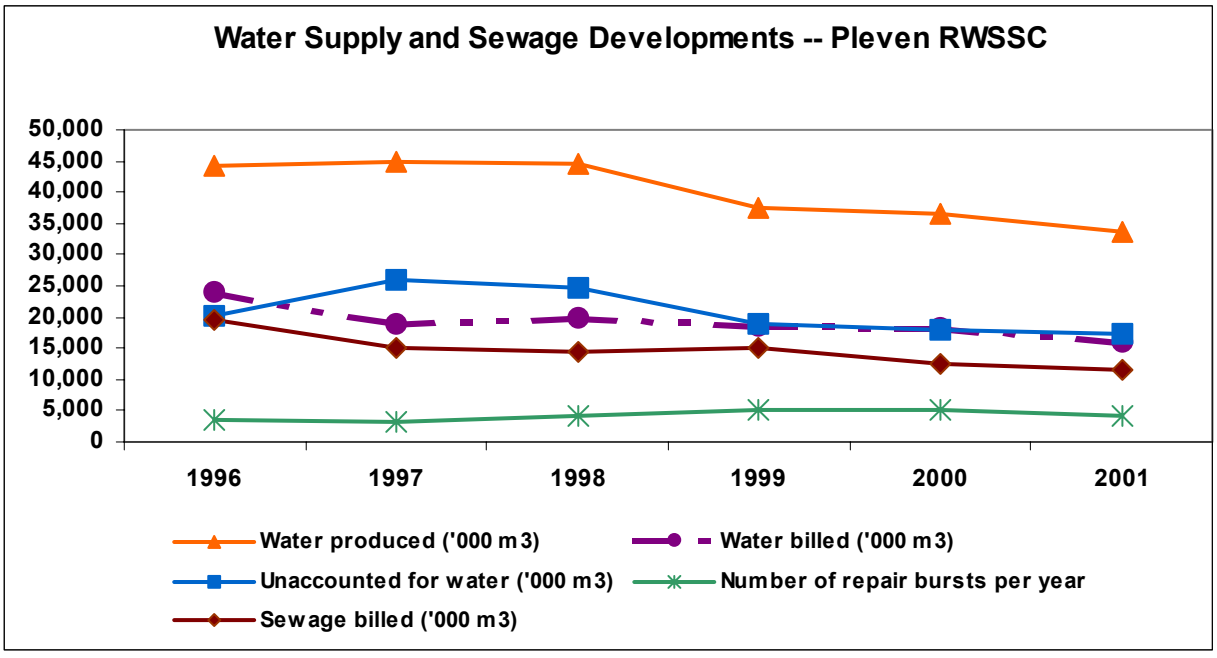
Source: World Bank Loan Program Reports, MRDPW.

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

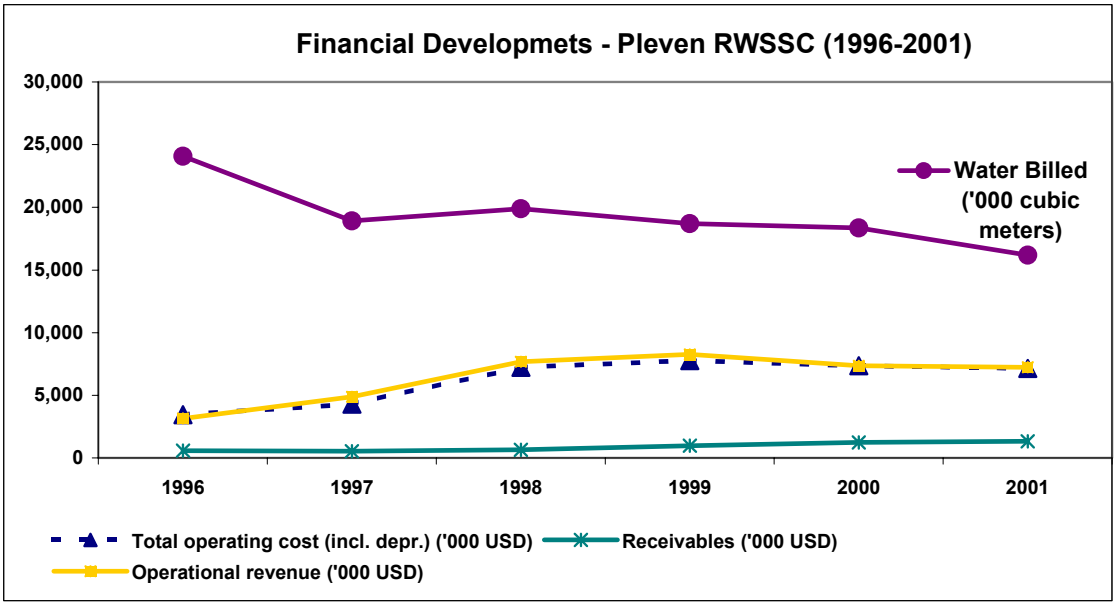


Another finding from Table 1 and later confirmed in Table 3 is the number of employees as compared with the population in the region that uses the services of the water company. The data for 2002 indicates that Pleven RWSSC serves 4% of the population in Bulgaria but account for 7.7% of the total staff 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)

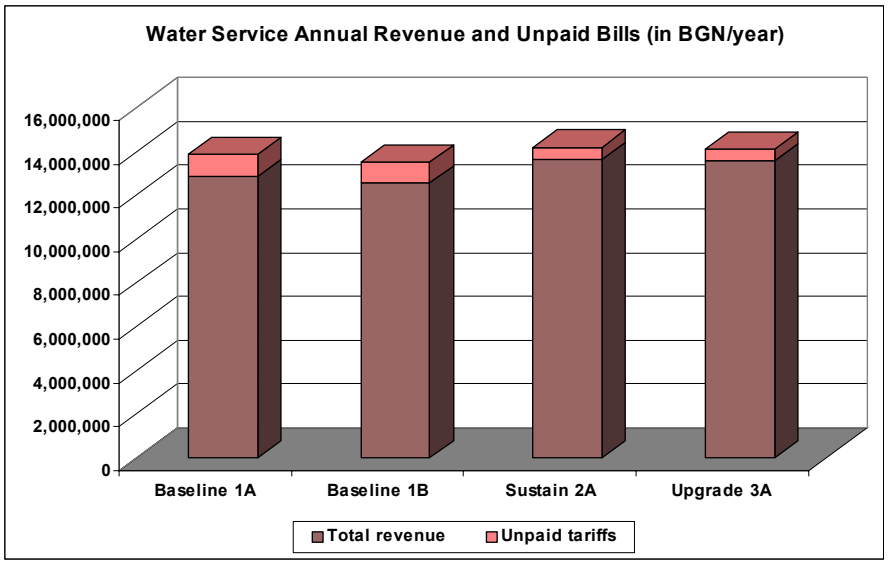
		Water				Wastewater			
Service user category	**Number of Accounts**	**Baseline 1A**	**Baseline 1B**	**Sustain 2A**	**Upgrade 3A**	**Baseline 1A**	**Baseline 1B**	**Sustain 2A**	**Upgrade 3A**
Households A1 (WSc-SNT)	13,669	0.75	0.73	0.80	0.81	0.07	0.10	0.20	0.33
Households A2 (WSc-ST)	54,012	0.75	0.73	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



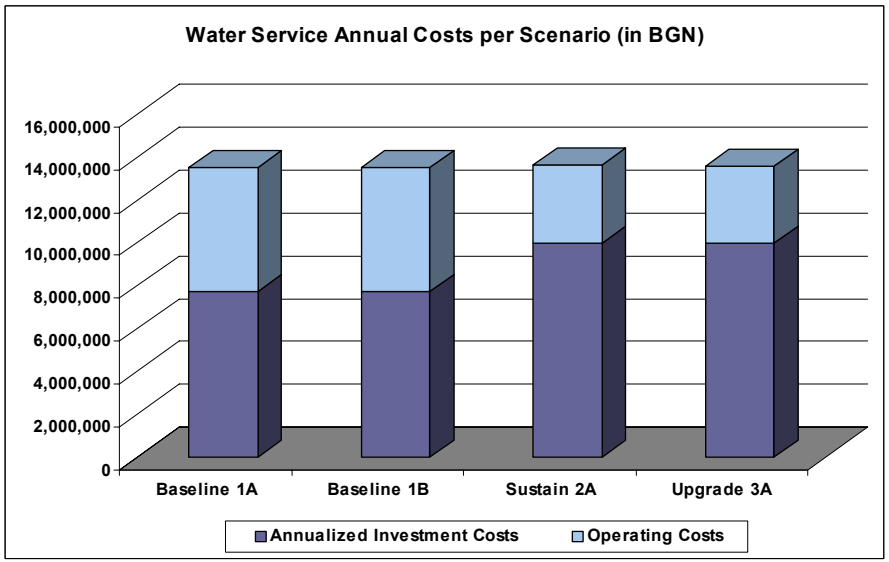
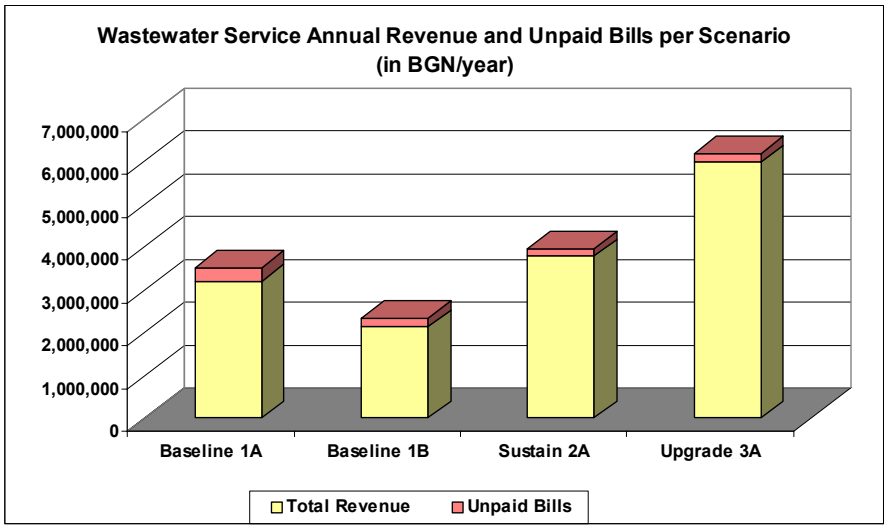


Figure 7 Wastewater Service Revenues and Unpaid Tariffs per Scenario

Figure 8 Water Service Costs Breakdown per Scenario



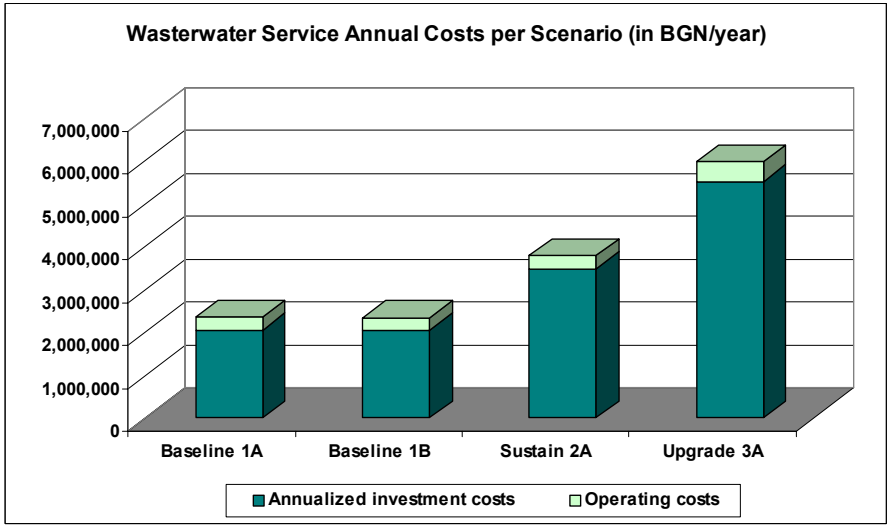


Table 8 Balance of Accounts for Water and Wastewater Services Together (in BGN)

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)

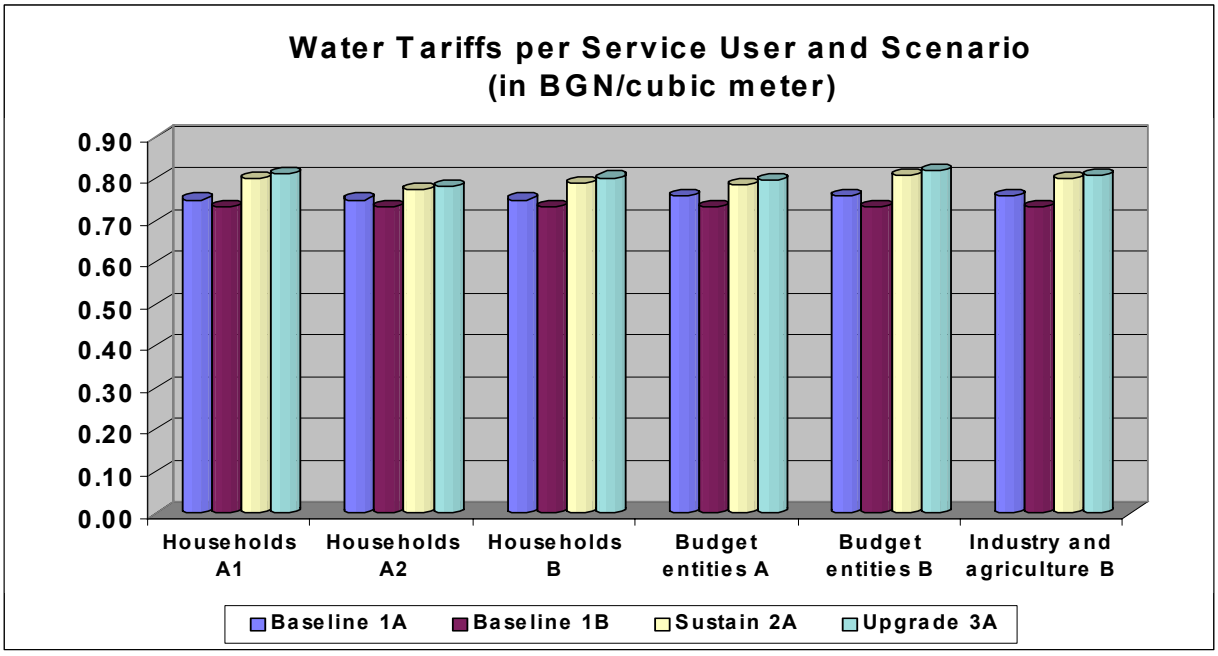
		Water				Wastewater			
Service user category	**Number of Accounts[10]**	**Baseline 1A**	**Baseline 1B**	**Sustain 2A**	**Upgrade 3A**	**Baseline 1A**	**Baseline 1B**	**Sustain 2A**	**Upgrade 3A**
Households A1 (WSc-SNT)	13,669	1,096,673	1,094,992	1,058,376	931,499	877,339	875,994	846,701	745,199
Households 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.

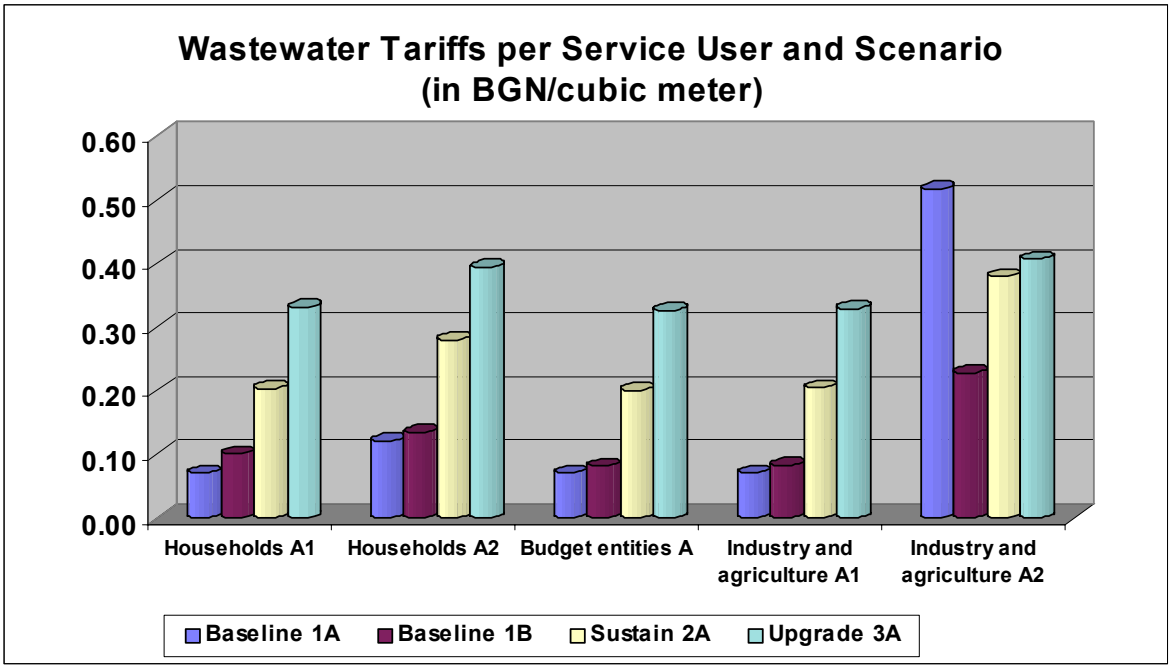
Second basic finding is that even when we raised levels of investment to reduce leakage and improve receivables collection in the *Sustain 2A* scenario, Pleven RWSSC ended up with enough revenue to nearly offset the investment needs (Table 8). Though significant investments were made, it seems that tariffs 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.

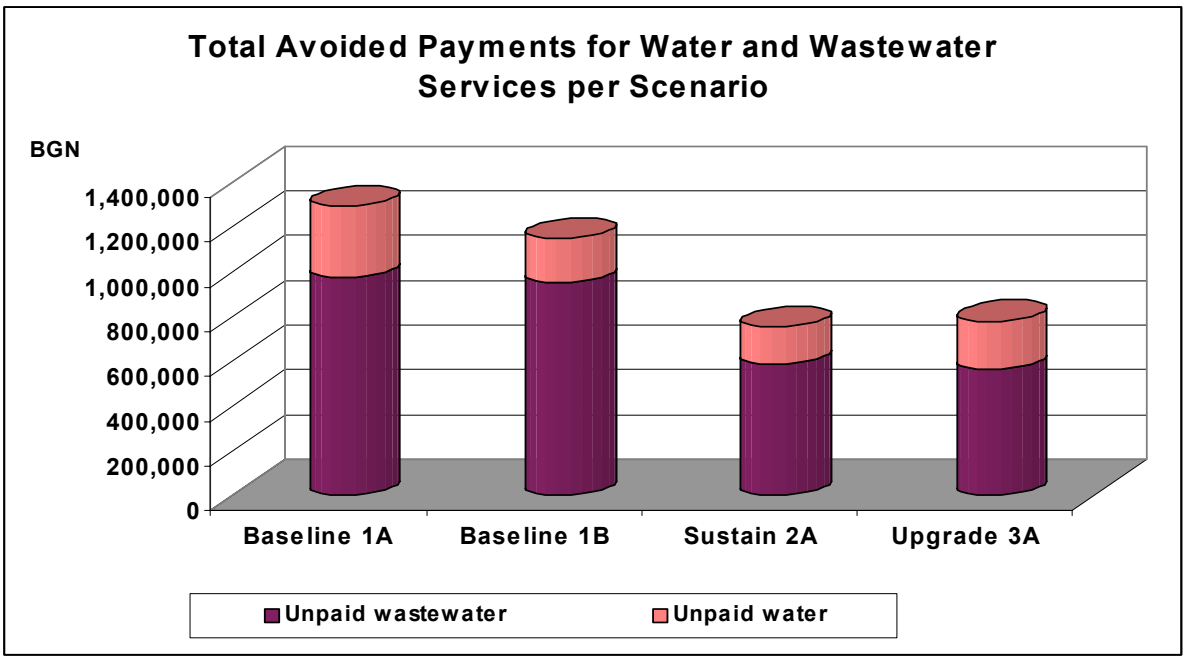
In the additional scenarios we have run leakage was assigned per responsibility in percentage for each type of service users (Appendix II). Due to the complexity of the network that has to reach every subscriber, the fact that it is user's responsibility to maintain the pipes once they have entered his 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).

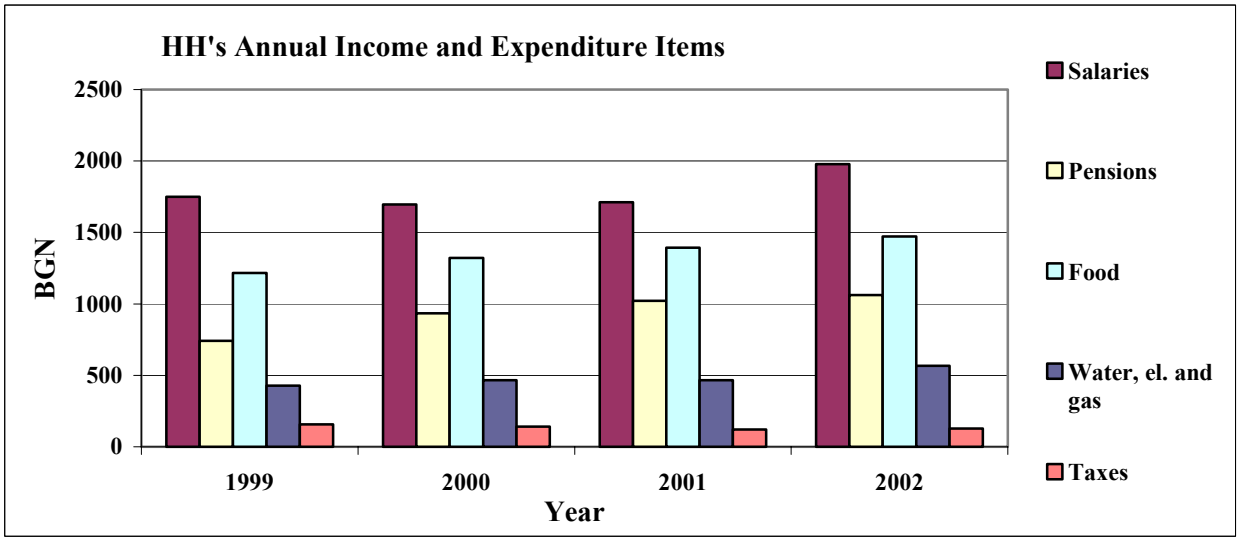
6.2 Overview of Households Income and Expenditure in Bulgaria

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

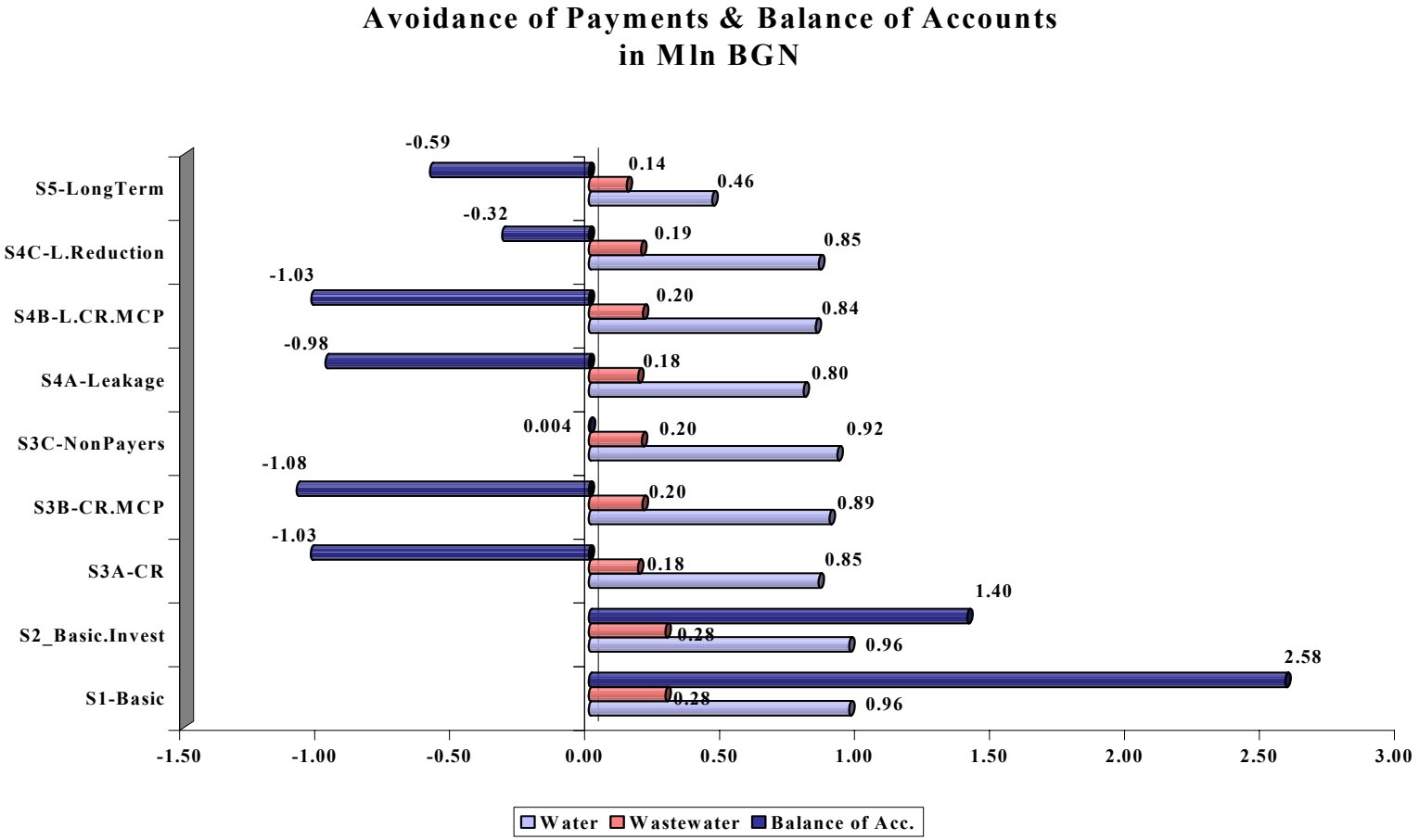


Figure 14 Annual Water and Wastewater Payments per Household (no VAT)

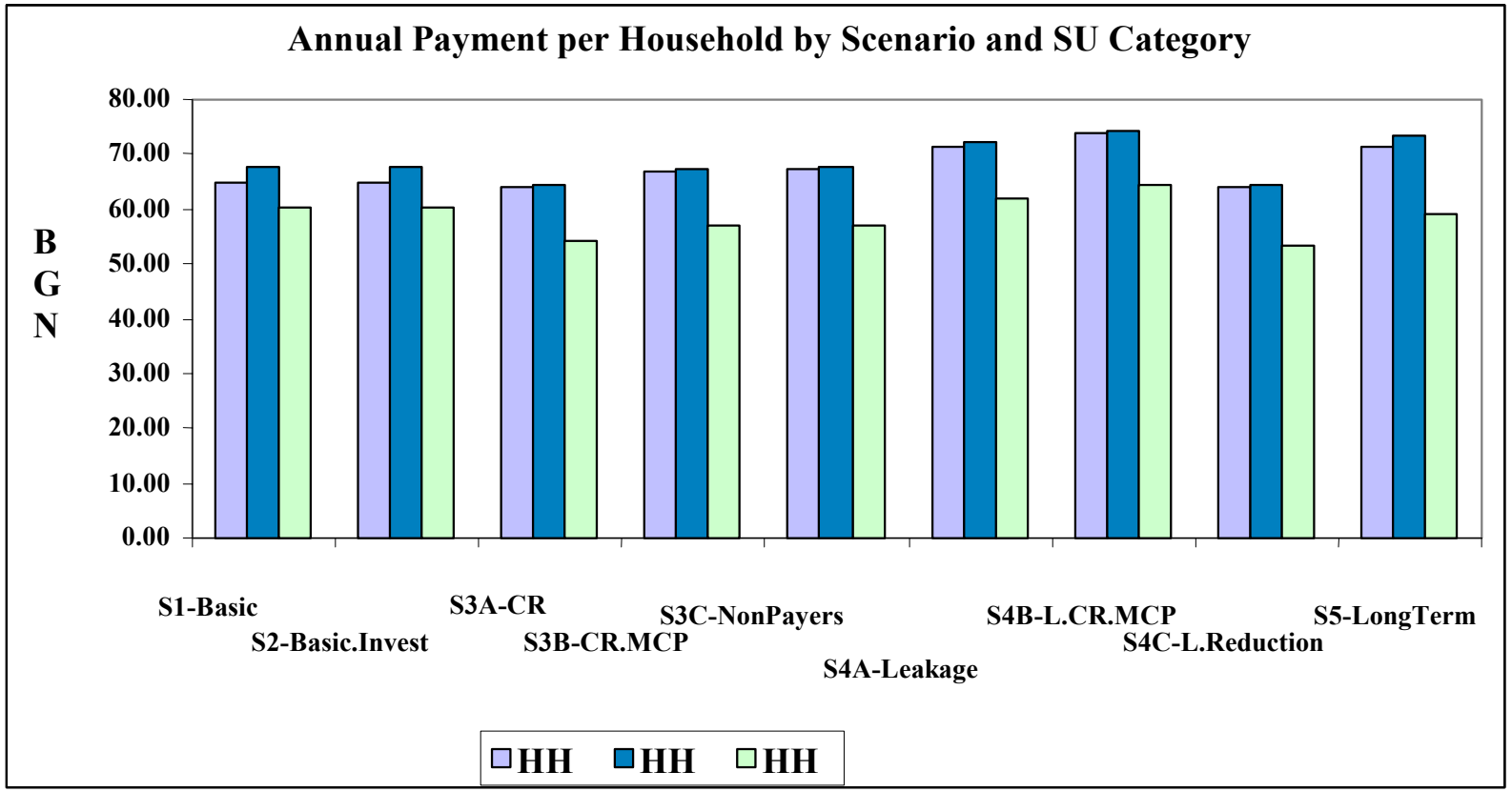


Figure 15 Scenario Breakdown for Total Water Consumption by Category of Service Users (in cubic meters per year)

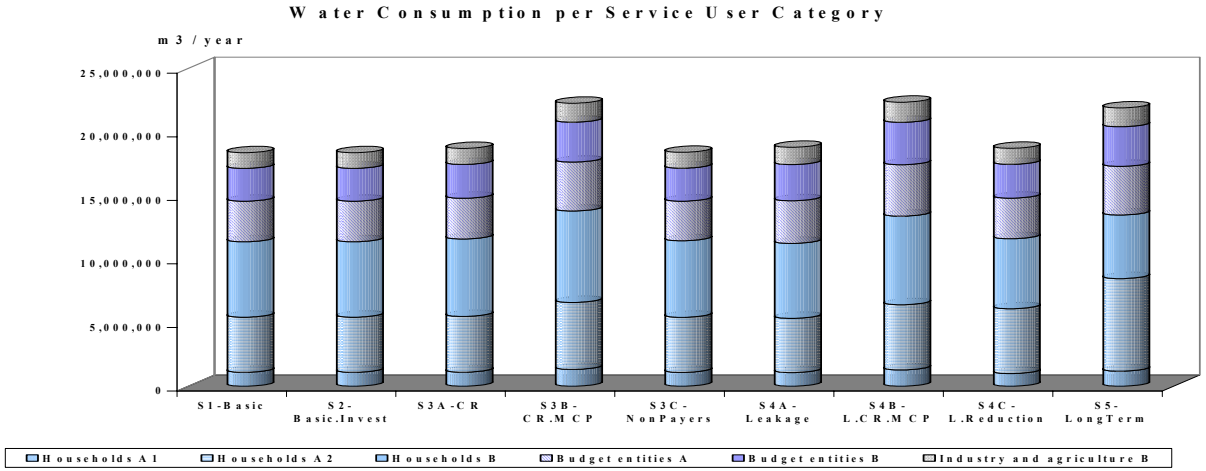
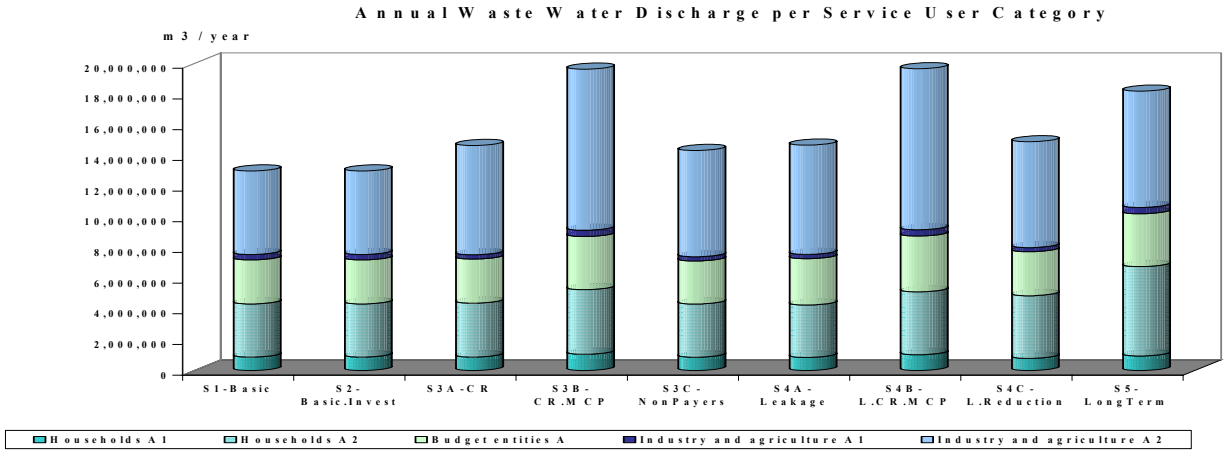


Figure 16 Total Sewage Discharge per Scenario and SU Category.



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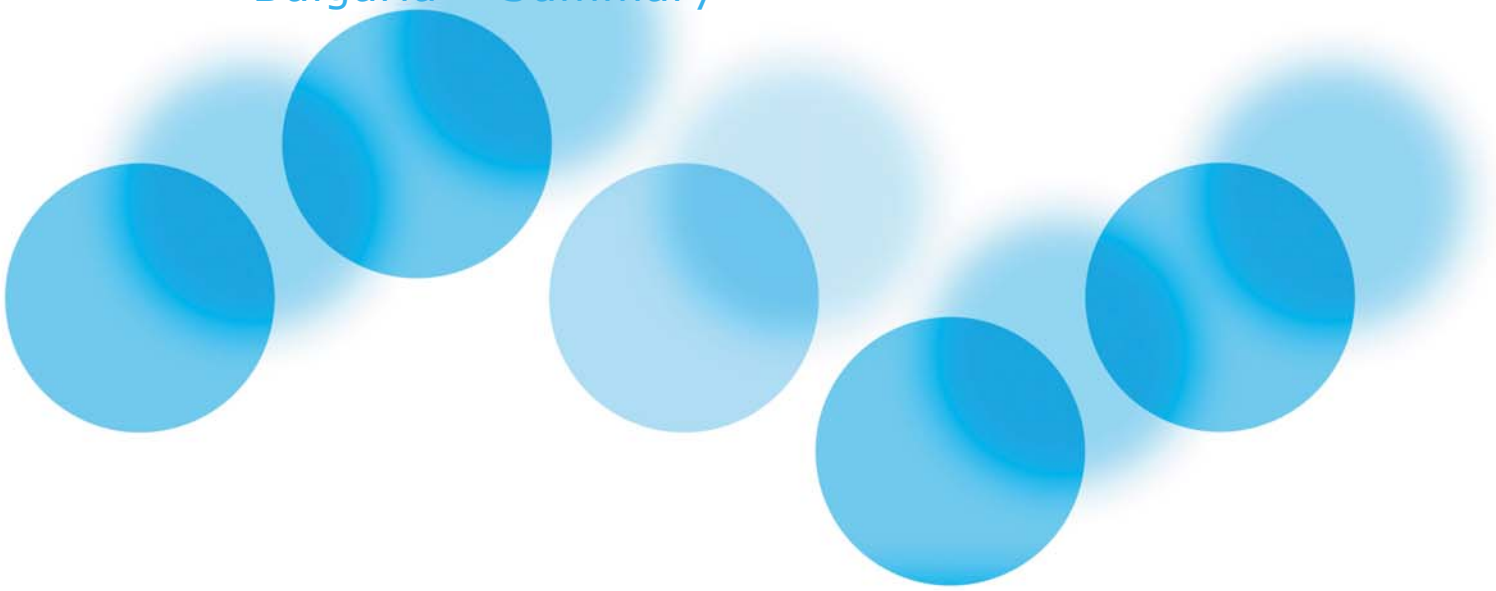
September 2004

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 – Summary



WORKING FOR THE DANUBE AND ITS PEOPLE

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REGIONAL
PROJECT

AUTHORS

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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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Overview of Issues and Proposed Tariff and Charge Reforms: Bulgaria

On its way to European Union accession Bulgaria is facing numerous challenges and is undergoing significant reforms. The changes that take place in water services sector could not be viewed separately from the general changes in regard to environmental protection and regional development policies. It is more than clear that achieving progress in one area and neglecting another would not lead to much success in practice. Moreover, due to the inherited from the past integration of public services, it is not easy to address changes in one area without considering the necessity for change in the whole sector. In that sense when we are discussing reforms related to pollution reduction, we need to examine closer the present situation of the water service sector, the sustainability of operations and potential future developments. That could be the starting point or the basis, which determines the particular framework for reforms consideration and proposals selection.

Speaking about privatization or any other ownership reform for example would be meaningless if not thinking how to prepare the ground for such a change and bring in line all stakeholders' interests and efforts. Local circumstances and conditions could be an obstacle or a benefit for any policy we are trying to promote. That is why when developing the Bulgarian National Profile and Case Study, one of our prime objectives was to be more practical in addressing pressing local (regional) problems. To achieve our goal and implement effective nutrient reduction reforms, we have to prepare the ground for them. First by starting with stabilizing the existing water service system and ensuring its sustainability not just one year from now but also in the future.

The need to assess areas for potential improvements and unutilized resources is vital for the water sector in Bulgaria. In its efforts to reach EU standards and requirements, our country is trying to implement reforms that might not always be effective given the local conditions. For example, the transition from centrally planned economy to a market oriented one requires the transfer of authority related to local policy decisions to municipal governments. However, if we couple that need with the fact that existing infrastructure was built in large national scale not taking much into account any smaller administrative divisions than we have a problem. Adding the state of amortization of that infrastructure and the government budget constraints we have already a big problem.

Bulgarian water supply and sewage companies need investments and government support to handle issues like replacement of outdated equipment, building new WWTPs, increasing the number and coverage of sewage connection, etc. However, if the central budget is limited and there might be obstacles to transfer state resources into private hands what other options are there? One possibility is to try to utilize the available resources. On larger scale, Bulgaria has knowledgeable experts, committed to reforms government and already built though not in ideal shape infrastructure. What we do not have is functioning effluent charges system, effective incentive schemes for industries to commit themselves to pollution reduction and society well aware and active in issues related to environmental protection and resource savings. There are, however, additional, unutilized resources on water companies and government levels that could positively change the present situation.

In the report to follow we will try to show that there are substantial areas for improvement that can be utilized to address the existing problems that Bulgarian water sector is facing. Furthermore, with cooperation, accurate data, and disciplined decision making on the part of policy makers and water units management solutions could be found that reduce water pollution from municipal water systems at a reasonable cost. In addition the current steps taken towards better strategic government planning and vision for the future of the sector as outlined in the National Priority Programs, cooperation projects between Ministry of Regional Development and Public Works and Ministry of Environment and Waters, give signals for positive developments in that direction. The envisaged involvement of the private sector participation in the operation and management of the water companies could also contribute for the resolution of the problems arising in the case of state acting as both owner and regulator trying to protect socially disadvantage groups of the population.

The unutilized resources and areas for improvement in question could be divided in several streams. One of them is related to the possible reassessment of existing tariffs and charges design mechanism

so that they reflect real costs of production. The present practice is that only water billed to consumers is taken into account and expenses that are related to investment and water losses above 25% are not considered. Another area for improvement is related to the cross subsidizing among service users. Industrial users pay in general higher water and waste water tariffs than budget entities and households. Though aimed to protect social interests, such a redistribution create few incentives for water saving and its efficient use. It could also very well erode profits for water companies as industry has better options to shift to alternative sources (its own) of water supply. In addition the current practice of pollution fines encourages in some cases firms to pay and pollute instead of build WWTPs or take other measures to prevent pollution.

Yet third stream of unutilized resources comes from the shift in management and organizational practices towards pro-service and cost-reducing decision-making. The use of these is aimed to make good, transparent choices about investments and increase the collection efficiency of outstanding debt that most of the water companies carry for more than a year. The need for good, long term investment decisions is more and more pressing as the equipment and distribution network are depreciating further and have to be replaced. The potential dilemma, in case the objective is met, would be how any net-revenues from higher tariffs are to be invested so that to have practical beneficial effect.

Recently much hope is laid on the positive effects of private sector participation in the water sector. Apart from additional capital to increase investment opportunities, the interest-driven efficiency gains in daily operations could be more than the when the water company was state controlled. However, where some people see benefits other see danger. The usual concern is that private owners would not care about the socially disadvantaged part of the community and would probably exploit the company equipment and infrastructure with the objective to obtain short-term economic profits. That would threaten the long run sustainability and availability of water services or at least face community with substantial costs to repair the damages.

The possible areas for improvement and unutilized resources have their costs and each carry some potential risks. It will be our goal not only to address them but also to render their use meaningful through practical implementation in concrete reform proposals. In this sense, a major task throughout the National Profile and the Case Study analysis will be not only to present a detailed overview of the local conditions with existing problems and possible areas for improvement but also to try to develop a basis for selection among potential reform proposals. For the purpose of the present study we will attempt to recommend those that have relevance to ensuring the sustainability of the system and resulting in possible upgrades related to the efficiency of operations and closely linked to water pollution reduction and service quality.