REPUBLIC OF BULGARIA
MINISTRY OF REGIONAL DEVELOPMENT

STRATEGY FOR DEVELOPMENT AND MANAGEMENT OF THE WATER SUPPLY AND SANITATION SECTOR IN THE REPUBLIC OF BULGARIA 2014 - 2023

(Approved by Council of Minister's Decision No 269 of May 7, 2014)

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ABBREVIATIONS AND ACRONYMS

AC pipes	Asbestos cement pipes
CAPEX	Capital expenditures
CoM	Council of Ministers
EEA	European Environment Agency
EU	European Union
EUR	Euro
GoB	Government of Bulgaria
FLAG	Fund for Local Authorities and Governments
IFIs	International Financial Institutions
IAWBD	Internationale Arbeitsgemeinschaft fuer WasserBetriebe in der Donau Gebiet
IWA	International Water Association
JASPERS	Joint Assistance to Support Projects in European Regions
MIDP	Municipal Infrastructure Development Project
MOEW	Ministry of Environment and Water
MP	Master Plan
MRD	Ministry of Regional Development
NSI	National Statistical Institute
OPE	Operational Programme Environment
OPEX	Operating expenditures
PAG	Program Advisory Group
PER	Public Expenditure Review
PPP	Public Private Partnership
SEWRC	State Energy and Water Regulatory Commission
SFP	Strategic Financing Plan
TA	Technical Assistance
UIS	Unified Information System
UWWTD	Urban Wastewater Treatment Directive
UWWTP	Urban Wastewater Treatment Plant
WA	Water Act
WSSA	Water Supply and Sanitation Association
WSSC	Water Supply and Sanitation Company
WSS	Water Supply and Sanitation
WTP	Water Treatment Plant
WWT	Wastewater Treatment
WWTP	Wastewater Treatment Plant

The information, presented in this document, has been created within the period September 2012 – May 2013 and has served as a basis for the development of the Strategy for Development and Management of the WSS Sector in the Republic of Bulgaria 2014 – 2023.

This document has been prepared within Project № DIR-5111328-1-170 „Support for the reform in the WSS Sector”, implemented with the financial support of OP „Environment 2007 – 2013 г.”, co-financed by the European Union through the European Cohesion Fund

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Appendix 1: EU Legislation, National Legislation and Legal Definition of WSS terms

List of Relevant EU Regulations and National Transposing Legislation

DIRECTIVE 2000/60/EC of the European Parliament and the Council of 23 October 2000 establishing a framework for Community action in the field of water policy	Water Act (promulgated SG, No 67 of 27.07.1999, enforced 28.01.2000, last amendment, SG No 82 of 26.10.2012, enforced 26.11.2012)
	Ordinance No H-4 of September 14, 2012 on the characterization of surface water (promulgated SG, No.22 of March 5, 2013, enforced March 5, 2013)
	Ordinance No 1 of April 11, 2011 on water monitoring (promulgated SG, No 34 of April 29, 2011, enforced April 29, 2011, amended and supplemented, No 22 of March 5, 2013, enforced March 5, 2013, amended, No 44 of May 17, 2013, enforced May 17, 2013)
COUNCIL DIRECTIVE 98/83/EC of 3 November 1998 on the quality of water intended for human consumption	Ordinance No 9 of 16.03.2001 on the quality of water intended for drinking and household purposes (promulgated SG, No.30 of 28.03.2001, amended and supplemented SG No1 of 04.01.2011)
COUNCIL DIRECTIVE 91/271/EEC of 21 May 1991 concerning urban waste-water treatment	Water Act (promulgated SG, No 67 of 27.07.1999, enforced 28.01.2000, last amendment, SG No 82 of 26.10.2012, enforced 26.11.2012)
	Ordinance No 7 of 14.11.2000 on the terms and conditions for the discharge of waste industrial water into the municipal sewarage systems (promulgated SG, No 98 of 01.12.2000)
	Ordinance No 2 of June 8, 2011 on the issue of permits for discharge of wastewater in water bodies and setting individual emission limits for point source pollution (promulgated SG, No 47 of 21.06.2011, enforced 21.06.2011, amended, No 14 of 17.02. 2012, enforced , 17.02. 2012, supplemented No 44 of 17.05. 2013, enforced 17.05. 2013)
	Ordinance on the order and procedure for the use of wastewater sludge for agricultural purposes (promulgated SG, No 112 of 23.12.2004)
	Ordinance № 6 of 09.11.2000 on the emission norms for the admissible content of harmful and dangerous substances in wastewater discharged in water bodies (promulgated SG, No 97 of 28.11.2000, amended and supplemented SG No 24 of 23.03.2004, enforced 23.03.2004)
	Ordinance on the long-term levels, conditions and procedures for setting the annual target levels of indices concerning the quality of water supplying and sewarage services (promulgated SG, No 32 of 18.04.2006, enforced 18.04.2006)
COUNCIL DIRECTIVE 80/68/EEC of 17 December 1979 on the protection of groundwater against pollution caused by	Ordinance No 2 of 13.09.2007 on the protection of water from pollution with nitrates from agricultural sources (promulgated SG, No 27 of 11.03.2008, enforced 11.03.2008)

certain dangerous substances (Termination date 21.12.2013)	Ordinance No 3 of 16.10.2000 on the terms and conditions for research, design, approval and operation of the sanitary protective zones around water sources and facilities for drinking and household purposes and around mineral water sources, used for medical, prophylactics, drinking and hygiene purposes (promulgated SG, No. 88 of 27.10.2000)
	Ordinance No 2 of 08.06.2011 on the issue of permits for discharge of wastewater in water bodies and setting individual emission limits for point source pollution (promulgated SG, No 47 of 21.06.2011, enforced 21.06.2011, amended No 14 of 17.02. 2012, enforced 17.02. 2013, supplemented No 44 of 17.05.2013, enforced 17.05.2013)

List of Relevant National Regulations

Water Act (prom. SG. 67/27.07.1999) and the regulations for its implementation:

- ORDINANCE No 1 from 10.10.2007 for research, use and protection of groundwater (prom. SG. 87/30.10.2007)
- ORDINANCE No 3 from 16.10.2000 on the terms and conditions for research, design, approval and operation of sanitary protective zones around water sources and facilities for drinking water, and sources of mineral waters used for therapeutic, prophylactic, drinking and sewerage (promulgated SG. 88/2000)
- ORDINANCE No1 of April 11, 2011 23.04.2007 on Water Monitoring (promulgated SG. 34/ 29.04.2011; enforced 29.04.2011, amended and supplemented No 22of 05.03.2013, enforced 05.03.2013, amended No.44 of 17.05.2013, enforced 17.05.2013);
- ORDINANCE No 6 from 09.11.2000 on the emission standards for the levels of harmful and dangerous substances in wastewater, discharged into water points (promulgated SG. 97/ 28.11.2000)
- ORDINANCE No 7 from 14.11.2000 on the procedures for discharging industrial effluents into the sewerage system of the towns and villages (promulgated SG. 98/ 1.12.2000)
- ORDINANCE No 9 from16.03.2001 on the quality of drinking water (promulgated SG. 30/28.03.2001)
- ORDINANCE No 2 from 08.06.2011 on issuing permits for discharging wastewater into water points and setting individual emission limits for local sources of pollution (promulgated SG. 47 of 21.06.2011, enforced 21.06.2011, amended, No 14 of 17.02.2012, enforced 17.02.2012, supplemented No.44 of 17.05. 2013, enforced 17.05. 2013)
- ORDINANCE No 12 from 18.06.2002 on the quality requirements for surface water, for drinking purposes (promulgated SG. 63/ 06/28/2002)
- ORDINANCE No H-4 of September 14, 2012 on the characterization of surface water (promulgated SG, No.22 of March 5, 2013, enforced March 5, 2013)
- ORDINANCE No 13 from 29.01.2004 on the procedures for carrying out the technical operation of dams and associated facilities (promulgated SG. 17/2.03.2004)

ACT for Regulating Water supply and Sewerage services Prom. SG. 18/25.02.2005, in force from 20.01.2005, and the regulations for its implementation:

- Ordinance on price regulation for water-supply and sewerage services: sets the methodology to determine costs of water and sewerage services, provided by water and sewerage operators;
- Ordinance on the long-term levels, terms and procedure for setting the annual target levels of quality indices for water and sewerage services: sets the long-term levels of indices for quality of water and sewerage services, the terms and procedures to set annual target levels for the quality of such services and the accounting methods for them, the elements and business plan parameters and control procedures for their execution;
- Ordinance No 1 on the endorsement of a Methodology for setting the admissible water losses in the water-supply systems: the methodology establishes the rules to exercise control over the state of water supply systems in urban territories and analyze the situation thereof, including the total loss of water;
- Ordinance on the terms and procedure to register water and sewerage operators control experts: sets the terms and procedure of registering the experts who assist the State Energy and Water Regulatory Commission;
- Tariff of fees, collected by the State Energy and Water Regulatory Commission under the Water and Sewerage Services Regulation Act: sets the amount of annual water and sewerage regulation fee;
- Rules on the structure and organization of the State Energy and Water Regulatory Commission: issued pursuant to the Energy Act, but also regulating the Commission's activity as a water regulator.

ACT for Spatial Planning Promulgated SG. 1 from 2.01.2001, in force from 31.03.2001, in particular **Chapter Four** thereof**, "Networks and facilities of the physical infrastructure"** and the set of ordinances, applicable in the water and sewerage services provision:

- Ordinance No 2 of March 22, 2005 on the design, construction and operation of water-supply systems;
- Ordinance No RD-02-20-8 of May 17, 2013 on the design, construction and operation of sewerage systems (promulgated SG, No.49 of June 4, 2013, enforced July 5, 2013)
- Ordinance No 4 of June 17, 2005 on the design, construction and operation of water- supply and sewerage systems in buildings;
- Ordinance No 7 of December 22, 2003 on the rules and standards for planning of individual types of territories and spatial development zones (Chapter Fourteen „Water-supply and sewerage network and facilities structure");
- Ordinance No 8 of July 28, 1999 on the rules and standards regulating the deployment of physical conduits and facilities in urbanized areas,

Law on Environmental Protection (Prom. SG. 91/25.09.2002) and the sub delegated legislation for its implementation.
Biological Diversity Act (prom. SG. 77/9.08.2002) and the sub delegated legislation for its implementation.
MOEW Ordinance No. 2 (June 8, 2011) on wastewater discharge
Law on Waste management (Prom.SG 63/ 13.08.2010)

- ORDINANCE on the terms and procedures for utilization of sludge from wastewater treatment through its use in agriculture (Prom.SG.112/23.12.2010)

List of Legal definitions in the WSS sector

WATER-SUPPLY AND SEWERAGE		
water-supply system	a totality of facilities for the extraction of natural waters, their treatment and/or decontamination until attainment of the requisite quality, and their storage, transfer, distribution and supply to the corporeal immovables of consumers	§ 1, Para 1, Item 32 of the SP of the WA
sewerage system	a totality of sewer branches, street sewer networks in the urbanized areas, main collector sewers and treatment plants or treatment facilities wherethrough the waste waters and/or the rain waters are removed from the corporeal immovables of consumers, are treated and, where necessary, decontaminated until attainment of the requisite quality, and are discharged into the relevant water site	§ 1, Para 1, Item 33 of the SP of the WA
water intended for human consumption	surface or ground waters, either in their original state or after treatment, intended for drinking, cooking or other household purposes, supplied through a water-conduit system or from a tank truck, in bottles, cans or other packaging, as well as the waters used for the manufacture of food, medicinal or cosmetic products or substances intended for human consumption in case the quality of the water may affect the quality of the products in their finished form	§ 1, Para 1, Item 36 of the SP of the WA
water services	all services which provide water for households, public institutions or any economic activity, through water abstraction, impoundment, storage, treatment and distribution of surface waters or ground waters, as well as waste-water collection, removal and treatment through treatment facilities which subsequently discharge into surface water bodies	§ 1, Para 1, Item 74 of the SP of the WA
water use	water services together with any other human activity related to water withdrawal, water site use and land use, with regard to which, upon characterization of water bodies performed under the conditions of the Ordinances cited in Article 135, Para 1, Item 2 and 9 of the WA, it has been established that it is an activity having a significant impact on the state of waters; such services and activities are taken into account when conducting the economic analysis under Article 192, Para 2, Item 1 of the WA	§ 1, Para 1, Item 80 of the SP of the WA
water-conduit network	an element of the water-supply system in the urbanized area, consisting of conduits and the adjoining facilities thereof for distribution and transfer of water to consumers	§ 1, Para 1, Item 82 of the SP of the WA

sewer network	an element of the sewerage system in the urbanized area, consisting of conduits and the adjoining facilities thereof for removal of wastewater from consumers to the main collector sewers outside the urbanized areas	§ 1, Para 1, Item 83 of the SP of the WA
regional water and sewerage utility	a water and sewerage utility operating in the territory of multiple municipalities	§ 1, Para 1, Item 85 of the SP of the WA
municipal water and sewerage utility	water and sewerage utility operating in the territory of a single municipality	§ 1, Para 1, Item 86 of the SP of the WA
water-supply and sewerage services	the services of treatment and delivery of water intended for drinking and household uses, industrial uses and other uses, of removal and treatment of waste water and run-off rain water from the corporeal immovables of consumers within urbanized areas (the nucleated and dispersed settlements), as well as the activities of construction, maintenance and operation of the water-supply and sewer systems, including the treatment plants and the other facilities	Article 1, Para 2 of the WSSSRA
water and sewerage utilities	all enterprises whereof the objects are provision of water-supply and sewerage services	Article 2, Para 1 of the WSSSRA
non-revenue water	difference between the volume of water abstracted, entering the water-supply system, and the billed water consumption	§ 1, Item 10 of Ordinance on the Setting Up of Annual Target Levels for Quality Assessment of Water-Supply and Sewerage Services

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Appendix 2: SWOT Analysis

STRENGTHS
• European water and wastewater Directives are fully transposed in the national legislation and BNS. • Overall the country is not water stressed and has the necessary water resources for drinking water supply. • The country has almost universal centralized water supply coverage and good quality of the drinking water. • Significant number of WSSCs deliver services at regional level. • Qualified WWS specialists are available to work in the sector.
WEAKNESSES
✓ Uneven distributions of the water resources throughout the country leading to water rationing in a number of settlements. ✓ The quality of the drinking water in small water supply zones is not up to the standards. ✓ Failure on behalf of the WSSCs to comply with the European legislation, concerning the volume and frequency of drinking water quality monitoring. ✓ Heavily under-maintained water supply and sanitation assets and large water losses (around 60%). ✓ Wastewater collection and treatment coverage is not compliant with the legal requirements and as a result the sector needs significant investments. ✓ Low productivity and poor remunerations in the WSS sector. . ✓ Many WSSCs are unable to invest due to low working ratio (operational expenses/operational revenues). ✓ SEWRC lacks administrative capacity and the necessary autonomy to adequately address the problems of the sector. ✓ Lack of autonomy of WSSCs managers leading to problems with the sustainability of both the companies and the WSS services. ✓ Low households income, leading to the need of social assistance among others for the payment of WSS bills. ✓ Systematic lack of financing for the sector. ✓ Difficulties in operation and maintenance of WSS assets due to different ownership structures are requirements.
OPPORTUNITIES
o A growing understanding that a restructuring of the WSS sector is needed. o Availability of EU Grant financing to address significant part of the required compliance investments. o High level central and local governments support to achieve compliance with ecological requirements. o Introduction of WSSCs benchmarking system could enhance productivity.

- Consolidation of WSSCs could enhance productivity.
- Changes to the regulatory framework to introduce WSSCs' specific approach.
- Regional approach for the design, financing, implementation and management of investments in the WSS sector.
- State social support to the vulnerable groups to address WSS services affordability and acceptability issues.
- Creation of comprehensive WSS law.

➢ THREATS

- Global climate changes leading to drought zones create significant risk to the water supply for the population and industry.
- Vulnerable households spending on WSS services are endangered due to the slow increase of their purchasing power.
- Secondary and University systems do not “produce” the necessary specialist for the WSS sector.
- Inability to implement of the changes to the Water Act from 2009 concerning the ownership of the WSS assets without amendments to the regulations.
- Negative demographic trend leading to depopulation and low water consumption.
- Significant number of small WSSCs cannot invest significant amounts to achieve environmental compliance and provide services as per the requirements of the law.
- Delay in Regional WSS Master plans approval and implementation leading to further ad hoc problem solving in the sector;
- Lack of capital subsidies from the central budget for the sector;
- EU environmental grant funds not fully absorbed;
- Political interference to operational decisions taken by WSSCs and SEWRC.

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Appendix 3: Expenditure and funding scenario – Assumptions and Results

1. METHODOLOGY, DATA AND ASSUMPTIONS FOR CALCULATION OF CAPITAL AND OPERATIONAL EXPENDITURE NEEDS

The capital and operational expenditure models have been developed to achieve the following objectives by 2038:

- Wastewater collection:
  - 75% coverage for household users;
  - 100% coverage for non-household users.
- Wastewater treatment:
  - 75% coverage for household users;
  - 100% coverage for non-household users.
- Reduction of NRW to 30%[1].
- Sustainability of water resources in order to address raw water scarcity.

Approach in Undertaking CAPEX Estimates

Structuring the CAPEX models

In developing the CAPEX models we've looked at the overall management and operations of a typical water utility. Therefore, the capital expenditure plans were structured to cover the following functions:

- Water Supply Estimated Investments:
  - Abstraction sources (reservoirs/gravity sources/wells/boreholes, etc.);
  - Water treatment (DWTP/Disinfection facilities);
  - Transmission pipes;
  - Pumping stations;
  - Service reservoirs;
  - Distribution pipes
  - Revenue meters.
- Wastewater Estimated Investments:
  - Rehabilitation of large collectors;
  - Rehabilitation of sewer network;
  - Rehabilitation of wastewater pumping stations;
  - Construction of new sewers;
  - Rehabilitation of existing WWTPs;

[1] 30% NRW will in actual fact be achieved in 2039, as investments carried out in 2038 will contribute to achiev-ing this objective.

  - Construction of new WWTPs;
  - Sludge disposal.
- Other Investments:
  - Vehicles;
  - Heavy plant and machinery.
- Business systems:
  - Laboratories;
  - MIS.

Calculating the Investment Needs

In developing the capital expenditure models, we’ve used data provided from the WSS regional masterplan assignments. The masterplan assignments are contracts carried by international consultants for the Ministry of Regional Development. Three consortiums are engaged to prepare the Master Plans and short-term, medium-term and long-term investment programs for the separate districts, as the country is subdivided into three regions: Eastern, Central and Western. Unfortunately, only few full master plans (to include short, medium & long term investment programmes) were made available to the team. However, short term investment programmes (STIP) for all three regions were presented to us. In view of this, we’ve developed a methodology for calculating the investment needs for those regions that only have short term investment programmes. The section below describes in detail the methodology applied for calculating the capital expenditure needs, steps taken and assumptions applied.

Using the investment estimates from the WSS master plans

At the outset of the assignment, two Regional master plans were made available to us and a Master Plan (MP for agglomerations of over 10 000 p.e.): (a) RMP for Pernik, (b) RMP for Yambol and (c) MP for Botevgrad. For those districts that the draft plans have been developed (Pernik and Yambol), the investments included in these documents were taken into account. The information from Botevgrad investment plan has been added to the investment needs of the corresponding district – Sofia Oblast.

In studying the plans, we’ve noted that they are rather oriented towards the implementation of projects addressing, for instance, water quality issues, compliance with EU directives and replacing specific sections of the networks. Therefore the team has decided to built on the RMP investments in order to prepare a capital planning expenditure programme with the aim to meet the objectives of the Strategy.

The approach in calculating the additional investments is described below (in steps 2 to 4).

Using the investment estimates from the short-term investment programs

The MRD provided us with the short-term investment programmes, covering the period 2014-2020, for three regions: West, Central and East (with the exception of Sofia City). We asked for and were provided a short-term investment programme for Sofia City, covering the period 2014-2018.

The short term investment programmes (STIP) for the Western region were split by year over the 2014-2020 period and therefore, we’ve simply used the investments per year as presented in the STIP. Whereas, the investments for Central and Eastern regions, had a total amount for the period in the STIP. Therefore, we've developed an additional methodology for planning the STIP investments over the period. The following assumptions for splitting these investments over the period 2014-2020 have been made to achieve the investment profile:

- Investments that are linked to compliance with UWWTD, i.e. wastewater discharge and treatment investments;
- Investments that are not linked to compliance with UWWTD, i.e. water supply investments.

	2014	2015	2016	2017	2018	2019	2020
Wastewater investments	25%	40%	25%	5%	5%		
Water supply investments	5%	5%	10%	15%	25%	25%	15%

During this period, no additional investments (current investments of the WSSCs) for the period are assumed. The approach here is different from the approach in using the masterplans because it is assumed that the consultants who have prepared the short term investment programmes have best understanding of the needs of these districts in the short term.

The methodology for estimating the investment needs post the short term period (i.e. 2021-2038) and building upon the masterplans, involved making a number of assumptions, including:

- Nominal asset life for the various asset categories;
- Replacement/refurbishment rate per year;
- Average unit cost.

As a base for determining the average unit cost, we've used the unit prices developed by the masterplan consultants.

Water sources

This category includes surface and underground water sources. The average nominal asset life of water sources is assumed at 20 years. The type of facilities that are included in this category include the actual water abstraction facilities, the sanitary protection facilities and building parts. The replacement/refurbishment rate is assumed at 5% per annum. The assumed unit cost for replacement of water sources is as follows:

- Surface water sources – BGN 20,000 per replaced/refurbished unit.
- Underground water sources – BGN 50,000 per replaced/refurbished unit.

Therefore, the assumed average cost is BGN 35,000 per replaced/refurbished unit.

Water treatment plants

The nominal asset life of water treatment plants (WTP) is assumed to be 30 years. The assumptions for the refurbishment of existing water treatment plants are as follows:

- For WTPs with capacity ≤100 l/s, BGN 60,000 for every l/s capacity;
- For WTPs with capacity 100-1,000 l/s, BGN 30,000 for every l/s capacity;
- For WTPs with capacity 1,000-2,000 l/s, BGN 22,000 for every l/s capacity;

- For WTPs with capacity ≥2,000 l/s, BGN 9,200 for every l/s capacity.

Disinfection facilities

Nominal asset life for disinfection facilities is assumed to be 10 years. The replacement rate is assumed to be 10% per year. The cost for replacement of disinfection facilities with capacity of ≤30 l/s is assumed to be BGN 50,000.

Transmission pipes

In Bulgaria, large proportion of the pipes used (for transmission pipes around 65%) are asbestos cement pipes. The nominal asset life of these types of pipes is around 50 years. We've assumed a 2% replacement rate necessary per year. The average cost for replacement of a kilometre of transmission pipes is calculated to be BGN 499,750. This is calculated based on the below methodology, where it is assumed that 55% of the pipes are with a diameter of up-to 280 mm.

Diameter (mm)	% representation	BGN/m	BGN/km	Weighted average price/m	Weighted average price/km
225	20%	360	360,000	72	72,000
250	20%	395	395,000	79	79,000
280	15%	435	435,000	65	65,250
315	10%	480	480,000	48	48,000
355	10%	530	530,000	53	53,000
400	10%	585	585,000	59	58,500
450	5%	680	680,000	34	34,000
500	5%	800	800,000	40	40,000
560	2%	880	880,000	18	17,600
630	2%	1,020	1,020,000	20	20,400
710	1%	1,200	1,200,000	12	12,000
				500	**499,750**

Distribution pipes

Similarly to transmission pipes, asbestos cement pipes are most commonly used in the water distribution network in Bulgaria (around 70%). The asbestos cement pipes have a life expectancy of around 50 years. For the purpose of this assignment, a 2% replacement rate per year is assumed. It should be stressed that most of the pipe network in Bulgaria has been laid in the 60s and 70s. The last 20 years have not seen any significant pipe replacement programmes. Therefore, the majority of the distribution pipes have already reached their end of life time. The assumptions for calculating the average cost for replacing a kilometre of distribution network pipes are provided below:

Diameter (mm)	% representa-tion	BGN/m	BGN/km	Weighted av-erage price/m	Weighted average price/km
90	35%	210	210,000	74	73,500
110	30%	230	230,000	69	69,000
125	15%	250	250,000	38	37,500
140	10%	280	280,000	28	28,000
160	5%	300	300,000	15	15,000
180	3%	315	315,000	9	9,450
200	2%	330	330,000	7	6,600
				239	**239,050**

In this case, it is assumed that 65% of the distribution pipes are with a diameter of up-to 110 mm.

Service reservoirs

The nominal life of service reservoirs is assumed to be 30 years. The refurbishment rate is assumed to be 3% per year. To calculate the average price for the refurbishment of service reservoirs, we've made the following assumptions:

Capacity (m^3)	% representation	BGN/m^3	Weighted average m^3
100	15%	2,500	15
150	20%	2,150	30
200	20%	2,000	40
350	20%	1,800	70
500	10%	1,550	50
1000	7%	1,320	70
2000	5%	1,250	100
3000	3%	1,150	90
	Average price / m^3	**1,715**	**58**
	Average price BGN	**99,684**	

It is assumed that the smaller sizes of service reservoirs are more commonly used. Therefore, the weighted average capacity of service reservoirs is taken into account when calculating the average cost.

Pumping stations – water supply

The average price for replacement of a pumping station is assumed to be BGN 64,530[2].
Pumping stations are assumed to have a nominal asset life of 20 years and therefore, the replacement rate per year is assumed to be 5%.

[2] The aggregate average price for 2011 from publicly available information on tenderes, co-funded with EU funds.

kW	% representation	BGN/kW	Weighted average BGN/kW
10	15%	2,600	3,900
25	20%	1,400	7,000
50	25%	850	10,625
100	15%	670	10,050
200	7%	470	6,580
300	5%	355	5,325
400	3%	300	3,600
500	3%	260	3,900
1000	4%	175	7,000
1500	2%	145	4,350
2000	1%	110	2,200
		Average	**64,530**

Revenue meters

Revenue meters, which are used throughout the water supply network to measure flow are expected to have a life of 10 years, therefore the replacement rate per year is assumed to be 10%. The average price of a meter is assumed to be BGN 300/unit.

Large collectors

For large collectors we have assumed nominal asset life of 50 years and a replacement rate of 2% per annum. The average price for replacement of a kilometre of large collectors is calculated as follows:

Diameter	% representation	BGN/m	BGN/km	Weighted average price/m	Weighted average price/km
1,000	40%	1,500	1,500,000	600	600,000
1,100	35%	1,700	1,700,000	595	595,000
1,200	10%	1,900	1,900,000	190	190,000
1,400	5%	2,300	2,300,000	115	115,000
1,600	4%	3,000	3,000,000	120	120,000
1,800	3%	3,500	3,500,000	105	105,000
2,000	2%	4,100	4,100,000	82	82,000
2,200	1%	4,500	4,500,000	45	45,000
2,400	0%	5,200	5,200,000	0	0
				1,852	**1,852,000**

Sewer pipes

As per large collectors, sewer pipes have been assumed to have asset life of 50 years and to be replaced at a rate of 2% per annum.

The average price for replacement of a kilometre of sewer pipe is calculated as follows:

Diameter	% representa-tion	BGN/m	BGN/km	Weighted average price/m	Weighted average price/km
315	35%	460	460,000	161	161,000
400	30%	590	590,000	177	177,000
500	15%	720	720,000	108	108,000
600	10%	950	950,000	95	95,000
700	5%	1,100	1,100,000	55	55,000
800	3%	1,200	1,200,000	36	36,000
900	2%	1,350	1,350,000	27	27,000
				659	**659,000**

Pumping stations – wastewater

The average price for replacement of a pumping station is assumed to be BGN 76,910[3]. Pumping stations are assumed to have a nominal asset life of 20 years and therefore, the replacement rate per year is assumed to be 5%.

kW	% representation	BGN/kW	Weighted average BGN/kW
10	15%	3,300	4,950
25	20%	1,650	8,250
50	25%	900	11,250
100	15%	800	12,000
200	7%	600	8,400
300	5%	400	6,000
400	3%	380	4,560
500	3%	300	4,500
1000	4%	210	8,400
1500	2%	180	5,400
2000	1%	160	3,200
		Average	**76,910**

Rehabilitation of wastewater treatment plants

The annual rehabilitation cost for wastewater treatment plants is assumed to be at 2% per annum of the initial investment cost. This only applies to the WWTP that are to be build in the period 2014-2020. Therefore, the rehabilitation investment cost is applied from 2020 onwards.

[3] Aggregate average price for 2011 from publicly available information on tenders, co-funded with EU funds

The table below summarises the assumptions made for estimating the capital expenditure investments necessary in the WSS Sector.

	Nominal Asset Life (years)	Refurbishment/ Replacement Rate per Year	Unit	Average BGN
Water sources	20	5%	#	35,000
Water treatment plants ≤100 l/s	30	2%	#	60,000
Water treatment plants 100-1,000 l/s	30	2%	#	30,000
Water treatment plants 1,000-2,000 l/s	30	2%	#	22,000
Water treatment plants ≥ 2,000	30	2%	#	9,200
Disinfection facilities	10	2%	#	50,000
Transmission pipes	50	2%	km	499,750
Pump stations	20	5%	#	64,530
Service reservoirs	30	3%	#	99,684
Distribution pipes	50	2%	km	239,050
Revenue meters	10	10%	#	300
Large collectors	50	2%	#	1,852,000
Sewer network	50	2%	#	659,000
Pump stations	20	5%	#	76,910
Rehabilitation of existing WWTPs	30	2%	#	
Vehicles	5	20%	#	30,000
Heavy plant and machinery	15	7%	#	100,000

Integrated Water Cycles projects

Integrated Water Cycles (IWC) are projects funded by the current Operational Programme Environment. The purpose of these projects is to fund investmets, related to the overall water cycle: supply, collectiona and treatment, in order to achieve compliance with the Directive, concerning urban waster water treatment (UWWTD).. Unfortunately, the available information for the IWC projects is limited (including the information received from the masterplan assignments) and we were unable to obtain reliable information in order to split these investments into water supply, wastewater collection and wastewater treatment.

Additional cost

Additional costs for project preparation and execution are also taken on board. However, additional costs are applied only to those investments that are not considered straight on replacements. For example, pump replacements, revenue metres replacements and/or vehicle and machinery replacements. The applied assumptions for the additional costs are as follows:

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Additional costs assumptions	**Rate (of total investments cost)**
Feasibility study	1%
Design	4%
Supervision	5%
Project management	3%
Contingency	10%
Total additional cost	23%

Obtaining information on facilities/asset number of units

Information on the number of facilities/assets was obtained from the latest available business plans (2009-2013). Where more than one WSSC exist in a given district, their facilities have been consolidated to provide a total number for the district as a whole.

2. METHODOLOGY, DATA AND ASSUMPTIONS FOR SCENARIOS FOR FINANCING OF CAPITAL AND OPERATIONAL EXPENDITURE NEEDS[4]

Overall methodology

In order to develop models enabling the testing of options and scenarios for the financing of the expenditure needs assessments the following approach was used:

1. CAPEX and OPEX data gathering;
2. Data verification;
3. Additional data collection;
4. Construction of a 'master' Financial Model (in Excel) for the period 2014-2038 at district level.
5. Modification of the 'master' Financial Model to accommodate specific district issues and run all scenarios for each district.
6. Summary of all scenarios at national level.

Re 1: Data gathering: for the development of expenditure needs assessment model (CAPEX) see the approach and methodology in the previous chapter; OPEX – the main source of historical data for WSSCs' operational expenditures was the SEWRC (WSSCs Business plans, WSSCs annual reports to the regulator). 2010 and 2011 actual WSSCs OPEX data that was reported to the regulator was summarized at district level (to reflect the total OPEX of all WSSCs operating in a district) and was then used to construct the WSS Sector operational expenditures at the national level;

Re 2 Data verification: the OPEX data reported by the WSSCs to the regulator for 2010 and 2011 was verified against WSSCs financial statements, SEWRC decisions on Business plans and tariffs;

Re 3 Additional data collection – additional data needed for the construction of the 'master' Financial Model was collected from reliable public sources as NSI, MRD, MOEW, WSSCs, other recent WSS reports, etc.

Re 4 Construction of a 'master' Financial Model (in Excel) for 25 years as a basis to produce all scenarios needed for the period 2014-2038 at district level. The main pillars of the model are the historical OPEX data for previous periods (see assumptions below) for each WSSC (consolidated per district) and results from expenditure needs assessments (CAPEX, see assumptions above). The model was created following the steps below:

- Developing a dynamic model based on spreadsheets for facilitating the development and analysis of different scenarios and the impact of CAPEX and its financing on OPEX, water quantities, tariffs, affordability and sustainability of WSSCs;
- Filling out the model with actual data for 2010, 2011;

[4] This Appendix is based on the work of WYG 2013

- Summation of different WSSCs in a district and main inputs (for example averaging the tariffs per district);
- Forecasting based on the specific district assumption (for example EU funds distribution is based on the population living in the district);
- Assessing the impact of the expenditure needs on the tariffs considering affordability level for the district;
- Estimation of possible savings from operations due to CAPEX realization (for example electricity costs);
- Illustration of main results: contribution of different funding sources, impacts on tariffs, impacts on OPEX, achieved results and expenditures covered by different scenarios.
- The model contains: assumptions (unified across all districts); CAPEX, OPEX, Quantities, Tariffs, EU Grant Calculation, Government Grant Calculation, Loan Calculation, Cashflow, Scenarios and Results (specific for each district).

Assumptions

General assumptions taken from the model**:**

Assumptions affecting the revenues:

Revenue	Unit	Comments
Change in Population connected to water (WS)	%	Assumed annual increase
Change in Water consumption	l/c/d	Assumed annual increase
Change in Water sold to non-household customers	mil m³	No change assumed
Change in Water sold to other VIK	mil m³	No change assumed
Population connected to wastewater collection as % of water supplied pop.	%	as % of pop connected to WS
Wastewater collected from non-household users as % of water sold to non-household user	%	as % of water sold to non-household users
Population connected to Wastewater treatment as % of water supplied pop.	%	as % of pop connected to WS
Wastewater treated for non-households as % of water sold to non-households	%	as % of water sold to non-households
Change in volume of Wastewater treated for industry	mil m³	Assumed annual increase
Change in average water supply tariff for households	BGN/m³	Assumed annual increase
Change in average water supply tariff for non-household customers	BGN/m³	Assumed annual increase
Change in average water supply tariff for other ViK	BGN/m³	Assumed annual increase
Change in average sewerage tariff for households	BGN/m³	Assumed annual increase
Change in average sewerage tariff for non-households, 1st category	BGN/m³	Assumed annual increase
Change in average sewerage tariff for non-households, 2nd category	BGN/m³	Assumed annual increase
Change in average sewerage tariff for non-households, 3rd category	BGN/m³	Assumed annual increase
Change in average Wastewater treatement tariff for population	BGN/m³	Assumed annual increase
Change in average Wastewater treatement tariff for non-households, 1st category	BGN/m³	Assumed annual increase
Change in average Wastewater treatement tariff for non-households, 2nd category	BGN/m³	Assumed annual increase
Change in average Wastewater treatement tariff for non-households, 3rd category	BGN/m³	Assumed annual increase
Change in persons per household	%	No change assumed
Change in average income per person for the region	%	Assumed annual increase equal to annual increase in real GDP

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Assumptions affecting operational expenditures:

Operational Expenses	Unit	Comments
change in electricity price	BGN/kWh	no change assumed
change in electricity consumption (WS) without CAPEX	kWh/m3	no change assumed
change in electricity consumption (WS) due to CAPEX realization	kWh/m3	assumed annual decrease
change in water abstraction fee	BGN/m3	no change assumed
change in water discharge fee	BGN/m3	no change assumed
change in chemicals price	BGN/m3	no change assumed
change in electricity consumption (WWC) without CAPEX	kWh/m3	assumed annual increase
change in electricity consumption (WWC) due to CAPEX realization	kWh/m3	
change in electricity consumption (WWT) without CAPEX	kWh/m3	assumed annual increase
change in electricity consumption (WWT) due to CAPEX realization	kWh/m3	
existing maintenance	BGN mil	equal to existing
new maintenance	%	of investment made in previous years
Change in Personnel costs	BGN mil	No change assumed
Depreciation	BGN mil	of investments made in previous years
Other expenses	BGN mil	as % of Total Operational less Other Expe
Bad debts	BGN mil	as % of Revenue

Other assumptions:

Water quantity	Unit	Comments
Change in water bought from other ViK (mil m3)	mil m³	No change assumed
Non-revenue water-real (%)	%	UFW (%)
Population in the district living in agglomerations with more than 2,000 p.e.	thousand #	Comments
Total population in the district living in agglomerations, 2,000 p.e. - 10,000 p.e	890.364	from MoEW report for compliance with Directive 91/271 concerning urban wastewater treatment
Total population in the district living in agglomerations, above 10,000 p.e	4625.884	same as above
Total population in the district living in agglomerations above 2,000 p.e.	5516.248	same as above
Other assumptions	Unit	Comments
Discount rate	5%	as per EU guidelines for CBA for investment projects, 2008
Granted amount of an investment project	95%	as avearge for 2007-2013 programming period
EU grant amount from Cohesion Fund 2014-2020, mil BGN	1,956	similar to the CF amount available for integrated water projects in 2007-2013 programming period
EU grant amount from EAFRD 2014-2020, mil BGN	489	similar to the EAFRD amount available for integrated water projects in 2007-2013 programming period
EU grant amount from CF and EAFRD, 2014-2020	80%	as for CF in 2007-2013 programming period
State budget amount co-financing EU grant, 2014-2020	20%	as for 2007-2013 programming period
total population in Bulgaria in 2011, thousand #	7327.184	as per National Statistics Institute
maximum EU grant amount applicable for the disctrict, % of total EU grant amount	100.00%	on the basis of the population

CAPEX assumptions – see above expenditure needs assessment. The figures in the model are 2011 real prices;

OPEX assumptions – made on the basis of historical data for 2010 and 2011 provided by the SEWRC and forward looking O&M costs and expected savings associated with the implementation of the investments depending on the profile of the realized investments (see the explanations in scenarios). The figures in the model are 2011 real prices.

Details of OPEX assumptions:

a. Direct O&M costs for water supply. The most significant direct O&M costs are those associated with electricity, chemicals, water abstraction and maintenance.

- Electricity costs depends on electricity consumption, electricity price and abstracted and supplied water quantities. Electricity consumption is assumed to decrease proportionally to investments realized in water (for example in pumps) reaching 10%[5] overall decrease in electricity consumption. Electricity price is in 2011 constant terms. Changes in abstracted and supplied water quantities which influence overall electricity costs are described below.
- Chemical costs depend on chemicals price and abstracted water quantities. While chemicals price is in 2011 constant terms, changes in quantities of abstracted water influence overall chemical costs.
- Costs for water consumption depend on fee per m3 and abstracted water quantities. Water consumption fee is a cost item for price formation and as such its increase will result in raising the water tariff to offset the increased cost, while changes in quantity of abstracted water influence the total costs for water consumption.
- Maintenance costs depend on the existing maintenance costs and additional maintenance costs (1% of all new investments in water supply infrastructure, realized in the previous year).

There is an acceptable trade-off between decrease in overall water supply direct costs due to realized savings and increase in water supply direct costs due to increased maintenance costs to reflect proper maintenance practices.

b. Direct O&M costs for sewerage. Those are mainly electricity and maintenance, as follows:

- The existing electricity consumption is assumed to decrease proportionally to the investments realized in wastewater pumps but at the same time there will be new consumption due to the extended network. Electricity price is in 2011 constant terms. The change in collected wastewater quantities is described below.
- Maintenance costs depends on current maintenance costs and additional maintenance costs (1% of all new investments in sewerage infrastructure realized in the previous year).

Similarly to the above there is an acceptable trade-off between decrease in overall sewerage direct costs due to realized savings and increase in direct costs due to maintenance costs reflecting proper maintenance practices and increased network.

c. Direct O&M costs for the facilities for wastewater treatment. Those are mainly for electricity, chemicals, wastewater discharge fee and maintenance.

- Rehabilitation of the existing WWTPs and possible electricity savings are offset by the low degree of coverage with treatment services and new WWTP put in operation. There are no savings realized here, but only additional costs. Electricity price is in 2011 constant terms. The change in wastewater treated quantities is described below.
- Chemical costs depend on chemicals price and wastewater treated quantities. Chemicals price is in 2011 constant terms.

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[5] This figure is based on discussions with managers of WSSC, where water pumps were already replaced and efficiencies monitored.

- Costs for wastewater discharge fee depend on fee per m3 and treated wastewater quantities. Discharge fee per m3 is in 2011 constant terms.
- Maintenance costs depends on existing maintenance costs and additional maintenance costs (1% of all new investments in WWTP, realized in the year following the investments).

d. Indirect O&M costs. Those are personnel costs, depreciation, provisions and other costs.

- Personnel costs are in 2011 constant terms, assuming two trends: salary increase and personnel decrease reaching European good practices for the sector (except for Business as usual scenario).[6]
- Bad debts are assumed 5% of revenues[7].
- Other expenses are assumed as % of the total expenses less other expenses and depreciation (2011 base). All OPEX that are not explicitly mentioned above are part of other expenses.

Water Quantities:

e. Abstracted water – depends on water sold and NRW.

f. Water sold – depends on water consumption rate and population served (see general assumptions).

g. Non-revenue water (NRW) – depends on real and commercial losses. It is assumed that 10% of initial (2011) NRW is due to commercial losses. Commercial losses decrease with the increase of the per capita consumption and the overall improvement of sales but do not drop below 5% of the current total NRW. Physical losses decrease as a result of the realized investments in water transmission and distribution networks. The base year is 2011. The expected result at the end of the period after realization of all planned corresponding CAPEX is 30%, effective in 2039.

h. Wastewater collected – depends on the % connected users, which depends on the realized investments in sewerage. The base year is 2011. The expected results in the end of the period, in case all CAPEX investments are made, is 100% coverage ratio for households living in agglomerations above 2,000 p.e. within the district.

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[6] The general assumption is that salaries will only increase if there is an increase in real GDP (assumed at 3.2% annually on average for the period 2011-2038). Thus, the assumption made means that the personnel will decrease by 3.2% on average on annual basis until it reaches European good practices for the sector of staff per 1000 connections due to improved WSSCs efficiency. At the same time, personnel will increase due to new assets acquired (for instance WWTPs), but the increase is considered to be marginal to the reductions following the consolidation of the WSSCs.

[7] There is lack of sufficient and reliable data for the existing bad debts within the sector. We used data from the audited WSSCs financial reports were available. Most of the data show bad debts of around 5% of revenues. This does not mean that the average collection ratio is 95%. For calculation of collection rate WSSCs use different calculations methodologies: total billed amounts in a period to the total collected amounts from the billed amounts; total billed amounts in a period to total collected amounts in a period etc. Bad debt (as expenditure) refers to revenues that will never be collected – the assumption is for 5% for bad debts for all WSSC for the period 2014-2038.

i. Wastewater treated – depends on the % connected users, which depends on the investments in WWTPs and investments in sewerage. The base year is 2011. The expected results in the end of the period, in case all CAPEX investments are made, is 100% coverage ratio for households users living in agglomerations above 2,000 p.e.

Tariffs:

j. Affordable tariff level is calculated following the applicable regulatory methodology: on the basis of income per person per district, number of persons per household for the same district, and on the basis of 2800 l/c/month water consumption. The affordable level for 10 and 10-30 decile of the population is estimated on the basis of information provided by NSI.

k. Tariff assumptions for the different scenario vary, depending on the expenditures made. The highest annual increase is 25 % and is inapplicable for more than 3 consecutive years. Some WSSCs have different tariffs for water supply, while in some districts, many WSSCs exist (for example in Pazardzik district there are 9), all of which have different tariffs, and that requires aggregation of the tariffs in the district. The aggregated tariffs are calculated as total revenue for the district divided by the total water quantities by types of users and types of services, using the information of SEWRC for 2010 and 2011. As a result, the aggregated price for each specific district is received, in which more than one tariff is applied at the moment. Reduction of prices isapplied where the final cash amount in 2038 is too high compared to that for 2010 and 2011, and the ratio of debt service is above 1.3.

l. All revenues, CAPEX and OPEX costs, etc. in the model are without VAT. VAT is only used when calculating the final tariffs to consumers to properly calculate the affordability level (by applying the regulatory requirements). It is consistent with having VAT on revenues and transferring the VAT to the state, having VAT on CAPEX and OPEX and recovering the VAT from the state. The calculations in the model are VAT neutral.

m. EU grant contribution consists of EU grants already committed for 2014-2015 and new EU grants for the next programming period (2014-2020). Existing EU grants are applied to already committed integrated water cycles and WWT projects for the respective district, while the new EU grants are applied based on the following general assumptions:

- EU funding from cohesion and rural development funds was estimated based on the existing rules and levels of cohesion and rural development funding, requirements as per draft EU regulations for 2014-2020 and EU guideline for CBA, 2008. The funding was distributed among districts based on the population living in the district (per capita approach);
- 100% absorption of the EU grants is assumed.

n. Loans are applied only in the calculation of scenario 4 in order to smooth-out tariff increase and reduce government grant amount; two options for loans/credits were used – from IFIs and commercial banks. Where applicable, the first option was applied - IFI loans, under the assumption that commercial banks feel more comfortable to provide loans to companies in which IFIs have already demonstrated interest. If IFI loan was not sufficient, then a commercial loan to fill in the remaining funding gap (if any) was applied.

Assumptions	IFI loan	Commercial bank loan
Start year	2014	2017
Total amount, BGN million	473.5	166.4
Interest (everything included) in %	5%	7%
Term in years	25*	15**
Grace period in years	3	3

*rollover (automatic renewal) of the debt in the 15th year

**rollover of the debt in the 10th year

For all the loans no more than three consecutive years of disbursement are considered. A maximum applicable loan per district is equal to 4 times EBITDA as per the corresponding year. Applied DSCR is minimum 1.3. If a WSSC's cash flow does not provide for the minimum DSCR or its tariff is already at the socially affordable level, it is considered not capable of borrowing. Only WSSCs (aggregated at district level) that meet simultaneously both requirements are eligible to borrow for the purposes of this analysis.

o. Government grants for the necessary investments in the WSS sector are applicable only after exhausting all other possible sources of financing and in case there is still a funding gap.

p. Subsidies: Not applicable for water sector in Bulgaria[8].

Data issues

1. Revenues – lack of reliable input data per WSSC for different categories of revenues (per users and in many cases per type of services). We used as a basis the information available in the audited financial 2010 and 2011 reports of the WSSCs published in the Commercial Register.
2. Water quantities – lack of reliable input data per WSSC for water quantities by category of user. The team calculated quantities based on the estimated revenues by type of service and type of users using the corresponding aggregated water tariff for each district.
3. Aggregated tariffs – calculated on the basis of the information provided in the corresponding price decisions of the SEWRC. For the WSSC with more than one tariff for water supply, aggregated tariffs for 2010 and 2011 are calculated on a weighted average basis (revenues divided by water quantities as provided into the respective SEWRC's price decision for the respective years, adjusted for the months for which the corresponding price was applied). The same approach was applied for sewerage and wastewater tariffs per category of users. Aggregated water tariffs per district are further used for the needs of the modelling.
4. The modelling is developed on district level, to correspond to the scope of the investments forecast. For the districts – "oblasts" with more than one operating WSSC, aggregation of the raw data is done. Summation of WSSCs in a district impacts water quantities, revenues and costs.

1. For several WSSC, which have significant investments in WWTP in 2011-2013, corresponding adjustments for 2012 and 2013 for costs, revenues and water quantities were made as follows:

   a) The WSSC in Dimitrovgrad, Ruse, Stara Zagora, Turgovishte, Haskovo: have introduced WWTPs in 2011 and in 2012, therefore there are no history reports on full year operations for 2011. Data for quantities and tariffs, hence revenues from the State Regulator Decisions on WWTP tariffs are being used. Additional quantities have been added for 2012, respectively 2013, depending on months in operation in 2011, respectively 2012.

[8] Only transport sector is applicable for subsidies in Bulgaria.

b) Regarding Vidin, Kurdjali, Silistra, Yambol: These WSSC have not built WWTP operations up to date of this report. Forecasts for the WWTP quantities are being made on the basis of the forecast for the % connected population. Forecasts for the tariffs/revenues/OPEX are being made on a weighted average basis from the latest WWTPs introduced in the country. Quantities, therefore revenues and OPEX are forecasted 2 years after the respective investment on pro rata basis regarding investments done.

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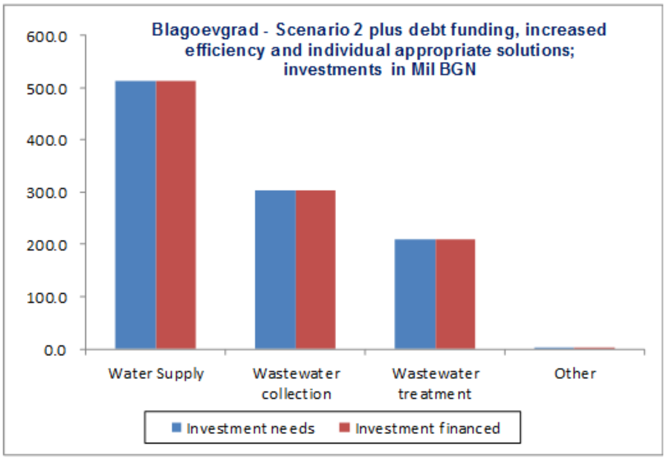
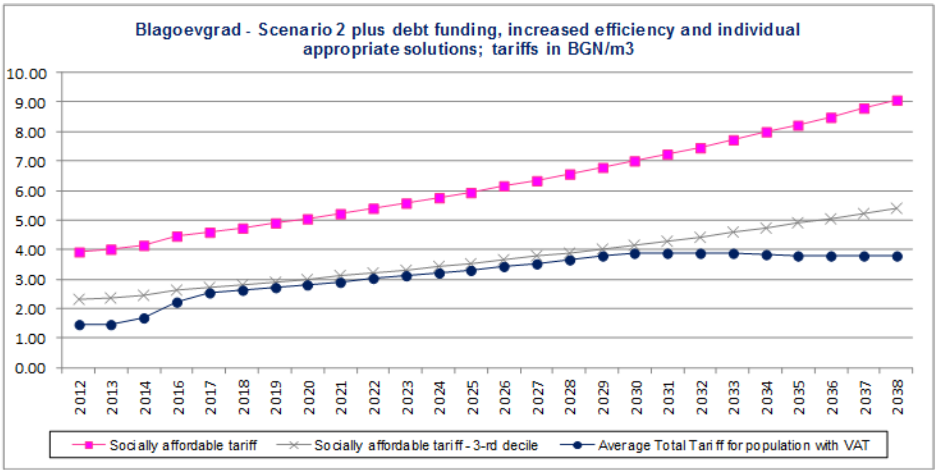
1. Blagoevgrad District

Blagoevgrad - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	513.3	513.3
Abstraction	8.6	8.6
Water treatment	79.6	79.6
Transmission	265.6	265.6
Distribution	159.5	159.5
Wastewater	512.3	512.3
Wastewater collection	302.5	302.5
Wastewater treatment	209.8	209.8
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	1 027.3	1 027.3





Blagoevgrad - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	489.6	489.6	17.1	199.2	116.8	-	123.5	50.1	-	-
2024-2028	179.2	179.2	9.9	-	-	-	179.2	-	-	-
2029-2038	358.4	358.4	11.4	-	-	-	358.4	-	-	-
TOTAL, MBGN	1 027.3	1 027.3	38.4	199.2	116.8	-	661.1	50.1	-	-

Key indicators

Key indicator, Unit	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW, %	49.7%	43.2%	39.8%	31.1%	30.0%	
population connected to WWC, % of water supplied population	72.1%	72.6%	72.6%	72.6%	72.6%	
population connected to WWT, % of water supplied population	4.6%	72.6%	72.6%	72.6%	72.6%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	-
compliance with UWWTD, % of target	6.4%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs, MBGN since 2013	NA	0.28	0.35	0.59	NA	-
wastewater collection (savings) / additional costs, MBGN since 2013	NA	0.01	0.01	0.00	NA	
wastewater treatment (savings) / additional costs, MBGN since 2013	NA	6.17	6.13	6.00	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs, MBGN since 2013	NA	(3.9)	(4.3)	(5.2)	NA	4%
(savings) from other costs, MBGN since 2013	NA	(1.8)	(1.8)	(1.9)	NA	

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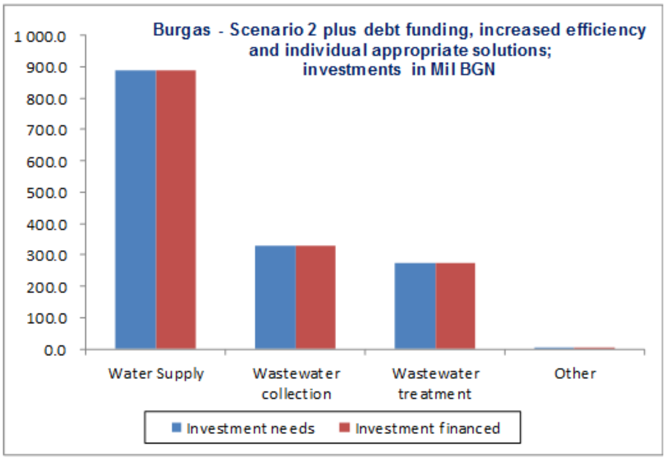
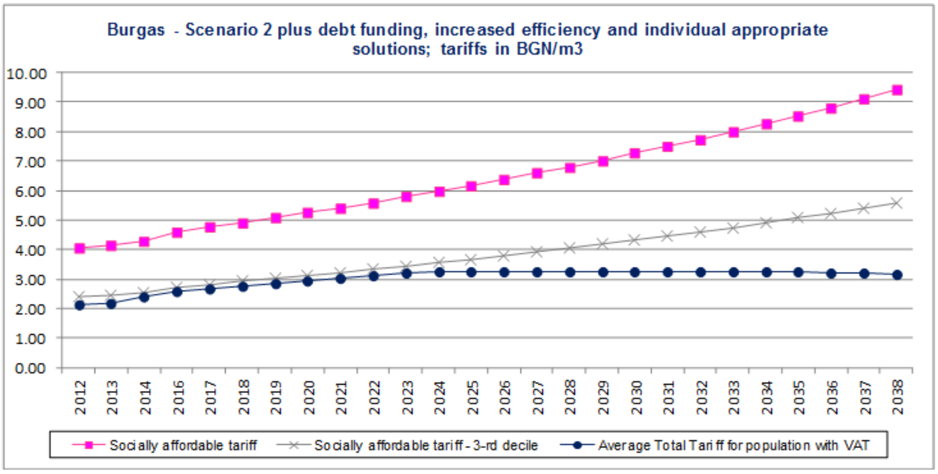
2. Burgas District

Burgas - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	886.3	886.3
Abstraction	15.5	15.5
Water treatment	80.8	80.8
Transmission	485.0	485.0
Distribution	305.0	305.0
Wastewater	604.8	604.8
Wastewater collection	330.1	330.1
Wastewater treatment	274.7	274.7
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	1 492.8	1 492.8





Burgas - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	701.4	701.4	-	227.2	142.6	-	331.6	-	-	-
2024-2028	263.8	263.8	-	-	-	-	263.8	-	-	-
2029-2038	527.6	527.6	-	-	-	-	527.6	-	-	-
TOTAL, MBGN	1 492.8	1 492.8	-	227.2	142.6	-	1 123.0	-	-	-

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	54.3%	45.4%	41.4%	31.5%	30.0%	
population connected to WWC; % of water supplied population	68.8%	78.1%	78.1%	78.1%	78.1%	
population connected to WWT; % of water supplied population	51.2%	78.1%	78.1%	78.1%	78.1%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:			-		-
compliance with UWWTD; % of target	65.6%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	0.62	0.41	0.06	NA	-
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.32	0.31	0.26	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	3.49	3.51	3.56	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(7.1)	(7.9)	(9.5)	NA	36%
(savings) from other costs; MBGN since 2013	NA	(5.9)	(6.1)	(6.4)	NA	

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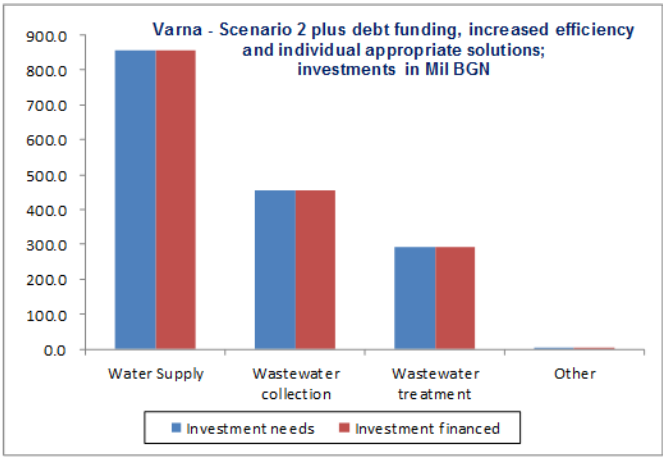
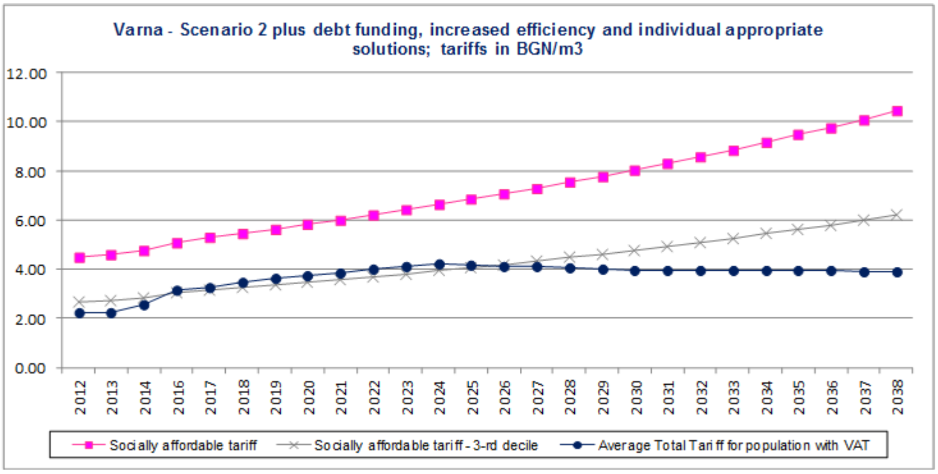
3. Varna District

Varna - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	854.6	854.6
Abstraction	16.0	16.0
Water treatment	0.0	0.0
Transmission	421.5	421.5
Distribution	417.1	417.1
Wastewater	746.2	746.2
Wastewater collection	453.3	453.3
Wastewater treatment	292.8	292.8
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	1 602.5	1 602.5





Varna - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	830.5	830.5	18.7	155.9	114.1	-	396.3	164.2	-	2.7
2024-2028	257.3	257.3	37.6	-	-	-	257.3	-	-	0.6
2029-2038	514.6	514.6	52.9	-	-	-	514.6	-	-	-
TOTAL, MBGN	1 602.5	1 602.5	109.2	155.9	114.1	-	1 168.2	164.2	-	3.3

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	66.8%	51.3%	45.2%	31.5%	30.0%	
population connected to WWC; % of water supplied population	74.5%	83.5%	83.5%	83.5%	83.5%	
population connected to WWT; % of water supplied population	66.8%	83.5%	83.5%	83.5%	83.5%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	2016
compliance with UWWTD; % of target	80.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(1.20)	(1.41)	(2.07)	NA	2025
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.10	0.13	0.11	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	2.78	2.96	3.21	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(8.7)	(9.6)	(11.5)	NA	42%
(savings) from other costs; MBGN since 2013	NA	(4.0)	(4.1)	(4.5)	NA	

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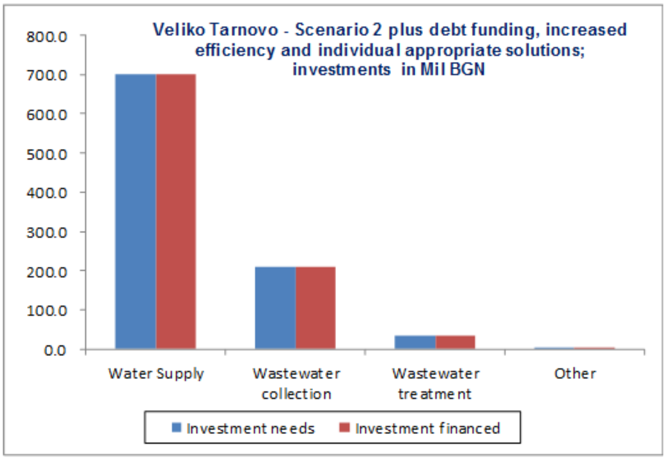
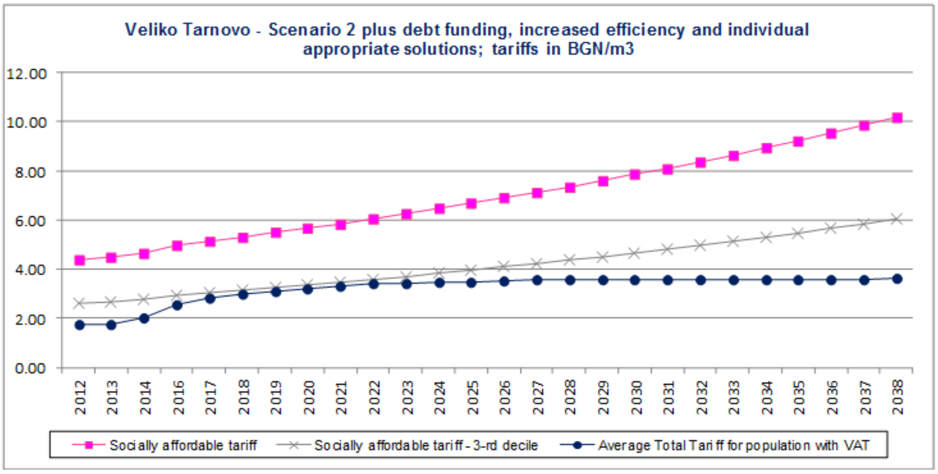
4. Veliko Tarnovo District

Veliko Tarnovo - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**701.2**	**701.2**
Abstraction	15.0	15.0
Water treatment	13.5	13.5
Transmission	341.5	341.5
Distribution	331.2	331.2
Wastewater	**243.5**	**243.5**
Wastewater collection	209.7	209.7
Wastewater treatment	33.8	33.8
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**946.3**	**946.3**





Veliko Tarnovo - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	391.4	391.4	-	82.6	63.3	-	245.5	-	-	-
2024-2028	185.0	185.0	-	-	-	-	185.0	-	-	-
2029-2038	369.9	369.9	-	-	-	-	369.9	-	-	-
TOTAL, MBGN	**946.3**	**946.3**	-	**82.6**	**63.3**	-	**800.4**	-	-	-

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	65.4%	51.2%	44.8%	31.3%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	61.6%	68.1%	68.1%	68.1%	68.1%	
population connected to WWT; % of water supplied population	31.9%	68.1%	68.1%	68.1%	68.1%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	-
compliance with UWWTD; % of target	46.9%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.01)	0.02	0.16	NA	-
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.57	0.59	0.59	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.2)	(2.4)	(2.9)	NA	38%
(savings) from other costs; MBGN since 2013	NA	(0.6)	(0.7)	(0.7)	NA	

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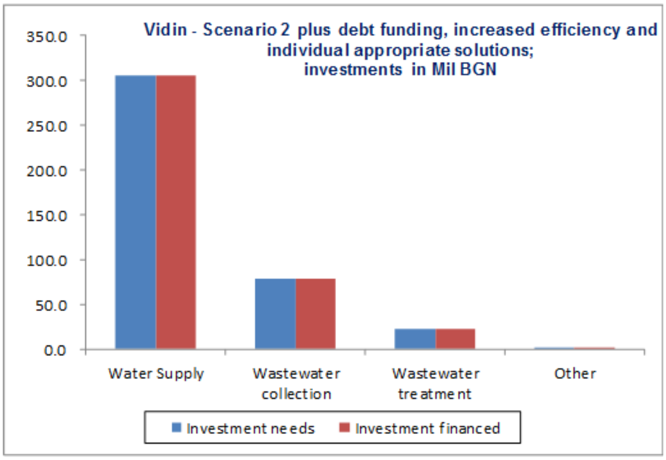
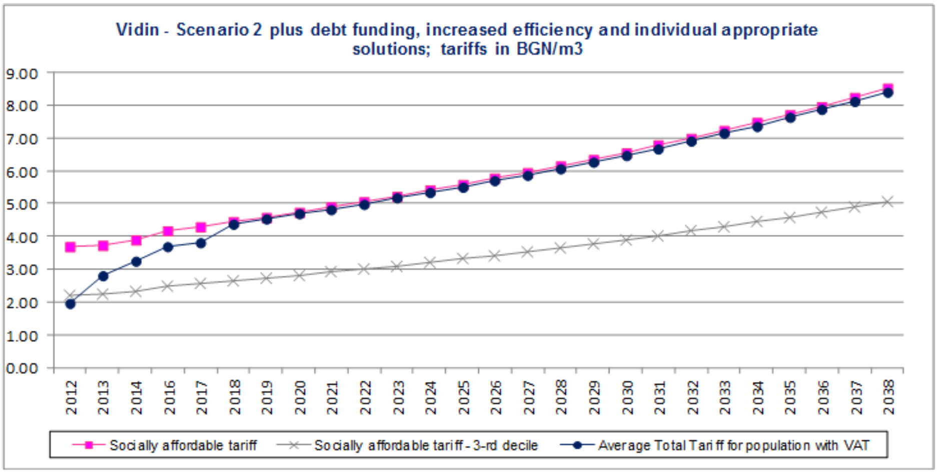
5. Vidin District

Vidin - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**304.9**	**304.9**
Abstraction	4.2	4.2
Water treatment	5.2	5.2
Transmission	163.7	163.7
Distribution	131.8	131.8
Wastewater	**100.5**	**100.5**
Wastewater collection	78.7	78.7
Wastewater treatment	21.8	21.8
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**407.1**	**407.1**





Vidin - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	168.2	168.2	-	33.1	23.6	46.3	65.3	-	-	3.4
2024-2028	79.6	79.6	0.1	-	-	20.3	55.7	3.7	-	2.6
2029-2038	159.3	159.3	12.3	-	-	-	132.2	27.1	-	6.4
TOTAL, MBGN	**407.1**	**407.1**	**12.4**	**33.1**	**23.6**	**66.6**	**253.1**	**30.8**	**-**	**12.5**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	50.6%	43.6%	39.0%	30.4%	30.0%	
population connected to WWC; % of water supplied population	42.3%	63.2%	63.2%	63.2%	63.2%	
population connected to WWT; % of water supplied population	0.0%	63.2%	63.2%	63.2%	63.2%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2014**
compliance with UWWTD; % of target	0.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.00)	(0.02)	(0.09)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.04	0.04	0.02	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.66	0.67	0.64	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.2)	(1.4)	(1.7)	NA	31%
(savings) from other costs; MBGN since 2013	NA	(0.3)	(0.4)	(0.4)	NA	

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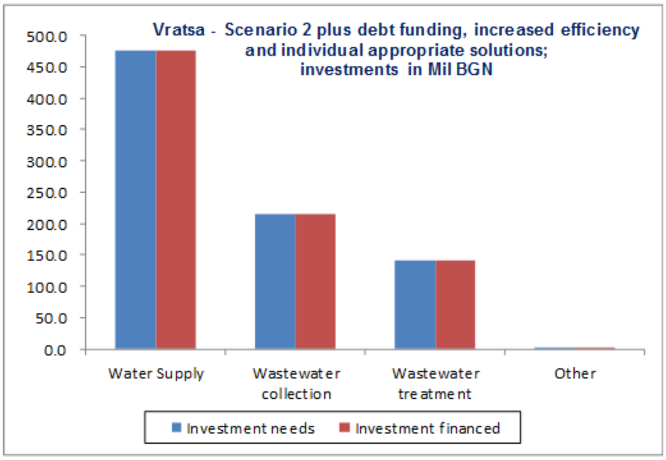
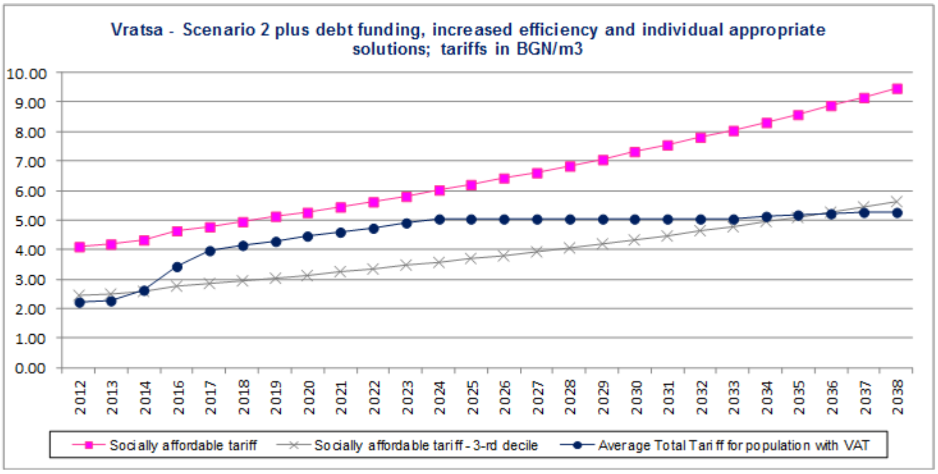
6. Vratsa District

Vratsa - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**475.2**	**475.2**
Abstraction	7.1	7.1
Water treatment	3.3	3.3
Transmission	247.0	247.0
Distribution	217.8	217.8
Wastewater	**357.4**	**357.4**
Wastewater collection	215.3	215.3
Wastewater treatment	142.2	142.2
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**834.3**	**834.3**





Vratsa - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	389.8	389.8	21.5	140.8	78.3	-	107.1	63.7	-	4.6
2024-2028	148.2	148.2	12.5	-	-	-	148.2	-	-	3.0
2029-2038	296.3	296.3	14.5	-	-	-	296.3	-	-	1.5
TOTAL, MBGN	**834.3**	**834.3**	**48.5**	**140.8**	**78.3**	**-**	**551.6**	**63.7**	**-**	**9.1**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	64.1%	56.1%	48.6%	31.4%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	51.2%	68.3%	68.3%	68.3%	68.3%	
population connected to WWT; % of water supplied population	29.5%	68.3%	68.3%	68.3%	68.3%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2014**
compliance with UWWTD; % of target	43.3%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.41)	(0.75)	(1.35)	NA	**2035**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.02	0.02	0.02	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.64	1.66	1.69	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.2)	(2.4)	(2.9)	NA	36%
(savings) from other costs; MBGN since 2013	NA	(1.2)	(1.3)	(1.5)	NA	

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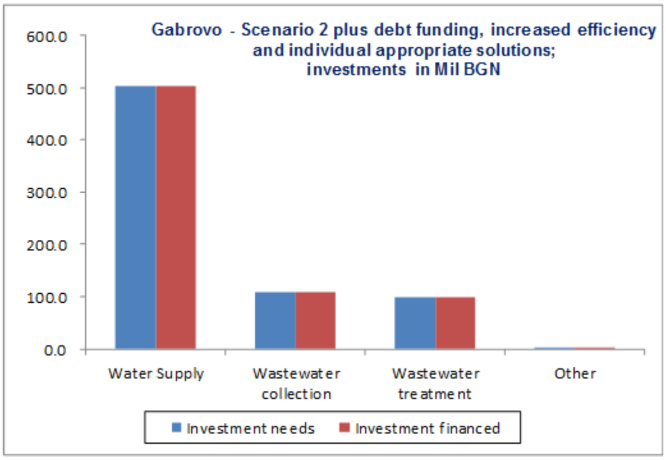
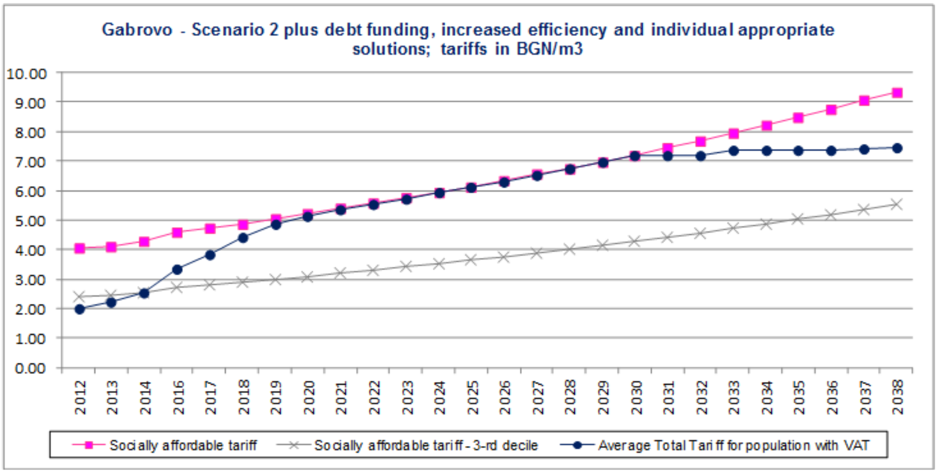
7. Gabrovo District

Gabrovo - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	501.6	501.6
Abstraction	10.5	10.5
Water treatment	1.2	1.2
Transmission	334.8	334.8
Distribution	155.2	155.2
Wastewater	208.4	208.4
Wastewater collection	109.1	109.1
Wastewater treatment	99.3	99.3
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	711.7	711.7





Gabrovo - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	410.6	410.6	13.0	83.8	47.1	36.0	142.4	101.3	-	4.6
2024-2028	100.4	100.4	25.1	-	-	5.1	84.3	11.0	-	4.4
2029-2038	200.7	200.7	37.4	-	-	-	200.7	-	-	8.1
TOTAL, MBGN	711.7	711.7	75.5	83.8	47.1	41.1	427.5	112.3	-	17.1

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	61.9%	44.9%	40.0%	30.9%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	72.9%	81.1%	81.1%	81.1%	81.1%	
population connected to WWT; % of water supplied population	52.3%	81.1%	81.1%	81.1%	81.1%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	2014
compliance with UWWTD; % of target	64.5%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.17)	(0.17)	(0.20)	NA	2038
wastewater collection (savings) / additional costs; MBGN since 2013	NA	(0.00)	(0.00)	(0.00)	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.09	1.10	1.09	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.2)	(2.4)	(2.9)	NA	32%
(savings) from other costs; MBGN since 2013	NA	(0.3)	(0.4)	(0.4)	NA	

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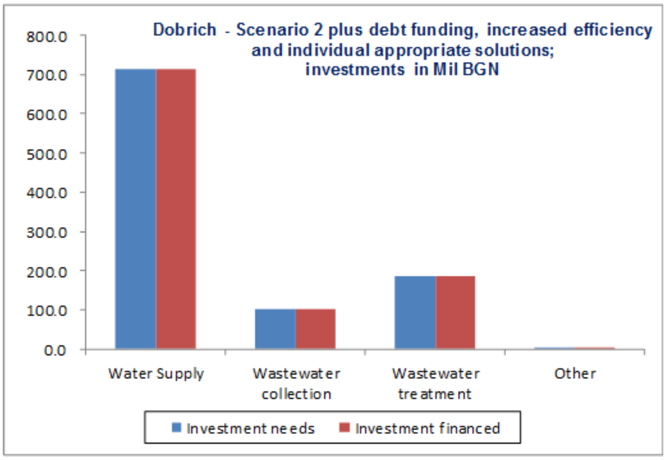
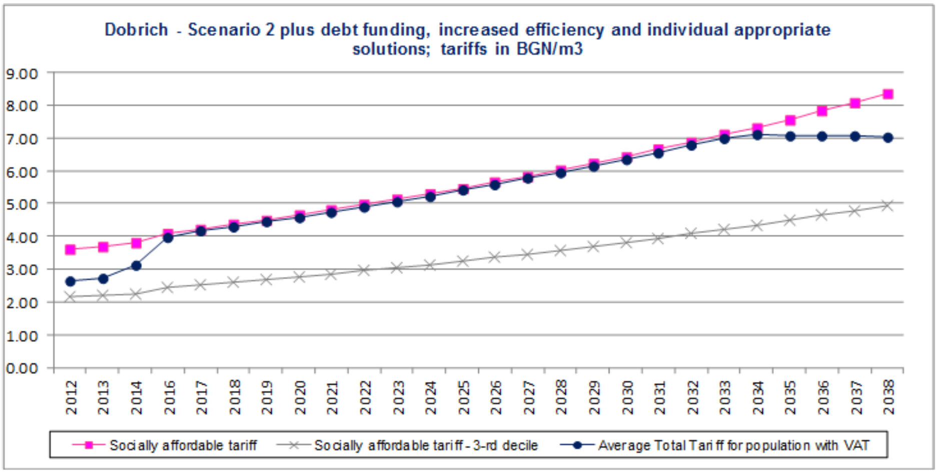
8. Dobrich District

Dobrich - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**714.6**	**714.6**
Abstraction	**8.2**	**8.2**
Water treatment	**0.0**	**0.0**
Transmission	**503.7**	**503.7**
Distribution	**202.8**	**202.8**
Wastewater	**285.2**	**285.2**
Wastewater collection	**100.0**	**100.0**
Wastewater treatment	**185.2**	**185.2**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**1 001.5**	**1 001.5**





Dobrich - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	453.3	453.3	-	151.6	83.2	76.7	141.7	-	-	7.5
2024-2028	182.7	182.7	6.7	-	-	12.9	102.1	67.8	-	5.5
2029-2038	365.5	365.5	28.3	-	-	-	365.5	-	-	13.1
TOTAL, MBGN	**1 001.5**	**1 001.5**	**35.0**	**151.6**	**83.2**	**89.6**	**609.3**	**67.8**	**-**	**26.1**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	79.8%	64.2%	55.3%	32.1%	30.0%	
population connected to WWC; % of water supplied population	54.3%	71.6%	71.6%	71.6%	71.6%	
population connected to WWT; % of water supplied population	54.0%	71.6%	71.6%	71.6%	71.6%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2014**
compliance with UWWTD; % of target	75.5%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(2.89)	(3.64)	(4.68)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.02	0.01	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.93	1.96	2.03	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.1)	(2.3)	(2.8)	NA	44%
(savings) from other costs; MBGN since 2013	NA	(1.1)	(1.3)	(1.5)	NA	

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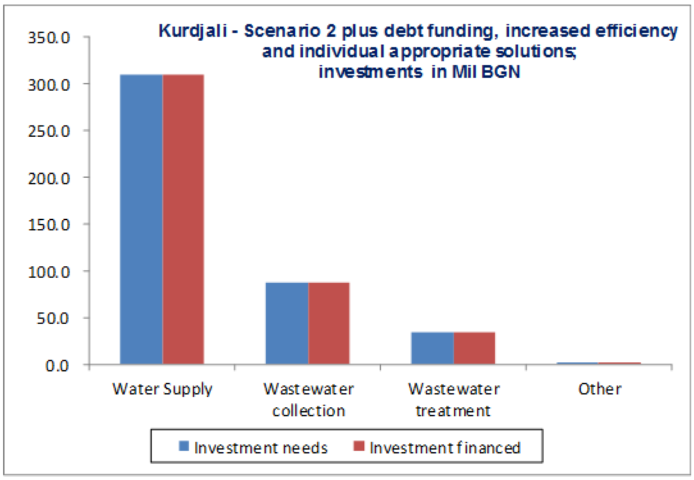
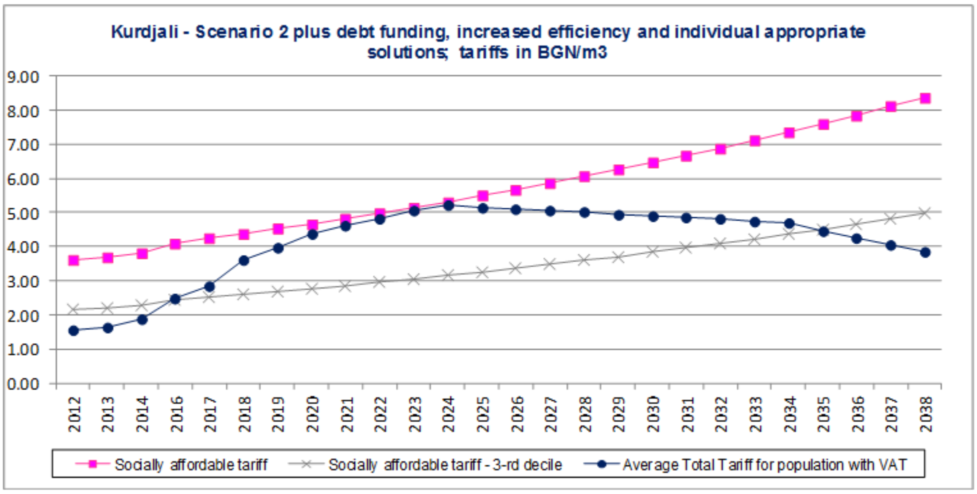
9. Kardzhali District

Kurdjali - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	308.9	308.9
Abstraction	4.1	4.1
Water treatment	0.6	0.6
Transmission	245.9	245.9
Distribution	58.3	58.3
Wastewater	120.9	120.9
Wastewater collection	87.2	87.2
Wastewater treatment	33.7	33.7
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	431.4	431.4





Kurdjali - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	191.2	191.2	1.8	49.7	36.8	-	97.5	7.2	-	2.9
2024-2028	80.1	80.1	1.9	-	-	-	80.1	-	-	2.8
2029-2038	160.1	160.1	1.4	-	-	-	160.1	-	-	1.6
TOTAL, MBGN	431.4	431.4	5.0	49.7	36.8	-	337.7	7.2	-	7.3

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	49.9%	41.2%	38.2%	30.8%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	39.9%	42.1%	42.1%	42.1%	42.1%	
population connected to WWT; % of water supplied population	0.0%	42.1%	42.1%	42.1%	42.1%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	2016
compliance with UWWTD; % of target	0.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.02)	(0.01)	0.00	NA	2034
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.88	0.91	0.97	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.8)	(2.0)	(2.3)	NA	32%
(savings) from other costs; MBGN since 2013	NA	(0.2)	(0.2)	(0.2)	NA	

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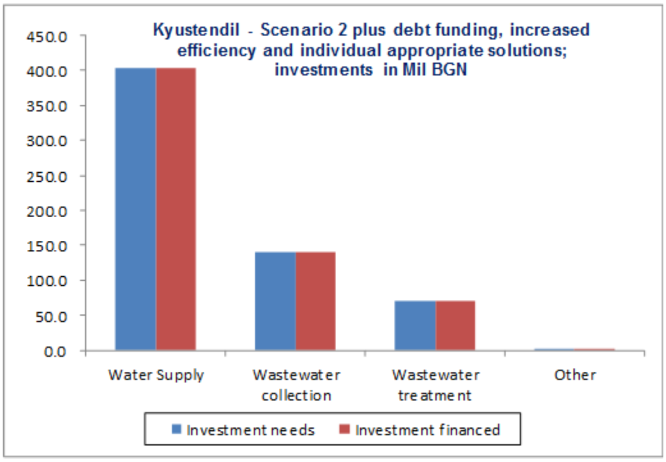
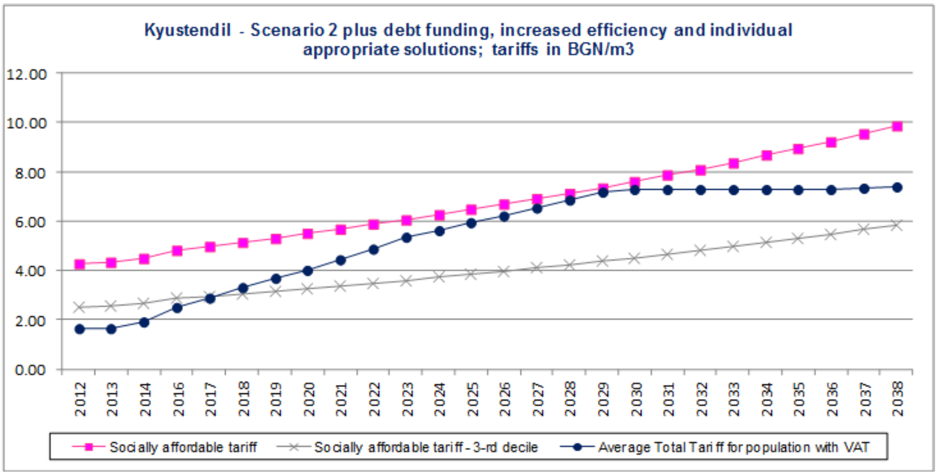
10. Kyustendil District

Kyustendil - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**403.6**	**403.6**
Abstraction	**8.9**	**8.9**
Water treatment	**25.0**	**25.0**
Transmission	**201.8**	**201.8**
Distribution	**167.9**	**167.9**
Wastewater	**210.6**	**210.6**
Wastewater collection	**140.7**	**140.7**
Wastewater treatment	**69.9**	**69.9**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**615.9**	**615.9**





Kyustendil - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	247.9	247.9	0.1	76.7	44.5	28.9	93.1	4.8	-	1.9
2024-2028	122.7	122.7	4.9	-	-	-	102.9	19.8	-	3.8
2029-2038	245.3	245.3	9.4	-	-	-	245.3	-	-	7.3
TOTAL, MBGN	**615.9**	**615.9**	**14.4**	**76.7**	**44.5**	**28.9**	**441.2**	**24.6**	**-**	**12.9**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	64.6%	54.1%	47.3%	31.2%	30.0%	
population connected to WWC; % of water supplied population	69.7%	71.0%	71.0%	71.0%	71.0%	
population connected to WWT; % of water supplied population	53.4%	71.0%	71.0%	71.0%	71.0%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2018**
compliance with UWWTD; % of target	75.2%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	0.06	0.03	(0.01)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	-	-	-	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.77	0.79	0.80	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.4)	(1.6)	(1.9)	NA	36%
(savings) from other costs; MBGN since 2013	NA	(1.1)	(1.1)	(1.2)	NA	

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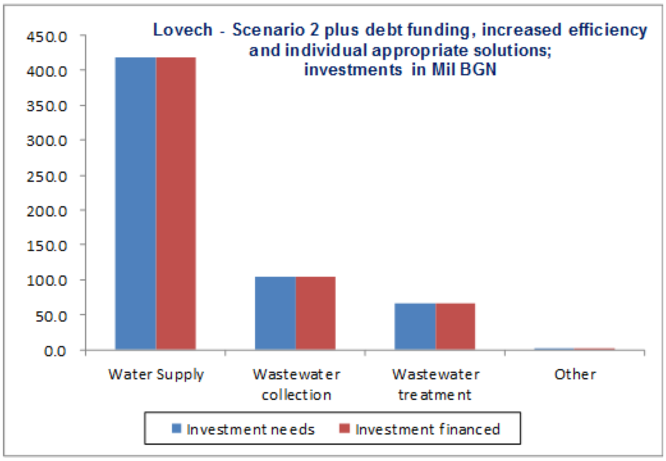
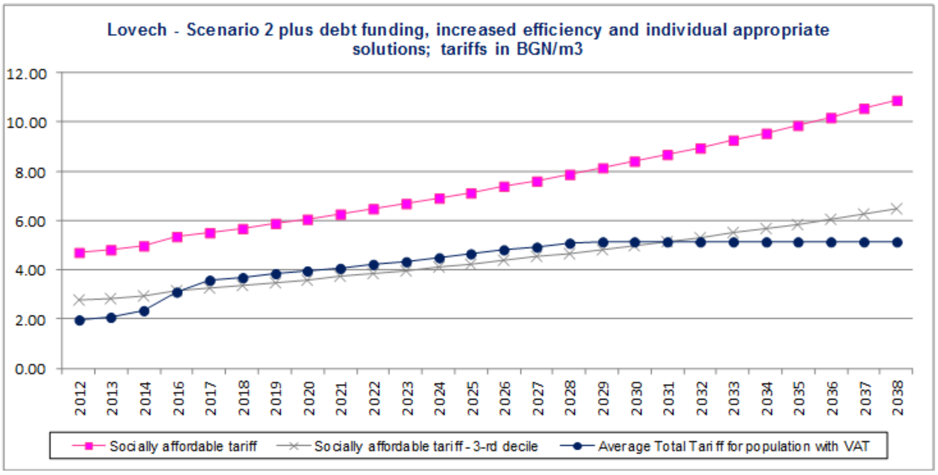
11. Lovech District

Lovech - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**418.1**	**418.1**
Abstraction	16.3	16.3
Water treatment	34.2	34.2
Transmission	191.8	191.8
Distribution	175.8	175.8
Wastewater	**171.5**	**171.5**
Wastewater collection	104.9	104.9
Wastewater treatment	66.6	66.6
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**591.3**	**591.3**





Lovech - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	250.8	250.8	3.2	83.5	47.4	-	110.3	9.6	-	0.9
2024-2028	113.5	113.5	1.9	-	-	-	113.0	0.5	-	0.8
2029-2038	227.0	227.0	2.5	-	-	-	227.0	-	-	0.2
TOTAL, MBGN	**591.3**	**591.3**	**7.6**	**83.5**	**47.4**	**-**	**450.3**	**10.1**	**-**	**1.9**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	51.3%	45.5%	41.3%	31.3%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	38.2%	64.1%	64.1%	64.1%	64.1%	
population connected to WWT; % of water supplied population	36.0%	64.1%	64.1%	64.1%	64.1%	First year:
compliance with UWWTD, year: **2023**		last year of deferred investments:			-	**2017**
compliance with UWWTD; % of target	56.1%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	0.48	0.45	0.42	NA	**2030**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.96	0.95	0.92	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.9)	(2.1)	(2.5)	NA	28%
(savings) from other costs; MBGN since 2013	NA	(1.0)	(1.0)	(1.1)	NA	

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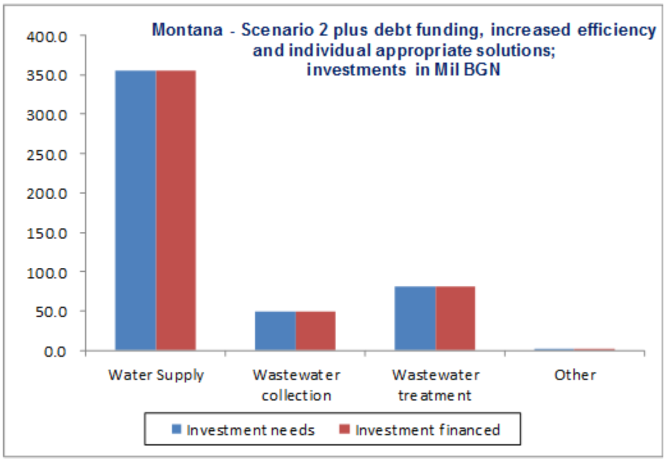
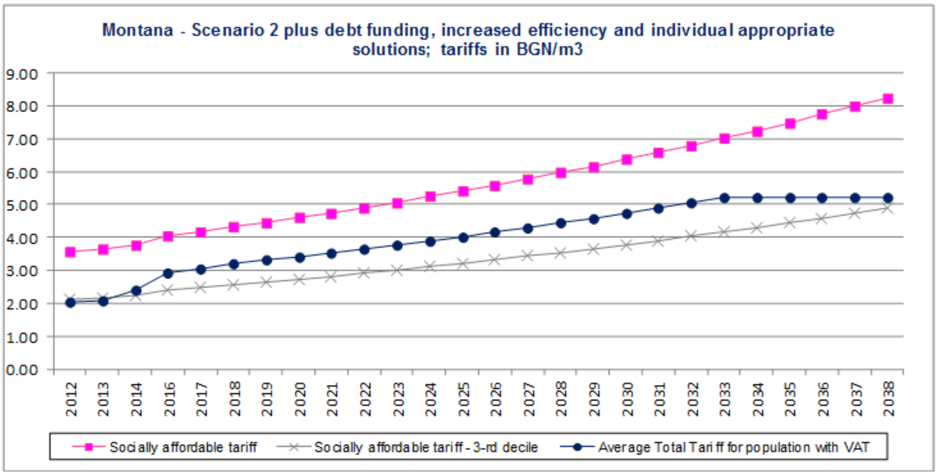
12. Montana District

Montana - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**356.0**	**356.0**
Abstraction	**9.4**	**9.4**
Water treatment	**13.1**	**13.1**
Transmission	**173.5**	**173.5**
Distribution	**160.0**	**160.0**
Wastewater	**129.5**	**129.5**
Wastewater collection	**48.5**	**48.5**
Wastewater treatment	**81.0**	**81.0**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**487.2**	**487.2**





Montana - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	182.6	182.6	-	91.1	53.4	-	38.1	-	-	2.1
2024-2028	101.5	101.5	-	-	-	-	101.5	-	-	1.6
2029-2038	203.1	203.1	-	-	-	-	203.1	-	-	2.9
TOTAL, MBGN	**487.2**	**487.2**	-	**91.1**	**53.4**	-	**342.7**	-	-	**6.7**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	64.8%	57.0%	49.2%	31.6%	30.0%	
population connected to WWC; % of water supplied population	51.0%	62.7%	62.7%	62.7%	62.7%	
population connected to WWT; % of water supplied population	51.0%	62.7%	62.7%	62.7%	62.7%	First year:
compliance with UWWTD, year: **2022**	last year of deferred investments:				-	**2014**
compliance with UWWTD; % of target	81.2%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.09)	(0.28)	(0.62)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.74	0.79	0.88	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.6)	(1.8)	(2.1)	NA	31%
(savings) from other costs; MBGN since 2013	NA	(0.1)	(0.1)	(0.2)	NA	

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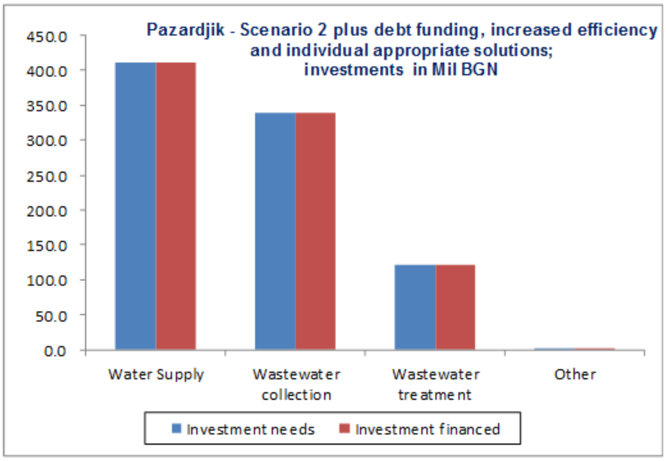
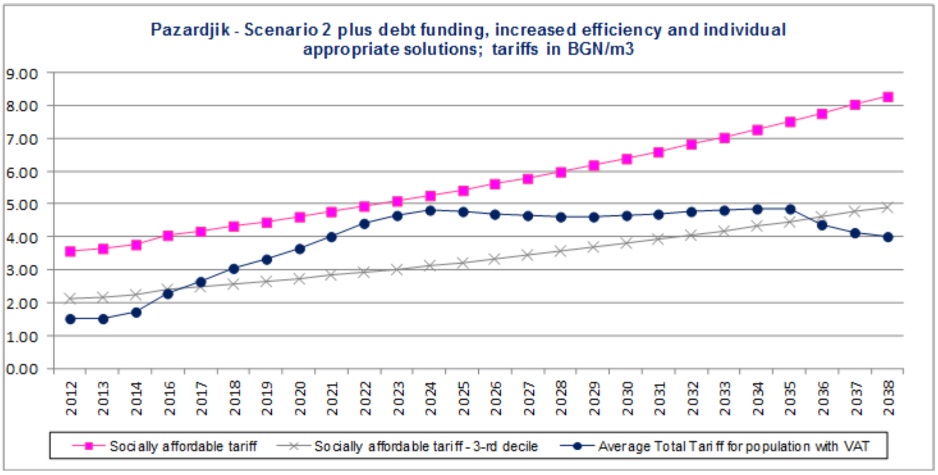
13. Pazardzhik District

Pazardjik - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	412.0	412.0
Abstraction	8.5	8.5
Water treatment	26.3	26.3
Transmission	158.7	158.7
Distribution	218.6	218.6
Wastewater	460.3	460.3
Wastewater collection	338.6	338.6
Wastewater treatment	121.7	121.7
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	874.0	874.0





Pazardjik - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	465.3	465.3	25.4	89.5	66.4	-	170.9	138.5	-	4.9
2024-2028	136.2	136.2	35.0	-	-	-	136.2	-	-	5.7
2029-2038	272.5	272.5	34.1	-	-	-	272.5	-	-	3.9
TOTAL, MBGN	874.0	874.0	94.5	89.5	66.4	-	579.6	138.5	-	14.6

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	58.4%	46.0%	41.6%	31.1%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	70.8%	75.2%	75.2%	75.2%	75.2%	
population connected to WWT; % of water supplied population	33.0%	75.2%	75.2%	75.2%	75.2%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	2017
compliance with UWWTD; % of target	43.9%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.15)	(0.19)	(0.29)	NA	2035
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.01	0.01	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.46	1.53	1.64	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.0)	(2.3)	(2.7)	NA	28%
(savings) from other costs; MBGN since 2013	NA	(1.2)	(1.3)	(1.3)	NA	

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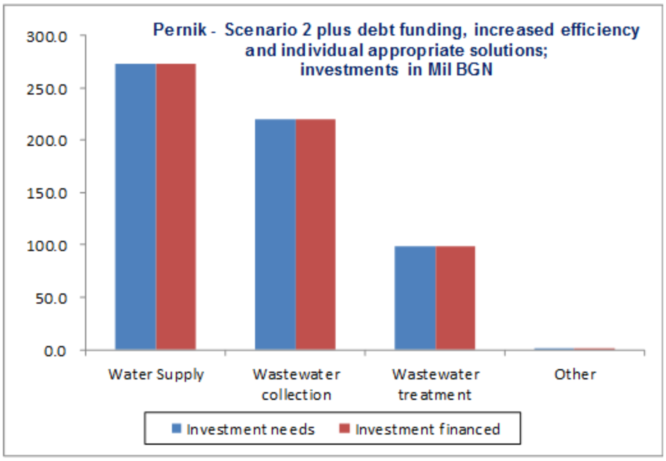
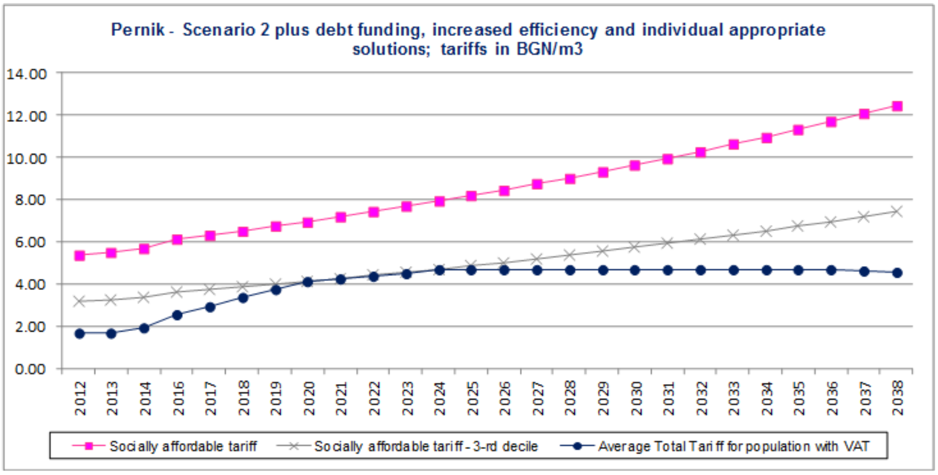
14. Pernik District

Pernik - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**273.3**	**273.3**
Abstraction	**7.0**	**7.0**
Water treatment	**23.4**	**23.4**
Transmission	**125.3**	**125.3**
Distribution	**117.6**	**117.6**
Wastewater	**319.4**	**319.4**
Wastewater collection	**220.1**	**220.1**
Wastewater treatment	**99.2**	**99.2**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**594.3**	**594.3**





Pernik - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	294.7	294.7	1.5	113.7	60.7	-	108.1	12.2	-	-
2024-2028	99.9	99.9	2.9	-	-	-	99.9	-	-	-
2029-2038	199.8	199.8	4.2	-	-	-	199.8	-	-	-
TOTAL, MBGN	**594.3**	**594.3**	**8.6**	**113.7**	**60.7**	**-**	**407.8**	**12.2**	**-**	**-**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	61.1%	52.4%	46.3%	31.3%	30.0%	
population connected to WWC; % of water supplied population	51.9%	80.0%	80.0%	80.0%	80.0%	
population connected to WWT; % of water supplied population	44.6%	80.0%	80.0%	80.0%	80.0%	First year:
compliance with UWWTD, year: **2022**	last year of deferred investments:				-	-
compliance with UWWTD; % of target	55.7%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.32)	(0.43)	(0.56)	NA	-
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.10	1.09	1.07	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.8)	(2.0)	(2.4)	NA	41%
(savings) from other costs; MBGN since 2013	NA	(1.0)	(1.1)	(1.2)	NA	

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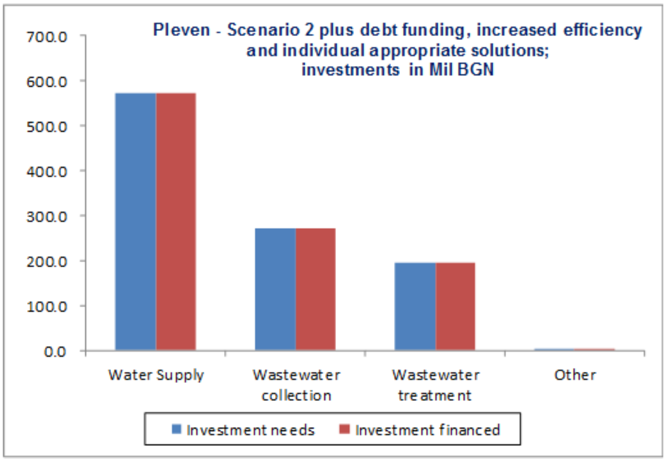
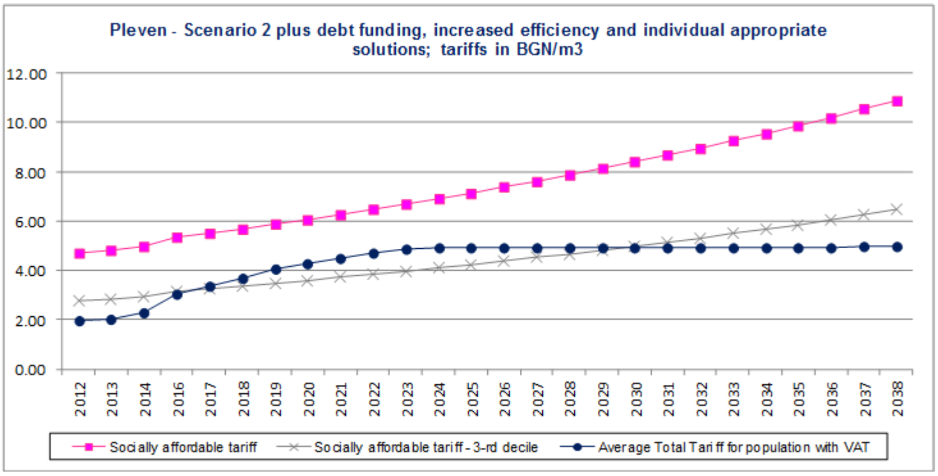
15. Pleven District

Pleven - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	572.1	572.1
Abstraction	12.8	12.8
Water treatment	14.5	14.5
Transmission	273.3	273.3
Distribution	271.5	271.5
Wastewater	465.8	465.8
Wastewater collection	271.2	271.2
Wastewater treatment	194.6	194.6
Other	2.7	2.7
Transport & plant	1.6	1.6
Business systems	1.1	1.1
Total Investment	1 040.6	1 040.6





Pleven - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	555.5	555.5	26.2	193.3	107.2	-	177.6	77.4	-	3.4
2024-2028	161.7	161.7	15.2	-	-	-	161.7	-	-	2.1
2029-2038	323.4	323.4	17.6	-	-	-	323.4	-	-	0.1
TOTAL, MBGN	1 040.6	1 040.6	59.0	193.3	107.2	-	662.7	77.4	-	5.6

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	52.6%	45.7%	41.4%	30.7%	30.0%	
population connected to WWC; % of water supplied population	51.8%	63.1%	63.1%	63.1%	63.1%	
population connected to WWT; % of water supplied population	41.4%	63.1%	63.1%	63.1%	63.1%	First year:
compliance with UWWTD, year: 2023		last year of deferred investments:			-	2017
compliance with UWWTD; % of target	65.6%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	0.06	(0.38)	(1.19)	NA	2029
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.01	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	2.10	2.11	2.12	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(4.1)	(4.5)	(5.4)	NA	34%
(savings) from other costs; MBGN since 2013	NA	(1.2)	(1.4)	(1.6)	NA	

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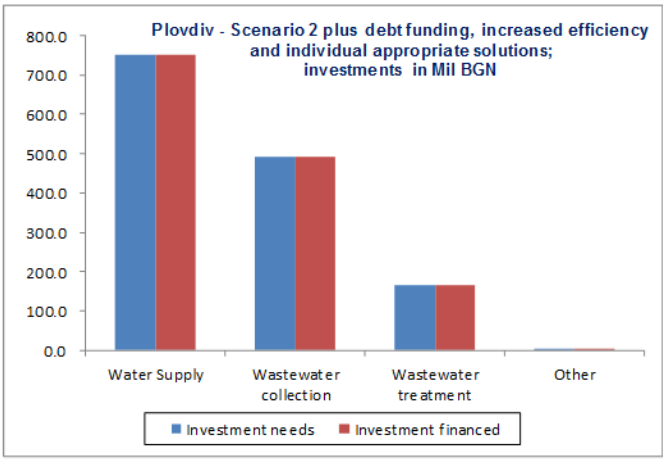
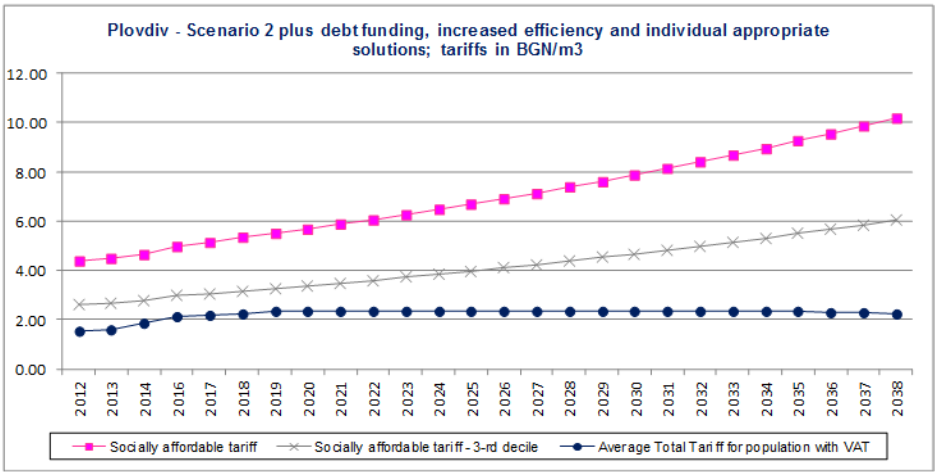
16. Plovdiv District

Plovdiv - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**749.5**	**749.5**
Abstraction	18.2	18.2
Water treatment	0.0	0.0
Transmission	308.3	308.3
Distribution	422.9	422.9
Wastewater	**656.2**	**656.2**
Wastewater collection	491.4	491.4
Wastewater treatment	164.9	164.9
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**1 407.3**	**1 407.3**





Plovdiv - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	671.5	671.5	-	217.1	170.5	-	283.8	-	-	-
2024-2028	245.3	245.3	-	-	-	-	245.3	-	-	-
2029-2038	490.6	490.6	-	-	-	-	490.6	-	-	-
TOTAL, MBGN	**1 407.3**	**1 407.3**	-	**217.1**	**170.5**	-	**1 019.7**	-	-	-

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	59.9%	48.0%	43.3%	31.5%	30.0%	
population connected to WWC; % of water supplied population	66.0%	76.1%	76.1%	76.1%	76.1%	
population connected to WWT; % of water supplied population	49.2%	76.1%	76.1%	76.1%	76.1%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	-
compliance with UWWTD; % of target	64.6%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(1.31)	(1.88)	(2.84)	NA	-
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.01	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	2.54	2.56	2.60	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(6.9)	(7.6)	(9.1)	NA	44%
(savings) from other costs; MBGN since 2013	NA	(6.8)	(7.0)	(7.3)	NA	

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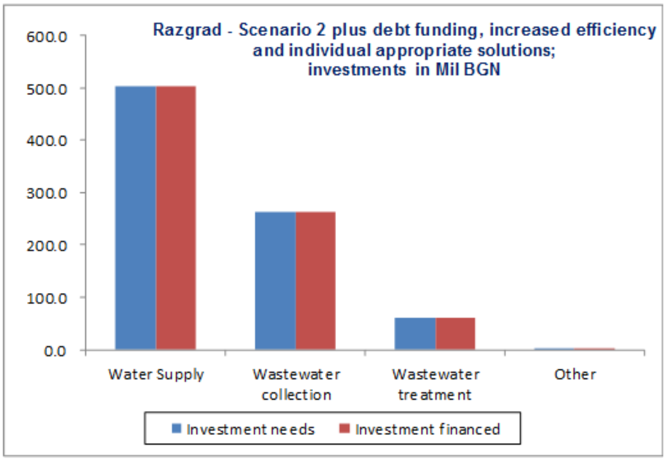
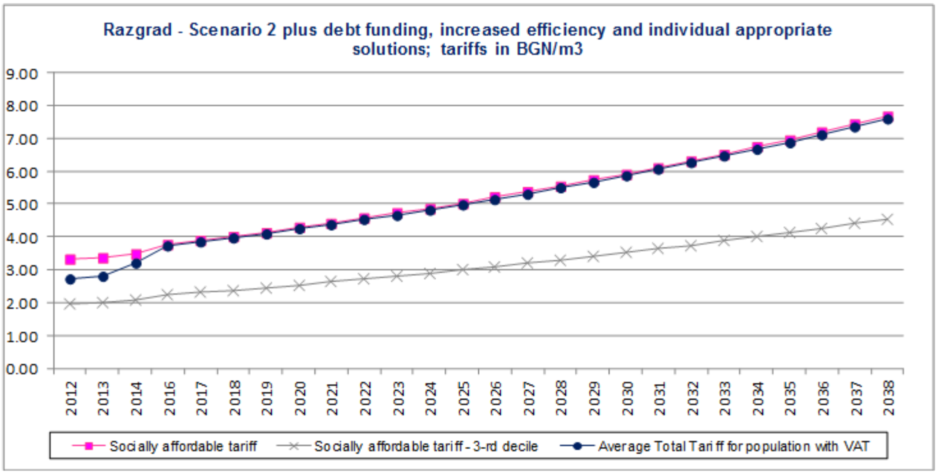
17. Razgrad District

Razgrad - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**502.5**	**502.5**
Abstraction	11.5	11.5
Water treatment	0.0	0.0
Transmission	245.7	245.7
Distribution	245.2	245.2
Wastewater	**324.8**	**324.8**
Wastewater collection	263.7	263.7
Wastewater treatment	61.1	61.1
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**829.0**	**829.0**





Razgrad - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	421.7	421.7	-	54.4	35.5	247.5	84.3	-	-	5.1
2024-2028	135.8	135.8	-	-	-	61.2	74.6	-	-	3.5
2029-2038	271.6	271.6	-	-	-	65.4	206.2	-	-	8.2
TOTAL, MBGN	**829.0**	**829.0**	**-**	**54.4**	**35.5**	**374.0**	**365.2**	**-**	**-**	**16.8**

Key indicators

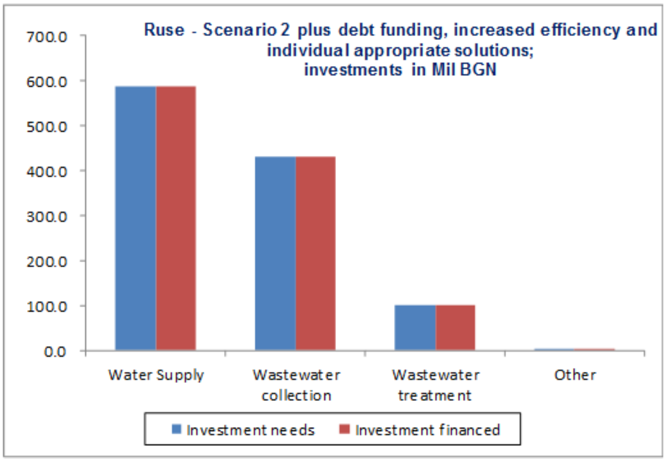
Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	67.3%	58.0%	50.0%	32.3%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	30.3%	48.6%	48.6%	48.6%	48.6%	
population connected to WWT; % of water supplied population	30.3%	48.6%	48.6%	48.6%	48.6%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2014**
compliance with UWWTD; % of target	62.3%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.71)	(0.98)	(1.49)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.01	0.01	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.65	0.68	0.68	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.6)	(2.9)	(3.4)	NA	48%
(savings) from other costs; MBGN since 2013	NA	(0.7)	(0.8)	(1.0)	NA	

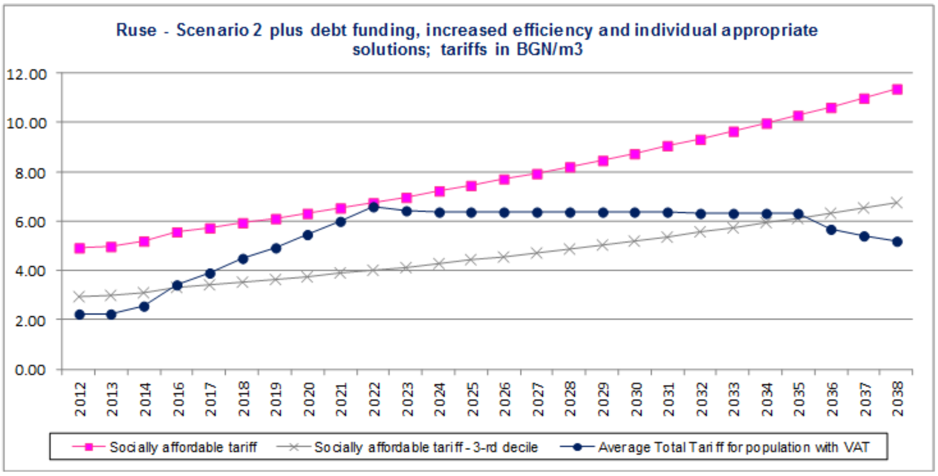
18. Ruse District

Ruse - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**587.0**	**587.0**
Abstraction	8.3	8.3
Water treatment	0.0	0.0
Transmission	164.2	164.2
Distribution	414.5	414.5
Wastewater	**530.2**	**530.2**
Wastewater collection	429.5	429.5
Wastewater treatment	100.6	100.6
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**1 118.8**	**1 118.8**





Ruse - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	712.8	712.8	44.2	105.2	68.3	65.0	248.5	225.8	-	8.7
2024-2028	135.3	135.3	56.2	-	-	-	135.3	-	-	6.8
2029-2038	270.7	270.7	56.3	-	-	-	270.7	-	-	4.0
TOTAL, MBGN	**1 118.8**	**1 118.8**	**156.7**	**105.2**	**68.3**	**65.0**	**654.6**	**225.8**	**-**	**19.4**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	42.2%	35.2%	33.9%	30.6%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	63.5%	76.9%	76.9%	76.9%	76.9%	
population connected to WWT; % of water supplied population	0.0%	76.9%	76.9%	76.9%	76.9%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2016**
compliance with UWWTD; % of target	0.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.09)	(0.19)	(0.38)	NA	**2035**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.03	0.03	0.03	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.95	1.94	1.89	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(3.4)	(3.8)	(4.5)	NA	23%
(savings) from other costs; MBGN since 2013	NA	(0.5)	(0.6)	(0.7)	NA	

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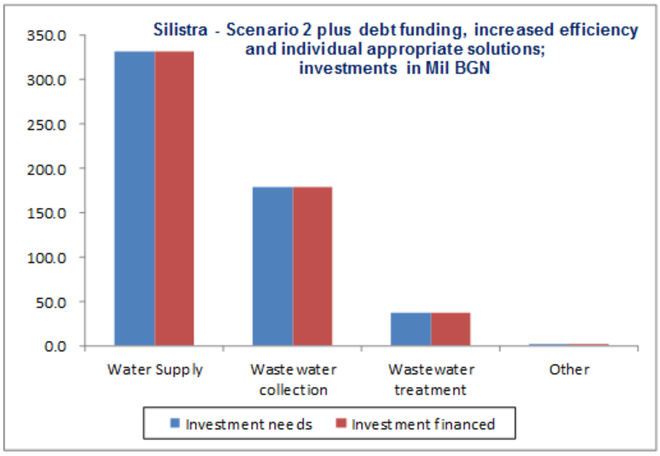
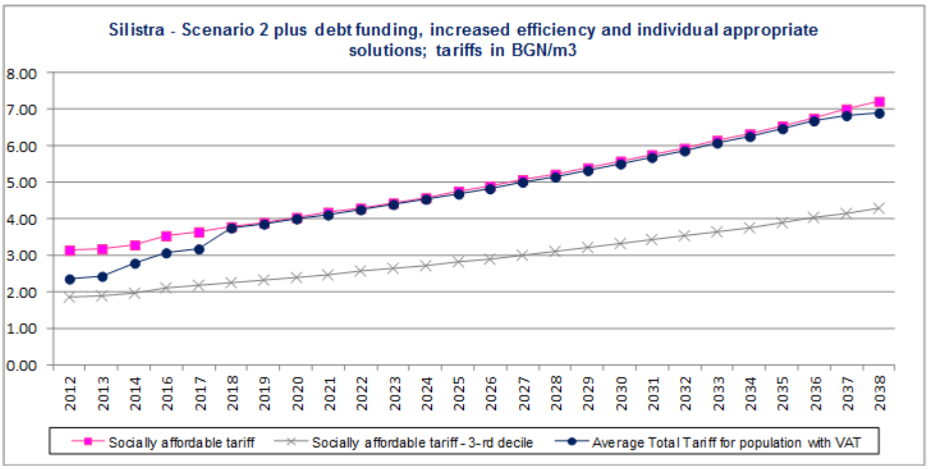
19. Silistra District

Silistra - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	331.9	331.9
Abstraction	3.9	3.9
Water treatment	0.0	0.0
Transmission	169.2	169.2
Distribution	158.8	158.8
Wastewater	215.2	215.2
Wastewater collection	178.6	178.6
Wastewater treatment	36.6	36.6
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	548.8	548.8





Silistra - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	254.7	254.7	-	38.7	28.8	119.2	68.1	-	-	3.8
2024-2028	98.0	98.0	-	-	-	36.4	61.7	-	-	3.0
2029-2038	196.1	196.1	5.2	-	-	4.9	175.9	15.3	-	7.9
TOTAL, MBGN	548.8	548.8	5.2	38.7	28.8	160.4	305.7	15.3	-	14.8

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	54.2%	46.5%	41.7%	30.3%	30.0%	
population connected to WWC; % of water supplied population	55.0%	63.1%	63.1%	63.1%	63.1%	
population connected to WWT; % of water supplied population	0.0%	63.1%	63.1%	63.1%	63.1%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	2014
compliance with UWWTD; % of target	0.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.09)	(0.17)	(0.39)	NA	2038
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.02	0.02	0.02	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.90	0.93	0.96	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.0)	(2.2)	(2.7)	NA	38%
(savings) from other costs; MBGN since 2013	NA	(0.7)	(0.7)	(0.8)	NA	

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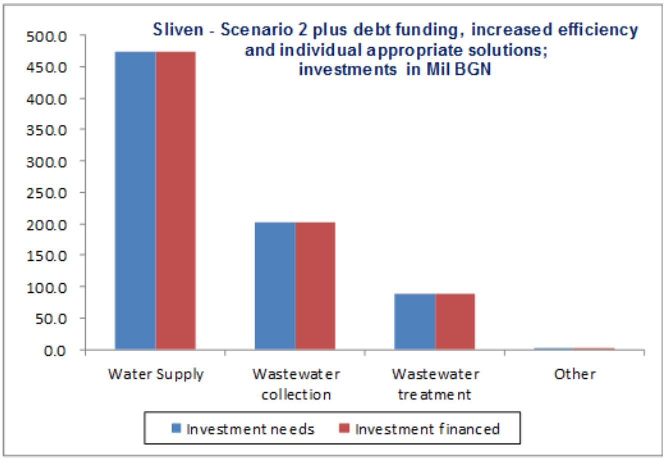
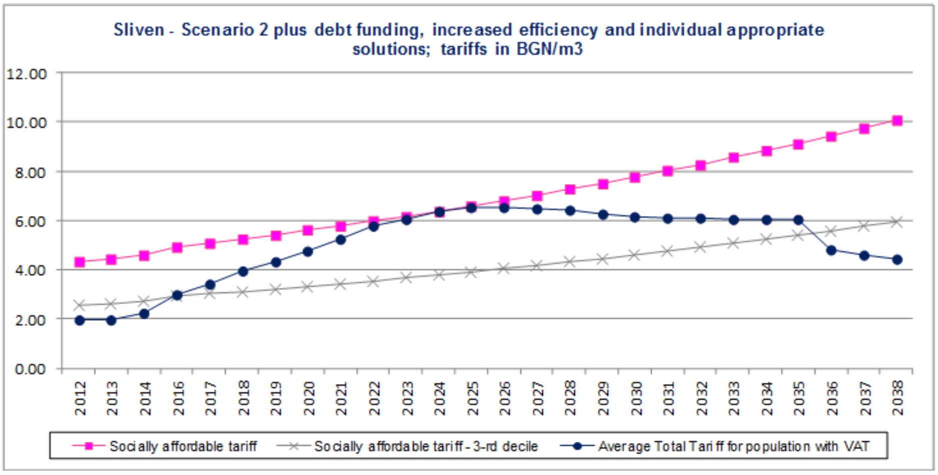
20. Sliven District

Sliven - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**472.9**	**472.9**
Abstraction	16.1	16.1
Water treatment	18.7	18.7
Transmission	172.8	172.8
Distribution	265.2	265.2
Wastewater	**290.1**	**290.1**
Wastewater collection	201.6	201.6
Wastewater treatment	88.5	88.5
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**764.7**	**764.7**





Sliven - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	426.4	426.4	19.9	108.3	67.2	-	132.8	118.1	-	5.4
2024-2028	112.8	112.8	32.7	-	-	-	112.8	-	-	7.0
2029-2038	225.5	225.5	26.9	-	-	-	225.5	-	-	5.1
TOTAL, MBGN	**764.7**	**764.7**	**79.4**	**108.3**	**67.2**	**-**	**471.0**	**118.1**	**-**	**17.5**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	85.6%	65.1%	55.1%	31.8%	30.0%	
population connected to WWC; % of water supplied population	57.6%	66.2%	66.2%	66.2%	66.2%	
population connected to WWT; % of water supplied population	55.8%	66.2%	66.2%	66.2%	66.2%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2016**
compliance with UWWTD; % of target	84.3%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(1.13)	(1.19)	(1.11)	NA	**2035**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.03	1.07	1.12	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.1)	(2.3)	(2.7)	NA	49%
(savings) from other costs; MBGN since 2013	NA	(2.0)	(2.0)	(2.1)	NA	

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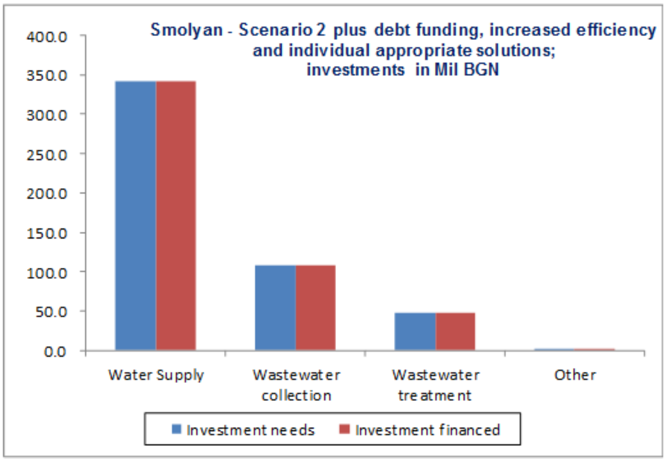
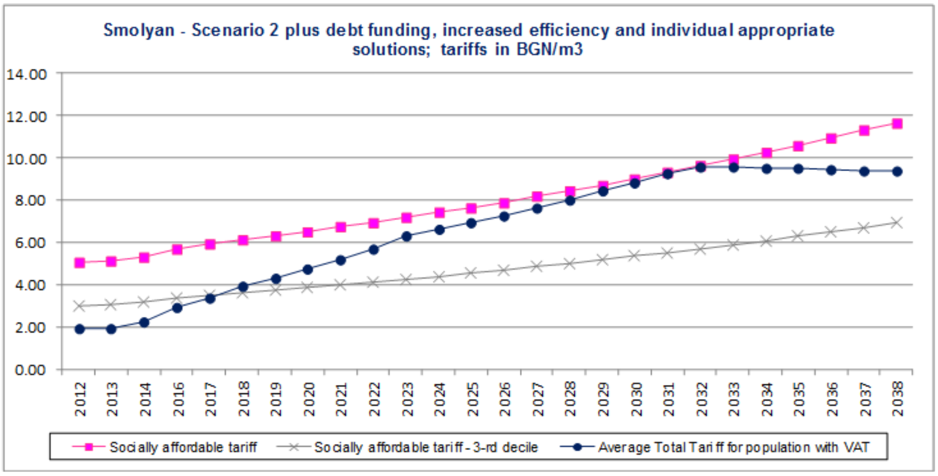
21. Smolyan District

Smolyan - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	341.7	341.7
Abstraction	17.5	17.5
Water treatment	21.5	21.5
Transmission	221.9	221.9
Distribution	80.7	80.7
Wastewater	155.1	155.1
Wastewater collection	108.2	108.2
Wastewater treatment	46.9	46.9
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	498.4	498.4





Smolyan - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	221.5	221.5	6.6	40.2	28.4	53.7	66.6	32.7	-	1.4
2024-2028	92.3	92.3	14.2	-	-	-	57.3	35.0	-	3.0
2029-2038	184.6	184.6	22.2	-	-	-	184.6	-	-	8.0
TOTAL, MBGN	498.4	498.4	42.9	40.2	28.4	53.7	308.5	67.7	-	12.4

Key indicators

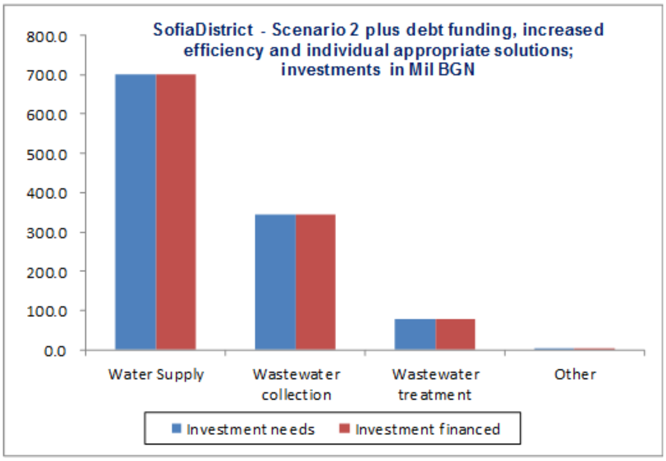
Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	46.9%	40.3%	37.4%	30.3%	30.0%	
population connected to WWC; % of water supplied population	64.5%	64.5%	64.5%	64.5%	64.5%	
population connected to WWT; % of water supplied population	38.4%	64.5%	64.5%	64.5%	64.5%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	2018
compliance with UWWTD; % of target	59.4%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	0.17	0.20	0.27	NA	2038
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.08	0.08	0.08	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.65	0.67	0.73	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.2)	(1.3)	(1.7)	NA	17%
(savings) from other costs; MBGN since 2013	NA	(0.1)	(0.1)	(0.2)	NA	

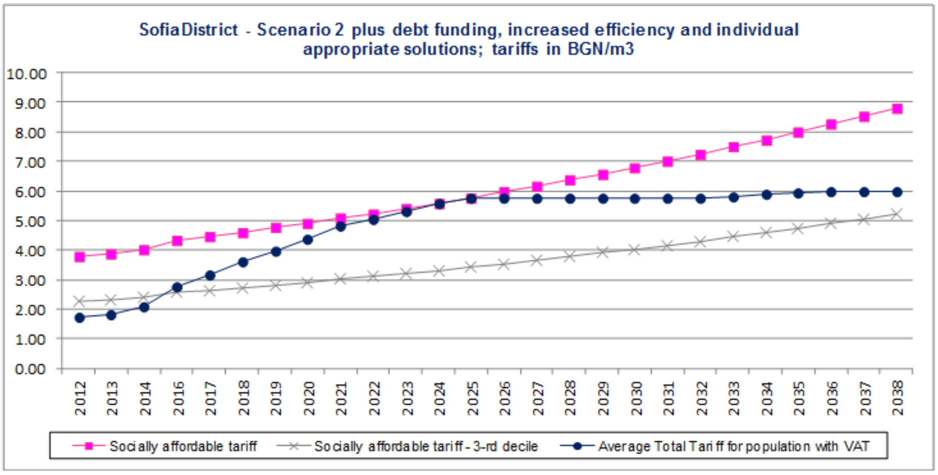
22. Sofia District

SofiaDistrict - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	699.1	699.1
Abstraction	25.2	25.2
Water treatment	16.5	16.5
Transmission	321.8	321.8
Distribution	335.6	335.6
Wastewater	420.8	420.8
Wastewater collection	343.9	343.9
Wastewater treatment	76.9	76.9
Other	3.4	3.4
Transport & plant	3.2	3.2
Business systems	0.2	0.2
Total Investment	1 123.3	1 123.3





SofiaDistrict - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	544.7	544.7	11.5	91.8	64.2	140.3	194.8	53.6	-	7.4
2024-2028	192.8	192.8	11.5	-	-	-	192.8	-	-	7.9
2029-2038	385.7	385.7	14.9	-	-	-	385.7	-	-	9.1
TOTAL, MBGN	1 123.3	1 123.3	37.8	91.8	64.2	140.3	773.4	53.6	-	24.4

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	55.7%	44.8%	40.6%	30.4%	30.0%	
population connected to WWC; % of water supplied population	66.7%	70.0%	70.0%	70.0%	70.0%	
population connected to WWT; % of water supplied population	13.7%	70.0%	70.0%	70.0%	70.0%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	2016
compliance with UWWTD; % of target	19.6%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.15)	(0.25)	(0.39)	NA	2038
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.56	1.56	1.56	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(3.0)	(3.3)	(4.0)	NA	31%
(savings) from other costs; MBGN since 2013	NA	(0.5)	(0.6)	(0.7)	NA	

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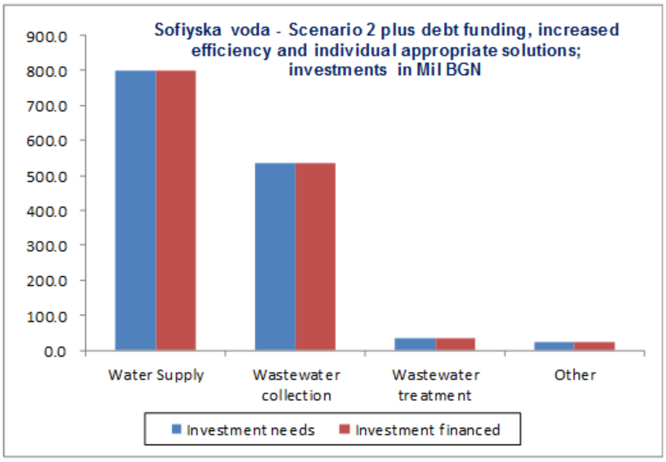
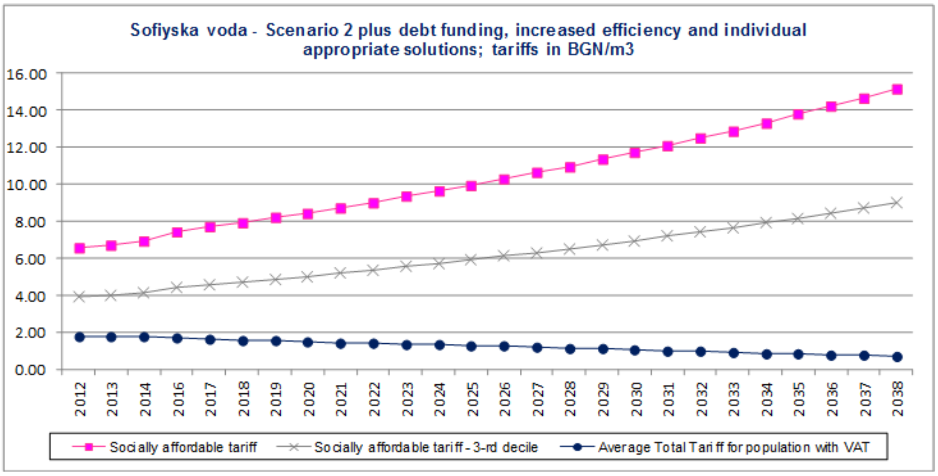
23. City of Sofia

Sofiyska voda - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**801.3**	**801.3**
Abstraction	0.0	0.0
Water treatment	30.7	30.7
Transmission	169.5	169.5
Distribution	601.2	601.2
Wastewater	**569.2**	**569.2**
Wastewater collection	533.3	533.3
Wastewater treatment	35.9	35.9
Other	**23.1**	**23.1**
Transport & plant	11.3	11.3
Business systems	11.8	11.8
Total Investment	**1 393.6**	**1 393.6**





Sofiyska voda - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	618.5	618.5	-	315.9	245.8	-	56.8	-	-	-
2024-2028	258.4	258.4	-	-	-	-	258.4	-	-	-
2029-2038	516.7	516.7	-	-	-	-	516.7	-	-	-
TOTAL, MBGN	**1 393.6**	**1 393.6**	-	**315.9**	**245.8**	-	**831.9**	-	-	-

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	58.6%	47.6%	43.0%	31.2%	30.0%	
population connected to WWC; % of water supplied population	87.4%	94.5%	94.5%	94.5%	94.5%	
population connected to WWT; % of water supplied population	86.8%	94.5%	94.5%	94.5%	94.5%	First year:
compliance with UWWTD, year: **2022**	last year of deferred investments:				-	-
compliance with UWWTD; % of target	91.9%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	0.49	0.12	(0.60)	NA	-
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.01	0.01	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.87	0.89	0.97	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	-	-	-	NA	-1%
(savings) from other costs; MBGN since 2013	NA	0.6	0.4	0.0	NA	

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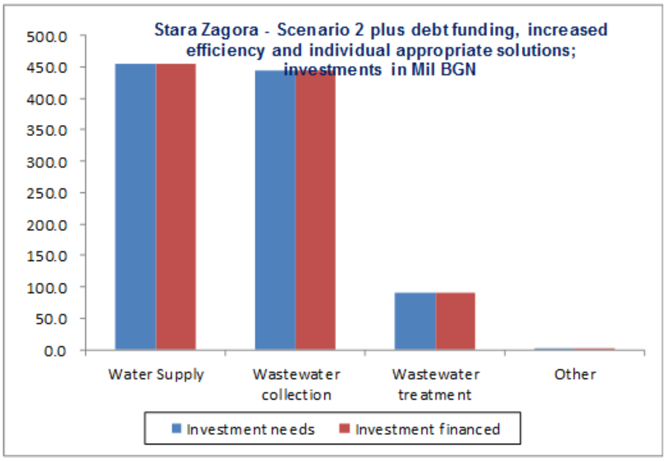
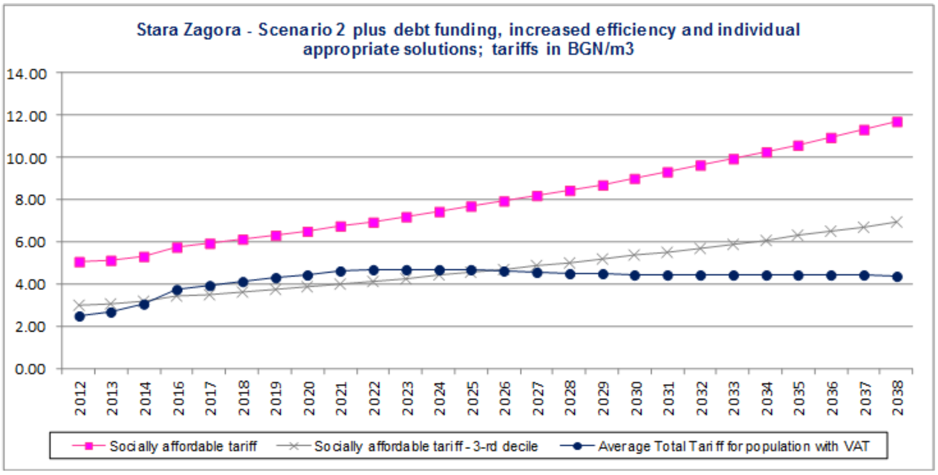
24. Stara Zagora District

Stara Zagora - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**453.9**	**453.9**
Abstraction	**17.6**	**17.6**
Water treatment	**1.7**	**1.7**
Transmission	**292.0**	**292.0**
Distribution	**142.6**	**142.6**
Wastewater	**534.6**	**534.6**
Wastewater collection	**444.3**	**444.3**
Wastewater treatment	**90.3**	**90.3**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**990.2**	**990.2**





Stara Zagora - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	570.8	570.8	13.9	109.9	78.6	-	255.1	127.2	-	3.7
2024-2028	139.8	139.8	29.2	-	-	-	139.8	-	-	0.4
2029-2038	279.6	279.6	41.0	-	-	-	279.6	-	-	-
TOTAL, MBGN	**990.2**	**990.2**	**84.0**	**109.9**	**78.6**	**-**	**674.5**	**127.2**	**-**	**4.1**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	53.9%	41.4%	38.0%	30.3%	30.0%	
population connected to WWC; % of water supplied population	68.8%	70.2%	70.2%	70.2%	70.2%	
population connected to WWT; % of water supplied population	35.3%	70.2%	70.2%	70.2%	70.2%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2015**
compliance with UWWTD; % of target	50.2%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.67)	(0.79)	(1.56)	NA	**2025**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.08	1.14	1.17	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(4.5)	(5.0)	(6.0)	NA	34%
(savings) from other costs; MBGN since 2013	NA	(1.6)	(1.7)	(2.0)	NA	

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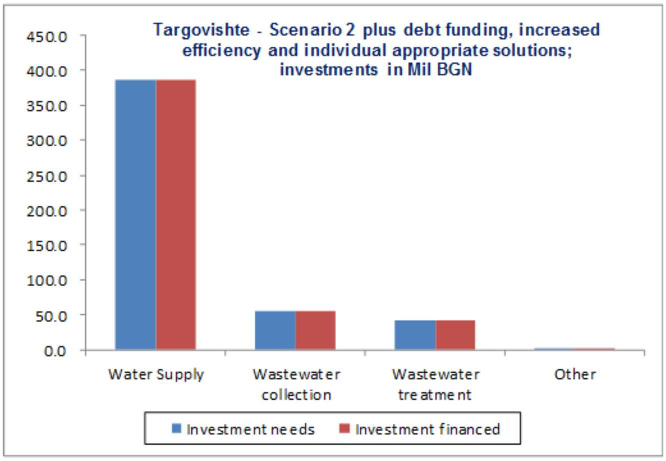
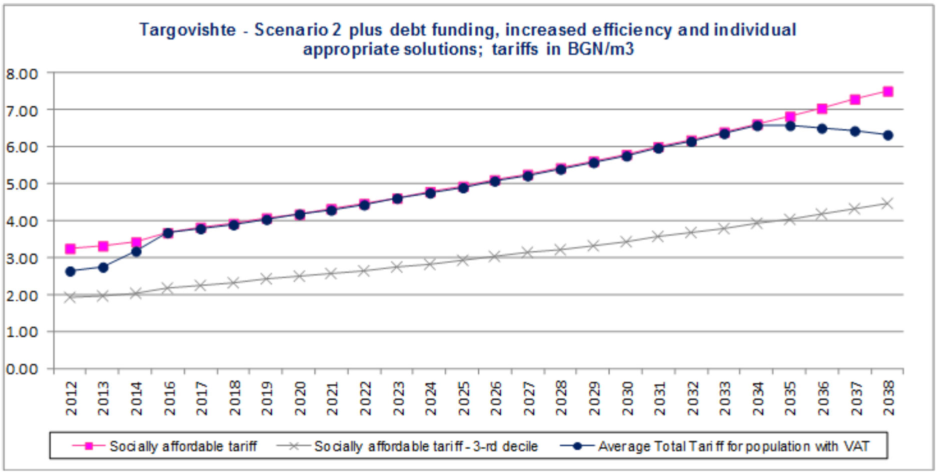
25. Targovishte District

Targovishte - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**386.9**	**386.9**
Abstraction	**13.3**	**13.3**
Water treatment	**13.7**	**13.7**
Transmission	**221.0**	**221.0**
Distribution	**138.8**	**138.8**
Wastewater	**96.9**	**96.9**
Wastewater collection	**54.4**	**54.4**
Wastewater treatment	**42.5**	**42.5**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**485.5**	**485.5**





Targovishte - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	249.1	249.1	-	39.1	29.1	117.4	63.5	-	-	4.0
2024-2028	78.8	78.8	3.4	-	-	5.9	37.4	35.5	-	2.8
2029-2038	157.5	157.5	14.8	-	-	-	157.5	-	-	7.0
TOTAL, MBGN	**485.5**	**485.5**	**18.2**	**39.1**	**29.1**	**123.3**	**258.4**	**35.5**	**-**	**13.8**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	62.1%	44.8%	40.6%	30.5%	30.0%	
population connected to WWC; % of water supplied population	58.6%	61.4%	61.4%	61.4%	61.4%	
population connected to WWT; % of water supplied population	0.0%	61.4%	61.4%	61.4%	61.4%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2014**
compliance with UWWTD; % of target	0.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.18)	(0.18)	(0.16)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.02	0.02	0.02	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.55	0.59	0.70	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.2)	(1.4)	(1.7)	NA	21%
(savings) from other costs; MBGN since 2013	NA	(0.2)	(0.2)	(0.3)	NA	

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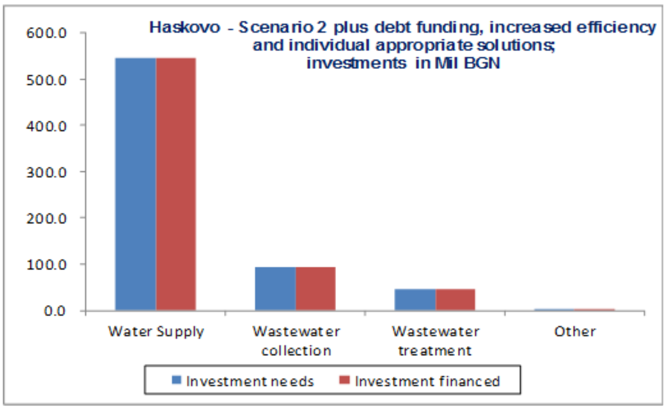
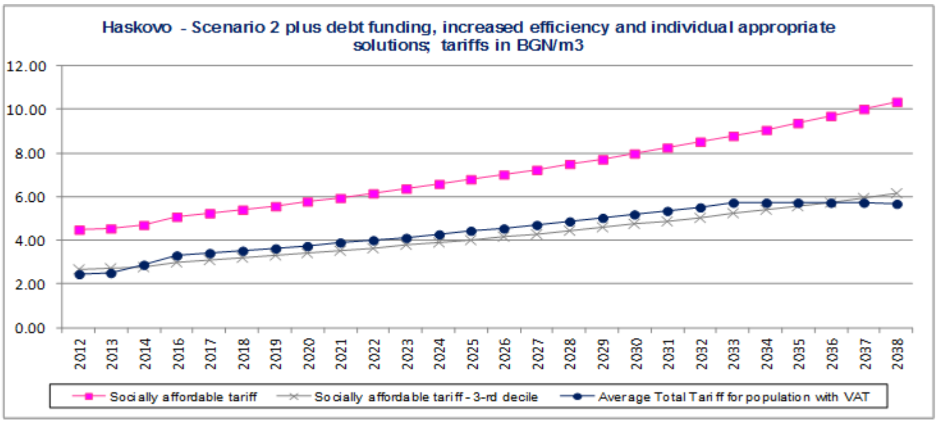
26. Haskovo District

Haskovo - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**544.9**	**544.9**
Abstraction	16.1	16.1
Water treatment	4.1	4.1
Transmission	232.5	232.5
Distribution	292.2	292.2
Wastewater	**141.0**	**141.0**
Wastewater collection	94.6	94.6
Wastewater treatment	46.4	46.4
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**687.6**	**687.6**





Haskovo - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	214.5	214.5	-	78.1	60.8	-	75.6	-	-	1.9
2024-2028	157.7	157.7	-	-	-	-	157.7	-	-	1.4
2029-2038	315.4	315.4	3.1	-	-	-	307.8	7.6	-	1.9
TOTAL, MBGN	**687.6**	**687.6**	**3.1**	**78.1**	**60.8**	**-**	**541.1**	**7.6**	**-**	**5.2**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	49.1%	43.7%	39.8%	30.8%	30.0%	
population connected to WWC; % of water supplied population	65.3%	72.0%	72.0%	72.0%	72.0%	
population connected to WWT; % of water supplied population	9.6%	72.0%	72.0%	72.0%	72.0%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2014**
compliance with UWWTD; % of target	13.4%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.05)	(0.25)	(1.06)	NA	**2035**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.01	0.01	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.16	1.23	1.18	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(3.1)	(3.4)	(4.1)	NA	29%
(savings) from other costs; MBGN since 2013	NA	(0.5)	(0.5)	(0.6)	NA	

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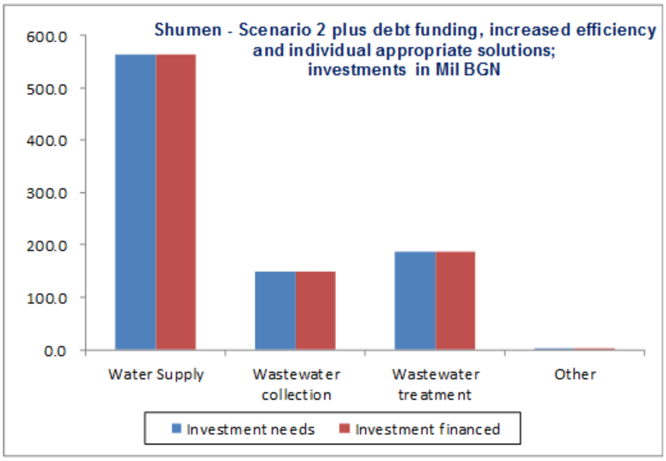
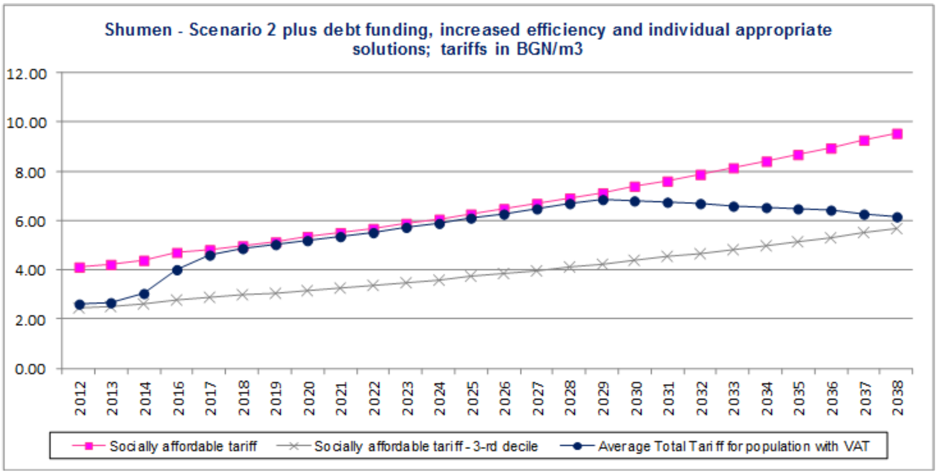
27. Shumen District

Shumen - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**562.5**	**562.5**
Abstraction	**4.6**	**4.6**
Water treatment	**35.5**	**35.5**
Transmission	**339.4**	**339.4**
Distribution	**182.9**	**182.9**
Wastewater	**338.0**	**338.0**
Wastewater collection	**150.2**	**150.2**
Wastewater treatment	**187.8**	**187.8**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**902.2**	**902.2**





Shumen - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	525.4	525.4	14.1	145.6	78.9	81.9	134.4	84.7	-	6.9
2024-2028	125.6	125.6	23.3	-	-	-	106.1	19.5	-	5.6
2029-2038	251.2	251.2	32.7	-	-	-	251.2	-	-	8.1
TOTAL, MBGN	**902.2**	**902.2**	**70.2**	**145.6**	**78.9**	**81.9**	**491.6**	**104.2**	**-**	**20.5**

Key indicators

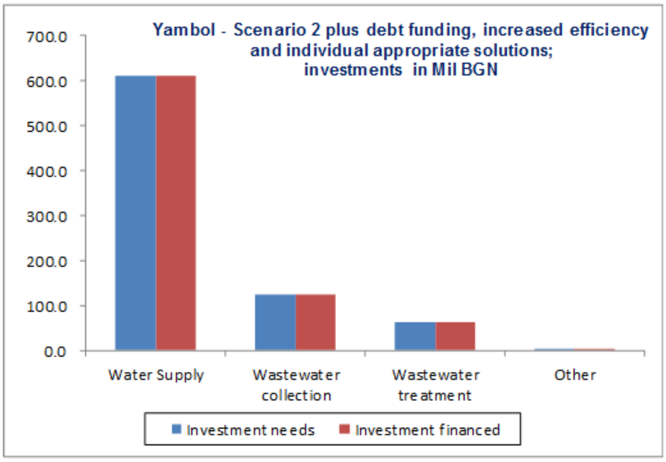
Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	67.9%	51.3%	44.9%	30.9%	30.0%	
population connected to WWC; % of water supplied population	60.4%	63.0%	63.0%	63.0%	63.0%	
population connected to WWT; % of water supplied population	35.2%	63.0%	63.0%	63.0%	63.0%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2014**
compliance with UWWTD; % of target	55.8%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(1.19)	(1.42)	(1.69)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.87	1.90	1.99	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.6)	(2.9)	(3.4)	NA	33%
(savings) from other costs; MBGN since 2013	NA	(1.0)	(1.1)	(1.2)	NA	

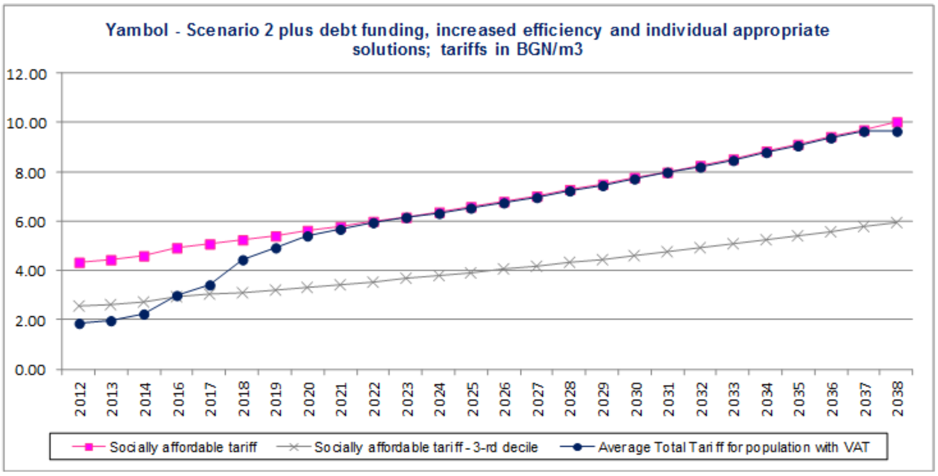
28. Yambol District

Yambol - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**610.0**	**610.0**
Abstraction	**11.7**	**11.7**
Water treatment	**0.0**	**0.0**
Transmission	**539.0**	**539.0**
Distribution	**59.3**	**59.3**
Wastewater	**188.5**	**188.5**
Wastewater collection	**125.7**	**125.7**
Wastewater treatment	**62.8**	**62.8**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**800.2**	**800.2**





Yambol - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	279.7	279.7	-	43.2	30.9	77.9	127.7	-	-	4.0
2024-2028	173.5	173.5	3.1	-	-	22.3	81.8	69.4	-	4.8
2029-2038	347.0	347.0	30.1	-	-	-	347.0	-	-	12.6
TOTAL, MBGN	**800.2**	**800.2**	**33.2**	**43.2**	**30.9**	**100.2**	**556.6**	**69.4**	**-**	**21.5**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	75.7%	64.1%	54.7%	31.6%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	76.4%	86.4%	86.4%	86.4%	86.4%	
population connected to WWT; % of water supplied population	0.0%	86.4%	86.4%	86.4%	86.4%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2016**
compliance with UWWTD; % of target	0.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.62)	(0.82)	(1.01)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.02	0.02	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.46	1.51	1.57	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.7)	(1.8)	(2.2)	NA	32%
(savings) from other costs; MBGN since 2013	NA	(0.6)	(0.7)	(0.8)	NA	

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Appendix 4: Examples of interpretation of excessive costs in other EU countries and principles of definition of agglomerations

Sector Information Note[i]

Definition of Waste Water Solutions for Agglomerations to Avoid Excessive Cost

1. Introduction

This note is intended to be used as a basis for further discussions to determine the appropriateness of current practices on the planning of adequate cost effective waste water solutions for smaller agglomerations within Bulgaria. To date the discussions on agglomerations at a National and on an individual project level have focused on two (partially unconnected) issues; namely:

a) Definition of agglomerations;
b) Practices to determine service coverage levels within defined agglomerations.

To address these subject matters this Note provides a summary of:

a) background information on the main principals applied for the definition of an agglomeration within the EC Commission;
b) agglomeration definitions and main principals adopted within individual Member States;
c) the practices adopted within Member States to determine an "appropriate" level of coverage of a centralised sewer system within the agglomeration.

2. Definition of Agglomerations

a) EU Principles

The term agglomeration under Article 2(4) of the Urban Wastewater Directive is "*an area where the population and / or economic activities are sufficiently concentrated for urban waste water to be collected and conducted to an urban waste water treatment plant or to a final discharge point*"

The term "*sufficiently concentrated*" relates to the concentration of population, economic activities as well as a combination of the two. Within the "*agglomeration*" definition, an agglomeration can be served by one or by several urban wastewater treatment plants. Furthermore, a single agglomeration can cover several collecting systems with each one of them connected to one or several plants. The possible definitions are summarised in the below diagram[9] which shows the following options;

Scenario A	One agglomeration that is served by one treatment plant
A-1	Number of closely connected settlements that are served by a single treatment plant
A-2	Single agglomeration covering several adjacent administrative authorities

	served by a single collection system and treatment plant
Scenario B	One agglomeration served by two (or more) separate collecting systems each with its own treatment plant.
B-1	A single agglomeration covering several adjacent administrative entities that are served by several collecting systems and several plants.
Scenario C	Separate agglomerations each with a separate collecting system, but all served by a single treatment plant.

The definition of the “*agglomeration*” does not define the selection basis to determine the most appropriate “*scenario*” to be adopted. However, following general principals - the area served by an individual wastewater treatment plant should be the most cost effective also taking into account other technical, operational and environmental considerations.

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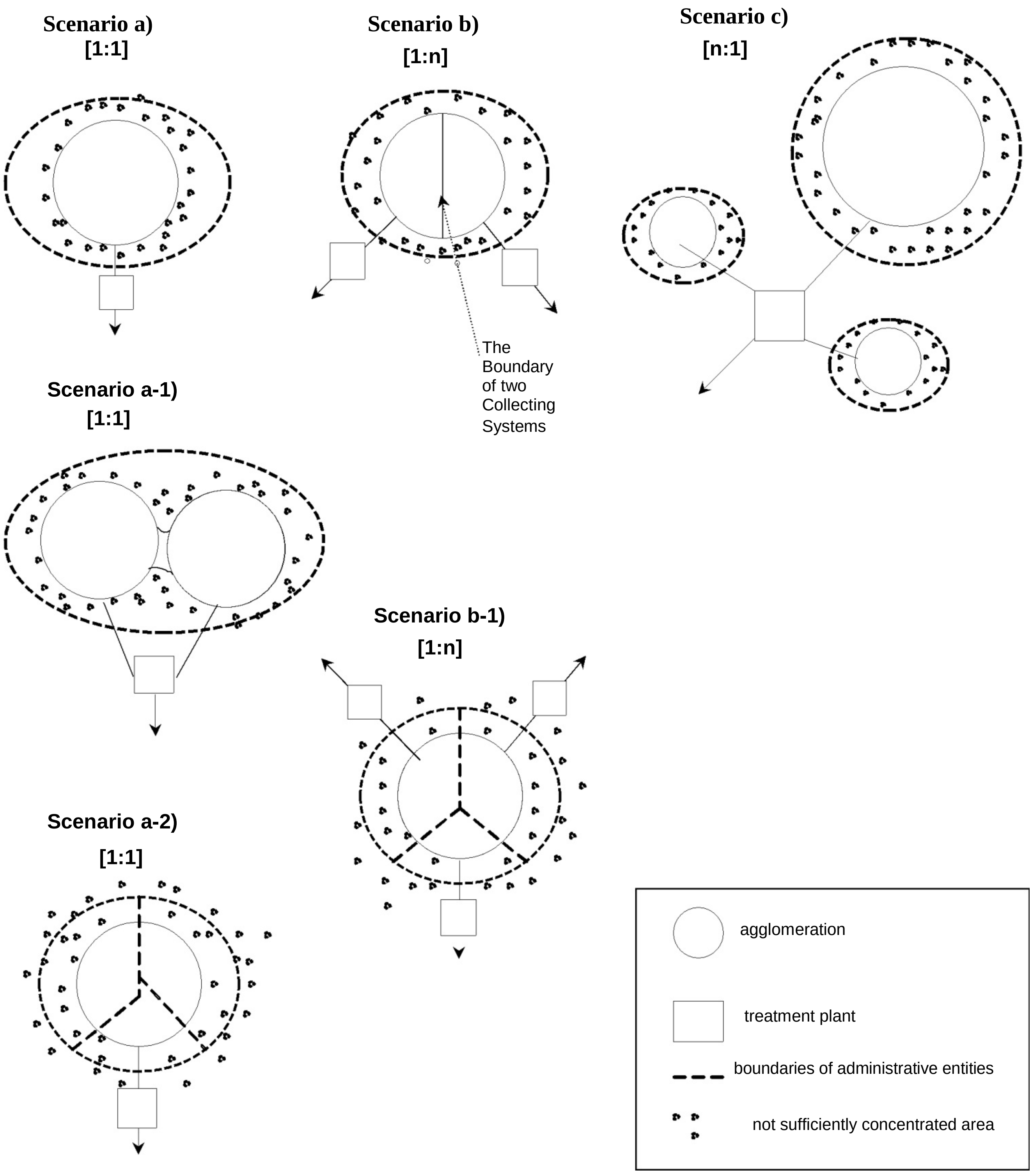

Figure 1. Possible relationships between agglomerations and urban waste water treatment plants.

In determining the size of the agglomeration (the generated load) account should be taken of:

- the resident population;
- non-resident population (tourists etc);
- industrial wastewater from enterprises and economic activities that is or should be discharged

into the collecting system or urban wastewater treatment plant;

- all remaining urban wastewater whether collected or not collected but generated in the agglomeration

b) Methods Adopted in Member States

Different Member States apply different interpretations of an agglomeration and furthermore in many instances, there are also differences within individual Member States. The practical examples can be seen as:

Country	Definition
Czech Republic	• 636 agglomerations above 2,000 PE with 158 above 10,000 PE; • Single or multiple agglomerations discharging to a single treatment plant (Scenario A and C); • Agglomerations are closely linked to administrative areas
Slovakia	• 356 agglomerations above 2,000 PE with 80 agglomerations above 10,000 PE; • Agglomerations mainly relate to administrative areas (Scenario A) with a single collecting system discharging to 1 wastewater plant; • Several agglomerations are served by a single treatment plant; • Settlements within the geographical area covered by the agglomeration with populations below 2,000 PE are often excluded although the main collector pipe traverses or passes close to the settlement;
Hungary	• Some 2,345 agglomerations in total of which 497 are above 2,000 PE and 192 above 10,000 PE; • Agglomeration defined based on catchment area of the wastewater treatment plant (irrespective of administrative boundaries) with systems often extended to include small settlements; • Agglomerations can comprise several municipalities which generally form an Association of Municipalities for project preparation and implementation purposes; • Ad hoc interpretation discussions;
Poland	• Some 1,577 agglomerations with 459 above 15,000 PE. Agglomerations definition mostly under scenario A (all 3), with limited use of scenario B (legacy of existing infrastructure) and occasionally C; • Under scenario A agglomerations can often be extended to include smaller settlements and peri – urban areas; • Formal rules for defining an agglomeration.
Romania	• Some 2,610 agglomerations above 2,000 PE of which 263 are above 10,000 PE;
Slovenia	• 156 agglomerations above 2,000 PE of which 29 are above 10,000 PE;
Lithuania	• 70 agglomerations above 2,000 PE of which 31 are above 10,000 PE; • Mainly Scenarios a and a-2)
Source: Details on number of agglomerations from DG Environment	

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c) Issues to Consider

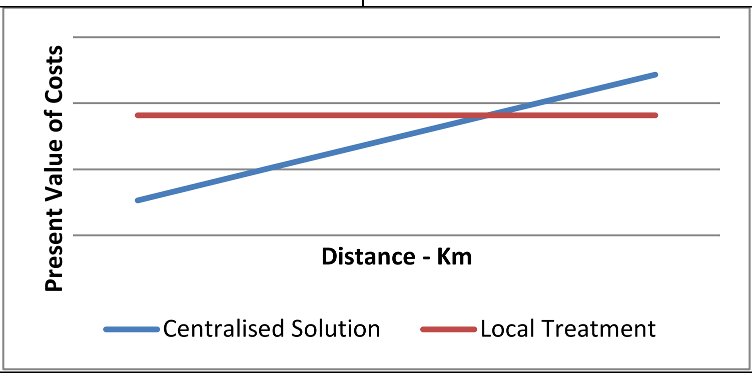
Within Bulgaria, the applied definition of an agglomeration has to comply with the general guidance given under the Directive 91/273/EEU "Urban Wastewater Treatment". The main issues to be considered in determining the size (and extent) of the agglomeration within this process are seen to be:

(i) Definition of "sufficiently and not sufficiently concentrated"

The definition needs to consider two aspects.

- firstly, whether the isolated settlements should be served by a centralised treatment plant or have its own separate plant and
- secondly, irrespective of the above whether there should be a formal sewer collecting system.

Justification normally considers the following aspects:

<table>
<tr><td>Cost effectiveness</td><td colspan="2">Comparison in present value terms of the following two options. To provide a clearer outcome, the constant of the sewer system within the settlement should be excluded from both the options:</td></tr>
<tr><td></td><td>Centralised Solution</td><td>Independent plant</td></tr>
<tr><td></td><td>• Cost of connecting pipeline from the settlement to the next system
• Additional wastewater treatment costs</td><td>• Cost of wastewater treatment plant;
• Cost of connection of main system to this plant.</td></tr>
<tr><td></td><td colspan="2">
</td></tr>
<tr><td>Cost effectiveness</td><td colspan="2">Where concentrations of population and industries within settlements are considered insufficient to justify a sewer system, the inclusion of the settlement within an agglomeration should depend on the least cost solution for emptying and treating wastes from IAS (individual appropriate systems).</td></tr>
<tr><td>Environmental</td><td colspan="2">Availability of recipient discharging water body and quality impacts;</td></tr>
<tr><td>Operational / Technical</td><td colspan="2">Complexity of operating numerous small treatment plants.</td></tr>
</table>

The issue of including small settlements into a defined agglomeration (not sufficiently concentrated) has arisen in projects in a number of other Member States. Within Bulgaria, it is noted that in the definition of many agglomerations peripheral (and in some instances relatively remote) areas around the main urban centre are generally included within the agglomeration. In some cases, connection to a sewer collecting system is only envisaged in subsequent phases of project implementation programme. It is considered important to remember that it is not a prerequisite to provide a sewer connection to all inhabitants within an agglomeration.

(ii) Inclusion of the non-resident (tourist) and industrial load

The inclusion of these two aspects within the total anthropogenic load projections is correct, but raises uncertainties in determining existing and future loads. The problem becomes more significant where currently wastewater from these sources either is not collected or not treated and therefore the existing load is not known. In making these allowances, consideration needs to be given to:

- For industrial wastewater : the impact of necessary pre-treatment and whether the industry should be connected to the sewer system or have independent treatment;
- realistic forecasting of future development of industrial enterprises and the parameters of their waste waters;
- For tourism: realistic forecasting of future development of tourism.

Practical approach / National guidelines should be required as a basis for determining existing anthropogenic load and reliability of future projections. As a minimum, these should be established and used as part of the project review and approval process.

3. Coverage Levels within Agglomerations

a) EU Principles

The Urban Wastewater Directive does not specify required coverage levels (to a sewer collecting system) that need to be achieved on either a project or national level as a compliance criteria. However, comprehensive is presumed. The Directive requires that where sewer systems are not developed that individual appropriate solutions are put in place.

b) Methods Adopted in Other Member States

Other Member States have adopted different parameters to judge the extent to coverage of sewer network within an agglomeration. These parameters generally are based around efficiency indicators (housing density) and it is assumed that those premises that are not covered by the sewer system continue to use individual systems for the collection and treatment of wastewater. In most instances, provisions are not included in the proposed projects to ensure the adequacy of these systems or the parallel collection services. However, capacity requirements at the centralised wastewater treatment plant are taken into account.

Country	Benchmark Guidelines	Comment
Hungary	• 200 inhabitants per 1 km of extension (including main transmission pipeline); • 168 inhabitants excluding the main transmission pipeline.	• Applied for the whole agglomeration and not sections within • Application is defined in national legislation
Poland	• 120 PE per 1 km of extension	• Applied for the agglomeration and not sections within; • Inhabitants can include non permanent and tourists residents; • Exemptions for certain areas of extensions / routing of pipeline such as through water sensitive areas;
Romania	• Cost effectiveness but threshold value not defined	
Slovakia	• Proximity (distance threshold no less than 250 metres from previous connection); • No cost effectiveness parameter	
Czech	• None for coverage; • Cost comparison against individual system; • Distance threshold no less than 200 metres between buildings; • Capital cost sustainability of overall system (CZK 85,000 / € 3,400 per PE connected)	
Slovenia	• Population density	

It can be noted that the above parameters are mostly not formally adopted and are often relaxed in certain projects.

In meeting the obligation to provide comprehensive collection, individual countries apply formally and informally different threshold levels as a target level for achieving comprehensiveness. These can be summarised as:

Country	Benchmark Guidelines
Hungary	• Not defined, but system coverage after projects is generally above 90%
Poland	• 95% - 100% (Sewer network, IAS and closed tank) for settlements above 2,000 PE by the year 2015;
Slovakia	• 85%
Czech	• Not defined, but comprehensive coverage above 90% is common

c) Issues to be Considered

Within Bulgaria, most projects strive to achieve almost full coverage of the sewer system in each settlement of the agglomeration that is served (some settlements in the agglomeration are occasionally not served). An option analysis is rarely undertaken to determine the appropriateness of the proposed increase in coverage (connection) levels. Some areas are justified in terms of water protection zones. The need for an option analysis for sewer extensions should generally be addressed. Justification (especially in projects covering rural areas) has often been requested during the project approval process in several Member States.

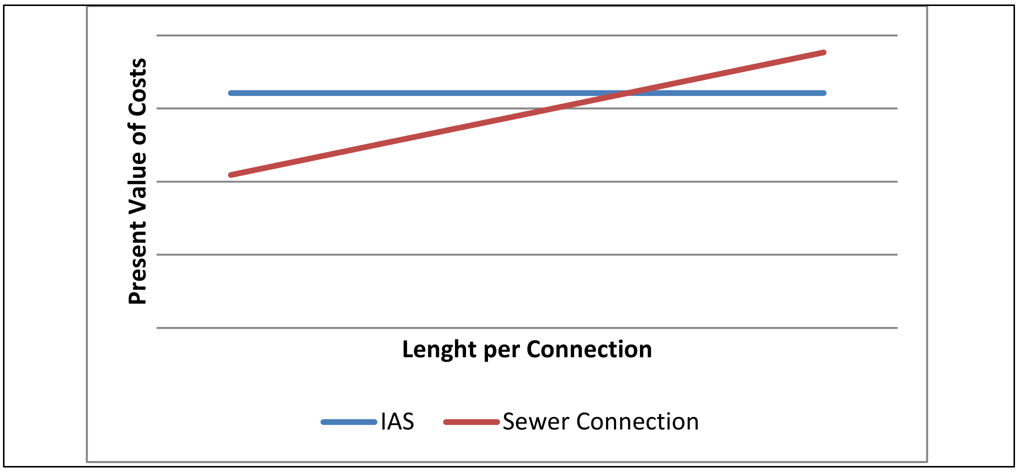
To justify sewer extensions other Member States generally apply a cost effectiveness threshold. This is either implicitly a cost, or more commonly a length per connection parameter. The thresholds tend to be derived at a national level and are applied on a project level irrespective of local project characteristics that may influence the findings.

A general basis to derive an appropriate cost effectiveness threshold is the comparison of the connection cost to a sewer and the alternative of an IAS (Independent Appropriate Solution). This analysis can be undertaken on a settlement by settlement basis and also for areas within individual settlements. The cost effectiveness analysis should compare:

- Sewer option : Capital cost of sewer, its operation and incremental operating costs of the wastewater treatment plant;

- IAS option : Capital cost of the household facility (closed or open septic tank or other), its maintenance, and operating costs of the wastewater treatment plant.

The analysis (especially that for the IAS option) should be undertaken using actual costs incurred and nonfinancial costs incurred by the household for collection and emptying services (that can contain a profit element).



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Appendix 5: Data on Water Supply Quality in the Republic of Bulgaria

Copy of the lettr of the Ministry of Health (with outgoing No. 04-15-27 of February 15, 2013) with all attachments to it.

R E P U B L I C   O F   B U L G A R I A

MINISTRY OF HEALTH

1000 Sofia, 5, Sveta Nedelya Square Tel.: 9301273, Fax: 9811833

Outgoing No. № _______________
Sofia ___________ 2013 г.

TO
MR. DOBROMIR SIMIDCHIEV
DEPUTY MINISTER
OF REGIONAL DEVELOPMENT AND PUBLIC WORKS

To your letter № 90-05-1902 of January 25, 2013

DEAR MR. SIMIDCHIEV,

In relation to your letter (incoming № 04-15-27 of January 25, 2013) regarding the development of a Strategy for the Development and Management of the WSS Sector, and the request for provision of information regarding the Monitoring, performed by the authorities of the Ministry of Health on the quality of drinking water in the Republic of Bulgaria for the 2007-2011 period, we hereby inform you of the following:

The requirements, related to the quality of drinking water at the level of the European Union have been regulated in Directive 98/83/EU on the quality of water intended for human consumption. The Directive was transposed into the national legislation through Ordinance № 9 on the quality of water intended for drinking and household purposes.
The Directive regulates the volume and frequency of the drinking water quality monitoring which should be performed in the respective water supply zones, in accordance with the quantity of distributed water in 24 hours in the respective zone and the number of population permanently connected to the water supply network within the zone.

The Water Act and Ordinance № 9 oblige the WSS Companies to carry out the full volume of the necessary monitoring. The territorial authorities of the MH – the Regional Health Inspections (RHIs), also have the obligation to carry out monitoring but in smaller volumes – 50 % of the monitoring, carried out by the WSS Companies.

Pursuant to the Directive, in its capacity as an EU member-country, the Republic of Bulgaria is obliged to prepare and submit to the European Commission a report, containing the results from the drinking water quality monitoring in the country every three years.
The reports are sent in an electronic format and present electronic Excel tables, where data is entered in a very specific manner, prepared in accordance with the special manuals.
It is important to stress that only data on the so called **large water supply zones** is included in these reports (in accordance with Art. 13, para. 2 of the above-mentioned Directive). These are the zones where over 1000 cubic meters of water are supplied in 24 hours and/or water is supplied to over 5000 people, permanently connected to the water supply network.

Based on the table-format reports, submitted by the EU member-countries, the EC develops an aggregate summary report, containing the analyzed and aggregated data for the EU as a whole.

In the beginning of 2009, the Ministry of Health in its capacity as a competent authority on enforcing the law on drinking water in Bulgaria, developed and submitted the first report of the Republic of Bulgaria for the 2005-2007 reporting period. In it, the data from the monitoring carried out by the WSS Operators and the RHIs was included for 2007 only (that is the year when Bulgaria became a full member of the EU).

In 2012, a report was developed and submitted for the next three-year period (2008-2010). To date, the aggregated summary report of the EC has still not been drawn up for that period.

Other important problems, whose resolution is necessary in order to improve the quality of drinking water, are: reconstruction and renewal of water mains, that are predominantly severely worn out and outdated, built of asbestos cement pipes which often break; ensuring additional quantities of water in areas, where there are water shortages and restricted water supply is necessary (water regime).

It is important to stress that according to the European requirements, the supply of water with deviations from the norms can be allowed by the national competent authorities for a period no longer than 6 years, and in exceptional cases – for an additional period of 3 years, but only upon permission from the European Commission.
Failure to comply with these requirements, as well as the insufficient monitoring, create actual conditions for starting an infringement procedure against Bulgaria by the European Commission.

The above said means that the resolution of the main problems with relation to the deviation from the drinking water norms in Bulgaria (microbiological, chemical – nitrates, chromium, fluoride, manganese, etc.) should be of priority importance in defining the main objectives and measures within the branch Strategy on the Development and Management of the WSS Sector. The timely ensuring of the necessary funds to undertake fast and effective measures (the construction of new water sources, drinking water treatment plants and facilities for treatment and decontamination, construction of connections between the water supply systems in water supply zones, replacement of outdated and worn out water supply mains, etc.) is imperative, in order to achieve compliance with the national and European legislation.
An important issue is also the resolution of the problem with the failure of the WSS Operators to fulfill their obligations with relation to performing the monitoring of drinking water in the necessary volume and frequency, in compliance with European requirements.

We also propose that the Strategy suggest in what way, in a clear and precise manner, the rights, responsibilities and obligations shall of all parties involved in the process of management, operation, and maintenance of the WSS Sector be distinguished. Should this fail to be done, real danger exists that with the establishment of the WSS Associations, the opportunity for "blurred" obligations and responsibilities of the specific parties involved in this process, multiply. It should be clearly defined who shall manage and implement activities on identification, planning and implementation of fast and adequate measures to eliminate discrepancies in the quality of water, in what way and from what sources funding should be ensured for the implementation of these activities.
We hereby express our readiness for active cooperation and participation in the development of the branch Strategy on the Development and Management of the WSS Sector.

Attachment: as per the text above.

DESSISLAVA DIMITROVA
DEPUTY MINISTER
Coordinated by:
Dr. D. Dimitrov, Director of PHMSDP Directorate
Prepared by:
Dr. Ivo Atanassov, State Expert at PHMSDP Directorate

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ATTACHMENT № 1

Large water supply zones

Parameter	2007					2008					2009					2010				
	zones where the indicator has been tested	zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	compliance %	zones where the indicator has been tested	of zones with deviations from	Total number of analyses	number of non-compliant analyses	compliance %	zones where the indicator has been tested	of zones with deviations from	Total number of analyses	number of non-compliant analyses	compliance %	zones where the indicator has been tested б	of zones with deviations from	Total number of analyses	number of non-compliant analyses	compliance %
Escherichia coli	235	71	26516	243	99.08	253	58	24896	179	99.28	199	54	18816	186	99.01	196	69	17803	355	98.01
enterococci	232	22	6058	53	99.13	249	21	5836	65	98.89	186	16	4754	25	99.47	183	19	4763	23	99.52
antimony	39	0	199	0	100	62	0	251	0	100	111	0	1731	0	100	126	0	1638	0	100
Arsenic	160	0	773	0	100	195	0	725	0	100	185	0	2116	0	100	178	0	1957	0	100
benzene	27	0	95	0	100	49	0	109	0	100	89	0	249	0	100	131	0	347	0	100
Benzo (a) pyrene	24	0	103	0	100	46	0	89	0	100	94	0	259	0	100	112	0	313	0	100
Boron	86	0	451	0	100	131	0	597	0	100	131	0	736	0	100	154	0	697	0	100
Bromates	1	0	1	0	100	17	0	54	0	100	5	0	5	0	100	15	0	40	0	100
cadmium	181	0	916	0	100	213	0	871	0	100	181	0	2094	0	100	177	0	2005	0	100
Chromium	220	0	1401	0	100	234	0	1323	0	100	190	0	2456	0	100	187	0	2398	0	100
Copper	223	0	1250	0	100	242	0	1183	0	100	192	0	2304	0	100	180	0	2180	0	100
Cyanides	152	0	799	0	100	143	0	823	0	100	137	0	830	0	100	171	0	903	0	100
1,2-Dichloroethane	20	0	84	0	100	48	0	119	0	100	89	0	249	0	100	134	0	393	0	100
Fluorides	215	0	1412	0	100	234	0	1389	0	100	184	1	1100	1	99.91	182	0	1017	0	100
Lead	179	0	943	0	100	226	0	890	0	100	190	0	2136	0	100	180	0	2013	0	100
mercury	24	0	91	0	100	34	0	76	0	100	90	0	261	0	100	130	0	328	0	100
nickel	116	0	462	0	100	138	0	679	0	100	168	0	2057	0	100	168	0	2027	0	100
Nitrates	235	21	17563	203	98.84	251	24	19055	305	98.40	198	23	14022	255	98.18	196	24	12992	207	98.41
Nitrates output treatment plants	21	1	10256	5	99.95	28	0	10784	0	100	24	0	3000	0	100	19	0	3291	0	100
Nitrates at consumer's tap	235	3	23176	10	99.96	253	1	23518	2	99.99	199	1	17111	11	99.94	196	1	16558	1	99.99
Nitrates/Nitrites formula	235	22	17563	204	98.84	226	24	19055	305	98.47	199	28	14000	295	97.89	196	27	12946	240	98.15
Pesticites - total	35	0	2961	0	100	63	0	150	0	100	118	0	302	0	100	137	0	442	0	100
Polycyclic aromatic hydrocarbons	28	0	92	0	100	42	0	65	0	100	92	0	257	0	100	113	0	316	0	100
selenium	74	0	328	0	100	100	0	351	0	100	147	0	1837	0	100	159	0	1751	0	100
Tetrachloride and trichloroethane	20	0	84	0	100	46	0	112	0	100	89	0	248	0	100	134	0	391	0	100
trihalomethanes- total	37	0	139	0	100	55	0	170	0	100	100	0	264	0	100	139	1	402	1	99.75
aluminum	166	2	3088	6	99.81	170	2	5438	4	99.93	167	0	5190	0	100	162	1	5602	47	99.16
ammonia ion	235	2	32106	11	99.97	253	3	23049	21	99.91	199	2	17154	22	99.87	196	3	16810	3	99.98
Chlorides	234	0	9866	0	100	251	1	10957	1	99.99	197	0	6008	0	100	196	1	5710	2	99.97
Clostridium perfringence	76	1	1275	1	99.92	88	1	1744	1	99.94	87	5	3161	11	99.65	104	4	3079	14	99.55
conductance	226	0	17255	0	100	251	0	20086	0	100	198	0	16123	0	100	196	0	15976	0	100
Active reaction (pH)	235	1	22075	3	99.99	253	1	22060	1	99.99	199	8	16950	12	99.93	196	8	16688	12	99.93
Iron	234	24	8221	60	99.27	251	22	9753	58	99.41	196	20	7582	94	98.76	195	22	7559	282	96.27
Manganese	235	16	16171	409	97.47	251	15	17033	334	98.04	198	20	14522	302	97.92	196	25	14386	279	98.06
oxidation	230	3	10552	6	99.94	253	4	11102	51	99.54	197	6	7289	213	97.08	196	10	7386	245	96.68
sulphates	232	1	2100	7	99.67	251	3	1801	13	99.28	192	2	1440	10	99.31	190	2	1189	3	99.75
sodium	81	0	430	0	100	83	0	425	0	100	102	0	466	0	100	139	0	513	0	100
coliforms	235	127	26010	757	97.09	253	127	23961	1102	95.4	199	92	18816	653	96.53	196	80	17799	704	96.04
tritium	1	0	1	0	100	16	0	5	0	100	35	0	114	0	100	44	0	68	0	100
Total indicative dose	97	0	174	0	100	47	0	78	0	100	58	0	96	0	100	59	0	110	0	100
Colour	235	18	23097	49	99.79	253	19	21742	47	99.78	199	14	16818	33	99.8	196	22	16802	65	99.61
Odour	235	6	2274	16	99.93	253	4	21597	5	99.98	199	11	17128	25	99.85	196	7	16860	11	99.93
Taste	235	4	21686	10	99.95	253	4	20719	6	99.97	198	11	15688	22	99.86	195	6	15540	12	99.92
Number of colonies at 220C	175	4	6814	7	99.9	198	7	5610	34	99.39	181	21	5843	106	98.19	178	20	4332	87	97.99
Total organic carbon	6	0	23	0	100	30	0	322	0	100	23	0	87	0	100	28	0	160	0	100
Turbidity	234	35	22188	286	98.71	242	34	22395	202	99.1	198	31	16474	474	97.12	195	46	16519	749	95.47

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Small zones-category 3

Parameter	2009					2010				
	zones where the indicator has been tested	zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	compliance %	number of zones where the indicator has been tested	zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	compliance %
Aluminum	207	0	578	0	100	211	1	536	1	99.81
Arsenic	212	1	438	1	99.77	222	1	464	26	94.4
Boron	177	0	331	0	100	196	0	378	0	100
Benzo (a) pyrene	82	0	102	0	100	129	0	167	0	100
benzene	81	0	99	0	100	143	0	178	0	100
Bromates	0	0	0	0	0	8	0	8	0	100
Number of colonies at 22^{o}C	228	14	632	17	97.31	229	13	643	17	97.36
cadmium	218	0	429	0	100	229	0	465	0	100
chlorides	252	1	1875	1	99.95	263	1	2031	2	99.9
Clostridium perfringence	102	0	390	0	100	108	2	404	2	99.51
Cyanides	167	0	352	0	100	217	0	463	0	100
coliforms	259	116	4600	250	94.57	263	93	4381	203	95.37
Colour	260	4	4300	8	99.81	263	13	4275	20	99.53
Chromium	236	4	636	22	96.54	239	2	635	11	98.27
Copper	234	0	515	0	100	243	0	541	0	100
1,2-Dichloroethane	74	0	95	0	100	150	0	189	0	100
Conductivity	260	0	4199	0	100	263	0	3970	0	100
enterococci	238	15	910	16	98.24	246	12	945	15	98.41
Escherichia coli	259	46	4597	79	98.28	263	64	4374	158	96.39
Fluorides	237	2	566	16	97.17	237	2	575	20	96.52
Iron	251	8	1695	15	99.12	258	13	1584	18	98.86
Mercury	82	0	117	0	100	133	0	184	0	100
Manganese	253	10	3662	81	97.79	263	10	3623	92	97.46
sodium	96	0	149	0	100	172	0	261	0	100
ammonia ion	260	1	4519	28	99.38	263	4	4278	16	99.63
nickel	192	0	363	0	100	216	0	440	0	100
Nitrates at consumer's tap	260	2	4500	38	99.16	263	3	4221	15	99.64
Nitrates output treatment plants	19	0	115	0	100	21	0	95	0	100
Nitrates	253	41	4244	353	91.68	263	49	3880	390	89.95
Odour	260	7	4495	14	99.69	263	3	4301	3	99.93
oxidation	258	0	1709	0	100	260	0	1554	0	100
Polycyclic aromatic hydrocarbons	82	0	102	0	100	129	0	167	0	100
Lead	229	0	453	0	100	238	0	482	0	100
Active reactions (pH)	260	10	4524	15	99.67	263	5	4295	6	99.86
antimony	113	1	188	1	99.47	161	0	245	0	100
selenium	146	0	251	0	100	191	1	307	1	99.67
Sulphates	243	2	599	5	99.17	243	2	626	4	99.36
Taste	257	2	3984	6	99.85	261	4	3739	5	99.87
trihalomethanes- total	84	0	116	0	100	157	0	194	0	100
Total indicative dose	42	0	53	0	100	98	0	120	0	100
Total organic carbon	4	0	5	0	100	6	1	15	5	66.67
Tetrachloride and trichloroethane	82	0	103	0	100	150	0	188	0	100
tritium	34	0	40	0	100	46	0	51	0	100
Turbidity	258	11	4340	26	99.4	262	27	4240	48	98.87
Pesticides -total	115	0	148	0	100	169	0	248	0	100

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Small zones-category 2

Parameter	2009					2010				
	number of zones where the indicator has been tested	Number of zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	compliance %	number of zones where the indicator has been tested	Number of zones with deviation from the	Total number of analyses	number of non-compliant analyses	compliance %
Aluminum	561	0	1227	0	100	564	0	1103	0	100
Arsenic	550	2	863	3	99.65	578	0	967	0	100
Boron	457	0	687	0	100	526	0	859	0	100
Benzo (a) pyrene	144	0	150	0	100	311	0	385	0	100
Bensene	137	0	142	0	100	343	0	419	0	100
Bromates	1	0	1	0	100	31	0	32	0	100
Number of colonies at 22°C	598	50	1252	82	93.45	621	32	1282	33	97.43
cadmium	550	0	811	0	100	593	0	991	0	100
chlorides	681	2	3484	3	99.91	717	2	3719	11	99.7
Clostridium perfringence	249	5	601	5	99.17	265	7	664	8	98.8
Cyanides	414	0	776	0	100	556	0	1035	0	100
Колиформи	707	255	8291	591	92.87	723	246	8446	485	94.26
Colour	707	10	7979	15	99.81	723	17	8434	21	99.75
Chromium	642	13	1307	59	95.49	633	13	1394	67	95.19
Copper	604	0	1064	0	100	652	0	1217	0	100
1,2-Dichloroethane	122	0	128	0	100	346	0	423	0	100
Conductivity	706	1	7588	5	99.93	723	1	7838	4	99.95
enterococci	625	23	1603	23	98.57	654	32	1717	34	98.02
Escherichia coli	707	105	8301	171	97.94	723	191	8434	354	95.8
Fluorides	621	3	1148	4	99.65	633	4	1262	10	99.21
Iron	677	18	3439	44	98.72	692	17	3249	31	99.05
Mercury	133	0	160	0	100	274	0	345	0	100
Manganese	681	20	6649	42	99.37	719	22	6864	30	99.56
sodium	193	0	233	0	100	390	0	557	0	100
ammonia ion	707	1	8396	1	99.99	723	5	8454	6	99.93
nickel	467	0	688	0	100	564	0	981	0	100
Nitrates at consumer's tap	707	3	8388	3	99.96	723	0	8383	0	100
Nitrates output treatment plants	24	0	105	0	100	19	0	100	0	100
Nitrates	684	107	7966	612	92.32	722	120	7650	693	90.94
Odour	707	20	8370	34	99.59	723	6	8497	7	99.92
oxidation	699	1	3657	1	99.97	710	1	3684	1	99.97
Polycyclic aromatic hydrocarbons	143	0	149	0	100	310	0	384	0	100
Lead	585	0	889	0	100	639	0	1072	0	100
Active reactions (pH)	707	6	8405	16	99.81	723	7	8492	20	99.76
antimony	190	0	241	0	100	333	0	454	0	100
selenium	273	0	383	0	100	398	1	622	1	99.84
Sulphates	646	2	1215	3	99.75	646	4	1285	6	99.53
Taste	703	14	7555	21	99.72	719	6	7704	6	99.92
trihalomethanes- total	136	0	143	0	100	347	0	426	0	100
Total indicative dose	109	0	132	0	100	216	0	245	0	100
Total organic carbon	15	0	19	0	100	15	0	18	0	100
Tetrachloride and trichloroethane	136	0	142	0	100	346	0	423	0	100
tritium	21	0	22	0	100	145	0	151	0	100
Turbidity	704	32	7927	41	99.48	720	50	8274	69	99.17
Pesticides -total	220	0	239	0	100	412	0	529	0	100

Small zones - category 1

Parameter	2009					2010				
	zones where the indicator has been tested	zones with deviation from the	Total number of analyses	number of non-compliant analyses	compliance %	zones where the indicator has been tested	zones with deviation from the	Total number of analyses	number of non-compliant analyses	compliance %
Aluminum	851	0	1661	0	100	828	0	1532	0	100
Arsenic	821	1	1123	1	99.91	845	1	1220	13	98.93
Boron	612	1	836	1	99.88	696	1	1058	1	99.91
Benzo (a) pyrene	160	0	167	0	100	279	0	327	0	100
Bensene	159	0	166	0	100	349	0	396	0	100
Bromates	0	0	0	0	0	22	0	23	0	100
Number of colonies at 22°C	927	152	2208	266	87.95	967	85	2059	106	94.85
cadmium	832	0	1112	0	100	868	0	1229	0	100
chlorides	1092	0	4844	0	100	1187	0	5365	0	100
Clostridium perfringence	374	8	886	8	99.1	365	22	879	24	97.27
Cyanides	711	0	1216	0	100	896	0	1516	0	100
Колиформи	1148	447	9452	1024	89.17	1202	425	9984	838	91.61
Colour	1146	18	9223	27	99.71	1203	36	10079	55	99.45
Chromium	978	4	1708	18	98.95	970	3	1858	13	99.3
Copper	914	0	1488	0	100	963	0	1643	0	100
1,2-Dichloroethane	152	0	158	0	100	350	0	399	0	100
Conductivity	1147	0	9015	0	100	1200	0	9612	0	100
enterococci	962	63	1945	65	96.66	1011	87	2291	92	95.98
Escherichia coli	1148	243	9487	406	95.72	1202	337	10019	760	92.41
Fluorides	933	4	1557	7	99.55	949	3	1707	8	99.53
Iron	1061	23	4343	57	98.69	1086	23	4302	57	98.68
Mercury	198	0	225	0	100	263	0	316	0	100
Manganese	1083	29	8290	98	98.82	1162	26	8810	127	98.56
sodium	214	0	239	0	100	384	0	499	0	100
ammonia ion	1150	7	9639	36	99.63	1202	8	10088	28	99.72
nickel	707	0	1010	0	100	751	0	1220	0	100
Nitrates at consumer's tap	1150	1	9637	3	99.97	1203	4	9989	4	99.96
Nitrates output treatment plants	60	0	373	0	100	55	0	392	0	100
Nitrates	1106	176	9176	962	89.52	1198	180	9226	920	90.03
Odour	1150	49	9634	62	99.36	1203	31	10148	49	99.52
oxidation	1111	5	5218	5	99.9	1115	8	5341	10	99.81
Polycyclic aromatic hydrocarbons	160	0	167	0	100	286	0	335	0	100
Lead	859	2	1192	2	99.83	890	0	1283	0	100
Active reactions (pH)	1151	16	9661	27	99.72	1203	14	10146	30	99.7
antimony	296	1	344	1	99.71	335	0	415	0	100
selenium	442	0	532	0	100	467	0	614	0	100
Sulphates	1003	5	1662	5	99.7	995	5	1816	7	99.61
Taste	1143	36	8613	45	99.48	1194	31	9200	36	99.61
trihalomethanes- total	169	0	176	0	100	359	0	409	0	100
Total indicative dose	130	0	136	0	100	231	0	247	0	100
Total organic carbon	11	0	13	0	100	29	0	35	0	100
Tetrachloride and trichloroethane	154	0	161	0	100	350	0	399	0	100
tritium	30	0	40	0	100	104	0	109	0	100
Turbidity	1139	55	8812	88	99	1197	91	9584	140	98.54
Pesticides -total	249	0	266	0	100	401	0	462	0	100

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Small zonesи - category 0

Parameter	2009					2010				
	number of zones where the indicator has been tested	zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	compliance %	number of zones where the indicator has been tested	zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	complian ce %
Aluminum	169	0	270	0	100	177	0	261	0	100
Arsenic	145	0	161	0	100	125	0	142	0	100
Boron	126	0	154	0	100	128	0	157	0	100
Benzo (a) pyrene	38	0	40	0	100	52	0	55	0	100
Bensene	38	0	40	0	100	55	0	58	0	100
Bromates	1	0	1	0	100	1	0	1	0	100
Number of colonies at 22^{o}C	204	20	388	22	94.33	211	17	391	18	95.4
cadmium	158	0	190	0	100	146	0	179	0	100
chlorides	250	0	965	0	100	263	0	1155	0	100
Clostridium perfringence	59	0	166	0	100	40	1	116	1	99.14
Cyanides	171	0	233	0	100	161	0	224	0	100
Колиформи	258	136	1393	230	83.49	274	119	1576	237	84.96
Colour	260	8	1398	8	99.43	272	19	1568	24	98.47
Chromium	199	0	280	0	100	181	0	287	0	100
Copper	193	0	259	0	100	182	0	244	0	100
1,2-Dichloroethane	38	0	40	0	100	56	0	59	0	100
Conductivity	248	0	1313	0	100	273	0	1571	0	100
enterococci	201	17	355	20	94.37	223	35	436	36	91.74
Escherichia coli	258	70	1403	95	93.23	274	101	1583	175	88.95
Fluorides	201	0	285	0	100	176	0	276	0	100
Iron	237	3	696	7	98.99	249	13	685	13	98.1
Mercury	59	0	62	0	100	32	0	34	0	100
Manganese	252	2	1212	2	99.84	264	5	1404	6	99.57
sodium	12	0	13	0	100	35	0	36	0	100
ammonia ion	260	2	1389	2	99.86	273	1	1574	1	99.94
nickel	135	0	166	0	100	123	0	171	0	100
Nitrates at consumer's tap	260	0	1398	0	100	273	0	1558	0	100
Nitrates output treatment plants	18	0	119	0	100	17	0	110	0	100
Nitrates	260	4	1310	19	98.55	271	10	1422	42	97.05
Odour	260	20	1404	24	98.29	273	25	1580	38	97.59
oxidation	240	0	883	0	100	250	2	1033	2	99.81
Polycyclic aromatic hydrocarbons	38	0	40	0	100	52	0	55	0	100
Lead	160	0	194	0	100	146	0	181	0	100
Active reactions (pH)	260	2	1406	3	99.79	273	3	1579	4	99.75
antimony	77	0	79	0	100	56	0	56	0	100
selenium	114	0	120	0	100	85	0	91	0	100
Sulphates	209	0	311	0	100	193	0	293	0	100
Taste	254	20	1259	24	98.09	269	14	1447	14	99.03
trihalomethanes- total	38	0	40	0	100	56	0	59	0	100
Total indicative dose	33	0	33	0	100	42	0	43	0	100
Total organic carbon	1	0	1	0	100	2	0	2	0	100
Tetrachloride and trichloroethane	38	0	40	0	100	56	0	59	0	100
tritium	40	0	41	0	100	7	0	10	0	100
Turbidity	255	13	1243	18	98.55	271	37	1503	48	96.81
Pesticides -total	46	0	48	0	100	58	0	61	0	100

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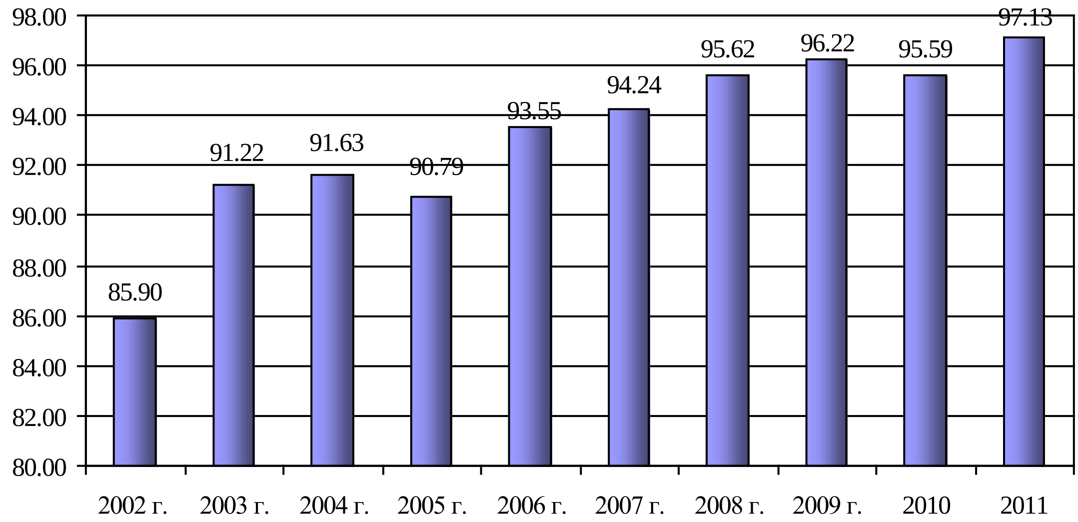
Attachment № 2
Quality of drinking water – 2011.
(Aggregate data from the Monitoring of drinking water carried out by the Regional Health Inspections in 2011)

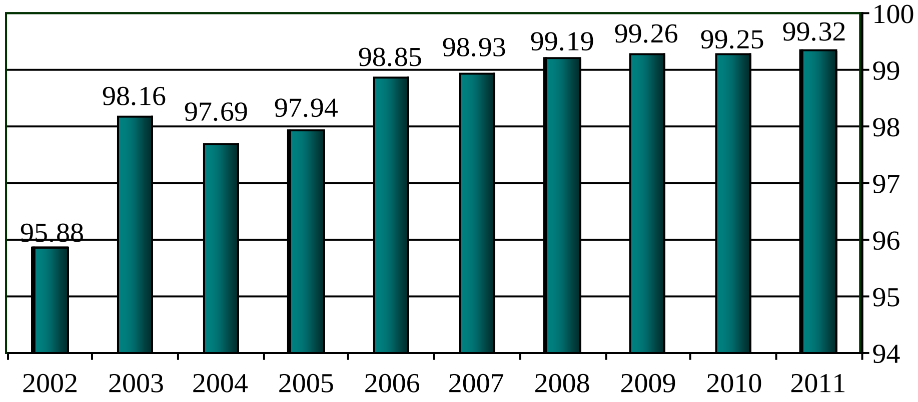
In 2011, the 28 RHI in the country carried out monitoring of the chemical, microbiological and radiological indicators for the quality of drinking water, supplied to the population in 8 652 points in the country. 6 357 water sources are being used to supply the water for drinking and household purposes, out of which 248 are surface ones (3,9 %) and 6109 are ground sources (96,1 %). Only 112 (or 45,1 %) of surface water sources undergo the necessary water treatment.
A total of 19 484 samples have been analyzed, of which 16 841 (86,43 %) samples by indicators for permanent monitoring and 2 643 samples (13,57 %) by indicators for periodic monitoring. Of the tested samples for permanent monitoring, 8,9 % showed non-compliance, and with regards to the samples for periodic monitoring – 14,9 % (against 10 % and 15,7 % for 2010 respectively)

In 2011, at the RHI, a total of 369 034 analyses under the tested indicators have been conducted, out of which 293 263 (79,46 %) within the state health control (SHC), while the remaining 75 771 (20,54 %) have been conducted upon the request of natural and legal persons. The contracting parties have mostly been WSS Companies which do not have the laboratory capacity for many of the monitored indicators. Out of the total number of analyses of the drinking water, conducted by the RHI under the SHC, compliance with the norms has been confirmed for 98,98 % of them.
In 2011, 46 020 analyses have been conducted within the SHC, as the non-compliance percentage is 2,87 % against 4,41 % for 2010.



The microbiological non-compliance exceeds 5% in 5 regions – Bourgas (6,69 %), Kyustendil (8,23%), Montana (7,23%), Silistra (8,42%) and Turgovishte (5,34%), while in 2010 the norms were exceeded in 14 regions.
Overall, deviation from the norms under this type of indicators is characteristic of small water supply systems, which do not have treatment facilities and water is supplied to the population directly after only decontamination. This periodically repeated non-compliance in the microbiological quality of drinking water reflects the shortcomings in the decontamination of water, due to the lack of modern facilities and installations which would ensure systematic, constant and effective decontamination of the water, incorrect location of the decontaminating stations, poor condition of the network of water supply mains, use of inappropriate decontaminants/disinfectants, etc.

A total of 247 243 analyses have been conducted under the state health control by **organoleptic, chemical and radiological** indicators and the results show non-compliance in 0,68 % of them.



Lasting deviations in the chemical composition have been registered under **the nitrates, manganese, fluoride, chromium and arsenic** indicators.

Excessive amount of **nitrates** (>50 mg/l) have been registered most often, in the greatest number of water supply zones. Nitrates are a perennial problem for drinking water supply in regions with intensive agriculture. The problem has been registered in 23 regions, as the most affected ones are Haskovo, Turgovishte, Stara Zagora, Pleven, Shoumen, Varna, Veliko Turnovo, Razgrad, Rousse, Yambol and Bourgas. In the majority of cases the norms have been exceeded up to two times..

In 2011 in Sofia and in the regions of Vidin, Pernik, Kurdzhali and Smolyan there are no registered tested samples of water with increased content of nitrates.

There is a general trend of very slow decrease in the number of exposed population in the last three decades but the forecast is that we cannot expect dramatic changes in the next few years. The exposure of the rural population in small water supply zones is prevalent.

In some regions of the country (the regions of Pleven and Montana) the deviation from the norm of the chromium content in the ground drinking water marks a lasting trend. The increased chromium content in the drinking water sources is not of anthropogenic origin, but is rather due to natural geogenical presence in the ground waters. Most often, the chromium concentration falls within the range between 0,05-0,1 mg/l, i.e. it exceeds up to two times the acceptable norm and is registered in a limited number of small water supply zones.

In 2011, small water supply systems with a concentration of fluoride in the drinking water exceeding the acceptable norm continue to operate (in the regions of Blagoevgrad, Bourgas, Haskovo and Yambol). It is about a naturally conditioned increased content of fluoride in the ground waters. The concentrations are relatively not so high – they exceed the accepted norm of 1.5 mg/l by around two times.

The established deviation from the norm of the arsenic indicator in three water supply zones in Haskovo Region are also caused by the naturally higher content of this element in the ground waters in the region. For one of the zones the problem has already been resolved through the connection of the settlement to a new water supply main in another water supply zone, where the content of arsenic in the drinking water does not exceed the norm. In the other two zones the issue has not yet been resolved.

The problem with the deviation from the norm of the "manganese" indicators presents no direct health hazard, even if the norm is exceeded up to a certain level, but is very important for the consumers, as this indicator changes strongly the colour, taste and turbidity of water.

The problem is mostly of regional character – settlements mostly in the regions of Haskovo, Stara Zagora, Gabrovo, Veliko Turnovo, Sliven, etc. The increased content of manganese is due to natural factors. In some settlements in the region of Haskovo concentrations of manganese considerably exceeding the acceptable norm have been reported, which not only deteriorates the organoleptic qualities of water, but may present a health hazard. The problem continues to exist to date, although it could be resolved through the construction of treatment (manganese removal) plants or of new water supply mains from neighbouring water supply zones, providing water that meets the requirements

The problem with the lack of treatment facilities for the water from the surface water sources (including large dams, such as Ticha dam and others) also remains unresolved in the previous year. This results in deterioration of the quality of water supplied by organoleptic indicators (colour, turbidity, taste odour), especially in periods of torrential rains or rapid snowmelt.

In 2011 too, the WSS Operators as a whole fail to fulfill their obligations with relation to conducting monitoring of the drinking water quality in its full volume and frequency in compliance with the national and European legislation.

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RHI	Number of water sources for the supply of drinking water	Of them :open water sources		Number of stations of the water supply network of the settlements	Monitoring				Analyses conducted							
		Number	Of them: with treatment facilities		Number of samples under the continuous monitoring indicators	Of them: complying with Ordinance № 9	Number of samples under the periodic monitoring indicators	Of them: complying with Ordinance № 9	All tests conducted	Under the SHC: Number of samples under the chemical, organoleptic and radiological indicators	Of them: complying with Ordinance № 9	% non-compliant	Number of samples under the microbiological indicators	Of them: complying with Ordinance № 9	% non-compliant	Upon requests
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Blagoevgrad	232	32	4	493	1 195	1 152	119	110	19 980	12 050	11 975	0.62%	4 029	3 970	1.46%	3 901
Bourgas	284	2	2	520	709	582	64	41	13 782	8 834	8 795	0.44%	1 674	1 562	6.69%	3 274
Varna	324			337	724	676	74	56	17 919	8 062	7 973	1.10%	2 716	2 667	1.80%	7 141
V. Turnovo	226	1	1	259	273	232	59	39	9 936	5 722	5 631	1.59%	1 447	1 447		2 767
Vidin	65	3		257	120	117	43	41	3 853	2 524	2 524		424	419	1.18%	905
Vratsa	189			261	557	526	64	60	12 275	9 369	9 334	0.37%	1 529	1 465	4.19%	1 377
Gabrovo	328	18	12	406	559	511	132	102	9 600	7 800	7 693	1.37%	1 432	1 362	4.89%	368
Dobrich	186			414	532	450	88	66	10 910	8 192	8 106	1.05%	1 316	1 267	3.72%	1 402
Kurdjali	111	2	2	226	169	165	96	95	6 729	4 704	4 698	0.13%	925	882	4.65%	1 100
Kuystendil	222	36	6	185	267	234	77	48	8 713	4 955	4 950	0.10%	1 263	1 159	8.23%	2 495
Lovech	288	6		217	147	141	44	42	9 103	3 409	3 401	0.23%	587	575	2.04%	5 107
Montana	202	21	16	208	772	683	34	29	12 612	8 955	8 936	0.21%	1 868	1 733	7.23%	1 789
Pazardzhik	189	17	12	240	274	254	85	78	10 355	6 236	6 223	0.21%	945	907	4.02%	3 174
Pernik	182	7	3	347	507	476	70	63	14 093	8 183	8 177	0.07%	1 491	1 448	2.88%	4 419
Pleven	431			277	614	487	113	76	16 720	13 507	13 325	1.35%	1 849	1 817	1.73%	1 364
Plovdiv	228	17	17	228	386	345	243	220	15 249	11 253	11 218	0.31%	1 389	1 338	3.67%	2 607
Razgrad	111			208	228	196	82	71	8 512	4 676	4 632	0.94%	686	666	2.92%	3 150
Rousse	165			165	316	273	49	35	5 615	4 085	4 020	1.59%	654	643	1.68%	876
Silistra	82			234	159	136	30	22	3 949	2 817	2 812	0.18%	368	337	8.42%	764
Sliven	254	3	1	235	510	480	23	21	9 491	7 151	7 131	0.28%	1 135	1 096	3.44%	1 205
Smolyan	225	8	7	337	246	235	56	56	6 748	4 488	4 483	0.11%	728	717	1.51%	1 532
Sripcph	38	19	2	78	1 275	1 260	28	27	43 225	27 619	27 619		3 965	3 949	0.40%	11 641
Sofia Region	396	52	26	782	2 829	2 807	254	245	26 420	20 003	19 985	0.09%	3 382	3 316	1.95%	3 035
Stara Zagora	403	2		420	1 486	1 404	299	289	24 805	18 328	18 243	0.46%	3 858	3 839	0.49%	2 619
Turgovishte	224	1	1	365	534	413	82	58	12 164	8 759	8 564	2.23%	1 479	1 400	5.34%	1 926
Haskovo	351			416	946	658	209	155	21 336	17 170	16 791	2.21%	2 720	2 610	4.04%	1 446

Shoumen	233	1		317	303	263	68	49	9 348	4 756	4 715	0.86%	1 517	1 483	2.24%	3 075
Yambol	188			220	204	178	58	54	5 592	3 636	3 610	0.72%	644	627	2.64%	1 312
TOTAL	**6 357**	**248**	**112**	**8 652**	**16 841**	**15 334**	**2 643**	**2 248**	**369 034**	**247 243**	**245 564**	**0.68 %**	**46 020**	**44 701**	**2.87 %**	**75 771**

Appendix 6: Ownership and Management of WSS Assets

The Water Act (WA) requires that the ownership of WSS infrastructure assets rest with public authorities as so-called “public state assets” or “public municipal assets” (henceforth just called state and municipal assets). Outside Sofia, the Bulgarian WSS sector predominantly features public operators. The majority of operators are owned by the state, a municipality or jointly by the state (51%) and municipalities (49%).

However, the delay in the implementation of the WA significantly affects the proper management of WSS assets. Since the WA is still not fully applied, most of the WSS assets are still (March 31, 2013) commercially owned – and reflected in the balance sheets of WSSCs. In addition, similar assets are reflected differently in the balance sheets of WSSCs (both WSSA assets as well as the right to use WSS assets exist simultaneously). The resulting complexity contributes to the slow pace of improvements to service quality, efficiency and asset management and maintenance. The MRD has taken a number of steps to address these complexities.

As per the Water Act for the purpose of management, planning and delivery of water and sewerage services, the territory of the country is divided into “designated territories”. These territories correspond to the regions served by the existing WSS operators. The act requires that Water Supply and Sanitation Association (WSSA) is established when the ownership of the WSS assets in the designated territory is separated between the state and one or more municipalities. WSSAs are mainly responsible to:

- Appoint the WSSCs as provisioned under the Water Act or the Concession Act.
- Develop and approve Regional Master Plans for the WSS systems and Master Plans for agglomerations above 10,000 inhabitants within their designated territory.
- Approve the Business Plans of the WSSCs.

All WSSA have been established as at March 31, 2013with the exception of one.

As stated above, according to the WA all WSS infrastructure (not buildings, vehicles, equipment and etc.) is to become state or municipal property. In general, WSS assets within the boundaries of a municipality will become public municipal property. However, if a WSS asset serves more than one municipality it will become public state property.

The WSS assets are currently in the balance sheet (BS) of WSS operators. After the adoption of the amendments to the WA, henceforth called “A” day, the WSSCs should provide a list of all the public assets in their balance sheet; local public authorities should do the same for all WSS assets that are not in the balance sheets of the operators but are within their territory and are used for the provision of WSS services, and both WSSCs and municipalities should submit those lists to MRD (A+4 months). According to the WA, upon receipt of the lists, the MRD then must prepare protocols for distribution of these WSS assets between the state and municipalities (A+10 months). The new WSS owners (state and municipalities) will have 2 months to object the distribution protocols (A+12 months). If there is no objection the WSS assets will be considered accepted and the ownership over them transferred by law (*ex lege*) to WSSA. After that, to finalize the process, the owners of the WSSCs need to start the process of removing the public WSS assets from their balance sheets (A+15 months).

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Appendix 7: Functioning of Water Supply and Sanitation Associations and Consolidation of Operators

The existing WA establishes the WSSAs as legal entities, one for each administrative district. However, a couple of issues are outstanding:

1) **How to transform the newly established legal entity, the WSSA into a fully functioning association,** capable of planning and managing WSS infrastructure at administrative district (oblast) level and managing selection of the district operator.

2) **How to select the operator in a region**. Currently 65 operators are operating in 28 administrative districts. The intention is to have one operator for each WSSA. It is possible that the same operator may serve more than one WSSA in the future.

3) **How to ensure a fair regulatory impact of the transfer of assets.** WSSCs have expressed concerns that their allowed tariffs could go down when the assets are transferred from their balance sheet to the municipality or state even while they retain responsibility to operate and maintain the asset. The intention is for such a transfer to be tariff neutral.

Re 1) The WA includes key features to ensure that WSSAs can become fully functional. The state (through the regional governor) and municipalities in the region (through their representative) are the members of the WSSA. The voting rights are distributed: state – 35%, municipalities in the region – 65% with distribution based on the number of population living in the municipality. The WA requires decisions to be taken with at least 3/4 majority and these are binding. This implies that most WSSAs will be able to take decisions if the state and the two biggest municipalities agree.

The Ministry of Regional Development (MRD) is now supporting the WSSAs in several ways. The MRD is planning to launch a TA program for WSSA (financed as one component of the MRD TA project under the Operational Program Environment). The TA program for WSSAs is targeted to address equipment and capacity issues of WSSA.

The MRD is now developing WSSA "bylaws", mainly to deal with its organization and activities, decision making process, etc. In December 2012 the ministry has contracted a consultant to support this work.

As mentioned above, the public WSS assets will *ex lege* be transferred to the WSSA, which will manage, but not operate these. Thus, the WSSA needs to delegate the operation and maintenance of the WSS assets and select a WSS operator to provide WSS services.

Re 2) The WA provides for two options for selection of an operator:

1) Direct award to a current operator providing WSS services in the region. In this case the operation and maintenance of the WSS assets will be handed over through a "quasi-Concession" Contract (10 years if there are no requirements for major investments or 15 years if there is an obligation for major investments). Based on a study by EBRD, the MRD has approved a Model Contract between the WSSA and an existing WSS operator (EBRD (2011). The model contract

will need to be adapted to the specific circumstances in each district. Awaiting the clarity in asset transfers etc. that is being provided by the pending changes to the Water Act the WSSAs have so far not selected operators.

Further supporting the WSSAs, the MRD has requested the same consultant that is developing the by-laws to also develop a draft ordinance which clearly describes the process of award and licensing of a current operator under this model 1)

2) Competitive selection of a new operator (under the Concession Act). In his case a Concession Contract (up to 35 years) will be used. The MRD is working with IFC to develop a model Concession Contract for such cases.

In both cases, the WA foresees the licensing of WSSCs to ensure that operators fulfill minimum technical, financial and skills requirements. The SEWRC is envisaged to check the WSS operators' compliance with the ordinance for the requirements and criteria to operators and qualification of their staff and be responsible to issue licenses to those companies that fulfill the minimum criteria.

According to the amendments of the WA, the WSSA should select a WSS operator not earlier than 12 months from the publishing of the ordinance for the requirements to the WSS operators but not later than 18 months. This will give the existing WSS operators 12 months to comply with the requirements of the ordinance. If in the future, there is no WSSC on the designated territory, which complies with the requirements then the WSSA will start a concession procedure for the selection of a new operator. To avoid discontinuity of service, it is envisaged that the WSS services will be provided by the existing WSS operator (s) until there is a contract between the WSSA and a WSS operator having: a valid license, approved General conditions to customers, and a Business plan (BP) and water tariffs approved by the SEWRC.

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Appendix 8: WSSC Efficiency Review

1. Approach and methodology

We assessed the efficiency of the Water supply and sewerage companies (WSSCs) on the base of *comparative* approach, allowing us to compare the Companies on different aspects, incl. ownership (municipal owned or state owned), geographical spread (district or municipal), size, etc. We selected set of performance indicators with the general purpose to compare main activity aspects of each water company with the performance results.

In order to achieve the main target of our project – to assess the efficiency of the water sector companies in Bulgaria on the base of comparison we developed a special assessment model that we use as a ***main methodology tool***. The assessment model and its specific features are described in details in Chapter 2 of the report.

Apart from the main methodology tool we performed the presented analysis using following ***additional methods***:

- *Analysis of data qualit*y – included analysis of the preliminary information provided by the SEWRC to the World Bank Project team, review and assessment of the data quality and its applicability to the project goals, collection and review of additional information from other sources. In more details, this information includes:
  - Information available on the IWA web site and more precisely the International Water Utility Efficiency Assessment matrix. The matrix was reviewed on the base of the applicability of its indicators in the local context. Moreover, the use of such internationally recognized matrix allows the international comparison of the efficiency of Bulgarian water companies.
  - IBNET database. The database provides information on important parameters related to the level of efficiency of water companies as: water and sewerage coverage, total and residential water consumption, non-revenue water, average revenue, operational cost, collection period etc. Two main obstacles for using this information were identified: 1/ Last IBNET database year is 2008, i.e. the information is not up-dated and 2/ most of the companies are anonymous (represented as A,B,C etc.). Only Stara Zagora, Turgovishte and Sofiyska voda are officially presented.
  - Business plans of the water companies for the period 2009–2013. After reviewing all business plans we decided that the information is applicable for the needs of this project. Information in BPs provides good and relatively wide background for assessment.
  - National Strategy for management and development of water sector in Bulgaria. Special attention was paid on the sections dedicated to the analysis of the water companies as: institutional capacity, current financial status. The conclusions made in this Strategy were carefully investigated, as well as the strategic goals for water sector development in this document.

- Gathering recent baseline data. After reviewing the initial data and making analysis of its applicability to our project goals, a need for more recent data appears, as the assessment of the efficiency of the water companies is much more useful based on recent information. For that purpose the World Bank project team acquired last reported data from the Regulator – "Target Levels" for 2011.

The tight time schedule of the assignment did not allow making detailed verification of baseline data, including visits or any other contacts with companies. This refers both to the baseline data from the business plans for the regulatory period 2009-2013 and to the baseline data taken from the reporting "Target Levels" files for 2011, submitted by the WSSCs to the SEWRC. The assumption was that companies fulfilled their obligations to submit the correct data to the regulator. However, the data for each company was analyzed for consistency before using it in this efficiency review. A number of inconsistent inputs were encountered in the "Target Levels" worksheets as a result of this review and analysis of the baseline data. The consultant made certain corrections in several places, where omissions were identified, related to the input of data in the files. In order to preserve the data in the original files, the corrections were introduced in the free columns next to the original number, without deleting the latter. Consequently, the consultant used the corrected numbers by linking to the cells in which they were introduced. The identified omissions and the corrections made are described in **Table 1.1**

Table 1.1: Corrections in the baseline data made by the consultant

No	WSSC	Omission identified	Correction made
1	Kresna	In "Target levels" worksheet: Amount of water sold inconsistent with related indicators. The reason: water sold presented in 000m3 instead of in m3.	Amount of water sold converted from 000m3 into m3 (three digits added)
2	Kresna	In "Target levels" worksheet: Average salary unreasonably high – more than 2000 BGN. The reason: reported number of staff of 7 (in cell E77) is most likely wrong.	Model linked to another cell – E129, where reported number of staff is 16.
3	Veliko Turnovo	In "Target levels" worksheet: Amount of water sold inconsistent with related indicators. The reason: water sold presented in 000m3 instead of in m3.	Amount of water sold converted from 000m3 into m3 (three digits added)
4	Veliko Turnovo	In "Target levels" worksheet: Operation costs and operating revenue inconsistent with related indicators. The reason: operation costs and operating revenue presented in 000BGN instead of in BGN.	Operation costs and operating revenue converted from 000BGN into BGN (three digits added)
5	Kurdjali	In "Target levels" worksheet: Total number of population in the region adds up to 492,057 people (this exceeds three times the true number of population). The reason: the number of population of 164,019, put three times – in each of the three operation systems worksheets.	The number used by the consultant for the analysis is 164,019
6	Kurdjali	In "Target levels" worksheet: The reported population connected to water supply is	No correction for this was made. The most likely reason is the massive

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No	WSSC	Omission identified	Correction made
		185,834 and exceeds significantly the corrected number of 164,019	emigration from the region and the reduced population. A significant part of the connected population from previous years does not live in the region any more.
7	Sapareva Banya	In "Target levels" worksheet: Remuneration costs inconsistent with related indicators. Remuneration costs presented in 000BGN instead of in BGN	Remuneration costs converted from 000BGN into BGN (three digits added)
8	Berkovitsa	In "Target levels" worksheet: Number of water connections is most likely wrong – 855 per population served of 19,692.	No correction was made. No hint about the true number of connections.
9	Panagyurishte	In "Target levels" worksheet: Amount of water sold inconsistent with related indicators. Non revenue water goes up to 0.96 and operating cost per 1m3 of water goes up to 13 BGN, as calculated by the scoring model. The reason: probably a technical mistake while inputting the numbers - water sold is one digit less.	One "0" added to the end of the number for "Amount of water sold". The related NRW ratio and the operating cost per unit go back to normal levels and are consistent with the ones reported by the company.

2. Assessment model

The applied efficiency assessment matrix of the Bulgaria WSS sector as a whole and of each WSS company is based upon the IWA Water Utility Efficiency (Self) Assessment Methodology. The IWA assessment model can be seen as **Attachment 3** to this Report (**Original IWA Model**). This IWA methodology is explicit and open. It is created by international water utility professionals for use in a low and middle income country context. It covers all functional areas of the water utility, its operating environment and dimensions of water service. Within the context of the assessment under this model "efficiency" is defined not in a narrow technical sense, but in a comprehensive nature analyzing efficiency in six areas as follows:

1. Corporate Governance
2. Human Resources
3. Accountability towards Customers
4. Financial
5. Commercial
6. Technical

The specific model, developed for the current efficiency review of Bulgarian WSS companies, is customized for the purpose of:

1. taking into account the specifics of the water sector in Bulgaria and
2. accounting for the nature of the data available.

The original IWA model is designed primarily for self assessment based on inside information from the companies, while the current efficiency review relies on data provided by the

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SEWRC. Because of this, certain modifications of the used indicators had to be made, as well as of the assessment criteria used for scoring. The purpose was to reduce the subjective judgment to the minimum and to make the assessment as objective as possible. The applied model for this review includes 18 key performance indicators out of the 39 indicators used by IWA. For comparison, the number of WB IBNET indicators is 25 and the number of the indicators used by the Bulgarian SEWRC is 72. The 18 indicators are sufficient to provide a profound picture of water companies' performance, while at the same time their relatively small number makes it possible to focus the analysis over the main aspects.

The **18 selected indicators**, distributed among the six performance areas, are as follows:

1. Corporate Governance

Quality of business plan/strategy

Public relations/customer communications

1.1.Quality control/quality management

2. Human Resources

2.1.Recruitment and staffing levels

2.2.Staff training and education programs

2.3.Remuneration level

3. Accountability towards Customers

3.1.Service coverage

3.2.Delivery/continuity of service

3.3.Water quality

4. Financial

4.1.Working ratio

4.2.Operating unit cost

4.3.Creditworthiness

4.4.

5. Commercial

5.1.Collection efficiency

5.2.Customer metering

5.3.Customer information

6. Technical

6.1.Non-revenue water management

6.2.Maintenance level

6.3.Level of asset management

Most of the above 18 indicators are among the indicators used by SEWRC for the monitoring of WSSCs and for the process of analysis and approval of companies' requests for new tariff levels. The data for the calculation or for the scoring of each of the indicators is available either in the texts of the business plans or in the "Target Levels" worksheets.

The model applies a five-level scoring system (from 1 to 5) for each of the 18 selected indicators in 6 performance areas. Half of the indicators – 9 out of 18, are scored on the basis of specific calculated ratios for each evaluated company and certain agreed benchmarks, applicable for all assessed companies. Sub-indicators are also used for 4 of the indicators, in an attempt to achieve higher representativeness of these basic indicators and more precise scoring. The sub-indicators are presented in detail in **Table 2** and their total number is 9. Benchmarks are selected to allow for international comparison of achieved levels, but at the same time customized to reflect the average levels for the sector as a whole in Bulgaria.

The scoring scale (from 1 to 5) can be interpreted as follows:
1 – poor performance
2 – below average performance
3 – average performance
4 – good performance
5 – excellent performance

Each of the six areas is important for the sustainable performance of the companies and for delivering high quality water supply and sewerage services in the long run. Each of the six areas is given equal weight in the calculation of the total score. The criteria, the benchmarks, the calculated specific ratios, which are used for scoring of each of the 18 indicators of each company, and the scoring itself, can be best seen in **Attachment 2: Assessment Model**. **Table 2.1**. contains additional explanations.

2.1. Scoring in area 1 – Corporate governance:

The companies' strategy is assessed, based upon the information in the business plan and the website of each company. The scoring is dependent upon:
2.1.1. the availability and the quality of BP, the presence of strategy in it and the quality of the presented strategy. In order to achieve the highest score the company needs to have presented well defined strategy with clear mission and goals. The goals are assessed on the base of their adequacy, achievability and contribution to the development of the company's sustainability;
2.1.2. the level of the communication tools and PR, applied to relations with customers and with public. This includes but is not limited to: presence of PR specialist in the company; presence, quality and functions of the corporative web site – only to inform or to interact with the public; level of content management of the corporative web site, existing centers for client servicing or presence of network of such centers.
2.1.3. procedures for quality control, awarded international certificates for quality control, environmental management, and types of certificates. It is important to remind that the BPs used are for regulatory period 2009-2013. They were actually developed and submitted in 2008 and contain reporting data for 2007. The fact that the BPs were developed about 5 years ago is

to a great extent compensated by the up-to-date websites of companies and the actual data in them.

2.2. Scoring in area 2 – Human resources:

The idea is that the quality of personnel, its optimal number and proper management are of key importance for the level of the services provided. Qualified staff is crucial for the successful everyday operations and the sustainable development of the company. The scoring includes:

2.1. recruitment and staffing levels, using the number of staff per 1000 connections as benchmarks. Other things being equal, the efficiency in the area of HR management for each WSSC suggests that services are provided by a lower number of staff per water 1000 connections or per 1000 people served. The specific benchmarks applied for this indicator reflect typical levels of staff in international experience, but are also customized to take into account the average for the country as derived by the model.

2.2. staff training and education programs is scored depending on the percentage of staff that has been trained during the period and the availability of a training plan and budget in the BP;

2.3. remuneration level – the importance of this is determined by the fact that remuneration is one of the key factors for recruiting and retaining qualified staff. The benchmarks are used for this indicator, as explained in Table 1, are based on the NSI data for the average remuneration for the sector of 689 BGN.

2.3.Scoring in area 3 – Accountability towards customers

The scoring includes:

3.1. Service coverage – Three sub-indicators for the coverage level are estimated and applied:

a. water service coverage – scoring is in accordance with the percent of population connected to water supply. The benchmarks used are based upon the typical for the country levels of coverage.

b. waste-water collection coverage - scoring depends on the percent of population connected to waste water collection. The selected benchmarks are in accordance with average levels of coverage of this service in the country.

c. waste water treatment level – scoring is in accordance with the amount of waste water treated as percent of the amount of water sold. The benchmarks are in accordance with average levels of coverage of this service in the country.

Indicator 3.1 is the arithmetic average of the three sub-indicators above.

3.2. Delivery/continuity of service – Scoring depends on the continuity of water supply – permanent (24/7 – 24 hours a day and seven days per week), or with interruptions, and on the reported number of population, suffering from interruptions of water supply.

3.3. Water quality – Two sub-indicators are used for water quality:

a. Physicochemical and radiological indicators/quality and

b. Microbiological indicators.

The scoring of each of the two sub-indicators is based on the percent of tests compliant with regulations (the ratio between compliant tests and all tests). The scoring in this case applies only two grades – 5, when 95% or more of tests are compliant with regulations and 1, when less than 95% of tests are compliant with regulations.

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Indicator 3.3 is the arithmetic average of the two sub-indicators above.

2.4. Scoring in area 4 – Financial

4.1. Working ratio (OPEX/REV) – The ratio is simplified – OPEX/REV, accommodated to the data available in the "Target Levels" worksheet. The benchmarks applied for the scoring take into account typical levels of possible profit margins.
4.2. Operating unit cost (OPEX/Volume of water sold) - the scoring is based on the estimated operating unit cost for each company. The benchmarks are based on the average tariff levels in the country.
4.3. Creditworthiness – the scoring is based on the judgment about the access to credit of each company, the experience with applying for loans, utilizing loans and repaying loans, the likeliness to get new local or international loans under its owner's guarantee or under its own guarantee. The experience with international loans is scored 5, the very low chance to get any credit is scored 1.

2.5. Scoring in area 5 – Commercial aspect

5.1. Collection efficiency – two sub-indicators are used:

a. collection ratio - the benchmarks for this sub-indicator are based on the desired best level of above 99%, and are also adjusted to take into account the average for the WSSCs in the country.

b. collection period (days receivables outstanding) – the benchmarks take into account the practice of Bulgarian WSSCs to bill on a monthly basis.

Indicator 5.1 is the arithmetic average of the two sub-indicators.

5.2. Customer metering - the scoring is based on the percent of customers/connections being metered, the level (in %) of meters being tested and calibrated, the scheduled replacement of meters.
5.3. Customer information - the scoring is based on the level and quality of customer database according to the business plan and the facilities used to regularly update customers info, internal quality system related to customers and interactive access by customers according to company's website.

2.6. Scoring in area 6 – Technical

6.1. NRW management (NRW/water delivered) – the indicator is calculated as the ratio of non-revenue water to water delivered to the system. The benchmarks used are based on European standards, but raised by 10 percentage points, because of the higher average NRW in Bulgaria.
6.2. Maintenance level – two sub-indicators are used:

a. Sub-indicator "timely completed planned interruptions to total planned interruptions". The idea is that planned interruptions (as opposed to emergency interruptions) are an indicator of the proactive management related to assets maintenance and replacement of old assets. The number of timely completed interruptions, that are reported, testifies that this proactive policy is implemented in practice. This indicator is not perfect in explaining the scale of activities and investments for the renewal of assets, but the data available at this stage does not allow for the usage of a more representative indicator. The benchmarks used are in accordance with average levels derived by the model.

b. Sub-indicator – "completed planned interruptions per 1000 connections". The higher number of actually completed planned interruptions should indicate higher efforts in the improvement of assets along the systems. The benchmarks used are in accordance with average levels derived by the model and on the desired level of above 0.90.

6.3. Level of asset management (number of breakages per 1000 connections) – the number of breakages is indicative of the state of the assets/infrastructure of each company. The benchmarks are adjusted to the average levels in the country.

Table 2.1: Description of the scoring by areas and indicators

Performance Area	Indicator	Sub-indicators	Score	Criteria / Benchmarks
Corporate governance	Quality of BP/Strategy	Na	1	None
			2	In relation to some activities
			3	Some departments have documented mission statement
			4	Most departments have documented mission statement
			5	Mission statement at utility level and in all departments
	PR/Customer communications	Na	1	No dedicated PR person, no website, no communication tools and policy
			2	Some PR actions are taken but without any formalized policy and no established tools
			3	PR actions do exist on a permanent basis, with website, but no policy is in place
			4	PR tools and actions exist, including website, and are regularly activated and updated
			5	PR recognized as a full process, website, communication tools, and formalized policy is in place
	Quality control/Quality management	Na	1	No procedures or certificates for quality control
			2	Some internal procedures for quality control
			3	Internal procedures for quality control signed by the management
			4	ISO certificates
			5	EMS certificate
Human Resources	Recruitment and staffing levels	Na	1	Above 9 per 1000 water connections
			2	Between 9 and 7 per 1000 water connections
			3	Between 7 and 5 per 1000 water connections
			4	Between 5 and 3 per 1000 water connections
			5	Below 3 per 1000 water connections
	Staff training and education pro-	Na	1	No staff training or education and no related budget
			2	Basic training for some functions provided, mostly on-the-job training
			3	Limited staff training and capacity building, availabil-

Performance Area	Indicator	Sub-indicators	Score	Criteria / Benchmarks
	grams			ity of a minimal education plan
			4	Actively managed staff training and capacity building, availability of education plan, staff encouraged to make own suggestions
			5	Actively managed staff training and capacity building, comprehensive and budgeted education plan, staff encouraged to make own suggestions, participation in third party courses, participation in conferences possible
	Remuneration level	Na	1	Average remuneration level below 550 BGN
			2	Average remuneration level between 550 and 650 BGN
			3	Average remuneration level between 650 and 750 BGN
			4	Average remuneration level between 750 and 850 BGN
			5	Average remuneration level above 850 BGN
Performance Area	**Indicator**	**Sub-indicators**	**Score**	**Criteria / Benchmarks**
Accountability to Customers	Service coverage (arithmetic average of the 3 sub-indicators)	Water supply	1	Water supply below 96%
			2	Water supply between 96% and 97%
			3	Water supply between 97% and 98%
			4	Water supply between 98% and 99%
			5	Water supply above 99%
		Waste water collection	1	Waste water collection below 20%
			2	Waste water collection between 20% and 40%
			3	Waste water collection between 40% and 60%
			4	Waste water collection between 60% and 80%
			5	Waste water collection above 80%
		Waste water treatment	1	Waste water treatment below 20%
			2	Waste water treatment between 20% and 40%
			3	Waste water treatment between 40% and 60%
			4	Waste water treatment between 60% and 80%
			5	Waste water treatment above 80%
	Delivery/continuity of service	Na	1	Inadequate water pressure is chronic, or hours of supply are limited
			2	Inadequate water pressure is chronic in several areas, supply is not 24/7
			3	Inadequate water pressure is chronic in some of the service area, or there are frequent service disruptions
			4	Mostly demand driven level of service, but service disruption objectives are not met
			5	Demand driven level of service to agreed targets; 24/7 supply
		Physiochemical and radiological	1	Less than 95% of tests compliant with regulations
			2	

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Performance Area	Indicator	Sub-indicators	Score	Criteria / Benchmarks
	Water quality (arithmetic average of the two indicators)	indicators/quality	3	
			4	
			5	More than 95% of tests compliant with regulations
		Microbiological indicators/quality	1	Less than 95% of tests compliant with regulations
			2	
			3	
			4	
			5	More than 95% of tests compliant with regulations
Performance Area	**Indicator**	**Sub-indicators**	**Score**	**Criteria / Benchmarks**
Financial	Working ratio (Opex/Op-Rev)		1	Above 1.00
			2	Between 1.00 and 0.90
			3	Between 0.90 and 0.80
			4	Between 0.80 and 0.70
			5	Below 0.70
	Operating unit cost (Opex/Water sold)		1	Above 2.00
			2	Between 2.00 and 1.50
			3	Between 1.50 and 1.00
			4	Between 1.00 and 0.80
			5	Below 0.80
	Creditworthiness		1	Utility has no rating or no access to credit
			2	Utulity has access to local and limited credit under its owner's guarantee
			3	Utulity has access to limited international credit under its owner's guarantee or to local credit
			4	Utulity has access to limited international credit without its owner's guarantee
			5	Utulity has an investment grade credit rating and has access to banks and competitive offers
Commercial	Collection efficiency	Collection ratio	1	Less than 70% of bills actually collected
			2	Between 70% and 80% of bills actually collected
			3	Between 80% and 90% of bills actually collected
			4	Between 90% and 99% of bills actually collected
			5	More than 99% of bills actually collected
		Collection period (days receivables outstanding)	1	Average collection period above 90 days
			2	Average collection period between 90 and 60 days
			3	Average collection period between 60 and 45 days
			4	Average collection period between 45 and 30 days
			5	Average collection period below 30 days
	Customer metering	Na	1	No metering
			2	Limited metering
			3	All industrial clients are metered; not all domestic cli-

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Performance Area	Indicator	Sub-indicators	Score	Criteria / Benchmarks
				ents are metered; no metering of public clients
			4	All customers are metered. No regular testing and calibration of meters. No scheduled meters replacement
			5	All customers are metered. Regular testing and calibration of meters. Scheduled meters replacement
	Customer information	Na	1	Paper customers files, not updated
			2	Computerized customers database, not updated
			3	Computerized customers database, regularly updated
			4	Computerized customers database, internal quality control system
			5	Computerized customers database, internal quality control system. Total control of customers database evolution. Customer relationship management.
Technical	Non-revenue water management (NRW/Water delivered)	Na	1	Above 0.60
			2	Between 0.60 and 0.50
			3	Between 0.50 and 0.40
			4	Between 0.40 and 0.30
			5	Below 0.30
	Maintenance level	Timely completed interruptions / planned interruptions	1	Below 0.60
			2	Between 0.60 and 0.70
			3	Between 0.70 and 0.80
			4	Between 0.80 and 0.90
			5	Above 0.90
		Number of timely completed planned interruptions per 1000 connections	1	Below 1.50
			2	Between 1.50 and 3.00
			3	Between 3.00 and 4.00
			4	Between 4.00 and 5.50
			5	Above 5.50
	Level of asset management – number of breakages per 1000 connections	Na	1	Above 120
			2	Between 120 and 90
			3	Between 90 and 60
			4	Between 60 and 30
			5	Below 30

3. Analysis of WSSCs performance

The efficiency review and analysis of the WSSCs in Bulgaria is carried out in the following main aspects:

- Analysis of the performance of the WSSCs as a whole. This will help to compare the level of performance of the Bulgaria WSS companies internationally;

- Analysis of the individual performance of each company;
- Comparative analysis of the level of performance of district companies versus municipal companies versus private operators;
- Comparative analysis of the level of performance of companies by size;
- Comparative analysis of the level of performance of companies providing WW treatment versus companies not providing WW treatment.

The number of WSS companies in Bulgaria is dynamic through the years, with new WSS entities starting operations in some years and others closing or merging with other companies. Probably this is the reason why the total number of companies varies in data sources from different years. The total number of companies as in the ViK list, accompanying the 2009-2013 business plans data is **68**.

Out of this list, **9** "so called" water companies are not included in the analysis, because they are operated only to provide water and/or sewerage services to a single production plant or to a single resort place. They do not act as typical WSS companies. These are:

1. WWTP Leko Ko Radomir,
2. WWTP Lozenec ("PRO" EAD),
3. Verila Service,
4. Viki Invest-Elenite,
5. Zlatni Pyasutsi,
6. ViK Ecoproekt – Russe,
7. ViK Kovachevci,
8. ViK Lighthouse Golf Resort AD,
9. ViK Lukoil Neftochim Burgas.

In the course of the analysis **8** more companies have been subsequently taken out of the sample, because no business plans for 2009-2013 period have been submitted, no data for "Target Levels" have been submitted or data in the "Target Levels" reports have been insufficient. This makes impossible the completion of the scoring, which would distort the overall assessment – for the sector as a whole and by groups of companies. Most of these excluded from the sample companies are municipal. The excluded companies are:

1. ViK Chamkoria-Samokov,
2. ViK Breznik,
3. ViK Kyustendil (taken over by Kyustendilska Voda, which is the current district operator),
4. ViK Burzijska voda (selo Burzia),
5. ViK Antonovo,
6. ViK Belovo,
7. ViK Strelcha
8. ViK selo Leskovets

Thus, the current efficiency review of Bulgaria's WSS sector covers the remaining **51 WSS companies**, providing services to the population, the business and the public sector. **Table 3.1** provides the list of the 51 reviewed WSS companies in Bulgaria, presented by districts.

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Table 3.1.: List of the 51 reviewed WSS companies by districts

	Number in the model	District	WSS Company (ViK)
1	1	Blagoevgrad	ViK Blagoevgrad
	1.a		ViK Kresna
	1.b		ViK Mikrevo (“Strimon”)
	1.c		ViK Petrich
	1.d		ViK Sandanski
2	2	Burgas	ViK Burgas
3	3	Varna	ViK Varna
4	4	Veliko Turnovo	ViK Veliko Turnovo (“Yovkovtsi”)
	4.a		ViK Svishtov
5	5	Vidin	ViK Vidin
6	6	Vratsa	ViK Vratsa
7	7	Gabrovo	ViK Gabrovo
	7.a		ViK Sevlievo
8	8	Dobrich	ViK Dobrich
9	9	Kurdjali	ViK Kurdjali
10	10	Kyustendil	ViK Kyustendilska Voda (shortly named in the models as ViK Kyustendil)
	10.a		ViK Dupnitsa
	10.b		ViK Sapareva Banya (“Panichishte”)
11	11	Lovech	ViK Lovech
	11.a		ViK Troyan
12	12	Montana	ViK Montana
	12.a		ViK Berkovitsa
13	13	Pazardjik	ViK Pazardjik
	13.a		ViK Batak
	13.b		ViK Bratsigovo
	13.c		ViK Velingrad
	13.d		ViK Panagyurishte
	13.e		ViK Peshtera
	13.f		ViK Rakitovo
14	14.1	Pernik	ViK Pernik
15	15	Pleven	ViK Pleven

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	Number in the model	District	WSS Company (ViK)
	15.a		ViK Knezha
16	16	Plovdiv	ViK Plovdiv
17	17	Razgrad	ViK Isperih
	18		ViK Razgrad
	18.a		ViKKubrat
	18.b		ViK Rakovski
18	19	Ruse	ViK Ruse
19	20	Silistra	ViK Silistra
20	21	Sliven	ViK Sliven
21	22	Smolian	ViK Smolian
22	23	Sofia Oblast (District)	ViK Sofia
	23a		ViK Botevgrad
23	24	Stara Zagora	ViK Stara Zagora
24	25	Turgovishte	ViK Turgovishte
25	26	Haskovo	ViK Haskovo
	26.a		ViK Stambolovo
	27		ViK Dimitrovgrad
26	28	Shumen	ViK Shumen
27	29	Yambol	ViK Yambol
28	30	Sofia Grad	Sofiyska Voda

For the purpose of the analysis we first divide the WSS companies into three main groups, depending on their ownership:

1. Group of **district companies**, including 28 companies (27 district companies plus ViK Isperih, which is the second company with state-ownership in the district of Razgrad. It serves three municipalities on the territory of the district of Razgrad.
2. Group of **municipal companies**, including and **22 municipal companies (**21 municipally-owned companies plus ViK Dimitrovgrad. The company is with mixed ownership – 51% state and 49% municipal. The reason behind adding ViK Dimitorvgrad to the group of municipal companies is that it has the features of a municipal company, rather than of a district company. It operates on the territory and provides services to one municipality – Dimitrovgrad.
3. **Private operators**, represented by a single company – ViK Sofiiska Voda, which provides WSS services to the City of Sofia (this is at the same time district of Sofia Grad).

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The WSS sector in Bulgaria is quite fragmented. The number of companies is too big, given the territory of the country and the number of the population. The average number of population serviced by one company is 148 590. For the group of the district companies this number is 205 729. The average number of population serviced by one municipal company is only 26 265 people.
The number of population serviced by WSSC Sofijska Voda is 1 291 591 people.

The district with the highest number of WSS companies is Pazardjik. It is serviced by 1 district and 8 municipal companies (as explained above, two of the municipal companies – Belovo and Strelcha, are not included in the list of reviewed companies, because of the lack of data). The next district in terms of number of companies is Blagoevgrad with 1 district and 4 municipal companies. Only 14 out of the 28 districts in the country are serviced by a single company.

3.1. All companies results

The detailed score for each of the reviewed companies is presented in **Attachment 1: Summary Tables**[10]. The printouts of the assessment worksheets for each company are presented in **Attachment 2: Assessment Model**.

Table 3.1.1: Bulgaria WSS companies performance scoring – 2011

	Area	All WSSCs	District WSSCs	Municipal WSSCs	Private operator
1	Corporate Governance	2.50	2.95	1.85	4.00
2	Human Resources	2.69	2.93	2.35	3.33
3	Accountability towards Customers	3.42	3.50	3.26	4.67
4	Financial	2.31	2.18	2.38	4.67
5	Commercial	2.91	3.04	2.75	2.67
6	Technical	2.88	2.67	3.15	2.83
	Total score	**2.78**	**2.88**	**2.62**	**3.69**

Table 3.1.1 summarizes the evaluation results of the 51 reviewed water sector and sewerage companies in Bulgaria. The total score, which takes into account the scoring of the 6 performance areas, is **2.78**. This is quite lower than the "average performance" according to the applied 5-level scoring scale. **Table 3.1.1** also indicates that district companies perform somewhat better with an average of 2.88, as compared with municipal companies average of 2.62. However, the difference is not significant (only 0.25) and none of the groups reaches the "average 3" performance level according to the 1 to 5 scoring scale. One conclusion based on the data is that there is still a long way to go to reach the "good" and "excellent" levels of performance. The only private operator – Sofijska Voda, however, has a much better score 3.62.

[10] The only reason for not including these tables in the main text of the report is that they are too long and do not fit well on the pages.

Table SS1-1 of **Attachment 1** provides a detailed picture of the scoring of each of the reviewed WSS companies in Bulgaria - the table shows the total score, as well as the score by areas for each company. The lower part of the table is a summary of the results for the sample as a whole.

Table 3.1.2 is the summary part of **Table SS1-1** of **Attachment 1**. It shows the arithmetic average, the median, the standard deviation, the minimum and the maximum for the whole set of companies – for total score and by performance areas. The arithmetic average for the overall performance of all companies is 2.78 and is equal to the median of 2.78. The standard deviation is only 0.36, which is an indication that these average values are quite representative of the whole picture. The maximum is 3.69 (the best performing company) and the minimum is 1.96 (the worst performing company).

Table 3.1.2: Summary of all WSS companies scoring results

	Total Score	Corporate Gover-nance	Human Resour-ces	Accounta-bility to Customers	Financial	Commer-cial	Technical
Average	**2.78**	2.50	2.69	3.42	2.31	2.91	2.88
Median	**2.78**	2.33	2.67	3.33	2.00	2.83	2.83
Standard dev.	**0.36**	0.86	0.71	0.72	0.60	0.56	0.72
Max	**3.69**	4.00	4.33	4.89	4.67	4.50	5.00
Min	**1.96**	1.00	1.33	2.11	1.33	1.67	1.33

The average values by areas are within the range of 2.31 to 3.42. Accountability to customers – 3.42, is actually the only area with a score higher than the "average" level of 3.00. All the others are below 3.00: corporate governance with 2.50, human resources with 2.69, commercial with 2.91, financial with 2.31 and technical with 2.88.

Table SS1-2 of **Attachment 1** provides the ranking of all companies by total score, starting with the highest score WSS company – ViK Sofiiska Voda, and finishing with the lowest score company – ViK Stambolovo. The companies in the table are divided in five groups of ten companies in each (eleven in the first group), marked with different colors.

The highest score group (of eleven companies), marked with green color, consists of 1 private operator – Sofiiska Voda, 9 district companies and only 1 municipal company. These are the best performing companies according to the scoring, and their total score is between 3.69 and 3.00 – all above or equal to the "average" of 3.00. These are: Sofijska Voda, Plovdiv, Burgas, Blagoevgrad, Stara Zagora, Russe, Smolyan, Lovech, Petrich, Vratsa, Veliko Turnovo.

The second group of ten companies, marked in light green, consists of 5 district and 5 municipal companies, with a score about the "average" level of performance - between 2.95 and 2.81. It includes: Varna, Batak, Rakitovo, Shumen, Dupnitsa, Velingrad, Razgrad, Botevgrad, Gabrovo, Silistra.

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The third group, marked in yellow, is in the middle and its score ranges between 2.80 and 2.72. It includes 6 district and 4 municipal companies. It includes: Sandanski, Dimitrovgrad, Pernik, Troyan, Sofia-district, Sliven, Mikrevo, Kurdjali, Pazardjik, Vidin.

The fourth group, marked in pale pink, includes 5 district and 5 municipal companies, with total score between 2.71 and 2.46. These are: Pleven, Peshtera, Kyustendil, Montana, Sevlievo, Sapareva Banya, Turgovishte, Bracigovo, Kresna, Haskovo.

The last group is the worst performing one and is marked in white color. It consists of 3 district and 7 municipal companies. Their total score is between 2.46 and 1.96. These are: Svishtov, Berkovitsa, Isperih, Dobrich, Kneza, Panagyurishte, Rakovski, Kubrat, Yambol, Stambolovo.

3.2.District and municipal companies results

District companies performance

Table 3.2.1 is the summary part of **Table SS2-1**. It shows the arithmetic average, the median, the standard deviation, the minimum and the maximum for the district companies – for total score and by performance areas. As commented above, the score for the overall performance of the district companies is slightly below the "average" level of 3.00 – the arithmetic average is 2.88 and the median is 2.79. The standard deviations is only 0.34. The maximum is 3.51 (the best performing district company - Plovdiv) and the minimum is 2.25 (the worst performing district company - Yambol).

Table 3.2.1: Summary of district WSS companies scoring results – 2011

		Total Score	Corporate Gover-nance	Human Resour-ces	Accounta-bility to Customers	Financial	Commer-cial	Technical
Average		**2.88**	**2.95**	**2.93**	**3.50**	**2.18**	**3.04**	**2.67**
Median		**2.79**	**2.83**	**3.00**	**3.39**	**2.00**	**3.08**	**2.67**
Standard dev.		**0.34**	**0.68**	**0.69**	**0.64**	**0.48**	**0.58**	**0.54**
Max		**3.51**	**4.00**	**4.33**	**4.89**	**3.33**	**4.50**	**4.00**
Min		**2.25**	**2.00**	**1.67**	**2.33**	**1.67**	**2.00**	**1.33**

The average values by areas are within the range of 2.18 (for financial performance) to 3.50 (for accountability to customers). The other area scoring higher than 3.00 is Commercial with 3.04. The rest are Corporate governance – 2.95, Human resources – 2.93 and Technical – 2.67. The same results are also illustrated on **Figure 3.2.1**.

Table SS2-2 of **Attachment 1** provides the ranking of district companies by total score, starting with the highest score company – ViK Plovdiv, and finishing with the lowest score company – ViK Yambol. The district companies in the table are divided again in five groups, corresponding to their ranking in the All-companies table. The companies are marked using the same colors as in the All-companies table. The widest area is the green one with 9 district companies, followed by the light green with 5 companies. The third group has 6 companies, the fourth – 5 companies, and the fifth – 3 companies. The explanation of this distribution is the higher score of most district companies. Half of the 28 district companies (14) fall in the green and light green areas, with score from 3.51 to 2.81. However, only 9 of them are above the "average" level of 3.00. Even the two district companies with highest score – Plovdiv and Burgas, are still well below "good" performance level of 4.00. The three district companies in the worst performing group score really very low: Isperih with 2.38, Dobrich with 2.35, and Yambol with 2.25.

Municipal companies performance

Table 3.2.2 is the summary part of **Table SS3-1** of **Attachment 1**. It shows the arithmetic average, the median, the standard deviation, the minimum and the maximum for the municipal companies – for total score and by performance areas. As discussed above, the score for the overall performance of the municipal companies is quite lower than that of district companies. It is also well below the "average" level of 3.00 – the arithmetic average is 2.62 and the median is 2.65. The standard deviation is 0.29, which is an indication that these average values are quite representative. The maximum is 3.12 (the best performing municipal company) and the minimum is 1.96 (the worst performing company).

Table 3.2.2: Summary of municipal WSS companies scoring results – 2011

		Total Score	Corporate Gover-nance	Human Resour-ces	Accounta-bility to Customers	Financial	Commer-cial	Technical
Average		**2.62**	**1.85**	**2.35**	**3.26**	**2.38**	**2.75**	**3.15**
Median		**2.65**	**1.67**	**2.33**	**3.22**	**2.33**	**2.75**	**3.17**
Standard dev.		**0.29**	**0.58**	**0.60**	**0.76**	**0.52**	**0.50**	**0.85**
Max		**3.12**	**3.00**	**3.67**	**4.67**	**3.33**	**3.50**	**5.00**
Min		**1.96**	**1.00**	**1.33**	**2.11**	**1.33**	**1.67**	**1.67**

The average values by areas are within the range of 1.85 to 3.15. Two of the areas score higher than the average - Accountability to customers with 3.26 and Technical with 3.15. The other four areas score well below 3.00: Corporate governance – 1.85, Human resources – 2.35, Financial – 2.38 and Commercial – 2.75.

Private operator performance

The only WSS company in the country, managed by a private operator, is ViK Sofiiska Voda. This company is the leader in the scoring with a total score of 3.69, approaching the "good" performance level of 4.00. As seen from **Table 3.2.3** the company has the "excellent" score of 4.67 in the Financial area, 4.67 in Accountability to customers, 4.00 in Corporate governance, 3.33 in Human resources. However, two areas are below the "average" level of 3.00 – Commercial with 2.67 and Technical with 2.83.

Table 3.2.3: ViK Sofiiska Voda scoring results - 2011

		Total Score	Corporate Gover-nance	Human Resour-ces	Accounta-bility to Customers	Financial	Commer-cial	Technical
Sofiiska Voda		**3.69**	4.00	3.33	4.67	4.67	2.67	2.83

3.3. Results for companies of different size

The second classification of WSS companies for the purpose of this review is by size. The data for individual companies testifies about their huge diversity in terms of size. **Table SS1-3** of **Attachment 1 (Summary Tables)** provides the essential parameters related to size for each of the 51 companies reviewed. The selected parameters include: annual amount of water sold, number of population connected to water supply, number of connections, number of staff, annual revenue. The last two columns provide also information about the level of waste water collection and the level of waste water treatment. **Table 3.3.1** summarizes the parameters for the sector as a whole. The average amount of water sold per annum is 7,203,407 m3, while the medium is twice lower – 3,721,161 m3. The standard deviation of 13,827,596 is about twice the average. This is due to the big diversity of companies by size, mentioned above. The water sold by the largest company – Sofijska Voda, is 91,536,492 m3, while the amount of water sold for the smallest company – Rakovski, is only 105,935 m3. It is the same with the rest of the size parameters. For example, the average number of staff is 324 people, the maximum is 1496 and the minimum is only 6.

Table 3.3.1: Summary of all companies average size parameters

	Water sold (in m^3)	Number of population serviced	Number of connections	Number of staff	Annual revenue (BGN)	Waste water collection	Waste water treatment
Average	7,203,407	149,605	42,335	324	10,509,214	0.57	0.62
Median	3,721,161	87,208	29,275	266	6,001,270	0.60	0.00
Standard dev.	13,827,596	212,613	41,944	336	17,992,861	0.30	0.86
Max	91,536,492	1,291,591	175,179	1496	114,370,124	1.01	4.15
Min	105,935	3,239	855	6	150,465	0.00	0.00

Table SS1-4 of **Attachment 1 (Summary Tables)** shows the ranking of the 51 WSS companies by size, based on the amount of water sold. The companies are divided in **4 groups**: given the individual numbers by companies, as well as the average and the median in **Table 3.3.1**, we found it appropriate to use the following benchmarks: **group 1** – companies with water sold more than 7,000,000 m^3, **group 2** – companies with water sold between 7,000,000 and 3,000,000 m^3, **group 3** – with water sold between 3,000,000 m^3 and 1,000,000 m3, and **group 4** – with water sold less than 1,000,000 m^3. Four more Summary Sheets – SS4, SS5, SS6, SS7, have been developed in the scoring model to correspond to each of the four groups, with detailed tables for the scoring of companies in each group.

Table 3.3.2: Scoring results of companies with different size

	Total Score	Corporate Governance	Human Resources	Accountability to Customers	Financial	Commercial	Technical
All companies average	**2.78**	**2.50**	**2.69**	**3.42**	**2.31**	**2.91**	**2.88**
Group 1 - (largest)	**3.14**	**3.42**	**3.08**	**3.74**	**2.67**	**3.15**	**2.76**
Group 2	**2.76**	**2.71**	**2.88**	**3.43**	**2.00**	**2.94**	**2.63**
Group 3	**2.72**	**2.33**	**2.45**	**3.28**	**2.27**	**2.80**	**3.15**
Group 4 - (smallest)	**2.52**	**1.44**	**2.25**	**3.20**	**2.42**	**2.71**	**3.08**

Table 3.3.2 provides the summarized scoring results for the four groups. The largest companies in group one are with the highest total score of 3.14, well above the all-companies average of 2.78. The lowest score of 2.52 belongs to group 4, the smallest companies. The other two groups have almost the same total score, respectively 2.76 (group 2) and 2.72 (group 3).

3.4. Results of companies providing WW treatment Vs. companies not providing WW treatment

Table SS1-4 of **Attachment 1 (Summary Tables)**, which shows the ranking of the 51 WSS companies by size, provides also information about the level of waste water (WW) collection and WW treatment by each company (in the two rightmost columns). According to **Table SS1-4** almost all WSS companies provide the service waste water collection. Only 6 out of the 51 companies report zero percent of population connected to waste water collection, including two district and four municipal companies: Isperih, Sofia-district, Mikrevo, Sapareva Banya, Rakovski and Stambolovo.

At the same time only half of all companies report waste water treatment. These WSS companies are shown in **Table SS8-1** of **Attachment 1 (Summary Tables)**. Their number is 25 and the level of waste water treatment varies significantly along companies. This indicator is calculated as the ratio of the amount of water treated to the amount of water sold. For a number of companies this ratio is higher than one because not only water sold is directed to the waste water treatment facilities. Rain water, non revenue-water, as well as water derived by business entities from their own sources flow into the sewerage systems and into the waste water treatment plants. The companies are divided in two groups: companies providing WW treatment (**Table SS8-1**) and companies not providing WW treatment (**Table SS9-1**).

Table 3.4.1: Scoring results of WSSCs providing WW treatment and of WSSCs not providing WW treatment

	Total Score	Corporate Governance	Human Resources	Accountability to Customers	Financial	Commercial	Technical
All companies average	**2.78**	**2.50**	**2.69**	**3.42**	**2.31**	**2.91**	**2.88**
Group 1-Providing WW treatment	**2.94**	**2.97**	**2.77**	**3.68**	**2.29**	**3.01**	**2.90**
Group 2-Not providing WW treatment	**2.64**	**2.04**	**2.60**	**3.17**	**2.33**	**2.81**	**2.86**

Table 3.4.1 presents illustrates the average score of the group of 25 companies which provide the service WW treatment and the average score of the group of 26 companies not providing WW treatment. The total score of the first group is 2.94, slightly higher than the all-companies average of 2.78. The total score for the second group is quite lower - 2.64. The companies providing the full set of services, including WW treatment, show better overall performance. However, both groups are below the "average" performance of 3.00.

REPUBLIC OF BULGARIA

MINISTRY OF REGIONAL DEVELOPMENT

STRATEGY FOR DEVELOPMENT AND MANAGEMENT OF THE WATER SUPPLY AND SANITATION SECTOR IN THE REPUBLIC OF BULGARIA 2014 - 2023

(Approved by Council of Minister's Decision No 269 of May 7, 2014)

VOLUME II: Appendices

April 2014

European Union

Operational Program Environment 2007 - 2013

EU Structural Funds

THE WORLD BANK

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AC pipes	Asbestos cement pipes
CAPEX	Capital expenditures
CoM	Council of Ministers
EEA	European Environment Agency
EU	European Union
EUR	Euro
GoB	Government of Bulgaria
FLAG	Fund for Local Authorities and Governments
IFIs	International Financial Institutions
IAWBD	Internationale Arbeitsgemeinschaft fuer WasserBetriebe in der Donau Gebiet
IWA	International Water Association
JASPERS	Joint Assistance to Support Projects in European Regions
MIDP	Municipal Infrastructure Development Project
MOEW	Ministry of Environment and Water
MP	Master Plan
MRD	Ministry of Regional Development
NSI	National Statistical Institute
OPE	Operational Programme Environment
OPEX	Operating expenditures
PAG	Program Advisory Group
PER	Public Expenditure Review
PPP	Public Private Partnership
SEWRC	State Energy and Water Regulatory Commission
SFP	Strategic Financing Plan
TA	Technical Assistance
UIS	Unified Information System
UWWTD	Urban Wastewater Treatment Directive
UWWTP	Urban Wastewater Treatment Plant
WA	Water Act
WSSA	Water Supply and Sanitation Association
WSSC	Water Supply and Sanitation Company
WSS	Water Supply and Sanitation
WTP	Water Treatment Plant
WWT	Wastewater Treatment
WWTP	Wastewater Treatment Plant

The information, presented in this document, has been created within the period September 2012 – May 2013 and has served as a basis for the development of the Strategy for Development and Management of the WSS Sector in the Republic of Bulgaria 2014 – 2023.

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Appendix 1: EU Legislation, National Legislation and Legal Definition of WSS terms

List of Relevant EU Regulations and National Transposing Legislation

DIRECTIVE 2000/60/EC of the European Parliament and the Council of 23 October 2000 establishing a framework for Community action in the field of water policy	Water Act (promulgated SG, No 67 of 27.07.1999, enforced 28.01.2000, last amendment, SG No 82 of 26.10.2012, enforced 26.11.2012)
	Ordinance No H-4 of September 14, 2012 on the characterization of surface water (promulgated SG, No.22 of March 5, 2013, enforced March 5, 2013)
	Ordinance No 1 of April 11, 2011 on water monitoring (promulgated SG, No 34 of April 29, 2011, enforced April 29, 2011, amended and supplemented, No 22 of March 5, 2013, enforced March 5, 2013, amended, No 44 of May 17, 2013, enforced May 17, 2013)
COUNCIL DIRECTIVE 98/83/EC of 3 November 1998 on the quality of water intended for human consumption	Ordinance No 9 of 16.03.2001 on the quality of water intended for drinking and household purposes (promulgated SG, No.30 of 28.03.2001, amended and supplemented SG No1 of 04.01.2011)
COUNCIL DIRECTIVE 91/271/EEC of 21 May 1991 concerning urban wastewater treatment	Water Act (promulgated SG, No 67 of 27.07.1999, enforced 28.01.2000, last amendment, SG No 82 of 26.10.2012, enforced 26.11.2012)
	Ordinance No 7 of 14.11.2000 on the terms and conditions for the discharge of waste industrial water into the municipal sewarage systems (promulgated SG, No 98 of 01.12.2000)
	Ordinance No 2 of June 8, 2011 on the issue of permits for discharge of wastewater in water bodies and setting individual emission limits for point source pollution (promulgated SG, No 47 of 21.06.2011, enforced 21.06.2011, amended, No 14 of 17.02. 2012, enforced , 17.02. 2012, supplemented No 44 of 17.05. 2013, enforced 17.05. 2013)
	Ordinance on the order and procedure for the use of wastewater sludge for agricultural purposes (promulgated SG, No 112 of 23.12.2004)
	Ordinance № 6 of 09.11.2000 on the emission norms for the admissible content of harmful and dangerous substances in wastewater discharged in water bodies (promulgated SG, No 97 of 28.11.2000, amended and supplemented SG No 24 of 23.03.2004, enforced 23.03.2004)
	Ordinance on the long-term levels, conditions and procedures for setting the annual target levels of indices concerning the quality of water supplying and sewarage services (promulgated SG, No 32 of 18.04.2006, enforced 18.04.2006)
COUNCIL DIRECTIVE 80/68/EEC of 17 December 1979 on the protection of groundwater against pollution caused by	Ordinance No 2 of 13.09.2007 on the protection of water from pollution with nitrates from agricultural sources (promulgated SG, No 27 of 11.03.2008, enforced 11.03.2008)

certain dangerous substances (Termination date 21.12.2013)	Ordinance No 3 of 16.10.2000 on the terms and conditions for research, design, approval and operation of the sanitary protective zones around water sources and facilities for drinking and household purposes and around mineral water sources, used for medical, prophylactics, drinking and hygiene purposes (promulgated SG, No. 88 of 27.10.2000)
	Ordinance No 2 of 08.06.2011 on the issue of permits for discharge of wastewater in water bodies and setting individual emission limits for point source pollution (promulgated SG, No 47 of 21.06.2011, enforced 21.06.2011, amended No 14 of 17.02. 2012, enforced 17.02. 2013, supplemented No 44 of 17.05.2013, enforced 17.05.2013)

List of Relevant National Regulations

Water Act (prom. SG. 67/27.07.1999) and the regulations for its implementation:

- ORDINANCE No 1 from 10.10.2007 for research, use and protection of groundwater (prom. SG. 87/30.10.2007)
- ORDINANCE No 3 from 16.10.2000 on the terms and conditions for research, design, approval and operation of sanitary protective zones around water sources and facilities for drinking water, and sources of mineral waters used for therapeutic, prophylactic, drinking and sewerage (promulgated SG. 88/2000)
- ORDINANCE No1 of April 11, 2011 23.04.2007 on Water Monitoring (promulgated SG. 34/ 29.04.2011; enforced 29.04.2011, amended and supplemented No 22of 05.03.2013, enforced 05.03.2013, amended No.44 of 17.05.2013, enforced 17.05.2013);
- ORDINANCE No 6 from 09.11.2000 on the emission standards for the levels of harmful and dangerous substances in wastewater, discharged into water points (promulgated SG. 97/ 28.11.2000)
- ORDINANCE No 7 from 14.11.2000 on the procedures for discharging industrial effluents into the sewerage system of the towns and villages (promulgated SG. 98/ 1.12.2000)
- ORDINANCE No 9 from16.03.2001 on the quality of drinking water (promulgated SG. 30/28.03.2001)
- ORDINANCE No 2 from 08.06.2011 on issuing permits for discharging wastewater into water points and setting individual emission limits for local sources of pollution (promulgated SG. 47 of 21.06.2011, enforced 21.06.2011, amended, No 14 of 17.02.2012, enforced 17.02.2012, supplemented No.44 of 17.05. 2013, enforced 17.05. 2013)
- ORDINANCE No 12 from 18.06.2002 on the quality requirements for surface water, for drinking purposes (promulgated SG. 63/ 06/28/2002)
- ORDINANCE No H-4 of September 14, 2012 on the characterization of surface water (promulgated SG, No.22 of March 5, 2013, enforced March 5, 2013)
- ORDINANCE No 13 from 29.01.2004 on the procedures for carrying out the technical operation of dams and associated facilities (promulgated SG. 17/2.03.2004)

ACT for Regulating Water supply and Sewerage services Prom. SG. 18/25.02.2005, in force from 20.01.2005, and the regulations for its implementation:

- Ordinance on price regulation for water-supply and sewerage services: sets the methodology to determine costs of water and sewerage services, provided by water and sewerage operators;
- Ordinance on the long-term levels, terms and procedure for setting the annual target levels of quality indices for water and sewerage services: sets the long-term levels of indices for quality of water and sewerage services, the terms and procedures to set annual target levels for the quality of such services and the accounting methods for them, the elements and business plan parameters and control procedures for their execution;
- Ordinance No 1 on the endorsement of a Methodology for setting the admissible water losses in the water-supply systems: the methodology establishes the rules to exercise control over the state of water supply systems in urban territories and analyze the situation thereof, including the total loss of water;
- Ordinance on the terms and procedure to register water and sewerage operators control experts: sets the terms and procedure of registering the experts who assist the State Energy and Water Regulatory Commission;
- Tariff of fees, collected by the State Energy and Water Regulatory Commission under the Water and Sewerage Services Regulation Act: sets the amount of annual water and sewerage regulation fee;
- Rules on the structure and organization of the State Energy and Water Regulatory Commission: issued pursuant to the Energy Act, but also regulating the Commission's activity as a water regulator.

ACT for Spatial Planning Promulgated SG. 1 from 2.01.2001, in force from 31.03.2001, in particular **Chapter Four** thereof**, "Networks and facilities of the physical infrastructure"** and the set of ordinances, applicable in the water and sewerage services provision:

- Ordinance No 2 of March 22, 2005 on the design, construction and operation of water-supply systems;
- Ordinance No RD-02-20-8 of May 17, 2013 on the design, construction and operation of sewerage systems (promulgated SG, No.49 of June 4, 2013, enforced July 5, 2013)
- Ordinance No 4 of June 17, 2005 on the design, construction and operation of water- supply and sewerage systems in buildings;
- Ordinance No 7 of December 22, 2003 on the rules and standards for planning of individual types of territories and spatial development zones (Chapter Fourteen „Water-supply and sewerage network and facilities structure");
- Ordinance No 8 of July 28, 1999 on the rules and standards regulating the deployment of physical conduits and facilities in urbanized areas,

Law on Environmental Protection (Prom. SG. 91/25.09.2002) and the sub delegated legislation for its implementation.
Biological Diversity Act (prom. SG. 77/9.08.2002) and the sub delegated legislation for its implementation.
MOEW Ordinance No. 2 (June 8, 2011) on wastewater discharge
Law on Waste management (Prom.SG 63/ 13.08.2010)

- ORDINANCE on the terms and procedures for utilization of sludge from wastewater treatment through its use in agriculture (Prom.SG.112/23.12.2010)

List of Legal definitions in the WSS sector

WATER-SUPPLY AND SEWERAGE		
water-supply system	a totality of facilities for the extraction of natural waters, their treatment and/or decontamination until attainment of the requisite quality, and their storage, transfer, distribution and supply to the corporeal immovables of consumers	§ 1, Para 1, Item 32 of the SP of the WA
sewerage system	a totality of sewer branches, street sewer networks in the urbanized areas, main collector sewers and treatment plants or treatment facilities wherethrough the waste waters and/or the rain waters are removed from the corporeal immovables of consumers, are treated and, where necessary, decontaminated until attainment of the requisite quality, and are discharged into the relevant water site	§ 1, Para 1, Item 33 of the SP of the WA
water intended for human consumption	surface or ground waters, either in their original state or after treatment, intended for drinking, cooking or other household purposes, supplied through a water-conduit system or from a tank truck, in bottles, cans or other packaging, as well as the waters used for the manufacture of food, medicinal or cosmetic products or substances intended for human consumption in case the quality of the water may affect the quality of the products in their finished form	§ 1, Para 1, Item 36 of the SP of the WA
water services	all services which provide water for households, public institutions or any economic activity, through water abstraction, impoundment, storage, treatment and distribution of surface waters or ground waters, as well as waste-water collection, removal and treatment through treatment facilities which subsequently discharge into surface water bodies	§ 1, Para 1, Item 74 of the SP of the WA
water use	water services together with any other human activity related to water withdrawal, water site use and land use, with regard to which, upon characterization of water bodies performed under the conditions of the Ordinances cited in Article 135, Para 1, Item 2 and 9 of the WA, it has been established that it is an activity having a significant impact on the state of waters; such services and activities are taken into account when conducting the economic analysis under Article 192, Para 2, Item 1 of the WA	§ 1, Para 1, Item 80 of the SP of the WA
water-conduit network	an element of the water-supply system in the urbanized area, consisting of conduits and the adjoining facilities thereof for distribution and transfer of water to consumers	§ 1, Para 1, Item 82 of the SP of the WA

sewer network	an element of the sewerage system in the urbanized area, consisting of conduits and the adjoining facilities thereof for removal of wastewater from consumers to the main collector sewers outside the urbanized areas	§ 1, Para 1, Item 83 of the SP of the WA
regional water and sewerage utility	a water and sewerage utility operating in the territory of multiple municipalities	§ 1, Para 1, Item 85 of the SP of the WA
municipal water and sewerage utility	water and sewerage utility operating in the territory of a single municipality	§ 1, Para 1, Item 86 of the SP of the WA
water-supply and sewerage services	the services of treatment and delivery of water intended for drinking and household uses, industrial uses and other uses, of removal and treatment of waste water and run-off rain water from the corporeal immovables of consumers within urbanized areas (the nucleated and dispersed settlements), as well as the activities of construction, maintenance and operation of the water-supply and sewer systems, including the treatment plants and the other facilities	Article 1, Para 2 of the WSSSRA
water and sewerage utilities	all enterprises whereof the objects are provision of water-supply and sewerage services	Article 2, Para 1 of the WSSSRA
non-revenue water	difference between the volume of water abstracted, entering the water-supply system, and the billed water consumption	§ 1, Item 10 of Ordinance on the Setting Up of Annual Target Levels for Quality Assessment of Water-Supply and Sewerage Services

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Appendix 2: SWOT Analysis

STRENGTHS
• European water and wastewater Directives are fully transposed in the national legislation and BNS. • Overall the country is not water stressed and has the necessary water resources for drinking water supply. • The country has almost universal centralized water supply coverage and good quality of the drinking water. • Significant number of WSSCs deliver services at regional level. • Qualified WWS specialists are available to work in the sector.
WEAKNESSES
✓ Uneven distributions of the water resources throughout the country leading to water rationing in a number of settlements. ✓ The quality of the drinking water in small water supply zones is not up to the standards. ✓ Failure on behalf of the WSSCs to comply with the European legislation, concerning the volume and frequency of drinking water quality monitoring. ✓ Heavily under-maintained water supply and sanitation assets and large water losses (around 60%). ✓ Wastewater collection and treatment coverage is not compliant with the legal requirements and as a result the sector needs significant investments. ✓ Low productivity and poor remunerations in the WSS sector. . ✓ Many WSSCs are unable to invest due to low working ratio (operational expenses/operational revenues). ✓ SEWRC lacks administrative capacity and the necessary autonomy to adequately address the problems of the sector. ✓ Lack of autonomy of WSSCs managers leading to problems with the sustainability of both the companies and the WSS services. ✓ Low households income, leading to the need of social assistance among others for the payment of WSS bills. ✓ Systematic lack of financing for the sector. ✓ Difficulties in operation and maintenance of WSS assets due to different ownership structures are requirements.
OPPORTUNITIES
o A growing understanding that a restructuring of the WSS sector is needed. o Availability of EU Grant financing to address significant part of the required compliance investments. o High level central and local governments support to achieve compliance with ecological requirements. o Introduction of WSSCs benchmarking system could enhance productivity.

- Consolidation of WSSCs could enhance productivity. - Changes to the regulatory framework to introduce WSSCs’ specific approach. - Regional approach for the design, financing, implementation and management of investments in the WSS sector. - State social support to the vulnerable groups to address WSS services affordability and acceptability issues. - Creation of comprehensive WSS law.
➢ THREATS
➢ Global climate changes leading to drought zones create significant risk to the water supply for the population and industry. ➢ Vulnerable households spending on WSS services are endangered due to the slow increase of their purchasing power. ➢ Secondary and University systems do not “produce” the necessary specialist for the WSS sector. ➢ Inability to implement of the changes to the Water Act from 2009 concerning the ownership of the WSS assets without amendments to the regulations. ➢ Negative demographic trend leading to depopulation and low water consumption. ➢ Significant number of small WSSCs cannot invest significant amounts to achieve environmental compliance and provide services as per the requirements of the law. ➢ Delay in Regional WSS Master plans approval and implementation leading to further ad hoc problem solving in the sector; ➢ Lack of capital subsidies from the central budget for the sector; ➢ EU environmental grant funds not fully absorbed; ➢ Political interference to operational decisions taken by WSSCs and SEWRC.

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Appendix 3: Expenditure and funding scenario – Assumptions and Results

1. METHODOLOGY, DATA AND ASSUMPTIONS FOR CALCULATION OF CAPITAL AND OPERATIONAL EXPENDITURE NEEDS

The capital and operational expenditure models have been developed to achieve the following objectives by 2038:

- Wastewater collection:
  - 75% coverage for household users;
  - 100% coverage for non-household users.
- Wastewater treatment:
  - 75% coverage for household users;
  - 100% coverage for non-household users.
- Reduction of NRW to 30%[1].
- Sustainability of water resources in order to address raw water scarcity.

Approach in Undertaking CAPEX Estimates

Structuring the CAPEX models

In developing the CAPEX models we've looked at the overall management and operations of a typical water utility. Therefore, the capital expenditure plans were structured to cover the following functions:

- Water Supply Estimated Investments:
  - Abstraction sources (reservoirs/gravity sources/wells/boreholes, etc.);
  - Water treatment (DWTP/Disinfection facilities);
  - Transmission pipes;
  - Pumping stations;
  - Service reservoirs;
  - Distribution pipes
  - Revenue meters.
- Wastewater Estimated Investments:
  - Rehabilitation of large collectors;
  - Rehabilitation of sewer network;
  - Rehabilitation of wastewater pumping stations;
  - Construction of new sewers;
  - Rehabilitation of existing WWTPs;

[1] 30% NRW will in actual fact be achieved in 2039, as investments carried out in 2038 will contribute to achieving this objective.

  - Construction of new WWTPs;
  - Sludge disposal.
- Other Investments:
  - Vehicles;
  - Heavy plant and machinery.
- Business systems:
  - Laboratories;
  - MIS.

Calculating the Investment Needs

In developing the capital expenditure models, we've used data provided from the WSS regional masterplan assignments. The masterplan assignments are contracts carried by international consultants for the Ministry of Regional Development. Three consortiums are engaged to prepare the Master Plans and short-term, medium-term and long-term investment programs for the separate districts, as the country is subdivided into three regions: Eastern, Central and Western. Unfortunately, only few full master plans (to include short, medium & long term investment programmes) were made available to the team. However, short term investment programmes (STIP) for all three regions were presented to us. In view of this, we've developed a methodology for calculating the investment needs for those regions that only have short term investment programmes. The section below describes in detail the methodology applied for calculating the capital expenditure needs, steps taken and assumptions applied.

Using the investment estimates from the WSS master plans

At the outset of the assignment, two Regional master plans were made available to us and a Master Plan (MP for agglomerations of over 10 000 p.e.): (a) RMP for Pernik, (b) RMP for Yambol and (c) MP for Botevgrad. For those districts that the draft plans have been developed (Pernik and Yambol), the investments included in these documents were taken into account. The information from Botevgrad investment plan has been added to the investment needs of the corresponding district – Sofia Oblast.

In studying the plans, we've noted that they are rather oriented towards the implementation of projects addressing, for instance, water quality issues, compliance with EU directives and replacing specific sections of the networks. Therefore the team has decided to built on the RMP investments in order to prepare a capital planning expenditure programme with the aim to meet the objectives of the Strategy.

The approach in calculating the additional investments is described below (in steps 2 to 4).

Using the investment estimates from the short-term investment programs

The MRD provided us with the short-term investment programmes, covering the period 2014-2020, for three regions: West, Central and East (with the exception of Sofia City). We asked for and were provided a short-term investment programme for Sofia City, covering the period 2014-2018.

The short term investment programmes (STIP) for the Western region were split by year over the 2014-2020 period and therefore, we've simply used the investments per year as presented in the STIP. Whereas, the investments for Central and Eastern regions, had a total amount for the period in the STIP. Therefore, we've developed an additional methodology for planning the STIP investments over the period. The following assumptions for splitting these investments over the period 2014-2020 have been made to achieve the investment profile:

- Investments that are linked to compliance with UWWTD, i.e. wastewater discharge and treatment investments;
- Investments that are not linked to compliance with UWWTD, i.e. water supply investments.

	2014	2015	2016	2017	2018	2019	2020
Wastewater investments	25%	40%	25%	5%	5%		
Water supply investments	5%	5%	10%	15%	25%	25%	15%

During this period, no additional investments (current investments of the WSSCs) for the period are assumed. The approach here is different from the approach in using the masterplans because it is assumed that the consultants who have prepared the short term investment programmes have best understanding of the needs of these districts in the short term.

The methodology for estimating the investment needs post the short term period (i.e. 2021-2038) and building upon the masterplans, involved making a number of assumptions, including:

- Nominal asset life for the various asset categories;
- Replacement/refurbishment rate per year;
- Average unit cost.

As a base for determining the average unit cost, we've used the unit prices developed by the masterplan consultants.

Water sources

This category includes surface and underground water sources. The average nominal asset life of water sources is assumed at 20 years. The type of facilities that are included in this category include the actual water abstraction facilities, the sanitary protection facilities and building parts. The replacement/refurbishment rate is assumed at 5% per annum. The assumed unit cost for replacement of water sources is as follows:

- Surface water sources – BGN 20,000 per replaced/refurbished unit.
- Underground water sources – BGN 50,000 per replaced/refurbished unit.

Therefore, the assumed average cost is BGN 35,000 per replaced/refurbished unit.

Water treatment plants

The nominal asset life of water treatment plants (WTP) is assumed to be 30 years. The assumptions for the refurbishment of existing water treatment plants are as follows:

- For WTPs with capacity ≤100 l/s, BGN 60,000 for every l/s capacity;
- For WTPs with capacity 100-1,000 l/s, BGN 30,000 for every l/s capacity;
- For WTPs with capacity 1,000-2,000 l/s, BGN 22,000 for every l/s capacity;

- For WTPs with capacity ≥2,000 l/s, BGN 9,200 for every l/s capacity.

Disinfection facilities

Nominal asset life for disinfection facilities is assumed to be 10 years. The replacement rate is assumed to be 10% per year. The cost for replacement of disinfection facilities with capacity of ≤30 l/s is assumed to be BGN 50,000.

Transmission pipes

In Bulgaria, large proportion of the pipes used (for transmission pipes around 65%) are asbestos cement pipes. The nominal asset life of these types of pipes is around 50 years. We’ve assumed a 2% replacement rate necessary per year. The average cost for replacement of a kilometre of transmission pipes is calculated to be BGN 499,750. This is calculated based on the below methodology, where it is assumed that 55% of the pipes are with a diameter of up-to 280 mm.

Diameter (mm)	% representation	BGN/m	BGN/km	Weighted average price/m	Weighted average price/km
225	20%	360	360,000	72	72,000
250	20%	395	395,000	79	79,000
280	15%	435	435,000	65	65,250
315	10%	480	480,000	48	48,000
355	10%	530	530,000	53	53,000
400	10%	585	585,000	59	58,500
450	5%	680	680,000	34	34,000
500	5%	800	800,000	40	40,000
560	2%	880	880,000	18	17,600
630	2%	1,020	1,020,000	20	20,400
710	1%	1,200	1,200,000	12	12,000
				500	**499,750**

Distribution pipes

Similarly to transmission pipes, asbestos cement pipes are most commonly used in the water distribution network in Bulgaria (around 70%). The asbestos cement pipes have a life expectancy of around 50 years. For the purpose of this assignment, a 2% replacement rate per year is assumed. It should be stressed that most of the pipe network in Bulgaria has been laid in the 60s and 70s. The last 20 years have not seen any significant pipe replacement programmes. Therefore, the majority of the distribution pipes have already reached their end of life time. The assumptions for calculating the average cost for replacing a kilometre of distribution network pipes are provided below:

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Diameter (mm)	**% representa-tion**	**BGN/m**	**BGN/km**	**Weighted av-erage price/m**	**Weighted average price/km**
90	35%	210	210,000	74	73,500
110	30%	230	230,000	69	69,000
125	15%	250	250,000	38	37,500
140	10%	280	280,000	28	28,000
160	5%	300	300,000	15	15,000
180	3%	315	315,000	9	9,450
200	2%	330	330,000	7	6,600
				239	**239,050**

In this case, it is assumed that 65% of the distribution pipes are with a diameter of up-to 110 mm.

Service reservoirs

The nominal life of service reservoirs is assumed to be 30 years. The refurbishment rate is assumed to be 3% per year. To calculate the average price for the refurbishment of service reservoirs, we've made the following assumptions:

Capacity (m^3)	**% representation**	**BGN/m^3**	**Weighted average m^3**
100	15%	2,500	15
150	20%	2,150	30
200	20%	2,000	40
350	20%	1,800	70
500	10%	1,550	50
1000	7%	1,320	70
2000	5%	1,250	100
3000	3%	1,150	90
	Average price / m^3	**1,715**	**58**
	Average price BGN	**99,684**	

It is assumed that the smaller sizes of service reservoirs are more commonly used. Therefore, the weighted average capacity of service reservoirs is taken into account when calculating the average cost.

Pumping stations – water supply

The average price for replacement of a pumping station is assumed to be BGN 64,530[2]. Pumping stations are assumed to have a nominal asset life of 20 years and therefore, the replacement rate per year is assumed to be 5%.

[2] The aggregate average price for 2011 from publicly available information on tenderes, co-funded with EU funds.

kW	% representation	BGN/kW	Weighted average BGN/kW
10	15%	2,600	3,900
25	20%	1,400	7,000
50	25%	850	10,625
100	15%	670	10,050
200	7%	470	6,580
300	5%	355	5,325
400	3%	300	3,600
500	3%	260	3,900
1000	4%	175	7,000
1500	2%	145	4,350
2000	1%	110	2,200
		Average	**64,530**

Revenue meters

Revenue meters, which are used throughout the water supply network to measure flow are expected to have a life of 10 years, therefore the replacement rate per year is assumed to be 10%. The average price of a meter is assumed to be BGN 300/unit.

Large collectors

For large collectors we have assumed nominal asset life of 50 years and a replacement rate of 2% per annum. The average price for replacement of a kilometre of large collectors is calculated as follows:

Diameter	% representation	BGN/m	BGN/km	Weighted average price/m	Weighted average price/km
1,000	40%	1,500	1,500,000	600	600,000
1,100	35%	1,700	1,700,000	595	595,000
1,200	10%	1,900	1,900,000	190	190,000
1,400	5%	2,300	2,300,000	115	115,000
1,600	4%	3,000	3,000,000	120	120,000
1,800	3%	3,500	3,500,000	105	105,000
2,000	2%	4,100	4,100,000	82	82,000
2,200	1%	4,500	4,500,000	45	45,000
2,400	0%	5,200	5,200,000	0	0
				1,852	**1,852,000**

Sewer pipes

As per large collectors, sewer pipes have been assumed to have asset life of 50 years and to be replaced at a rate of 2% per annum.

The average price for replacement of a kilometre of sewer pipe is calculated as follows:

Diameter	% representa-tion	BGN/m	BGN/km	Weighted average price/m	Weighted average price/km
315	35%	460	460,000	161	161,000
400	30%	590	590,000	177	177,000
500	15%	720	720,000	108	108,000
600	10%	950	950,000	95	95,000
700	5%	1,100	1,100,000	55	55,000
800	3%	1,200	1,200,000	36	36,000
900	2%	1,350	1,350,000	27	27,000
				659	**659,000**

Pumping stations – wastewater

The average price for replacement of a pumping station is assumed to be BGN 76,910[3]. Pumping stations are assumed to have a nominal asset life of 20 years and therefore, the replacement rate per year is assumed to be 5%.

kW	% representation	BGN/kW	Weighted average BGN/kW
10	15%	3,300	4,950
25	20%	1,650	8,250
50	25%	900	11,250
100	15%	800	12,000
200	7%	600	8,400
300	5%	400	6,000
400	3%	380	4,560
500	3%	300	4,500
1000	4%	210	8,400
1500	2%	180	5,400
2000	1%	160	3,200
		Average	**76,910**

Rehabilitation of wastewater treatment plants

The annual rehabilitation cost for wastewater treatment plants is assumed to be at 2% per annum of the initial investment cost. This only applies to the WWTP that are to be build in the period 2014-2020. Therefore, the rehabilitation investment cost is applied from 2020 onwards.

[3] Aggregate average price for 2011 from publicly available information on tenders, co-funded with EU funds

The table below summarises the assumptions made for estimating the capital expenditure investments necessary in the WSS Sector.

	Nominal Asset Life (years)	Refurbishment/ Replacement Rate per Year	Unit	Average BGN
Water sources	20	5%	#	35,000
Water treatment plants ≤100 l/s	30	2%	#	60,000
Water treatment plants 100-1,000 l/s	30	2%	#	30,000
Water treatment plants 1,000-2,000 l/s	30	2%	#	22,000
Water treatment plants ≥ 2,000	30	2%	#	9,200
Disinfection facilities	10	2%	#	50,000
Transmission pipes	50	2%	km	499,750
Pump stations	20	5%	#	64,530
Service reservoirs	30	3%	#	99,684
Distribution pipes	50	2%	km	239,050
Revenue meters	10	10%	#	300
Large collectors	50	2%	#	1,852,000
Sewer network	50	2%	#	659,000
Pump stations	20	5%	#	76,910
Rehabilitation of existing WWTPs	30	2%	#	
Vehicles	5	20%	#	30,000
Heavy plant and machinery	15	7%	#	100,000

Integrated Water Cycles projects

Integrated Water Cycles (IWC) are projects funded by the current Operational Programme Environment. The purpose of these projects is to fund investmets, related to the overall water cycle: supply, collectiona and treatment, in order to achieve compliance with the Directive, concerning urban waster water treatment (UWWTD).. Unfortunately, the available information for the IWC projects is limited (including the information received from the masterplan assignments) and we were unable to obtain reliable information in order to split these investments into water supply, wastewater collection and wastewater treatment.

Additional cost

Additional costs for project preparation and execution are also taken on board. However, additional costs are applied only to those investments that are not considered straight on replacements. For example, pump replacements, revenue metres replacements and/or vehicle and machinery replacements. The applied assumptions for the additional costs are as follows:

Additional costs assumptions	Rate (of total investments cost)
Feasibility study	1%
Design	4%
Supervision	5%
Project management	3%
Contingency	10%
Total additional cost	23%

Obtaining information on facilities/asset number of units

Information on the number of facilities/assets was obtained from the latest available business plans (2009-2013). Where more than one WSSC exist in a given district, their facilities have been consolidated to provide a total number for the district as a whole.

2. METHODOLOGY, DATA AND ASSUMPTIONS FOR SCENARIOS FOR FINANCING OF CAPITAL AND OPERATIONAL EXPENDITURE NEEDS[4]

Overall methodology

In order to develop models enabling the testing of options and scenarios for the financing of the expenditure needs assessments the following approach was used:

1. CAPEX and OPEX data gathering;
2. Data verification;
3. Additional data collection;
4. Construction of a 'master' Financial Model (in Excel) for the period 2014-2038 at district level.
5. Modification of the 'master' Financial Model to accommodate specific district issues and run all scenarios for each district.
6. Summary of all scenarios at national level.

Re 1: Data gathering: for the development of expenditure needs assessment model (CAPEX) see the approach and methodology in the previous chapter; OPEX – the main source of historical data for WSSCs' operational expenditures was the SEWRC (WSSCs Business plans, WSSCs annual reports to the regulator). 2010 and 2011 actual WSSCs OPEX data that was reported to the regulator was summarized at district level (to reflect the total OPEX of all WSSCs operating in a district) and was then used to construct the WSS Sector operational expenditures at the national level;

Re 2 Data verification: the OPEX data reported by the WSSCs to the regulator for 2010 and 2011 was verified against WSSCs financial statements, SEWRC decisions on Business plans and tariffs;

Re 3 Additional data collection – additional data needed for the construction of the 'master' Financial Model was collected from reliable public sources as NSI, MRD, MOEW, WSSCs, other recent WSS reports, etc.

Re 4 Construction of a 'master' Financial Model (in Excel) for 25 years as a basis to produce all scenarios needed for the period 2014-2038 at district level. The main pillars of the model are the historical OPEX data for previous periods (see assumptions below) for each WSSC (consolidated per district) and results from expenditure needs assessments (CAPEX, see assumptions above). The model was created following the steps below:

- Developing a dynamic model based on spreadsheets for facilitating the development and analysis of different scenarios and the impact of CAPEX and its financing on OPEX, water quantities, tariffs, affordability and sustainability of WSSCs;
- Filling out the model with actual data for 2010, 2011;

[4] This Appendix is based on the work of WYG 2013

- Summation of different WSSCs in a district and main inputs (for example averaging the tariffs per district);
- Forecasting based on the specific district assumption (for example EU funds distribution is based on the population living in the district);
- Assessing the impact of the expenditure needs on the tariffs considering affordability level for the district;
- Estimation of possible savings from operations due to CAPEX realization (for example electricity costs);
- Illustration of main results: contribution of different funding sources, impacts on tariffs, impacts on OPEX, achieved results and expenditures covered by different scenarios.
- The model contains: assumptions (unified across all districts); CAPEX, OPEX, Quantities, Tariffs, EU Grant Calculation, Government Grant Calculation, Loan Calculation, Cashflow, Scenarios and Results (specific for each district).

Assumptions

General assumptions taken from the model**:**

Assumptions affecting the revenues:

Revenue	Unit	Comments
Change in Population connected to water (WS)	%	Assumed annual increase
Change in Water consumption	l/c/d	Assumed annual increase
Change in Water sold to non-household customers	mil m³	No change assumed
Change in Water sold to other VIK	mil m³	No change assumed
Population connected to wastewater collection as % of water supplied pop.	%	as % of pop connected to WS
Wastewater collected from non-household users as % of water sold to non-household users	%	as % of water sold to non-household users
Population connected to Wastewater treatment as % of water supplied pop.	%	as % of pop connected to WS
Wastewater treated for non-households as % of water sold to non-households	%	as % of water sold to non-households
Change in volume of Wastewater treated for industry	mil m³	Assumed annual increase
Change in average water supply tariff for households	BGN/m³	Assumed annual increase
Change in average water supply tariff for non-household customers	BGN/m³	Assumed annual increase
Change in average water supply tariff for other ViK	BGN/m³	Assumed annual increase
Change in average sewerage tariff for households	BGN/m³	Assumed annual increase
Change in average sewerage tariff for non-households, 1st category	BGN/m³	Assumed annual increase
Change in average sewerage tariff for non-households, 2nd category	BGN/m³	Assumed annual increase
Change in average sewerage tariff for non-households, 3rd category	BGN/m³	Assumed annual increase
Change in average Wastewater treatement tariff for population	BGN/m³	Assumed annual increase
Change in average Wastewater treatement tariff for non-households, 1st category	BGN/m³	Assumed annual increase
Change in average Wastewater treatement tariff for non-households, 2nd category	BGN/m³	Assumed annual increase
Change in average Wastewater treatement tariff for non-households, 3rd category	BGN/m³	Assumed annual increase
Change in persons per household	%	No change assumed
Change in average income per person for the region	%	Assumed annual increase equal to annual increase in real GDP

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Assumptions affecting operational expenditures:

Operational Expenses	Unit	Comments
change in electricity price	BGN/kWh	no change assumed
change in electricity consumption (WS) without CAPEX	kWh/m3	no change assumed
change in electricity consumption (WS) due to CAPEX realization	kWh/m3	assumed annual decrease
change in water abstraction fee	BGN/m3	no change assumed
change in water discharge fee	BGN/m3	no change assumed
change in chemicals price	BGN/m3	no change assumed
change in electricity consumption (WWC) without CAPEX	kWh/m3	assumed annual increase
change in electricity consumption (WWC) due to CAPEX realization	kWh/m3	
change in electricity consumption (WWT) without CAPEX	kWh/m3	assumed annual increase
change in electricity consumption (WWT) due to CAPEX realization	kWh/m3	
existing maintenance	BGN mil	equal to existing
new maintenance	%	of investment made in previous years
Change in Personnel costs	BGN mil	No change assumed
Depreciation	BGN mil	of investments made in previous years
Other expenses	BGN mil	as % of Total Operational less Other Expe
Bad debts	BGN mil	as % of Revenue

Other assumptions:

Water quantity	Unit	Comments
Change in water bought from other ViK (mil m3)	mil m³	No change assumed
Non-revenue water-real (%)	%	UFW (%)
Population in the district living in agglomerations with more than 2,000 p.e.	**thousand #**	**Comments**
Total population in the district living in agglomerations, 2,000 p.e. - 10,000 p.e	890.364	from MoEW report for compliance with Directive 91/271 concerning urban wastewater treatment
Total population in the district living in agglomerations, above 10,000 p.e	4625.884	same as above
Total population in the district living in agglomerations above 2,000 p.e.	5516.248	same as above
Other assumptions	**Unit**	**Comments**
Discount rate	5%	as per EU guidelines for CBA for investment projects, 2008
Granted amount of an investment project	95%	as avearge for 2007-2013 programming period
EU grant amount from Cohesion Fund 2014-2020, mil BGN	1,956	similar to the CF amount available for integrated water projects in 2007-2013 programming period
EU grant amount from EAFRD 2014-2020, mil BGN	489	similar to the EAFRD amount available for integrated water projects in 2007-2013 programming period
EU grant amount from CF and EAFRD, 2014-2020	80%	as for CF in 2007-2013 programming period
State budget amount co-financing EU grant, 2014-2020	20%	as for 2007-2013 programming period
total population in Bulgaria in 2011, thousand #	7327.184	as per National Statistics Institute
maximum EU grant amount applicable for the disctrict, % of total EU grant amount	100.00%	on the basis of the population

CAPEX assumptions – see above expenditure needs assessment. The figures in the model are 2011 real prices;

OPEX assumptions – made on the basis of historical data for 2010 and 2011 provided by the SEWRC and forward looking O&M costs and expected savings associated with the implementation of the investments depending on the profile of the realized investments (see the explanations in scenarios). The figures in the model are 2011 real prices.

Details of OPEX assumptions:

a. Direct O&M costs for water supply. The most significant direct O&M costs are those associated with electricity, chemicals, water abstraction and maintenance.

- Electricity costs depends on electricity consumption, electricity price and abstracted and supplied water quantities. Electricity consumption is assumed to decrease proportionally to investments realized in water (for example in pumps) reaching 10%[5] overall decrease in electricity consumption. Electricity price is in 2011 constant terms. Changes in abstracted and supplied water quantities which influence overall electricity costs are described below.
- Chemical costs depend on chemicals price and abstracted water quantities. While chemicals price is in 2011 constant terms, changes in quantities of abstracted water influence overall chemical costs.
- Costs for water consumption depend on fee per m3 and abstracted water quantities. Water consumption fee is a cost item for price formation and as such its increase will result in raising the water tariff to offset the increased cost, while changes in quantity of abstracted water influence the total costs for water consumption.
- Maintenance costs depend on the existing maintenance costs and additional maintenance costs (1% of all new investments in water supply infrastructure, realized in the previous year).

There is an acceptable trade-off between decrease in overall water supply direct costs due to realized savings and increase in water supply direct costs due to increased maintenance costs to reflect proper maintenance practices.

b. Direct O&M costs for sewerage. Those are mainly electricity and maintenance, as follows:

- The existing electricity consumption is assumed to decrease proportionally to the investments realized in wastewater pumps but at the same time there will be new consumption due to the extended network. Electricity price is in 2011 constant terms. The change in collected wastewater quantities is described below.
- Maintenance costs depends on current maintenance costs and additional maintenance costs (1% of all new investments in sewerage infrastructure realized in the previous year).

Similarly to the above there is an acceptable trade-off between decrease in overall sewerage direct costs due to realized savings and increase in direct costs due to maintenance costs reflecting proper maintenance practices and increased network.

c. Direct O&M costs for the facilities for wastewater treatment. Those are mainly for electricity, chemicals, wastewater discharge fee and maintenance.

- Rehabilitation of the existing WWTPs and possible electricity savings are offset by the low degree of coverage with treatment services and new WWTP put in operation. There are no savings realized here, but only additional costs. Electricity price is in 2011 constant terms. The change in wastewater treated quantities is described below.
- Chemical costs depend on chemicals price and wastewater treated quantities. Chemicals price is in 2011 constant terms.

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[5] This figure is based on discussions with managers of WSSC, where water pumps were already replaced and efficiencies monitored.

- Costs for wastewater discharge fee depend on fee per m3 and treated wastewater quantities. Discharge fee per m3 is in 2011 constant terms.
- Maintenance costs depends on existing maintenance costs and additional maintenance costs (1% of all new investments in WWTP, realized in the year following the investments).

d. Indirect O&M costs. Those are personnel costs, depreciation, provisions and other costs.

- Personnel costs are in 2011 constant terms, assuming two trends: salary increase and personnel decrease reaching European good practices for the sector (except for Business as usual scenario).[6]
- Bad debts are assumed 5% of revenues[7].
- Other expenses are assumed as % of the total expenses less other expenses and depreciation (2011 base). All OPEX that are not explicitly mentioned above are part of other expenses.

Water Quantities:

e. Abstracted water – depends on water sold and NRW.

f. Water sold – depends on water consumption rate and population served (see general assumptions).

g. Non-revenue water (NRW) – depends on real and commercial losses. It is assumed that 10% of initial (2011) NRW is due to commercial losses. Commercial losses decrease with the increase of the per capita consumption and the overall improvement of sales but do not drop below 5% of the current total NRW. Physical losses decrease as a result of the realized investments in water transmission and distribution networks. The base year is 2011. The expected result at the end of the period after realization of all planned corresponding CAPEX is 30%, effective in 2039.

h. Wastewater collected – depends on the % connected users, which depends on the realized investments in sewerage. The base year is 2011. The expected results in the end of the period, in case all CAPEX investments are made, is 100% coverage ratio for households living in agglomerations above 2,000 p.e. within the district.

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[6] The general assumption is that salaries will only increase if there is an increase in real GDP (assumed at 3.2% annually on average for the period 2011-2038). Thus, the assumption made means that the personnel will decrease by 3.2% on average on annual basis until it reaches European good practices for the sector of staff per 1000 connections due to improved WSSCs efficiency. At the same time, personnel will increase due to new assets acquired (for instance WWTPs), but the increase is considered to be marginal to the reductions following the consolidation of the WSSCs.

[7] There is lack of sufficient and reliable data for the existing bad debts within the sector. We used data from the audited WSSCs financial reports were available. Most of the data show bad debts of around 5% of revenues. This does not mean that the average collection ratio is 95%. For calculation of collection rate WSSCs use different calculations methodologies: total billed amounts in a period to the total collected amounts from the billed amounts; total billed amounts in a period to total collected amounts in a period etc. Bad debt (as expenditure) refers to revenues that will never be collected – the assumption is for 5% for bad debts for all WSSC for the period 2014-2038.

i. Wastewater treated – depends on the % connected users, which depends on the investments in WWTPs and investments in sewerage. The base year is 2011. The expected results in the end of the period, in case all CAPEX investments are made, is 100% coverage ratio for households users living in agglomerations above 2,000 p.e.

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Tariffs:

j. Affordable tariff level is calculated following the applicable regulatory methodology: on the basis of income per person per district, number of persons per household for the same district, and on the basis of 2800 l/c/month water consumption. The affordable level for 10 and 10-30 decile of the population is estimated on the basis of information provided by NSI.

k. Tariff assumptions for the different scenario vary, depending on the expenditures made. The highest annual increase is 25 % and is inapplicable for more than 3 consecutive years. Some WSSCs have different tariffs for water supply, while in some districts, many WSSCs exist (for example in Pazardzik district there are 9), all of which have different tariffs, and that requires aggregation of the tariffs in the district. The aggregated tariffs are calculated as total revenue for the district divided by the total water quantities by types of users and types of services, using the information of SEWRC for 2010 and 2011. As a result, the aggregated price for each specific district is received, in which more than one tariff is applied at the moment. Reduction of prices isapplied where the final cash amount in 2038 is too high compared to that for 2010 and 2011, and the ratio of debt service is above 1.3.

l. All revenues, CAPEX and OPEX costs, etc. in the model are without VAT. VAT is only used when calculating the final tariffs to consumers to properly calculate the affordability level (by applying the regulatory requirements). It is consistent with having VAT on revenues and transferring the VAT to the state, having VAT on CAPEX and OPEX and recovering the VAT from the state. The calculations in the model are VAT neutral.

m. EU grant contribution consists of EU grants already committed for 2014-2015 and new EU grants for the next programming period (2014-2020). Existing EU grants are applied to already committed integrated water cycles and WWT projects for the respective district, while the new EU grants are applied based on the following general assumptions:

- EU funding from cohesion and rural development funds was estimated based on the existing rules and levels of cohesion and rural development funding, requirements as per draft EU regulations for 2014-2020 and EU guideline for CBA, 2008. The funding was distributed among districts based on the population living in the district (per capita approach);
- 100% absorption of the EU grants is assumed.

n. Loans are applied only in the calculation of scenario 4 in order to smooth-out tariff increase and reduce government grant amount; two options for loans/credits were used – from IFIs and commercial banks. Where applicable, the first option was applied - IFI loans, under the assumption that commercial banks feel more comfortable to provide loans to companies in which IFIs have already demonstrated interest. If IFI loan was not sufficient, then a commercial loan to fill in the remaining funding gap (if any) was applied.

Assumptions	IFI loan	Commercial bank loan
Start year	2014	2017
Total amount, BGN million	473.5	166.4
Interest (everything included) in %	5%	7%
Term in years	25*	15**
Grace period in years	3	3

*rollover (automatic renewal) of the debt in the 15th year

**rollover of the debt in the 10th year

For all the loans no more than three consecutive years of disbursement are considered. A maximum applicable loan per district is equal to 4 times EBITDA as per the corresponding year. Applied DSCR is minimum 1.3. If a WSSC's cash flow does not provide for the minimum DSCR or its tariff is already at the socially affordable level, it is considered not capable of borrowing. Only WSSCs (aggregated at district level) that meet simultaneously both requirements are eligible to borrow for the purposes of this analysis.

o. Government grants for the necessary investments in the WSS sector are applicable only after exhausting all other possible sources of financing and in case there is still a funding gap.

p. Subsidies: Not applicable for water sector in Bulgaria[8].

Data issues

1. Revenues – lack of reliable input data per WSSC for different categories of revenues (per users and in many cases per type of services). We used as a basis the information available in the audited financial 2010 and 2011 reports of the WSSCs published in the Commercial Register.
2. Water quantities – lack of reliable input data per WSSC for water quantities by category of user. The team calculated quantities based on the estimated revenues by type of service and type of users using the corresponding aggregated water tariff for each district.
3. Aggregated tariffs – calculated on the basis of the information provided in the corresponding price decisions of the SEWRC. For the WSSC with more than one tariff for water supply, aggregated tariffs for 2010 and 2011 are calculated on a weighted average basis (revenues divided by water quantities as provided into the respective SEWRC's price decision for the respective years, adjusted for the months for which the corresponding price was applied). The same approach was applied for sewerage and wastewater tariffs per category of users. Aggregated water tariffs per district are further used for the needs of the modelling.
4. The modelling is developed on district level, to correspond to the scope of the investments forecast. For the districts – "oblasts" with more than one operating WSSC, aggregation of the raw data is done. Summation of WSSCs in a district impacts water quantities, revenues and costs.

1. For several WSSC, which have significant investments in WWTP in 2011-2013, corresponding adjustments for 2012 and 2013 for costs, revenues and water quantities were made as follows:

   a) The WSSC in Dimitrovgrad, Ruse, Stara Zagora, Turgovishte, Haskovo: have introduced WWTPs in 2011 and in 2012, therefore there are no history reports on full year operations for 2011. Data for quantities and tariffs, hence revenues from the State Regulator Decisions on WWTP tariffs are being used. Additional quantities have been added for 2012, respectively 2013, depending on months in operation in 2011, respectively 2012.

[8] Only transport sector is applicable for subsidies in Bulgaria.

b) Regarding Vidin, Kurdjali, Silistra, Yambol: These WSSC have not built WWTP operations up to date of this report. Forecasts for the WWTP quantities are being made on the basis of the forecast for the % connected population. Forecasts for the tariffs/revenues/OPEX are being made on a weighted average basis from the latest WWTPs introduced in the country. Quantities, therefore revenues and OPEX are forecasted 2 years after the respective investment on pro rata basis regarding investments done.

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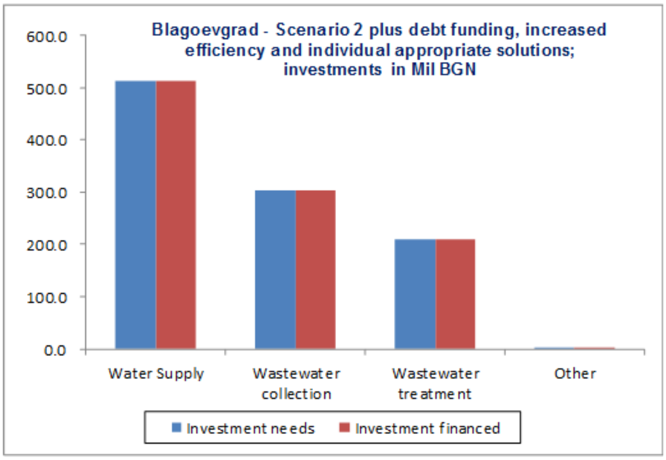
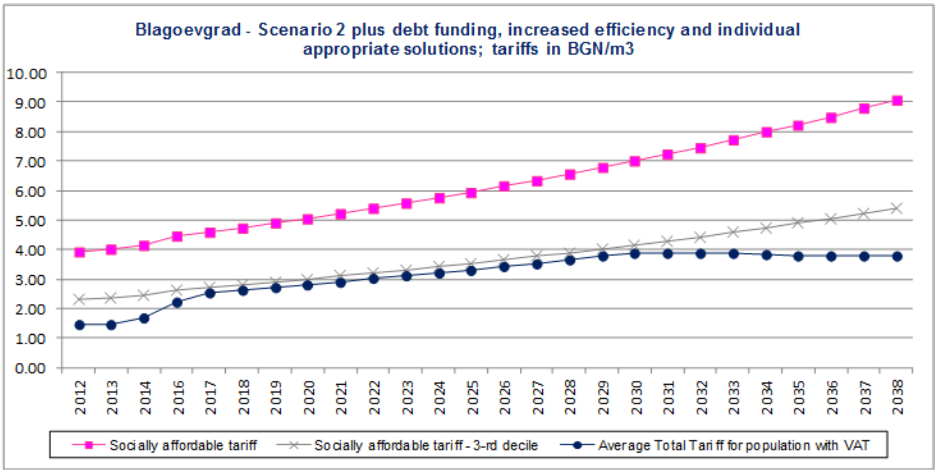
1. Blagoevgrad District

Blagoevgrad - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**513.3**	**513.3**
Abstraction	8.6	8.6
Water treatment	79.6	79.6
Transmission	265.6	265.6
Distribution	159.5	159.5
Wastewater	**512.3**	**512.3**
Wastewater collection	302.5	302.5
Wastewater treatment	209.8	209.8
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**1 027.3**	**1 027.3**





Blagoevgrad - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	489.6	489.6	17.1	199.2	116.8	-	123.5	50.1	-	-
2024-2028	179.2	179.2	9.9	-	-	-	179.2	-	-	-
2029-2038	358.4	358.4	11.4	-	-	-	358.4	-	-	-
TOTAL, MBGN	**1 027.3**	**1 027.3**	**38.4**	**199.2**	**116.8**	**-**	**661.1**	**50.1**	**-**	**-**

Key indicators

Key indicator, Unit	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW, %	49.7%	43.2%	39.8%	31.1%	30.0%	
population connected to WWC, % of water supplied population	72.1%	72.6%	72.6%	72.6%	72.6%	
population connected to WWT, % of water supplied population	4.6%	72.6%	72.6%	72.6%	72.6%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	-
compliance with UWWTD, % of target	6.4%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs, MBGN since 2013	NA	0.28	0.35	0.59	NA	-
wastewater collection (savings) / additional costs, MBGN since 2013	NA	0.01	0.01	0.00	NA	
wastewater treatment (savings) / additional costs, MBGN since 2013	NA	6.17	6.13	6.00	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs, MBGN since 2013	NA	(3.9)	(4.3)	(5.2)	NA	4%
(savings) from other costs, MBGN since 2013	NA	(1.8)	(1.8)	(1.9)	NA	

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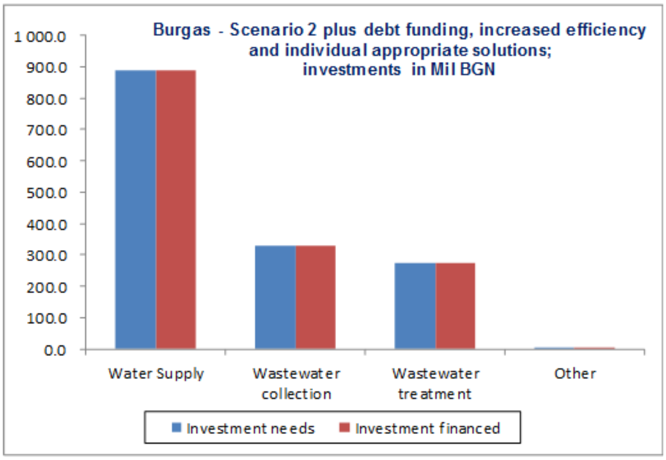
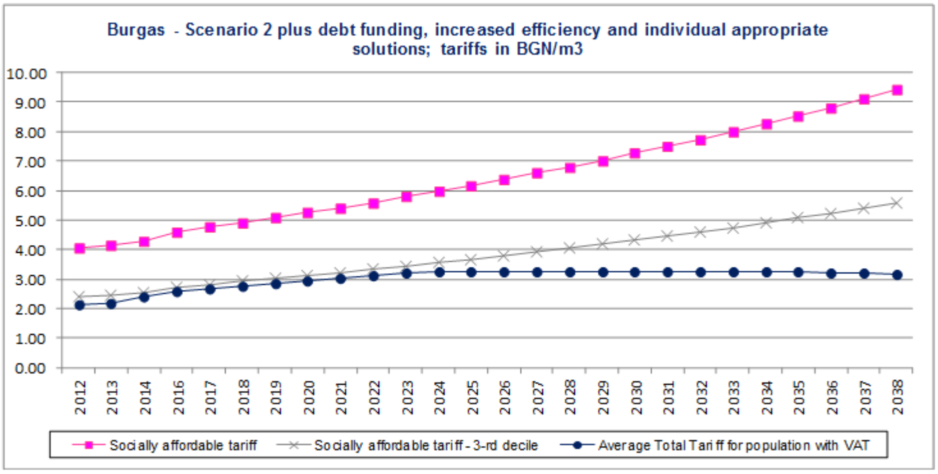
2. Burgas District

Burgas - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**886.3**	**886.3**
Abstraction	15.5	15.5
Water treatment	80.8	80.8
Transmission	485.0	485.0
Distribution	305.0	305.0
Wastewater	**604.8**	**604.8**
Wastewater collection	330.1	330.1
Wastewater treatment	274.7	274.7
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**1 492.8**	**1 492.8**





Burgas - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	701.4	701.4	-	227.2	142.6	-	331.6	-	-	-
2024-2028	263.8	263.8	-	-	-	-	263.8	-	-	-
2029-2038	527.6	527.6	-	-	-	-	527.6	-	-	-
TOTAL, MBGN	**1 492.8**	**1 492.8**	-	**227.2**	**142.6**	-	**1 123.0**	-	-	-

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	54.3%	45.4%	41.4%	31.5%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	68.8%	78.1%	78.1%	78.1%	78.1%	
population connected to WWT; % of water supplied population	51.2%	78.1%	78.1%	78.1%	78.1%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	-
compliance with UWWTD; % of target	65.6%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	0.62	0.41	0.06	NA	-
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.32	0.31	0.26	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	3.49	3.51	3.56	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(7.1)	(7.9)	(9.5)	NA	36%
(savings) from other costs; MBGN since 2013	NA	(5.9)	(6.1)	(6.4)	NA	

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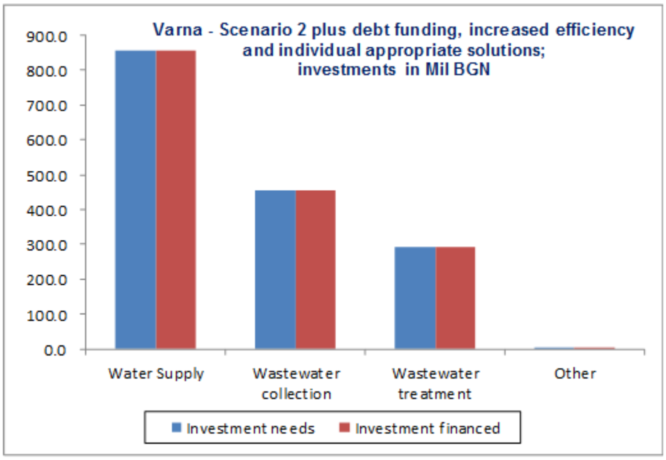
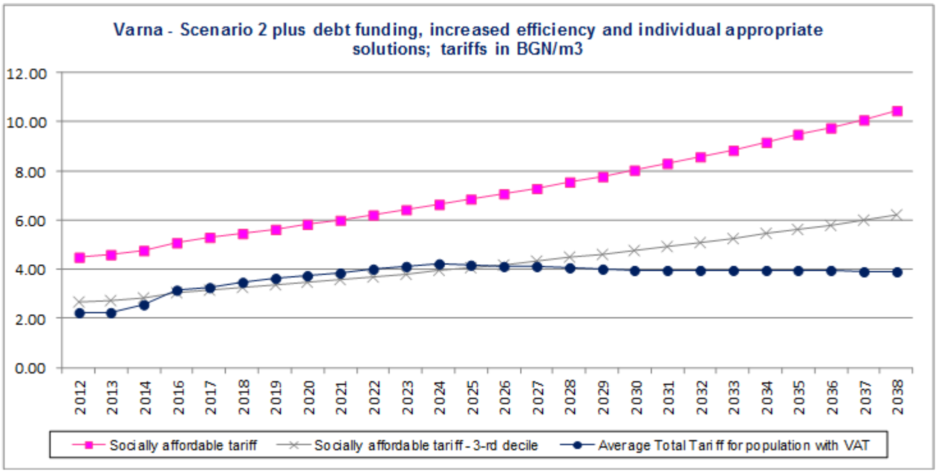
3. Varna District

Varna - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	854.6	854.6
Abstraction	16.0	16.0
Water treatment	0.0	0.0
Transmission	421.5	421.5
Distribution	417.1	417.1
Wastewater	746.2	746.2
Wastewater collection	453.3	453.3
Wastewater treatment	292.8	292.8
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	1 602.5	1 602.5





Varna - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	830.5	830.5	18.7	155.9	114.1	-	396.3	164.2	-	2.7
2024-2028	257.3	257.3	37.6	-	-	-	257.3	-	-	0.6
2029-2038	514.6	514.6	52.9	-	-	-	514.6	-	-	-
TOTAL, MBGN	**1 602.5**	**1 602.5**	**109.2**	**155.9**	**114.1**	**-**	**1 168.2**	**164.2**	**-**	**3.3**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	66.8%	51.3%	45.2%	31.5%	30.0%	
population connected to WWC; % of water supplied population	74.5%	83.5%	83.5%	83.5%	83.5%	
population connected to WWT; % of water supplied population	66.8%	83.5%	83.5%	83.5%	83.5%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2016**
compliance with UWWTD; % of target	80.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(1.20)	(1.41)	(2.07)	NA	**2025**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.10	0.13	0.11	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	2.78	2.96	3.21	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(8.7)	(9.6)	(11.5)	NA	42%
(savings) from other costs; MBGN since 2013	NA	(4.0)	(4.1)	(4.5)	NA	

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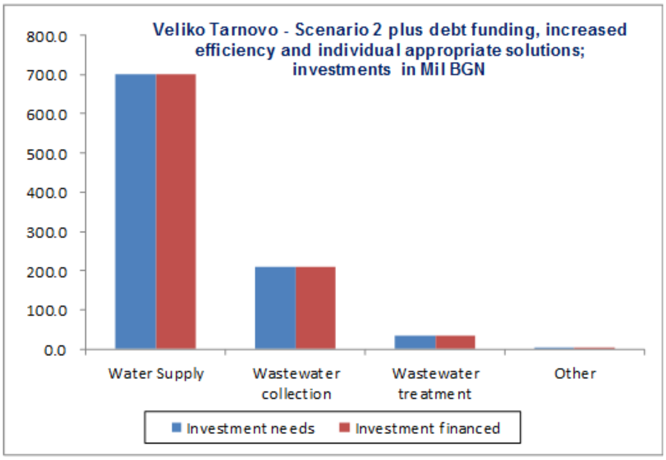
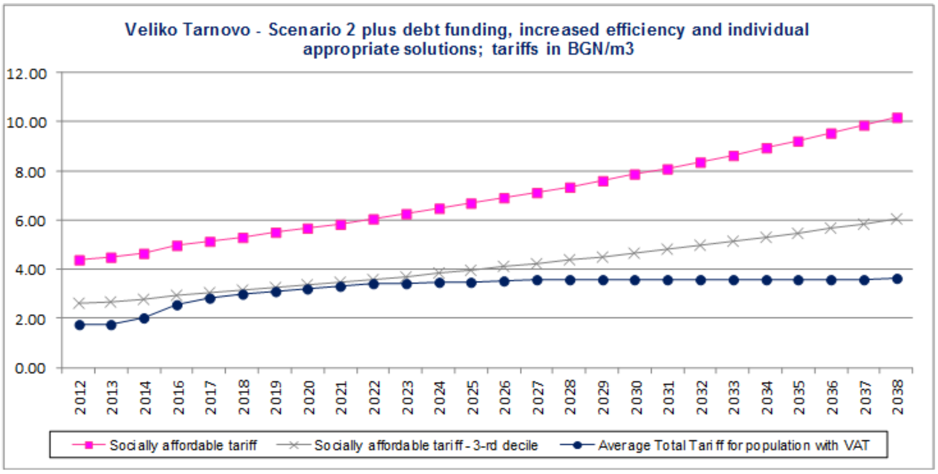
4. Veliko Tarnovo District

Veliko Tarnovo - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	701.2	701.2
Abstraction	15.0	15.0
Water treatment	13.5	13.5
Transmission	341.5	341.5
Distribution	331.2	331.2
Wastewater	243.5	243.5
Wastewater collection	209.7	209.7
Wastewater treatment	33.8	33.8
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	946.3	946.3





Veliko Tarnovo - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	391.4	391.4	-	82.6	63.3	-	245.5	-	-	-
2024-2028	185.0	185.0	-	-	-	-	185.0	-	-	-
2029-2038	369.9	369.9	-	-	-	-	369.9	-	-	-
TOTAL, MBGN	946.3	946.3	-	82.6	63.3	-	800.4	-	-	-

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	65.4%	51.2%	44.8%	31.3%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	61.6%	68.1%	68.1%	68.1%	68.1%	
population connected to WWT; % of water supplied population	31.9%	68.1%	68.1%	68.1%	68.1%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	-
compliance with UWWTD; % of target	46.9%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.01)	0.02	0.16	NA	-
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.57	0.59	0.59	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.2)	(2.4)	(2.9)	NA	38%
(savings) from other costs; MBGN since 2013	NA	(0.6)	(0.7)	(0.7)	NA	

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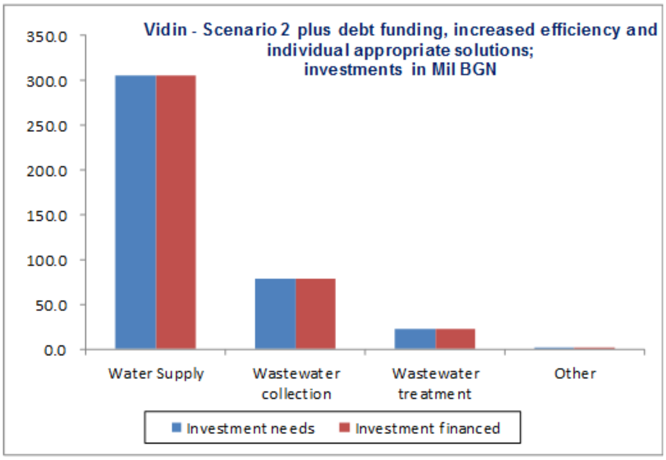
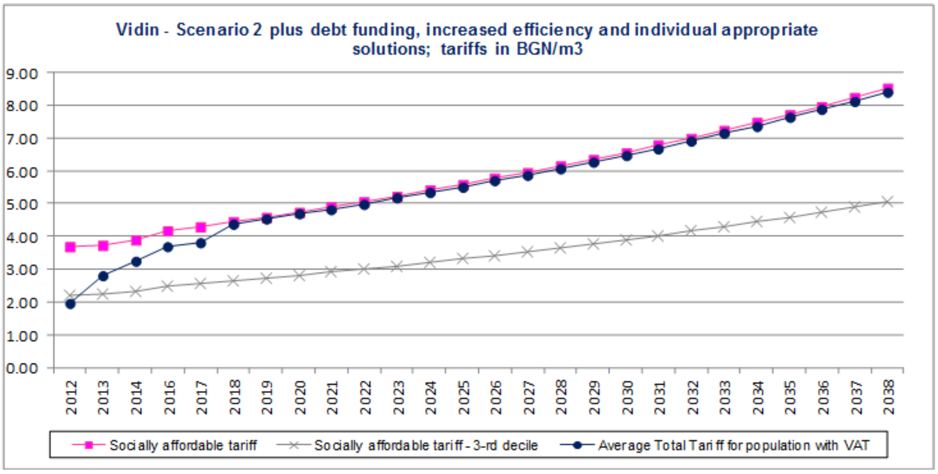
5. Vidin District

Vidin - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	304.9	304.9
Abstraction	4.2	4.2
Water treatment	5.2	5.2
Transmission	163.7	163.7
Distribution	131.8	131.8
Wastewater	100.5	100.5
Wastewater collection	78.7	78.7
Wastewater treatment	21.8	21.8
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	407.1	407.1





Vidin - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	168.2	168.2	-	33.1	23.6	46.3	65.3	-	-	3.4
2024-2028	79.6	79.6	0.1	-	-	20.3	55.7	3.7	-	2.6
2029-2038	159.3	159.3	12.3	-	-	-	132.2	27.1	-	6.4
TOTAL, MBGN	407.1	407.1	12.4	33.1	23.6	66.6	253.1	30.8	-	12.5

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	50.6%	43.6%	39.0%	30.4%	30.0%	
population connected to WWC; % of water supplied population	42.3%	63.2%	63.2%	63.2%	63.2%	
population connected to WWT; % of water supplied population	0.0%	63.2%	63.2%	63.2%	63.2%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	2014
compliance with UWWTD; % of target	0.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.00)	(0.02)	(0.09)	NA	2038
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.04	0.04	0.02	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.66	0.67	0.64	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.2)	(1.4)	(1.7)	NA	31%
(savings) from other costs; MBGN since 2013	NA	(0.3)	(0.4)	(0.4)	NA	

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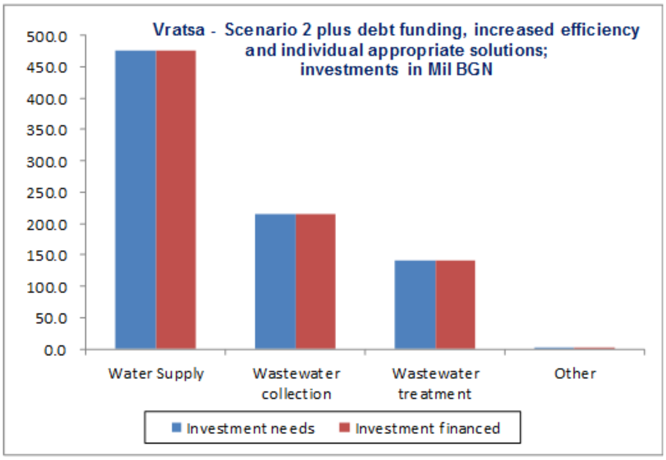
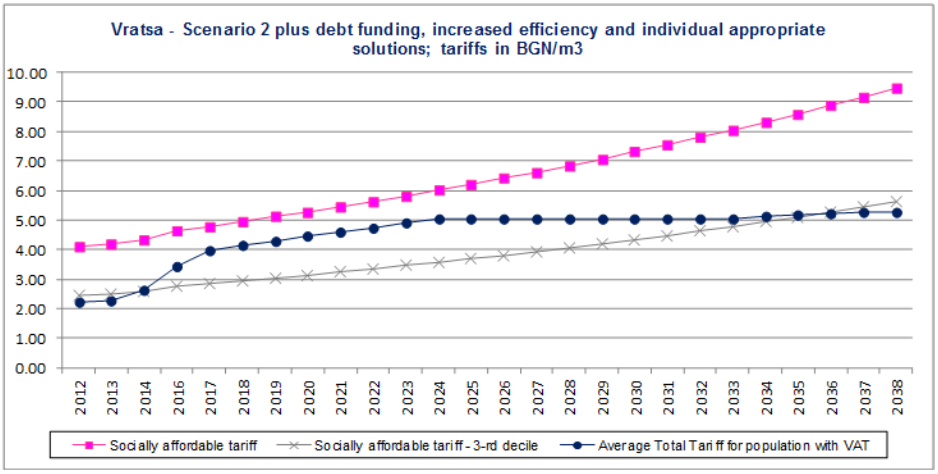
6. Vratsa District

Vratsa - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**475.2**	**475.2**
Abstraction	7.1	7.1
Water treatment	3.3	3.3
Transmission	247.0	247.0
Distribution	217.8	217.8
Wastewater	**357.4**	**357.4**
Wastewater collection	215.3	215.3
Wastewater treatment	142.2	142.2
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**834.3**	**834.3**





Vratsa - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	389.8	389.8	21.5	140.8	78.3	-	107.1	63.7	-	4.6
2024-2028	148.2	148.2	12.5	-	-	-	148.2	-	-	3.0
2029-2038	296.3	296.3	14.5	-	-	-	296.3	-	-	1.5
TOTAL, MBGN	**834.3**	**834.3**	**48.5**	**140.8**	**78.3**	**-**	**551.6**	**63.7**	**-**	**9.1**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	64.1%	56.1%	48.6%	31.4%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	51.2%	68.3%	68.3%	68.3%	68.3%	
population connected to WWT; % of water supplied population	29.5%	68.3%	68.3%	68.3%	68.3%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2014**
compliance with UWWTD; % of target	43.3%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.41)	(0.75)	(1.35)	NA	**2035**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.02	0.02	0.02	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.64	1.66	1.69	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.2)	(2.4)	(2.9)	NA	36%
(savings) from other costs; MBGN since 2013	NA	(1.2)	(1.3)	(1.5)	NA	

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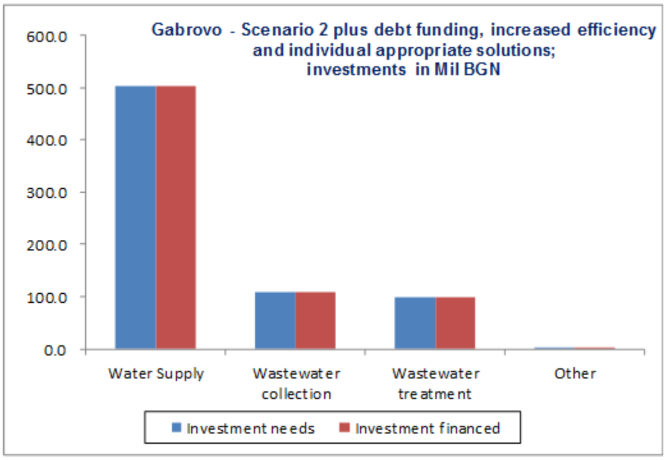
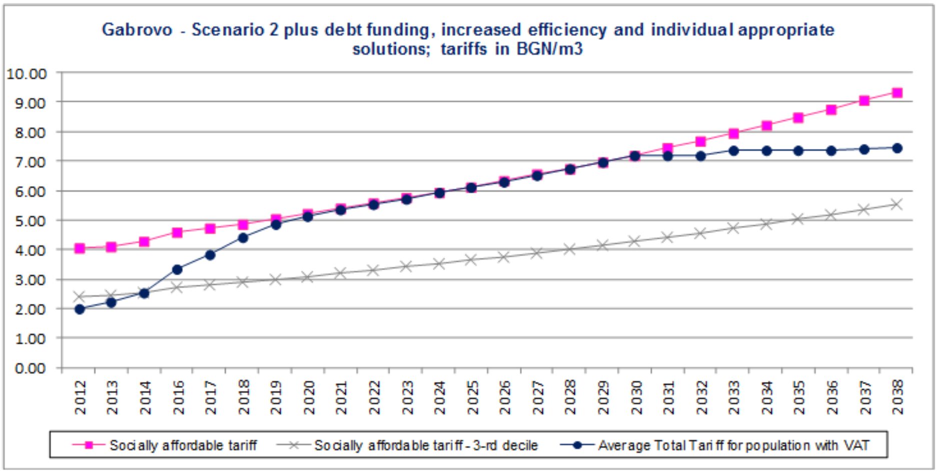
7. Gabrovo District

Gabrovo - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**501.6**	**501.6**
Abstraction	**10.5**	**10.5**
Water treatment	**1.2**	**1.2**
Transmission	**334.8**	**334.8**
Distribution	**155.2**	**155.2**
Wastewater	**208.4**	**208.4**
Wastewater collection	**109.1**	**109.1**
Wastewater treatment	**99.3**	**99.3**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**711.7**	**711.7**





Gabrovo - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	410.6	410.6	13.0	83.8	47.1	36.0	142.4	101.3	-	4.6
2024-2028	100.4	100.4	25.1	-	-	5.1	84.3	11.0	-	4.4
2029-2038	200.7	200.7	37.4	-	-	-	200.7	-	-	8.1
TOTAL, MBGN	**711.7**	**711.7**	**75.5**	**83.8**	**47.1**	**41.1**	**427.5**	**112.3**	**-**	**17.1**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	61.9%	44.9%	40.0%	30.9%	30.0%	
population connected to WWC; % of water supplied population	72.9%	81.1%	81.1%	81.1%	81.1%	
population connected to WWT; % of water supplied population	52.3%	81.1%	81.1%	81.1%	81.1%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2014**
compliance with UWWTD; % of target	64.5%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.17)	(0.17)	(0.20)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	(0.00)	(0.00)	(0.00)	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.09	1.10	1.09	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.2)	(2.4)	(2.9)	NA	32%
(savings) from other costs; MBGN since 2013	NA	(0.3)	(0.4)	(0.4)	NA	

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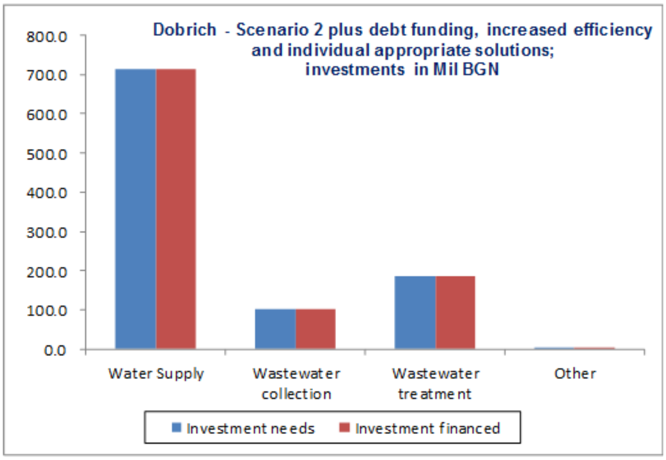
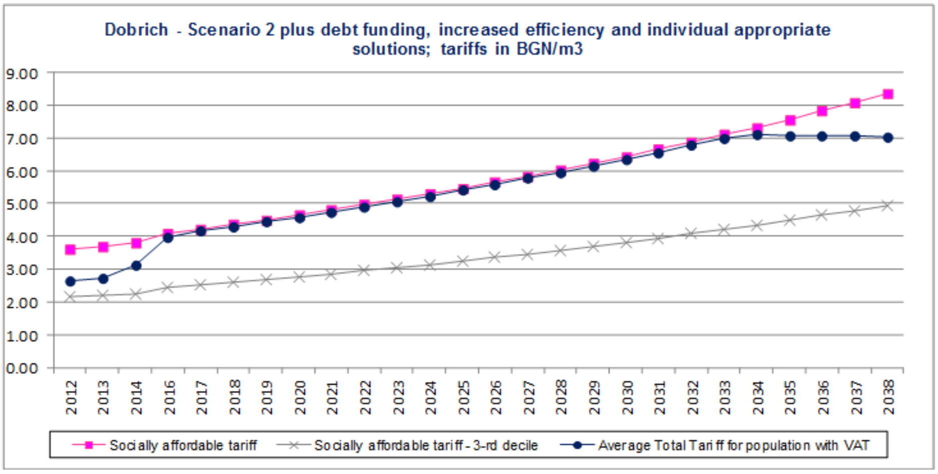
8. Dobrich District

Dobrich - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	714.6	714.6
Abstraction	8.2	8.2
Water treatment	0.0	0.0
Transmission	503.7	503.7
Distribution	202.8	202.8
Wastewater	285.2	285.2
Wastewater collection	100.0	100.0
Wastewater treatment	185.2	185.2
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	1 001.5	1 001.5





Dobrich - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	453.3	453.3	-	151.6	83.2	76.7	141.7	-	-	7.5
2024-2028	182.7	182.7	6.7	-	-	12.9	102.1	67.8	-	5.5
2029-2038	365.5	365.5	28.3	-	-	-	365.5	-	-	13.1
TOTAL, MBGN	1 001.5	1 001.5	35.0	151.6	83.2	89.6	609.3	67.8	-	26.1

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	79.8%	64.2%	55.3%	32.1%	30.0%	
population connected to WWC; % of water supplied population	54.3%	71.6%	71.6%	71.6%	71.6%	
population connected to WWT; % of water supplied population	54.0%	71.6%	71.6%	71.6%	71.6%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	2014
compliance with UWWTD; % of target	75.5%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(2.89)	(3.64)	(4.68)	NA	2038
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.02	0.01	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.93	1.96	2.03	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.1)	(2.3)	(2.8)	NA	44%
(savings) from other costs; MBGN since 2013	NA	(1.1)	(1.3)	(1.5)	NA	

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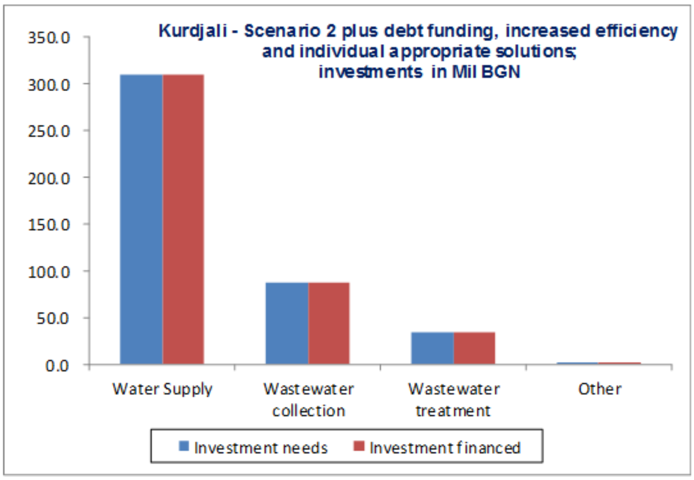
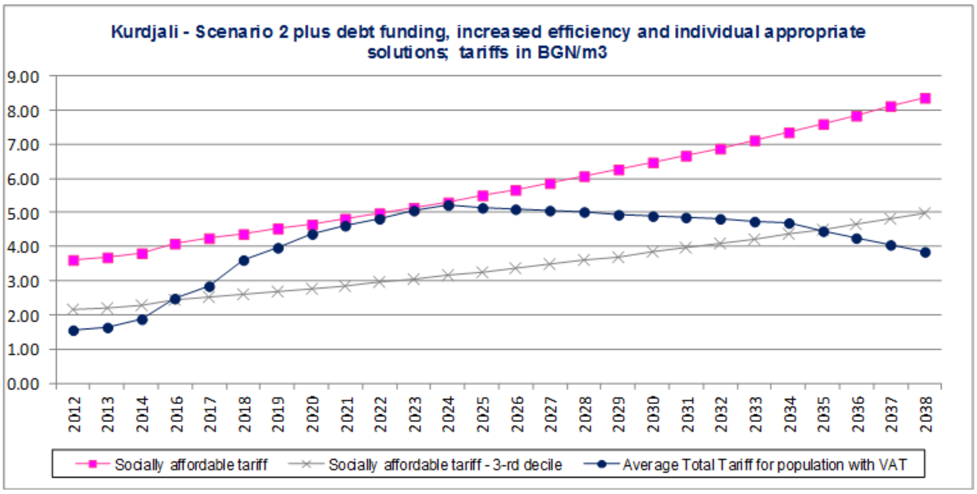
9. Kardzhali District

Kurdjali - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	308.9	308.9
Abstraction	4.1	4.1
Water treatment	0.6	0.6
Transmission	245.9	245.9
Distribution	58.3	58.3
Wastewater	120.9	120.9
Wastewater collection	87.2	87.2
Wastewater treatment	33.7	33.7
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	431.4	431.4





Kurdjali - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	191.2	191.2	1.8	49.7	36.8	-	97.5	7.2	-	2.9
2024-2028	80.1	80.1	1.9	-	-	-	80.1	-	-	2.8
2029-2038	160.1	160.1	1.4	-	-	-	160.1	-	-	1.6
TOTAL, MBGN	431.4	431.4	5.0	49.7	36.8	-	337.7	7.2	-	7.3

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	49.9%	41.2%	38.2%	30.8%	30.0%	
population connected to WWC; % of water supplied population	39.9%	42.1%	42.1%	42.1%	42.1%	
population connected to WWT; % of water supplied population	0.0%	42.1%	42.1%	42.1%	42.1%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	2016
compliance with UWWTD; % of target	0.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.02)	(0.01)	0.00	NA	2034
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.88	0.91	0.97	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.8)	(2.0)	(2.3)	NA	32%
(savings) from other costs; MBGN since 2013	NA	(0.2)	(0.2)	(0.2)	NA	

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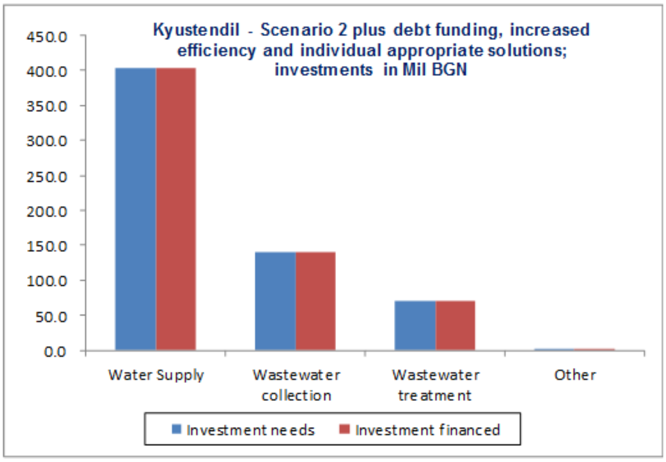
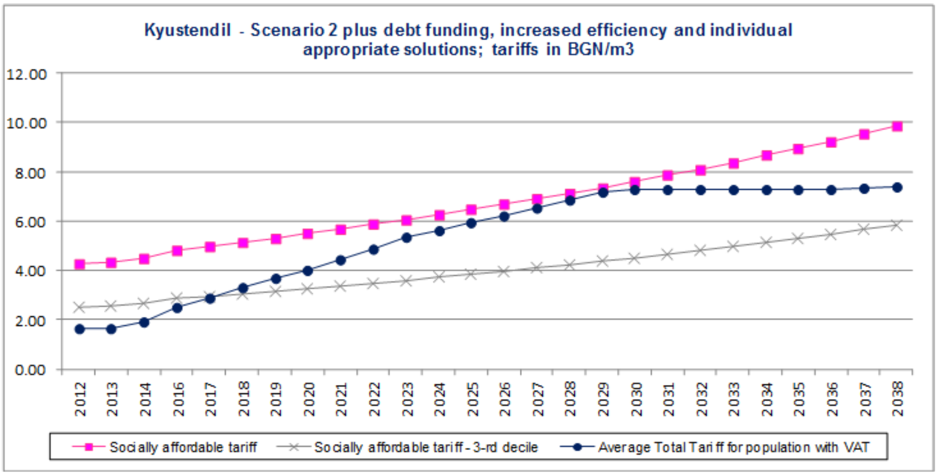
10. Kyustendil District

Kyustendil - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**403.6**	**403.6**
Abstraction	**8.9**	**8.9**
Water treatment	**25.0**	**25.0**
Transmission	**201.8**	**201.8**
Distribution	**167.9**	**167.9**
Wastewater	**210.6**	**210.6**
Wastewater collection	**140.7**	**140.7**
Wastewater treatment	**69.9**	**69.9**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**615.9**	**615.9**





Kyustendil - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	247.9	247.9	0.1	76.7	44.5	28.9	93.1	4.8	-	1.9
2024-2028	122.7	122.7	4.9	-	-	-	102.9	19.8	-	3.8
2029-2038	245.3	245.3	9.4	-	-	-	245.3	-	-	7.3
TOTAL, MBGN	**615.9**	**615.9**	**14.4**	**76.7**	**44.5**	**28.9**	**441.2**	**24.6**	**-**	**12.9**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	64.6%	54.1%	47.3%	31.2%	30.0%	
population connected to WWC; % of water supplied population	69.7%	71.0%	71.0%	71.0%	71.0%	
population connected to WWT; % of water supplied population	53.4%	71.0%	71.0%	71.0%	71.0%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2018**
compliance with UWWTD; % of target	75.2%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	0.06	0.03	(0.01)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	-	-	-	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.77	0.79	0.80	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.4)	(1.6)	(1.9)	NA	36%
(savings) from other costs; MBGN since 2013	NA	(1.1)	(1.1)	(1.2)	NA	

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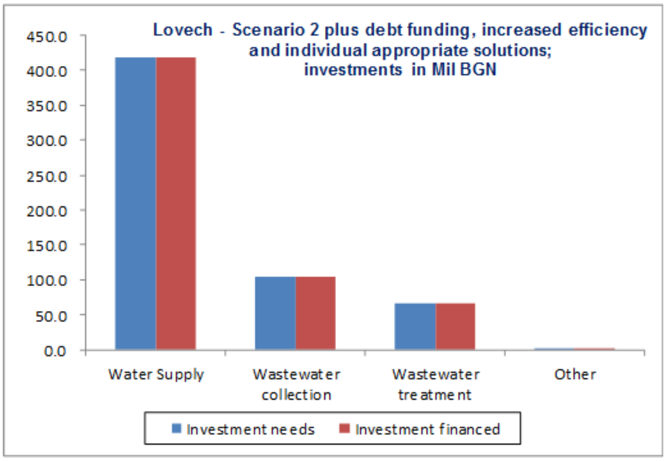
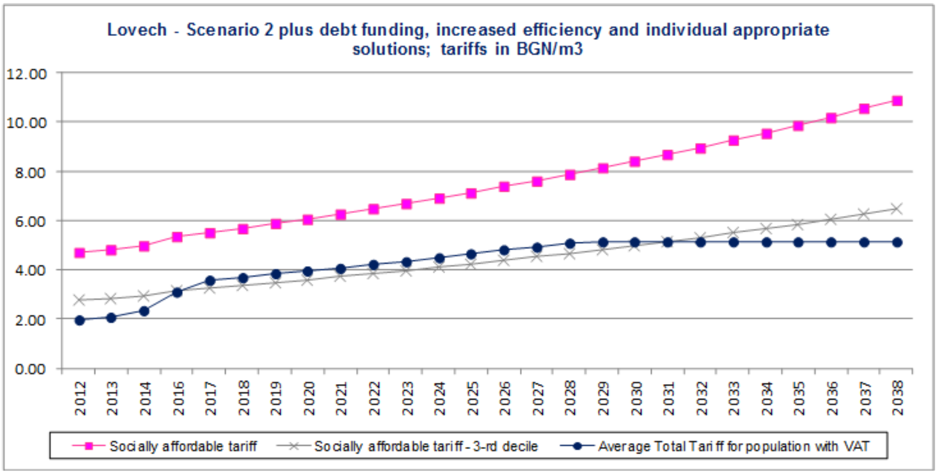
11. Lovech District

Lovech - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	418.1	418.1
Abstraction	16.3	16.3
Water treatment	34.2	34.2
Transmission	191.8	191.8
Distribution	175.8	175.8
Wastewater	171.5	171.5
Wastewater collection	104.9	104.9
Wastewater treatment	66.6	66.6
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	591.3	591.3





Lovech - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	250.8	250.8	3.2	83.5	47.4	-	110.3	9.6	-	0.9
2024-2028	113.5	113.5	1.9	-	-	-	113.0	0.5	-	0.8
2029-2038	227.0	227.0	2.5	-	-	-	227.0	-	-	0.2
TOTAL, MBGN	591.3	591.3	7.6	83.5	47.4	-	450.3	10.1	-	1.9

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	51.3%	45.5%	41.3%	31.3%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	38.2%	64.1%	64.1%	64.1%	64.1%	
population connected to WWT; % of water supplied population	36.0%	64.1%	64.1%	64.1%	64.1%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	2017
compliance with UWWTD; % of target	56.1%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	0.48	0.45	0.42	NA	2030
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.96	0.95	0.92	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.9)	(2.1)	(2.5)	NA	28%
(savings) from other costs; MBGN since 2013	NA	(1.0)	(1.0)	(1.1)	NA	

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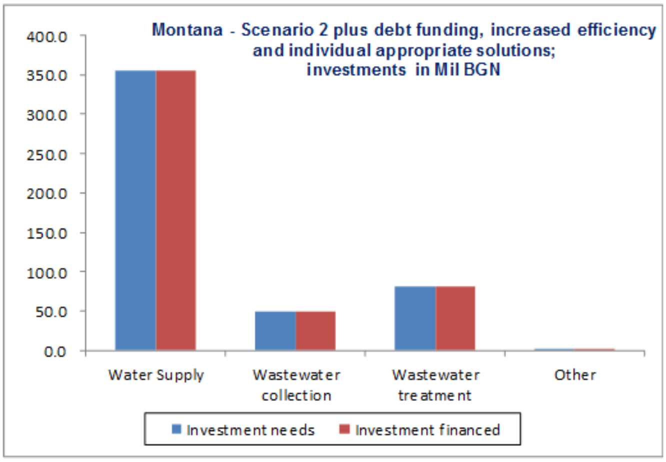
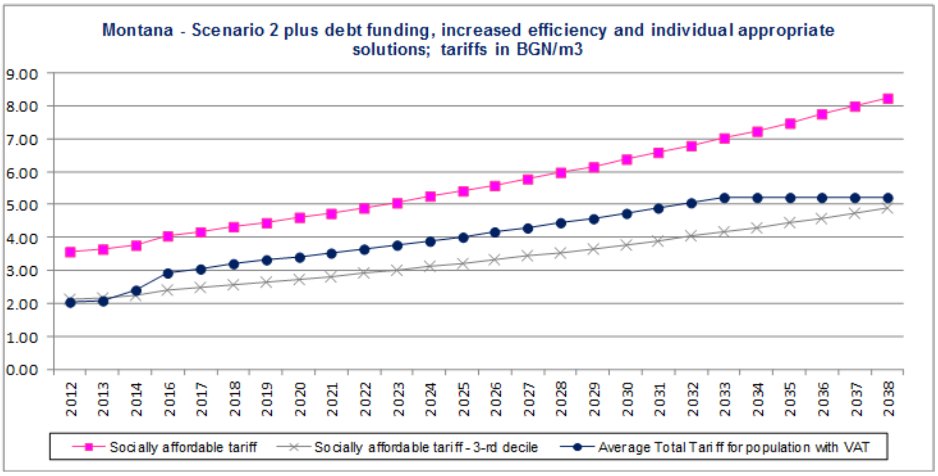
12. Montana District

Montana - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**356.0**	**356.0**
Abstraction	**9.4**	**9.4**
Water treatment	**13.1**	**13.1**
Transmission	**173.5**	**173.5**
Distribution	**160.0**	**160.0**
Wastewater	**129.5**	**129.5**
Wastewater collection	**48.5**	**48.5**
Wastewater treatment	**81.0**	**81.0**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**487.2**	**487.2**





Montana - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	182.6	182.6	-	91.1	53.4	-	38.1	-	-	2.1
2024-2028	101.5	101.5	-	-	-	-	101.5	-	-	1.6
2029-2038	203.1	203.1	-	-	-	-	203.1	-	-	2.9
TOTAL, MBGN	**487.2**	**487.2**	-	**91.1**	**53.4**	-	**342.7**	-	-	**6.7**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	64.8%	57.0%	49.2%	31.6%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	51.0%	62.7%	62.7%	62.7%	62.7%	
population connected to WWT; % of water supplied population	51.0%	62.7%	62.7%	62.7%	62.7%	First year:
compliance with UWWTD, year: **2022**	last year of deferred investments:				-	**2014**
compliance with UWWTD; % of target	81.2%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.09)	(0.28)	(0.62)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.74	0.79	0.88	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.6)	(1.8)	(2.1)	NA	31%
(savings) from other costs; MBGN since 2013	NA	(0.1)	(0.1)	(0.2)	NA	

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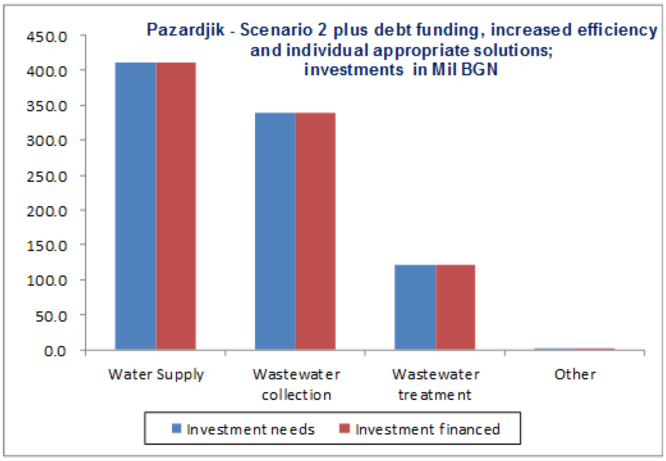
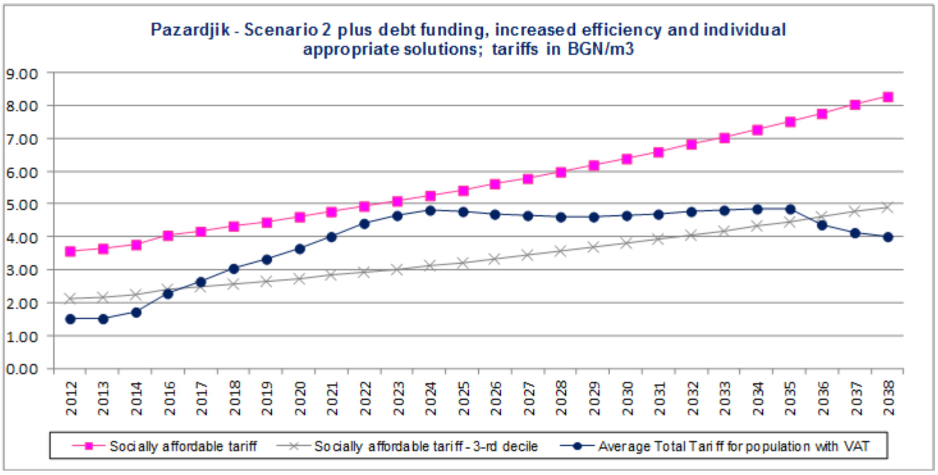
13. Pazardzhik District

Pazardjik - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**412.0**	**412.0**
Abstraction	**8.5**	**8.5**
Water treatment	**26.3**	**26.3**
Transmission	**158.7**	**158.7**
Distribution	**218.6**	**218.6**
Wastewater	**460.3**	**460.3**
Wastewater collection	**338.6**	**338.6**
Wastewater treatment	**121.7**	**121.7**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**874.0**	**874.0**





Pazardjik - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	465.3	465.3	25.4	89.5	66.4	-	170.9	138.5	-	4.9
2024-2028	136.2	136.2	35.0	-	-	-	136.2	-	-	5.7
2029-2038	272.5	272.5	34.1	-	-	-	272.5	-	-	3.9
TOTAL, MBGN	**874.0**	**874.0**	**94.5**	**89.5**	**66.4**	**-**	**579.6**	**138.5**	**-**	**14.6**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	58.4%	46.0%	41.6%	31.1%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	70.8%	75.2%	75.2%	75.2%	75.2%	
population connected to WWT; % of water supplied population	33.0%	75.2%	75.2%	75.2%	75.2%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2017**
compliance with UWWTD; % of target	43.9%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.15)	(0.19)	(0.29)	NA	**2035**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.01	0.01	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.46	1.53	1.64	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.0)	(2.3)	(2.7)	NA	28%
(savings) from other costs; MBGN since 2013	NA	(1.2)	(1.3)	(1.3)	NA	

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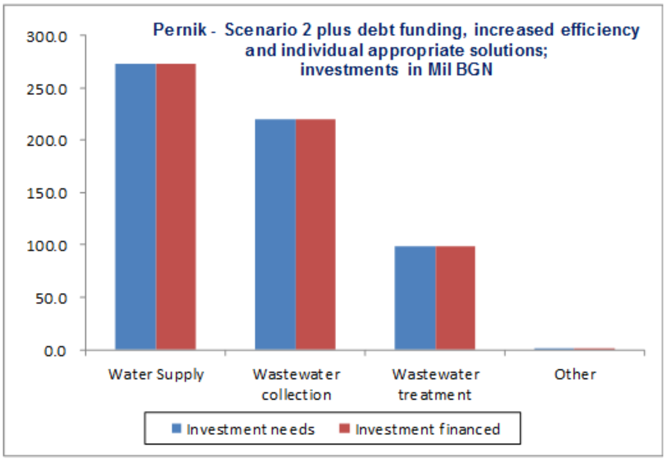
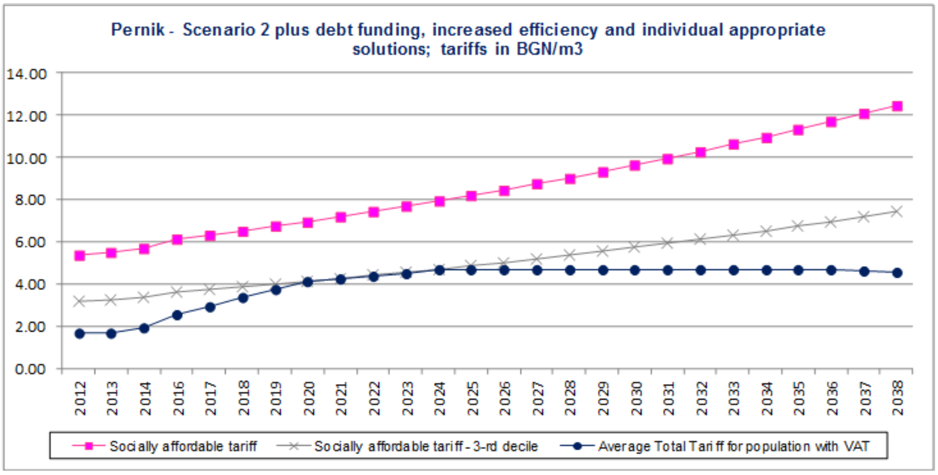
14. Pernik District

Pernik - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	273.3	273.3
Abstraction	7.0	7.0
Water treatment	23.4	23.4
Transmission	125.3	125.3
Distribution	117.6	117.6
Wastewater	319.4	319.4
Wastewater collection	220.1	220.1
Wastewater treatment	99.2	99.2
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	594.3	594.3





Pernik - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	294.7	294.7	1.5	113.7	60.7	-	108.1	12.2	-	-
2024-2028	99.9	99.9	2.9	-	-	-	99.9	-	-	-
2029-2038	199.8	199.8	4.2	-	-	-	199.8	-	-	-
TOTAL, MBGN	594.3	594.3	8.6	113.7	60.7	-	407.8	12.2	-	-

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	61.1%	52.4%	46.3%	31.3%	30.0%	
population connected to WWC; % of water supplied population	51.9%	80.0%	80.0%	80.0%	80.0%	
population connected to WWT; % of water supplied population	44.6%	80.0%	80.0%	80.0%	80.0%	First year:
compliance with UWWTD, year: 2022	last year of deferred investments:				-	-
compliance with UWWTD; % of target	55.7%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.32)	(0.43)	(0.56)	NA	-
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.10	1.09	1.07	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.8)	(2.0)	(2.4)	NA	41%
(savings) from other costs; MBGN since 2013	NA	(1.0)	(1.1)	(1.2)	NA	

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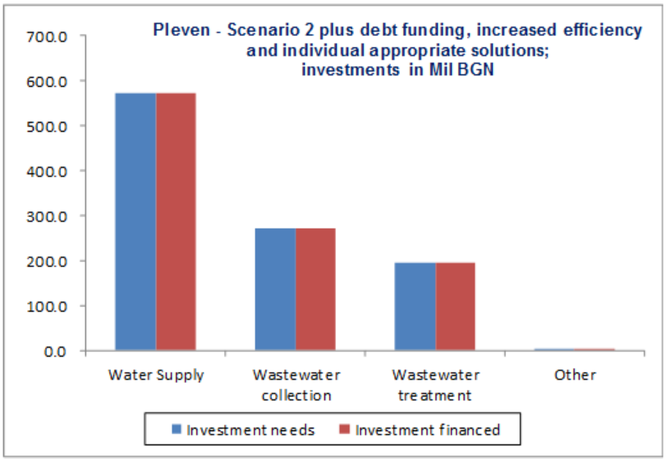
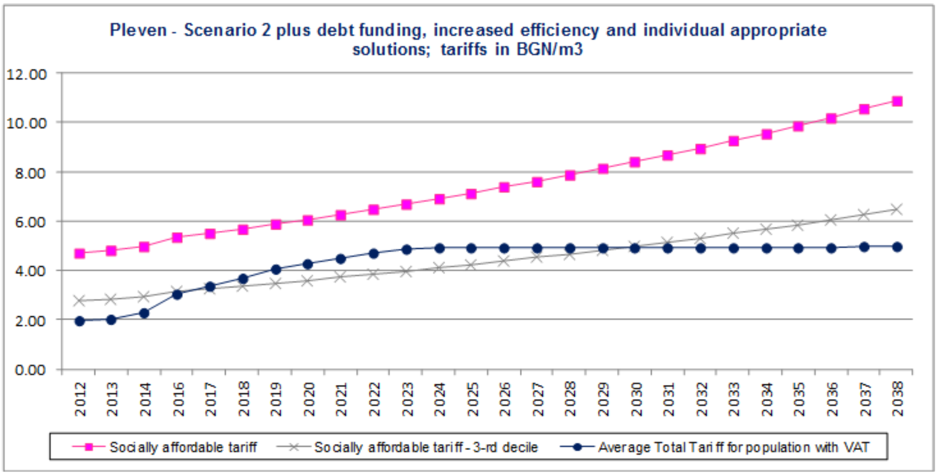
15. Pleven District

Pleven - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**572.1**	**572.1**
Abstraction	**12.8**	**12.8**
Water treatment	**14.5**	**14.5**
Transmission	**273.3**	**273.3**
Distribution	**271.5**	**271.5**
Wastewater	**465.8**	**465.8**
Wastewater collection	**271.2**	**271.2**
Wastewater treatment	**194.6**	**194.6**
Other	**2.7**	**2.7**
Transport & plant	**1.6**	**1.6**
Business systems	**1.1**	**1.1**
Total Investment	**1 040.6**	**1 040.6**





Pleven - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	555.5	555.5	26.2	193.3	107.2	-	177.6	77.4	-	3.4
2024-2028	161.7	161.7	15.2	-	-	-	161.7	-	-	2.1
2029-2038	323.4	323.4	17.6	-	-	-	323.4	-	-	0.1
TOTAL, MBGN	**1 040.6**	**1 040.6**	**59.0**	**193.3**	**107.2**	**-**	**662.7**	**77.4**	**-**	**5.6**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	52.6%	45.7%	41.4%	30.7%	30.0%	
population connected to WWC; % of water supplied population	51.8%	63.1%	63.1%	63.1%	63.1%	
population connected to WWT; % of water supplied population	41.4%	63.1%	63.1%	63.1%	63.1%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2017**
compliance with UWWTD; % of target	65.6%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	0.06	(0.38)	(1.19)	NA	**2029**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.01	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	2.10	2.11	2.12	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(4.1)	(4.5)	(5.4)	NA	34%
(savings) from other costs; MBGN since 2013	NA	(1.2)	(1.4)	(1.6)	NA	

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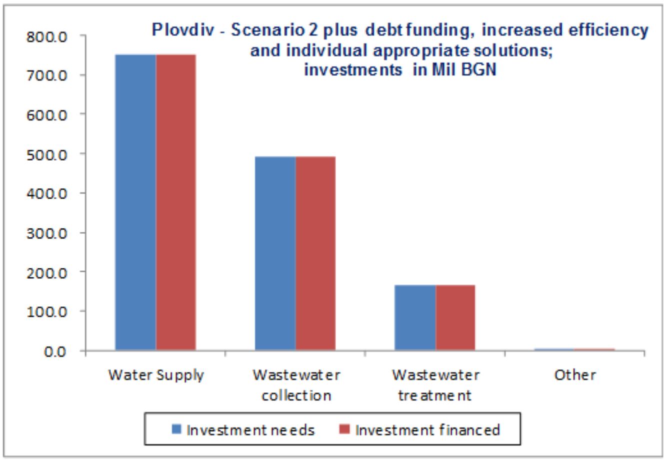
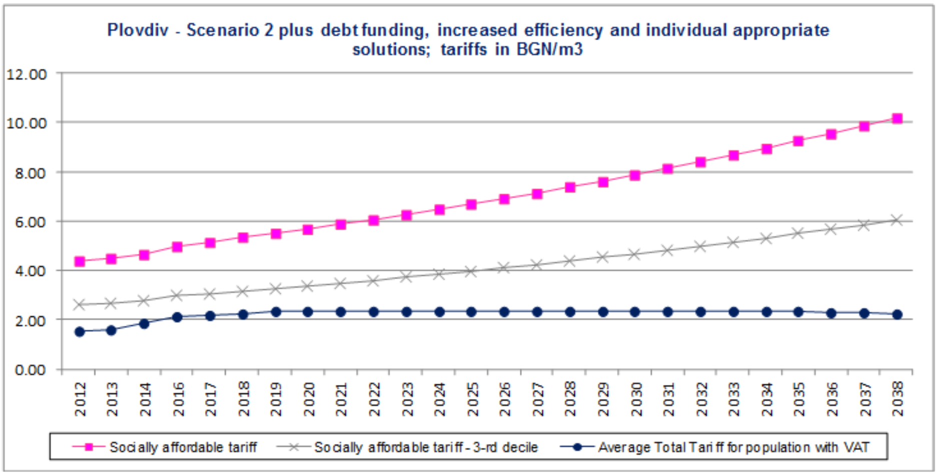
16. Plovdiv District

Plovdiv - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	749.5	749.5
Abstraction	18.2	18.2
Water treatment	0.0	0.0
Transmission	308.3	308.3
Distribution	422.9	422.9
Wastewater	656.2	656.2
Wastewater collection	491.4	491.4
Wastewater treatment	164.9	164.9
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	1 407.3	1 407.3





Plovdiv - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	671.5	671.5	-	217.1	170.5	-	283.8	-	-	-
2024-2028	245.3	245.3	-	-	-	-	245.3	-	-	-
2029-2038	490.6	490.6	-	-	-	-	490.6	-	-	-
TOTAL, MBGN	1 407.3	1 407.3	-	217.1	170.5	-	1 019.7	-	-	-

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	59.9%	48.0%	43.3%	31.5%	30.0%	
population connected to WWC; % of water supplied population	66.0%	76.1%	76.1%	76.1%	76.1%	
population connected to WWT; % of water supplied population	49.2%	76.1%	76.1%	76.1%	76.1%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	-
compliance with UWWTD; % of target	64.6%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(1.31)	(1.88)	(2.84)	NA	-
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.01	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	2.54	2.56	2.60	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(6.9)	(7.6)	(9.1)	NA	44%
(savings) from other costs; MBGN since 2013	NA	(6.8)	(7.0)	(7.3)	NA	

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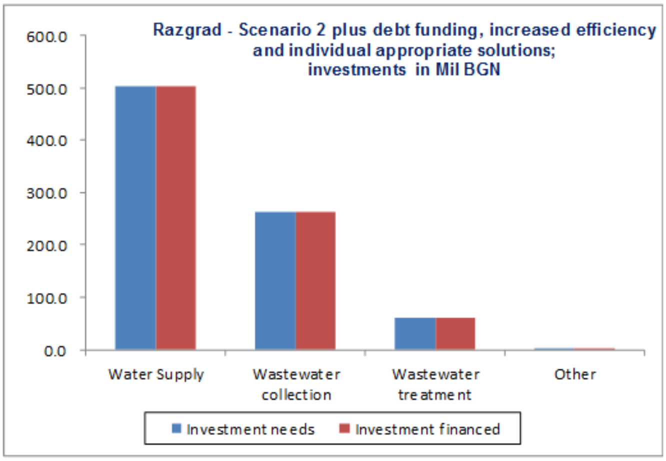
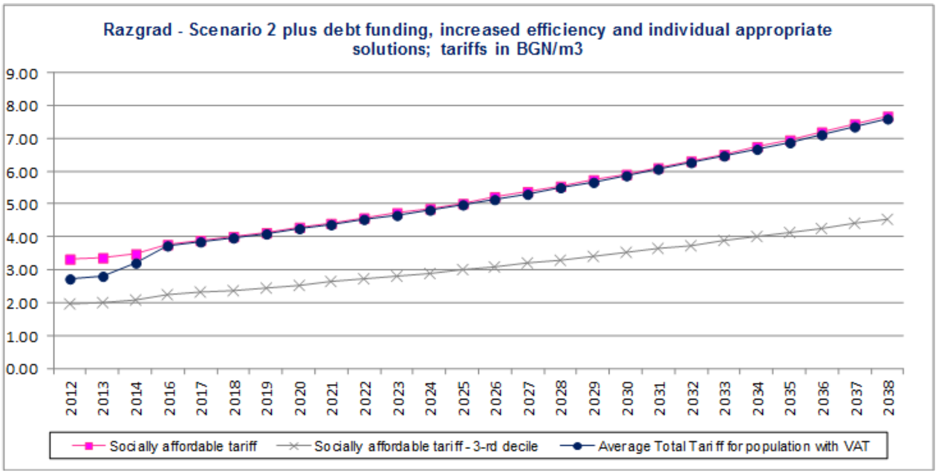
17. Razgrad District

Razgrad - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	502.5	502.5
Abstraction	11.5	11.5
Water treatment	0.0	0.0
Transmission	245.7	245.7
Distribution	245.2	245.2
Wastewater	324.8	324.8
Wastewater collection	263.7	263.7
Wastewater treatment	61.1	61.1
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	829.0	829.0





Razgrad - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	421.7	421.7	-	54.4	35.5	247.5	84.3	-	-	5.1
2024-2028	135.8	135.8	-	-	-	61.2	74.6	-	-	3.5
2029-2038	271.6	271.6	-	-	-	65.4	206.2	-	-	8.2
TOTAL, MBGN	829.0	829.0	-	54.4	35.5	374.0	365.2	-	-	16.8

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	67.3%	58.0%	50.0%	32.3%	30.0%	
population connected to WWC; % of water supplied population	30.3%	48.6%	48.6%	48.6%	48.6%	
population connected to WWT; % of water supplied population	30.3%	48.6%	48.6%	48.6%	48.6%	First year:
compliance with UWWTD, year: 2023		last year of deferred investments:			-	2014
compliance with UWWTD; % of target	62.3%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.71)	(0.98)	(1.49)	NA	2038
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.01	0.01	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.65	0.68	0.68	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.6)	(2.9)	(3.4)	NA	48%
(savings) from other costs; MBGN since 2013	NA	(0.7)	(0.8)	(1.0)	NA	

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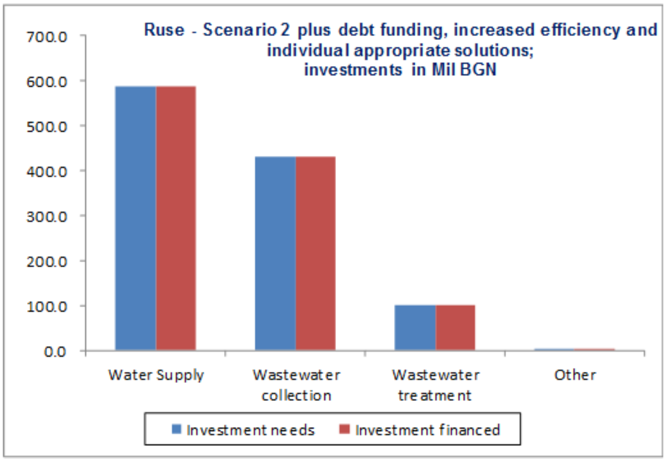
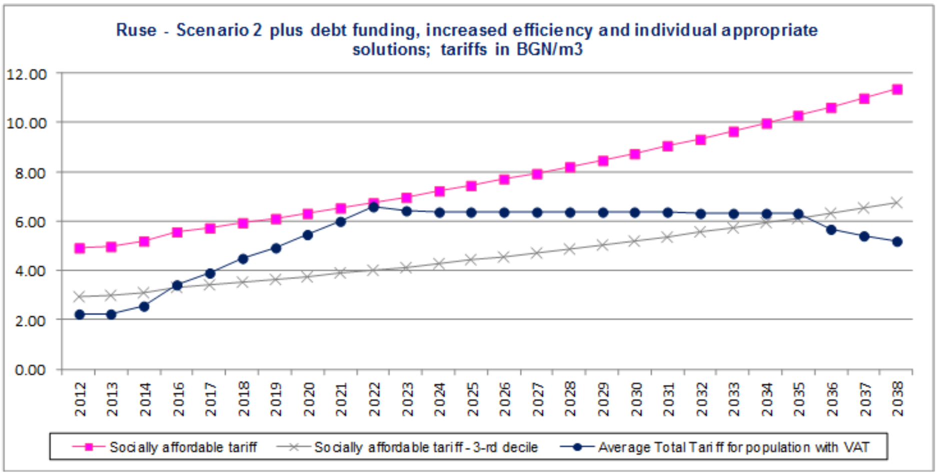
18. Ruse District

Ruse - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**587.0**	**587.0**
Abstraction	**8.3**	**8.3**
Water treatment	**0.0**	**0.0**
Transmission	**164.2**	**164.2**
Distribution	**414.5**	**414.5**
Wastewater	**530.2**	**530.2**
Wastewater collection	**429.5**	**429.5**
Wastewater treatment	**100.6**	**100.6**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**1 118.8**	**1 118.8**





Ruse - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	712.8	712.8	44.2	105.2	68.3	65.0	248.5	225.8	-	8.7
2024-2028	135.3	135.3	56.2	-	-	-	135.3	-	-	6.8
2029-2038	270.7	270.7	56.3	-	-	-	270.7	-	-	4.0
TOTAL, MBGN	**1 118.8**	**1 118.8**	**156.7**	**105.2**	**68.3**	**65.0**	**654.6**	**225.8**	**-**	**19.4**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	42.2%	35.2%	33.9%	30.6%	30.0%	
population connected to WWC; % of water supplied population	63.5%	76.9%	76.9%	76.9%	76.9%	
population connected to WWT; % of water supplied population	0.0%	76.9%	76.9%	76.9%	76.9%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2016**
compliance with UWWTD; % of target	0.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.09)	(0.19)	(0.38)	NA	**2035**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.03	0.03	0.03	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.95	1.94	1.89	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(3.4)	(3.8)	(4.5)	NA	23%
(savings) from other costs; MBGN since 2013	NA	(0.5)	(0.6)	(0.7)	NA	

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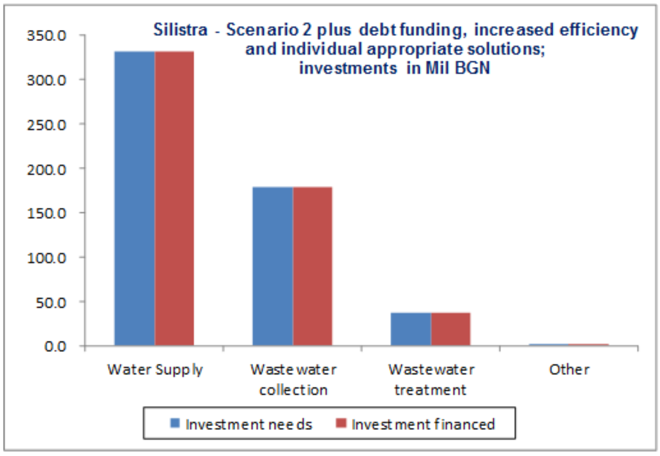
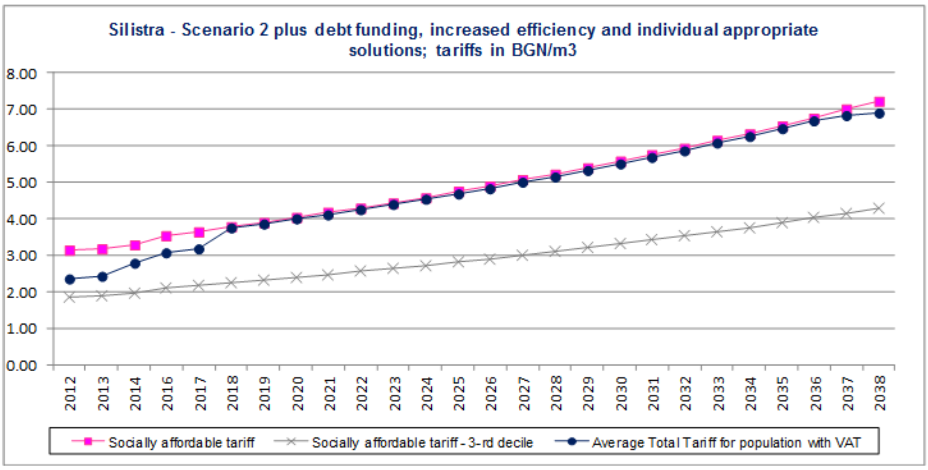
19. Silistra District

Silistra - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**331.9**	**331.9**
Abstraction	3.9	3.9
Water treatment	0.0	0.0
Transmission	169.2	169.2
Distribution	158.8	158.8
Wastewater	**215.2**	**215.2**
Wastewater collection	178.6	178.6
Wastewater treatment	36.6	36.6
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**548.8**	**548.8**





Silistra - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	254.7	254.7	-	38.7	28.8	119.2	68.1	-	-	3.8
2024-2028	98.0	98.0	-	-	-	36.4	61.7	-	-	3.0
2029-2038	196.1	196.1	5.2	-	-	4.9	175.9	15.3	-	7.9
TOTAL, MBGN	**548.8**	**548.8**	**5.2**	**38.7**	**28.8**	**160.4**	**305.7**	**15.3**	**-**	**14.8**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	54.2%	46.5%	41.7%	30.3%	30.0%	
population connected to WWC; % of water supplied population	55.0%	63.1%	63.1%	63.1%	63.1%	
population connected to WWT; % of water supplied population	0.0%	63.1%	63.1%	63.1%	63.1%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2014**
compliance with UWWTD; % of target	0.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.09)	(0.17)	(0.39)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.02	0.02	0.02	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.90	0.93	0.96	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.0)	(2.2)	(2.7)	NA	38%
(savings) from other costs; MBGN since 2013	NA	(0.7)	(0.7)	(0.8)	NA	

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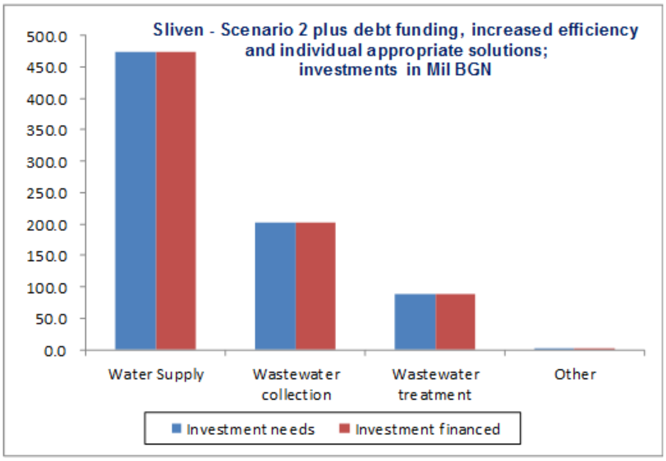
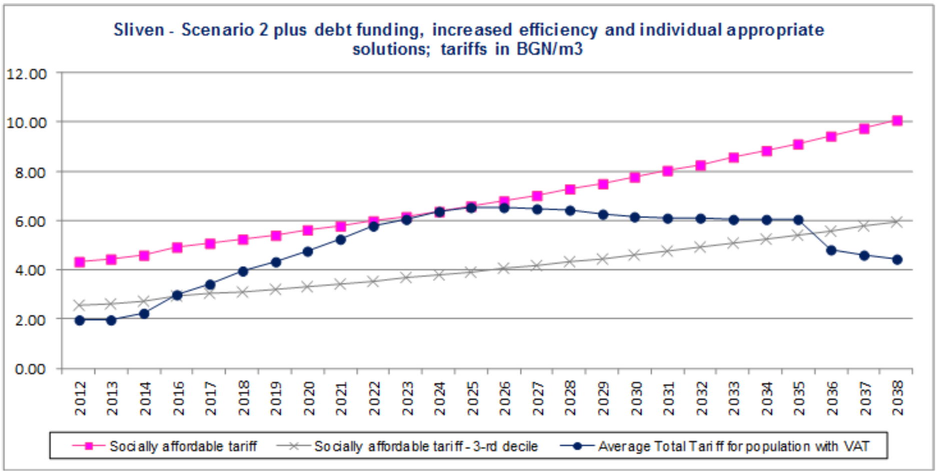
20. Sliven District

Sliven - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**472.9**	**472.9**
Abstraction	**16.1**	**16.1**
Water treatment	**18.7**	**18.7**
Transmission	**172.8**	**172.8**
Distribution	**265.2**	**265.2**
Wastewater	**290.1**	**290.1**
Wastewater collection	**201.6**	**201.6**
Wastewater treatment	**88.5**	**88.5**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**764.7**	**764.7**





Sliven - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	426.4	426.4	19.9	108.3	67.2	-	132.8	118.1	-	5.4
2024-2028	112.8	112.8	32.7	-	-	-	112.8	-	-	7.0
2029-2038	225.5	225.5	26.9	-	-	-	225.5	-	-	5.1
TOTAL, MBGN	**764.7**	**764.7**	**79.4**	**108.3**	**67.2**	-	**471.0**	**118.1**	-	**17.5**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	85.6%	65.1%	55.1%	31.8%	30.0%	
population connected to WWC; % of water supplied population	57.6%	66.2%	66.2%	66.2%	66.2%	
population connected to WWT; % of water supplied population	55.8%	66.2%	66.2%	66.2%	66.2%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2016**
compliance with UWWTD; % of target	84.3%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(1.13)	(1.19)	(1.11)	NA	**2035**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.03	1.07	1.12	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.1)	(2.3)	(2.7)	NA	49%
(savings) from other costs; MBGN since 2013	NA	(2.0)	(2.0)	(2.1)	NA	

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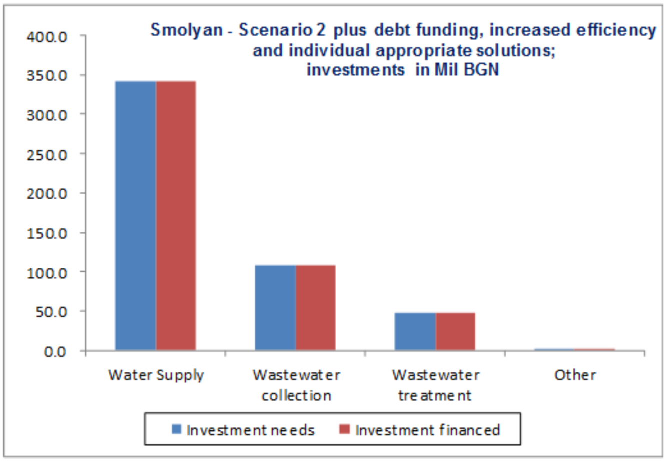
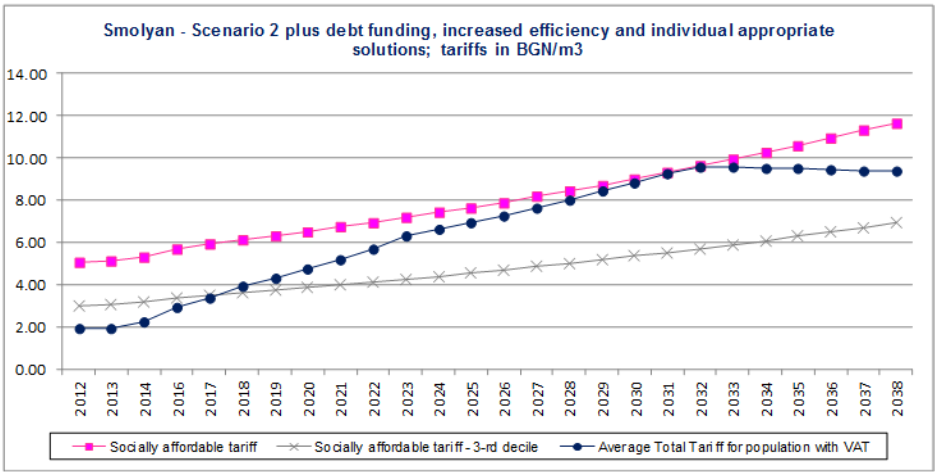
21. Smolyan District

Smolyan - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**341.7**	**341.7**
Abstraction	**17.5**	**17.5**
Water treatment	**21.5**	**21.5**
Transmission	**221.9**	**221.9**
Distribution	**80.7**	**80.7**
Wastewater	**155.1**	**155.1**
Wastewater collection	**108.2**	**108.2**
Wastewater treatment	**46.9**	**46.9**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**498.4**	**498.4**





Smolyan - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	221.5	221.5	6.6	40.2	28.4	53.7	66.6	32.7	-	1.4
2024-2028	92.3	92.3	14.2	-	-	-	57.3	35.0	-	3.0
2029-2038	184.6	184.6	22.2	-	-	-	184.6	-	-	8.0
TOTAL, MBGN	**498.4**	**498.4**	**42.9**	**40.2**	**28.4**	**53.7**	**308.5**	**67.7**	**-**	**12.4**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	46.9%	40.3%	37.4%	30.3%	30.0%	
population connected to WWC; % of water supplied population	64.5%	64.5%	64.5%	64.5%	64.5%	
population connected to WWT; % of water supplied population	38.4%	64.5%	64.5%	64.5%	64.5%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2018**
compliance with UWWTD; % of target	59.4%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	0.17	0.20	0.27	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.08	0.08	0.08	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.65	0.67	0.73	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.2)	(1.3)	(1.7)	NA	17%
(savings) from other costs; MBGN since 2013	NA	(0.1)	(0.1)	(0.2)	NA	

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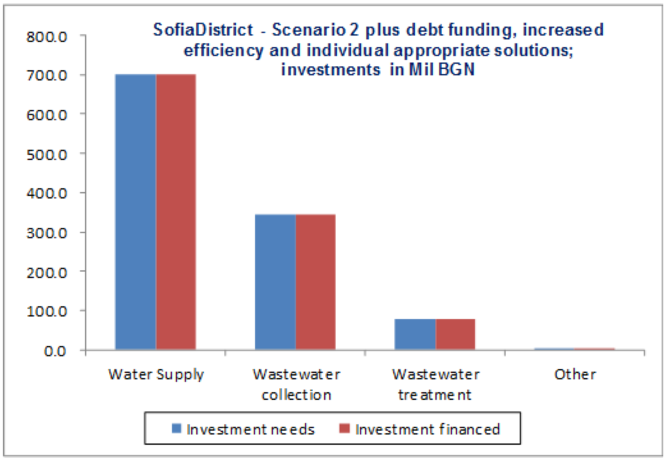
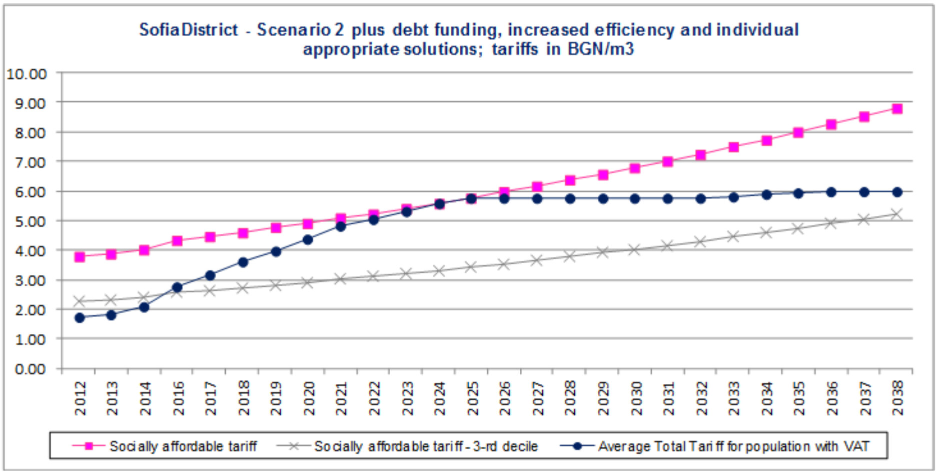
22. Sofia District

SofiaDistrict - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**699.1**	**699.1**
Abstraction	**25.2**	**25.2**
Water treatment	**16.5**	**16.5**
Transmission	**321.8**	**321.8**
Distribution	**335.6**	**335.6**
Wastewater	**420.8**	**420.8**
Wastewater collection	**343.9**	**343.9**
Wastewater treatment	**76.9**	**76.9**
Other	**3.4**	**3.4**
Transport & plant	**3.2**	**3.2**
Business systems	**0.2**	**0.2**
Total Investment	**1 123.3**	**1 123.3**





SofiaDistrict - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	544.7	544.7	11.5	91.8	64.2	140.3	194.8	53.6	-	7.4
2024-2028	192.8	192.8	11.5	-	-	-	192.8	-	-	7.9
2029-2038	385.7	385.7	14.9	-	-	-	385.7	-	-	9.1
TOTAL, MBGN	**1 123.3**	**1 123.3**	**37.8**	**91.8**	**64.2**	**140.3**	**773.4**	**53.6**	**-**	**24.4**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	55.7%	44.8%	40.6%	30.4%	30.0%	
population connected to WWC; % of water supplied population	66.7%	70.0%	70.0%	70.0%	70.0%	
population connected to WWT; % of water supplied population	13.7%	70.0%	70.0%	70.0%	70.0%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2016**
compliance with UWWTD; % of target	19.6%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.15)	(0.25)	(0.39)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.56	1.56	1.56	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(3.0)	(3.3)	(4.0)	NA	31%
(savings) from other costs; MBGN since 2013	NA	(0.5)	(0.6)	(0.7)	NA	

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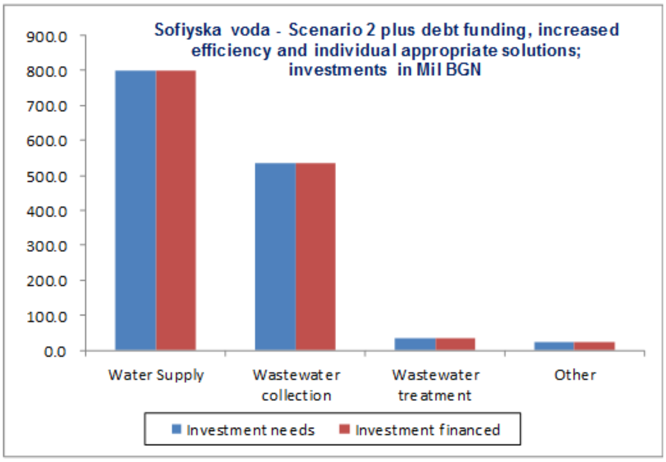
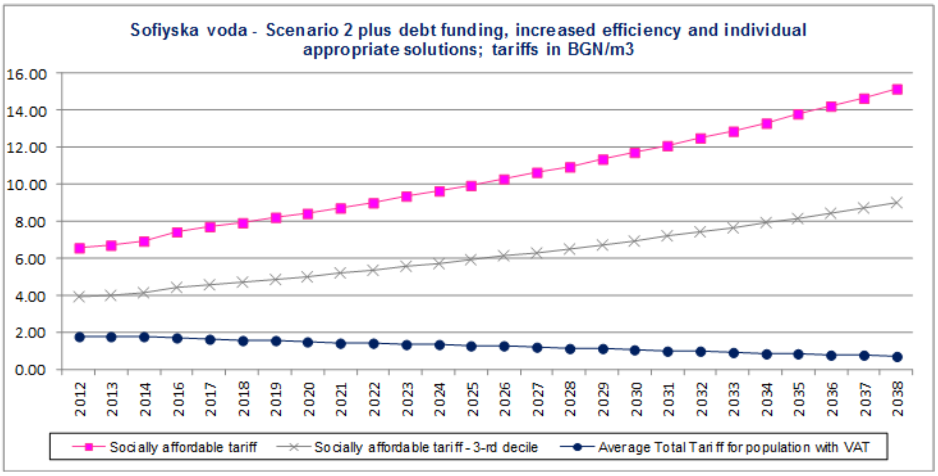
23. City of Sofia

Sofiyska voda - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	801.3	801.3
Abstraction	0.0	0.0
Water treatment	30.7	30.7
Transmission	169.5	169.5
Distribution	601.2	601.2
Wastewater	569.2	569.2
Wastewater collection	533.3	533.3
Wastewater treatment	35.9	35.9
Other	23.1	23.1
Transport & plant	11.3	11.3
Business systems	11.8	11.8
Total Investment	1 393.6	1 393.6





Sofiyska voda - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	618.5	618.5	-	315.9	245.8	-	56.8	-	-	-
2024-2028	258.4	258.4	-	-	-	-	258.4	-	-	-
2029-2038	516.7	516.7	-	-	-	-	516.7	-	-	-
TOTAL, MBGN	1 393.6	1 393.6	-	315.9	245.8	-	831.9	-	-	-

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	58.6%	47.6%	43.0%	31.2%	30.0%	
population connected to WWC; % of water supplied population	87.4%	94.5%	94.5%	94.5%	94.5%	
population connected to WWT; % of water supplied population	86.8%	94.5%	94.5%	94.5%	94.5%	First year:
compliance with UWWTD, year: 2022	last year of deferred investments:				-	-
compliance with UWWTD; % of target	91.9%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	0.49	0.12	(0.60)	NA	-
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.01	0.01	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.87	0.89	0.97	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	-	-	-	NA	-1%
(savings) from other costs; MBGN since 2013	NA	0.6	0.4	0.0	NA	

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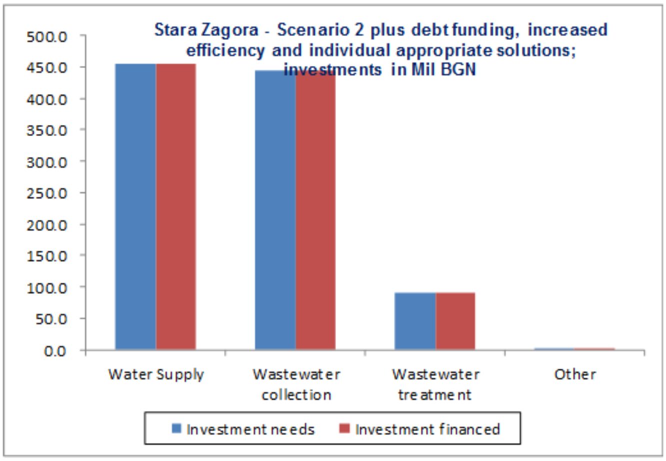
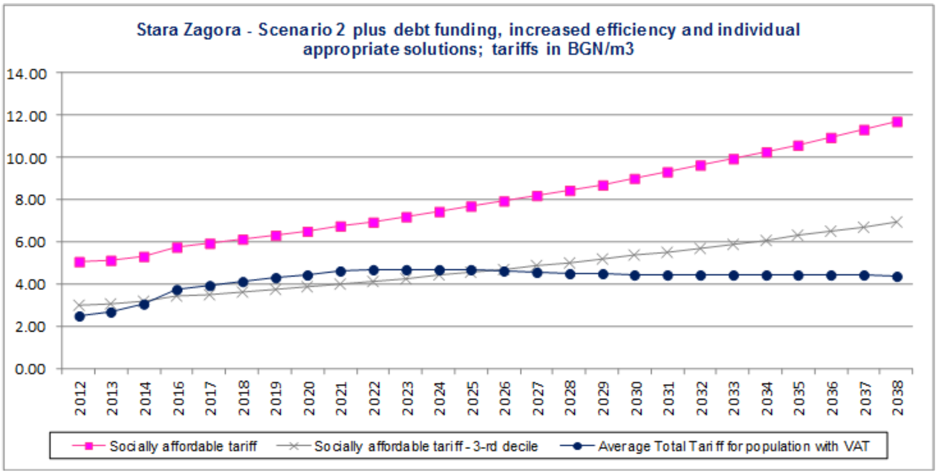
24. Stara Zagora District

Stara Zagora - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**453.9**	**453.9**
Abstraction	**17.6**	**17.6**
Water treatment	**1.7**	**1.7**
Transmission	**292.0**	**292.0**
Distribution	**142.6**	**142.6**
Wastewater	**534.6**	**534.6**
Wastewater collection	**444.3**	**444.3**
Wastewater treatment	**90.3**	**90.3**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**990.2**	**990.2**





Stara Zagora - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	570.8	570.8	13.9	109.9	78.6	-	255.1	127.2	-	3.7
2024-2028	139.8	139.8	29.2	-	-	-	139.8	-	-	0.4
2029-2038	279.6	279.6	41.0	-	-	-	279.6	-	-	-
TOTAL, MBGN	**990.2**	**990.2**	**84.0**	**109.9**	**78.6**	**-**	**674.5**	**127.2**	**-**	**4.1**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	53.9%	41.4%	38.0%	30.3%	30.0%	
population connected to WWC; % of water supplied population	68.8%	70.2%	70.2%	70.2%	70.2%	
population connected to WWT; % of water supplied population	35.3%	70.2%	70.2%	70.2%	70.2%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2015**
compliance with UWWTD; % of target	50.2%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.67)	(0.79)	(1.56)	NA	**2025**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.08	1.14	1.17	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(4.5)	(5.0)	(6.0)	NA	34%
(savings) from other costs; MBGN since 2013	NA	(1.6)	(1.7)	(2.0)	NA	

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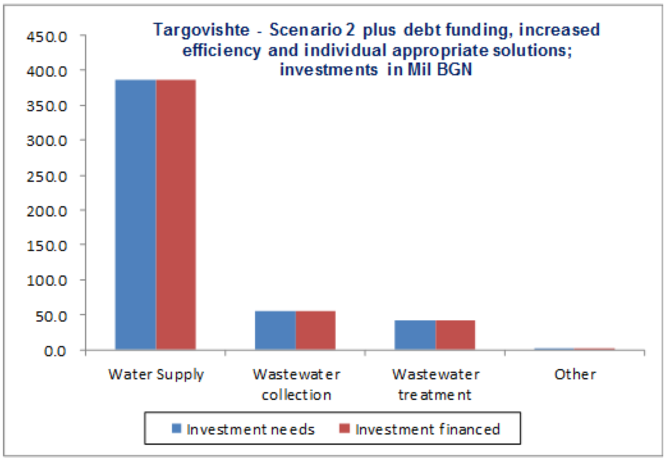
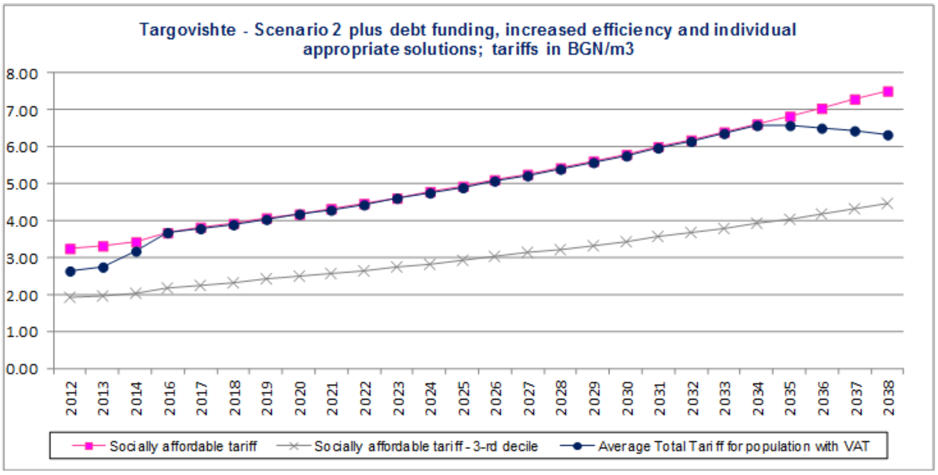
25. Targovishte District

Targovishte - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	386.9	386.9
Abstraction	13.3	13.3
Water treatment	13.7	13.7
Transmission	221.0	221.0
Distribution	138.8	138.8
Wastewater	96.9	96.9
Wastewater collection	54.4	54.4
Wastewater treatment	42.5	42.5
Other	1.7	1.7
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	485.5	485.5





Targovishte - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	249.1	249.1	-	39.1	29.1	117.4	63.5	-	-	4.0
2024-2028	78.8	78.8	3.4	-	-	5.9	37.4	35.5	-	2.8
2029-2038	157.5	157.5	14.8	-	-	-	157.5	-	-	7.0
TOTAL, MBGN	485.5	485.5	18.2	39.1	29.1	123.3	258.4	35.5	-	13.8

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	62.1%	44.8%	40.6%	30.5%	30.0%	
population connected to WWC; % of water supplied population	58.6%	61.4%	61.4%	61.4%	61.4%	
population connected to WWT; % of water supplied population	0.0%	61.4%	61.4%	61.4%	61.4%	First year:
compliance with UWWTD, year: 2023	last year of deferred investments:				-	2014
compliance with UWWTD; % of target	0.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.18)	(0.18)	(0.16)	NA	2038
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.02	0.02	0.02	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	0.55	0.59	0.70	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.2)	(1.4)	(1.7)	NA	21%
(savings) from other costs; MBGN since 2013	NA	(0.2)	(0.2)	(0.3)	NA	

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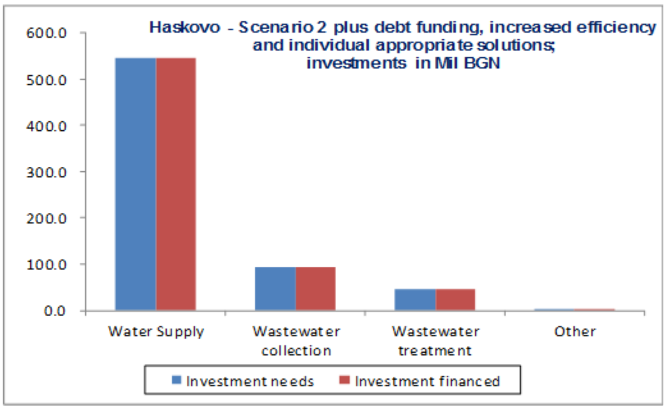
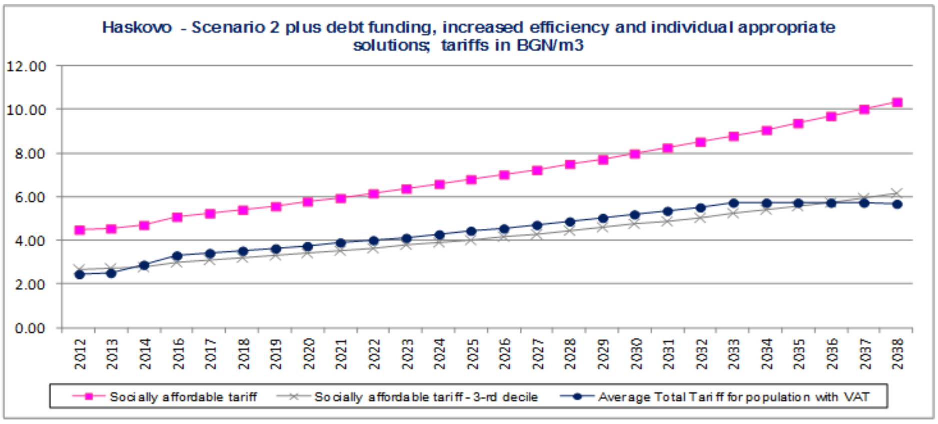
26. Haskovo District

Haskovo - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**544.9**	**544.9**
Abstraction	**16.1**	**16.1**
Water treatment	**4.1**	**4.1**
Transmission	**232.5**	**232.5**
Distribution	**292.2**	**292.2**
Wastewater	**141.0**	**141.0**
Wastewater collection	**94.6**	**94.6**
Wastewater treatment	**46.4**	**46.4**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**687.6**	**687.6**





Haskovo - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	214.5	214.5	-	78.1	60.8	-	75.6	-	-	1.9
2024-2028	157.7	157.7	-	-	-	-	157.7	-	-	1.4
2029-2038	315.4	315.4	3.1	-	-	-	307.8	7.6	-	1.9
TOTAL, MBGN	**687.6**	**687.6**	**3.1**	**78.1**	**60.8**	**-**	**541.1**	**7.6**	**-**	**5.2**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	49.1%	43.7%	39.8%	30.8%	30.0%	
population connected to WWC; % of water supplied population	65.3%	72.0%	72.0%	72.0%	72.0%	
population connected to WWT; % of water supplied population	9.6%	72.0%	72.0%	72.0%	72.0%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2014**
compliance with UWWTD; % of target	13.4%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.05)	(0.25)	(1.06)	NA	**2035**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.01	0.01	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.16	1.23	1.18	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(3.1)	(3.4)	(4.1)	NA	29%
(savings) from other costs; MBGN since 2013	NA	(0.5)	(0.5)	(0.6)	NA	

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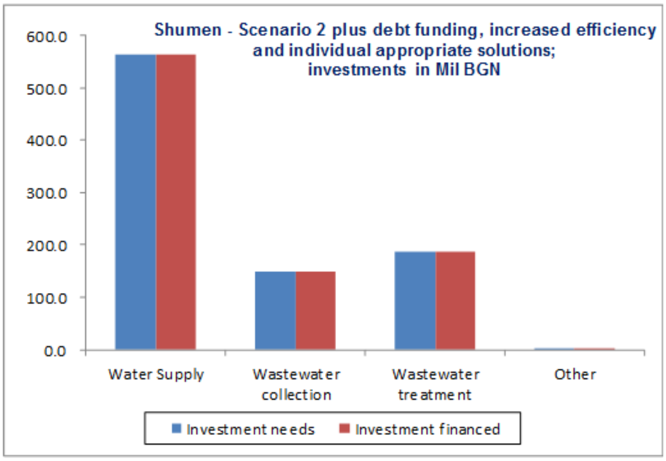
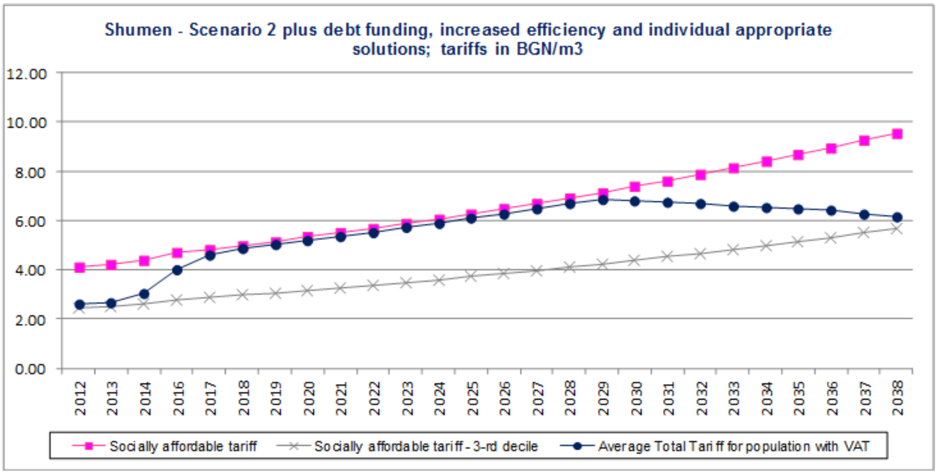
27. Shumen District

Shumen - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**562.5**	**562.5**
Abstraction	4.6	4.6
Water treatment	35.5	35.5
Transmission	339.4	339.4
Distribution	182.9	182.9
Wastewater	**338.0**	**338.0**
Wastewater collection	150.2	150.2
Wastewater treatment	187.8	187.8
Other	**1.7**	**1.7**
Transport & plant	1.6	1.6
Business systems	0.1	0.1
Total Investment	**902.2**	**902.2**





Shumen - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant		Government grant	WSSC		Investment gap (postponement)	Gov't Income Support
				Grant from EU funds	National contribution		Internally generated funds	Loans		
2014-2023	525.4	525.4	14.1	145.6	78.9	81.9	134.4	84.7	-	6.9
2024-2028	125.6	125.6	23.3	-	-	-	106.1	19.5	-	5.6
2029-2038	251.2	251.2	32.7	-	-	-	251.2	-	-	8.1
TOTAL, MBGN	**902.2**	**902.2**	**70.2**	**145.6**	**78.9**	**81.9**	**491.6**	**104.2**	**-**	**20.5**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	Gov't Income Support
NRW; %	67.9%	51.3%	44.9%	30.9%	30.0%	
population connected to WWC; % of water supplied population	60.4%	63.0%	63.0%	63.0%	63.0%	
population connected to WWT; % of water supplied population	35.2%	63.0%	63.0%	63.0%	63.0%	First year:
compliance with UWWTD, year: **2023**		last year of deferred investments:			-	**2014**
compliance with UWWTD; % of target	55.8%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(1.19)	(1.42)	(1.69)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.00	0.00	0.00	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.87	1.90	1.99	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(2.6)	(2.9)	(3.4)	NA	33%
(savings) from other costs; MBGN since 2013	NA	(1.0)	(1.1)	(1.2)	NA	

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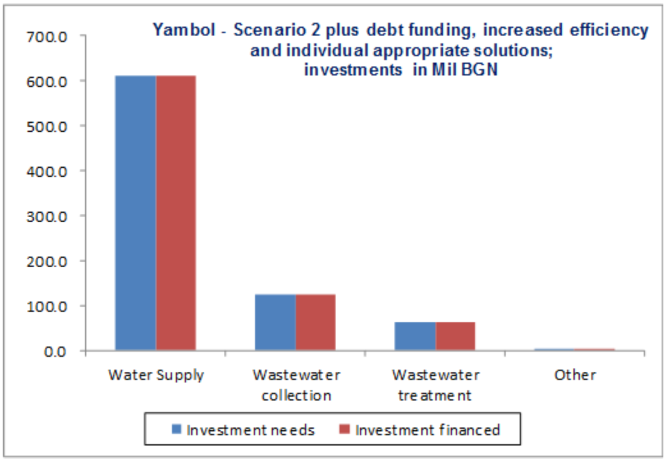
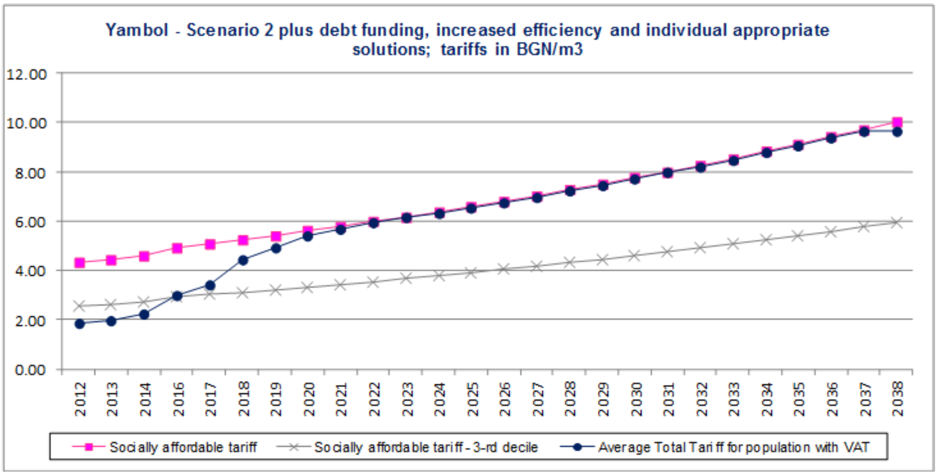
28. Yambol District

Yambol - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Mil BGN

Type of investment	Investment needs	Investment financed
Water Supply	**610.0**	**610.0**
Abstraction	**11.7**	**11.7**
Water treatment	**0.0**	**0.0**
Transmission	**539.0**	**539.0**
Distribution	**59.3**	**59.3**
Wastewater	**188.5**	**188.5**
Wastewater collection	**125.7**	**125.7**
Wastewater treatment	**62.8**	**62.8**
Other	**1.7**	**1.7**
Transport & plant	**1.6**	**1.6**
Business systems	**0.1**	**0.1**
Total Investment	**800.2**	**800.2**





Yambol - Scenario 2 plus debt funding, increased efficiency and individual appropriate solutions

Funding sources, MBGN

Period	Investment needs	Investment financed	Investment cost of debt	EU grant: Grant from EU funds	EU grant: National contribution	Government grant	WSSC: Internally generated funds	WSSC: Loans	Investment gap (postponement)	Gov't Income Support
2014-2023	279.7	279.7	-	43.2	30.9	77.9	127.7	-	-	4.0
2024-2028	173.5	173.5	3.1	-	-	22.3	81.8	69.4	-	4.8
2029-2038	347.0	347.0	30.1	-	-	-	347.0	-	-	12.6
TOTAL, MBGN	**800.2**	**800.2**	**33.2**	**43.2**	**30.9**	**100.2**	**556.6**	**69.4**	-	**21.5**

Key indicators

Key indicator	2011	2024	2028	2038	Target 2039	
NRW; %	75.7%	64.1%	54.7%	31.6%	30.0%	Gov't Income Support
population connected to WWC; % of water supplied population	76.4%	86.4%	86.4%	86.4%	86.4%	
population connected to WWT; % of water supplied population	0.0%	86.4%	86.4%	86.4%	86.4%	First year:
compliance with UWWTD, year: **2023**	last year of deferred investments:				-	**2016**
compliance with UWWTD; % of target	0.0%	100.0%	100.0%	100.0%	100.0%	Last year:
water supply (savings) / additional costs; MBGN since 2013	NA	(0.62)	(0.82)	(1.01)	NA	**2038**
wastewater collection (savings) / additional costs; MBGN since 2013	NA	0.01	0.02	0.02	NA	
wastewater treatment (savings) / additional costs; MBGN since 2013	NA	1.46	1.51	1.57	NA	OPEX reduction
additional efficiency gains						
(savings) from personnel costs; MBGN since 2013	NA	(1.7)	(1.8)	(2.2)	NA	32%
(savings) from other costs; MBGN since 2013	NA	(0.6)	(0.7)	(0.8)	NA	

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Appendix 4: Examples of interpretation of excessive costs in other EU countries and principles of definition of agglomerations

Sector Information Note[i]

Definition of Waste Water Solutions for Agglomerations to Avoid Excessive Cost

1. Introduction

This note is intended to be used as a basis for further discussions to determine the appropriateness of current practices on the planning of adequate cost effective waste water solutions for smaller agglomerations within Bulgaria. To date the discussions on agglomerations at a National and on an individual project level have focused on two (partially unconnected) issues; namely:

a) Definition of agglomerations;
b) Practices to determine service coverage levels within defined agglomerations.

To address these subject matters this Note provides a summary of:

a) background information on the main principals applied for the definition of an agglomeration within the EC Commission;
b) agglomeration definitions and main principals adopted within individual Member States;
c) the practices adopted within Member States to determine an "appropriate" level of coverage of a centralised sewer system within the agglomeration.

2. Definition of Agglomerations

a) EU Principles

The term agglomeration under Article 2(4) of the Urban Wastewater Directive is "*an area where the population and / or economic activities are sufficiently concentrated for urban waste water to be collected and conducted to an urban waste water treatment plant or to a final discharge point*"

The term "*sufficiently concentrated*" relates to the concentration of population, economic activities as well as a combination of the two. Within the "*agglomeration*" definition, an agglomeration can be served by one or by several urban wastewater treatment plants. Furthermore, a single agglomeration can cover several collecting systems with each one of them connected to one or several plants. The possible definitions are summarised in the below diagram[9] which shows the following options;

Scenario A	One agglomeration that is served by one treatment plant
A-1	Number of closely connected settlements that are served by a single treatment plant
A-2	Single agglomeration covering several adjacent administrative authorities

	served by a single collection system and treatment plant
Scenario B	One agglomeration served by two (or more) separate collecting systems each with its own treatment plant.
B-1	A single agglomeration covering several adjacent administrative entities that are served by several collecting systems and several plants.
Scenario C	Separate agglomerations each with a separate collecting system, but all served by a single treatment plant.

The definition of the "*agglomeration*" does not define the selection basis to determine the most appropriate "*scenario*" to be adopted. However, following general principals - the area served by an individual wastewater treatment plant should be the most cost effective also taking into account other technical, operational and environmental considerations.

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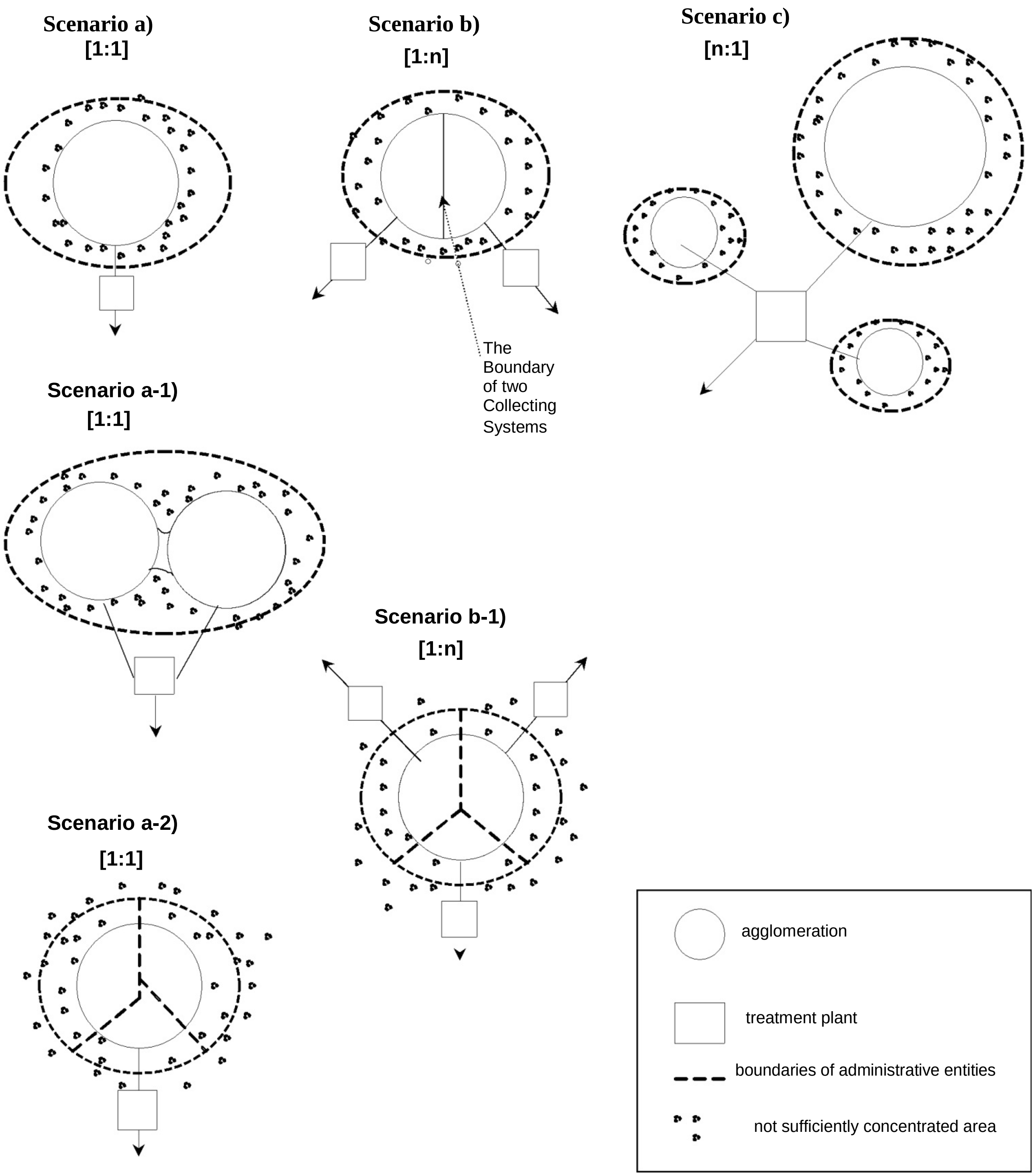

Figure 1. Possible relationships between agglomerations and urban waste water treatment plants.

In determining the size of the agglomeration (the generated load) account should be taken of:

- the resident population;
- non-resident population (tourists etc);
- industrial wastewater from enterprises and economic activities that is or should be discharged

into the collecting system or urban wastewater treatment plant;
- all remaining urban wastewater whether collected or not collected but generated in the agglomeration

b) Methods Adopted in Member States

Different Member States apply different interpretations of an agglomeration and furthermore in many instances, there are also differences within individual Member States. The practical examples can be seen as:

Country	Definition
Czech Republic	• 636 agglomerations above 2,000 PE with 158 above 10,000 PE; • Single or multiple agglomerations discharging to a single treatment plant (Scenario A and C); • Agglomerations are closely linked to administrative areas
Slovakia	• 356 agglomerations above 2,000 PE with 80 agglomerations above 10,000 PE; • Agglomerations mainly relate to administrative areas (Scenario A) with a single collecting system discharging to 1 wastewater plant; • Several agglomerations are served by a single treatment plant; • Settlements within the geographical area covered by the agglomeration with populations below 2,000 PE are often excluded although the main collector pipe traverses or passes close to the settlement;
Hungary	• Some 2,345 agglomerations in total of which 497 are above 2,000 PE and 192 above 10,000 PE; • Agglomeration defined based on catchment area of the wastewater treatment plant (irrespective of administrative boundaries) with systems often extended to include small settlements; • Agglomerations can comprise several municipalities which generally form an Association of Municipalities for project preparation and implementation purposes; • Ad hoc interpretation discussions;
Poland	• Some 1,577 agglomerations with 459 above 15,000 PE. Agglomerations definition mostly under scenario A (all 3), with limited use of scenario B (legacy of existing infrastructure) and occasionally C; • Under scenario A agglomerations can often be extended to include smaller settlements and peri – urban areas; • Formal rules for defining an agglomeration.
Romania	• Some 2,610 agglomerations above 2,000 PE of which 263 are above 10,000 PE;
Slovenia	• 156 agglomerations above 2,000 PE of which 29 are above 10,000 PE;
Lithuania	• 70 agglomerations above 2,000 PE of which 31 are above 10,000 PE; • Mainly Scenarios a and a-2)
Source: Details on number of agglomerations from DG Environment	

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c) Issues to Consider

Within Bulgaria, the applied definition of an agglomeration has to comply with the general guidance given under the Directive 91/273/EEU "Urban Wastewater Treatment". The main issues to be considered in determining the size (and extent) of the agglomeration within this process are seen to be:

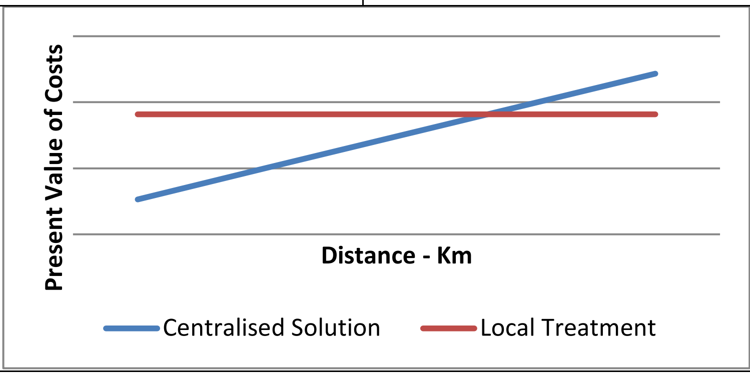
(i) Definition of "sufficiently and not sufficiently concentrated"

The definition needs to consider two aspects.

- firstly, whether the isolated settlements should be served by a centralised treatment plant or have its own separate plant and
- secondly, irrespective of the above whether there should be a formal sewer collecting system.

Justification normally considers the following aspects:

Cost effectiveness	Comparison in present value terms of the following two options. To provide a clearer outcome, the constant of the sewer system within the settlement should be excluded from both the options:	
	Centralised Solution	**Independent plant**
	• Cost of connecting pipeline from the settlement to the next system • Additional wastewater treatment costs	• Cost of wastewater treatment plant; • Cost of connection of main system to this plant.



Cost effectiveness	Where concentrations of population and industries within settlements are considered insufficient to justify a sewer system, the inclusion of the settlement within an agglomeration should depend on the least cost solution for emptying and treating wastes from IAS (individual appropriate systems).
Environmental	Availability of recipient discharging water body and quality impacts;
Operational / Technical	Complexity of operating numerous small treatment plants.

The issue of including small settlements into a defined agglomeration (not sufficiently concentrated) has arisen in projects in a number of other Member States. Within Bulgaria, it is noted that in the definition of many agglomerations peripheral (and in some instances relatively remote) areas around the main urban centre are generally included within the agglomeration. In some cases, connection to a sewer collecting system is only envisaged in subsequent phases of project implementation programme. It is considered important to remember that it is not a prerequisite to provide a sewer connection to all inhabitants within an agglomeration.

(ii) Inclusion of the non-resident (tourist) and industrial load

The inclusion of these two aspects within the total anthropogenic load projections is correct, but raises uncertainties in determining existing and future loads. The problem becomes more significant where currently wastewater from these sources either is not collected or not treated and therefore the existing load is not known. In making these allowances, consideration needs to be given to:

- For industrial wastewater : the impact of necessary pre-treatment and whether the industry should be connected to the sewer system or have independent treatment;
- realistic forecasting of future development of industrial enterprises and the parameters of their waste waters;
- For tourism: realistic forecasting of future development of tourism.

Practical approach / National guidelines should be required as a basis for determining existing anthropogenic load and reliability of future projections. As a minimum, these should be established and used as part of the project review and approval process.

3. Coverage Levels within Agglomerations

a) EU Principles

The Urban Wastewater Directive does not specify required coverage levels (to a sewer collecting system) that need to be achieved on either a project or national level as a compliance criteria. However, comprehensive is presumed. The Directive requires that where sewer systems are not developed that individual appropriate solutions are put in place.

b) Methods Adopted in Other Member States

Other Member States have adopted different parameters to judge the extent to coverage of sewer network within an agglomeration. These parameters generally are based around efficiency indicators (housing density) and it is assumed that those premises that are not covered by the sewer system continue to use individual systems for the collection and treatment of wastewater. In most instances, provisions are not included in the proposed projects to ensure the adequacy of these systems or the parallel collection services. However, capacity requirements at the centralised wastewater treatment plant are taken into account.

Country	Benchmark Guidelines	Comment
Hungary	• 200 inhabitants per 1 km of extension (including main transmission pipeline); • 168 inhabitants excluding the main transmission pipeline.	• Applied for the whole agglomeration and not sections within • Application is defined in national legislation
Poland	• 120 PE per 1 km of extension	• Applied for the agglomeration and not sections within; • Inhabitants can include non permanent and tourists residents; • Exemptions for certain areas of extensions / routing of pipeline such as through water sensitive areas;
Romania	• Cost effectiveness but threshold value not defined	
Slovakia	• Proximity (distance threshold no less than 250 metres from previous connection); • No cost effectiveness parameter	
Czech	• None for coverage; • Cost comparison against individual system; • Distance threshold no less than 200 metres between buildings; • Capital cost sustainability of overall system (CZK 85,000 / € 3,400 per PE connected)	
Slovenia	• Population density	

It can be noted that the above parameters are mostly not formally adopted and are often relaxed in certain projects.

In meeting the obligation to provide comprehensive collection, individual countries apply formally and informally different threshold levels as a target level for achieving comprehensiveness. These can be summarised as:

Country	Benchmark Guidelines
Hungary	• Not defined, but system coverage after projects is generally above 90%
Poland	• 95% - 100% (Sewer network, IAS and closed tank) for settlements above 2,000 PE by the year 2015;
Slovakia	• 85%
Czech	• Not defined, but comprehensive coverage above 90% is common

c) Issues to be Considered

Within Bulgaria, most projects strive to achieve almost full coverage of the sewer system in each settlement of the agglomeration that is served (some settlements in the agglomeration are occasionally not served). An option analysis is rarely undertaken to determine the appropriateness of the proposed increase in coverage (connection) levels. Some areas are justified in terms of water protection zones. The need for an option analysis for sewer extensions should generally be addressed. Justification (especially in projects covering rural areas) has often been requested during the project approval process in several Member States.

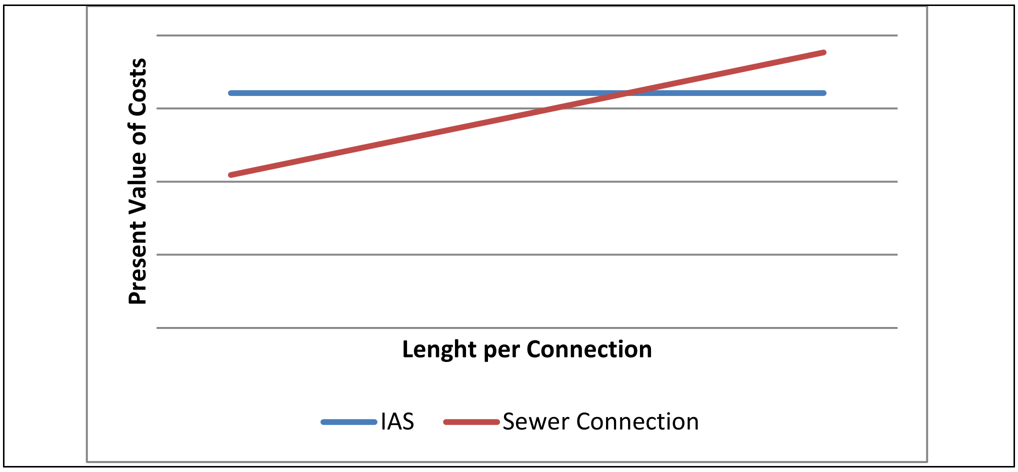
To justify sewer extensions other Member States generally apply a cost effectiveness threshold. This is either implicitly a cost, or more commonly a length per connection parameter. The thresholds tend to be derived at a national level and are applied on a project level irrespective of local project characteristics that may influence the findings.

A general basis to derive an appropriate cost effectiveness threshold is the comparison of the connection cost to a sewer and the alternative of an IAS (Independent Appropriate Solution). This analysis can be undertaken on a settlement by settlement basis and also for areas within individual settlements. The cost effectiveness analysis should compare:

- Sewer option : Capital cost of sewer, its operation and incremental operating costs of the wastewater treatment plant;

- IAS option : Capital cost of the household facility (closed or open septic tank or other), its maintenance, and operating costs of the wastewater treatment plant.

The analysis (especially that for the IAS option) should be undertaken using actual costs incurred and nonfinancial costs incurred by the household for collection and emptying services (that can contain a profit element).



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Appendix 5: Data on Water Supply Quality in the Republic of Bulgaria

Copy of the lettr of the Ministry of Health (with outgoing No. 04-15-27 of February 15, 2013) with all attachments to it.

R E P U B L I C O F B U L G A R I A

MINISTRY OF HEALTH

1000 Sofia, 5, Sveta Nedelya Square Tel.: 9301273, Fax: 9811833

Outgoing No. № _______________
Sofia ___________ 2013 г.

TO
MR. DOBROMIR SIMIDCHIEV
DEPUTY MINISTER
OF REGIONAL DEVELOPMENT AND PUBLIC WORKS

To your letter № 90-05-1902 of January 25, 2013

DEAR MR. SIMIDCHIEV,

In relation to your letter (incoming № 04-15-27 of January 25, 2013) regarding the development of a Strategy for the Development and Management of the WSS Sector, and the request for provision of information regarding the Monitoring, performed by the authorities of the Ministry of Health on the quality of drinking water in the Republic of Bulgaria for the 2007-2011 period, we hereby inform you of the following:

The requirements, related to the quality of drinking water at the level of the European Union have been regulated in Directive 98/83/EU on the quality of water intended for human consumption. The Directive was transposed into the national legislation through Ordinance № 9 on the quality of water intended for drinking and household purposes.
The Directive regulates the volume and frequency of the drinking water quality monitoring which should be performed in the respective water supply zones, in accordance with the quantity of distributed water in 24 hours in the respective zone and the number of population permanently connected to the water supply network within the zone.

The Water Act and Ordinance № 9 oblige the WSS Companies to carry out the full volume of the necessary monitoring. The territorial authorities of the MH – the Regional Health Inspections (RHIs), also have the obligation to carry out monitoring but in smaller volumes – 50 % of the monitoring, carried out by the WSS Companies.

Pursuant to the Directive, in its capacity as an EU member-country, the Republic of Bulgaria is obliged to prepare and submit to the European Commission a report, containing the results from the drinking water quality monitoring in the country every three years.
The reports are sent in an electronic format and present electronic Excel tables, where data is entered in a very specific manner, prepared in accordance with the special manuals.
It is important to stress that only data on the so called **large water supply zones** is included in these reports (in accordance with Art. 13, para. 2 of the above-mentioned Directive). These are the zones where over 1000 cubic meters of water are supplied in 24 hours and/or water is supplied to over 5000 people, permanently connected to the water supply network.

Based on the table-format reports, submitted by the EU member-countries, the EC develops an aggregate summary report, containing the analyzed and aggregated data for the EU as a whole.

In the beginning of 2009, the Ministry of Health in its capacity as a competent authority on enforcing the law on drinking water in Bulgaria, developed and submitted the first report of the Republic of Bulgaria for the 2005-2007 reporting period. In it, the data from the monitoring carried out by the WSS Operators and the RHIs was included for 2007 only (that is the year when Bulgaria became a full member of the EU).

In 2012, a report was developed and submitted for the next three-year period (2008-2010). To date, the aggregated summary report of the EC has still not been drawn up for that period.

Other important problems, whose resolution is necessary in order to improve the quality of drinking water, are: reconstruction and renewal of water mains, that are predominantly severely worn out and outdated, built of asbestos cement pipes which often break; ensuring additional quantities of water in areas, where there are water shortages and restricted water supply is necessary (water regime).

It is important to stress that according to the European requirements, the supply of water with deviations from the norms can be allowed by the national competent authorities for a period no longer than 6 years, and in exceptional cases – for an additional period of 3 years, but only upon permission from the European Commission.
Failure to comply with these requirements, as well as the insufficient monitoring, create actual conditions for starting an infringement procedure against Bulgaria by the European Commission.

The above said means that the resolution of the main problems with relation to the deviation from the drinking water norms in Bulgaria (microbiological, chemical – nitrates, chromium, fluoride, manganese, etc.) should be of priority importance in defining the main objectives and measures within the branch Strategy on the Development and Management of the WSS Sector. The timely ensuring of the necessary funds to undertake fast and effective measures (the construction of new water sources, drinking water treatment plants and facilities for treatment and decontamination, construction of connections between the water supply systems in water supply zones, replacement of outdated and worn out water supply mains, etc.) is imperative, in order to achieve compliance with the national and European legislation.
An important issue is also the resolution of the problem with the failure of the WSS Operators to fulfill their obligations with relation to performing the monitoring of drinking water in the necessary volume and frequency, in compliance with European requirements.

We also propose that the Strategy suggest in what way, in a clear and precise manner, the rights, responsibilities and obligations shall of all parties involved in the process of management, operation, and maintenance of the WSS Sector be distinguished. Should this fail to be done, real danger exists that with the establishment of the WSS Associations, the opportunity for "blurred" obligations and responsibilities of the specific parties involved in this process, multiply. It should be clearly defined who shall manage and implement activities on identification, planning and implementation of fast and adequate measures to eliminate discrepancies in the quality of water, in what way and from what sources funding should be ensured for the implementation of these activities.
We hereby express our readiness for active cooperation and participation in the development of the branch Strategy on the Development and Management of the WSS Sector.

Attachment: as per the text above.

DESSISLAVA DIMITROVA
DEPUTY MINISTER
Coordinated by:
Dr. D. Dimitrov, Director of PHMSDP Directorate
Prepared by:
Dr. Ivo Atanassov, State Expert at PHMSDP Directorate

This document has been prepared within Project № DIR-5111328-1-170 „Support for the reform in the WSS Sector", implemented with the financial support of OP „Environment 2007 – 2013 г.", co-financed by the European Union through the European Cohesion Fund

ATTACHMENT № 1

Large water supply zones

Parameter	2007					2008					2009					2010				
	zones where the indicator has been tested	zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	compliance %	zones where the indicator has been tested	of zones with deviations from	Total number of analyses	number of non-compliant analyses	compliance %	zones where the indicator has been tested	of zones with deviations from	Total number of analyses	number of non-compliant analyses	compliance %	zones where the indicator has been tested б	of zones with deviations from	Total number of analyses	number of non-compliant analyses	compliance %
Escherichia coli	235	71	26516	243	99.08	253	58	24896	179	99.28	199	54	18816	186	99.01	196	69	17803	355	98.01
enterococci	232	22	6058	53	99.13	249	21	5836	65	98.89	186	16	4754	25	99.47	183	19	4763	23	99.52
antimony	39	0	199	0	100	62	0	251	0	100	111	0	1731	0	100	126	0	1638	0	100
Arsenic	160	0	773	0	100	195	0	725	0	100	185	0	2116	0	100	178	0	1957	0	100
benzene	27	0	95	0	100	49	0	109	0	100	89	0	249	0	100	131	0	347	0	100
Benzo (a) pyrene	24	0	103	0	100	46	0	89	0	100	94	0	259	0	100	112	0	313	0	100
Boron	86	0	451	0	100	131	0	597	0	100	131	0	736	0	100	154	0	697	0	100
Bromates	1	0	1	0	100	17	0	54	0	100	5	0	5	0	100	15	0	40	0	100
cadmium	181	0	916	0	100	213	0	871	0	100	181	0	2094	0	100	177	0	2005	0	100
Chromium	220	0	1401	0	100	234	0	1323	0	100	190	0	2456	0	100	187	0	2398	0	100
Copper	223	0	1250	0	100	242	0	1183	0	100	192	0	2304	0	100	180	0	2180	0	100
Cyanides	152	0	799	0	100	143	0	823	0	100	137	0	830	0	100	171	0	903	0	100
1,2-Dichloroethane	20	0	84	0	100	48	0	119	0	100	89	0	249	0	100	134	0	393	0	100
Fluorides	215	0	1412	0	100	234	0	1389	0	100	184	1	1100	1	99.91	182	0	1017	0	100
Lead	179	0	943	0	100	226	0	890	0	100	190	0	2136	0	100	180	0	2013	0	100
mercury	24	0	91	0	100	34	0	76	0	100	90	0	261	0	100	130	0	328	0	100
nickel	116	0	462	0	100	138	0	679	0	100	168	0	2057	0	100	168	0	2027	0	100
Nitrates	235	21	17563	203	98.84	251	24	19055	305	98.40	198	23	14022	255	98.18	196	24	12992	207	98.41
Nitrates output treatment plants	21	1	10256	5	99.95	28	0	10784	0	100	24	0	3000	0	100	19	0	3291	0	100
Nitrates at consumer's tap	235	3	23176	10	99.96	253	1	23518	2	99.99	199	1	17111	11	99.94	196	1	16558	1	99.99
Nitrates/Nitrites formula	235	22	17563	204	98.84	226	24	19055	305	98.47	199	28	14000	295	97.89	196	27	12946	240	98.15
Pesticites - total	35	0	2961	0	100	63	0	150	0	100	118	0	302	0	100	137	0	442	0	100
Polycyclic aromatic hydrocarbons	28	0	92	0	100	42	0	65	0	100	92	0	257	0	100	113	0	316	0	100
selenium	74	0	328	0	100	100	0	351	0	100	147	0	1837	0	100	159	0	1751	0	100
Tetrachloride and trichloroethane	20	0	84	0	100	46	0	112	0	100	89	0	248	0	100	134	0	391	0	100
trihalomethanes- total	37	0	139	0	100	55	0	170	0	100	100	0	264	0	100	139	1	402	1	99.75
aluminum	166	2	3088	6	99.81	170	2	5438	4	99.93	167	0	5190	0	100	162	1	5602	47	99.16
ammonia ion	235	2	32106	11	99.97	253	3	23049	21	99.91	199	2	17154	22	99.87	196	3	16810	3	99.98
Chlorides	234	0	9866	0	100	251	1	10957	1	99.99	197	0	6008	0	100	196	1	5710	2	99.97
Clostridium perfringence	76	1	1275	1	99.92	88	1	1744	1	99.94	87	5	3161	11	99.65	104	4	3079	14	99.55
conductance	226	0	17255	0	100	251	0	20086	0	100	198	0	16123	0	100	196	0	15976	0	100
Active reaction (pH)	235	1	22075	3	99.99	253	1	22060	1	99.99	199	8	16950	12	99.93	196	8	16688	12	99.93
Iron	234	24	8221	60	99.27	251	22	9753	58	99.41	196	20	7582	94	98.76	195	22	7559	282	96.27
Manganese	235	16	16171	409	97.47	251	15	17033	334	98.04	198	20	14522	302	97.92	196	25	14386	279	98.06
oxidation	230	3	10552	6	99.94	253	4	11102	51	99.54	197	6	7289	213	97.08	196	10	7386	245	96.68
sulphates	232	1	2100	7	99.67	251	3	1801	13	99.28	192	2	1440	10	99.31	190	2	1189	3	99.75
sodium	81	0	430	0	100	83	0	425	0	100	102	0	466	0	100	139	0	513	0	100
coliforms	235	127	26010	757	97.09	253	127	23961	1102	95.4	199	92	18816	653	96.53	196	80	17799	704	96.04
tritium	1	0	1	0	100	16	0	5	0	100	35	0	114	0	100	44	0	68	0	100
Total indicative dose	97	0	174	0	100	47	0	78	0	100	58	0	96	0	100	59	0	110	0	100
Colour	235	18	23097	49	99.79	253	19	21742	47	99.78	199	14	16818	33	99.8	196	22	16802	65	99.61
Odour	235	6	2274	16	99.93	253	4	21597	5	99.98	199	11	17128	25	99.85	196	7	16860	11	99.93
Taste	235	4	21686	10	99.95	253	4	20719	6	99.97	198	11	15688	22	99.86	195	6	15540	12	99.92
Number of colonies at 220C	175	4	6814	7	99.9	198	7	5610	34	99.39	181	21	5843	106	98.19	178	20	4332	87	97.99
Total organic carbon	6	0	23	0	100	30	0	322	0	100	23	0	87	0	100	28	0	160	0	100
Turbidity	234	35	22188	286	98.71	242	34	22395	202	99.1	198	31	16474	474	97.12	195	46	16519	749	95.47

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Small zones-category 3

Parameter	2009					2010				
	zones where the indicator has been tested	zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	compliance %	number of zones where the indicator has been tested	zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	compliance %
Aluminum	207	0	578	0	100	211	1	536	1	99.81
Arsenic	212	1	438	1	99.77	222	1	464	26	94.4
Boron	177	0	331	0	100	196	0	378	0	100
Benzo (a) pyrene	82	0	102	0	100	129	0	167	0	100
benzene	81	0	99	0	100	143	0	178	0	100
Bromates	0	0	0	0	0	8	0	8	0	100
Number of colonies at 22^{o}C	228	14	632	17	97.31	229	13	643	17	97.36
cadmium	218	0	429	0	100	229	0	465	0	100
chlorides	252	1	1875	1	99.95	263	1	2031	2	99.9
Clostridium perfringence	102	0	390	0	100	108	2	404	2	99.51
Cyanides	167	0	352	0	100	217	0	463	0	100
coliforms	259	116	4600	250	94.57	263	93	4381	203	95.37
Colour	260	4	4300	8	99.81	263	13	4275	20	99.53
Chromium	236	4	636	22	96.54	239	2	635	11	98.27
Copper	234	0	515	0	100	243	0	541	0	100
1,2-Dichloroethane	74	0	95	0	100	150	0	189	0	100
Conductivity	260	0	4199	0	100	263	0	3970	0	100
enterococci	238	15	910	16	98.24	246	12	945	15	98.41
Escherichia coli	259	46	4597	79	98.28	263	64	4374	158	96.39
Fluorides	237	2	566	16	97.17	237	2	575	20	96.52
Iron	251	8	1695	15	99.12	258	13	1584	18	98.86
Mercury	82	0	117	0	100	133	0	184	0	100
Manganese	253	10	3662	81	97.79	263	10	3623	92	97.46
sodium	96	0	149	0	100	172	0	261	0	100
ammonia ion	260	1	4519	28	99.38	263	4	4278	16	99.63
nickel	192	0	363	0	100	216	0	440	0	100
Nitrates at consumer's tap	260	2	4500	38	99.16	263	3	4221	15	99.64
Nitrates output treatment plants	19	0	115	0	100	21	0	95	0	100
Nitrates	253	41	4244	353	91.68	263	49	3880	390	89.95
Odour	260	7	4495	14	99.69	263	3	4301	3	99.93
oxidation	258	0	1709	0	100	260	0	1554	0	100
Polycyclic aromatic hydrocarbons	82	0	102	0	100	129	0	167	0	100
Lead	229	0	453	0	100	238	0	482	0	100
Active reactions (pH)	260	10	4524	15	99.67	263	5	4295	6	99.86
antimony	113	1	188	1	99.47	161	0	245	0	100
selenium	146	0	251	0	100	191	1	307	1	99.67
Sulphates	243	2	599	5	99.17	243	2	626	4	99.36
Taste	257	2	3984	6	99.85	261	4	3739	5	99.87
trihalomethanes- total	84	0	116	0	100	157	0	194	0	100
Total indicative dose	42	0	53	0	100	98	0	120	0	100
Total organic carbon	4	0	5	0	100	6	1	15	5	66.67
Tetrachloride and trichloroethane	82	0	103	0	100	150	0	188	0	100
tritium	34	0	40	0	100	46	0	51	0	100
Turbidity	258	11	4340	26	99.4	262	27	4240	48	98.87
Pesticides -total	115	0	148	0	100	169	0	248	0	100

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Small zones-category 2

Parameter	2009					2010				
	number of zones where the indicator has been tested	Number of zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	compliance %	number of zones where the indicator has been tested	Number of zones with deviation from the	Total number of analyses	number of non-compliant analyses	compliance %
Aluminum	561	0	1227	0	100	564	0	1103	0	100
Arsenic	550	2	863	3	99.65	578	0	967	0	100
Boron	457	0	687	0	100	526	0	859	0	100
Benzo (a) pyrene	144	0	150	0	100	311	0	385	0	100
Bensene	137	0	142	0	100	343	0	419	0	100
Bromates	1	0	1	0	100	31	0	32	0	100
Number of colonies at 22^{o}C	598	50	1252	82	93.45	621	32	1282	33	97.43
cadmium	550	0	811	0	100	593	0	991	0	100
chlorides	681	2	3484	3	99.91	717	2	3719	11	99.7
Clostridium perfringence	249	5	601	5	99.17	265	7	664	8	98.8
Cyanides	414	0	776	0	100	556	0	1035	0	100
Колиформи	707	255	8291	591	92.87	723	246	8446	485	94.26
Colour	707	10	7979	15	99.81	723	17	8434	21	99.75
Chromium	642	13	1307	59	95.49	633	13	1394	67	95.19
Copper	604	0	1064	0	100	652	0	1217	0	100
1,2-Dichloroethane	122	0	128	0	100	346	0	423	0	100
Conductivity	706	1	7588	5	99.93	723	1	7838	4	99.95
enterococci	625	23	1603	23	98.57	654	32	1717	34	98.02
Escherichia coli	707	105	8301	171	97.94	723	191	8434	354	95.8
Fluorides	621	3	1148	4	99.65	633	4	1262	10	99.21
Iron	677	18	3439	44	98.72	692	17	3249	31	99.05
Mercury	133	0	160	0	100	274	0	345	0	100
Manganese	681	20	6649	42	99.37	719	22	6864	30	99.56
sodium	193	0	233	0	100	390	0	557	0	100
ammonia ion	707	1	8396	1	99.99	723	5	8454	6	99.93
nickel	467	0	688	0	100	564	0	981	0	100
Nitrates at consumer's tap	707	3	8388	3	99.96	723	0	8383	0	100
Nitrates output treatment plants	24	0	105	0	100	19	0	100	0	100
Nitrates	684	107	7966	612	92.32	722	120	7650	693	90.94
Odour	707	20	8370	34	99.59	723	6	8497	7	99.92
oxidation	699	1	3657	1	99.97	710	1	3684	1	99.97
Polycyclic aromatic hydrocarbons	143	0	149	0	100	310	0	384	0	100
Lead	585	0	889	0	100	639	0	1072	0	100
Active reactions (pH)	707	6	8405	16	99.81	723	7	8492	20	99.76
antimony	190	0	241	0	100	333	0	454	0	100
selenium	273	0	383	0	100	398	1	622	1	99.84
Sulphates	646	2	1215	3	99.75	646	4	1285	6	99.53
Taste	703	14	7555	21	99.72	719	6	7704	6	99.92
trihalomethanes- total	136	0	143	0	100	347	0	426	0	100
Total indicative dose	109	0	132	0	100	216	0	245	0	100
Total organic carbon	15	0	19	0	100	15	0	18	0	100
Tetrachloride and trichloroethane	136	0	142	0	100	346	0	423	0	100
tritium	21	0	22	0	100	145	0	151	0	100
Turbidity	704	32	7927	41	99.48	720	50	8274	69	99.17
Pesticides -total	220	0	239	0	100	412	0	529	0	100

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Small zones - category 1

Parameter	2009					2010				
	zones where the indicator has been tested	zones with deviation from the	Total number of analyses	number of non-compliant analyses	compliance %	zones where the indicator has been tested	zones with deviation from the	Total number of analyses	number of non-compliant analyses	complianc e %
Aluminum	851	0	1661	0	100	828	0	1532	0	100
Arsenic	821	1	1123	1	99.91	845	1	1220	13	98.93
Boron	612	1	836	1	99.88	696	1	1058	1	99.91
Benzo (a) pyrene	160	0	167	0	100	279	0	327	0	100
Bensene	159	0	166	0	100	349	0	396	0	100
Bromates	0	0	0	0	0	22	0	23	0	100
Number of colonies at 22°C	927	152	2208	266	87.95	967	85	2059	106	94.85
cadmium	832	0	1112	0	100	868	0	1229	0	100
chlorides	1092	0	4844	0	100	1187	0	5365	0	100
Clostridium perfringence	374	8	886	8	99.1	365	22	879	24	97.27
Cyanides	711	0	1216	0	100	896	0	1516	0	100
Колиформи	1148	447	9452	1024	89.17	1202	425	9984	838	91.61
Colour	1146	18	9223	27	99.71	1203	36	10079	55	99.45
Chromium	978	4	1708	18	98.95	970	3	1858	13	99.3
Copper	914	0	1488	0	100	963	0	1643	0	100
1,2-Dichloroethane	152	0	158	0	100	350	0	399	0	100
Conductivity	1147	0	9015	0	100	1200	0	9612	0	100
enterococci	962	63	1945	65	96.66	1011	87	2291	92	95.98
Escherichia coli	1148	243	9487	406	95.72	1202	337	10019	760	92.41
Fluorides	933	4	1557	7	99.55	949	3	1707	8	99.53
Iron	1061	23	4343	57	98.69	1086	23	4302	57	98.68
Mercury	198	0	225	0	100	263	0	316	0	100
Manganese	1083	29	8290	98	98.82	1162	26	8810	127	98.56
sodium	214	0	239	0	100	384	0	499	0	100
ammonia ion	1150	7	9639	36	99.63	1202	8	10088	28	99.72
nickel	707	0	1010	0	100	751	0	1220	0	100
Nitrates at consumer's tap	1150	1	9637	3	99.97	1203	4	9989	4	99.96
Nitrates output treatment plants	60	0	373	0	100	55	0	392	0	100
Nitrates	1106	176	9176	962	89.52	1198	180	9226	920	90.03
Odour	1150	49	9634	62	99.36	1203	31	10148	49	99.52
oxidation	1111	5	5218	5	99.9	1115	8	5341	10	99.81
Polycyclic aromatic hydrocarbons	160	0	167	0	100	286	0	335	0	100
Lead	859	2	1192	2	99.83	890	0	1283	0	100
Active reactions (pH)	1151	16	9661	27	99.72	1203	14	10146	30	99.7
antimony	296	1	344	1	99.71	335	0	415	0	100
selenium	442	0	532	0	100	467	0	614	0	100
Sulphates	1003	5	1662	5	99.7	995	5	1816	7	99.61
Taste	1143	36	8613	45	99.48	1194	31	9200	36	99.61
trihalomethanes- total	169	0	176	0	100	359	0	409	0	100
Total indicative dose	130	0	136	0	100	231	0	247	0	100
Total organic carbon	11	0	13	0	100	29	0	35	0	100
Tetrachloride and trichloroethane	154	0	161	0	100	350	0	399	0	100
tritium	30	0	40	0	100	104	0	109	0	100
Turbidity	1139	55	8812	88	99	1197	91	9584	140	98.54
Pesticides -total	249	0	266	0	100	401	0	462	0	100

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Small zonesи - category 0

Parameter	2009					2010				
	number of zones where the indicator has been tested	zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	compliance %	number of zones where the indicator has been tested	zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	complian ce %
Aluminum	169	0	270	0	100	177	0	261	0	100
Arsenic	145	0	161	0	100	125	0	142	0	100
Boron	126	0	154	0	100	128	0	157	0	100
Benzo (a) pyrene	38	0	40	0	100	52	0	55	0	100
Bensene	38	0	40	0	100	55	0	58	0	100
Bromates	1	0	1	0	100	1	0	1	0	100
Number of colonies at 22^{o}C	204	20	388	22	94.33	211	17	391	18	95.4
cadmium	158	0	190	0	100	146	0	179	0	100
chlorides	250	0	965	0	100	263	0	1155	0	100
Clostridium perfringence	59	0	166	0	100	40	1	116	1	99.14
Cyanides	171	0	233	0	100	161	0	224	0	100
Колиформи	258	136	1393	230	83.49	274	119	1576	237	84.96
Colour	260	8	1398	8	99.43	272	19	1568	24	98.47
Chromium	199	0	280	0	100	181	0	287	0	100
Copper	193	0	259	0	100	182	0	244	0	100
1,2-Dichloroethane	38	0	40	0	100	56	0	59	0	100
Conductivity	248	0	1313	0	100	273	0	1571	0	100
enterococci	201	17	355	20	94.37	223	35	436	36	91.74
Escherichia coli	258	70	1403	95	93.23	274	101	1583	175	88.95
Fluorides	201	0	285	0	100	176	0	276	0	100
Iron	237	3	696	7	98.99	249	13	685	13	98.1
Mercury	59	0	62	0	100	32	0	34	0	100
Manganese	252	2	1212	2	99.84	264	5	1404	6	99.57
sodium	12	0	13	0	100	35	0	36	0	100
ammonia ion	260	2	1389	2	99.86	273	1	1574	1	99.94
nickel	135	0	166	0	100	123	0	171	0	100
Nitrates at consumer's tap	260	0	1398	0	100	273	0	1558	0	100
Nitrates output treatment plants	18	0	119	0	100	17	0	110	0	100
Nitrates	260	4	1310	19	98.55	271	10	1422	42	97.05
Odour	260	20	1404	24	98.29	273	25	1580	38	97.59
oxidation	240	0	883	0	100	250	2	1033	2	99.81
Polycyclic aromatic hydrocarbons	38	0	40	0	100	52	0	55	0	100
Lead	160	0	194	0	100	146	0	181	0	100
Active reactions (pH)	260	2	1406	3	99.79	273	3	1579	4	99.75
antimony	77	0	79	0	100	56	0	56	0	100
selenium	114	0	120	0	100	85	0	91	0	100
Sulphates	209	0	311	0	100	193	0	293	0	100
Taste	254	20	1259	24	98.09	269	14	1447	14	99.03
trihalomethanes- total	38	0	40	0	100	56	0	59	0	100
Total indicative dose	33	0	33	0	100	42	0	43	0	100
Total organic carbon	1	0	1	0	100	2	0	2	0	100
Tetrachloride and trichloroethane	38	0	40	0	100	56	0	59	0	100
tritium	40	0	41	0	100	7	0	10	0	100
Turbidity	255	13	1243	18	98.55	271	37	1503	48	96.81
Pesticides -total	46	0	48	0	100	58	0	61	0	100

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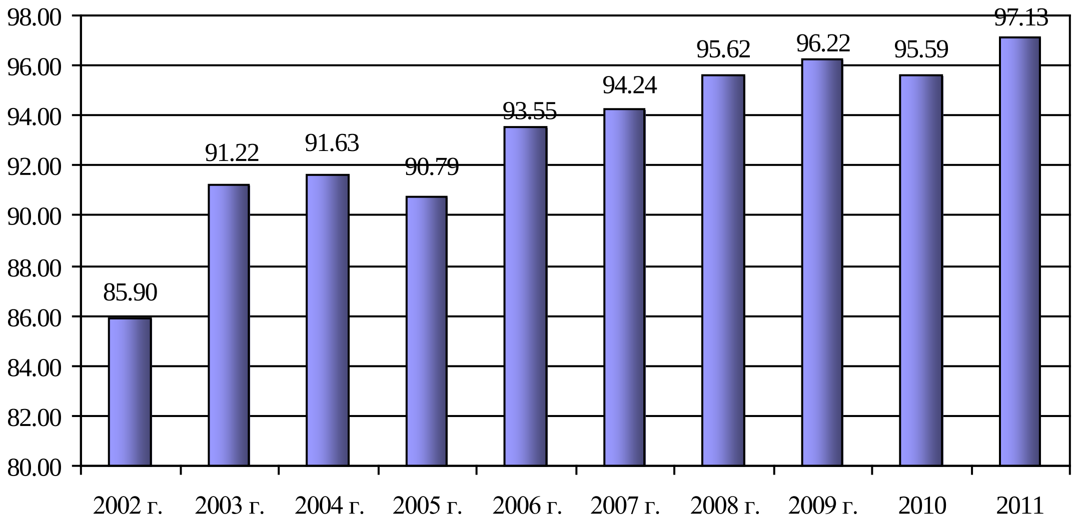
Attachment № 2
Quality of drinking water – 2011.
(Aggregate data from the Monitoring of drinking water carried out by the Regional Health Inspections in 2011)

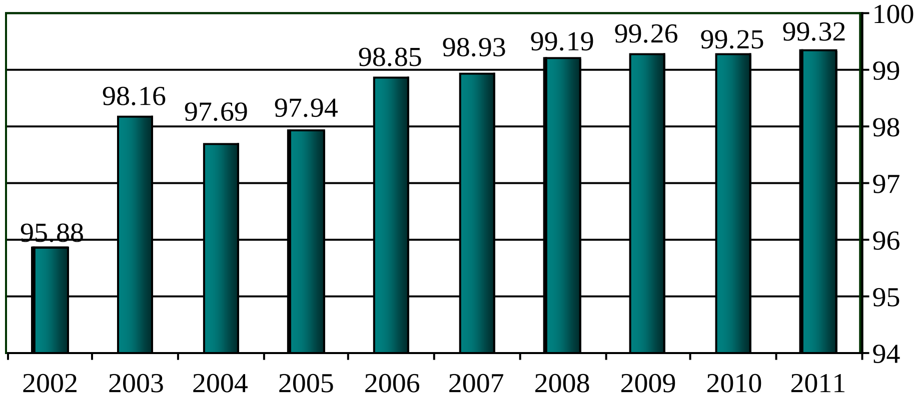
In 2011, the 28 RHI in the country carried out monitoring of the chemical, microbiological and radiological indicators for the quality of drinking water, supplied to the population in 8 652 points in the country. 6 357 water sources are being used to supply the water for drinking and household purposes, out of which 248 are surface ones (3,9 %) and 6109 are ground sources (96,1 %). Only 112 (or 45,1 %) of surface water sources undergo the necessary water treatment.
A total of 19 484 samples have been analyzed, of which 16 841 (86,43 %) samples by indicators for permanent monitoring and 2 643 samples (13,57 %) by indicators for periodic monitoring. Of the tested samples for permanent monitoring, 8,9 % showed non-compliance, and with regards to the samples for periodic monitoring – 14,9 % (against 10 % and 15,7 % for 2010 respectively)

In 2011, at the RHI, a total of 369 034 analyses under the tested indicators have been conducted, out of which 293 263 (79,46 %) within the state health control (SHC), while the remaining 75 771 (20,54 %) have been conducted upon the request of natural and legal persons. The contracting parties have mostly been WSS Companies which do not have the laboratory capacity for many of the monitored indicators. Out of the total number of analyses of the drinking water, conducted by the RHI under the SHC, compliance with the norms has been confirmed for 98,98 % of them.
In 2011, 46 020 analyses have been conducted within the SHC, as the non-compliance percentage is 2,87 % against 4,41 % for 2010.



The microbiological non-compliance exceeds 5% in 5 regions – Bourgas (6,69 %), Kyustendil (8,23%), Montana (7,23%), Silistra (8,42%) and Turgovishte (5,34%), while in 2010 the norms were exceeded in 14 regions.
Overall, deviation from the norms under this type of indicators is characteristic of small water supply systems, which do not have treatment facilities and water is supplied to the population directly after only decontamination. This periodically repeated non-compliance in the microbiological quality of drinking water reflects the shortcomings in the decontamination of water, due to the lack of modern facilities and installations which would ensure systematic, constant and effective decontamination of the water, incorrect location of the decontaminating stations, poor condition of the network of water supply mains, use of inappropriate decontaminants/disinfectants, etc.

A total of 247 243 analyses have been conducted under the state health control by **organoleptic, chemical and radiological** indicators and the results show non-compliance in 0,68 % of them.



Lasting deviations in the chemical composition have been registered under **the nitrates, manganese, fluoride, chromium and arsenic** indicators.

Excessive amount of **nitrates** (>50 mg/l) have been registered most often, in the greatest number of water supply zones. Nitrates are a perennial problem for drinking water supply in regions with intensive agriculture. The problem has been registered in 23 regions, as the most affected ones are Haskovo, Turgovishte, Stara Zagora, Pleven, Shoumen, Varna, Veliko Turnovo, Razgrad, Rousse, Yambol and Bourgas. In the majority of cases the norms have been exceeded up to two times..

In 2011 in Sofia and in the regions of Vidin, Pernik, Kurdzhali and Smolyan there are no registered tested samples of water with increased content of nitrates.

There is a general trend of very slow decrease in the number of exposed population in the last three decades but the forecast is that we cannot expect dramatic changes in the next few years. The exposure of the rural population in small water supply zones is prevalent.

In some regions of the country (the regions of Pleven and Montana) the deviation from the norm of the chromium content in the ground drinking water marks a lasting trend. The increased chromium content in the drinking water sources is not of anthropogenic origin, but is rather due to natural geogenical presence in the ground waters. Most often, the chromium concentration falls within the range between 0,05-0,1 mg/l, i.e. it exceeds up to two times the acceptable norm and is registered in a limited number of small water supply zones.

In 2011, small water supply systems with a concentration of fluoride in the drinking water exceeding the acceptable norm continue to operate (in the regions of Blagoevgrad, Bourgas, Haskovo and Yambol). It is about a naturally conditioned increased content of fluoride in the ground waters. The concentrations are relatively not so high – they exceed the accepted norm of 1.5 mg/l by around two times.

The established deviation from the norm of the arsenic indicator in three water supply zones in Haskovo Region are also caused by the naturally higher content of this element in the ground waters in the region. For one of the zones the problem has already been resolved through the connection of the settlement to a new water supply main in another water supply zone, where the content of arsenic in the drinking water does not exceed the norm. In the other two zones the issue has not yet been resolved.

The problem with the deviation from the norm of the "manganese" indicators presents no direct health hazard, even if the norm is exceeded up to a certain level, but is very important for the consumers, as this indicator changes strongly the colour, taste and turbidity of water.

The problem is mostly of regional character – settlements mostly in the regions of Haskovo, Stara Zagora, Gabrovo, Veliko Turnovo, Sliven, etc. The increased content of manganese is due to natural factors. In some settlements in the region of Haskovo concentrations of manganese considerably exceeding the acceptable norm have been reported, which not only deteriorates the organoleptic qualities of water, but may present a health hazard. The problem continues to exist to date, although it could be resolved through the construction of treatment (manganese removal) plants or of new water supply mains from neighbouring water supply zones, providing water that meets the requirements

The problem with the lack of treatment facilities for the water from the surface water sources (including large dams, such as Ticha dam and others) also remains unresolved in the previous year. This results in deterioration of the quality of water supplied by organoleptic indicators (colour, turbidity, taste odour), especially in periods of torrential rains or rapid snowmelt.

In 2011 too, the WSS Operators as a whole fail to fulfill their obligations with relation to conducting monitoring of the drinking water quality in its full volume and frequency in compliance with the national and European legislation.

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RHI	Number of water sources for the supply of drinking water	Of them :open water sources		Number of stations of the water supply network of the settlements	Monitoring				Analyses conducted							
		Num ber	Of them: with treatment facilities		Number of samples under the continuous monitoring indicators	Of them: complying with Ordinance № 9	Number of samples under the periodic monitoring indicators	Of them: complying with Ordinance № 9	All tests conducted	Under the SHC						Upon requests
										Number of samples under the chemical, organoleptic and radiological indicators	Of them: complying with Ordinance № 9	% non-compliant	Number of samples under the microbiological indicators	Of them: complying with Ordinance № 9	% non-compliant	
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Blagoevgrad	232	32	4	493	1 195	1 152	119	110	19 980	12 050	11 975	0.62%	4 029	3 970	1.46%	3 901
Bourgas	284	2	2	520	709	582	64	41	13 782	8 834	8 795	0.44%	1 674	1 562	6.69%	3 274
Varna	324			337	724	676	74	56	17 919	8 062	7 973	1.10%	2 716	2 667	1.80%	7 141
V. Turnovo	226	1	1	259	273	232	59	39	9 936	5 722	5 631	1.59%	1 447	1 447		2 767
Vidin	65	3		257	120	117	43	41	3 853	2 524	2 524		424	419	1.18%	905
Vratsa	189			261	557	526	64	60	12 275	9 369	9 334	0.37%	1 529	1 465	4.19%	1 377
Gabrovo	328	18	12	406	559	511	132	102	9 600	7 800	7 693	1.37%	1 432	1 362	4.89%	368
Dobrich	186			414	532	450	88	66	10 910	8 192	8 106	1.05%	1 316	1 267	3.72%	1 402
Kurdjali	111	2	2	226	169	165	96	95	6 729	4 704	4 698	0.13%	925	882	4.65%	1 100
Kuystendil	222	36	6	185	267	234	77	48	8 713	4 955	4 950	0.10%	1 263	1 159	8.23%	2 495
Lovech	288	6		217	147	141	44	42	9 103	3 409	3 401	0.23%	587	575	2.04%	5 107
Montana	202	21	16	208	772	683	34	29	12 612	8 955	8 936	0.21%	1 868	1 733	7.23%	1 789
Pazardzhik	189	17	12	240	274	254	85	78	10 355	6 236	6 223	0.21%	945	907	4.02%	3 174
Pernik	182	7	3	347	507	476	70	63	14 093	8 183	8 177	0.07%	1 491	1 448	2.88%	4 419
Pleven	431			277	614	487	113	76	16 720	13 507	13 325	1.35%	1 849	1 817	1.73%	1 364
Plovdiv	228	17	17	228	386	345	243	220	15 249	11 253	11 218	0.31%	1 389	1 338	3.67%	2 607
Razgrad	111			208	228	196	82	71	8 512	4 676	4 632	0.94%	686	666	2.92%	3 150
Rousse	165			165	316	273	49	35	5 615	4 085	4 020	1.59%	654	643	1.68%	876
Silistra	82			234	159	136	30	22	3 949	2 817	2 812	0.18%	368	337	8.42%	764
Sliven	254	3	1	235	510	480	23	21	9 491	7 151	7 131	0.28%	1 135	1 096	3.44%	1 205
Smolyan	225	8	7	337	246	235	56	56	6 748	4 488	4 483	0.11%	728	717	1.51%	1 532
Sripcph	38	19	2	78	1 275	1 260	28	27	43 225	27 619	27 619		3 965	3 949	0.40%	11 641
Sofia Region	396	52	26	782	2 829	2 807	254	245	26 420	20 003	19 985	0.09%	3 382	3 316	1.95%	3 035
Stara Zagora	403	2		420	1 486	1 404	299	289	24 805	18 328	18 243	0.46%	3 858	3 839	0.49%	2 619
Turgovishte	224	1	1	365	534	413	82	58	12 164	8 759	8 564	2.23%	1 479	1 400	5.34%	1 926
Haskovo	351			416	946	658	209	155	21 336	17 170	16 791	2.21%	2 720	2 610	4.04%	1 446

Shoumen	233	1		317	303	263	68	49	9 348	4 756	4 715	0.86%	1 517	1 483	2.24%	3 075
Yambol	188			220	204	178	58	54	5 592	3 636	3 610	0.72%	644	627	2.64%	1 312
TOTAL	**6 357**	**248**	**112**	**8 652**	**16 841**	**15 334**	**2 643**	**2 248**	**369 034**	**247 243**	**245 564**	**0.68 %**	**46 020**	**44 701**	**2.87 %**	**75 771**

Appendix 6: Ownership and Management of WSS Assets

The Water Act (WA) requires that the ownership of WSS infrastructure assets rest with public authorities as so-called “public state assets” or “public municipal assets” (henceforth just called state and municipal assets). Outside Sofia, the Bulgarian WSS sector predominantly features public operators. The majority of operators are owned by the state, a municipality or jointly by the state (51%) and municipalities (49%).

However, the delay in the implementation of the WA significantly affects the proper management of WSS assets. Since the WA is still not fully applied, most of the WSS assets are still (March 31, 2013) commercially owned – and reflected in the balance sheets of WSSCs. In addition, similar assets are reflected differently in the balance sheets of WSSCs (both WSSA assets as well as the right to use WSS assets exist simultaneously). The resulting complexity contributes to the slow pace of improvements to service quality, efficiency and asset management and maintenance. The MRD has taken a number of steps to address these complexities.

As per the Water Act for the purpose of management, planning and delivery of water and sewerage services, the territory of the country is divided into “designated territories”. These territories correspond to the regions served by the existing WSS operators. The act requires that Water Supply and Sanitation Association (WSSA) is established when the ownership of the WSS assets in the designated territory is separated between the state and one or more municipalities. WSSAs are mainly responsible to:

- Appoint the WSSCs as provisioned under the Water Act or the Concession Act.
- Develop and approve Regional Master Plans for the WSS systems and Master Plans for agglomerations above 10,000 inhabitants within their designated territory.
- Approve the Business Plans of the WSSCs.

All WSSA have been established as at March 31, 2013with the exception of one.

As stated above, according to the WA all WSS infrastructure (not buildings, vehicles, equipment and etc.) is to become state or municipal property. In general, WSS assets within the boundaries of a municipality will become public municipal property. However, if a WSS asset serves more than one municipality it will become public state property.

The WSS assets are currently in the balance sheet (BS) of WSS operators. After the adoption of the amendments to the WA, henceforth called “A” day, the WSSCs should provide a list of all the public assets in their balance sheet; local public authorities should do the same for all WSS assets that are not in the balance sheets of the operators but are within their territory and are used for the provision of WSS services, and both WSSCs and municipalities should submit those lists to MRD (A+4 months). According to the WA, upon receipt of the lists, the MRD then must prepare protocols for distribution of these WSS assets between the state and municipalities (A+10 months). The new WSS owners (state and municipalities) will have 2 months to object the distribution protocols (A+12 months). If there is no objection the WSS assets will be considered accepted and the ownership over them transferred by law (*ex lege*) to WSSA. After that, to finalize the process, the owners of the WSSCs need to start the process of removing the public WSS assets from their balance sheets (A+15 months).

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Appendix 7: Functioning of Water Supply and Sanitation Associations and Consolidation of Operators

The existing WA establishes the WSSAs as legal entities, one for each administrative district. However, a couple of issues are outstanding:

1) **How to transform the newly established legal entity, the WSSA into a fully functioning association,** capable of planning and managing WSS infrastructure at administrative district (oblast) level and managing selection of the district operator.

2) **How to select the operator in a region**. Currently 65 operators are operating in 28 administrative districts. The intention is to have one operator for each WSSA. It is possible that the same operator may serve more than one WSSA in the future.

3) **How to ensure a fair regulatory impact of the transfer of assets.** WSSCs have expressed concerns that their allowed tariffs could go down when the assets are transferred from their balance sheet to the municipality or state even while they retain responsibility to operate and maintain the asset. The intention is for such a transfer to be tariff neutral.

Re 1) The WA includes key features to ensure that WSSAs can become fully functional. The state (through the regional governor) and municipalities in the region (through their representative) are the members of the WSSA. The voting rights are distributed: state – 35%, municipalities in the region – 65% with distribution based on the number of population living in the municipality. The WA requires decisions to be taken with at least 3/4 majority and these are binding. This implies that most WSSAs will be able to take decisions if the state and the two biggest municipalities agree.

The Ministry of Regional Development (MRD) is now supporting the WSSAs in several ways. The MRD is planning to launch a TA program for WSSA (financed as one component of the MRD TA project under the Operational Program Environment). The TA program for WSSAs is targeted to address equipment and capacity issues of WSSA.

The MRD is now developing WSSA "bylaws", mainly to deal with its organization and activities, decision making process, etc. In December 2012 the ministry has contracted a consultant to support this work.

As mentioned above, the public WSS assets will *ex lege* be transferred to the WSSA, which will manage, but not operate these. Thus, the WSSA needs to delegate the operation and maintenance of the WSS assets and select a WSS operator to provide WSS services.

Re 2) The WA provides for two options for selection of an operator:

1) Direct award to a current operator providing WSS services in the region. In this case the operation and maintenance of the WSS assets will be handed over through a "quasi-Concession" Contract (10 years if there are no requirements for major investments or 15 years if there is an obligation for major investments). Based on a study by EBRD, the MRD has approved a Model Contract between the WSSA and an existing WSS operator (EBRD (2011). The model contract

will need to be adapted to the specific circumstances in each district. Awaiting the clarity in asset transfers etc. that is being provided by the pending changes to the Water Act the WSSAs have so far not selected operators.

Further supporting the WSSAs, the MRD has requested the same consultant that is developing the by-laws to also develop a draft ordinance which clearly describes the process of award and licensing of a current operator under this model 1)

2) Competitive selection of a new operator (under the Concession Act). In his case a Concession Contract (up to 35 years) will be used. The MRD is working with IFC to develop a model Concession Contract for such cases.

In both cases, the WA foresees the licensing of WSSCs to ensure that operators fulfill minimum technical, financial and skills requirements. The SEWRC is envisaged to check the WSS operators' compliance with the ordinance for the requirements and criteria to operators and qualification of their staff and be responsible to issue licenses to those companies that fulfill the minimum criteria.

According to the amendments of the WA, the WSSA should select a WSS operator not earlier than 12 months from the publishing of the ordinance for the requirements to the WSS operators but not later than 18 months. This will give the existing WSS operators 12 months to comply with the requirements of the ordinance. If in the future, there is no WSSC on the designated territory, which complies with the requirements then the WSSA will start a concession procedure for the selection of a new operator. To avoid discontinuity of service, it is envisaged that the WSS services will be provided by the existing WSS operator (s) until there is a contract between the WSSA and a WSS operator having: a valid license, approved General conditions to customers, and a Business plan (BP) and water tariffs approved by the SEWRC.

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Appendix 8: WSSC Efficiency Review

1. Approach and methodology

We assessed the efficiency of the Water supply and sewerage companies (WSSCs) on the base of *comparative* approach, allowing us to compare the Companies on different aspects, incl. ownership (municipal owned or state owned), geographical spread (district or municipal), size, etc. We selected set of performance indicators with the general purpose to compare main activity aspects of each water company with the performance results.

In order to achieve the main target of our project – to assess the efficiency of the water sector companies in Bulgaria on the base of comparison we developed a special assessment model that we use as a ***main methodology tool***. The assessment model and its specific features are described in details in Chapter 2 of the report.

Apart from the main methodology tool we performed the presented analysis using following ***additional methods***:

- *Analysis of data qualit*y – included analysis of the preliminary information provided by the SEWRC to the World Bank Project team, review and assessment of the data quality and its applicability to the project goals, collection and review of additional information from other sources. In more details, this information includes:
    - Information available on the IWA web site and more precisely the International Water Utility Efficiency Assessment matrix. The matrix was reviewed on the base of the applicability of its indicators in the local context. Moreover, the use of such internationally recognized matrix allows the international comparison of the efficiency of Bulgarian water companies.
    - IBNET database. The database provides information on important parameters related to the level of efficiency of water companies as: water and sewerage coverage, total and residential water consumption, non-revenue water, average revenue, operational cost, collection period etc. Two main obstacles for using this information were identified: 1/ Last IBNET database year is 2008, i.e. the information is not up-dated and 2/ most of the companies are anonymous (represented as A,B,C etc.). Only Stara Zagora, Turgovishte and Sofiyska voda are officially presented.
    - Business plans of the water companies for the period 2009–2013. After reviewing all business plans we decided that the information is applicable for the needs of this project. Information in BPs provides good and relatively wide background for assessment.
    - National Strategy for management and development of water sector in Bulgaria. Special attention was paid on the sections dedicated to the analysis of the water companies as: institutional capacity, current financial status. The conclusions made in this Strategy were carefully investigated, as well as the strategic goals for water sector development in this document.

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- Gathering recent baseline data. After reviewing the initial data and making analysis of its applicability to our project goals, a need for more recent data appears, as the assessment of the efficiency of the water companies is much more useful based on recent information. For that purpose the World Bank project team acquired last reported data from the Regulator – "Target Levels" for 2011.

The tight time schedule of the assignment did not allow making detailed verification of baseline data, including visits or any other contacts with companies. This refers both to the baseline data from the business plans for the regulatory period 2009-2013 and to the baseline data taken from the reporting "Target Levels" files for 2011, submitted by the WSSCs to the SEWRC. The assumption was that companies fulfilled their obligations to submit the correct data to the regulator. However, the data for each company was analyzed for consistency before using it in this efficiency review. A number of inconsistent inputs were encountered in the "Target Levels" worksheets as a result of this review and analysis of the baseline data. The consultant made certain corrections in several places, where omissions were identified, related to the input of data in the files. In order to preserve the data in the original files, the corrections were introduced in the free columns next to the original number, without deleting the latter. Consequently, the consultant used the corrected numbers by linking to the cells in which they were introduced. The identified omissions and the corrections made are described in **Table 1.1**

Table 1.1: Corrections in the baseline data made by the consultant

No	WSSC	Omission identified	Correction made
1	Kresna	In "Target levels" worksheet: Amount of water sold inconsistent with related indicators. The reason: water sold presented in 000m3 instead of in m3.	Amount of water sold converted from 000m3 into m3 (three digits added)
2	Kresna	In "Target levels" worksheet: Average salary unreasonably high – more than 2000 BGN. The reason: reported number of staff of 7 (in cell E77) is most likely wrong.	Model linked to another cell – E129, where reported number of staff is 16.
3	Veliko Turnovo	In "Target levels" worksheet: Amount of water sold inconsistent with related indicators. The reason: water sold presented in 000m3 instead of in m3.	Amount of water sold converted from 000m3 into m3 (three digits added)
4	Veliko Turnovo	In "Target levels" worksheet: Operation costs and operating revenue inconsistent with related indicators. The reason: operation costs and operating revenue presented in 000BGN instead of in BGN.	Operation costs and operating revenue converted from 000BGN into BGN (three digits added)
5	Kurdjali	In "Target levels" worksheet: Total number of population in the region adds up to 492,057 people (this exceeds three times the true number of population). The reason: the number of population of 164,019, put three times – in each of the three operation systems worksheets.	The number used by the consultant for the analysis is 164,019
6	Kurdjali	In "Target levels" worksheet: The reported population connected to water supply is	No correction for this was made. The most likely reason is the massive

No	WSSC	Omission identified	Correction made
		185,834 and exceeds significantly the corrected number of 164,019	emigration from the region and the reduced population. A significant part of the connected population from previous years does not live in the region any more.
7	Sapareva Banya	In "Target levels" worksheet: Remuneration costs inconsistent with related indicators. Remuneration costs presented in 000BGN instead of in BGN	Remuneration costs converted from 000BGN into BGN (three digits added)
8	Berkovitsa	In "Target levels" worksheet: Number of water connections is most likely wrong – 855 per population served of 19,692.	No correction was made. No hint about the true number of connections.
9	Panagyurishte	In "Target levels" worksheet: Amount of water sold inconsistent with related indicators. Non revenue water goes up to 0.96 and operating cost per 1m3 of water goes up to 13 BGN, as calculated by the scoring model. The reason: probably a technical mistake while inputting the numbers - water sold is one digit less.	One "0" added to the end of the number for "Amount of water sold". The related NRW ratio and the operating cost per unit go back to normal levels and are consistent with the ones reported by the company.

2. Assessment model

The applied efficiency assessment matrix of the Bulgaria WSS sector as a whole and of each WSS company is based upon the IWA Water Utility Efficiency (Self) Assessment Methodology. The IWA assessment model can be seen as **Attachment 3** to this Report (**Original IWA Model**). This IWA methodology is explicit and open. It is created by international water utility professionals for use in a low and middle income country context. It covers all functional areas of the water utility, its operating environment and dimensions of water service. Within the context of the assessment under this model "efficiency" is defined not in a narrow technical sense, but in a comprehensive nature analyzing efficiency in six areas as follows:

1. Corporate Governance
2. Human Resources
3. Accountability towards Customers
4. Financial
5. Commercial
6. Technical

The specific model, developed for the current efficiency review of Bulgarian WSS companies, is customized for the purpose of:

1. taking into account the specifics of the water sector in Bulgaria and
2. accounting for the nature of the data available.

The original IWA model is designed primarily for self assessment based on inside information from the companies, while the current efficiency review relies on data provided by the

SEWRC. Because of this, certain modifications of the used indicators had to be made, as well as of the assessment criteria used for scoring. The purpose was to reduce the subjective judgment to the minimum and to make the assessment as objective as possible. The applied model for this review includes 18 key performance indicators out of the 39 indicators used by IWA. For comparison, the number of WB IBNET indicators is 25 and the number of the indicators used by the Bulgarian SEWRC is 72. The 18 indicators are sufficient to provide a profound picture of water companies' performance, while at the same time their relatively small number makes it possible to focus the analysis over the main aspects.

The **18 selected indicators**, distributed among the six performance areas, are as follows:

1. Corporate Governance
Quality of business plan/strategy
Public relations/customer communications
1.1.Quality control/quality management

2. Human Resources
2.1.Recruitment and staffing levels
2.2.Staff training and education programs
2.3.Remuneration level

3. Accountability towards Customers
3.1.Service coverage
3.2.Delivery/continuity of service
3.3.Water quality

4. Financial
4.1.Working ratio
4.2.Operating unit cost
4.3.Creditworthiness
4.4.

5. Commercial
5.1.Collection efficiency
5.2.Customer metering
5.3.Customer information

6. Technical
6.1.Non-revenue water management
6.2.Maintenance level
6.3.Level of asset management

Most of the above 18 indicators are among the indicators used by SEWRC for the monitoring of WSSCs and for the process of analysis and approval of companies' requests for new tariff levels. The data for the calculation or for the scoring of each of the indicators is available either in the texts of the business plans or in the "Target Levels" worksheets.

The model applies a five-level scoring system (from 1 to 5) for each of the 18 selected indicators in 6 performance areas. Half of the indicators – 9 out of 18, are scored on the basis of specific calculated ratios for each evaluated company and certain agreed benchmarks, applicable for all assessed companies. Sub-indicators are also used for 4 of the indicators, in an attempt to achieve higher representativeness of these basic indicators and more precise scoring. The sub-indicators are presented in detail in **Table 2** and their total number is 9. Benchmarks are selected to allow for international comparison of achieved levels, but at the same time customized to reflect the average levels for the sector as a whole in Bulgaria.

The scoring scale (from 1 to 5) can be interpreted as follows:
1 – poor performance
2 – below average performance
3 – average performance
4 – good performance
5 – excellent performance

Each of the six areas is important for the sustainable performance of the companies and for delivering high quality water supply and sewerage services in the long run. Each of the six areas is given equal weight in the calculation of the total score. The criteria, the benchmarks, the calculated specific ratios, which are used for scoring of each of the 18 indicators of each company, and the scoring itself, can be best seen in **Attachment 2: Assessment Model**. **Table 2.1**. contains additional explanations.

2.1. Scoring in area 1 – Corporate governance:

The companies' strategy is assessed, based upon the information in the business plan and the website of each company. The scoring is dependent upon:

2.1.1. the availability and the quality of BP, the presence of strategy in it and the quality of the presented strategy. In order to achieve the highest score the company needs to have presented well defined strategy with clear mission and goals. The goals are assessed on the base of their adequacy, achievability and contribution to the development of the company's sustainability;

2.1.2. the level of the communication tools and PR, applied to relations with customers and with public. This includes but is not limited to: presence of PR specialist in the company; presence, quality and functions of the corporative web site – only to inform or to interact with the public; level of content management of the corporative web site, existing centers for client servicing or presence of network of such centers.

2.1.3. procedures for quality control, awarded international certificates for quality control, environmental management, and types of certificates. It is important to remind that the BPs used are for regulatory period 2009-2013. They were actually developed and submitted in 2008 and contain reporting data for 2007. The fact that the BPs were developed about 5 years ago is to a great extent compensated by the up-to-date websites of companies and the actual data in them.

2.2. Scoring in area 2 – Human resources:

The idea is that the quality of personnel, its optimal number and proper management are of key importance for the level of the services provided. Qualified staff is crucial for the successful everyday operations and the sustainable development of the company. The scoring includes:
2.1. recruitment and staffing levels, using the number of staff per 1000 connections as benchmarks. Other things being equal, the efficiency in the area of HR management for each WSSC suggests that services are provided by a lower number of staff per water 1000 connections or per 1000 people served. The specific benchmarks applied for this indicator reflect typical levels of staff in international experience, but are also customized to take into account the average for the country as derived by the model.
2.2. staff training and education programs is scored depending on the percentage of staff that has been trained during the period and the availability of a training plan and budget in the BP;
2.3. remuneration level – the importance of this is determined by the fact that remuneration is one of the key factors for recruiting and retaining qualified staff. The benchmarks are used for this indicator, as explained in Table 1, are based on the NSI data for the average remuneration for the sector of 689 BGN.

2.3.Scoring in area 3 – Accountability towards customers

The scoring includes:
3.1. Service coverage – Three sub-indicators for the coverage level are estimated and applied:

a. water service coverage – scoring is in accordance with the percent of population connected to water supply. The benchmarks used are based upon the typical for the country levels of coverage.

b. waste-water collection coverage - scoring depends on the percent of population connected to waste water collection. The selected benchmarks are in accordance with average levels of coverage of this service in the country.

c. waste water treatment level – scoring is in accordance with the amount of waste water treated as percent of the amount of water sold. The benchmarks are in accordance with average levels of coverage of this service in the country.

Indicator 3.1 is the arithmetic average of the three sub-indicators above.

3.2. Delivery/continuity of service – Scoring depends on the continuity of water supply – permanent (24/7 – 24 hours a day and seven days per week), or with interruptions, and on the reported number of population, suffering from interruptions of water supply.
3.3. Water quality – Two sub-indicators are used for water quality:

a. Physicochemical and radiological indicators/quality and

b. Microbiological indicators.

The scoring of each of the two sub-indicators is based on the percent of tests compliant with regulations (the ratio between compliant tests and all tests). The scoring in this case applies only two grades – 5, when 95% or more of tests are compliant with regulations and 1, when less than 95% of tests are compliant with regulations.

Indicator 3.3 is the arithmetic average of the two sub-indicators above.

2.4. Scoring in area 4 – Financial

4.1. Working ratio (OPEX/REV) – The ratio is simplified – OPEX/REV, accommodated to the data available in the "Target Levels" worksheet. The benchmarks applied for the scoring take into account typical levels of possible profit margins.
4.2. Operating unit cost (OPEX/Volume of water sold) - the scoring is based on the estimated operating unit cost for each company. The benchmarks are based on the average tariff levels in the country.
4.3. Creditworthiness – the scoring is based on the judgment about the access to credit of each company, the experience with applying for loans, utilizing loans and repaying loans, the likeliness to get new local or international loans under its owner's guarantee or under its own guarantee. The experience with international loans is scored 5, the very low chance to get any credit is scored 1.

2.5. Scoring in area 5 – Commercial aspect

5.1. Collection efficiency – two sub-indicators are used:

a. collection ratio - the benchmarks for this sub-indicator are based on the desired best level of above 99%, and are also adjusted to take into account the average for the WSSCs in the country.

b. collection period (days receivables outstanding) – the benchmarks take into account the practice of Bulgarian WSSCs to bill on a monthly basis.

Indicator 5.1 is the arithmetic average of the two sub-indicators.

5.2. Customer metering - the scoring is based on the percent of customers/connections being metered, the level (in %) of meters being tested and calibrated, the scheduled replacement of meters.
5.3. Customer information - the scoring is based on the level and quality of customer database according to the business plan and the facilities used to regularly update customers info, internal quality system related to customers and interactive access by customers according to company's website.

2.6. Scoring in area 6 – Technical

6.1. NRW management (NRW/water delivered) – the indicator is calculated as the ratio of non-revenue water to water delivered to the system. The benchmarks used are based on European standards, but raised by 10 percentage points, because of the higher average NRW in Bulgaria.
6.2. Maintenance level – two sub-indicators are used:

a. Sub-indicator "timely completed planned interruptions to total planned interruptions". The idea is that planned interruptions (as opposed to emergency interruptions) are an indicator of the proactive management related to assets maintenance and replacement of old assets. The number of timely completed interruptions, that are reported, testifies that this proactive policy is implemented in practice. This indicator is not perfect in explaining the scale of activities and investments for the renewal of assets, but the data available at this stage does not allow for the usage of a more representative indicator. The benchmarks used are in accordance with average levels derived by the model.

b. Sub-indicator – "completed planned interruptions per 1000 connections". The higher number of actually completed planned interruptions should indicate higher efforts in the improvement of assets along the systems. The benchmarks used are in accordance with average levels derived by the model and on the desired level of above 0.90.

6.3. Level of asset management (number of breakages per 1000 connections) – the number of breakages is indicative of the state of the assets/infrastructure of each company. The benchmarks are adjusted to the average levels in the country.

Table 2.1: Description of the scoring by areas and indicators

Performance Area	Indicator	Sub-indicators	Score	Criteria / Benchmarks
Corporate governance	Quality of BP/Strategy	Na	1	None
			2	In relation to some activities
			3	Some departments have documented mission statement
			4	Most departments have documented mission statement
			5	Mission statement at utility level and in all departments
	PR/Customer communications	Na	1	No dedicated PR person, no website, no communication tools and policy
			2	Some PR actions are taken but without any formalized policy and no established tools
			3	PR actions do exist on a permanent basis, with website, but no policy is in place
			4	PR tools and actions exist, including website, and are regularly activated and updated
			5	PR recognized as a full process, website, communication tools, and formalized policy is in place
	Quality control/Quality management	Na	1	No procedures or certificates for quality control
			2	Some internal procedures for quality control
			3	Internal procedures for quality control signed by the management
			4	ISO certificates
			5	EMS certificate
Human Resources	Recruitment and staffing levels	Na	1	Above 9 per 1000 water connections
			2	Between 9 and 7 per 1000 water connections
			3	Between 7 and 5 per 1000 water connections
			4	Between 5 and 3 per 1000 water connections
			5	Below 3 per 1000 water connections
	Staff training and education pro-	Na	1	No staff training or education and no related budget
			2	Basic training for some functions provided, mostly on-the-job training
			3	Limited staff training and capacity building, availabil-

Performance Area	Indicator	Sub-indicators	Score	Criteria / Benchmarks
	grams			ity of a minimal education plan
			4	Actively managed staff training and capacity building, availability of education plan, staff encouraged to make own suggestions
			5	Actively managed staff training and capacity building, comprehensive and budgeted education plan, staff encouraged to make own suggestions, participation in third party courses, participation in conferences possible
	Remuneration level	Na	1	Average remuneration level below 550 BGN
			2	Average remuneration level between 550 and 650 BGN
			3	Average remuneration level between 650 and 750 BGN
			4	Average remuneration level between 750 and 850 BGN
			5	Average remuneration level above 850 BGN
Performance Area	**Indicator**	**Sub-indicators**	**Score**	**Criteria / Benchmarks**
Accountability to Customers	Service coverage (arithmetic average of the 3 sub-indicators)	Water supply	1	Water supply below 96%
			2	Water supply between 96% and 97%
			3	Water supply between 97% and 98%
			4	Water supply between 98% and 99%
			5	Water supply above 99%
		Waste water collection	1	Waste water collection below 20%
			2	Waste water collection between 20% and 40%
			3	Waste water collection between 40% and 60%
			4	Waste water collection between 60% and 80%
			5	Waste water collection above 80%
		Waste water treatment	1	Waste water treatment below 20%
			2	Waste water treatment between 20% and 40%
			3	Waste water treatment between 40% and 60%
			4	Waste water treatment between 60% and 80%
			5	Waste water treatment above 80%
	Delivery/continuity of service	Na	1	Inadequate water pressure is chronic, or hours of supply are limited
			2	Inadequate water pressure is chronic in several areas, supply is not 24/7
			3	Inadequate water pressure is chronic in some of the service area, or there are frequent service disruptions
			4	Mostly demand driven level of service, but service disruption objectives are not met
			5	Demand driven level of service to agreed targets; 24/7 supply
		Physiochemical and radiological	1	Less than 95% of tests compliant with regulations
			2	

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Performance Area	Indicator	Sub-indicators	Score	Criteria / Benchmarks
	Water quality (arithmetic average of the two indicators)	indicators/quality	3	
			4	
			5	More than 95% of tests compliant with regulations
		Microbiological indicators/quality	1	Less than 95% of tests compliant with regulations
			2	
			3	
			4	
			5	More than 95% of tests compliant with regulations
Performance Area	**Indicator**	**Sub-indicators**	**Score**	**Criteria / Benchmarks**
Financial	Working ratio (Opex/Op-Rev)		1	Above 1.00
			2	Between 1.00 and 0.90
			3	Between 0.90 and 0.80
			4	Between 0.80 and 0.70
			5	Below 0.70
	Operating unit cost (Opex/Water sold)		1	Above 2.00
			2	Between 2.00 and 1.50
			3	Between 1.50 and 1.00
			4	Between 1.00 and 0.80
			5	Below 0.80
	Creditworthiness		1	Utility has no rating or no access to credit
			2	Utuility has access to local and limited credit under its owner’s guarantee
			3	Utility has access to limited international credit under its owner’s guarantee or to local credit
			4	Utility has access to limited international credit without its owner’s guarantee
			5	Utility has an investment grade credit rating and has access to banks and competitive offers
Commercial	Collection efficiency	Collection ratio	1	Less than 70% of bills actually collected
			2	Between 70% and 80% of bills actually collected
			3	Between 80% and 90% of bills actually collected
			4	Between 90% and 99% of bills actually collected
			5	More than 99% of bills actually collected
		Collection period (days receivables outstanding)	1	Average collection period above 90 days
			2	Average collection period between 90 and 60 days
			3	Average collection period between 60 and 45 days
			4	Average collection period between 45 and 30 days
			5	Average collection period below 30 days
	Customer metering	Na	1	No metering
			2	Limited metering
			3	All industrial clients are metered; not all domestic cli-

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Performance Area	Indicator	Sub-indicators	Score	Criteria / Benchmarks
				ents are metered; no metering of public clients
			4	All customers are metered. No regular testing and calibration of meters. No scheduled meters replacement
			5	All customers are metered. Regular testing and calibration of meters. Scheduled meters replacement
	Customer information	Na	1	Paper customers files, not updated
			2	Computerized customers database, not updated
			3	Computerized customers database, regularly updated
			4	Computerized customers database, internal quality control system
			5	Computerized customers database, internal quality control system. Total control of customers database evolution. Customer relationship management.
Technical	Non-revenue water management (NRW/Water delivered)	Na	1	Above 0.60
			2	Between 0.60 and 0.50
			3	Between 0.50 and 0.40
			4	Between 0.40 and 0.30
			5	Below 0.30
	Maintenance level	Timely completed interruptions / planned interruptions	1	Below 0.60
			2	Between 0.60 and 0.70
			3	Between 0.70 and 0.80
			4	Between 0.80 and 0.90
			5	Above 0.90
		Number of timely completed planned interruptions per 1000 connections	1	Below 1.50
			2	Between 1.50 and 3.00
			3	Between 3.00 and 4.00
			4	Between 4.00 and 5.50
			5	Above 5.50
	Level of asset management – number of breakages per 1000 connections	Na	1	Above 120
			2	Between 120 and 90
			3	Between 90 and 60
			4	Between 60 and 30
			5	Below 30

3. Analysis of WSSCs performance

The efficiency review and analysis of the WSSCs in Bulgaria is carried out in the following main aspects:

- Analysis of the performance of the WSSCs as a whole. This will help to compare the level of performance of the Bulgaria WSS companies internationally;

- Analysis of the individual performance of each company;
- Comparative analysis of the level of performance of district companies versus municipal companies versus private operators;
- Comparative analysis of the level of performance of companies by size;
- Comparative analysis of the level of performance of companies providing WW treatment versus companies not providing WW treatment.

The number of WSS companies in Bulgaria is dynamic through the years, with new WSS entities starting operations in some years and others closing or merging with other companies. Probably this is the reason why the total number of companies varies in data sources from different years. The total number of companies as in the ViK list, accompanying the 2009-2013 business plans data is **68**.

Out of this list, **9** "so called" water companies are not included in the analysis, because they are operated only to provide water and/or sewerage services to a single production plant or to a single resort place. They do not act as typical WSS companies. These are:

1. WWTP Leko Ko Radomir,
2. WWTP Lozenec ("PRO" EAD),
3. Verila Service,
4. Viki Invest-Elenite,
5. Zlatni Pyasutsi,
6. ViK Ecoproekt – Russe,
7. ViK Kovachevci,
8. ViK Lighthouse Golf Resort AD,
9. ViK Lukoil Neftochim Burgas.

In the course of the analysis **8** more companies have been subsequently taken out of the sample, because no business plans for 2009-2013 period have been submitted, no data for "Target Levels" have been submitted or data in the "Target Levels" reports have been insufficient. This makes impossible the completion of the scoring, which would distort the overall assessment – for the sector as a whole and by groups of companies. Most of these excluded from the sample companies are municipal. The excluded companies are:

1. ViK Chamkoria-Samokov,
2. ViK Breznik,
3. ViK Kyustendil (taken over by Kyustendilska Voda, which is the current district operator),
4. ViK Burzijska voda (selo Burzia),
5. ViK Antonovo,
6. ViK Belovo,
7. ViK Strelcha
8. ViK selo Leskovets

Thus, the current efficiency review of Bulgaria's WSS sector covers the remaining **51 WSS companies**, providing services to the population, the business and the public sector. **Table 3.1** provides the list of the 51 reviewed WSS companies in Bulgaria, presented by districts.

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Table 3.1.: List of the 51 reviewed WSS companies by districts

	Number in the model	District	WSS Company (ViK)
1	1	Blagoevgrad	ViK Blagoevgrad
	1.a		ViK Kresna
	1.b		ViK Mikrevo (“Strimon”)
	1.c		ViK Petrich
	1.d		ViK Sandanski
2	2	Burgas	ViK Burgas
3	3	Varna	ViK Varna
4	4	Veliko Turnovo	ViK Veliko Turnovo (“Yovkovtsi”)
	4.a		ViK Svishtov
5	5	Vidin	ViK Vidin
6	6	Vratsa	ViK Vratsa
7	7	Gabrovo	ViK Gabrovo
	7.a		ViK Sevlievo
8	8	Dobrich	ViK Dobrich
9	9	Kurdjali	ViK Kurdjali
10	10	Kyustendil	ViK Kyustendilska Voda (shortly named in the models as ViK Kyustendil)
	10.a		ViK Dupnitsa
	10.b		ViK Sapareva Banya (“Panichishte”)
11	11	Lovech	ViK Lovech
	11.a		ViK Troyan
12	12	Montana	ViK Montana
	12.a		ViK Berkovitsa
13	13	Pazardjik	ViK Pazardjik
	13.a		ViK Batak
	13.b		ViK Bratsigovo
	13.c		ViK Velingrad
	13.d		ViK Panagyurishte
	13.e		ViK Peshtera
	13.f		ViK Rakitovo
14	14.1	Pernik	ViK Pernik
15	15	Pleven	ViK Pleven

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	Number in the model	District	WSS Company (ViK)
	15.a		ViK Knezha
16	16	Plovdiv	ViK Plovdiv
17	17	Razgrad	ViK Isperih
	18		ViK Razgrad
	18.a		ViKKubrat
	18.b		ViK Rakovski
18	19	Ruse	ViK Ruse
19	20	Silistra	ViK Silistra
20	21	Sliven	ViK Sliven
21	22	Smolian	ViK Smolian
22	23	Sofia Oblast (District)	ViK Sofia
	23a		ViK Botevgrad
23	24	Stara Zagora	ViK Stara Zagora
24	25	Turgovishte	ViK Turgovishte
25	26	Haskovo	ViK Haskovo
	26.a		ViK Stambolovo
	27		ViK Dimitrovgrad
26	28	Shumen	ViK Shumen
27	29	Yambol	ViK Yambol
28	30	Sofia Grad	Sofiyska Voda

For the purpose of the analysis we first divide the WSS companies into three main groups, depending on their ownership:

1. Group of **district companies**, including 28 companies (27 district companies plus ViK Isperih, which is the second company with state-ownership in the district of Razgrad. It serves three municipalities on the territory of the district of Razgrad.
2. Group of **municipal companies**, including and **22 municipal companies (**21 municipally-owned companies plus ViK Dimitrovgrad. The company is with mixed ownership – 51% state and 49% municipal. The reason behind adding ViK Dimitorvgrad to the group of municipal companies is that it has the features of a municipal company, rather than of a district company. It operates on the territory and provides services to one municipality – Dimitrovgrad.
3. **Private operators**, represented by a single company – ViK Sofiiska Voda, which provides WSS services to the City of Sofia (this is at the same time district of Sofia Grad).

The WSS sector in Bulgaria is quite fragmented. The number of companies is too big, given the territory of the country and the number of the population. The average number of population serviced by one company is 148 590. For the group of the district companies this number is 205 729. The average number of population serviced by one municipal company is only 26 265 people.
The number of population serviced by WSSC Sofijska Voda is 1 291 591 people.

The district with the highest number of WSS companies is Pazardjik. It is serviced by 1 district and 8 municipal companies (as explained above, two of the municipal companies – Belovo and Strelcha, are not included in the list of reviewed companies, because of the lack of data). The next district in terms of number of companies is Blagoevgrad with 1 district and 4 municipal companies. Only 14 out of the 28 districts in the country are serviced by a single company.

3.1. All companies results

The detailed score for each of the reviewed companies is presented in **Attachment 1: Summary Tables**[10]. The printouts of the assessment worksheets for each company are presented in **Attachment 2: Assessment Model**.

Table 3.1.1: Bulgaria WSS companies performance scoring – 2011

	Area	All WSSCs	District WSSCs	Municipal WSSCs	Private operator
1	Corporate Governance	2.50	2.95	1.85	4.00
2	Human Resources	2.69	2.93	2.35	3.33
3	Accountability towards Customers	3.42	3.50	3.26	4.67
4	Financial	2.31	2.18	2.38	4.67
5	Commercial	2.91	3.04	2.75	2.67
6	Technical	2.88	2.67	3.15	2.83
	Total score	**2.78**	**2.88**	**2.62**	**3.69**

Table 3.1.1 summarizes the evaluation results of the 51 reviewed water sector and sewerage companies in Bulgaria. The total score, which takes into account the scoring of the 6 performance areas, is **2.78**. This is quite lower than the “average performance” according to the applied 5-level scoring scale. **Table 3.1.1** also indicates that district companies perform somewhat better with an average of 2.88, as compared with municipal companies average of 2.62. However, the difference is not significant (only 0.25) and none of the groups reaches the “average 3” performance level according to the 1 to 5 scoring scale. One conclusion based on the data is that there is still a long way to go to reach the “good” and “excellent” levels of performance. The only private operator – Sofijska Voda, however, has a much better score 3.62.

[10] The only reason for not including these tables in the main text of the report is that they are too long and do not fit well on the pages.

Table SS1-1 of **Attachment 1** provides a detailed picture of the scoring of each of the reviewed WSS companies in Bulgaria - the table shows the total score, as well as the score by areas for each company. The lower part of the table is a summary of the results for the sample as a whole.

Table 3.1.2 is the summary part of **Table SS1-1** of **Attachment 1**. It shows the arithmetic average, the median, the standard deviation, the minimum and the maximum for the whole set of companies – for total score and by performance areas. The arithmetic average for the overall performance of all companies is 2.78 and is equal to the median of 2.78. The standard deviation is only 0.36, which is an indication that these average values are quite representative of the whole picture. The maximum is 3.69 (the best performing company) and the minimum is 1.96 (the worst performing company).

Table 3.1.2: Summary of all WSS companies scoring results

	Total Score	Corporate Gover-nance	Human Resour-ces	Accounta-bility to Customers	Financial	Commer-cial	Technical
Average	**2.78**	2.50	2.69	3.42	2.31	2.91	2.88
Median	**2.78**	2.33	2.67	3.33	2.00	2.83	2.83
Standard dev.	**0.36**	0.86	0.71	0.72	0.60	0.56	0.72
Max	**3.69**	4.00	4.33	4.89	4.67	4.50	5.00
Min	**1.96**	1.00	1.33	2.11	1.33	1.67	1.33

The average values by areas are within the range of 2.31 to 3.42. Accountability to customers – 3.42, is actually the only area with a score higher than the "average" level of 3.00. All the others are below 3.00: corporate governance with 2.50, human resources with 2.69, commercial with 2.91, financial with 2.31 and technical with 2.88.

Table SS1-2 of **Attachment 1** provides the ranking of all companies by total score, starting with the highest score WSS company – ViK Sofiiska Voda, and finishing with the lowest score company – ViK Stambolovo. The companies in the table are divided in five groups of ten companies in each (eleven in the first group), marked with different colors.

The highest score group (of eleven companies), marked with green color, consists of 1 private operator – Sofiiska Voda, 9 district companies and only 1 municipal company. These are the best performing companies according to the scoring, and their total score is between 3.69 and 3.00 – all above or equal to the "average" of 3.00. These are: Sofijska Voda, Plovdiv, Burgas, Blagoevgrad, Stara Zagora, Russe, Smolyan, Lovech, Petrich, Vratsa, Veliko Turnovo.

The second group of ten companies, marked in light green, consists of 5 district and 5 municipal companies, with a score about the "average" level of performance - between 2.95 and 2.81. It includes: Varna, Batak, Rakitovo, Shumen, Dupnitsa, Velingrad, Razgrad, Botevgrad, Gabrovo, Silistra.

The third group, marked in yellow, is in the middle and its score ranges between 2.80 and 2.72. It includes 6 district and 4 municipal companies. It includes: Sandanski, Dimitrovgrad, Pernik, Troyan, Sofia-district, Sliven, Mikrevo, Kurdjali, Pazardjik, Vidin.

The fourth group, marked in pale pink, includes 5 district and 5 municipal companies, with total score between 2.71 and 2.46. These are: Pleven, Peshtera, Kyustendil, Montana, Sevlievo, Sapareva Banya, Turgovishte, Bracigovo, Kresna, Haskovo.

The last group is the worst performing one and is marked in white color. It consists of 3 district and 7 municipal companies. Their total score is between 2.46 and 1.96. These are: Svishtov, Berkovitsa, Isperih, Dobrich, Kneza, Panagyurishte, Rakovski, Kubrat, Yambol, Stambolovo.

3.2.District and municipal companies results

District companies performance

Table 3.2.1 is the summary part of **Table SS2-1**. It shows the arithmetic average, the median, the standard deviation, the minimum and the maximum for the district companies – for total score and by performance areas. As commented above, the score for the overall performance of the district companies is slightly below the "average" level of 3.00 – the arithmetic average is 2.88 and the median is 2.79. The standard deviations is only 0.34. The maximum is 3.51 (the best performing district company - Plovdiv) and the minimum is 2.25 (the worst performing district company - Yambol).

Table 3.2.1: Summary of district WSS companies scoring results – 2011

		Total Score	Corporate Gover-nance	Human Resour-ces	Accounta-bility to Customers	Financial	Commer-cial	Technical
Average		**2.88**	**2.95**	**2.93**	**3.50**	**2.18**	**3.04**	**2.67**
Median		**2.79**	**2.83**	**3.00**	**3.39**	**2.00**	**3.08**	**2.67**
Standard dev.		**0.34**	**0.68**	**0.69**	**0.64**	**0.48**	**0.58**	**0.54**
Max		**3.51**	**4.00**	**4.33**	**4.89**	**3.33**	**4.50**	**4.00**
Min		**2.25**	**2.00**	**1.67**	**2.33**	**1.67**	**2.00**	**1.33**

The average values by areas are within the range of 2.18 (for financial performance) to 3.50 (for accountability to customers). The other area scoring higher than 3.00 is Commercial with 3.04. The rest are Corporate governance – 2.95, Human resources – 2.93 and Technical – 2.67. The same results are also illustrated on **Figure 3.2.1**.

Table SS2-2 of **Attachment 1** provides the ranking of district companies by total score, starting with the highest score company – ViK Plovdiv, and finishing with the lowest score company – ViK Yambol. The district companies in the table are divided again in five groups, corresponding to their ranking in the All-companies table. The companies are marked using the same colors as in the All-companies table. The widest area is the green one with 9 district companies, followed by the light green with 5 companies. The third group has 6 companies, the fourth – 5 companies, and the fifth – 3 companies. The explanation of this distribution is the higher score of most district companies. Half of the 28 district companies (14) fall in the green

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and light green areas, with score from 3.51 to 2.81. However, only 9 of them are above the "average" level of 3.00. Even the two district companies with highest score – Plovdiv and Burgas, are still well below "good" performance level of 4.00. The three district companies in the worst performing group score really very low: Isperih with 2.38, Dobrich with 2.35, and Yambol with 2.25.

Municipal companies performance

Table 3.2.2 is the summary part of **Table SS3-1** of **Attachment 1**. It shows the arithmetic average, the median, the standard deviation, the minimum and the maximum for the municipal companies – for total score and by performance areas. As discussed above, the score for the overall performance of the municipal companies is quite lower than that of district companies. It is also well below the "average" level of 3.00 – the arithmetic average is 2.62 and the median is 2.65. The standard deviation is 0.29, which is an indication that these average values are quite representative. The maximum is 3.12 (the best performing municipal company) and the minimum is 1.96 (the worst performing company).

Table 3.2.2: Summary of municipal WSS companies scoring results – 2011

		Total Score	Corporate Gover-nance	Human Resour-ces	Accounta-bility to Customers	Financial	Commer-cial	Technical
Average		**2.62**	**1.85**	**2.35**	**3.26**	**2.38**	**2.75**	**3.15**
Median		**2.65**	**1.67**	**2.33**	**3.22**	**2.33**	**2.75**	**3.17**
Standard dev.		**0.29**	**0.58**	**0.60**	**0.76**	**0.52**	**0.50**	**0.85**
Max		**3.12**	**3.00**	**3.67**	**4.67**	**3.33**	**3.50**	**5.00**
Min		**1.96**	**1.00**	**1.33**	**2.11**	**1.33**	**1.67**	**1.67**

The average values by areas are within the range of 1.85 to 3.15. Two of the areas score higher than the average - Accountability to customers with 3.26 and Technical with 3.15. The other four areas score well below 3.00: Corporate governance – 1.85, Human resources – 2.35, Financial – 2.38 and Commercial – 2.75.

Private operator performance

The only WSS company in the country, managed by a private operator, is ViK Sofiiska Voda. This company is the leader in the scoring with a total score of 3.69, approaching the "good" performance level of 4.00. As seen from **Table 3.2.3** the company has the "excellent" score of 4.67 in the Financial area, 4.67 in Accountability to customers, 4.00 in Corporate governance, 3.33 in Human resources. However, two areas are below the "average" level of 3.00 – Commercial with 2.67 and Technical with 2.83.

Table 3.2.3: ViK Sofiiska Voda scoring results - 2011

		Total Score	Corporate Gover-nance	Human Resour-ces	Accounta-bility to Customers	Financial	Commer-cial	Technical
Sofiiska Voda		**3.69**	4.00	3.33	4.67	4.67	2.67	2.83

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3.3. Results for companies of different size

The second classification of WSS companies for the purpose of this review is by size. The data for individual companies testifies about their huge diversity in terms of size. **Table SS1-3** of **Attachment 1 (Summary Tables)** provides the essential parameters related to size for each of the 51 companies reviewed. The selected parameters include: annual amount of water sold, number of population connected to water supply, number of connections, number of staff, annual revenue. The last two columns provide also information about the level of waste water collection and the level of waste water treatment. **Table 3.3.1** summarizes the parameters for the sector as a whole. The average amount of water sold per annum is 7,203,407 m3, while the medium is twice lower – 3,721,161 m3. The standard deviation of 13,827,596 is about twice the average. This is due to the big diversity of companies by size, mentioned above. The water sold by the largest company – Sofijska Voda, is 91,536,492 m3, while the amount of water sold for the smallest company – Rakovski, is only 105,935 m3. It is the same with the rest of the size parameters. For example, the average number of staff is 324 people, the maximum is 1496 and the minimum is only 6.

Table 3.3.1: Summary of all companies average size parameters

	Water sold (in m^3)	Number of population serviced	Number of connections	Number of staff	Annual revenue (BGN)	Waste water collection	Waste water treatment
Average	7,203,407	149,605	42,335	324	10,509,214	0.57	0.62
Median	3,721,161	87,208	29,275	266	6,001,270	0.60	0.00
Standard dev.	13,827,596	212,613	41,944	336	17,992,861	0.30	0.86
Max	91,536,492	1,291,591	175,179	1496	114,370,124	1.01	4.15
Min	105,935	3,239	855	6	150,465	0.00	0.00

Table SS1-4 of **Attachment 1 (Summary Tables)** shows the ranking of the 51 WSS companies by size, based on the amount of water sold. The companies are divided in **4 groups**: given the individual numbers by companies, as well as the average and the median in **Table 3.3.1**, we found it appropriate to use the following benchmarks: **group 1** – companies with water sold more than 7,000,000 m^3, **group 2** – companies with water sold between 7,000,000 and 3,000,000 m^3, **group 3** – with water sold between 3,000,000 m^3 and 1,000,000 m3, and **group 4** – with water sold less than 1,000,000 m^3. Four more Summary Sheets – SS4, SS5, SS6, SS7, have been developed in the scoring model to correspond to each of the four groups, with detailed tables for the scoring of companies in each group.

Table 3.3.2: Scoring results of companies with different size

	Total Score	Corporate Governance	Human Resources	Accountability to Customers	Financial	Commercial	Technical
All companies average	**2.78**	**2.50**	**2.69**	**3.42**	**2.31**	**2.91**	**2.88**
Group 1 - (largest)	**3.14**	**3.42**	**3.08**	**3.74**	**2.67**	**3.15**	**2.76**
Group 2	**2.76**	**2.71**	**2.88**	**3.43**	**2.00**	**2.94**	**2.63**
Group 3	**2.72**	**2.33**	**2.45**	**3.28**	**2.27**	**2.80**	**3.15**
Group 4 - (smallest)	**2.52**	**1.44**	**2.25**	**3.20**	**2.42**	**2.71**	**3.08**

Table 3.3.2 provides the summarized scoring results for the four groups. The largest companies in group one are with the highest total score of 3.14, well above the all-companies average of 2.78. The lowest score of 2.52 belongs to group 4, the smallest companies. The other two groups have almost the same total score, respectively 2.76 (group 2) and 2.72 (group 3).

3.4. Results of companies providing WW treatment Vs. companies not providing WW treatment

Table SS1-4 of **Attachment 1 (Summary Tables)**, which shows the ranking of the 51 WSS companies by size, provides also information about the level of waste water (WW) collection and WW treatment by each company (in the two rightmost columns). According to **Table SS1-4** almost all WSS companies provide the service waste water collection. Only 6 out of the 51 companies report zero percent of population connected to waste water collection, including two district and four municipal companies: Isperih, Sofia-district, Mikrevo, Sapareva Banya, Rakovski and Stambolovo.

At the same time only half of all companies report waste water treatment. These WSS companies are shown in **Table SS8-1** of **Attachment 1 (Summary Tables)**. Their number is 25 and the level of waste water treatment varies significantly along companies. This indicator is calculated as the ratio of the amount of water treated to the amount of water sold. For a number of companies this ratio is higher than one because not only water sold is directed to the waste water treatment facilities. Rain water, non revenue-water, as well as water derived by business entities from their own sources flow into the sewerage systems and into the waste water treatment plants. The companies are divided in two groups: companies providing WW treatment (**Table SS8-1**) and companies not providing WW treatment (**Table SS9-1**).

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Table 3.4.1: Scoring results of WSSCs providing WW treatment and of WSSCs not providing WW treatment

	Total Score	Corporate Governance	Human Resources	Accountability to Customers	Financial	Commercial	Technical
All companies average	**2.78**	**2.50**	**2.69**	**3.42**	**2.31**	**2.91**	**2.88**
Group 1-Providing WW treatment	**2.94**	**2.97**	**2.77**	**3.68**	**2.29**	**3.01**	**2.90**
Group 2-Not providing WW treatment	**2.64**	**2.04**	**2.60**	**3.17**	**2.33**	**2.81**	**2.86**

Table 3.4.1 presents illustrates the average score of the group of 25 companies which provide the service WW treatment and the average score of the group of 26 companies not providing WW treatment. The total score of the first group is 2.94, slightly higher than the all-companies average of 2.78. The total score for the second group is quite lower - 2.64. The companies providing the full set of services, including WW treatment, show better overall performance. However, both groups are below the "average" performance of 3.00.

REPUBLIC OF BULGARIA

MINISTRY OF REGIONAL DEVELOPMENT AND PUBLIC WORKS

ADVISORY PROGRAM FOR THE DEVELOPMENT AND IMPLEMENTATION OF A WATER SUPPLY AND SANITATION STRATEGY

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ABBREVIATIONS AND ACRONYMS

AC pipes	Asbestos cement pipes
CAPEX	Capital expenditures
CoM	Council of Ministers
DWD	Drinking Water Directive
EEA	European Environment Agency
EU	European Union
GD ENV	General Directorate Environment (European Commission)
GoB	Government of Bulgaria
FLAG	Fund for Local Authorities and Governments
IFIs	International Financial Institutions
IAWBD	Internationale Arbeitsgemeinschaft fuer WasserBetriebe in der Donau Gebiet
IWA	International Water Association
JASPERS	Joint Assistance to Support Projects in European Regions
KWR	KWR Watercycle Research Institute
MIDP	Municipal Infrastructure Development Project
MOEW	Ministry of Environment and Water
MP	Master Plan
MRDPW	Ministry of Regional Development and Public Works
NSI	National Statistical Institute
OPE	Operational Programme Environment
OPEX	Operating expenditures
PAG	Program Advisory Group
PER	Public Expenditure Review
PPP	Public Private Partnership
SEWRC	State Energy and Water Regulatory Commission
SFP	Strategic Financing Plan
TA	Technical Assistance
UIS	Unified Information System
UWWTD	Urban Wastewater Treatment Directive
UWWTP	Urban Wastewater Treatment Plant
WSSA	Water Supply and Sanitation Association
WSSC	Water Supply and Sanitation Company
WSS	Water Supply and Sanitation
WTP	Water Treatment Plant
WWT	Wastewater Treatment
WWTP	Wastewater Treatment Plant

Country Manager:	Markus Repnik
Sector Manager:	Sumila Gulyani
Task Team Leader/Project Manager:	Pier Mantovani/Michael Jacobsen

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This report was produced by a core team led by Pier Mantovani and Michael Jacobsen (Lead Water Supply and Sanitation Specialists), comprising Ivaylo Hristov Kolev (Senior Financial Analyst), Stella Ilieva (Country Economist), Orlin M. Dikov (Senior Operations Officer), Albena Alexandrova Samsonova (Program Assistant), with contributions by Eolina Petrova Milova (Operations Officer), Ivelina Todorova Taushanova (Communications Officer), Toma Alexandrov Yanakiev (ET consultant, Economist). The contributions of Elisabetta Capannelli (Sector Leader), Michael John Webster (Senior Water Supply and Sanitation Specialist, Peer Reviewer), Alexander Danilenko (Senior Water Supply and Sanitation Specialist, Peer Reviewer) and Diego Rodriquez (Senior Economist, Peer Reviewer) in quality assurance and advice are gratefully acknowledged.

Contents

Executive Summary

1. The Public Expenditure Review (PER) is an intermediate output of the Advisory Program for the development and implementation of a water supply and sanitation (WSS) strategy. Along with the findings of other fact-based analyses, including the Inception Report, the Regulatory Review, and the Strategic Financing Plan, selected PER findings and recommendations will be integrated into a proposed WSS Strategy and Action Plan.

2. **Bulgaria's WSS sector features almost universal access to piped service, good water quality but very high water losses.** In a context of highly fragmented rural communities, even very small settlements are supplied with piped water. Most of the water supply networks were built in the 1960 – 1980s. Networks extensively rely on materials such as asbestos-cement (AC) and steel, which are approaching the end of their technical life. This translates into a high prevalence of breakages and hydraulic losses and, in turn, in inefficient water and energy use. Overall, these infrastructure features result into an exceptionally high level of hydraulic losses, estimated at 60%, among the worst in Europe.

3. Very good water quality. The information from 2007 to 2010 shows that the average compliance rate of water samples in big water supply zones was 99.6%. There are specific issues with quality of water in small water supply zones, but on national level the water quality is small zones is good. In 2009 and 2010 the average compliance rate of water samples in small water supply zones is 98.4%. It should mention though that Water Supply and Sanitation Companies (WSSCs) are not complying with their monitoring obligation up to the necessary volume and frequency as per the requirements of the national and European standards. The State is trying to compensate the necessary monitoring of water quality by performing up to 50% of the monitoring.

4. **66% of the population is connected to urban wastewater collection and 50% is connected to an urban wastewater treatment plant[1].** Among the EU12 group[2] of new EU Member States, only Romania and Cyprus collect a lower share of their pollution load than Bulgaria[3]. Similarly, at the end of 2010, only Romania and Malta were treating a smaller share of their collected loads than Bulgaria. Most EU12 countries recognized that meeting the Urban Waste Water Treatment Directive (UWWTD) would be difficult and costly, and negotiated transitions periods of up to 12 years. For Bulgaria, the transition period is 8 years. Thus, in order to meet the final UWWTD deadline, Bulgaria has more progress to make, in less time, than other EU12 countries.

5. **Bulgaria's goal is to maintain universal, good quality water service, and to reduce water losses**. Bulgaria also aims at reducing water pollution from settlements and at complying with the UWWTD, among other EU legal framework requirements. The PER describes the progress made in this respect, with particular emphasis on sources of finance, its

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[1]According to the data for the year 2011 of the National Statistical Institute (NSI), http://www.nsi.bg/otrasalen.php?otr=38 table 9.7 the figures are 74% for collection and 56% for treatment of wastewater. It should be noted that the NSI foot note 1 to the table notes "1 Source of data: NISI - annual statistical survey covering operators of public sewarage and UWWTP (exhaustive), data from municipalities are used also. It is possible that the percentage of the population to be overestimated for settlements with partially built water supply or sewage network." Based on detailed data from the regulator and other sources on the actual number of people connected we find that indeed the connection rates are lower than reported by the NSI, namely 66% for wastewater collection and 50% for wastewater treatment respectively. In Chapter 3 and onwards of this report the data with lower current coverage are used as the basis for the expenditure needs assessment.

[2] Estonia, Latvia, Lithuania, Poland, Slovakia, Czech Republic, Hungary, Slovenia, Bulgaria, Romania, Malta and Cyprus

[3] AAPC (2013) Figure 3.10 and 3.11 based on EEA (2012)

economic and functional composition, trends in public spending and the institutional structures in support of efficient and effective use of public resources. It is an important building block towards a final WSS Strategy and Action Plan to be delivered under the Advisory Program.

6. **It is very challenging for Bulgaria to comply with the urban wastewater treatment directive** as agreed in the Accession Treaty. Since 2007 there has been considerable improvement in compliance. With respect to the drinking water directive[4], Bulgaria is the only EU-12 country that scored compliance levels of 95-100% for all three types of parameters (microbiological, chemical and indicators). Considering that Bulgaria has more progress to make, in less time, than other EU12 countries, and considering the relatively low level of investments since 2007 it is not surprising that progress towards compliance is insufficient to secure compliance with the UWWTD by the final deadline on December 31, 2014.

7. **Total expenditure on water and wastewater is slightly above 1 per cent of GDP. (Chapter 4.1). This level is comparable to many other countries** but it reflects high share of operational expenditures by WSS companies (WSSC) and low share of investments. Bulgaria invests less in the sector than the rest of the EU12. Fiscal allocations to the sector in Bulgaria accounted for only 0.3 percent of GDP in 2008-09 compared to a median of 0.5 percent in the rest of EU12, Eurostat data.

8. **Inefficiencies in the WSS sector contribute to a high level of operational expenditures** while capital expenditures were constrained by worsening of the financial state of WSSCs and tighter credit conditions. Non-revenue water is higher than in other European countries, staff productivity is lower and there is a potential for large efficiency gains among utilities. This potential reflects both a need for consolidation in the sector and for improved governance. If all companies in Bulgaria performed as well as the best ones (Chapter 2.2), the same outputs could be produced with as little as half the inputs in many companies. Improved efficiency of WSSCs would help reallocation of expenditure from operational to capital needs and would make the case for increased borrowing in the sector.

9. **Since 2009 total expenditure in the WSS have declined despite high investment needs related with EU acquis requirements.** Total expenditures (Chapter 4.1) declined by 13 percent between 2011 and 2009 while capital expenditures fell by 39 percent reflecting sharp downward adjustment in fiscal allocations for the sector. At the same time, Bulgaria has one of the highest compliance costs, both in terms of absolute amount and in per capita terms. According to the strategic financing plan (SFP) estimates, Bulgaria will need to invest more than BGN 7,000 million to finance the needed wastewater projects in the future.

10. **To address the challenges ahead the WSS sector needs to significantly increase capital expenditure** and to do so a number of constraints must be addressed. The PER shows that disbursement of EU funds has been at less than EUR 50 million per year during the first six years of the Operational Programme Environment. In order to disburse all the funds available, disbursement would have to be approx. EUR 1,000 million during the last three years, or close to EUR 350 million annually. A similar argument is true for capital expenditure from other sources (general government and utilities). These will also have to be approximately six-fold higher in the coming years than in the past in order to meet the expenditure needs identified in the investment programmes.

[4] Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption.

11. **Ad hoc allocations to financing investment do not provide predictability, whereas a strategic approach could improve quality and secure needed spending levels**. The PER illustrates that public expenditures were high in 2007, 2008 and partly in 2009 reflecting the strong financial position of the government prior to the global economic crisis and that capital expenditure for WSS purposes suffered during the crisis falling by more than 50% from 2009 to 2011. To ensure both the quantity and the quality of the needed investments a strategic approach to capital spending in the WSS sector is needed.

12. **Better alignment of incentives, access to funding and benefits from the investments could contribute to a higher level and better quality of investments**. The data illustrate that currently local governments and EU funds are the two main sources of funding. Municipalities are the beneficiaries of EU funds. However, investments in WSS infrastructure create the basis for revenue generation by the WSSCs, that have little formal role in the current investment decisions and project implementation. Better alignment of incentives and formal roles could contribute to better quality of investments.

13. **Constraints on debt financing and the ability of WSSCs to finance capital investments reduce capital expenditure below the level needed to meet investment needs.** The analyses in the PER and World Bank (2012) both illustrate that the WSSCs have little access to debt funding for a number of reasons. Contributing factors include:

a. **A regulatory regime** which does not provide for adequate return on capital and in particular not on WSSC investments in infrastructure not owned by the WSSC;

b. **A low ratio of operating revenues to operating expenditure** partly due to inefficient operations,

c. **A dividend policy** which leaves only 20% of annual profits in the state-owned WSSCs;

d. **Uncertainty about the future WSSC revenue stream** in a situation where assets are about to be transferred and agreements between WSSAs and operators on future operation of WSS systems not yet in place.

World Bank (2013) demonstrates that a higher level of debt financing in the future is a necessary, but not sufficient, ingredient to meet future investment needs.

14. **Cumbersome procurement procedures and still poor administrative capacity to implement major capital projects are key constraints to execution of investments in the WSS sector.** The quality of tender documentation has led to many appeals by bidders which have delayed the start of many projects. Frequent changes to the public procurement legislation have exacerbated the difficulties in implementation. Difficulties have been pronounced for municipalities, who usually lack in-house capacity to follow frequent changes and prepare bidding documents in compliance with many and changing requirements.

15. **This issue may be addressed in several ways including the simplification of the procurement legislation and launching more large projects** with more professional preparation of tender documents rather than many small projects. Such changes are currently under consideration, including but not limited to, as part of the preparation of the Operational Programme Environment for the 2014 – 2020 programming period.

16. **To address inefficiencies in the WSS sector and make room for larger and high quality investments in WSS infrastructure, the PER suggests a number of reform options**, including:

    a. **A strategic approach to funding of capital investments** which would imply designing a realistic strategy for meeting the investment needs in the sector, that is affordable and takes into account the administrative capacity to implement projects. It is likely that the level of future investments would be much higher than the present, but lower than the needs currently expressed in the short term investment programs. The State should invest significant amounts in the sector.

    b. **Better opportunities for debt funding of capital investments.** Addressing the constraints to WSSC debt financing identified above would be an excellent starting point. In addition, the Government may want to reconsider its current policy of not procuring loans from IFIs for the purpose of WSS sector investments.

    c. **Optimization of operational expenditures in the WSS sector.** It is crucial to address the identified inefficiencies in the sector. A number of steps can be taken including, but not limited to, enhanced competitive pressure through benchmarking, greater use of private sector service provision to utilities, consolidation, development of staff skills and reduction of overemployment.

    d. **Enhancing revenues and addressing affordability. Current tariff revenues in Bulgaria are low compared to other EU12 countries.** Increased future service levels necessitate higher tariffs. However, affordability is a major concern, but models exist to use the existing social safety net system similar to what is done for electricity and heating. With collection rates of less than 80 per cent for half of the WSSCs in Bulgaria, there is considerable room for improvement. However, higher collection rates are likely to also require changes in current legal and administrative practice. There are currently many barriers to effective collection of unpaid bills by WSSCs.

1. Introduction

1.1. Objective of the report

16. **The Public Expenditure Review (PER) of the Water Supply and Sanitation (WSS) Sector in Bulgaria** constitutes an intermediate output of the Advisory Program (AP) for the development and implementation of a water supply and sanitation (WSS) strategy, as stipulated under the Advisory Services Agreement signed between the Government of Bulgaria and the World Bank dated July 26, 2012 financed through the resources of EU Structural Instruments allocated to Bulgaria. Along with other intermediate fact-based analyses under the AP, the PER contributes findings and recommendations to be considered by the Government for integration into a new Water Supply and Sanitation Strategy and Action Plan.

17. **The Strategic Financing Plan, see World Bank (2013) and the PER are closely linked documents.** However, both documents have been written so that they may be read independently of each other. In consequence there is some overlap in the issues covered and information presented.

18. **The following Agreement excerpts guide the scope of the Public Expenditure Review:**

"(It) is expected to include, but not be limited to the following components:

- *Evaluation of public expenditure priorities--across and within functions--given the resource constraint and distributional objectives. In other words: For what purposes are public funds spent in the water sector. This analysis will be both by economic categories (e.g. wages, cars, other, equipment, power etc.) and by functional categories (water supply treatment, water supply distribution, wastewater collection, wastewater treatment, administration etc). Such analysis can give an indication of efficiency and the extent to which expenditure are directly targeted at providing services;*
- *Examination of the link between expenditure inputs and outcomes (such an analysis does not necessarily have to be based on fancy statistical techniques; good anecdotes could work well as supplements in case data are poor and/or insufficient);*
- *Assessment of planned expenditure versus actual expenditure, and planned outcomes versus actual. This will include, but not be limited to a comparison between investment plans and actual investments;*
- *A comparative analysis of efficiency among water operators (building on existing analysis)*

1.2. Main audience

19. **The policy makers and key stakeholders represent the main audience of the report.** There a number of agencies at the central government level responsible for implementing the WSS policy of the Government—Ministry of Regional Development and Public Works (MRDPW), Ministry of Environment and Waters (MOEW), the State Energy and Water Regulatory Commission (SWERC), and the Ministry of Finance. These agencies are responsible for the most important decisions affecting the sector and could benefit from understanding better current state of spending in the sector and how it affects sectoral performance and future needs.

1.3. Outline of the report

20. **The PER has been produced in parallel with the Strategic Financing Plan (SFP)**. In contrast to the SFP which focused on the future medium and long-term investment needs in

the sector, the PER has more historical approach and medium-term perspective. By looking at recent expenditure trends, the PER tries to identify medium term challenges and propose options for reforms. The report is organized as follows:

21. **Chapter 2 presents an overview of the sector in Bulgaria including but not limited to a comparison of efficiency among water operators.** The chapter discusses the current state of the WSS sector by benchmarking Bulgaria to its peers in the new EU member states. It looks at the efficiency in resource allocation and service delivery in the sector.

22. **The institutional arrangements in the sector are described in Chapter 3, including but not limited to, an assessment of planned versus actual expenditure and outcomes.** The chapter looks at roles and responsibilities of the many players in the WSS sector to identify key bottlenecks in effective management of the sector. The institutional review also tries to identify issues in budgeting and planning of resources in the sector as well issues related to procurement. Since increasingly EU post- accession funds are financing investment needs in the sector, the chapter also reviews issues in utilizing EU funds.

23. **In Chapter 4, the analysis focuses on trends in spending during 2007-2011**. The assessment looks at the composition of spending according to type of expenditure (operational and capital), source of financing (central government, local government, EU funds, loan financing, and other types of financing) and by sub-sector (water supply, wastewater collection, and wastewater treatment). The objective of the analysis is to understand recent spending patterns and to identify options for reform and improvement.

24. **Efficiency and effectiveness of public spending is assessed in Chapter 5.** The analysis tries to link outputs to results of public spending by analyzing service delivery during 2007-2011.

2. Overview of the WSS sector[5]

2.1. Current state of the water supply and sanitation sector in an international perspective

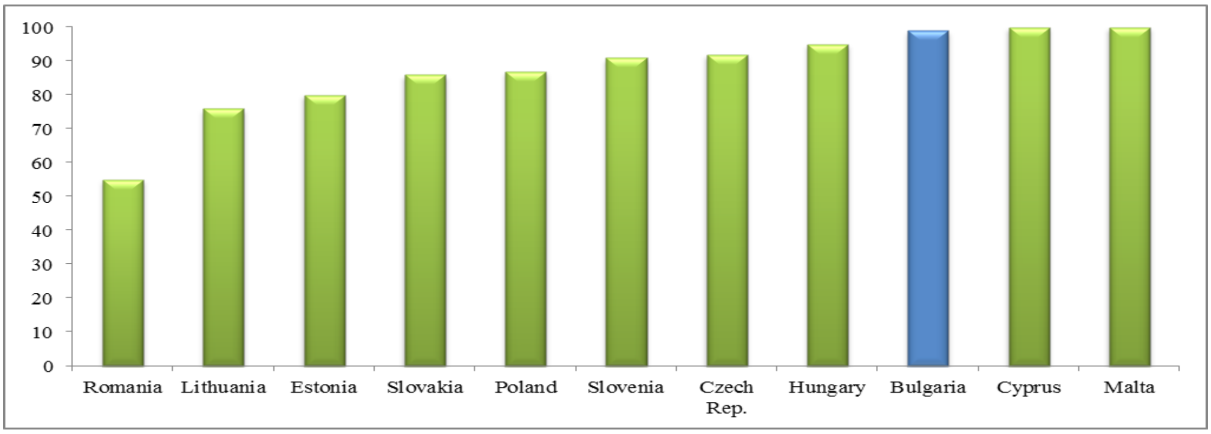
25. **This chapter discusses the current state of the WSS sector in comparison to other EU countries**. In doing so the Chapter focuses on service coverage, compliance with EU directives and indicators of service quality and efficiency in the WSS sector. Bulgarians have almost universal access to drinking water, the quality of the water is good, and coverage of population with wastewater collection and wastewater treatment has increased since 2007 although is lower compared to other countries in the EU. Despite recent improvements, there are important inefficiencies in the sector that need to be addressed if Bulgaria is to enhance the effectiveness of public service provision. The productivity in the WSS sector is low in a comparative perspective and water losses are one of the highest in the region.

2.1.1. Water Supply Coverage and Compliance

26. **Bulgaria has almost full coverage with public drinking water supply and fares better than most of its peers from EU12**[6]. Almost all the urban areas of Bulgaria have a water supply system and these systems generally have to comply with the drinking water directive (DWD). More than 5,000 towns and villages have central water supply systems. This represents 99% of the overall population in the country which is a very high coverage compared to other EU new member states.

[5] Note that this chapter contains similar information as Chapter 2 in the Strategic Financing Plan.
[6] EU12 covers all new EU member states since 2004—Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, and Slovenia.

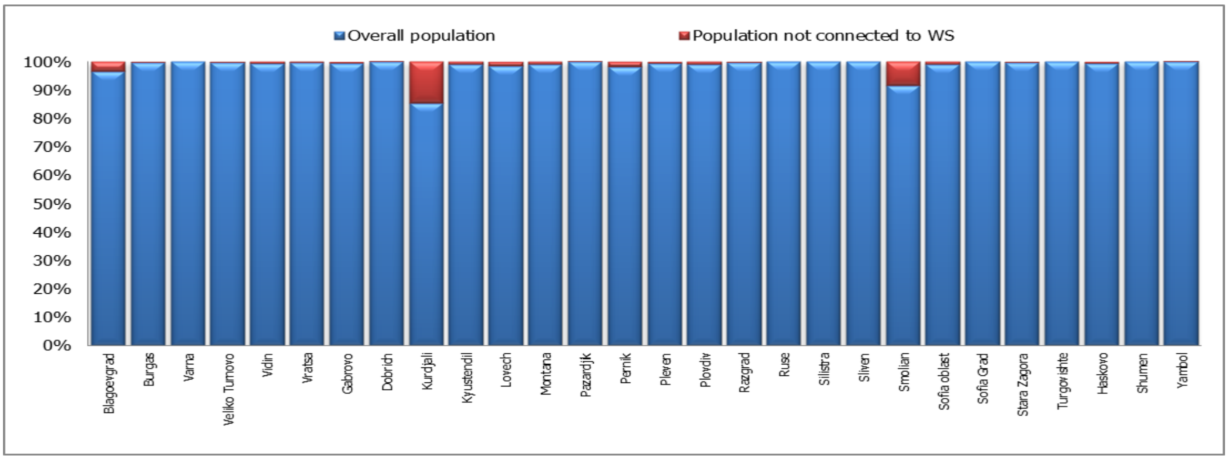
Figure 1 Public drinking water supply coverage in EU12, percent of population connected to drinking water supply



Source: EUROSTAT Database. 2012b. EUROSTAT Population Connected to Public Water Supply (Reference year 2009, except for Slovenia (SI) (2002) and the Czech Republic (CZ) (2007)). http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/dataset?p_product_code=TEN00012

27. **As can be seen from Figure 2 only 3 districts in Bulgaria have lower than the average for the country access to public drinking water supply.** Almost all districts have close to 100 percent access to public drinking water supply. Population only in Kurdjali, Smolian, and to a lesser extent in Blagoevgrad do not seem to rely entirely on public water supply due to significant number of people living small and scattered agglomerations below 2,000 p.e. There are also seasonal water shortages in some districts, such as Pleven, for example. Nevertheless, coverage in Bulgaria remains much higher than in most of the EU12.

Figure 2 Public drinking water supply coverage in Bulgaria by district



Source: WYG (2013)

28. **Bulgaria compares well with its peers also in terms of the quality of drinking water in the larger drinking water zones.** According to a recent report on the quality of drinking water in the European Union, Bulgaria is the only EU-12 country that scored compliance levels of 95-100% for all three types of parameters (microbiological, chemical and indicator) (KWR 2011, here quoted from AAPC (2013)). Bulgaria was among the 10 EU member states that scored well for all three types of parameters together with Poland and 8 other "old" member states[7]. The information from 2007 to 2010 shows that the average compliance rate of water samples in big water supply zones was 99.6%. There are specific issues with quality of water in small water supply zones, but on national level the water quality is small

[7] It should be noted that this report is based on reporting to the European Union. This reporting is required only for water supply more than 1,000 m^3 per day. This roughly translates into supply of 5,000 people or more.

zones is good. In 2009 and 2010 the average compliance rate of water samples in small water supply zones is 98.4%. It should mention though that Water Supply and Sanitation Companies (WSSCs) are not complying with their monitoring obligation up to the necessary volume and frequency as per the requirements of the national and European standards. The State is trying to compensate the necessary monitoring of water quality by performing up to 50% of the monitoring at its own cost.

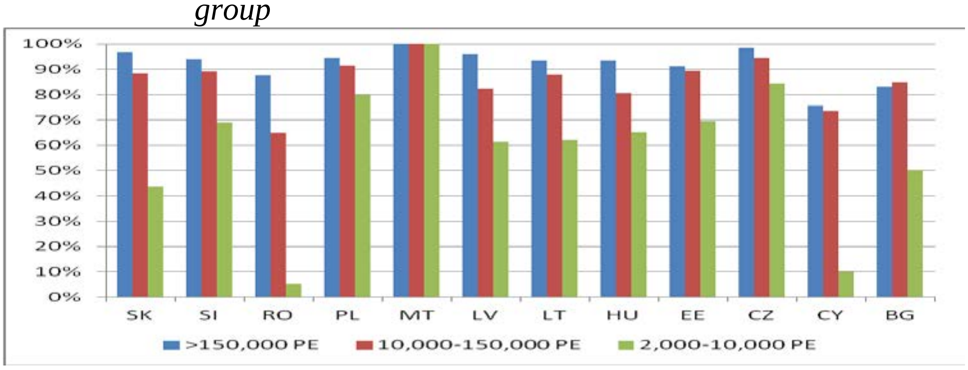
2.1.2. Wastewater Collection and Treatment Coverage and Compliance

29. **Wastewater collection and treatment coverage is lower than in the rest of the EU, thus magnifying the challenge for Bulgaria of complying with the Urban Waste-Water Treatment Directive (UWWTD) [8].** To comply with the Urban Waste-Water Treatment Directive (UWWTD), Bulgaria has to increase both wastewater collection and wastewater treatment from the current coverage levels of 66 and 50 per cent respectively[9]. The UWWTD basically requires that wastewater in agglomerations with more than 2,000 p.e. must be collected and that all collected wastewater must be treated. According to the Accession Treaty, Bulgaria has a transition period for compliance with the UWWTD. The deadline for final compliance is December 31, 2014.

30. **Most EU12 countries recognized that meeting the UWWTD would be difficult and costly, and negotiated transition periods of up to 12 years.** For Bulgaria the transition period is 8 years. At the same time, initial wastewater coverage was lower in Bulgaria than in several other countries Thus in order to meet the final deadline for compliance with the UWWTD, Bulgaria had more progress to make in less time.

31. **Compared to other EU12 countries, Bulgaria has one of the lowest rates of wastewater collection**. This is especially the case in large cities and in small agglomerations—Bulgaria has the second lowest collection rate in large cities, after Cyprus, and the third lowest rate in small agglomerations, after Cyprus and Romania. The collection rates, however, for medium sized towns (10,000 – 150,000 p.e.) are more or less on par with the rest of the EU12 countries.

Figure 3 Wastewater collection in EU12, % of total generated load in particular size group

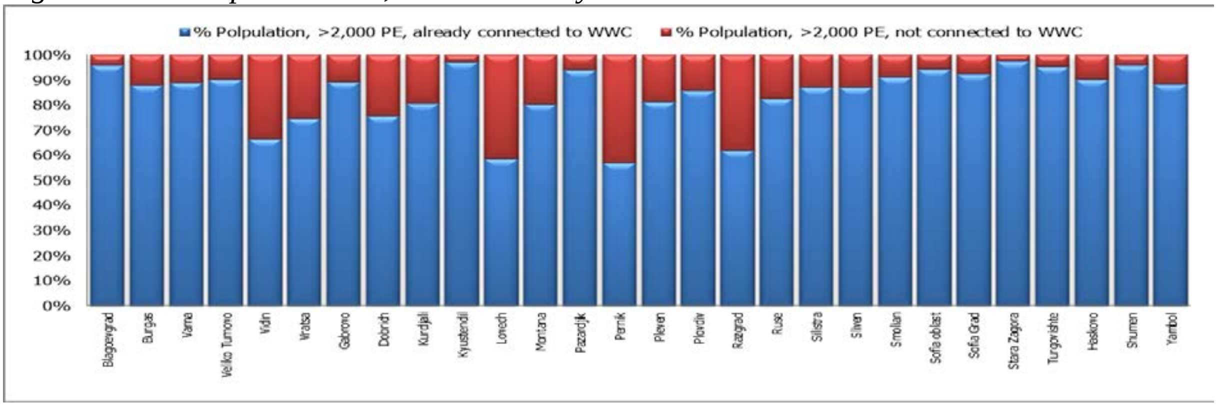


Source: AAPC (2013) with calculations based on EEA (2012*)*

32. **Nationally, 12 per cent of the population (or 670,000 people) that lives in settlements greater than 2,000 p.e., require to be connected to wastewater collection** in order to comply with the UWWTD. Figure 4 demonstrates the proportion of the population per district, living in settlements greater than 2,000 p.e. that are already connected to wastewater collection (WWC) versus this part of the population that is not currently connected and therefore requires connecting.

[8] Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment, OJ L 135, 30.5.1991.
[9] Note that these coverage data differ from those reported by NSI. For a detailed explanation see footnote to coverage data in the executive summary.

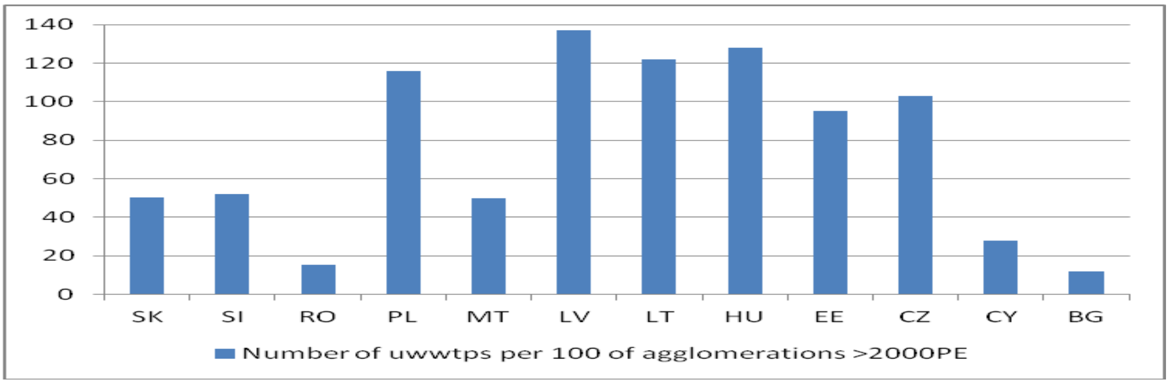
Figure 4 Population >2,000 PE already connected / not connected to WWC



Source: WYG (2013) based on SEWRC data (2012)

33. **In terms of connection to wastewater treatment plants, Bulgaria faces even a larger challenge.** Bulgaria has reported the lowest density of urban WWTPs among the EU12 countries (*Figure 5*). Bulgaria has only 12 urban WWTPs per 100 agglomerations with a population equivalent of more than 2,000 PE while the median for EU12 is more than 100 urban WWTPs.

Figure 5 Density of UWWTPs in EU12 countries (reference years 2009 and 2010)

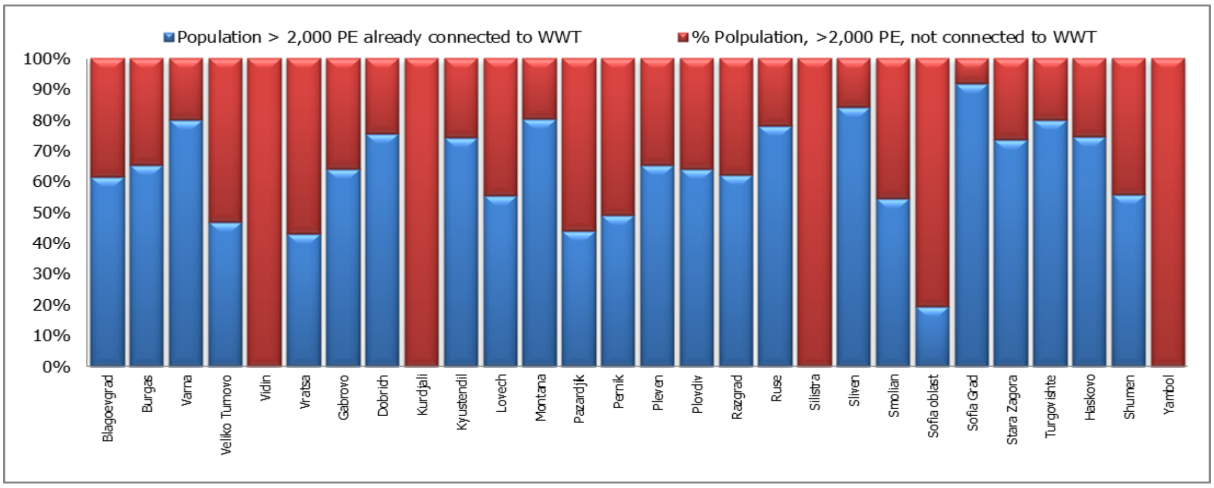


Source: AAPC (2013) with calculations based on EEA(2012)

34. **Nearly 34 percent of the population (1.85 million people) living in settlements greater than 2,000 p.e. require to be connected to an urban WWTP in order to comply with the UWWTD.** Figure 6 presents the share of population already connected to urban WWTPs versus the share of population requiring connection to WWT in order to comply with the UWWTD[10]. Currently, four districts have no WWT coverage. These are the districts of Vidin, Kurdjali, Silistra & Yambol.

[10] District specific figures are available in the WB upon request.

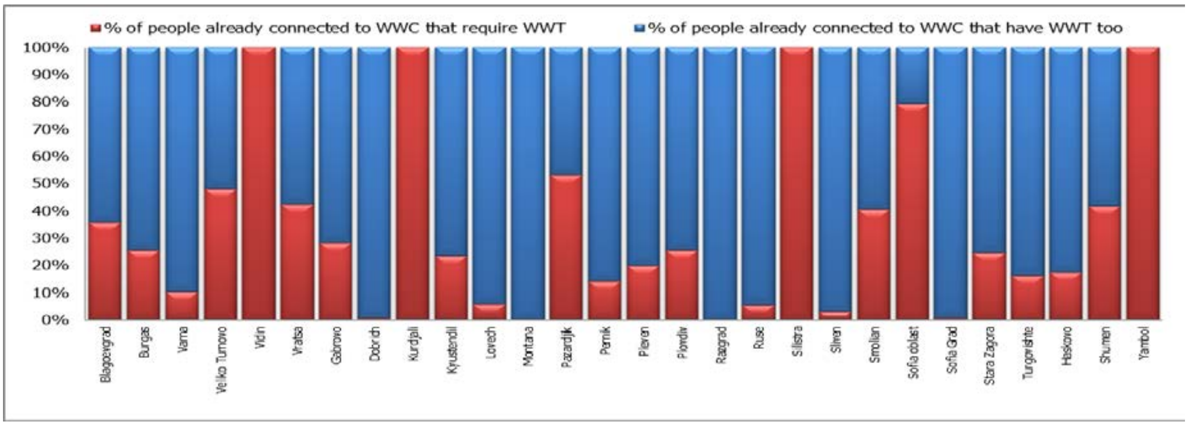
Figure 6 *Population >2,000 p.e. already connected / not connected to a WWTP*



Source WYG (2013) based on SEWRC data (2012)

35. **Currently 76 per cent of the population in Bulgaria that has WWC is also connected to WWT.** Figure 7 shows the current situation by district. The districts of Varna, Dobrich, Lovech, Montana, Razgrad, Ruse, Sliven, and Sofia grad have 10 percent or less yet to connect to WWT from the current coverage with WWC. On the other scale of the spectrum are the districts of Vidin, Kurdjali, Silistra, Sofia oblast and Yambol, which require connecting to WWT more than 80 percent of its population currently connected to WWC.

Figure 7 *Proportion of people currently connected to WWC that also are connected to a WWTP*



Source: WYG (2013) based on SEWRC data (2012)

36. **Future needs for wastewater collection and treatment infrastructure, however, could be smaller due to Bulgaria's worsening demographic situation.** As shown in Table 1, both the number of smaller agglomerations (between 2,000 p.e. and 10,000 p.e.) larger and agglomerations (with more than 10,000 p.e.) declined by 35 between 2010 and 2003 as a result of outmigration and natural decline of the population. By 2035, Bulgaria's population is projected to decline by more than 1.2 million which will have implications on the needs for wastewater collection and treatment infrastructure. Estimates for number of agglomerations in 2035, based on the NSI population projection per district and assuming that the p.e. values change in direct proportion to the population, suggest that the number of agglomerations between 2,000 p.e. and 10,000 p.e. could be reduced by 47 (to 226) compared to 2010 while agglomerations with more than 10,000 p.e. could fall to 72 in 2035 compared to 85 estimated in 2010.

Table 1 Number of agglomerations of different size in 2003 and 2010 and projected for 2035

Agglomerations	2003	2010	2035
> 2,000 p.e. but < or = 10,000 p.e.	309	273	226
> 10,000 p.e.	121	85	72

Source: For 2003 and 2010: MOEW (2012) Projection for 2035 based on NSI (2013) population projection by district.

37. **Table 2 shows existing and additionally required agglomerations needed to comply with the UWWTD by 2015.** A key challenge posed by demographic developments is how to plan for wastewater collection and treatment in small settlements with scattered population, in particular where these settlements are likely to experience a decrease in population and economic activity over the next decades. According to the UWWTD collection and treatment must be provided for agglomerations with currently more than 2,000 p.e. regardless of demographic projections. However, there is a provision for consideration of individual appropriate systems where collection entails excessive costs or does not provide environmental benefits[11].

Table 2 Overview of WWC and WWTPs by size of agglomerations as of December 31, 2010

Agglomerations	WWC existing[1]/ additionally required[2]	WWTP existing[1]/ additionally required[2]
> 2,000 p.e. but < or = 10,000 p.e.	35/239[3]	32/241
> 10,000 p.e.	14/70[3]	43[4]/42

Source: MOEW (2012)

Notes: 1 Considered as fully complying with the requirements of the directive

2 Additionally required to comply. Final deadline is end of 2014

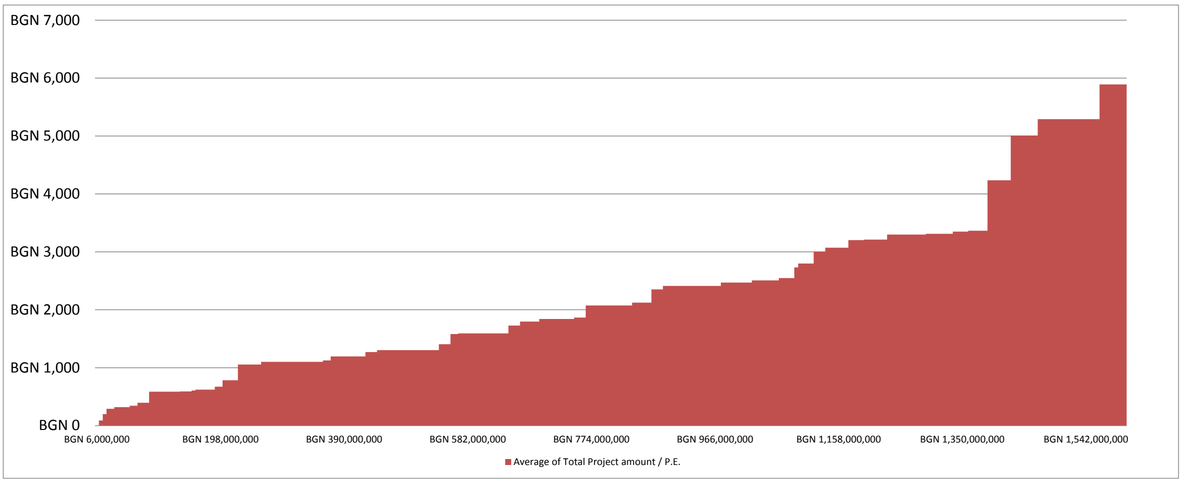
3 These add to 274 and 84 respectively, whereas the number of agglomerations is 273 and 85.

4 MOEW (2012) interpretation of 14 compliant WWC systems but 43 compliant WWTPs seems unconventional. It seems that the MOEW (2012) has interpreted the WWTP to be compliant if it has sufficient capacity (and proper technology). However, DG Environment considers that compliance with article 4 of the UWWTD (treatment) requires that 1) all wastewater is collected **and** 2) this is treated as per the directive (see EC (2012a) In this sense compliance in Bulgaria for WWTPs is 14 or less.

38. **Current and future sewer projects may have a very high cost**, as illustrated in Figure 8 and Figure 9. Several current projects have a cost per population equivalent (p.e.) above 3,000 BGN and some above 5,000 BGN. Based on estimates of needed lengths of sewers, number of wastewater treatment plants and unit costs from master plans, Figure 9 illustrates the future average cost of wastewater projects. The estimated cost per remaining p.e. is very high at more than 7,000 BGN per p.e.

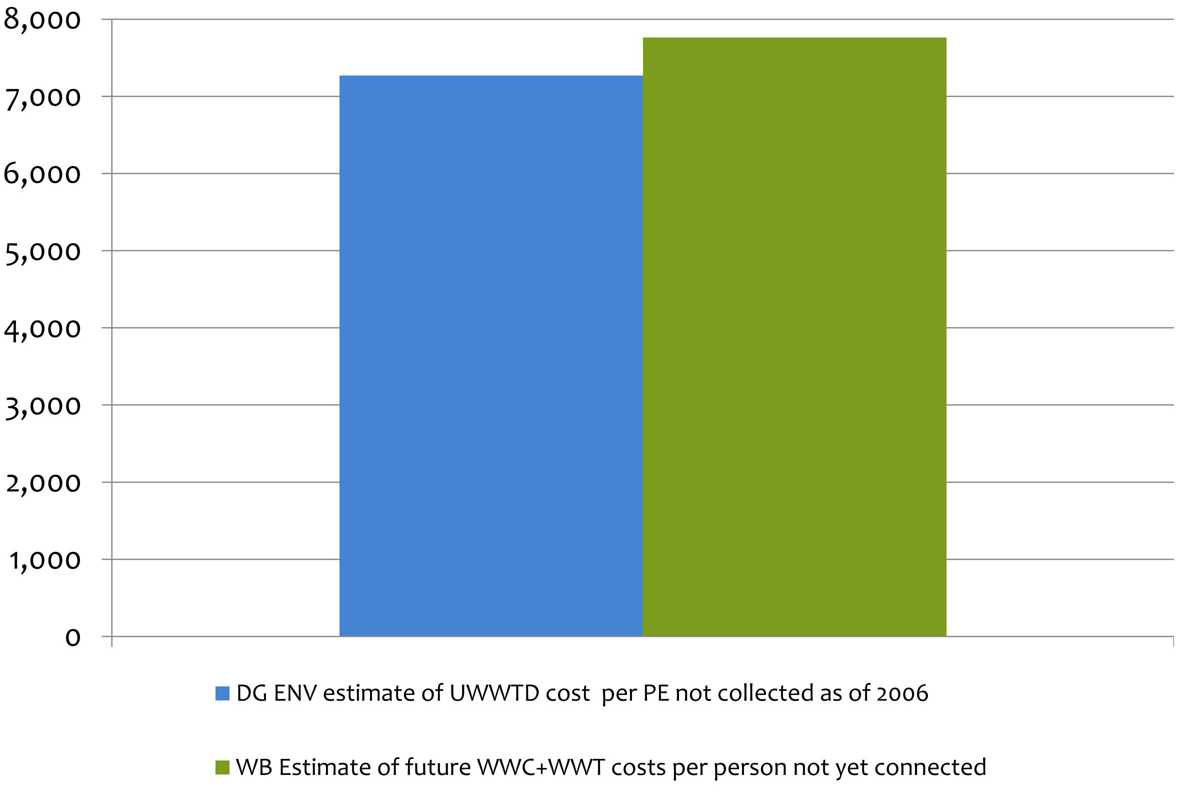
[11] UWWTD article 3.

Figure 8: Per p.e. cost and total cost of projects in the current portfolio of Operational Program Environment



Source: MOEW (2012). The figure includes completed ongoing and registered but not cancelled or suspended projects under OPE Axis 1 for which the project can be clearly linked to one agglomeration.

Figure 9: Estimates of future UWWTD compliance costs



Sources: DG ENV estimate, see COWI (2011), World Bank staff estimate, see World Bank (2013) based on WYG (2013)

39. **These findings raise the issue of how to avoid that Bulgaria incurs excessive costs in providing wastewater solutions.** This has three aspects: 1) Appropriate definition of agglomerations; 2) appropriate determination of the extent of coverage within an agglomeration; and 3) Legality, availability and use of individual appropriate solutions often referred to as residential on-site wastewater treatment options.

40. **Bulgaria seems to have adopted a definition of agglomerations which includes many peripheral areas.** According to JASPERS (2013):

> *"The issue of including small settlements in a defined agglomeration has arisen in projects in a number of Member States. Within Bulgaria it is noted that in the definition of many agglomerations peripheral (and in some instances relatively remote) areas around the main urban center are generally included within the agglomeration."*

41. **The UWWTD does not specifically require coverage levels (to a sewer collecting system) that need to be achieved.** Or as stated in JASPERS (2013):

> *"It is considered important to remember that it is not a pre-requisite to provide a sewer connection to all inhabitants within an agglomeration."*

Other EU Member States have adopted different parameters to judge the extent of coverage of sewer network within an agglomeration. There parameters are generally based density indicators, such as in Poland and Hungary, which require a minimum of 120 p.e. / 200 inhabitants per 1 km extension or cost-effectiveness such as in the Czech Republic, which requires a cost less than EUR 3,400 per p.e. connected.[12] Comparing the Czech cost-effectiveness requirement with our estimate of future costs in Bulgaria, it is seen that the average project in Bulgaria is estimate to be more expensive than the Czech requirement for consideration of individual appropriate solutions.

42. **Within Bulgaria, most projects strive to achieve almost full coverage of the sewer system in each settlement of the agglomeration that is served**. An option analysis is rarely undertaken to determine the appropriateness of the proposed increase in coverage levels. Some areas are justified in terms of water protection zones. Justification (based on option analyses) for sewer extensions has been requested during the project approval process in several member states[13].

43. **A general basis to assess excessive costs is to compare the connection costs to a sewer with the alternative individual appropriate systems. However, the current legislation does not provide for individual systems that are appropriate in a Bulgarian context**. At the moment the only legal alternative in Bulgaria to centralized collection by sewers is establishment of closed septic tanks. Closed tanks provide a high level of environmental protection if regularly emptied and if contents are transported and disposed to fully functional wastewater treatment plants. However, this solution entails very high operating costs if the contents are to be collected and disposed of in accordance with the regulations.

44. **Appropriate wastewater collection will be difficult to enforce.** There is currently no provision to force household to connect to a sewer line that is provided. Since connection may be costly and not mandatory; it goes without saying that a number of household outside dense city centers will choose not to connect. For the individual solutions the difficulty relates to the enforcement of the requirement that the tank shall be water tight as well as the proper and legal disposal of wastewater collected by trucks.

45. **There is an urgent need to establish national guidelines which address each of the three issues,** viz.: 1) Appropriate definition of agglomerations; 2) appropriate determination of the extent of coverage within an agglomeration; and 3) Legality, availability and use of

[12] These examples are from JASPERS 2013
[13] Based on JASPERS (2013)

individual appropriate solutions. As part of this work the MRDPW should also consider to revise the legal framework which currently narrowly defines individual appropriate solutions as being only water-tight septic tanks.

2.2. Efficiency in resource use and service delivery

46. **The Regulatory Review (World Bank 2012) indicated that many WSSCs do not operate with efficiency, profit maximization and long term sustainability as their key drivers**. For example, several municipal companies have not requested tariff increases even in years where costs for energy etc. have substantially increased. Cursory evidence also indicates that political interferences in operations are common.

47. **Bulgarian WSSCs appear to be much less efficient than most of their European peers (Table 3).** Bulgarian WSSCs are overstaffed and therefore operate at very low productivity levels. Measured in terms of staff per 1,000 connections Bulgarian companies have 4 to 5 times higher staff numbers compared to other EU countries. This partly reflects inefficiency, partly that Bulgarian WSSCs rely on in – house equipment and staff for almost all their needs (typically including workshops for heavy equipment). Non-revenue water is extremely high in Bulgaria and has little changed throughout the years suggesting there are deep seated structural issues in the WSS sector in Bulgaria. Pipe breakages per year are also higher in Bulgaria than in most of the countries, except Romania.

48. **Inefficiencies are likely to make it more difficult for WSSCs in Bulgaria to finance and implement the ambitious capital investment program**, which is necessary to meet compliance requirements and to achieve the required long term service levels.

Table 3 Selected indicators of efficiency for WSSCs in select EU countries

Efficiency of WSSCs	Bulgaria	Romania	Czech Republic	Lithuania	Germany	France
Staff per 1'000 connections	7.7	1.9	0.6	0.8	2.5	2.4
Non-Revenue Water (NRW)	60%	49%	47%	24%	7%	26%
Pipe breakages. Breaks/km/year	1.5	1.9	0.7	1.1	0.01	0.1
Tariff in EUR/m3	€ 1.00	€ 0.85	€ 1.75	€ 1.50	€ 3.95	€ 3.40

Source: Bulgaria: Staff productivity and average tariff: WSSC reporting to SEWRC; NRW: NSI (2013a) http://www.nsi.bg/ORPDOCS/Ecology_9.2.xls;. Czech Republic and Lithuania: IBNET, http://www.ib-net.org/ accessed December 2012, Germany and France: Witteveen + Bos (2013) Annex table.

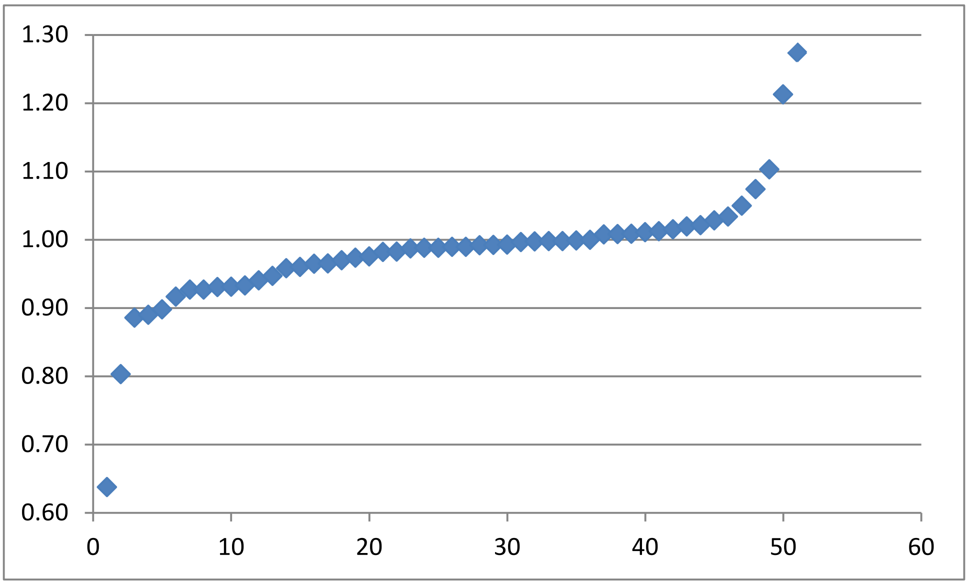
49. **The operating ratio (operating expenditure/operating costs) is of particular interest to an assessment of expenditure and ability to finance investments.** If the operating ratio is above 1.00 the company does not generate enough operating revenue to cover its operating costs. Sound companies that generate a significant operating surplus that can be invested (or used to finance debt) should preferably have operating ratios below 0.90. Figure 10 illustrates for 2011 that a large number of companies do not cover their operating costs (they have an operating ratio above 1.00) and only very few have an operating ratio that will enable them to use own funds for major capital investments. Not surprisingly, Sofiyska Voda is one of these few companies.

50. **Until now there has been little attempt to compare the efficiencies of Bulgarian WSSCs with their peers both in Bulgaria and abroad**. Tellingly, when data were collected for the International Benchmarking Network (IB-Net) only 19 out of 51 WSSCs in Bulgaria

responded and only 3 agreed to have their individual results to be made available to the public[14]. In many other countries, regular benchmarking is a relatively well-established tool used by WSSCs to assess how they are performing relative to their peers.

51. **Benchmarking is an effective tool to assess how WSSCs perform relative to their peers**. This section analyzes possible causes of inefficiencies and compares the efficiency of groups of WSSCs. The analysis has been carried out using two internationally accepted tools *IWA Water Utility Efficiency (Self) Assessment Methodology* and *Data Envelopment Analysis (DEA)*[15].The IWA methodology invokes a broad definition of efficiency and includes qualitative assessments. DEA is a linear programing tool widely used to compare the efficiency of complex production where several input produce more than one output.

Figure 10 Operating ratio for water utilities in Bulgaria



Source: POVVIK 2013 based on SEWRC (2012)

52. **51 of the 66 WSSCs which have to submit business plans to SEWRC have been analyzed[16].** These companies include 28 district companies (providing services to more than one municipality) and 23 municipal companies (providing services to a single municipality). The fifteen water operators excluded from the review are small private companies, providing services to enterprises or resorts, and municipal companies for which data was not presented by SEWRC.

53. **The IWA model covers all functional areas of the water utility, its operating environment and dimensions of water service and is widely used as the basis for benchmarking[17].** Here "efficiency" is defined not in a narrow technical sense, but in a comprehensive nature based on performance and processes in six areas: (i) Corporate Governance; (ii) Human Resources; (iii) Accountability towards Customers; (iv) Financial; (v) Commercial; and, (vi) Technical. For the purposes of this report, the IWA model, designed primarily for self-assessment, was modified by selecting 18 (with some sub-indicators) out of originally 39 performance indicators. The selected indicators cover the main performance aspects but take into account data availability and in particular reporting as part of the 72

[14] Sofiyska Voda, Stara Zagora and Targovishte

[15] Details of the analysis can be found in appendices of World Bank (2013), in Witteveen + Bos (2013) and POVVIK (2013)

[16] The primary source of data are the business plans submitted for this regulatory period which includes data for 2007 and data from the annual reports for 2008, 2009, 2010 and 2011.

[17] For example the International Benchmarking Network, http://www.ib-net.org/ is based on IWA methodology as is the benchmarking prepared by the European Benchmarking Co-operation http://www.waterbenchmark.org/ (both accessed January 2013)

indicators required to be reported by the SEWRC. For each indicator a five-level scoring system was applied with 1 given for poor performance, 3 given for an average performance and 5 given for excellent performance.

Table 4 Performance indicators used for assessment of the efficiency of Bulgarian WSSCs

Performance area	Performance Indicator
Corporate Governance	1. Quality of business plan/strategy 2. Public relations/customer communications 3. Quality control/quality management
Human Resources	4. Recruitment and staffing levels 5. Staff training and education programs 6. Remuneration level
Accountability towards Customers	7. Service coverage (Water, wastewater collection and wastewater treatment) 8. Continuity of service 9. Water quality (Physiochemical and radiological, and microbiological)
Financial	10. Working ratio 11. Operating unit cost 12. Creditworthiness
Commercial	13. Collection efficiency (Collection ratio, and collection period) 14. Customer metering 15. Customer information
Technical	16. Non-revenue water management 17. Maintenance level 18. Level of asset management

Source: POVVIK (2013), see also Appendix for more details.

54. **It should be noted, however, that the results of the assessment are indicative.** This is an external assessment relying on quantifying sometimes qualitative information. In the future, ad hoc external assessments should be replaced by regular assessments performed by the key stakeholders themselves. The results of the preliminary assessment performed as part of this report are presented and discussed below.

Table 5 Overview of indicator values by performance area and types of operator

	Performance Area	All Operators	Public Operators		Private Operators[1]	
			District	Municipal	District	Municipal
1	Corporate Governance	2.50	2.95	1.85		4.00
2	Human Resources	2.69	2.93	2.35		3.33
3	Accountability towards Customers	3.41	3.50	3.25		4.67
4	Financial	2.32	2.18	2.38		5.00
5	Commercial	2.89	3.02	2.73		2.67[2]
6	Technical	2.88	2.67	3.15		2.83
	TOTAL SCORE	**2.78**	**2.87**	**2.62**		**3.75**

[1] Sofiyska Voda is given separately because its uniqueness, providing services to Sofia by private operator

[2] Sofiyska Voda surprisingly reports a low collection ratio and a long period of receivables outstanding.

55. **Table 5 summarizes the results of the 51 reviewed water operators. Sofiyska Voda stands out as a better performer than the rest**. The main argument for private operators are their ability to achieve higher efficiency due to a combination of factors including better access to international experience, incentives better aligned with attaining efficiency and less political interference, and this result does not contradict that these forces have been active in Sofia.

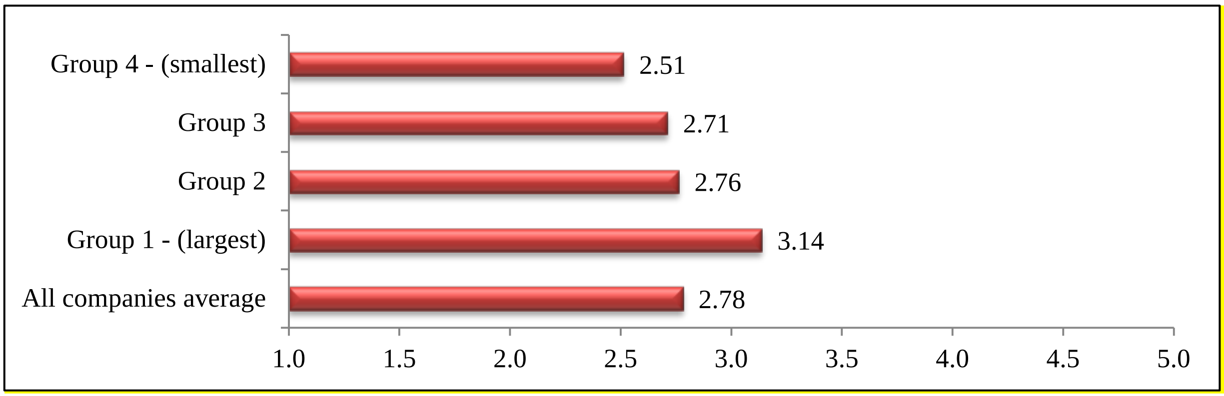
56. **Comparing the district companies with the municipal it can be noted that in 4 out of 6 areas there is little difference (less than 0.5) in scores.** Generally, district companies seem to fare better than municipal companies. Only two performance areas, namely governance and human resource show larger differences than 0.5 in average indicator values and here district companies achieve higher scores. Municipal companies obtain higher scores for technical indicators scoring 0.48 higher on average. Municipalities would typically argue that due to their decentralized nature they are more customer responsive than state-controlled district companies. If this was the case, one would expect municipal companies to do better in the areas of governance and customer responsiveness and not necessarily in the technical area. Only detailed analysis, based on a more complete data set and carried out with active involvement of the utilities in question, could reveal the causes of the differences in performance seen.

57. **To test the hypothesis that larger companies are more efficient than smaller, the WSSCs were grouped into 4 groups.** These four groups based on quantity of water sold per year (in m^3) are shown in Table 6.

Table 6 Grouping of WSSCs by size measured as water sold in m3 per year

Group	Water Sold
Group 1	more than 7,000,000 m3
Group 2	Between 3,000,000 and 7,000,000
Group 3	Between 1,000,000 and 3,000,000 m3
Group 4	less than 1,000,000 m3

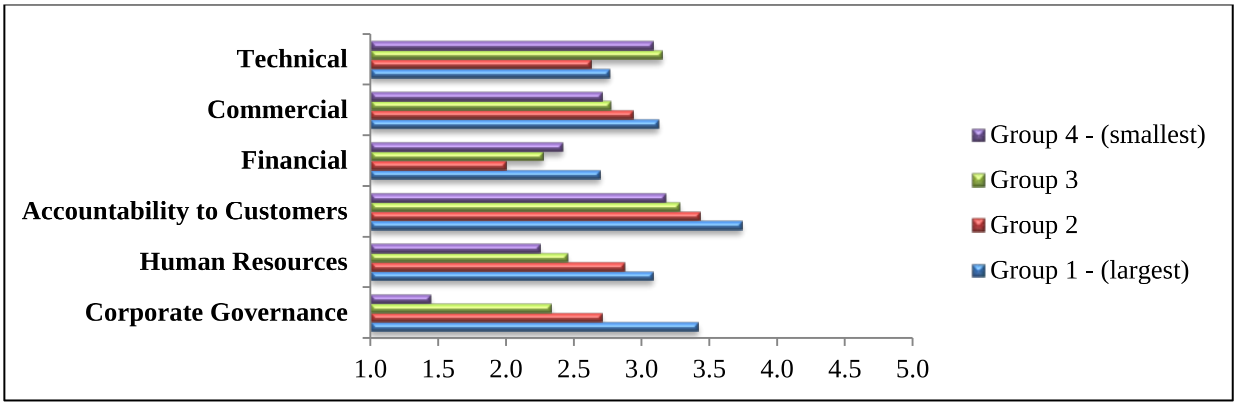
Figure 11 Average value of indicators by size of company



Source: POVVIK (2013)

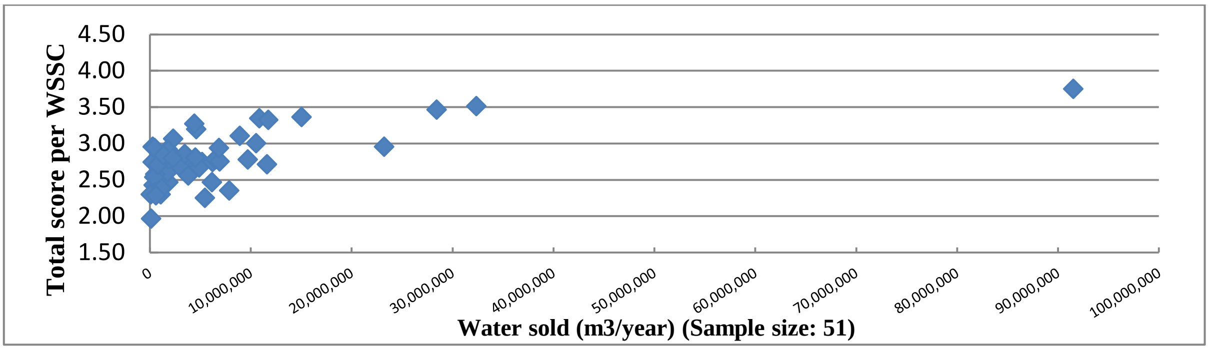
58. **Size of the companies seems to matter for human resources and governance indicators** (see *Figure 12*). Deviations across groups for these two indicators are the highest while technical indicators do not seem to be size-dependent.

Figure 12 Average value of indicators by performance area and size of company - grouped



Source: POVVIK (2013)

Figure 13 Scatter diagram of efficiency indicators and size for Bulgarian WSSCs



Source: Witteveen + Bos (2013)

59. **Based on Figure 11 to Figure 13 it is not possible to reject the hypothesis that larger WSSCs perform better than smaller.** The figures consistently show the group of larger companies performing better overall (**Figure 11**), better for each of the six groups of indicators (***Figure 12***) and the scatter diagram shows that the companies with sales above 10 million m^3 per year tend to have scores above the average value of 3, whereas most smaller companies have scores below 3**.**

60. **Typically using linear programming, DEA calculates the relative efficiency of an organization within a group, comparing it to the organization that performs the best practice within that same group.** The most common concept of efficiency is technical efficiency: the outputs generated by a set of physical inputs (such as the services of employees and machines) with comparable technologies. In other words: the most efficient company does not waste inputs when producing a given quantity of output (s). An organization operating at best practice within its group is said to be 100 percent technically efficient. When operating below best practice levels, then the organization's technical efficiency is expressed as a percentage of best practice (a score of 70 per cent means that efficiency is 30 per cent below best practice). The efficiency score related to size of the companies is pictured in Figure 13.
It must be noted that the data set is rather weak and that inclusion of data from additional years (which were not available at the time of writing) may change the results. This caveat of the analysis will therefore need to be taken into account when interpreting the results.

61. **Based on the present data set the figure reveals no statistical correlation between size and (present) technical efficiency for Bulgarian WSSCs.** It is to be noticed that there is a considerable gap between the most efficient companies (best in class) and the bulk of the companies. Scores in the range of 0.3 to 0.5 indicate a potential to achieve the same output(s) with less than half the inputs if the companies could perform similar to "best in class".

62. **International research demonstrates that there are major economies of scale and that larger utilities on average perform better than smaller ones.** See for example Lentini and Mercadier (2011) which reports a large review of empirical studies covering several regions in the world. In relation to economies of scale a key finding was: *'The studies from a significant set of countries show economies of scale (…) in populations of 100,000 to 1 million (or in some cases covering many millions), with population densities of up to 250 inhabitants per square kilometre, or with volumes up to 100 million to 200 million cubic meters per year.*

63. **Economy of scale has also been a motive for many consolidation efforts in Europe**. For example, in France and the UK, the private market (typically interested in financial efficiency) demonstrates a preference for large scale. The size of utility companies in the European Union differs, but the average water production is approximately 45 Mm^3 per year (Witteveen + Bos (2013)).

64. **However, past developments show that choices for levels of aggregation have not 'just' been a matter of financial and efficiency considerations.** Political, cultural and legislative aspects and considerations have been predominant explanatory factors in the organization of the sector. Furthermore, the 'optimal size' of WSSC cannot be given outside a country context. For example, in Austria, Germany and Scandinavia water companies continue to be small and typically organized in a municipal context[18]. It would be premature to conclude that they are therefore inefficient compared to their peers in countries with other organizational models.

65. **In yet other countries significant consolidation of public companies has taken place**. Examples are: Romania, where a regionalization process resulted in a present number of 42 (multi-) utility companies (approx. one per 450,000 population), down from a total of 800 water operators in the 1990s; Italy which now has 91 providers (one per approximately 650,000 population), down from 13,000 in the 1990's; and the Netherlands which presently have 10 providers (one per approximately 1,700,000 population) compared to more than 200 in the 1950s. Thus there is European precedence for the current efforts of consolidation in Bulgaria.

[18] For example, more than 6,000 WSC and an additional 6,000 WWC in Germany, more than 5,000 WSC and 1,800 WWC in Austria (Witteveen + Bos (2013) and more than 2,000 WSCs in Sweden http://www.svensktvatten.se/Documents/Kategorier/Om%20Svenskt%20Vatten/Facts%20on%20Water%20Supply%20and%20Sanitation%20in%20Sweden%20(English).pdf accessed January 28, 2013

3. Institutional arrangements in the WSS sector

3.1. Roles and responsibilities in the WSS and institutional coordination

66. **The Ministry of Regional Development and Public Works is responsible for**:

- Implementing state policy in the WSS sector at the national level[19]:
- Developing the WSS sector strategy, submits it for approval to the CoM, and coordinates its implementation;
- Adopting secondary legislation (e.g. the methodology for determination of permissible water losses in water supply systems, or according to the draft AASWA, the Ordinance for the requirements on the WSSCs);
- May indirectly influence the pricing of WSS services by imposing additional public service obligations[20] on the WSS operators related to: non-interruption of delivery of drinking water; environmental protection[21]; measures to protect the public against disasters and accidents[22]; measures related to national security and national defense[23];
- Approving, according to the draft AASWA, the regional Master Plans (MPs) and the investment programs prepared by the WSSAs[24]. This is an anticipated responsibility and may be temporary, until the WSSAs acquire sufficient capacity to approve their own MPs. If so, the draft AASWA should be amended accordingly.

67. **The Ministry of Environment and Waters is responsible for** [25]:

- Implementing the state policy for the water sector at large (with the exception of the WSS segment reserved for the MRDPW);
- Adopting some of the secondary legislation in the WSS sector (such as Ordinance on ground waters exploration, use and protection, adopted jointly by MOEW, MRDPW, Minister of Health and Ministry of Economy and Energy);
- Preparing the draft National Strategy for Management and Development of the Water Sector;
- Developing national programs for protection and sustainable use of water;
- Issuing, directly or through the 4 river basin directorates (MoEW's subordinate bodies), major permits for water abstraction and usage of water sources (including wastewater effluent discharges);
- Implementing, through the Executive Environment Agency (MoEW's subordinate body) the national monitoring of water bodies and conducts laboratory and field tests to assess the condition of water bodies;
- Implementing the monitoring of wastewater generation and water pollution sources through the regional inspectorates of environment and waters (MoEW's subordinate bodies); etc.

68. **Ministry of Health is responsible for** [26]:

- Adopting some of the secondary legislation in the WSS sector (such as the Ordinance on the quality of water for drinking and household use, adopted jointly by Minister of Health, MoEW and MRDPW);
- Directing the monitoring of the quality of waters used for drinking and household use and of the mineral waters used for therapy, preventive care, drinking and household

[19] Art. 10, para. 1, item 1 and Art. 10b, para. 1 of the Water Act.
[20] Art. 18 of WSSSRA.
[21] In coordination with the Minister of Environment and Waters.
[22] In coordination with the Minister of Interior.
[23] In coordination with the Minister of Defense.
[24] Currently the regional master plans and the investment programs are adopted by the WSSAs and the MRDPW is responsible only for their consolidation at national level and for issuing of guidelines for their preparation.
[25] Art. 151, para 2, item. 2 of the Water Act.
[26] Art. 155a, para 1, of the Water Act.

use, bottling, hygienic use, sports and recreation and summarizes the results at national level;

- Developing, jointly with MoEW and MRDPW, a National Action Plan for improvement of the quality of waters for drinking and household uses.

69. **The State Energy and Water Regulatory Commission (SEWRC) is the technical and economic regulator of WSS services.** Its regulatory functions include: regulation of quality of services and regulation of prices. The regulator has legislative functions as: preparation, coordination and submission to CoM of secondary legislation under WSSSRA; issuing written instructions on the application of secondary legislation under WSSSRA. One of the most important functions of the regulator is the review and control of WSS operators' performance: By law, the regulator has at its disposal a large set of instruments for effective review of the WSS operators' performance, including:

- Review of the Business Plan for its consistency with the legal requirements;
- Scheduled and unscheduled inspections, for which it can use the support of external experts;
- Incidental checks during the procedure for review of complaints.
- Review of the regular reports provided by the operators and right to request additional information; etc.

70. **The Water Supply and Sewerage Associations** (WSSAs) is responsible for:

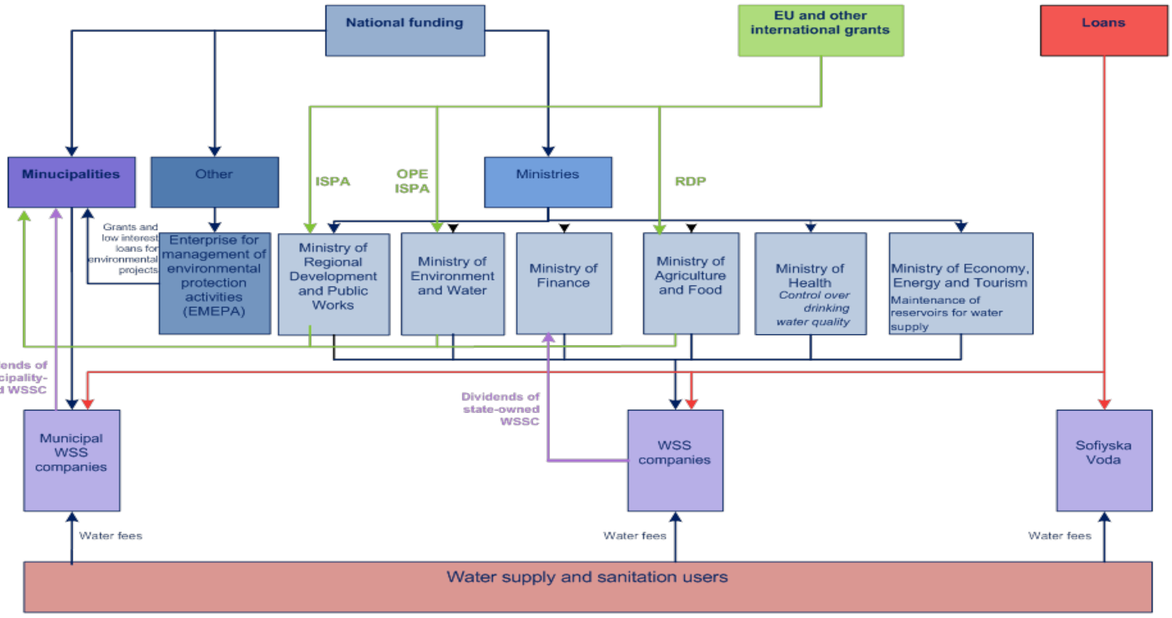
- Appointing the WSSCs as provisioned under the Water Act or the Concession Act.
- Developing and approve Regional Master Plans for the WSS systems and Master Plans for agglomerations above 10,000.00 inhabitants within their designated territory.
- Developing and approving short-term and long-term Investment Programs as part of the Master Plans.
- Approving the Business Plans of the WSSCs.

71. **The Water Supply and Sewerage Companies (WSSCs) provide WSS services to the population and their technical and financial performance is regulated by the SEWRC**. Their most important documents are the approved Business Plan along with General conditions to customers and applicable WSS prices.

3.2. Issues in budgeting and planning of WSS expenditure

72. **A number of these institutions play a key role in the financing of the WSS sector in Bulgaria (Figure 13).** At Central Government level, ministries are usually channeling funds from EU funds—MRDPW (ISPA), MOEW (OP Environment), Ministry of Agriculture and Food (OP Rural Development), are exercising control over the drinking water quality (Ministry of Health), or are collecting dividends from public WSSCs (Ministry of Finance). At local level, municipalities take care of key investments in municipal WSSCs and in municipal WSS infrastructure. Municipalities are beneficiaries under OP Environment and OP Rural Development. Municipal companies are paying dividends to municipalities.

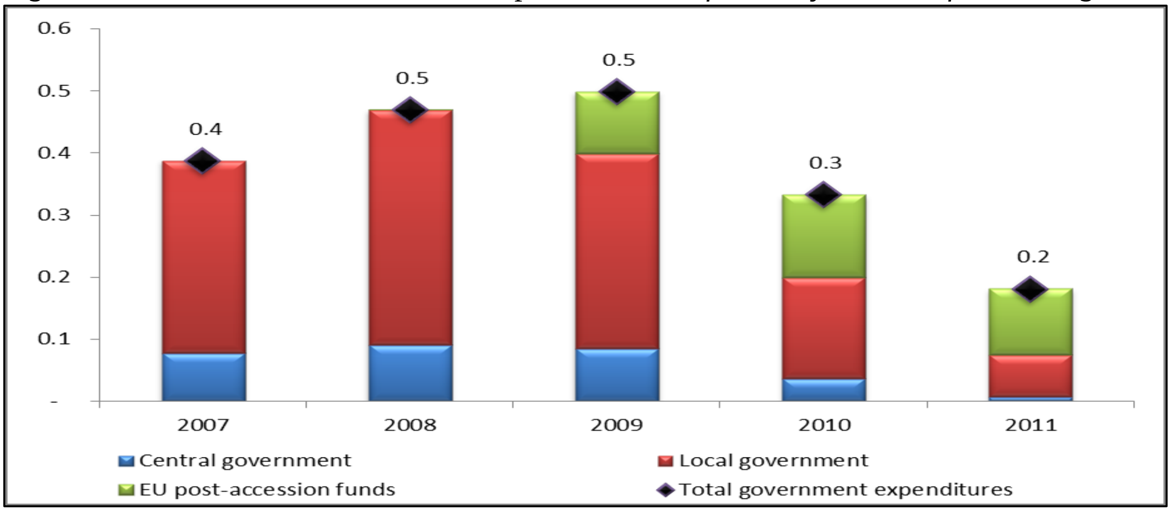
Figure 14 Financial Flows in the WSS in Bulgaria



Source: ECORYS (2013) Note: Blue lines indicate the national budget transfers (local financing); green lines indicate EU funds and other international grants, red lines signals borrowed money and purple lines are the flows from WSSCs to state and municipalities

73. **Municipalities (or local governments) are the largest investor in the WSS sector as beneficiaries of EU funds (Figure 13).** Municipalities almost exclusively implement the capital expenditure in the WSS sector. Municipal investments are financed through municipal own resources, targeted capital subsidies from the central government, EU funds, financing provided by EMEPA, other grants or loans. Municipal own resources are usually limited in smaller municipalities and so are the opportunities for borrowing as the Municipal Debt Law constrains municipal borrowing to ensure fiscal and debt sustainability of municipalities. Municipalities can borrow only if the annual debt payments do not exceed 15 percent of the sum of their own revenues and the equalizing grant received from the Central Government. Therefore, only larger and richer municipalities could afford to finance investments in the WSS sector from own or borrowed resources as municipalities need to attend to a number of other important capital needs. Smaller municipalities could rely on capital transfer from the central government, the so called targeted capital grant for projects with national importance or to tap EU funds or other international grant resources.

Figure 15Total General Government Expenditure, % of GDP by Source of Financing



Source: BOOST data based on MOF, cash basis

74. **Judged by the data, investing in the WSS sector does not seem to be a priority for municipalities in an environment of slow economic growth.** Resources allocated by municipalities to the WSS sector represent only 1-2 percent of overall municipal budgets in 2010-2011, down from around 5 percent in the previous year. The capital budget allocated to the WSS sector made up a larger share of overall capital budgets of municipalities—4 percent in 2011, falling from around 13 percent in 2008-9. Municipalities need incentives from the Central Government to invest more in the sector rather than in investing in other municipal activities, such as education, for example.

75. **Municipalities have limited incentives to invest in WSS projects and then transfer the assets to WSS companies which will get the revenues from operating the assets and service provision.** Municipalities, which are the sole beneficiaries of EU funded investment projects provide co-financing of the projects which amounts of up to 10 percent of the eligible costs[27]. In addition, there are other costs, that are not eligible for EU funding, such as costs for acquisition of land and VAT[28], that need to be covered by municipalities. Furthermore, municipalities will have to finance cash flow deficits as they occur[29]. Finally, there is no mechanism, however, to ensure that the WSS companies participate in the provision of co-financing of the projects as the companies in the end will be generating revenues from provision of WSS services.

76. **To incentivize municipalities in the WSS sector, the Central Governments provides transfers in the form of targeted capital grants.** However, the planning of these grants does not seem to be based on strategic approach and rather relies on municipalities' readiness or willingness to implement WSS projects. These targeted subsidies are of very small amounts, on the order of 2-25 million per year and are scattered around financing of very small, fragmented projects. For example there are three targeted subsidies allocated to municipality of Pravetz in 2008 for financing the rehabilitation of water supply network in three different neighborhoods of the municipality. Similar small projects are financed in municipalities of Batak and Devin. It is difficult to judge if these decisions were made on the

[27] Up to 80% co-financing (in practice 80%) of eligible expenditure comes from cohesion funds, with a requirement for 20% national co-financing. Of this municipalities traditionally finances 10 percentage points

[28] Current practice is to consider VAT as eligible expenditure. The European Commission (DG REGIO) has warned in a letter that it does not consider VAT to be an eligible expenditure. There is an ongoing dialogue between the Government of Bulgaria and the European Commission about whether VAT shall be an eligible expenditure . If a decision is taken by the Commission that VAT is not an eligible expenditure, then the question will arise whether this decision will be retro-active or will be in force starting with the next programming period.

[29] Typically an advance of 20% is provided and the cash flow is positive (seen from the side of the beneficiary) until approximately half way into the project. Most projects still require some bridge financing of negative cash flow during the last part of project implementation.

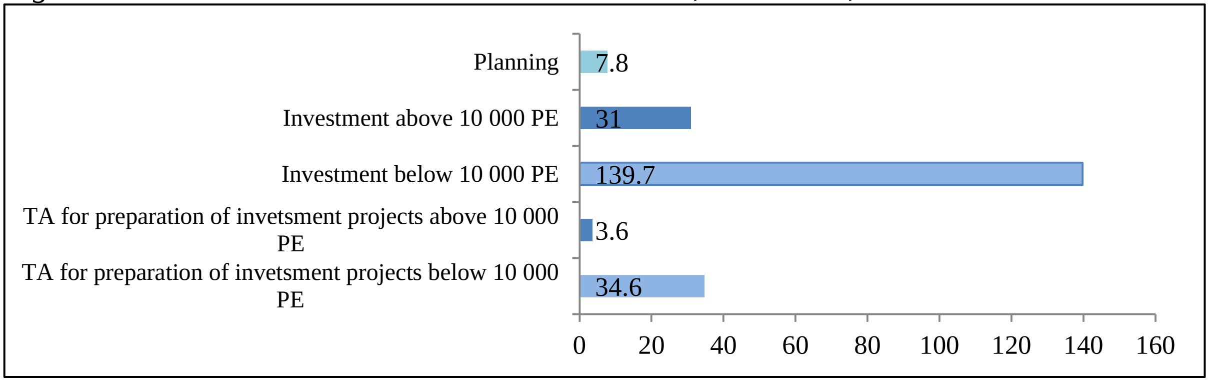
basis of some cost-benefit assessment and how they fit into the overall priority of the WSS sector.

77. **Discretionary approach to financing investments in the WSS sector does not provide predictability of budget resources.** Ad hoc allocations were made to the sector when the overall fiscal budget was in surplus in 2007 and 2008—with ad hoc decrees for execution of the budget in the end of the fiscal years the Government allowed for financing investments that were not planned in the budget law. This approach was discontinued after that as the economic downturn turned the fiscal surplus into a deficit in 2009.

78. **If there is strategic approach to the investment in the WSS sector, government spending would be smoother throughout the years.** The 2004 strategy for WSS sector has not formally been approved and Government contribution to the sector depended more on the availability of resources rather than on aligning these resources to address most urgent investment needs in the sector.

79. **Prioritization of projects could be substantially improved when planning the resource allocation in the sector.** Investments should be targeted at areas covering more population rather than at small settlements with rapidly declining population. As can be seen from Figure 15 the largest share of projects financed in 2008-11 under with EU funds under the Operational Program (OP) has been to small non-priority projects serving smaller number of population. The projects, approved in 2012 are directed towards priority agglomerations.

Figure 16 Disbursements under OP Environment, 2008-2011, Euro million



Source: Ministry of Finance, Annual Report of the National Fund Directorate (2009-11)

80. **Currently a set of WSS Master Plans are under preparation for each and all designated territories**. These Master Plans will include: an assessment of the current WSS systems, identification of investment needs including an option analysis and recommendation of the best technical and financial option(s). The objectives of the Master Plans are to:

- Provide a starting point for the preparation of feasibility studies for individual investment projects;
- Ensure compliance with the Environmental Acquis and all relevant EU Directives within committed deadlines;
- Ensure efficient use of water resources;
- Aim at securing co-financing from EU grants (Cohesion Fund);
- Define, short, medium and long term investment programmes;
- Form the basis for environmentally sound water and wastewater projects.

According to the Water Act, Water Supply and Sewerage Associations can approve projects when, and only when, these are in accordance with the relevant Master Plan. Thus the Master Plans perform a very important gate-keeping function in directing spending towards the best technical and financial options.

81. **Feasibility studies will follow the Master Plans. Project design needs to be based on a clear rationale and analysis of costs and benefits of the project.** At the moment this seems not to be done consistently. For example, there is a project proposed in Beloslav for the extension of the water supply and sewerage network with a total cost of BGN 21 million and aimed at serving population of 455 p.e. equivalent to an expenditure of BGN 46,435 per p.e.. This may be compared to the cost of projects, see Figure 8 and a similar project in Pernik where the expenditure per p.e. was BGN 815. This analysis should be done both for EU funded and nationally funded projects. Better consistency in project appraisal, design and preparation of cost-benefit analysis is needed. For EU funded projects one option would be to provide centralized project preparation support tasked with ensuring such consistence (and possibly providing also support to preparation of tender documents). Such a unit would facilitate the work of the Managing Authority. For all projects with central government financing (both co-financing of projects co-funded with EU funds and fully national project), the role of the Ministry of Finance could be enhanced. Ministry of Finance already reviews investment proposals, but there is no clear evidence that a rigorous check on the costs and benefits of projects takes place neither in the Ministry of Finance nor in the line ministries.

82. **Enforcing clear criteria for prioritizing projects in the WSS sector would help improve the effectiveness of government spending and reduce waste of public sector resources.** The new Approach and Methodology for Selection of Projects under Priority Axis 1 used by the Managing Authority for OP Environment since 2009 should be applied for both EU- and nationally funded WSS projects. The new approach envisages that priority should be given to projects for:

- For agglomerations above 10,000 p.e. with highest score given to agglomerations above 50,000 p.e.
- That bring more economic benefits with less costs
- For wastewater treatment (WWT) plants with already existing sewerage systems
- For integrated projects.

83. **To improve the strategic orientation of budgeting in the WSS sector the following reform options would need to be tackled in the medium-term:**

- Improve prioritization of WSS projects based on clear selection criteria
- Develop the new WSS strategy with clear financing needs in the medium and long-term aligned with overall budget resources
- Strengthen the capacity of the MRDPW to assess the economic benefits of project proposals and enhance monitoring and evaluation of WSS projects.
- Create a data base in the MRDPW containing information about all the sources of finance for WSS projects;
- Give more authority to MOF to be able to stop projects with doubtful benefits and discourage fragmentation of projects.

3.3. Issues with execution of WSS projects

84. **While prudent planning of public funds is important, effective use of public resources depends also on the quality of budget execution.** Cumbersome procurement and land acquisition procedures and still poor administrative capacity to implement capital projects have been identified as one of the key constraints to execution of capital projects in Bulgaria. This section of the PER reviews challenges to the procurement and implementation of capital projects that have been identified during the evaluation of the implementation of EU

funds [30] as well as issues identified in the implementation of OP Environment[31], Axis 1, that provides financing for water projects.

85. **Frequent changes to public procurement legislation have made difficult the implementation of procurement rules and procedures**. Between 2007 and 2012 the Public Procurement Law was subject to 18 amendments. Indeed, the intention for the changes was to close loopholes, improve, and simplify the legislation but this has created difficulties in the application of the law. This is especially difficult for municipalities who are the beneficiaries of the most of the EU funded WSS projects and usually lack in-house capacity to follow frequent changes to legislation and prepare the bidding documents in compliance with many and changing requirements. Cumbersome and lengthy land acquisition procedures are delaying the process of WSS project approval as well as obtaining the relevant construction permit**.**

86. **Appeals by bidders that have to been selected delay the start of project implementation. In most cases these appeals are unjustified but going through the Commission for the Protection of the Competition and the Supreme Administrative Court may take months**. According to the Annual Report for OP Environment for 2011, the number of appeals has increased as the economic downturn has led heightened competition between firms for tapping Government or EU resources.

3.4. Issues in utilizing EU funds

87. **EU funds provide important source of financing for modernizing the WSS infrastructure in Bulgaria.** Under pre-accession instruments, close to EUR 521 million were allocated to the WSS sector in total. Under the ISPA program EUR 468 million were allocated, while SAPARD financed rehabilitation of small scale wastewater collection and treatment facilities in rural areas (EUR 39 million) and PHARE supported the construction of four wastewater treatment plants (EUR 15 million). Under the EU funds, for programming period 2007-2013, the financing for the sector has nearly tripled with OP Environment allocating EUR 1,284 million[32] and OP Rural Development envisaging EUR 140 million for WSS investments in rural areas.

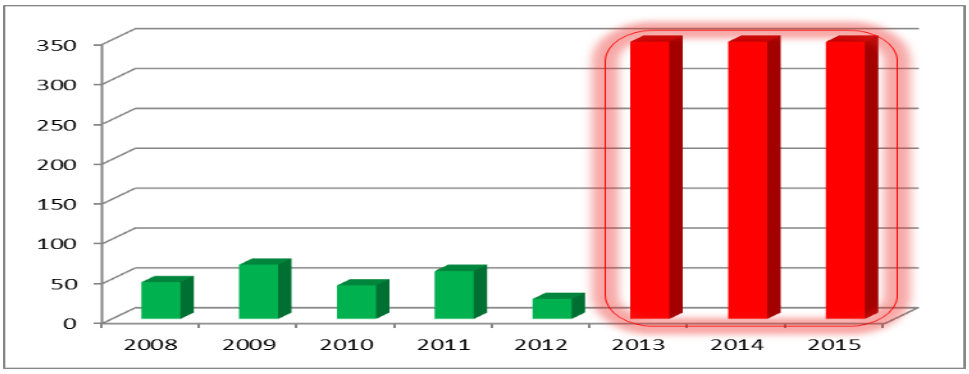
88. **Absorption of EU funds has been slow and presents a challenge for the future.** While close to 90 percent of funds under ISPA were disbursed at the end of 2011, the disbursements under OP Environment have progressed at very slow pace with only 17 percent disbursed in four years until 2011. As of February 5, 2013, disbursements grew to 19 percent. This means that in the remaining 3 years, the municipalities, which are the beneficiaries under the OP, will need to implement projects worth of EUR 1,000 million, or close to EUR 350 million (BGN 680 million) per year. To achieve this, the municipalities will need to triple their WSS budget—the largest amount spent by municipalities was in 2009 when according to Eurostat data BGN 227 million (or 116 million euro) were spent on the WSS sector.

[30] Evaluation of the implementation of the Structural instruments according to the objectives set in the National Strategic Reference Framework 2007 – 2013, Sofia , June, 2012

[31] Annual Reports for OP Environment 2007-2013, for 2009, 2010 and 2011.

[32] Including national co-financing

Figure 17 Disbursements under OP Environment, Priority Axis 1, million EUR



Source: Ministry of Finance, Annual Report of National Fund Directorate (2008-2011), for 2012 OP Environment data as of February 5, 2013, and World Bank staff estimates for 2013-2015, assuming 100% absorption and even distribution in the next 3 years.

89. **Expected substantial increase in implementation of WSS projects financed with EU funds will imply that municipalities should mobilize resources to contribute to these projects**. Municipalities currently have to provide up to 10 percent of co-financing (in 2010 their contribution was 5 percent, and then it can be increased up to 8 percent in 2011) but financing remains a challenge for many municipalities. With municipal revenues not likely to improve substantially in the medium term in the environment of slow economic growth in Europe, municipalities will hardly rely on own revenues to meet the higher co-financing needs. Municipalities can borrow from the Fund for Local Authorities and Governments (FLAG) which provides bridge financing for EU funded projects but only few of the municipalities have tapped the FLAG for WSS projects. In 2008-2012 FLAG extended 40 loans for WSS projects.

90. **In addition to issues with co-financing, municipalities will need to address capacity issues related to preparation of project proposals and overseeing the implementation of WSS projects.** Municipalities have difficulties in preparing project proposals and many of the proposals were turned down by the Managing Authority or returned to municipalities to correct these deficiencies. The inadequate quality of the project proposals has been identified as one of the main reasons for the slow contracting and absorption of EU funds in the WSS sector. Financing under OP Environment was withdrawn for 37 projects (32 projects for technical assistance and 5 for investment in infrastructure) due to serious deficiencies related to strategic, technical and financial aspects of the projects. Among these 37 project contracts for 17 projects were cancelled but the rest of the projects were in an advanced stage of preparation and therefore could not be stopped.

4. Trends in spending and financing in the WSS Sector

4.1. Overall spending in the WSS Sector

91. **Estimating expenditures in the Water Supply and Sewerage Sector is a challenging task as there is no single data source or single entity responsible for data collection and monitoring of spending in the sector.** Estimates in this report have relied on information from various sources with differing scope and covering differing periods—the NSI, Eurostat, the Ministry of Finance, the Ministry of Regional Development and Public Works, and the State Energy and Water Regulatory Commission. Changes in the classifications used since 2008 have added to the difficulty in estimating a consistent time series. Prior to 2008, all the subsectors were aggregated into one, both in the Classification of Economic Activities and in the Unified Budgetary Classification. Data from the SEWRC and MRDPW are provided by three subsectors—water supply, waste water collection, and waste water treatment. MRDPW collects data from state-owned and predominantly state-owned

WSSCs, while the SEWRC is the regulator for all WSSCs, state-owned, municipal, and the few private companies.

92. **To ensure consistency between estimates, the starting point of the expenditure analysis was to identify overall expenditure in the WSS sector.** This reflects that most of the difficulties and inconsistencies occur in the sub-sectoral breakdown due to the multitude of sources using different classifications and the changes in classification over time. For overall WSS expenditure source differ between sources for WSSCs and sources for General Government Expenditures. The sources for WSSC expenditures are SEWRC, MRDPW, and NSI. At the aggregate level these were fairly consistent. General Government expenditure estimates are based on Eurostat ESA 95 statistics and the BOOST database that uses MOF data on consolidated government budget. General Government expenditure data include current and capital expenditures made by the Central Government, Local Government (municipalities), but also expenditures financed with EU funds, EMEPA and other extra-budgetary accounts

93. **Every effort was made to ensure that there is no overlap of expenditures reported by WSS companies and the budget data.** There might still be some overlap since disaggregated data from NSI were not available. However, the authors of this report believe that such overlap (and consequent double-counting) is likely to be minimal. Furthermore, not all expenditures made by WSS companies can be considered as public expenditures as there are also few private companies performing WSS activities which were included in the analysis to provide comprehensive picture for expenditures in the sector. Again, in view of the authors of this report, the error caused by this is likely to be very small (and has the opposite sign)..

94. **Expenditures in the sector were estimated for 2007-2011, trend analysis focuses on developments since 2009.** The year 2007 was a borderline year when changes in methodologies were implemented and therefore some of the data is missing which involved the use of more assumptions to ensure consistency between the datasets. This means that the accuracy of the estimates is not comparable to the rest of the time series. Furthermore, 2007 and 2008 were the pre-crisis years when the government fiscal accounts were in surplus and WSS sector was a recipient of additional ad hoc funding from the state. The developments from 2009 to 2011 illustrate developments over a three year period with a broadly similar macro-economic environment.

Table 7 *Total Expenditure in Water Supply and Sanitation Sector, million BGN*

						Growth in %, 2011/2009	
	2007	2008	2009	2010	2011	Nominal	Real
Operational expenditures	428	472	501	504	542	8%	2%
Capital expenditures	278	419	412	244	251	-39%	-43%
Total expenditures	706	892	912	748	793	-13%	-18%

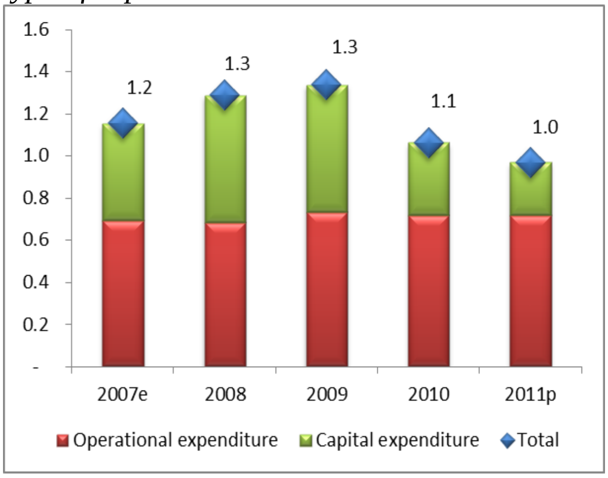
Source: World Bank staff and Ecorys estimates based on data from NSI, Eurostat, and SERC.
Note: 2007 data is estimate and 2011 data is provisional.

95. **Nearly 1 percent of GDP have been allocated to the WSS sector over the 2007-2011 period.** Almost two-thirds of spending in the sector is for current operations, mostly for wages and salaries of staff of state and municipal WSS companies and for materials. Total spending in the sector is broadly in line with spending observed in other new EU member states, although international comparisons for the sector are difficult as there are no consistent data sets.

96. **As shown in Table 7 and Figure 18 total expenditures in Bulgaria have declined since 2009, both in nominal and real terms.** In nominal terms expenditure declined by 13 per cent between 2011 and 2009 mainly on the account of fall in capital spending which was

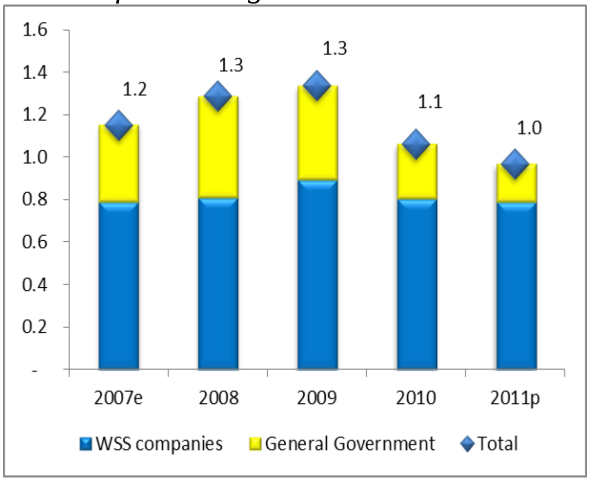
severely affected by the economic crisis and declined by 39 per cent. In real terms (amounts deflated by HIPC) the declines were even more severe. Only operational expenditures increased, albeit at moderate pace. Overall, expenditure in 2010 and 2011 were almost at the pre-crisis levels of 2007.

Figure 18 Total Expenditure, % of GDP by type of expenditure



Source: NSI, Eurostat, SEWRC, World Bank staff estimates

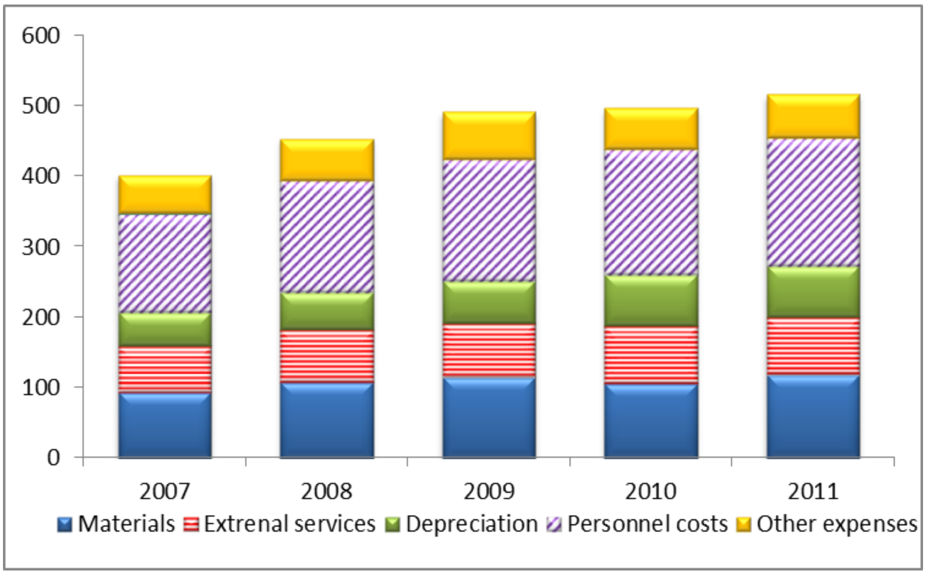
Figure 19 Total Expenditure, % of GDP by Source of Financing



Source: NSI, Eurostat, SEWRC, World Bank staff estimates

97. **WSS companies' expenses, essentially operational expenditure, have remained almost unchanged**. As shown in *Figure 20*, operational expenses of WSS companies have increased marginally since 2009 and in real terms even declined by 1 percent. However, despite efforts to keep the costs down, production has declined at faster rates, thus increasing the inefficiencies in the sector. The quantity of supplied water to final consumers was by 7.8 percent less in 2011 compared to 2009 (measured on the basis of million m^3 per year) while the quantity of treated water declined by 9.6 percent. Personnel costs make up the bulk of the operational spending of WSS companies and contribute to the rigidity of the cost structure (Figure 20). Personnel costs growth has been moderate since 2009 (in 2008 personnel costs grew by 15 percent in line with double-digit increase in wages in other sectors of the economy). Nevertheless, personnel costs still represent almost 35 percent of overall operational spending. This has meant relatively low wages in the sector (lower than the average in the country) and a larger number of employees compared to other countries in the region. Actually, Bulgarian WSS companies appear to be overstaffed with 7.7 staff/1,000 connections compared to less than 1 in the Czech Republic and Lithuania, and only 1.9 in Romania, see ***Table 3***.

Figure 20 WSS Companies' Operational Expenditures, million BGN



Source: NSI, Eurostat, SEWRC, World Bank staff

4.2. Source of Financing

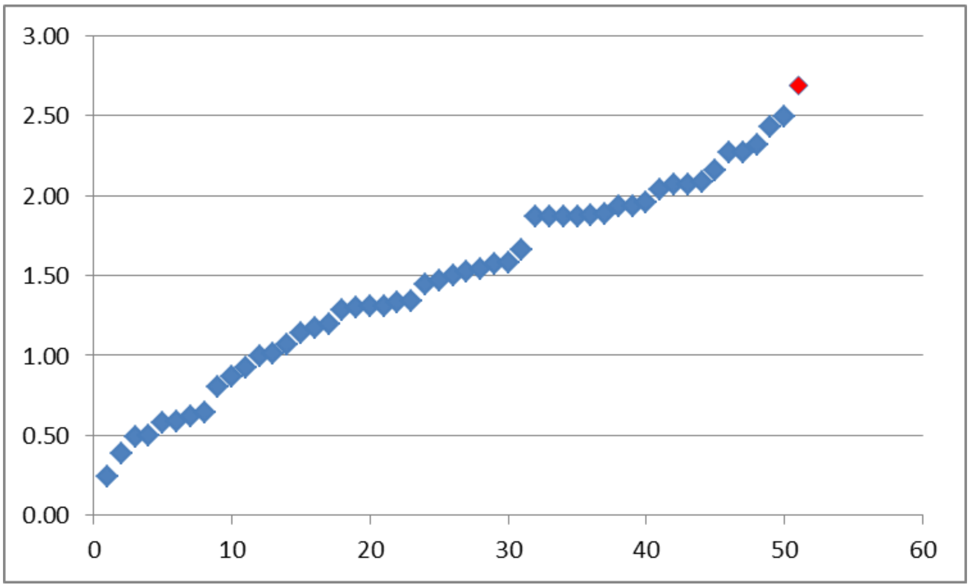
98. **Tariffs are the main source of funding for operational expenditures. They are being regulated by the SEWRC**. The commission decided that for the regulatory period 2009 – 2013 "price cap" methodology will be applied for the calculation of WSS prices. This methodology requires that the SEWRC determine the WSSC prices for the first year (2009) and then change them during the period to adjust for inflation and correct for efficiency improvements. The main components of the WSS prices are Recognized Annual Expenditures, WACC, Regulatory Assets Base and delivered Quantities. Generally, it is believed that the WSS prices do cover the operational expenditures of WSSCs. There are few exceptions and for the purposes of price calculation, the SEWRC does not include the following expenses in RAE:

- Financial expenses;
- Extraordinary expenses;
- Bad debt;
- Expenses not related to the provision of WSS services;
- Expenses, which the Commission with reason considers as not being in the interest of the consumers or expenses, which are not necessary for the execution of the regulated activity of the WSSC;
- Corporate income tax;
- Penalties and/or fines, imposed by government bodies or by the Commission as well as interest for delay, damages and other payments, related to default of concluded contracts.

In principle this ought to provide for a positive operational result (operating ratio lower than 1.00). However, as illustrated in ***Figure 10*** in many cases the operating ratio is higher than 1.00.

99. **Water tariffs in Bulgaria vary considerably from utility to utility and from a low level 25 stotinki per m^3 to 2.70 BGN per m^3.** Even this highest tariff is not high in international comparison. Current average tariff in Sofia is 1.67 BGN/m^3 in Bucharest 2.46 BGN/m^3, in Zagreb 3.62 BGN/m^3 in Istanbul 4.27 BGN/m^3 and in Warsaw 5.28 BGN/m^3. With tariffs below 2 BGN/m^3 and the full costs of operations likely to be similar to the cities cited it is not surprising that many Bulgarian utilities find it difficult to cover their costs.

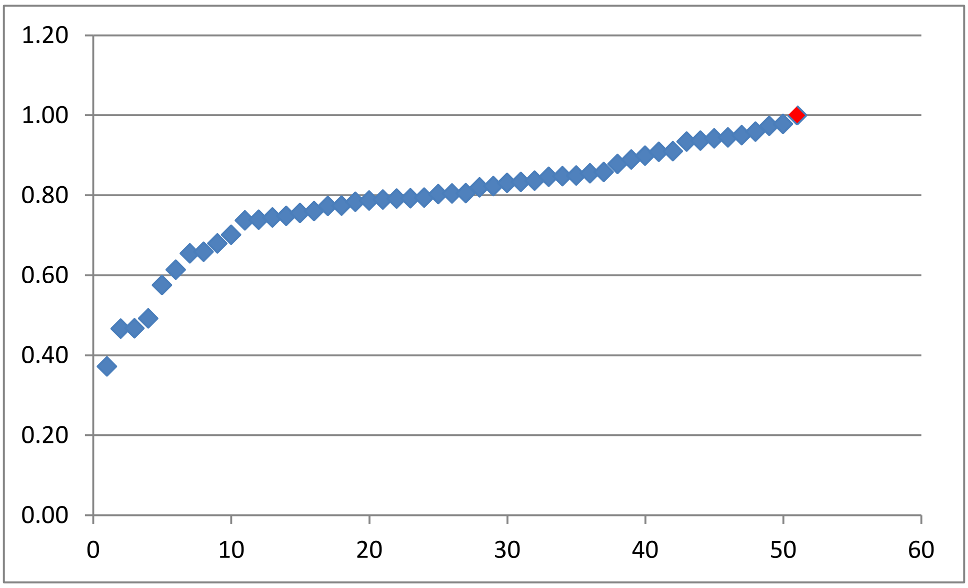
Figure 21 Water Tariffs in Bulgarian WSSCs in BGN m^3



Source: POVVIK (2013) based on reporting to SEWRC

100. **Collection ratios also vary considerably.** Approximately half of the companies have a respectable 80 per cent or better, but then another half do not. Well-run companies will have collection ratios above 95 per cent.

Figure 22: Collection Ratio for Bulgarian WSSCs

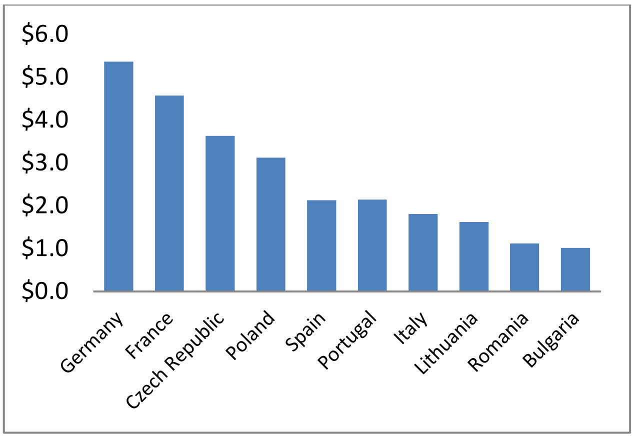


Source: POVVIK (2013) based on reporting to SEWRC

101. **Water tariffs in Bulgaria are much lower than in the rest of the EU, although the difference is smaller when compared to per capita incomes and Mediterranean countries.** ***Figure 23*** illustrates the combined tariff for water and wastewater in selected EU countries. On average tariffs in Bulgaria are much lower than in the other countries, even a bit lower than in Romania. ***Figure 24*** illustrates the GDP per capita (in purchasing power

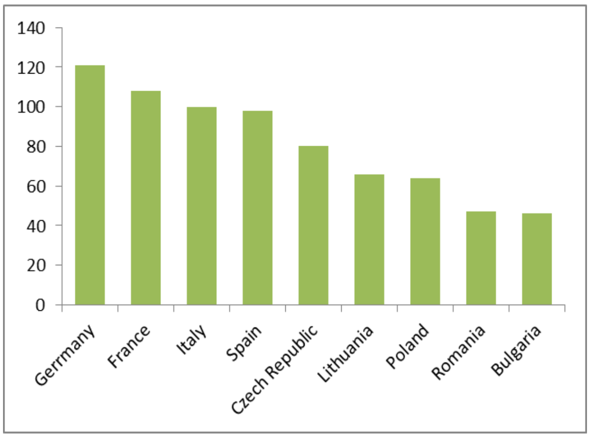
parities). The income of Bulgaria is approximately a third of that in Germany, but tariffs are 1/6th. However compared to Spain and Italy incomes are a little less than half and so are tariffs. Interestingly, other EU12 countries (here the Czech Republic and Poland) are characterized by relatively high tariffs (compared to incomes). This probably reflects that major recent investments in the WSS sector has taken place in these countries to comply with EU regulations and that these investments need to be financed. Bulgaria is in the same situation.

Figure 23 Combined Water and Wastewater Tariffs in Select Countries in USD/m^3



Source: Bulgaria: WSSC reporting to SEWRC; Romania and Lithuania: IBNET, http://www.ib-net.org/ accessed December 2012; Others: Global Water Intelligence (2011) selected cities, see http://www.globalwaterintel.com/archive/12/9/market-profile/global-water-tariffs-continue-upward-trend.html
Note: Here all tariffs refer to combined water and wastewater tariffs.. USD/EUR = 1.35

Figure 24 GDP per capita, PPP terms in 2011, EU27=100



Source: Eurostat
Note: Data for Romania refer to 2010.

102. **The differences between countries partly reflect different cost structures, partly different approaches to how to define cost recovery** (as required by the Water Framework directive) and different approaches to how quickly to achieve cost recovery. The Mediterranean countries have tended to put less emphasis on compliance and to put less emphasis on cost recovery (including the full opportunity costs of water abstracted) than their Central and North European peers[33].

103. **Inevitably, in Bulgaria water tariffs will have to increase in the coming years.** There is a strong economic reasoning for this. As illustrated in ***Figure 10*** the operating ratio of many companies is such that they cannot even finance their operating costs. Since there are no public subsidies to operational expenditure this situation cannot be sustained for long. Even if there are efficiency gains to be achieved, the absolute level of tariffs in many utilities support the conclusion that tariffs will have to increase just to cover operational expenditures. In addition, the WSS sector is currently embarking on a major investment program in particular in wastewater collection and treatment. New wastewater treatment plants will add significant operational expenditures that have to be financed from tariffs. Thus on average tariffs will have to go up. Finally, as argued elsewhere, the required major investment and maintenance program for the WSS sector is only sustainable if utilities can contribute to

[33] The Commission has initiated proceedings in the European court of Justice against Italy and Spain for failing to ensure that wastewater is properly treated.

financing capital expenditure to some degree. For most utilities this will require tariffs to go up.

104. **Water tariffs are politically sensitive and a major communication effort is needed to enhance acceptability of the necessary tariff increases.** Experience from many countries illustrate that water tariffs are politically sensitive. This is true both when WSSCs are privately operated and when they are public. In January and February 2013 there have been strong protests in Bulgaria against perceived recent increases in the price of electricity[34]. During this period two Chairperson of the State Energy and Water Regulatory Commission have resigned. However, there is no one to one relationship between the level of water prices and the level of discontent. For example, the water tariff in Istanbul is 2.91 USD/m^3 and in Cairo it is 0.06 USD/m^3 with no demonstrated discontent in Istanbul[35]. Similarly, there is no "rule" that large increases lead to protests. The water tariff in Bucharest was increased 45% last year to a level of 1.68 USD/m^3, which is considerably higher than Sofia[36].

105. **Strong communication on how revenues are used to provide service and on the justification will be crucial**. This is partly a communications issue, but the underlying reality is also very important. Here WSSC will need to convince their stakeholders that they are improving efficient use of resources and that revenues are spent for purposes that generate consumer benefits. High water losses are perceived to be inefficient use of resources, a tendency to use employment in water utilities also as labor and social policy and, in some cases, a suspicion that managers are acquiring special benefits are all issues that will need to be addresses.

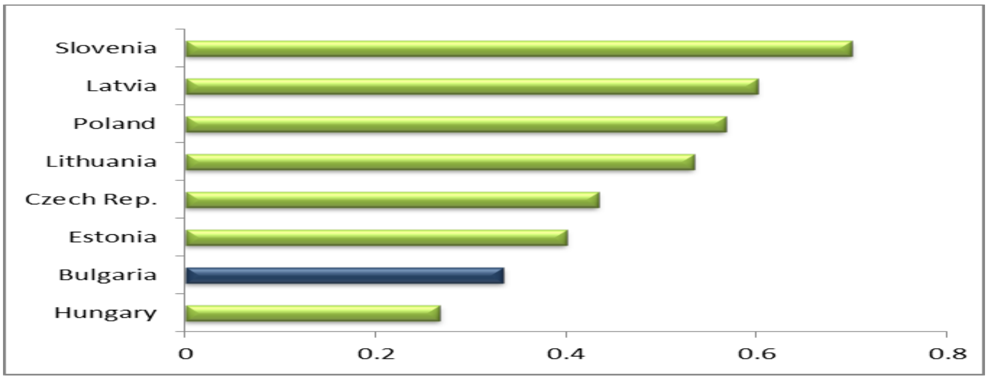
106. **General Government and EU funds are the main sources of financing for capital expenditure. Recent decline in capital expenditure reflects tightening of fiscal spending.** General Government expenditures for the WSS sector fell by close to 56 percent in nominal terms between 2011 and 2009 as the crisis affected negatively available budget resources. Indeed, budget revenues have deteriorated sharply since 2008 with Bulgaria's revenues falling the most in the EU. Municipal own revenues were also hit hard and municipalities were forced to postpone or cut spending in 2010 and 2011. Actually, municipal spending on the WSS sector in 2011 was only 23 percent of its level in 2009 and substantial portion of it was co-financing for EU projects. Municipalities find it difficult to provide the co-financing to EU funded projects as the municipalities are beneficiaries of the bulk of allocations of the Operational Program Environment. Central government has also tightened spending substantially relying increasingly on EU funds to cover for the bulk of the capital spending. Central Government contribution to the sector fell by more than ten-fold between 2011 and 2009 to merely BGN 5 million.

107. **Fiscal allocations for the WSS sector in Bulgaria have been modest compared to other EU12 countries.** ***Figure 25*** shows that general government spending on the WSS sector in Bulgaria is among the lowest in the region leading to low investment in the sector. At the same time, Bulgaria's investment needs are high—there is an extensive water supply network that needs to be rehabilitated and modernized; sewerage coverage needs to be extended as well as coverage with treatment services (which is one of the lowest in the EU). Compliance costs to meet the requirements of the EU Urban Waste Water Treatment Directive are high, both in absolute terms and in per capita terms. Low and falling government investments in the sector since 2009 have meant that the challenge for meeting future investment needs is even bigger. In addition there is a significant number of WSS projects that were started but are currently either on hold or terminated due to financing problems or

[34] The real price increase is not clear and is obscured by the bill referring to periods of different length, the bill being composed of a number of different components that are not easily understandable and a general suspicion of the companies involved in production, transmission and distribution.
[35] Global Water Intelligence 2012 Water Tariff Survey. GWI September 2012
[36] Global Water Intelligence 2012 Water Tariff Survey. GWI September 2012

change in priorities. Delayed investments in the sector may magnify the inefficiencies–high losses of produced water and high cost of production, including high energy intensity of the sector.

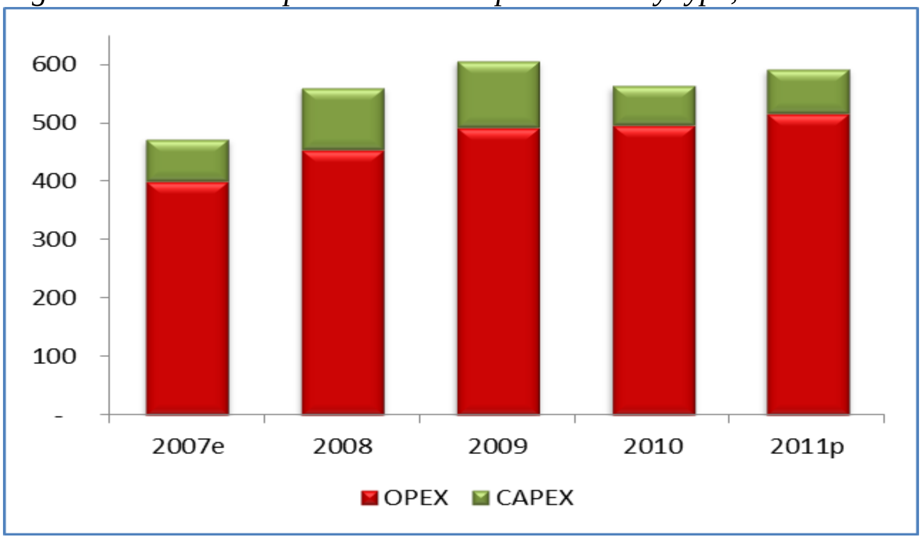
Figure 25: Total General Government Expenditure on WSS sector, % of GDP



*Source:*Eurostat, accrual basis

108. **Slow implementation of EU funded projects in the WSS sector contributed to declining government spending in the past few years.** Indeed, financing from EU Funds in the WSS sector increased as a share of total spending to close to 60% in 2011 (mainly under OP Environment and a small amount from OP Rural Development) but absorption rate has remained low compared to other new EU member states. Low absorption rates have many causes including a low capacity of municipalities to prepare and implement projects as well financial difficulties that municipalities face in securing the bridge financing and co-financing of the projects. Measures have been taken to address these problems with funds allocated for project preparation and supporting municipalities with funds from an EIB loan (a commitment of EUR 350 million) and the Fund for Local Authorities and Governments (FLAG) providing bridge financing to municipalities. However, disbursements of both EIB loan and FLAG bridge financing have been slow.

Figure 26: WSS Companies' Total Expenditures by type, million BGN



Source: NSI, Eurostat, SEWRC, World Bank staff estimates

109. **Capital expenditures of WSS companies were constrained by worsening of their financial state and tighter credit conditions.** Capital expenditures of WSS companies fell by 33 percent in nominal terms in 2011 compared to 2009. With revenues from activity falling as a result of lower consumption and costs of production increasing albeit at slow rate, companies find it difficult to allocate resources for investments. Larger WSS companies in

cities—Sofia, Varna, Plovdiv, Burgas, Russe and Stara Zagora—have been able to borrow from banks (mainly to finance operations and minor investments), but the rest of the companies have cut their investments. Investments financed by companies own resources have been declining since 2009 in line with worsening financial situation of WSSCs.

110. **Borrowing from banks has been sporadic with borrowed funds representing only a small portion of overall financing of the sector.** Public WSS companies rarely borrow to upgrade their assets. According to the MRDPW[37] long term debt of commercial companies with majority state ownership at the end of 2011 is BGN 127.7 million. For a comparison, Sofia water company long term debt at the end of 2011 is BGN 142.8 million. Long Term Debt to Total Asset Ratio[38] of commercial companies with majority state ownership at the end of 2011 is around 10 percent. Long Term Debt to Total Asset Ratio for SV at the end of 2011 is around 54%. Most of the assets of public WSSCs were created up to 1980s and the low tariffs and lack of access to finance in the past 20 years have led to the current deteriorated condition of the WSS assets and their significant depreciation in the books of the WSSCs. The operators are not leveraged and totally dependent on tariff revenues for investments, access to external financing is currently almost nonexistent. The financial expenses of commercial companies with majority state ownership as at the end of 2011 were BGN 8.1 million or 1.87% of the total costs of the companies. Sofia water company financial expenses as at the end of 2011 were BGN 12.5 million or 8.68% of the total costs of the company.

111. **WSSCs have not being able to borrow over the past few years because of unclear ownership structure.** First, due to the changes in the Water Act the WSS infrastructure is to become public state and public municipal property. These assets need to be extracted from the balance sheet of the WSSCs where they currently are (with minor exceptions of WSS assets co-financed by EU grant money). This is still an ongoing process. No lender will provide commercial loan to a company that is about to lose most of its assets[39] within a year. Second, there is no long term contract between the WSSA and water operators. When the WSS infrastructure assets are removed from WSSCs balance sheets the companies will become operators not owners as they currently are. At present, the WSSCs provide WSS services because they own the assets and as owners they are regulated by SEWRC through a 5-year business plan and tariff methodology. For the future operators to be regulated by SEWRC they need to have a contract with the representative body of the owners of WSS infrastructure – the WSSA through which the assets need to be transferred to the operator for operation and maintenance and provision of WSS service. Only then a lender can provide long term financing based on the expected future cashflow of the operator as per the terms of its contract.

112. **Expensive loans.** Based on the information available the authors of this report it was not possible to identify sizable new financing from investment loans to WSS sector during this period. This is mainly to do with the issues explained above. Even if a company succeeds in attracting external financing the financing is deemed to be expensive one. RWC Haskovo 2011 loan can be a good example. The company managed to benefit from a sizable loan in 2007 with interest rates being the base lending rate + 2% margin. In 2011 the company took a small loan but the interest rate was Sofibor + 5.75% margin. To be able to compare the overall

[37] Analysis of the main economic data and financial results of commercial companies with majority state ownership as at the end of 2011 managed by MRDPW

[38] Long Term Debt to Total Asset Ratio is the ratio that represents the financial position of the company and the company’s ability to meet all its financial requirements. It shows the percentage of a company’s assets that are financed with loans and other financial obligations that last over a year. This ratio is a variation of the traditional debt-to-equity ratio. By using this ratio, investors can identify the amount of leverage utilized by a specific company and compare it to others to help analyze the company's risk exposure.

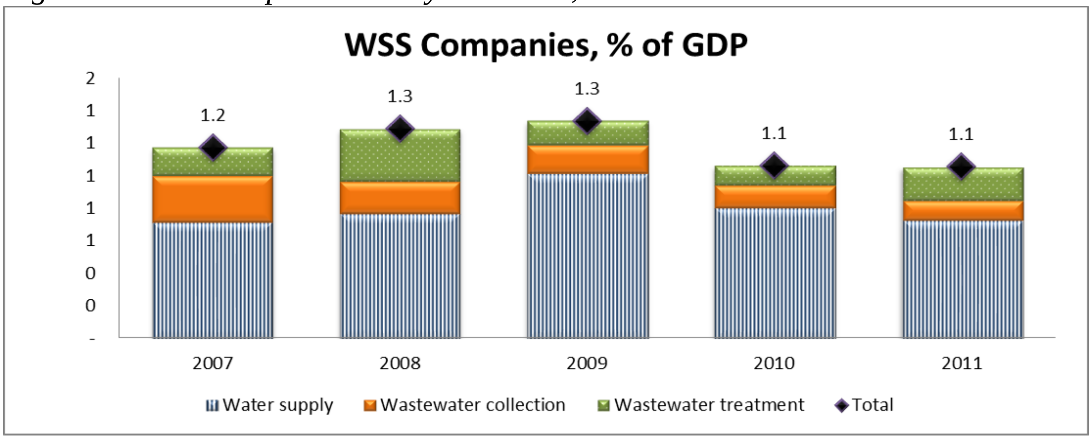
[39] A good example is RWC Haskovo. The company managed to secure 0.5 million euro investment loan in 2011 by pledging its own building and some land. This is not how an investment loan should be structured but accounting for the current conditions in the sector it might be the only possible way.

rate, we've checked that the average base lending rate in 2007 was below 4% plus the margin – 6% in total compared to average Sofibor in 2011 of 7.25% plus the margin – 13% in total.

4.3. Composition of expenditure by subsector[40]

113. **In Bulgaria expenditure for water supply dominate expenditures by WSSCs.** In most other European countries where wastewater treatment has been fully implemented, the cost of wastewater is as high as, or higher than, for water supply. In 2011, Bulgaria spent close to BGN 550 million on water supply or about 70% of the total for the sector. In other EU new member states, usually the bulk is spent on wastewater treatment. The unusual spending pattern in Bulgaria reflects Bulgaria's low coverage of wastewater treatment and collection and extensive water supply coverage. In addition, there might be a reporting bias to water supply as there are incentives for WSS companies to overstate their water supply activities on the basis of which SEWRC defines the prices for water supply. Operational expenditure for water supply may be reduced in the future, as capital investments in improvements in the water supply systems will reduce water losses and enhance energy efficiency. A few water supply treatment plants still have to be constructed and these will increase both capital and operational expenditure. In the long run, it is not clear whether total expenditure will increase or decrease as result. However, initially, they are most likely to increase. With regard to wastewater treatment expenditure it is inevitable that operational expenditure will increase as more wastewater treatment plants become fully operational.

Figure 27: Total Expenditures by subsector, million BGN



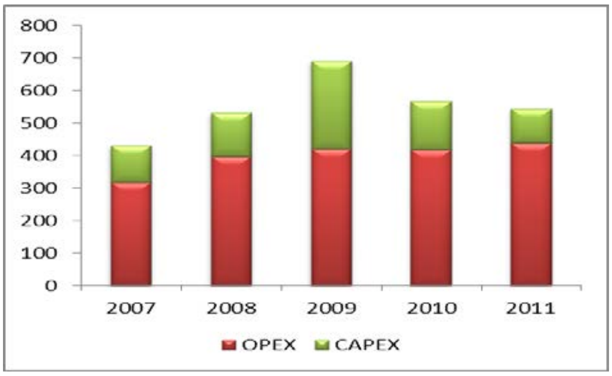
Source: NSI, Eurostat, SEWRC, World Bank staff estimates

4.3.1. Water supply

114. **Nearly 80 percent of the spending on water supply is allocated to current operations (Figure 23).** The structure of current operations is rather rigid which explains the little variation of operational spending throughout the years. Water supply companies allocate the highest share of their operational spending on personnel costs and appear to be most inefficient both compared to other countries in the region (see Table 3) but also compared to wastewater treatment and collection subsectors. As can be seen from Figure 7, only changes in capital spending are responsible for overall decline in spending in 2010-11. Capital spending in 2011 is almost half of its level in 2009 as government investment fell sharply affected by budget constraints. Investments of WSS companies also declined but not as severely as government investment, see Figure 29

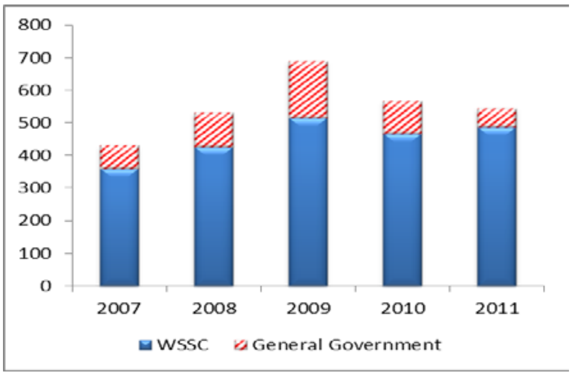
[40] There are a number of caveats with regard to the data, see Section 4.1. As stated there, the authors believe that despite data and methodological limitations, the estimates given in this section present a fair picture of the composition of expenditure by sub-sector.

Figure 28 Water Supply Expenditures by type, million BGN



Source: NSI, Eurostat, SEWRC, World Bank staff estimates

Figure 29 Water Supply Expenditures by source of financing, million BGN

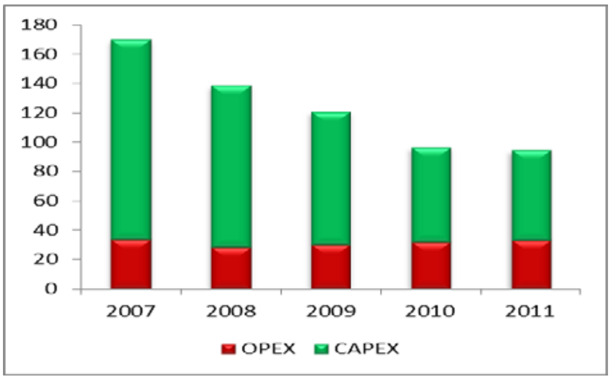


Source: NSI, Eurostat, SEWRC, World Bank staff estimates

4.3.2. Wastewater collection

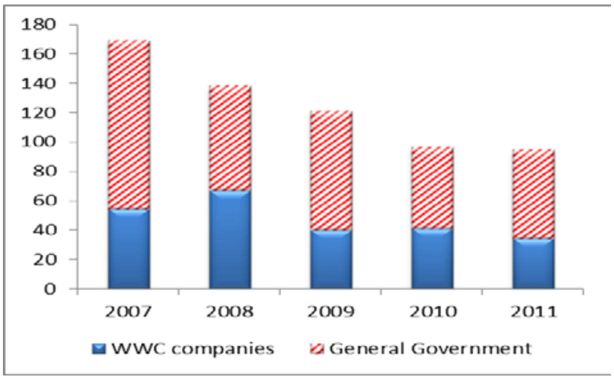
115. **In contrast to the water supply subsector, expenditures in the wastewater are dominated by capital spending (Figure 25).** Indeed capital spending followed the general downward trend observed in the WSS sector but still represents 65 per cent of overall spending in the sub-sector. Nearly all of the capital spending has been financed by the government while capital spending of wastewater collection companies has been volatile ranging from 33 percent of capital spending in 2008 to 3 percent in 2011 as access to loan financing has become much more limited following the crisis in 2998. As can be seen from Figure 26, General Government spending has slowed substantially since 2009, thus prolonging further the expected increase in coverage levels for the subsector.

Figure 30 Wastewater Collection Expenditures by type, million BGN



Source: NSI, Eurostat, SEWRC, World Bank staff estimates

Figure 31 Wastewater Collection Expenditures by source of financing, million BGN

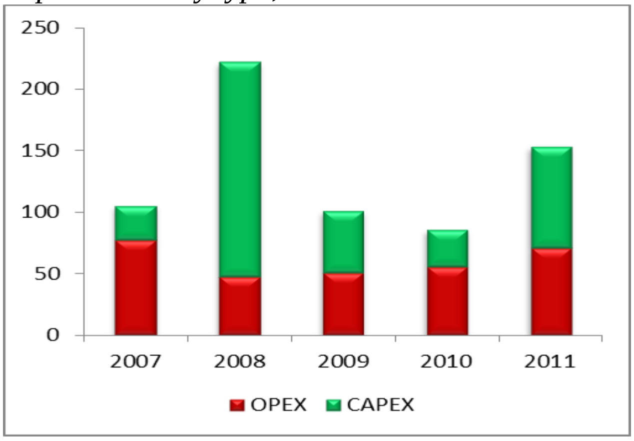


Source: NSI, Eurostat, SEWRC, World Bank staff estimates

4.3.3. Wastewater treatment

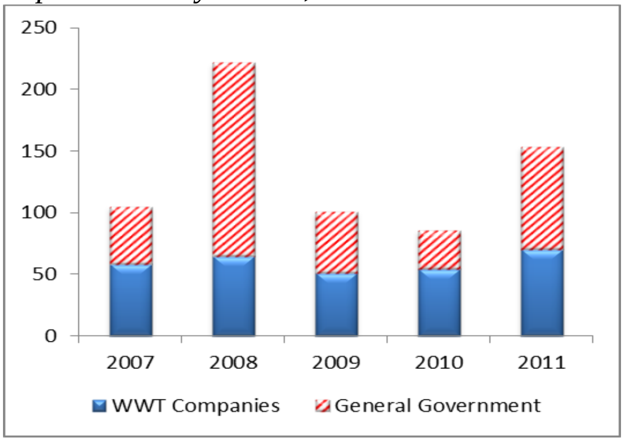
116. **Similar to the wastewater collection subsector, capital expenditures exceed operational expenditures in wastewater treatment (Figure 27).** Most of the capital expenditure is financed by the General Government budget, mainly through pre- and post-accession EU funds and the EMEPA. Wastewater treatment companies own resources allocated to investment have been very modest (Figure 28). Overall, expenditures in this subsector have been very volatile and do not suggest that there has been strategic approach to investment budgeting. The subsector still needs substantial investments to develop the needed infrastructure so that Bulgaria complies with the Urban Waste-Water Treatment Directive (UWWTD).

Figure 32 Wastewater Treatment Expenditures by type, million BGN



Source: NSI, Eurostat, SEWRC, World Bank staff estimates

Figure 33 Wastewater Treatment Expenditures by source, million BGN



Source: NSI, Eurostat, SEWRC, World Bank staff estimates

4.4. International Comparison of WSS expenditure and funding sources

4.4.1. Expenditure needs to comply with the environmental acquis and specifically UWWTD

117. **Data on expenditure needs, actual expenditure and funding sources for new member states to comply with the EU acquis for the water and wastewater sector are scarce.** It is not obligatory for the EU Member States to provide information on their investments to the European Commission periodically. The main source of cross-country data provided are the various studies ordered by the Commission. These studies have different aims and do not follow exactly the same methodology. Nevertheless, information about the assessed expenditure needs (as they were assessed ex ante and today) and the funding sources for other EU12 countries may shed some light on the likely future expenditure needs and funding for Bulgaria. When considering the implementation of the Directive and all the necessary investments, it is important to keep in mind that the European Union consists of different Member States with different situations and different systems of water management and policies. The particularities should be taken into account while interpreting the requirements of the directives and especially when comparing the situations in different countries on technical achievements and expenditures[41].

118. **Information from the implementation of water related directives available from the Water Information System for Europe (WISE)[42] suggests that the Government of Bulgaria estimates prior to accession were optimistic (see *Table 8*):**

- Government reported expenditure needs for compliance with the UWWTD per capita as assessed as of 2004 vary from close to 150 EUR/capita for Lithuania to nearly 460 EUR/capita for Romania[43], with estimated costs for Bulgaria at 274 EUR/capita. This per capita expenditure need was close to the average for EU12 but may not fully have captured the volume of investments needed in Bulgaria.

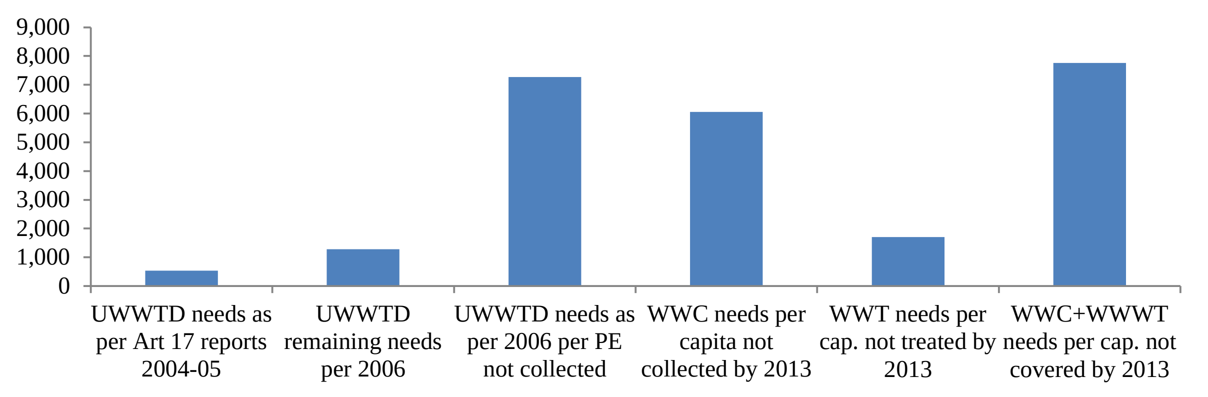
[41] An example is the requirement in article 3 of the UWWTD for agglomerations larger than 2000 PE is to provide a collection system. Many countries interpreted that to mean to connect to a sewer system in all cases. In fact the directive provides options for on-site sanitation in situations where it is appropriate and delivers the required environmental protection. This may impact costs of the UWWTD significantly.

[42] http://ec.europa.eu/environment/water/water-urbanwaste/implementation/factsfigures_en.htm

[43] Cyprus is an outlier and ignored here.

- The consultant who undertook an evaluation for DG Environment on expenditure needs as of end of 2006 found very different needs two years later[44]. For the Czech Republic, Hungary, Latvia, Lithuania, Malta, Slovenia and Slovakia the per capita needs were half or less of those previously reported. This is consistent with very active investment programs in those countries. For Bulgaria, Poland and Romania the costs assessed as of end of 2006 were higher than what their Government's reported end of 2004. In the case of Bulgaria, the costs were not only higher, but more than double the costs reported by the Government as of end 2004. Calculations of remaining expenditure needs as of 2013 prepared as part of the World Bank advisory program, indicate that remaining expenditure needs as of 2013 are similar to those assessed by COWI (2011) as of end of 2006.

Figure 34: Assessed cost of implementation of the UWWTD for Bulgaria at different points in time, BGN/capita or BGN/p.e.



Source: Table 8. See table for original sources and explanations.

119. **The assessed costs of implementation of the UWWTD have varied over time,** in Bulgaria as well as in other countries, see Table 8, which shows data for EU 12. To make the data comparable, all costs have been calculated into EUR per capita. Column 1 shows the population data used for comparative purposes. Column 2 reflects the article 17 reporting to the European Commission by the EU 12 governments, same data are shown on a per capita basis in column 3. The reporting covers the period ending in year 2004. Column 4 shows the remaining needs as of end of 2006 according to an assessment prepared for DG ENV (COWI 2011). It is interesting to note that there are big differences between the data reported by Governments for 2004 and the consultant's assessment for DG ENV in 2006. In some cases this is likely to reflect major implementation from 2004 to 2006 resulting in lower assessment in 2006. In other cases (for example Bulgaria and Poland) the independent assessment provides higher costs. In the case of Bulgaria the 2006 assessment was similar to an assessment done by the World Bank in 2005. Furthermore, taking into consideration the investments in urban wastewater done from 2006 to 2011, the data from COWI (2011) are consistent with the estimate of investment costs for wastewater provided in World Bank (2013).

120. **UWWTD capital investment costs mainly relate to population (and economic activity) for which wastewater collection and treatment is not yet provided.** Column 8 shows the calculated data for the pollution load (measured in p.e.) that has not been collected. In columns 9 and 10 the total cost estimates from 2004 and 2006 are provided per p.e. pollution load not yet collected.

[44] COWI. Compliance Costs of the Urban Wastewater Treatment Directive. 2010. Final Report. European Commission. Accessed December 2012. http://ec.europa.eu/environment/water/water-urbanwaste/info/pdf/Cost%20of%20UWWTD-Final%20report_2010.pdf

121. **According to these data Bulgaria has the second highest cost per pollution unit (p.e.) among the EU 12.** As discussed in World Bank (2013) this is likely to reflect specific characteristics of the definition of agglomerations, which will require a large sewer network expansion also in sparsely populated areas. This raises the issues of how to deal with excessive costs, spatial extent of agglomerations etc.

Table 8 Expenditure needs assessments for EU12 for environment, UWWTD and remaining compliance costs in million EUR, per capita and per PE

Column Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Calculation	**Source**	**Source**	**2/1**	**Source**	**4/1**	**Source**	**Source**	**6-7**	**2/8**	**4/8**
	Population (2004)	**UWWTD needs 2004**	**UWWTD needs 2004**	**UWWTD needs 2006**	**UWWTD needs 2006**	**Total generated load**	**Total collected load**	**Total NOT collected load**	**UWWTD needs 2004-05 per PE not collected**	**UWWTD needs as per 2006 per PE not collected**
	Million	Million EUR	EUR/capita	EUR million	EUR/capita	000 PE	000 PE	000 PE	EUR/PE	EUR/PE
BG	7.801	2,135	274	5,124	657	6,339	4,964	1,375	1,553	3,727
CY	0.730	630	863	363	497	884	531	353	1,785	1,028
CZ	10.216	2,975	291	1,524	149	9,820	9,206	614	4,845	2,482
EST	1.351	245	181	179	132	1,723	1,521	202	1,213	886
H	10.117	3,885	384	287	28	13,048	11,014	2,034	1,910	141
LV	2.319	840	362	69	30	1,784	1,502	282	2,979	245
LT	3.446	525	152	10	3	2,701	2,386	315	1,667	32
M	0.400	140	350	58	145	583	583	0	#N/A	#N/A
PL	38.191	11,165	292	15,056	394	43,526	40,108	3,418	3,267	4,405
RO	21.711	10,080	464	11,342	522	25,239	12,724	12,515	805	906
SK	5.380	1,610	299	876	163	5,005	4,035	970	1,660	903
SLO	1.996	805	403	428	214	1,532	1,277	255	3,157	1,678

Sources:
Population: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-NK-05-015/EN/KS-NK-05-015-EN.PDF accessed February 5 2013

UWWTD needs 2004: WISE, 2012and DG Regio. The position for the 10 Member States who joined the EU on 1 May 2004 (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovenia and Slovakia) is based on the information reported to the Commission during 2004-2005 under Article 17 reports (Implementation programmes), see http://ec.europa.eu/environment/water/water-urbanwaste/implementation/factsfigures_en.htm

UWWTD needs 2006: COWI. Compliance Costs of the Urban Wastewater Treatment Directive. 2010. Final Report. European Commission. Accessed December 2012. http://ec.europa.eu/environment/water/water-urbanwaste/info/pdf/Cost%20of%20UWWTD-Final%20report_2010.pdf

Total Generated Load: European Environment Agency (EEA). 2012. Waterbase - UWWTD: Urban Waste Water Treatment Directive. The European Topic Centre on Inland, Coastal and Marine waters. Version 4, date of delivery (date sent to the Data Service): 06/12/2012. Accessed January 2013. http://www.eea.europa.eu/data-and-maps/data/waterbase-uwwtd-urban-waste-water-treatment-directive-3. Data related to agglomerations with more than 2,000 p.e.

122. Table 9 **shows the share of needed water and waste water expenditure needs relative to GDP of selected countries.** In a sense the data can be interpreted as the relative capital investment burden due to DWD and the UWWTD implementation. The table illustrates that based on the data reported by the Government of Bulgaria for 2004-05 and on the transition periods agreed, the "burden" on the economy of Bulgaria then was not to be expected to be much different from that of other EU12 countries. However based on more recent assessment, the demands on the Bulgarian economy was for 1.66 per cent of GDP to be invested each year in order to comply with the UWWTD before the final deadline. Today this will be an even higher percentage, since WSS sector investments in 2011 and 2012 were (much) below 1.66 per cent of GDP.

Table 9 Water sector investment needs for the implementation of the UWWT directive, as indicated to the EC by new Member States as percentage of GDP

	GDP, current prices, million EUR, 2011	Investment needs for the UWWTD implementation, as of 2004, mill. EUR	Years left until compliance from 2005	Investment needs for the UWWTD implementation per capita[1] as of 2004	Average annual expenditure needs as percent of GDP of 2011
Bulgaria (official)	38,483	2,135	10	274	0.55%
Bulgaria (COWI)	38,483	5,124	8[2]	657[2]	1.66%
Cyprus	17,979	630	8	863	0.44%
Czech Republic	156,217	2,975	6	291	0.32%
Estonia	15,951	245	6	181	0.26%
Hungary	99,819	3,885	11	384	0.35%
Latvia	20,211	840	11	362	0.38%
Lithuania	30,807	525	5	152	0.34%
Malta	6,544	140	3	350	0.71%
Poland	369,666	11,165	11	292	0.27%
Romania	131,327	10,080	14	464	0.55%
Slovenia	36,172	805	11	299	0.20%
Slovakia	69,108	1,610	11	403	0.21%
Total / average		**35,035**		**370**	

Source: EUROSTAT, 2012 for GDP, WISE, 2012. The position for the 10 Member States who joined the EU on 1 May 2004 (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovenia and Slovakia) is based on the information reported to the Commission during 2004-2005 under Article 17 reports (Implementation programmes) . For Bulgaria 2006: COWI (2011) own calculations.

4.4.2. How big a share of funding can be expected from EU sources?

123. **While the concrete set of different funding sources differs across EU Member States, EU funds play an important or even a central role in the implementation of the EU related environmental requirements.** In most new EU countries, external public funds have played a significant role in supporting environmental investments. According to RGL Forensics et.al., 2011, a total amount of **EUR 15,308 million** was allocated by ISPA to water, wastewater

and solid waste sector projects during the 2000-2006 period. The analysis has demonstrated that the Cohesion fund (CF) and ISPA provided a significant contribution to the countries' needs and compliance with the environmental *acquis*. New assets, extensions or upgrades of infrastructure in water provision, sanitation services and solid waste management, as required by the EU Directives, were provided. In the EU10[45], EU funds such as ISPA, Cohesion Funds and European Regional Development Fund contributed nearly 30 percent of all resources spent (this is for 2000-2006, i.e. including the years before the accession)[46]. The text box below illustrates the situation for a particular year in Poland see AAPC (2013). It is quite typical of the situation in other years and in other countries.

Box 1. Water sector funding distribution in Poland

According to the Polish programme for implementation of the UWWTD for 2008–2015 (Update of the Implementation Plan for Council Directive 91/271/EEC concerning urban waste water treatment, National Board for Water Economy, Warsaw, March 2010), EUR 7650 million needs to be allocated to achieve the targets foreseen. This constitutes about EUR 956 million per year.

During 2007, PLN3,751 million or about EUR 900 million were allocated for the implementation of the UWWTD Directive. The sources of financing were the following:

- 36.1 percent –own resources, including resources of municipalities and water utilities

- 0.1 percent—budget resources: central, state, county and municipality

- 22.9 percent—international sources, mostly EU

- 25.4 percent—environmental fund (loans, credits and grants)

- 9.4 percent—national loans

- 6.1 percent—other sources.

The example shows quite a proportional distribution of the needs for water sector investments, as practically the same amount of funds has been allocated year by year during the implementation of the water sector requirements.

124. **Also for the current funding period 2007 to 2013, the Cohesion Policy provides significant support for the co-financing of wastewater treatment plants and collecting systems infrastructure in the EU.** Planned investments into infrastructure related to the

[45] Cyprus, The Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, the Slovak Republic, Slovenia
[46] According to RGL Forensics, AECOM and Imperial College London. Ex Post Evaluation of Cohesion Policy Interventions 2000-2006 Financed by the Cohesion Fund (including former ISPA). 2011. Final Report. European Commission. Accessed December 2012. http://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/expost2006/final_eu_report.pdf

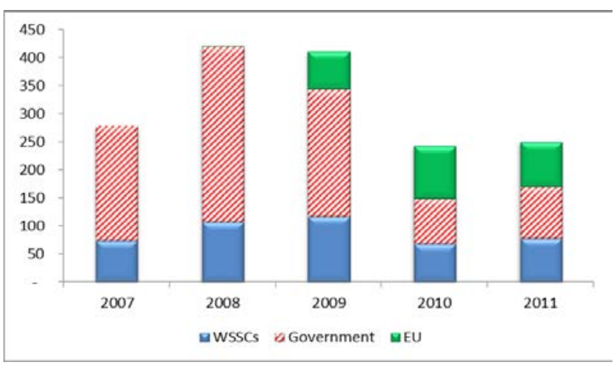
collection and treatment of wastewater amount to about **EUR 14 billion**. Also other EU institutions play an important role. The European Investment Bank (EIB), for instance, signed financing contracts worth EUR 5.5 billion in 2007 and 2008 in the field of "water, sewerage and solid waste".

125. **In conclusion, we may expect that also for Bulgaria EU funding is not likely to contribute much more than one third of total funding for the expenditure needs in the water and wastewater sector.**

5. Effects of expenditure

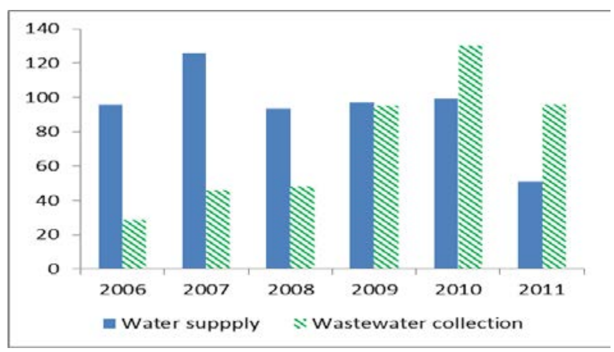
126. **In 2007-2011 nearly BGN 1.6 billion were invested in the WSS sector.** This chapter looks at the public investments made in the sector and provides a rough assessment of the impact of the spending on service delivery. Government has invested close to BGN1 billion (excluding EU funds) (***Figure 35***) in upgrading the WSS infrastructure. Together with WSSCs investment, which accounted for nearly BGN 440 million, and EU funding of around BGN 230 million, total investment in the sector has made possible the construction of close to 93 km per year of new network in the water supply and 83 km of wastewater collection network (*Figure 36*). In addition, between 2007 and 2011, close to 340 km per was rehabilitated in the water supply sub-sector and about 5 km per year in the wastewater collection sub-sector (***Table 10***).

Figure 35: Investments in the WSS sector, million BGN



Source: NSI, Eurostat, SEWRC, Ministry of Finance; World Bank staff estimates

Figure 36: Newly-built network during the year, in km



Source: NSI

127. **Investments made over 2007-2011 and improvements in the management of WSSCs have led to improved access of population to WSS services and fewer interruptions of water supply (Table 10).** The share of population connected to drinking water purification plants has increased by 4.3 percentage points since 2007 to 47.3 of total in 2011, while the share of population connected to urban wastewater collecting system increased to 74 percent in 2011 from 69.7 percent in 2007. Less consumers suffer from water supply regimes with the share of population declining to 3 percent in 2011.

Table 10 Select Indicators of WSS Sector Performance, 2007-2011

	2007	2008	2009	2010	2011
Water losses in public water supply, % of produced water	62	61	61	61	60
Population connected to Public water supply, %	99.0%	99.0%	99.0%	99.1%	99.2%
Population with water supply regime, %	6.3%	4.6%	3.3%	1.0%	3.0%
Population connected to drinking water purification plants, %	44.7%	45.5%	46.0%	46.3%	47.3%
Population connected to urban wastewater collecting system, %	69.7%	70.0%	70.4%	70.6%	74.0%
Rehabilitated/replaced water supply network, in km	338	369	361	284	365
Rehabilitated/replaced wastewater collection network, in km	3	3	10	4	4

Source: NSI – national annual observation of the WSS sector.

128. **Despite improvements in access to the WSS network, the sector continues to undergo substantial water losses in public water supply.** Most of the water supply networks were built in the 1960s – 1980s. Networks rely extensively on materials such as asbestos cement and steel, which are approaching the end of their technical life This translates into a high prevalence of breakages and hydraulic losses and, in turn, in inefficient water and energy use. Overall, these infrastructure features result in an exceptionally high level of hydraulic losses likely to be among the worst in Europe.

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REPUBLIC OF BULGARIA

MINISTRY OF REGIONAL DEVELOPMENT AND PUBLIC WORKS

ADVISORY PROGRAM FOR THE DEVELOPMENT AND IMPLEMENTATION OF A WATER SUPPLY AND SANITATION STRATEGY

Strategic Financing Plan – Final

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ABBREVIATIONS AND ACRONYMS

AC pipes	Asbestos cement pipes
CAPEX	Capital expenditures
CoM	Council of Ministers
Decile	Each decile includes 10 percent
DWQD	Drinking Water Quality Directive
EEA	European Environment Agency
EU	European Union
EUR	Euro
GoB	Government of Bulgaria
FLAG	Fund for Local Authorities and Governments
IFIs	International Financial Institutions
IAWBD	Internationale Arbeitsgemeinschaft fuer WasserBetriebe in der Donau Gebiet
IWA	International Water Association
JASPERS	Joint Assistance to Support Projects in European Regions
MIDP	Municipal Infrastructure Development Project
MOEW	Ministry of Environment and Water
MP	Master Plan
NSI	National Statistical Institute
OPE	Operational Programme Environment
OPEX	Operating expenditures
PAG	Program Advisory Group
PER	Public Expenditure Review
PPP	Public Private Partnership
SEWRC	State Energy and Water Regulatory Commission
SFP	Strategic Financing Plan
TA	Technical Assistance
UIS	Unified Information System
UWWTD	Urban Wastewater Treatment Directive
UWWTP	Urban Wastewater Treatment Plant
WSSA	Water Supply and Sanitation Association
WSSC	Water Supply and Sanitation Company
WSS	Water Supply and Sanitation
WTP	Water Treatment Plant
WWT	Wastewater Treatment
WWTP	Wastewater Treatment Plant

Country Manager:	Markus Repnik
Sector Manager:	Sumila Gulyani
Task Team Leader/Project Manager:	Pier Mantovani/Michael Jacobsen

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This report was produced by a core team led by Pier Mantovani and Michael Jacobsen (Lead Water Supply and Sanitation Specialists), comprising Ivaylo Hristov Kolev (Senior Financial Analyst), Stella Ilieva (Country Economist), Orlin M. Dikov (Senior Operations Officer), Albena Alexandrova Samsonova (Program Assistant), with contributions by Eolina Petrova Milova (Operations Officer), Ivelina Todorova Taushanova (Communications Officer), Toma Alexandrov Yanakiev (ET consultant, Economist). The contributions of Elisabetta Capannelli (Sector Leader), Michael John Webster (Senior Water Supply and Sanitation Specialist, Peer Reviewer), Alexander Danilenko (Senior Water Supply and Sanitation Specialist, Peer Reviewer) and Diego Rodriquez (Senior Economist, Peer Reviewer) in quality assurance and advice is gratefully acknowledged.

Table of Contents

Executive Summary

1. The Strategic Financing Plan (SFP) is an intermediate output of the Advisory Program for the development and implementation of a water supply and sanitation (WSS) strategy. Along with the findings of other fact-based analyses, including the Inception Report, the Regulatory Review, and the Public Expenditure Review, selected SFP findings and recommendations will be integrated into a proposed WSS Strategy and Action Plan.

2. **Despite some local seasonal scarcity issues, Bulgaria's water resources are neither scarce nor abundant by European standards.** Water withdrawals are limited compared to available resources, consistent with the decrease of irrigation activities since 1989. Climate change effects may exacerbate water resource management challenges, as more high-intensity events increase the risk of localized flooding, and more variation increases the risk of dry summers.

3. **Bulgaria's WSS sector features almost universal access to piped service, good water quality but very high water losses.** In a context of highly fragmented rural communities, even very small settlements are supplied with piped water. Most of the water supply networks were built in the 1960 – 1980s. Networks extensively rely on materials such as asbestos-cement (AC) and steel, which are approaching the end of their technical life. This translates into a high prevalence of breakages and hydraulic losses and, in turn, in inefficient water and energy use. Overall, these infrastructure features result into an exceptionally high level of hydraulic losses, estimated at 60%, among the worst in Europe.

4. **Very good water quality.** The information from 2007 to 2010 shows that the average compliance rate of water samples in big water supply zones was 99.6%. There are specific issues with quality of water in small water supply zones, but on national level the water quality in small zones is good. In 2009 and 2010 the average compliance rate of water samples in small water supply zones is 98.4%. It should be mentioned though that Water Supply and Sanitation Companies (WSSCs) are not complying with their monitoring obligation up to the necessary volume and frequency as per the requirements of the national and European standards. The State is trying to compensate the necessary monitoring of water quality by performing up to 50% of the monitoring.

5. **66% of the population is connected to urban wastewater collection and 50% is connected to an urban wastewater treatment plant[1].** Among the EU12 group[2] of new EU Member States, only Romania and Cyprus collect a lower share of their pollution load than Bulgaria[3].

[1] According to the data for the year 2011 of the National Statistical Institute (NSI), http://www.nsi.bg/otrasalen.php?otr=38 table 9.7 the figures are 74% for collection and 56% for treatment of wastewater. It should be noted that the NSI foot note 1 to the table notes "1 Source of data: NISI - annual statistical survey covering operators of public sewarage and UWWTP (exhaustive), data from municipalities are used also. It is possible that the percentage of the population to be overestimated for settlements with partially built water supply or sewage network." Based on detailed data from the regulator and other sources on the actual number of people connected we find that indeed the connection rates are lower than reported by the NSI, namely 66% for wastewater collection and 50% for wastewater treatment respectively. In Chapter 3 and onwards of this report the data with lower current coverage are used as the basis for the expenditure needs assessment.

[2] Estonia, Latvia, Lithuania, Polen, Slovakia, Czech Republic, Hungary, Slovenia, Bulgaria, Romania, Malta and Cyprus

[3] AAPC (2013) Figure 3.10 and 3.11 based on EEA (2012)

Similarly, at the end of 2010, only Romania and Malta were treating a smaller share of their collected loads than Bulgaria. Most EU12 countries recognized that meeting the Urban Waste Water Treatment Directive (UWWTD) would be difficult and costly, and negotiated transitions periods of up to 12 years. For Bulgaria, the transition period is 8 years. Thus, in order to meet the final UWWTD deadline, Bulgaria has more progress to make, in less time, than other EU12 countries.

6. **Bulgaria's goal is to maintain universal, good quality water service, and to reduce water losses.** Bulgaria also aims at reducing water pollution from settlements and at complying with the UWWTD, among other EU legal framework requirements. The SFP describes the opportunities and challenges of such evolution, with particular emphasis on financing scenarios, options to meet financing needs, and constraints to overcome. It is an important building block towards a final WSS Strategy and Action Plan to be delivered under the Advisory Program.

7. **The distribution of capital and operating expenditures across WSS sub-sectors in Bulgaria differs from most other European countries**. Contrary to what is common across Europe, expenditures in the wastewater subsector are substantially lower than for the water supply subsector. This is consistent with Bulgaria's situation of underdeveloped wastewater infrastructure, whereby the cumulated length of existing sewer networks is about a fourth that of water networks[4], and only a third or half the per capita length of that in other EU12 countries.

8. **The expenditure needs of the WSS sector pose a major financing challenge in both the short and long term.** Renewal and replacement needs for water supply alone are in the order of 15,500 million BGN over a 25 year period or close to 600 million BGN annually[5]. Such investments imply that about 50% of the total water supply network is replaced and as a result the average age of the networks is expected to fall slightly, but remain above 30 years. In addition, major investments in new wastewater collection and treatment systems are needed in the next few years, with capital expenditure estimated at approximately 7,000 million BGN prior to 2020. Renewal and replacement of existing wastewater collection and treatment systems are estimated at 200 million annually, reflecting that most of the wastewater treatment plants are recent and that sewers have a long lifetime. The total investments foreseen over the 25 years period are thus close to 26,000 million BGN or approximately 1,000 million BGN annually on average. Considering that in recent years WSS sector expenditures have ranged between 250 million BGN to 450 million BGN annually, it is clear that the sector faces a quantum leap in the pace of financing and implementation of infrastructure upgrades.

9. **Bulgaria's WSS sector must absorb high per capita costs, the recovery of which through tariffs raises serious affordability issues, in particular in small settlements.** The population of Bulgaria lives in relatively scattered communities and small settlements are losing population[6]. This demographic distribution and trend drives the relatively high capital (and operation-

[4] While water networks are traditionally longer than sewer networks the difference in Bulgaria is exceptionally large. This probably reflects that so far only the denser parts of settlements have been sewered.

[5] Throughout the main text of this report, figures are rounded for ease of reading. The calculations use exact figures, see the relevant appendices.

[6] The number of agglomerations in Bulgaria with more than 2,000 p.e. has fallen by 36 in 7 years as a consequence of depopulation of the small settlements, according to MEW (2012).

al) costs of providing water supply and sewerage services in Bulgaria[7]. As a result, any aggressive extension of wastewater collection and treatment to small settlements comes with a risk of potential overinvestment. This report discusses options to reduce the risk of overinvestments in particular where collection systems for small and scattered agglomerations may entail excessive costs or produce no environmental benefit. At the same time, incomes and affordability are lower in small settlements. The population in these settlements may thus be particularly vulnerable to both higher costs and lower ability to pay. The report discusses social equity and options to ensure better affordability. The need for central government support to CAPEX and for targeted household subsidies in certain districts is part of this discussion.

10. **Operational costs per unit of water sold are considerably higher than they should be......** This is the consequence of a number of factors including: Very high level of water losses resulting in inefficient use of energy and other resources; a high number of very small operators that are less efficient than larger ones; a reluctance to outsource services, which for instance causes even very small operators to own large equipment stocks as well as their own vehicle maintenance workshops. This report reviews options to enhance efficiency and reduce unit costs. Among the options reviewed are consolidation, increased competitive emulation through benchmarking of operators; introduction of competitive pressure in the form of private operators according to the existing legal framework.

11. **.......but WSS revenues are considerably lower than they should be**. The average water and wastewater revenue per m^3 sold in Bulgaria is 0.75 EUR, while such revenue in most other EU12 countries falls between 1.25 EUR/m^3 and 1.75 EUR/m^3[8]. In Bulgaria tariffs barely cover operational and maintenance costs. In consequence, as they stand, tariffs cannot substantially contribute funding to the necessary capital replacements, let alone to major network renewals and addition of new wastewater treatment plants. In addition, there are issues with the current tariff methodology as applied by the regulator. Current regulatory practice in facts provides a disincentive for WSSCs to incur capital expenditures, which results in certain CAPEX being reported as OPEX instead.

12. **The social equity issue has to be addressed since, in several districts, the "low" tariffs constitute a high share of incomes and are close to the legal maximum affordable tariff.** In a situation where systems have to be expanded with wastewater treatment plants which will further increase operational expenditure, this situation creates an additional financing challenge. The legal maximum affordable tariff as per State Energy and Water Regulatory Commission (SEWRC) regulation is 4% of average household income in the concerned district[9]. The corollary is that the poorest decile often have to pay more than 15% of household income and even the third decile often have to pay 10% + of their income. While other EU 12 countries charge higher tariffs, they generally do not charge such a high share of household incomes. The report presents options for resolving this conundrum.

[7] Relative to most EU 12 countries Bulgaria has more agglomerations with more than 2,000 p.e. and in particular many more reported agglomerations with less than 2,000 p.e., see AAPC (2013) Table 3.20.

[8] See AAPC (2013) figure 4.4.

[9] art 4 from the Supplemental Provisions of the Law on regulation of the WSS services states:" The social affordability of the WSS price is secured in cases when their value, defined on the basis of a monthly water consumption of 2.8 m3 per person does not exceed 4% of the average monthly income of a household in the respective district"

13. **Planned short term investment needs are very challenging to meet even with high utilization of EU grants and higher tariffs.** A high utilization of EU grants (assumed to be 100%) and high tariff increases (assumed to be 25% annually but up to the legal maximum) are sine qua none to meet planned short term investment needs. The report illustrates this with detailed calculations at national and district level. However, the report also illustrates that even full utilization of EU grants and maximum increases in tariffs will not provide enough cash for the planned short term investment programs. A combination of additional financing and/or postponement of certain investments is necessary. Additional financing can come from central government grants and, to a limited extent from debt financing. The report illustrates the magnitude of the financing gap, year by year and district by district and discusses the options to close the gap.

14. **Currently there are very few loans in the sector and low gearing of WSSCs.** In principle this should provide an opportunity for large scale additional debt financing. In practice, the tariff regulation issues will have to be resolved first, and the issues of WSSC creditworthiness will have to be addressed. Past loans by EBRD may provide a model.

15. **The high level of planned investments in the short term will also face non-financial constraints**. The public expenditure review pointed to a number of constraints related to institutional capacity to plan and implement investment programs, procurement processes etc. which are likely to constrain planned investments in the short term significantly below the 2,500 million per year in both 2014 and 2015 currently planned.

16. **There is no panacea, but a combination of measures (financial and non-financial) could enable Bulgaria to achieve its objectives for the development of the WSS sector.** The report has provided a feasible financing strategy which rests on six principles, viz.:

    - Full achievement of infrastructure upgrade targets for compliance and sustainability;
    - Full utilization of available EU funding;
    - Full cost recovery where affordable;
    - Cost reduction through gains in efficiency and governance;
    - Debt financing to the extent compatible with operational incomes and expenditures; and
    - Coverage of the remaining financing gap through central government grant funding.

    Achievement hereof will require that a number of policy issues are addressed, including but not limited to:

    - Preparation, agreement and annual update of a detailed plan for financing of sector needs;
    - Creation of an enabling environment for debt funding by WSSCs;
    - Improvement of the quality and timeliness of project preparation through establishment of a centralized facility for project preparation support;
    - Avoidance of excessive costs in particular in sparsely populated agglomerations but also through a revision of construction norms;
    - Strengthening regulatory functions to promote operational efficiencies of WSSCs and ensure predictable decisions on tariff adjustments; and
    - Promotion of competitive pressures in the sector including through the introduction of publicized benchmarking findings, outsourcing of relevant operational activities etc.

1 Introduction

1.1 Purpose of the report

This Strategic Financing Plan report constitutes an intermediate output of the Advisory Program (AP) for the development and implementation of a water supply and sanitation (WSS) strategy, as stipulated under the Advisory Services Agreement signed between the Government of Bulgaria and the World Bank dated July 26, 2012 to be financed through the resources of EU Structural Instruments allocated to Bulgaria. Along with other intermediate fact-based analyses under the AP, the SFP contributes findings and recommendations to be considered by the Government for integration into a new Water Supply and Sanitation Strategy and Action Plan.

The following Agreement excerpts guide the scope of the SFP:

"To ensure sufficient funding for the required investments of the sector is a major policy issue[10]*. The funding requirements of the sector include the requirements of the Accession Treaty in relation to the European Commission Drinking Water Directive and the Urban Wastewater Directive. These immediate costs have been assessed by a number of sources (including the World Bank) to be in the order of 8 to 14 billion BGN. In addition to these "immediate" expenditure needs, there are large medium term expenditure needs to replace aging infrastructure in networks, dams etc. Finally, there are large annual expenditure needs for operations, and these needs will increase significantly as new wastewater treatment plants are commissioned."*

" The strategic financing plan will consider all of the above needs taking into account that not all sources of finance can be used for all types of expenditure (for example cohesion funding cannot be used to finance operational expenditure). To this end, a national policy dialogue amongst interested parties will be carried out with the aim of developing consensus on what water supply and sanitation services the country can afford in the next 20-30 years and how it will pay for them".

" The Strategic Financing Plan will include: (i) an assessment of current financing gap; (ii) discussion of policy options that could help to close the financing gap; (iii) development of alternative scenarios to improve water service; and (iv) identification of most appropriate scenario and associated policy mix."

1.2 Main audience

The main audiences for this report are the policy-makers and key stakeholders in the WSS sector, including but not limited to those in the state administration and representatives of municipalities, water supply and sanitation companies, and representatives of the employees in the sector. The final consumers, and thus the entire Bulgarian population will be the main beneficiaries of appropriate policy decisions. The authors hope that their political representatives in Parliament may benefit from this report, which has, however, been kept in a fairly technical language.

[10] This and the following paragraph copies paragraphs 12 and 13 of Attachment 2 of the Schedule of the Agreement: Details of Activities", Government of Bulgaria and the World Bank, July 2012.

1.3 Outline of the report

The content of this report is closely associated with the Public Expenditure Review (PER), which is being produced in parallel. The two reports have been written with overlaps so that they can be read independently. The report is organized as follows:

Chapter 2 presents an overview of the status of the water and sanitation sector in Bulgaria. It discusses the current state of the WSS sector in relation to key cost and revenue drivers: 1) The legal framework governing the sector; 2) Water resources; 3) Population; and 4) WSS sector efficiency. Where appropriate the sector has been compared with other countries in particular the EU12 group.

In Chapter 3, future WSS expenditure needs are assessed on a district by district basis. The needs include both capital investment needs and operational expenditure needs. Although public debate often focuses on investments, operational expenditure (OPEX) today constitute 70% of total expenditure and will constitute the bulk of expenditure in the long term. Therefore, a review of operational expenditure was conducted, including the opportunities to reduce these through more efficient operations.

Capital expenditures (CAPEX) were estimated without the benefit of the majority of Regional Master Plans (RMPs) under preparation, but will eventually be based on these plans, which are being produced for the Ministry of Regional Development and Public Works (MRDPW) under a World Bank funded project. At the time of writing, short term investment programs for all districts and a limited number of RMPs were available to the team[11]. This information has been used when available and CAPEX needs estimates have been made for the rest. OPEX needs also have been assessed.

Chapter 4 considers scenarios for financing expenditure needs on a district by district level. The “Business as usual” scenario is clearly inadequate due to major financing gaps. The chapter then considers scenarios of full absorption of EU grants, tariff increases to the maximum extent of the law (where needed), debt financing and central government grants. Finally, the chapter considers the possible reduction in the financing gap that may be achieved by more efficient operations achieved for example through additional consolidation, better governance etc.

These analyses illustrate that the challenges differ markedly between districts. Some district incur major issues of affordability. The WSS sector in many districts with higher per capita incomes can close the financing gap with it’s own means (and EU funds), but in many districts the sector will need a combination of tariff increases, EU grants, Government grants and debt funding. In a few districts the WSSCs will not be able to afford any debt financing and these will have to rely on substantial government grants. These are the same districts where there are major issues related to affordability due to low household incomes.

Finally, Chapter 5 considers the challenges outlined, the opportunities in the future, and presents policy recommendations.

[11] The cut-off date for new information for this report was December 20, 2012. At that point draft master plans for three (3) designated territories were available. In addition short term investment programs (for 2014-2020) were available for all regions of the country, but with varying degree of detail. At the point of writing (January 21, 2013) the MRDPW has received 8 draft master plans (out of a total of 51 due).

2 Overview of the WSS Sector

This chapter discusses the current state of the WSS sector in relation to key drivers: 1) The legal framework governing the sector; 2) Water resources; 3) Population; and 4) WSS sector efficiency. Population affects the sector both directly as consumers and indirectly as determinants of the legal requirements to provide wastewater collection and treatment and to meet drinking water standards. Efficiency is a key determinant for service quality, costs and use of (non-financial) resources.

2.1 Legal framework

The key legal framework in relation to WSS expenditure needs and financing includes: The European Union Acquis transposed into Bulgarian Legislation, the National Water Sector Strategy (2012), and the draft Water Supply and Sanitation Strategy (2004).

2.1.1 The European Union acquis

A large number of EU directives are relevant to the water supply and sanitation sector[12]. The overarching directive is the Water Framework Directive. Its primary aims are:[13] 1) to expand the scope of water protection to all waters, surface waters and groundwater; 2) to achieve "good status" for all waters by a set deadline; 3) water management based on river basins; 4) having a "combined approach" of emission limit values and quality standards; 5) getting the prices right ; and 6) getting the citizen involved more closely.

The Urban Waste-Water Treatment Directive (UWWTD) is very important, not least due to the costs associated with it[14]. The Drinking Water Directive (DWD) is another key directive[15].

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[12] These include:

- Directive 76/160/EEC on the quality of bathing water;
- Directive 98/83/EC on the quality of waters intended for human consumption;
- Directive 75/440/EEC on quality of surface water intended for the abstraction of drinking water as amended by Directive 91/692/EEC
- Directive 78/659/EEC on the quality of fresh water needing protection or improvement in order to support fish life and Directive 79/923/EEC on the quality required for shellfish water;
- Directive 91/271/EEC on urban wastewater treatment;
- Directive 91/676/EEC on the protection of ground water against pollution caused by nitrates from agricultural sources;
- Directive 80/68/EEC on the protection of ground water against caused by certain dangerous substances;
- Directive 76/464/EEC pollution caused by certain dangerous substances discharged in the aquatic environment;
- Framework Water Directive 2000/60EC;
- Directive 77/795/EEC on the exchange of data on quality of surface fresh water in the EC.

[13] http://ec.europa.eu/environment/water/water-framework/info/intro_en.htm accessed January 25, 2013

[14] The urban wastewater directive, Council directive 91/271/EEC requires: 1) The Collection and treatment of waste water in all agglomerations of >2000 population equivalents (p.e.); 2) Secondary treatment of all discharges from agglomerations of > 2000 p.e., and more advanced treatment for agglomerations >10 000 population equivalents in designated sensitive areas and their catchments; 3) Pre-authorisation of all discharges of urban wastewater, of discharges from the food-processing industry and of industrial discharges into urban wastewater collection systems; 4) Monitoring of the performance of treatment plants and receiving waters; and 5) Controls of sewage

According to the accession treaty Bulgaria has a transition period for compliance with the UWWTD. The deadline for final compliance is December 31, 2014. These two directives are major cost drivers and have been explicitly considered in this SFP.

Policy integration and efficient use of resources are emphasized in recent policy documents from the European Commission including the Blueprint to Safeguards Europe's Water Resources[16] and the Roadmap to a Resource Efficient Europe[17]. While these documents do not (yet) have legal status, they provide a clear indication of the direction of legislation within the European Union. The blueprint stresses the need for implementation and integration of water policy objectives into other policy areas. Specifically, the document stresses efficiency and linked hereto cost-recovery. Resource efficiency and cost recovery are also important in the WSS sector and Bulgaria stands out with high water losses and low level of cost recovery compared to other EU member states.

2.1.2 Draft Water Supply and Sanitation Strategy (2004) and National Water Sector Strategy (2012)

A strategy for development and management of the water supply and sanitation sector was drafted in 2004 but never submitted to the approval of the Council of Ministers. The draft 2004 WSS Strategy analysed the status and set priorities and objectives for WSS sector development until 2015. It also included an action plan with measures that should be taken for achievement of the objectives as well as indicators to monitor the implementation of the action plan. This draft strategy was reviewed in World Bank (2012). A key finding was that many of the infrastructure measures included in the draft strategy were only partly implemented due to lack of financing. Typically a cost estimate was included, but the source of financing had not been identified.

Consistent with the requirements of the Water Act, Parliament approved a National Strategy and Action Plan for Water Sector Management and Development in November 2012. This strategy outlines the overall vision for the water sector at large, including water resources management, hydropower, flood protection, irrigation and water supply and sanitation. It provides for an active role of the public authorities in developing and managing the sector. It also specifies the responsibilities of the different institutions in the preparation and implementation of the sub-sector strategies and plans. The document confirms the responsibility of MRDPW for the preparation and implementation of a Strategy for Development and Management of Water Supply and Sanitation Sector as stipulated in the Water Act.

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sludge disposal and re-use, and treated waste water re-use whenever it is appropriate. See http://ec.europa.eu/environment/water/water-urbanwaste/index_en.html (accessed January 25, 2013)

[15] The drinking water directive, council directive 98/83/EC : 1) Sets quality standards for drinking water quality at the tap (microbiological, chemical and organoleptic parameters) and the general obligation that drinking water must be wholesome and clean; 2) Obliges Member States to regular monitoring of drinking water quality and to provide to consumers adequate and up-to-date information on their drinking water quality; 3) Member States may exempt water supplies serving less than 50 persons or providing less than 10 m3 of drinking water per day as an average and water in food-processing undertakings where the quality of water cannot affect the wholesomeness of the foodstuff in its finished form, see http://ec.europa.eu/environment/water/water-drink/index_en.html, accessed January 25, 2013

[16] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2012:0673:FIN:EN:PDF accessed January 28, 2013

[17] http://ec.europa.eu/environment/resource_efficiency/pdf/com2011_571.pdf accessed January 28, 2013

The Water Strategy has four main objectives as follows:

- **Objective 1**. Guaranteed water supply to the population and the business under the climate change conditions leading to draught
- **Objective 2**. Protecting and improving the status of surface and ground waters
- **Objective 3.** Improving the efficiency of integrated management of the water as an economic resource
- **Objective 4**. Decreasing the damage and flood risk

In particular objective 1 and 2 overlap with strategic objectives for the WSS sector.

The Strategy also assigns the responsibility of the preparation of integrated national annual plan for development of the water infrastructure to the MRDPW. This SFP may be understood as a contribution hereto. The SFP emphasizes the need for identification of funding sources for all measures included in the annual plan as well as the long term plan for development of water and wastewater infrastructure.

2.2 Water resource availability and climate change

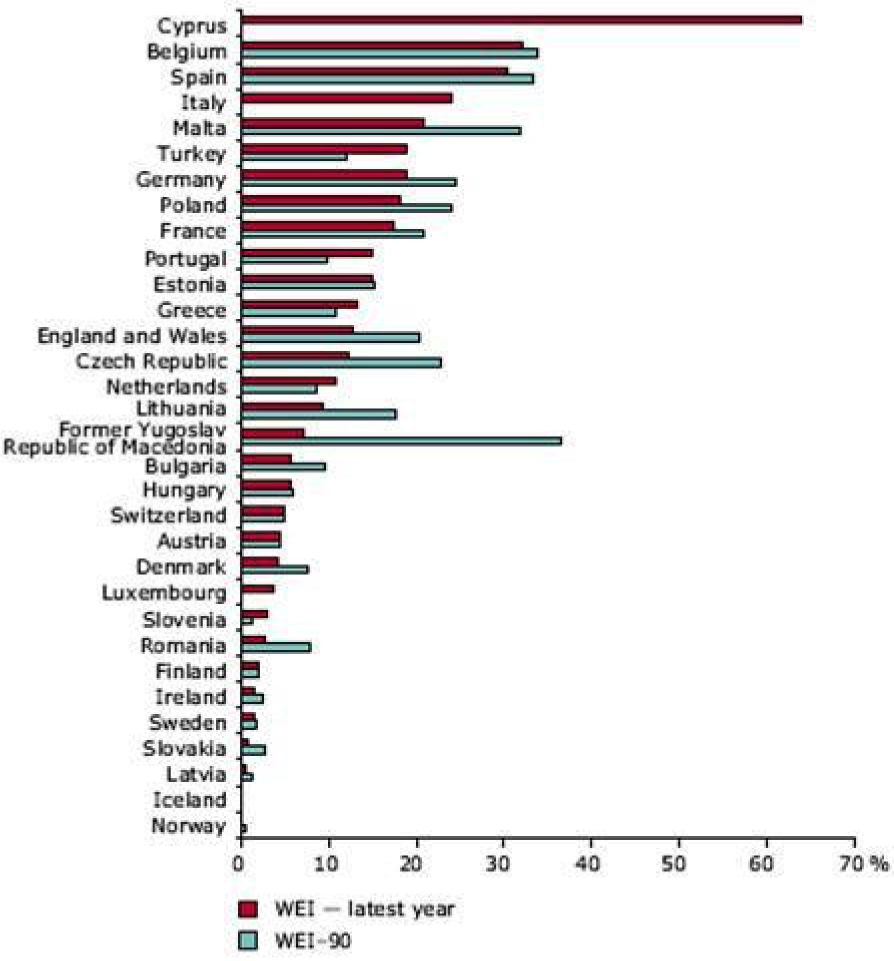
Key inter-linkages between the WSS sector and the larger water sector are via water resource availability and pollution. The WSS sector may compete with other sectors for water and it impacts on water quality, thus it may affect both freshwater ecosystems and the ability of other sectors to utilize the water available. This report will not dwell on these larger issues, but it is useful to provide a few figures to put the WSS sector in perspective.

Figure 1 illustrates the so-called water exploitation index for selected European countries. The water exploitation index (WEI) is a measure of the annual total water abstraction as a percentage of available long-term freshwater resources. The warning threshold, which distinguishes a non-stressed from a water scarce region, is around 20%, with severe scarcity occurring where the WEI exceeds 40%.

Generally the data for Bulgaria show that there is low water stress (18%), comparing the estimated total domestic water consumption of 3340 million m^3 in 2035 (excluding hydro energy and nuclear power plant) against the multi-year average internal water resource of 18,547 million m^3 (excluding the Danube River) for the period 1974-2008[18]. Also prior to 1990 Bulgaria was considered to be non-stressed, but then it was close to the threshold to a water scarce country. Since then abstractions have fallen drastically for both agricultural and industrial purpose and today Bulgaria overall is non-stressed.

[18] MEW (2012a) Annex 1, page 31

Figure 1. Water Exploitation Index (WEI) in 1990 and latest year in selected European countries[19]



This notwithstanding, there are areas of Bulgaria that can experience water scarcity and in particular seasonal water scarcity in dry summers. of similar extremely low levels of rainfalls in some years.

The most vulnerable areas with rainfall below 300 mm are: the Danube region from Vidin to Lom and Montana, Pavlikeni and Sofia from the Danube region; Shabla - Varna in the Black Sea region, Sliven, Plovdiv, Sadovo, Pazardzhik and Panagyurishte in the East Aegean Sea region and Blagoevgrad, Sandanski and Kyustendil from the West Aegean Sea region[20].

The climate is changing also in South Eastern Europe. According to World Bank 2009 the average temperature is expected to increase by 1.8 to 2.1 degrees Celcius with a particular decrease in the number of frost days. Precipitation and run-off will decrease, while the rainfall intensity and variability, the intervals between wet days will increase and heat waves will become more fre-

[19] Source: European Environmental Agency: The European Environment – State and Outlook 2010: Synthesis, 2010 here quoted from Roadmap to EU resource efficiency COM 2011 (571) Working Paper No. 2 Annex 7, figure 10.

[20] See MEW (2012a) figure 2.2.3.3.

quent21. For water supply and sanitation this implies that the risk of flooding will increase, as will the risk of seasonal water scarcity in selected areas. For the period up to 2035, scenarios have been developed in the course of development of the National Strategy for Management and Development of the Water Sector for the changes in precipitation and water availability. According to these scenarios no major change in the average annual precipitation is expected. This does not exclude the recurrence of similar extremely low levels of rainfalls in some years.

Table 1 Estimated water availability and abstraction in years 2015, 2021 and 2035

№	Basin	Natural resource of surface water by basins, taking into account the ecological minimum, million m^3 water	Abstracted water, 2015		Abstracted water, 2021		Abstracted water, 2035	
			Quantity, million m^3	Share of resources, %	Quantity, million m^3	Share of resources, %	Quantity, million m^3	Share of resources, %
1.	Danube Region	5169	603	11,7	601	11,6	587	11,4
2.	Black Sea Region	1858	581	31,3	587	31,4	596	32
3.	East Aegean Sea Region:							
3.1.	Black Sea Region 1974-2008	6014	2020	33,5	2025	33,7	2030	33,8
3.2.	Black Sea Region 1961-2008	5452	2020	37	2025	37,1	2030	37,2
4.	West Aegean Sea Region	2708	128	4,7	128	4,7	127	4,7

Source: MEW (2012a) Table 2.3.1 in Annex 1

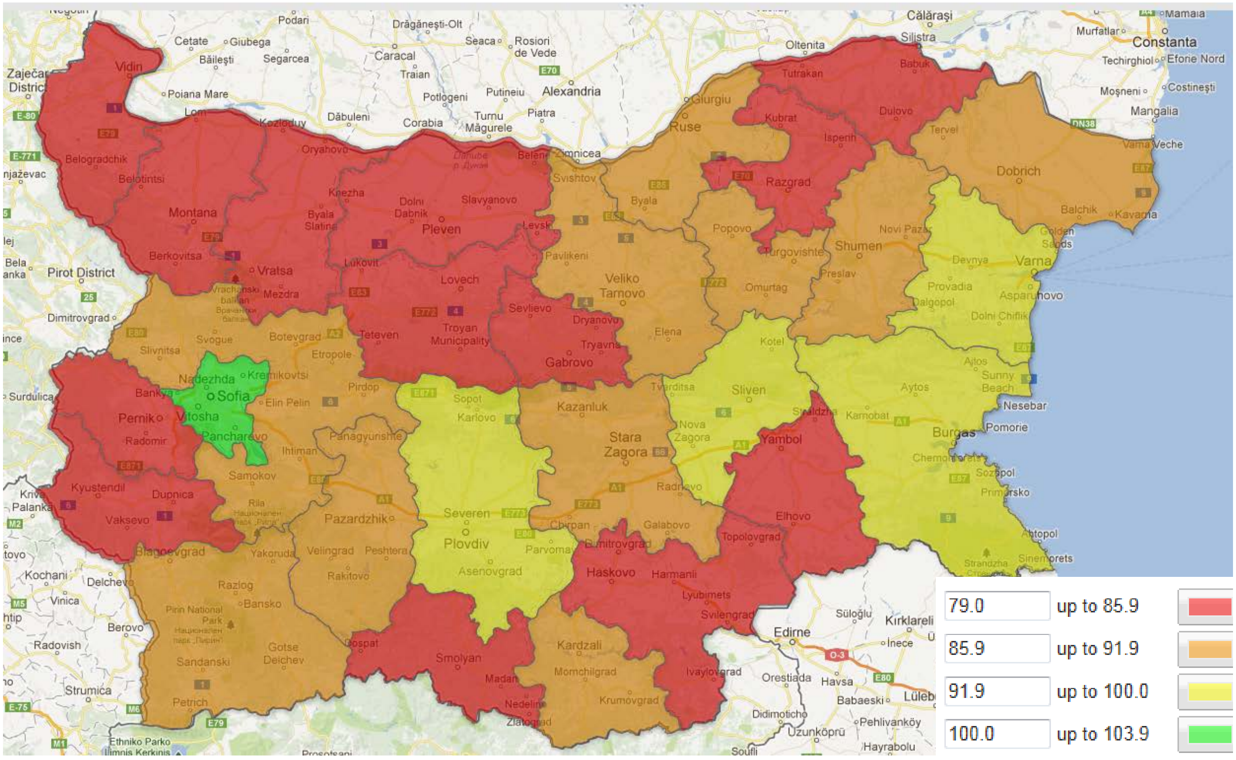
The main risk seems to be that intensity and variability will increase. This will have implications for the design of specific WSS infrastructures, but limited implications for the overall expenditure needs. The Government of Bulgaria considers revising the construction standards for building and for WSS systems. The standard for wastewater collection has not been revised for a long time. This would be an opportune moment to take the risk of increased variability and more high intensity events into account when revising the construction standards.

2.3 Demographic trends, income growth and aspirations of the population

The population of Bulgaria has reduced since 1990 and at the same time there has been a movement of people from rural to urban areas and from smaller settlements to larger. According to the official population projection this process is likely to continue. Figure 2 illustrates that according to the projection the future reduction in population will be larger in the relatively poor areas of the country and less on the coast. Only Sofia municipality is expected to gain population over the next three decades.

[21] World Bank 2009 Annex table 2.1.

Figure 2 Population projection to 2040 for Bulgaria



Source: Data based on http://www.nsi.bg/ORPDOCS

Note Legend shows 2040 population relative to 2010 population in %. i.e only Sofia municipality is expected to show an increase in population

The population which lives in settlements with population greater than 2,000 p.e. has implications for the investment requirements as per the UWWTD. As of end of 2011, 75% (about 5.5 million people) of the population of Bulgaria lives in such settlements. The share of the population, which lives in agglomerations that require wastewater collection as per the UWWTD, differs significantly between different districts[22].

The share of population in Bulgaria in agglomerations > 2,000 p.e. is similar to that of other EU12 countries, see Table 2. Note that Bulgaria has reported a large number of agglomerations with p.e. less than 2,000. Even though the EU-12 countries are different in terms of urbanization and population density, Bulgaria is comparable to other EU-12 countries in terms of number of UWWTD agglomerations per 100,000 population.

[22] Data in appendix.

Table 2: Number of agglomerations as reported by EU12 (reference years 2009 and 2010)

	SK	SI	RO	PL	MT	LV	LT	HU	EE	CZ	CY	BG
>150,000 PE	4	1	21	57	2	1	3	11	3	5	1	5
10,000-150,000 PE	78	28	245	591	2	23	33	178	19	154	9	80
2,000-10,000 PE	274	127	2176	639	2	60	41	308	38	475	47	273
Reported as less than 2,000 PE	0	0	213	1	0	4	18	142	0	0	0	576
Total	356	156	2655	1288	6	88	95	639	60	634	57	934
Number of agglomera-tions >2,000 PE per 100,000 population (1)	6,6	7,6	11,4	3,3	1,4	4,0	2,5	5,0	4,5	6,0	6,8	4,9

Data source: AAPC (2013) based on EEA, 2012.

(1) AAPC calculation based on population data as of 01.01.2011 (EUROSTAT, 2012a).

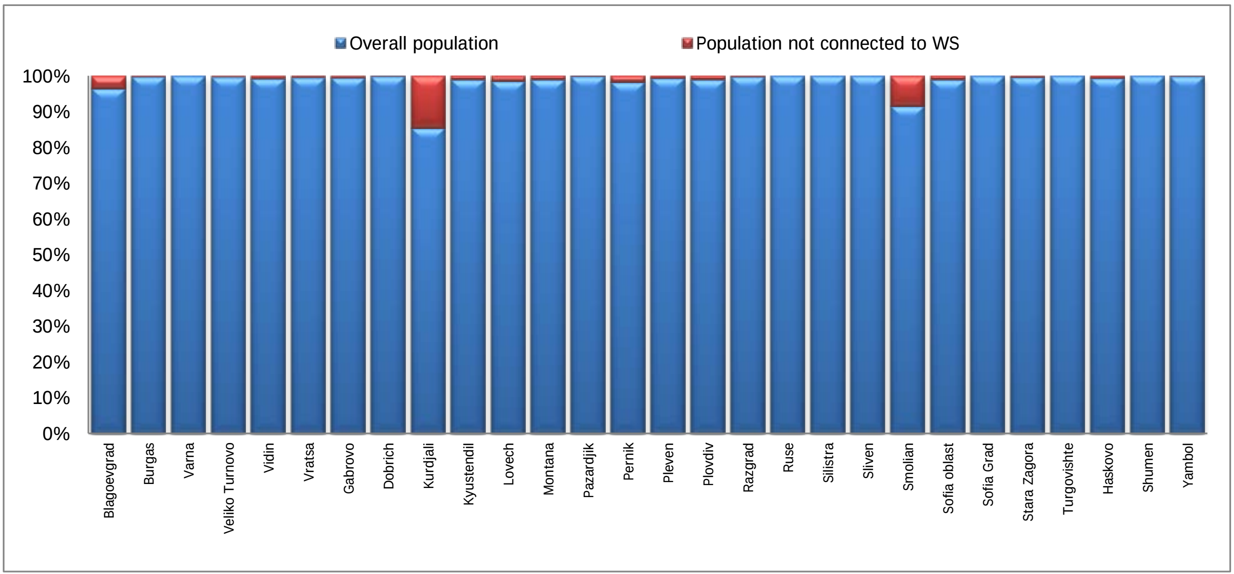
Following a sharp fall in incomes after 1989, per capita incomes grew rapidly for a number of years and have continued to grow even after the financial crisis, as Bulgaria continues to catch up with the rest of Europe. In this SFP we have assumed that household incomes continue to grow in line with GDP and that GDP increases 3.2 per cent annually. This implies a doubling of per capita incomes by the end of the period.

The accession to the EU in 2007 reinforced the aspirations of the Bulgarian people to achieve a European standard of living and to receive WSS services that correspond to good European practice. These aspirations must be taken into account when planning for sector developments. Among other things this implies an expectation of continued full coverage with water supply, extensive coverage with wastewater collection and elimination of seasonal water rationing in the future.

2.3.1 Water Supply

Almost all the urban areas of Bulgaria have a water supply system and these systems generally have to comply with the drinking water directive (DWD) More than 5,000 towns and villages have central water supply systems. This represents 99% of the overall population in the country, see Figure 3.

Figure 3: Water supply coverage by district



Source: WYG (2013)

According to a report on the quality of drinking water in the European Union, Bulgaria is the only EU-12 country that scored compliance levels of 95-100% for all three types of parameters (microbiological, chemical and indicator) (KWR 2011, here quoted from AAPC (2013)):

As regards the current situation in the Member States, the level of compliance with the Directive and the improvements, the following conclusions could be drawn:

- *On the basis of the data submitted the quality of drinking water in most EU Member States was relatively high. In summary, 10 Member States scored for all three types of parameters (microbiological, chemical and indicator) compliance levels of 95-100%. These Member States were: BE, BG, DE, FI, FR, EL, LU, NL, PT and the UK.*

The information provided by the Ministry of Health is showing that the quality of drinking water is very good. There are issues but most of these are local and not wide spread. The information from 2007 to 2010 shows that the average compliance rate of water samples in big water supply zones was 99.6%. There are specific issues with quality of water in small water supply zones, but on national level the water quality in small zones is good. In 2009 and 2010 the average compliance rate of water samples in small water supply zones is 98.4%. It should be mentioned though that Water Supply and Sanitation Companies (WSSCs) are not complying with their monitoring obligation up to the necessary volume and frequency as per the requirements of the national and European standards. The State is trying to compensate the necessary monitoring of water quality by performing up to 50% of the monitoring at its own cost.

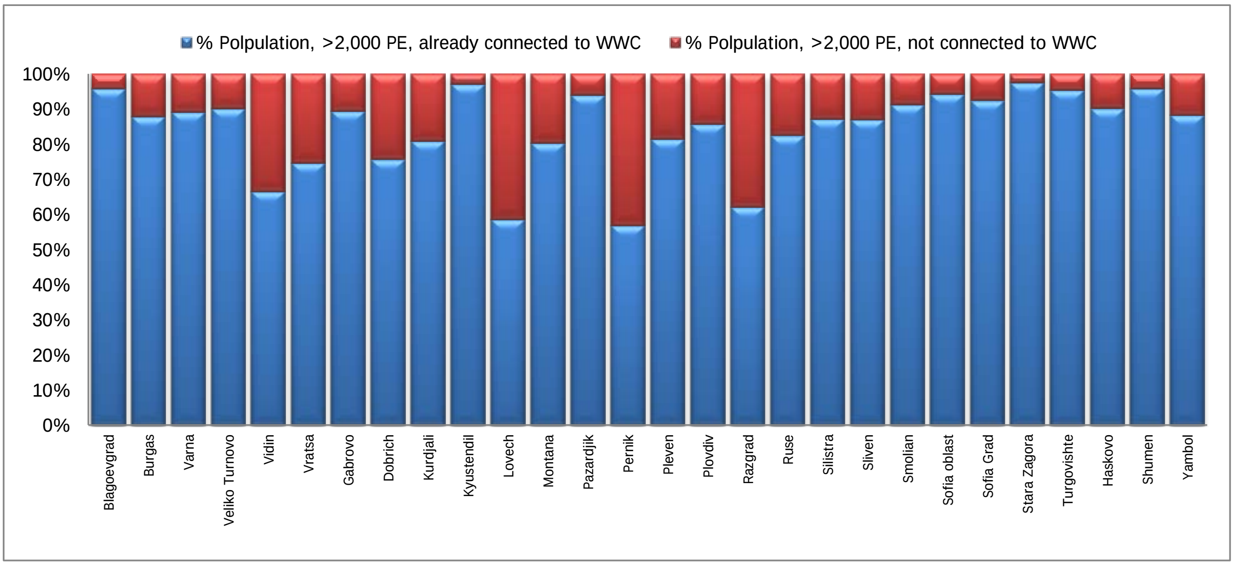
The obligation for the necessary monitoring of drinking water quality up to the required volume and frequency as per the applicable legislation and standards should be performed by the WSSCs and the State should only play a control function. This would mean development and accreditation of additional laboratories, which need to be established at regional level to optimize investments and operational costs.

2.3.2 Wastewater collection and treatment

To comply with the Urban Waste-Water Treatment Directive (UWWTD) [23] Bulgaria has to increase both wastewater collection and the connection to urban wastewater treatment plants from the current coverage levels of 66% and 50% respectively[24]. The UWWTD basically requires that wastewater in agglomerations with more than 2,000 p.e. must be collected and that all collected wastewater must be treated.

The graph below (Figure 4) demonstrates the proportion of the population per district, living in settlements greater than 2,000 PE that are already connected to wastewater collection (WWC) versus this part of the population that is not currently connected and therefore requires connecting. **Nationally, 12% (or 670,000 people) of the population that lives in settlements greater than 2,000 p.e., require to be connected to wastewater collection** in order to comply with the UWWTD.

Figure 4: Population >2,000 PE already connected / not connected to WWC



Sources: WYG (2013) based MEW (2012)

Compared to other EU12 countries, Bulgaria has a lower rate of wastewater collection in large cities and in small agglomerations. Only Romania and Cyprus have yet lower rates of collection. The connection rates are similar to other EU12 for medium sized towns (10,000 – 150,000 p.e.).

[23] Directive **91/271/EEC of 21 May 1991 concerning** urban waste-water treatment, **OJ L 135, 30.5.1991.**

[24] Note that these coverage data differ from those reported by NSI. For a detailed explanation see footnote to coverage data in the executive summary.

Figure 5: Wastewater collection in EU12, % of total generated load in particular size group[25]

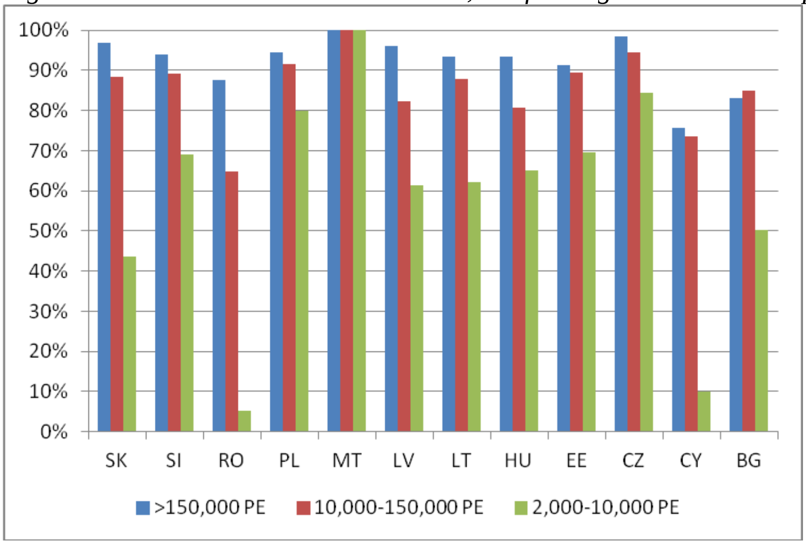
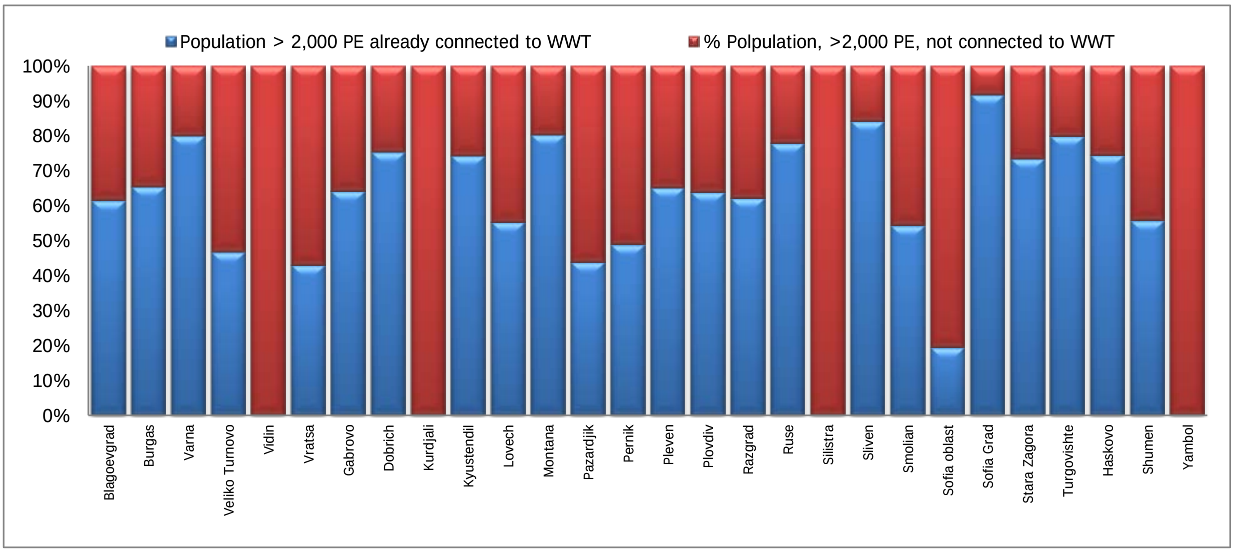


Figure 6 presents diagrammatically the ratio: already connected to urban WWTPs versus requiring connection to WWT in order to comply with the UWWTD. Currently, four districts have no WWT coverage. These are the districts of Vidin, Kurdjali, Silistra & Yambol. **The overall population that requires connecting to an urban WWTP in order to comply with the UWWTD**[26] **is approximately 1,850,000** or 34% of the population living in settlements greater than 2,000 p.e..

Figure 6: Population >2,000 p.e. already connected/not connected to a WWTP



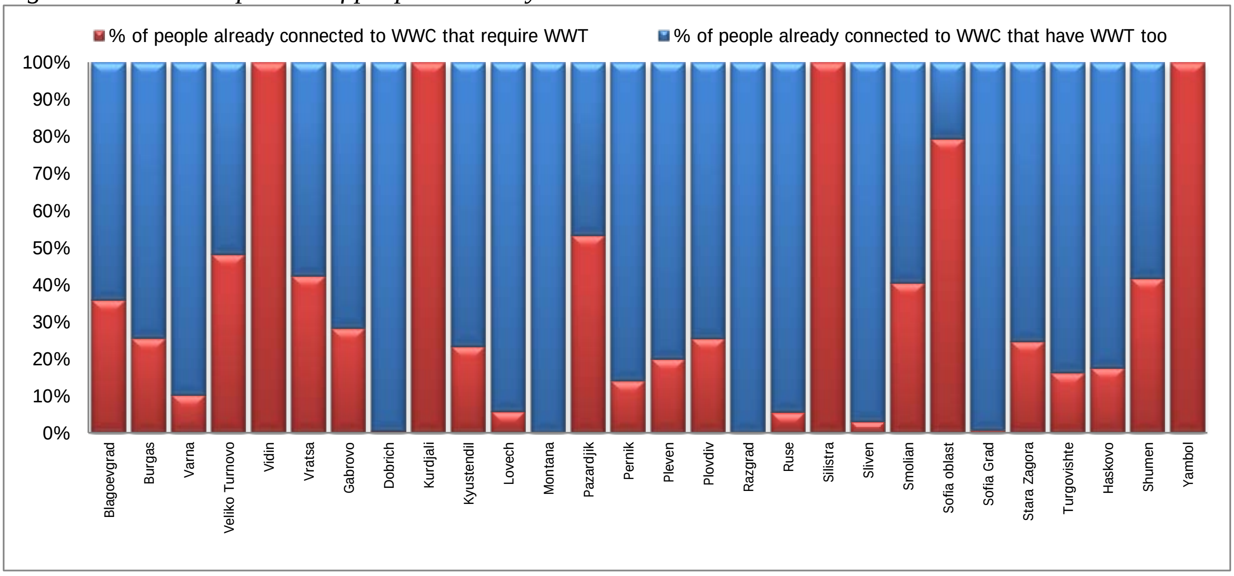
Sources: WYG (2013) based MEW (2012)

[25] Source: AAPC (2013) with calculations based on European Environment Agency (EEA). 2012.

[26] Here and later in the text when discussing population to be connected to WWTP we refer to all legally compliant ways to meet the requirements of UWWTD. The directive allows for decentralized individual appropriate solutions when they provide same level of environmental protection and where the centralized system do not provide better environmental impact or can lead to excessive costs.

Currently 76% of the population in Bulgaria that has WWC is also connected to WWT. Figure shows the current situation by district. The districts of Varna, Dobrich, Lovech, Montana, Razgrad, Ruse, Sliven and Sofia grad have 10% or less yet to connect to WWT from the current coverage with WWC. On the other scale of the spectrum are the districts of Vidin, Kurdjali, Silistra, Sofia oblast and Yambol, which require connecting to WWT more than 80% of its population currently connected to WWC.

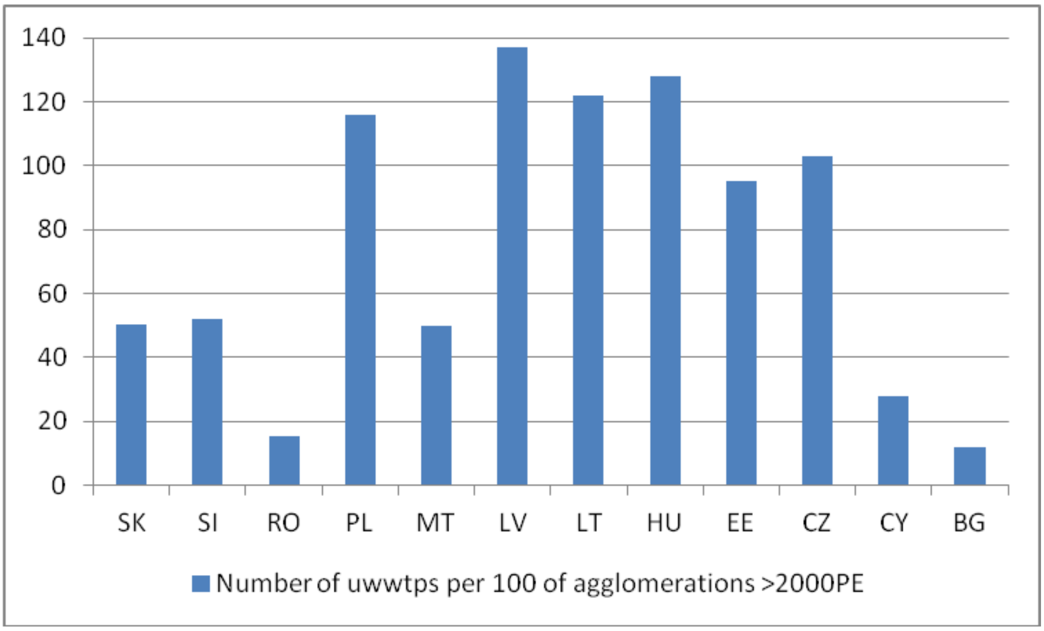
Figure 7: Proportion of people currently connected to WWC that also are connected to a WWTP



Sources: WYG (2013) based on MEW (2012)

Among the EU-12 countries BG has reported the lowest density of urban WWTPs (12 urban WWTPs per 100 agglomerations with a population equivalent of more than 2,000 PE).

Figure 8: Density of UWWTPs in EU12 countries (reference years 2009 and 2010)[27]



[27] Source: AAPC (2013) based on EEA (2012)

The following two tables illustrate the number of agglomerations above 2,000 p.e. and 10,000 p.e. respectively, the current coverage with wastewater collection and treatment infrastructure and the additional needs to fully comply with the UWWTD.

Table 3 Number of agglomerations of different size in 2003 and 2010 and projected for 2035

Agglomerations	2003	2010	2035
> 2,000 p.e. but < or = 10,000 p.e.	309	273	226
> 10,000 p.e.	121	85	72

Source: For 2003 and 2010: Government of Bulgaria (2012) Projection for 2035 based on NSI population projection by district.

Table 3 illustrates that the number of agglomerations with more than 2,000 p.e. and with more than 10,000 p.e. both fell by more than 35 from year 2003 to year 2010. Based on the NSI population projection per district and assuming that the p.e. values change in direct proportion to the population the number of agglomerations with more than 2,000 p.e. and less than or equal to 10,000 p.e. and with more than 10,000 p.e. respectively can be calculated. We find that the number of agglomerations with more than 10,000 p.e. may be reduced by 13 and the number of agglomerations with more than 2,000 p.e. but less than 10,000 p.e. may fall by 47.

Table 4 Overview of WWC and WWTPs by size of agglomerations as of December 31, 2010

Agglomerations	WWC existing[1]/ additionally required[2]	WWTP existing[1]/ additionally required[2]
> 2,000 p.e. but < or = 10,000 p.e.	35/239[3]	32/241
> 10,000 p.e.	14/70[3]	43[4]/42

Source: Government of Bulgaria (2012)

Notes: [1] considered as fully complying with the requirements of the directive

[2] additionally required to comply. Final deadline is 2015

[3] These add to 274 and 84 respectively, whereas the number of agglomerations is 273 and 85. This is a mistake in the original data.

[4] MEW (2012) interpretation of 14 compliant WWC systems but 43 compliant WWTPs seems unconventional. It seems that the MEW (2012) has intepreted the WWTP to be compliant if it has sufficient capacity (and proper technology). However, DG Environment considers that compliance with article 4 of the UWWTD (treatment) requires that 1) all wastewater is collected **and** 2) this is treated as per the directive (see EC (2012a) In this sense compliance in Bulgaria for WWTPs is 14 or less.

How to plan for wastewater collection and treatment in small settlements with scattered population, in particular where these settlements have experienced a decreasing population and economic activity over the past decades, represents a major challenge.

When are high costs excessive? In small settlements with scattered population the cost per person equivalent (p.e.) of providing wastewater collection and treatment will generally be much higher than in larger settlements with more dense population. The general requirement for wastewater collection in settlements with more than 2,000 p.e. notwithstanding, the UWWTD states: "Where the establishment of a collecting system is not justified either because it would produce no environmental benefit or because it would involve excessive cost, individual systems or other appropriate systems which achieve the same level of environmental protection shall be used."[28] This raises three questions: 1) When would a collection system produce "no environmental benefit"? 2) how to interpret "excessive cost"?[29], and 3) what are the alternative systems that are appropriate for Bulgaria? Chapter 4.1 will present a recommendation in relation to this issue.

2.4 WSSC Governance, Efficiency and Service Delivery

The Regulatory Review (World Bank 2012a) indicated that many WSSCs do not operate with efficiency, profit maximization and long term sustainability as their key drivers. For example, several municipal companies have not requested tariff increases even in years where costs for energy etc. have substantially increased. Cursory evidence also indicates that political interferences in operations are common.

Until now there has been little attempt to compare the efficiencies of Bulgarian WSSCs with their peers in Bulgaria and abroad. Tellingly, when data were collected for the IB-Net only 19of the Bulgarian WSSCs responded and only 3 allowed that their identity could be public[30]. In many other countries, regular benchmarking is one tool used by WSSCs to assess how they are performing relative to their peers.

Efficiency indicators for the Bulgarian WSSCs indicate that these are less efficient than most of their European peers. For example, while non-revenue water is high in much of southern and eastern Europe, it is very high in Bulgaria. Bulgaria has a high number of staff per 1'000 connections. This partly reflects inefficiency, partly that Bulgarian WSSCs rely on in – house equipment and staff for almost all their needs (typically including workshops for heavy equipment).

Inefficiencies are likely to make it more difficult for WSSCs to finance and implement the ambitious capital investment program, which is necessary to meet compliance requirements and to achieve the required long term service levels.

[28] UWWTD Article 3.

[29] The Managing Authority for the Operational Program Environment has currently an application for EU funding of a wastewater project with cost per person equivalent collected and treated of more than 11,000 BGN. Compared to typical costs in the 700 BGN to 3,000 BGN range, this seems like a very high p.e. cost. Unfortunately, the Commission has produced little guidance to resolve the question of when high costs are excessive.

[30] Sofiyska Voda AD, VIK OOD Targovishte and VIK EOOD Stara Zagora

Table 5 Selected indicators of efficiency for WSSCs in selected EU countries

Efficiency of WSSCs	Bulgaria	Romania	Czech Republic	Lithuania	Germany	France
Staff per 1'000 connections	7.7	1.9	0.6	0.8	2.5	2.4
Non-Revenue Water (NRW)	60%	N.A.	47%	NA	7%	26%
Pipe breakages. Breaks/km/year	1.5	1.9	0.7	1.1	0.01	0.1
Tariff in EUR/m3	€ 1.00	€ 0.83	€ 1.75	€ 1.20	€ 3.97	€ 3.39

Source: Bulgaria: Staff productivity and average tariff: WSSC reporting to SEWRC; NRW: http://www.nsi.bg/ORPDOCS/Ecology_9.2.xls;. Czech Republic and Lithuania: IBNET, http://www.ib-net.org/ accessed December 2012, Germany and France: Witteveen + Bos (2013) Annex table.

Note: [1] Tariff for water supply only.

This report argues that benchmarking is an effective tool to assess how WSSCs perform relative to their peers. In the following, the report presents an analysis of possible causes of inefficiencies and a comparison of the efficiency of groups of WSSCs. The analysis has been carried out using two internationally accepted tools *IWA Water Utility Efficiency (Self) Assessment Methodology* and *Data Envelopment Analysis (DEA)*[31].The IWA methodology invokes a broad definition of efficiency and includes qualitative assessments. DEA is a linear programing tool widely used to compare the efficiency of complex production where several input produce more than one output.

51 of the 66 WSSCs which have to submit business plans to SEWRC have been analysed[32]. These companies include 28 district companies (providing services to more than one municipality) and 23 municipal companies (providing services to one single municipality). The fifteen water operators excluded from the review are small private companies, providing services to enterprises or resorts, and municipal companies for which data was not provided by SEWRC.

The IWA model covers all functional areas of the water utility, its operating environment and dimensions of water service and is widely used as the basis for benchmarking[33]. Here "efficiency" is defined not in a narrow technical sense, but in a comprehensive nature based on performance and processes in six areas: (i) Corporate Governance; (ii) Human Resources; (iii) Accountability towards Customers; (iv) Financial; (v) Commercial; and (vi) Technical. For the purposes of this report, the IWA model, designed primarily for self-assessment, was modified by selecting 18 (with some sub-indicators) out of originally 39 performance indicators. The selected indicators cover the main performance aspects, but take into account the data availability and in particular re-

[31] Details of the analysis can be found in Appendix **Error! Reference source not found.**5 and in Witteveen + Bos (2013) and POVVIK (2013)

[32] The primary source of data are the business plans submitted for this regulatory period which includes data for 2007 and data from the annual reports for 2008, 2009, 2010 and 2011.

[33] For example the International Benchmarking Network, http://www.ib-net.org/ is based on IWA methodology as is the benchmarking prepared by the European Benchmarking Co-operation http://www.waterbenchmark.org/ (both accessed January 2013)

porting as part of the 72 indicators required to be reported by the SEWRC. For each indicator a five-level scoring system was applied with 1 given for poor, 3 given for an average performance and 5 given for excellent performance.

Table 6 Performance indicators used for assessment of the efficiency of Bulgarian WSSCs

Performance area	Performance Indicator
Corporate Governance	1. Quality of business plan/strategy 2. Public relations/customer communications 3. Quality control/quality management
Human Resources	4. Recruitment and staffing levels 5. Staff training and education programs 6. Remuneration level
Accountability towards Customers	7. Service coverage (Water, wastewater collection and wastewater treatment) 8. Continuity of service 9. Water quality (Physiochemical and radiological, and microbiological)
Financial	10. Working ratio 11. Operating unit cost 12. Creditworthiness
Commercial	13. Collection efficiency (Collection ratio, and collection period) 14. Customer metering 15. Customer information
Technical	16. Non-revenue water management 17. Maintenance level 18. Level of asset management

Source: POVVIK (2013), see also Appendix for more details.

An external assessment which includes qualitative assessments can only be indicative. Thus the results below are just that. In the future, ad hoc external assessments should be replaced by regular assessments performed by the key stakeholders themselves. The results of the preliminary assessment performed as part of this report are presented and discussed below.

Table 7 Overview of indicator values by performance area and types of operator

	Performance Area	All Operators	Public Operators		Private Operators	
			District	Municipal	District	Municipal
1	Corporate Governance	2.50	2.95	1.85		4.00
2	Human Resources	2.69	2.93	2.35		3.33
3	Accountability towards Customers	3.41	3.50	3.25		4.67
4	Financial	2.32	2.18	2.38		5.00
5	Commercial	2.89	3.02	2.73		2.67[1]
6	Technical	2.88	2.67	3.15		2.83
	TOTAL SCORE	**2.78**	**2.87**	**2.62**		**3.75**

*Sofijska voda is given separately because of its uniqueness, providing services to Sofia and by private operator
[1] Sofiayska voda surprisingly reports a low collection ratio and a long period of receivables outstanding.

Table 7 summarizes the results of the 51 reviewed water operators. Sofiayaska Voda stands out as a better performer than the rest. The main argument for private operators are their ability to achieve higher efficiency due to a combination of factors including better access to international experience, incentives better aligned with attaining efficiency and less political interference, and this result does not contradict that these forces have been active in Sofia.

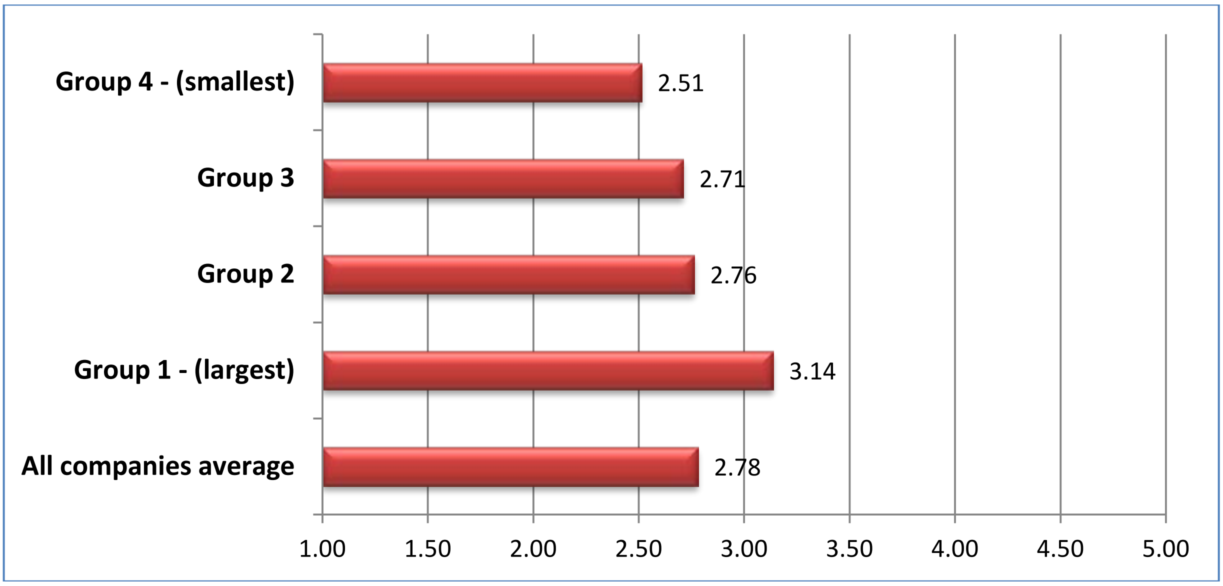
Comparing the district companies with the municipal it can be noted that in 4 of 6 areas there is little difference (less than 0.5) in scores. Only two performance areas, namely governance and human resource show larger differences than 0.5 in average indicator values and here district companies achieve higher scores. Municipal companies obtain higher scores for technical indicators scoring 0.48 higher on average. Municipalities would typically argue that due to their decentralized nature they are more customer responsive than state-controlled district companies. If this was the case, one would expect municipal companies to do better in the fields of governance and customer responsiveness and not necessarily in the technical area. Only detailed analysis and analyses based on a more complete data set and carried out with active involvement of the utilities in question could reveal the causes of the differences in performance seen.

In the following the hypothesis that larger companies are more efficient than smaller is investigated.

Table 8 Grouping of WSSCs by size measured as water sold in m^3 per year

Group	Water Sold
Group 1	more than 7,000,000 m3
Group 2	Between 3,000,000 and 7,000,000
Group 3	Between 1,000,000 and 3,000,000 m3
Group 4	less than 1,000,000 m3

Figure 9: Average value of indicators by size of company - grouped



*Figure*Figure 10 indicates that size seems to be particularly important in relation to human resources and governance, while the average value of the technical indicators in Bulgaria does not seem to be size dependent.

Figure 10: Average value of indicators by performance area and size of company–grouped Based on Figure 9

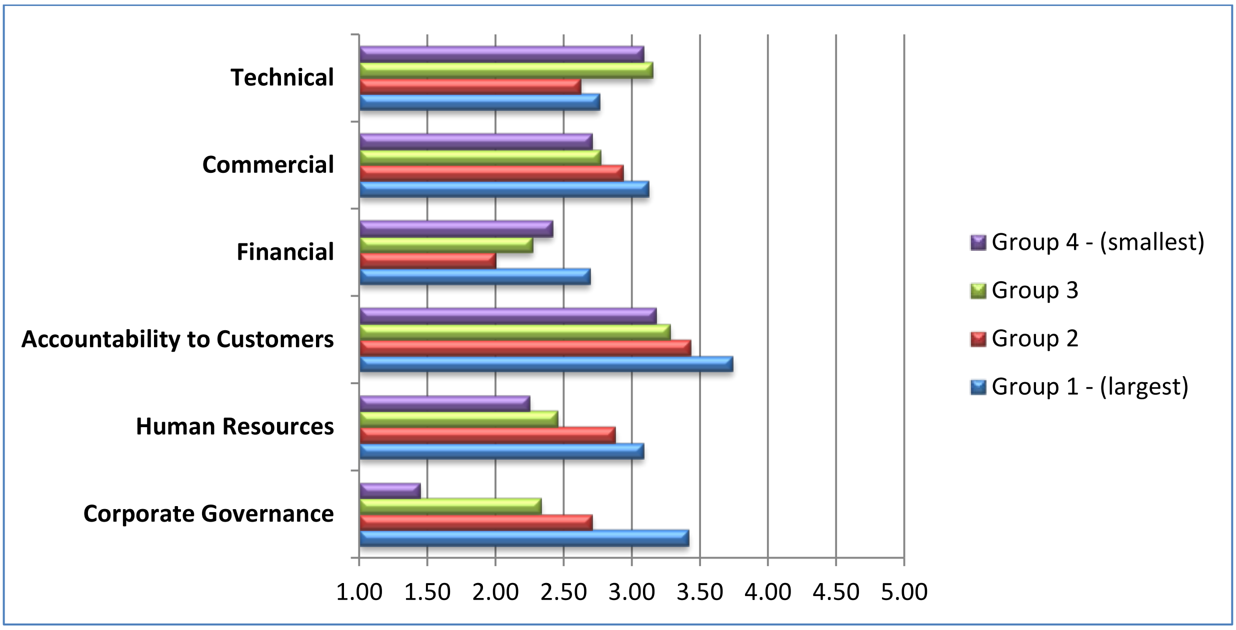
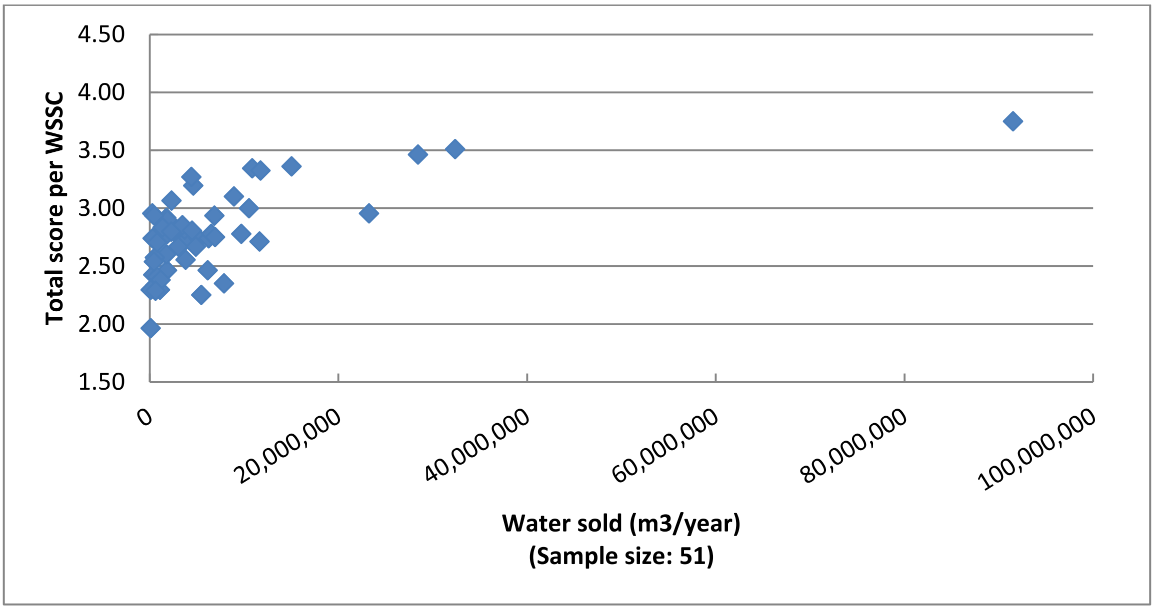


Figure 9 and Figure 10 it is not possible to reject the hypothesis that larger WSSCs are more efficient.

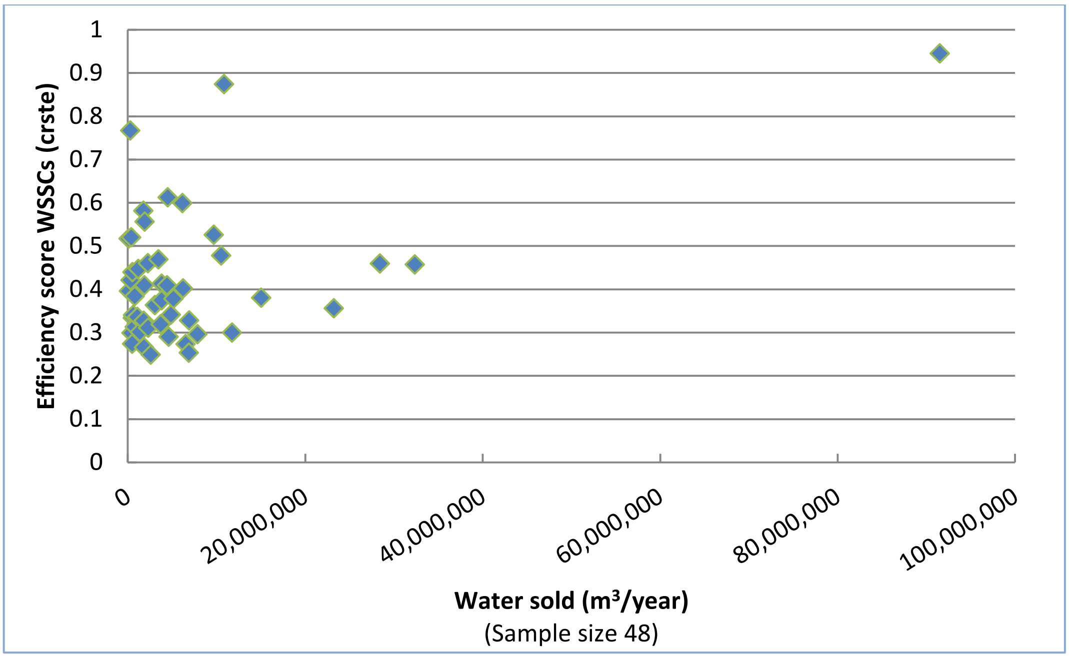
Figure11: Scatter diagram of efficiency indicators and size for Bulgarian WSSCs



Typically using linear programming, DEA calculates the relative efficiency of an organisation within a group, comparing it to the organisation that performs the best practice within that

same group. The most common concept of efficiency is technical efficiency: the outputs generated by a set of physical inputs (such as the services of employees and machines) with comparable technologies. In other words: the most efficient company does not waste inputs when producing a given quantity of output (s). An organisation operating at best practice within its group is said to be 100 per cent technically efficient. When operating below best practice levels, then the organisation's technical efficiency is expressed as a percentage of best practice (a score of 70% means that efficiency is 30% below best practice). The efficiency score related to size of the companies is pictured in Figure. It must be noted that the data set is rather weak and that inclusion of data from additional years (which were not available at the time of writing) may change the results. All conclusions are therefore caveated with this note.

Figure12: Scatter diagram of technical efficiencies (DEA) and size for Bulgarian WSSCs[34]



Based on the present data set the figure reveals no statistical correlation between size and (present) technical efficiency for Bulgarian WSSCs. It is to be noticed that there is a considerable gap between the most efficient companies (best in class) and the ‘bulk of the companies. Scores in the 0.3 to 0.5 range indicate a potential to achieve the same output(s) with less than half the inputs if the companies could perform similar to “best in class”.

International research demonstrates that there are major economies of scale and that larger utilities on average perform better than smaller ones, see for example Lentini and Mercadier (2011) which reports a large review of empirical studies covering several regions in the world. In relation to economies of scale a key finding was:

> *‘The studies from a significant set of countries show economies of scale (…) in populations of 100,000 to 1 million (or in some cases covering many millions), with population densities*

[34] The sample size for the DEA analysis is only 48 as additionally three companies had to be removed from the sample due to poor data quality

> *of up to 250 inhabitants per square kilometre, or with volumes up to 100 million to 200 million cubic meters per year.*

Economy of scale has also been a motive for many consolidation efforts in Europe. For example, in France and the UK, the private market (typically interested in financial efficiency) demonstrates a preference for large scale. The size of utility companies in the European Union differs, but the average water production is approximately 45 mln m^3 per year (Witteveen + Bos (2013)).

However, past developments show that choices for levels of aggregation have not ‘just’ been a matter of financial and efficiency considerations. Political, cultural and legislative aspects and considerations have been predominant explanatory factors in the organisation of the sector. **Furthermore, the ‘optimal size’ of WSSC cannot be given outside a country context**. For example, in Austria, Germany and Scandinavia water companies continue to be small and typically organized in a municipal context[35]. It would be premature to conclude that they are therefore inefficient compared to their peers in countries with other organizational models.

In yet other countries significant consolidation of public companies has taken place. Examples are: Romania, where a regionalisation process resulted in a present number of 42 (multi-) utility companies (approx. one per 450,000 pop.), down from a total of 800 water operators in the 1990s; Italy which now has 91 providers (one per approximately 650,000 pop.), down from 13,000 in the 1990's; and the Netherlands which presently have 10 providers (one per approximately 1,700,000 pop.) compared to more than 200 in the 1950s. Thus there is European precedence for the current efforts of consolidation in Bulgaria.

[35] For example, more than 6,000 WSC and an additional 6,000 WWC in Germany, more than 5,000 WSC and 1,800 WWC in Austria (Witteveen + Bos (2013) and more than 2,000 WSCs in Sweden http://www.svensktvatten.se/Documents/Kategorier/Om%20Svenskt%20Vatten/Facts%20on%20Water%20Supply%20and%20Sanitation%20in%20Sweden%20(English).pdf accessed January 28, 2013

3 Expenditure Needs Assessment

3.1 Approach, Methodology and Overview

This chapter assesses the expenditure needs up to 2038 in order to move the WSS from its current state to the desired future state. Needless to say, to achieve such a change in service quality, environmental performance, resource efficiency and value for money requires not just adequate expenditure and financing, but also improvements in sector governance, institutional and regulatory framework, attitudes and skills within the sector to mention a few. This notwithstanding the present SFP focuses on expenditure needs and (next chapter) financing, while drawing on previous analyses of governance, regulation etc. in the recommendations in the final chapter.

CAPEX have been assessed on a year by year and district (oblast) by district basis[36]. Where available the data from the WSS master plans have been used. Generally these data were available for the period up to 2020 only[37]. Where master plan investment estimates were not available, assessments of investment needs have been made. The assessments have been based on what is needed to operate and maintain a typical water supply and wastewater systems in a manner which is compliant with all relevant regulation and which sustains the ability of the system to provide service in the long run, while gradually improving efficiency as per the long term goals described above.

The first years are dominated by investments in wastewater. Specifically, wastewater treatment collection (sewers) and wastewater treatment plants have been added where needed to achieve compliance with the UWWTD[38]. If the short term investment plans are implemented as currently planned it seems that full compliance with the UWWTD will be achieved by end of 2018. In addition, a number of so-called water cycle projects are included as per the short term investment programs. These are integrated projects, which include both water supply and wastewater components.

At the same time there are investments for compliance with the Drinking Water Quality Directive. The total amount of investments to reach compliance with DWQD in the short-term investment plans to the Regional Master Plans (mainly DWTP, disinfection facilities and etc.) for the period 2014 – 2020 is BGN 374.2 million.

From 2020 the expenditures mainly relate to rehabilitation and reinvestment in water supply and wastewater systems. In addition to the current fully built up water supply coverage by 2020 the coverage with wastewater collection and treatment will be fully compliant. In view of the fact that the majority of the networks were built in the 1960s, 1970s and 1980s, and that very little renewal has taken place since then these networks will be 30 – 60 years of age by 2020. Rehabilitation and renewals have been calculated based on assumptions about the lifetimes of infrastructure that lead to conservative expenditure estimates.

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[36] Details of the methodology and assumptions made is available in an appendix to this report.

[37] At the point of writing (December 21, 2012) only the short term investment programs of all the Master Plans were available. Medium and long term investment needs were only available for three of 51 designated territories, namely: Pernik, Yambol and Botevgrad. The authors intend to update the expenditure needs assessment with the data from the final master plans when these are available.

[38] Here we used UWWTD as shorthand for the corresponding pertinent Bulgarian regulations.

OPEX have been calculated based on an assumption that maintenance costs need to be "adequate to sustain the system and its ability to provide water supply and sanitation services". The current level of OPEX have been assessed and compared to an ideal, "adequate" level. The finding is that the overall level of OPEX reported seems to be adequate. In consequence the future OPEX have been calculated based on the present plus additional OPEX that follow as a consequence of new and additional infrastructure, for example new wastewater treatment plants.

Non-revenue water (NRW) is assumed to fall from a current level of 60% to 30% by the end of the period. NRW is reduced partly due to a reduction in commercial losses, but mainly due to a reduction in technical losses in consequence of the network replacements. Naturally, for such a significant decrease in NRW all the existing know-how, technologies and experience should be applied to come up with optimal solution to address the losses in regions and systems, which will precede and supplement the investments in replacing sections of the water supply network. OPEX is reduced (ceteris paribus) as a consequence of the lower water losses.

Finally, ancillary and other expenditures likely to be incurred by each WSSA/WSSC year by year have been assessed and added[39]. The calculation of these costs will initially assume no change in financial variables (such as receivables in days, works in progress etc.). In other words no specific assessment of financial variables will be required. Furthermore it shall initially be assumed that all CAPEX are grants to the operator. This assumption is relaxed in the following chapter which considers financing options, including, but not limited to, debt financing.

3.2 Sector Objectives

For the purposes of the CAPEX and OPEX calculations the sector objectives have been translated to imply the following by 2038[40]:

- Drinking water supply.
  - Coverage remains at 99%
  - Reduction of NRW to 30%[41]
- Wastewater collection:
  - 75% coverage for household users (equivalent to collection in all agglomerations with more than 2,000 p.e.);
  - 100% coverage for non-household users.
- Wastewater treatment:
  - 75% coverage for household users[42];

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[39] For the purposes of this assessment it has been assumed that each district (WSSA) has one WSSC. Data for the current 51 designated territories have been aggregated to 28 districts. At this point no

[40] For more details see appendices

[41] 30% NRW will in actual fact be achieved in 2039, as investments carried out in 2038 will contribute to achieving this objective.

[42] All wastewater collected is treated in accordance with the legal requirements. Furthermore, where currently treatment plants exist, but do not meet the requirements (for example primary treatment) upgrading of these treatment plants to the level required has been assumed.

- 100% coverage for non-household users.

The investment needs for the period up to 2020 correspond to the proposed short term investment programs that have been submitted as part of the preparation of the master plans for 51 designated territories. The short term investment programs have been allocated to districts and to asset categories. When the information was available it has been directly used, and when the information in the short term investment programs was presented at a higher level of aggregation, ratios have been used to allocate to years, districts and asset categories[43].

The methodology for estimating the investment needs post the short term period (i.e. 2021-2038) involved making a number of assumptions, including[44]

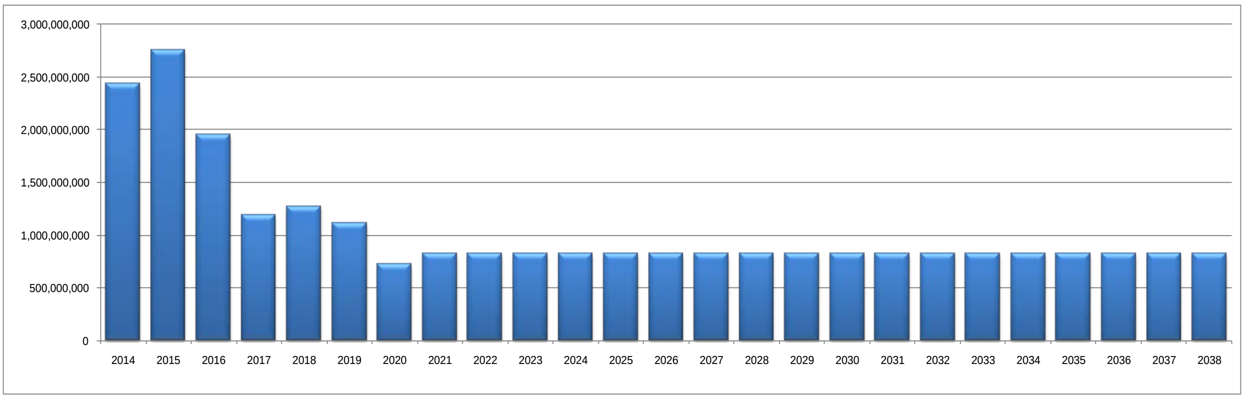
- Nominal asset life for the various asset categories;
- Replacement/refurbishment rate per year;
- Average unit cost.

As a base for determining the average unit cost, the unit costs developed by one of the master plan consultants have been used[45].

3.3 Results of the Expenditure Needs Assessment

According to the short term investment programs almost 12,000 million BGN will be invested in the period 2014 to 2020, reaching a peak of BGN 2,700 million in 2015, as illustrated in Figure 13Figure.

Figure13:Profile of overall investments 2014-2038



Source: WYG 2013 figure 9.

Is it likely that such an increase in capital investments from less than 400 million in 2011 to more than 2,400 million in 2014 can be achieved? A large number of projects have been submit-

[43] The short term investment programme (STIPs) for West region were split by territory and by year over the 2014-2020 period and therefore, we have simply used the investments per year as presented in the STIP. Whereas, the investments for Central and Eastern regions, had a total amount for the period for each territory. For these the investments have been allocated in time by WYG (2013) and their estimates are used here.

[44] As mentioned: 3 of 51 master plans were available at the time of writing and have been used directly. The methodology described here pertains to the rest of the country.

[45] The Consortium for the Western region has developed a catalogue of unit costs and these are published as part of the Master plan for Pernik

ted to the operational program environment and large commitments of funds have been made during 2012[46]. In order to comply with the European budgeting and spending rules the cohesion funds available under the current programming period (2007-2013) must be disbursed prior to December 31, 2015, according to the so-called n+2 rule. This indicates that there will be considerable incentives to complete projects and disburse funds between now and end of 2015. On the other hand, as discussed in World Bank (2013) the procurement process for investments in the WSS sector is subject to considerable delays in project implementation. At the same time, it is also questionable whether the construction sector can ramp up its capacity to construct WWS infrastructure that quickly.

From 2020 the WSS sector capital expenditure needs stabilize at approximately 800 million BGN annually. The investments from 2020 are largely refurbishment and replacement of existing infrastructure. 800 million BGN annually is equivalent to a little more than 100 BGN per capita per year. Seen in an international perspective an annual replacement cost of 50 Euro per capita per year to maintain an EU standard WSS system seems like a reasonable cost level. However, it translates into an annual expenditure need of approximately 2 BGN per cubic meter of water sold[47], which implies annual capital expenditure at a level which is higher than the water tariff in most WWSC currently. Thus while the costs may be reasonable, they are challenging and indicative of the need for the sector to be highly efficient.

The profile of investments with an early focus on wastewater investment to comply with the UWWTD and later investments in refurbishment and renewal to increase resource efficiency and maintain long term sustainability of the service is illustrated in Table 9 and Figure

Table 9 Breakdown of the investments (WS/WW) per period

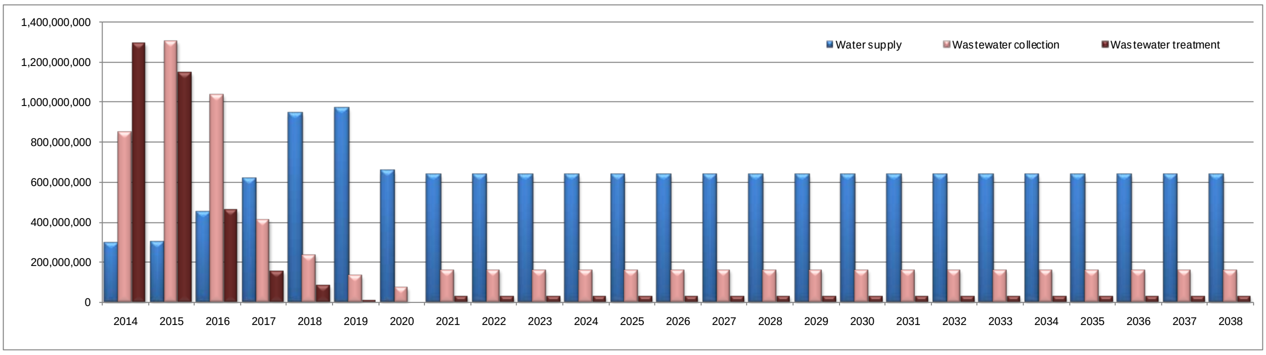
		2014-2020	2021-2028	2029-2038	2014-2038
WS	**BGN**	4,224,007,705	5,090,950,498	6,363,688,123	15,678,646,326
	%	37%	77%	77%	57%
WW	**BGN**	7,205,589,755	1,535,077,963	1,918,847,453	10,659,515,171
	%	63%	23%	23%	40%
Total	**BGN**	11,429,597,460	6,626,028,461	8,282,535,576	26,338,161,497
	%	100%	100%	100%	100%

Source: WYG (2013) table 9

46 According to MEW (2012a) as of September 30, 2012, 15% (or close to 400 million BGN) of the approximately 2,500 million BGN available under Axis 1 of the OP(E) for the programming period 2007 – 2013 had been disbursed but the program had been fully committed, indicating a large pipeline of projects.

47 Currently household consume approximately 100 lcd or 36 cubic metres per year and industry consumes little (in many places sales to industries etc are less than a third of sales to households). Adding say 12 cubic metres for industry etc. per person per year brings the annual total consumption close to 50 cubic metres per year.

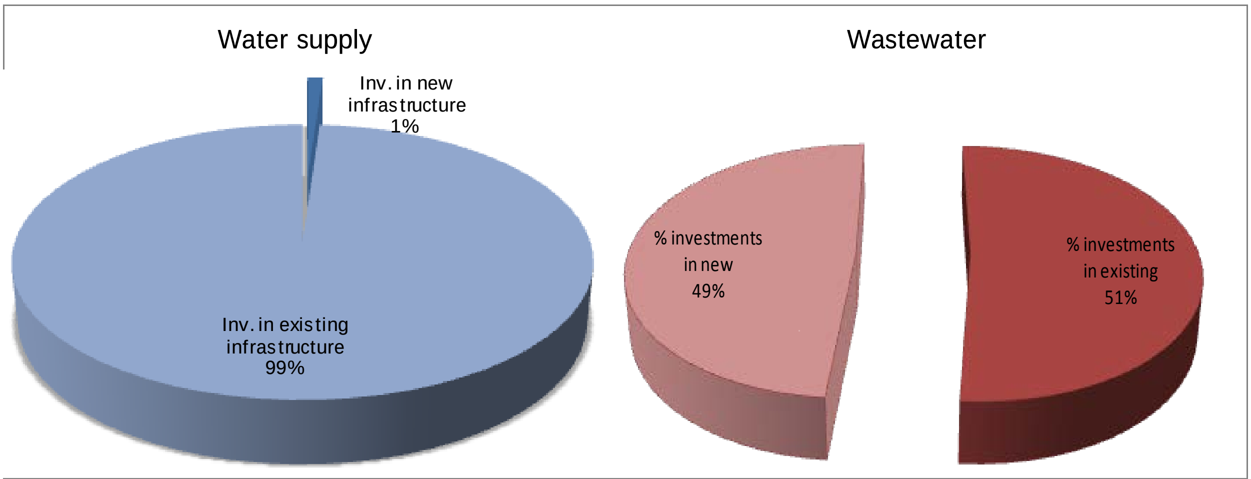
Figure 14: Profile of WS, WWC, WWT investments 2014-2038[48]



The profile of investments is heavily frontloaded. This reflects the short term investment programs which are part of the RMPs. A number of these investments may already be included among the commitments from OPE, however many must still be seeking financial commitments. The question has been raised above whether it is realistic to assume that it will be possible in terms of institutional capacity, procurement processes and construction capacity among contractors to achieve these very high investment levels. In addition to these concerns, Chapter 4 will illustrate that this frontloading makes it very difficult to design a credible financing plan.

Almost all of the investments in water supply are for renewal of existing infrastructure. Of course there are significant measures for compliance with DWQD (DWTP, disinfection facilities and etc.), which for the period 2014 – 2020 amount to BGN 374.2 million.Most of the investments after 2020 are in renewal of the existing water pipe networks[49]. This is illustrated in Figure 15.

Figure 15 Investments in existing infrastructure versus investments in new infrastructure



Source: WYG (2013) figure 11

During the planning period up to 2035 more than 70% of the water supply pipes will become more than 55 years old. Based on information about the age of the transmission, distribution and

[48] Source WYG (2013) figure 10.

[49] Currently, the World Bank is financing completion and rehabilitation of three water supply dams. At the moment, no investments in water supply dams is foreseen. However, also in the future there may be investments needed in dams, either single purpose water supply dams or multi-purpose dams. This expenditure needs assessment has, conservatively, not includes such (lumpy) investments.

collection networks which has been provided by a number of WSSCs in their reporting to the SEWRC, an asset age profile was estimated. Table 10 illustrates that 70% of the water supply transmission and distribution is prior to 1980 and thus more than 30 years old and 10% are more than 50 years old today.

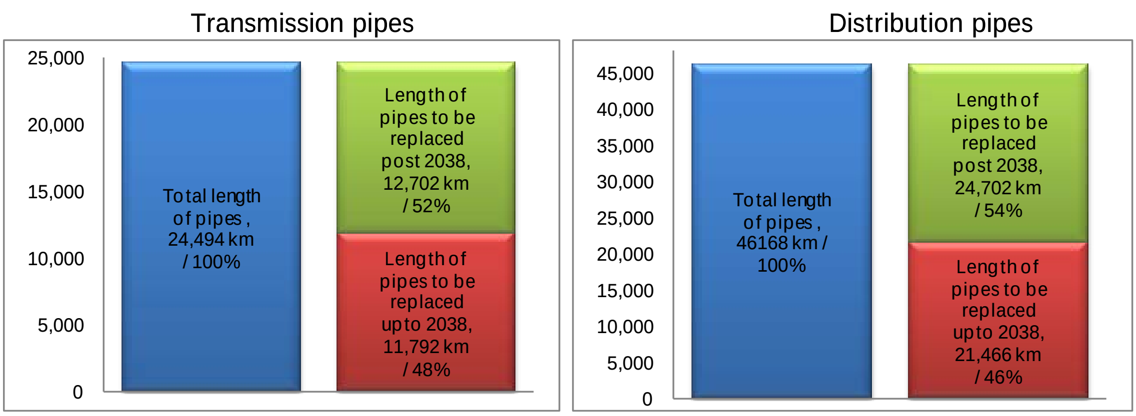
Table 10 Age profile of water supply networks 2013 to 2038

Summary of the Age Profile of Water Supply Pipes				
	2013	2024	2034	2038
>50 yrs	14%	23%	31%	41%
40 – 50 yrs	29%	28%	20%	6%
30 – 40 yrs	28%	20%	6%	3%
30 – 20 yrs	20%	6%	3%	20%
10 – 20 yrs	6%	3%	20%	20%
< 10 yrs	3%	20%	20%	10%
Total	100%	100%	100%	100%

Source: Data provided by WYG based on WSSC reporting to SEWRC.
Note: This table assumes that 2% of the pipes are replaced each year, starting with the oldest.

As illustrated in Figure 16, it is expected that around 12,000 km (48%) of the transmission pipes will be replaced in the period 2014-2038, whereas 46% of all distribution mains, or around 21,500 km, will be replaced. As a result the average age of the networks is expected to fall slightly, but to remain above 30 years. Unfortunately, due to the almost complete lack of investments in networks for two decades, while the average age fall slightly, the share of pipes older than 50 years increases drastically from 14% to more than 40%. In other words, the assumptions about replacement are conservative in terms of pipe lengths replaced, but ambitious in terms of the effect on NRW reduction. Such a development will only be achievable with very well planned, tested and selective pipe replacement that takes into account system effects when certain pipes are replaced. This again will require much more advanced planning, advance leakage detection, possibly establishment of separate district metering areas etc. than what is currently the case.

Figure 16: Length of water supply pipes to be replaced between until 2038



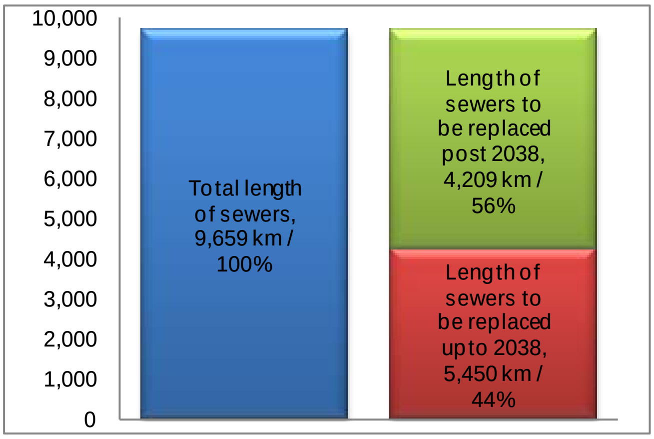


Figure17: Length of sewers to be replaced

In addition to extending the sewer network and connecting around 670,000 people, the capital programme envisages 44% of the eisting sewer network to be replaced in the

period up-to 2038. The remaining 56% will be left to be replaced post 2038 (Figure).

Sofia grad has well developed wastewater collection system. It has 1,563 km of sewers, which have connected 93% of the population living in settlements greater than 2,000 PE. Therefore, most of the investments will be focused on replacement of the existing sewer system.

The required investments and per capita investments differ substantially from district to district. Unfortunately, in many case the districts where per capita needs are larger, are also relatively poorer districts. This is illustrated in the following figures.

Figure 18:Household income per district

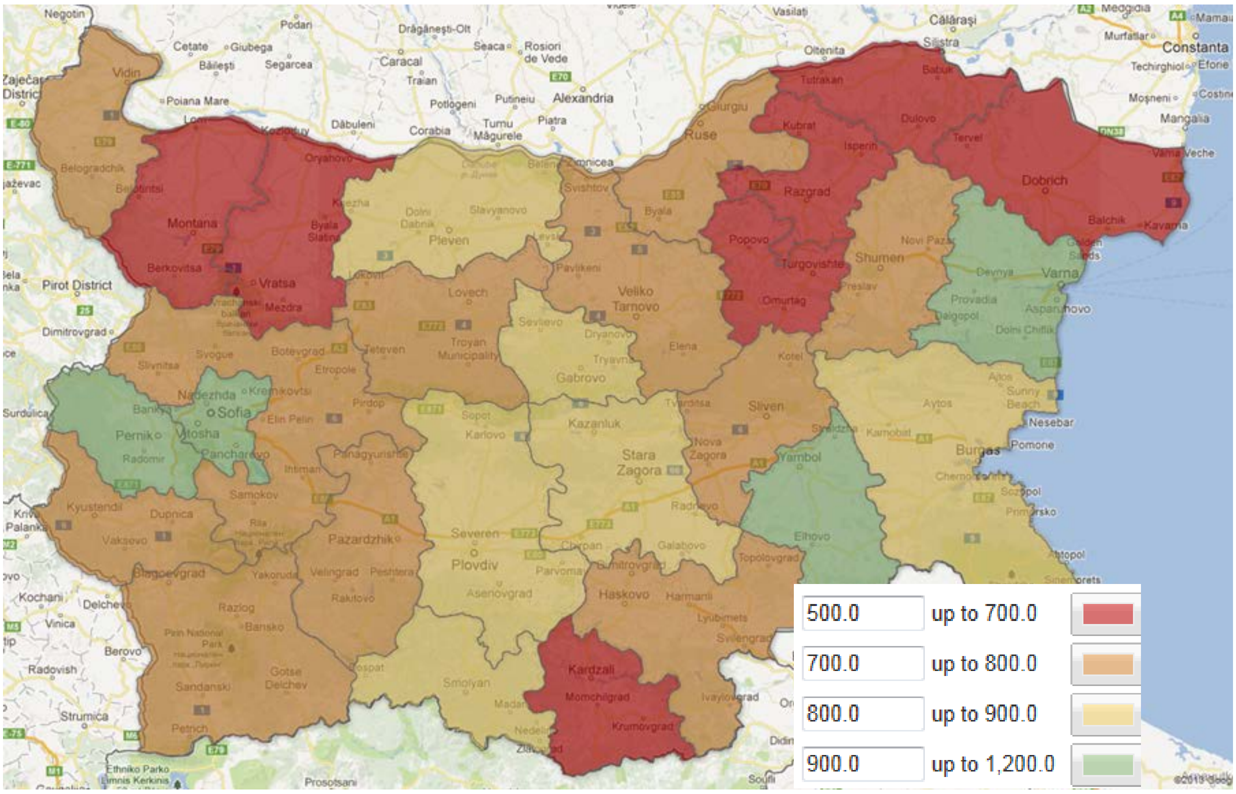


Figure 19:Water supply investment needs until 2038 per district[50]

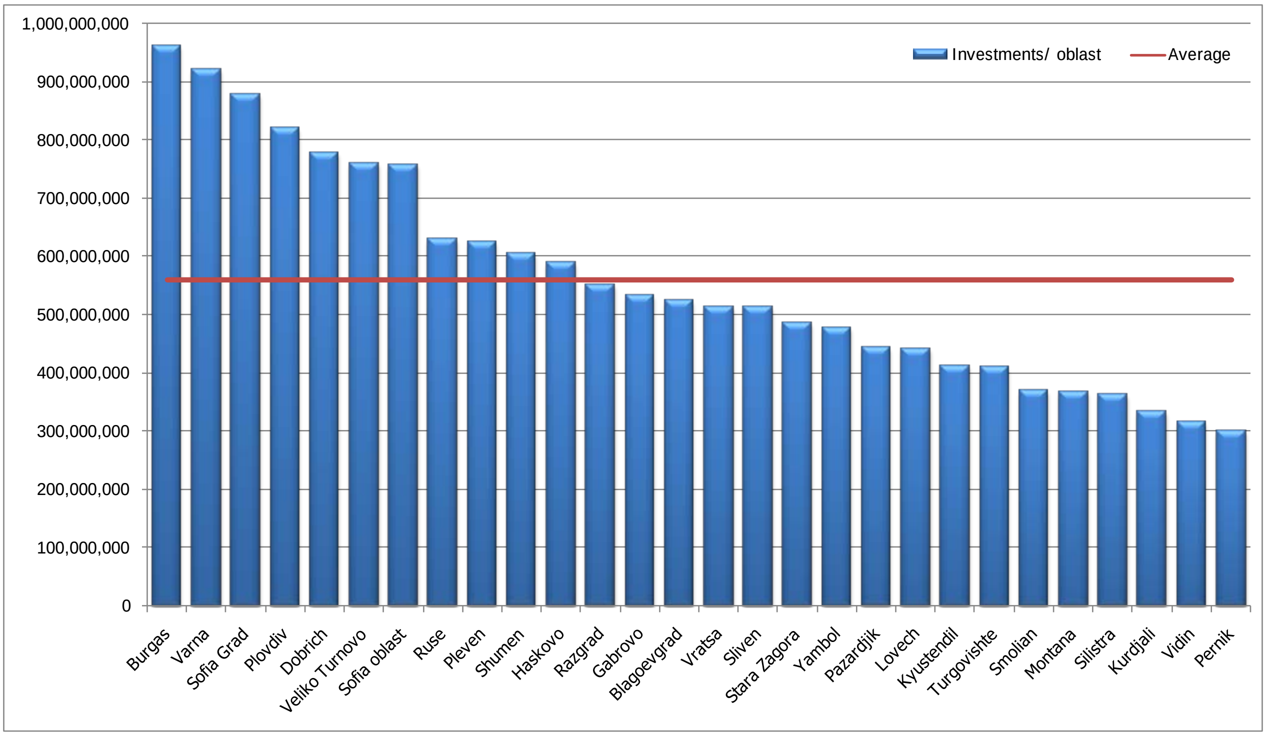
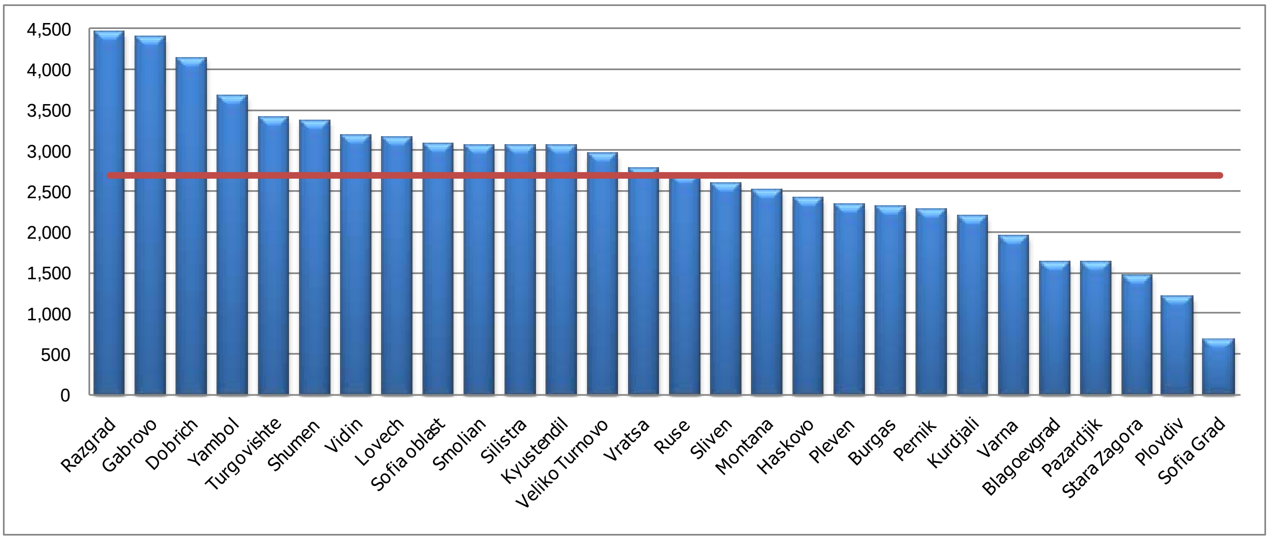
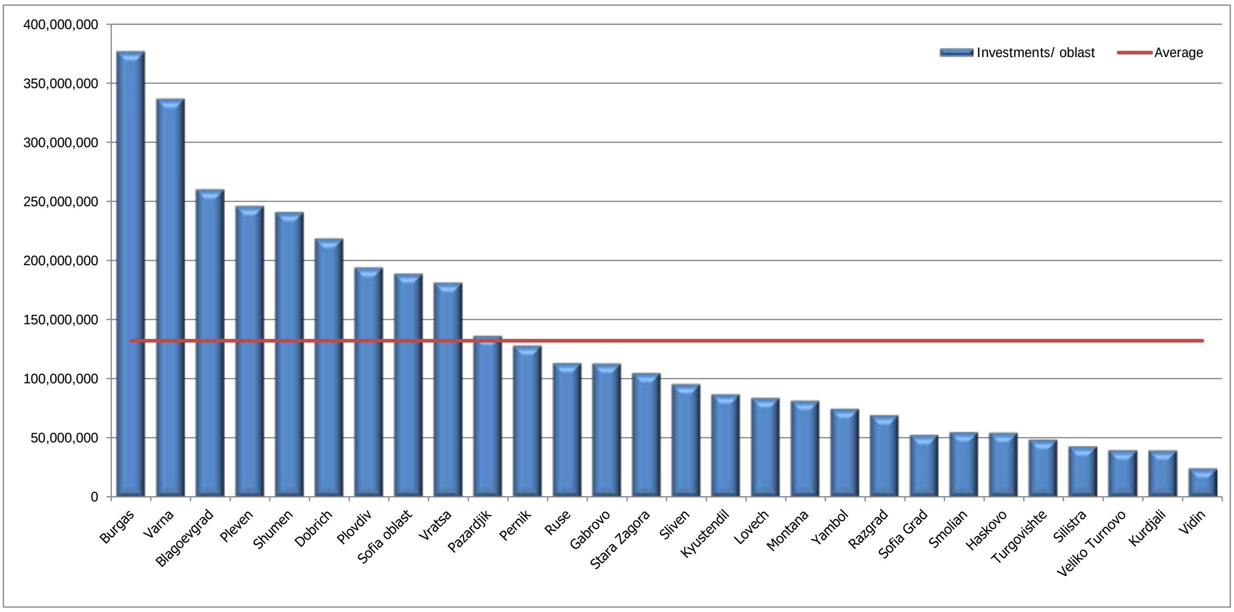


Figure 20: Water supply investment needs until 2038 per capita per district[51]



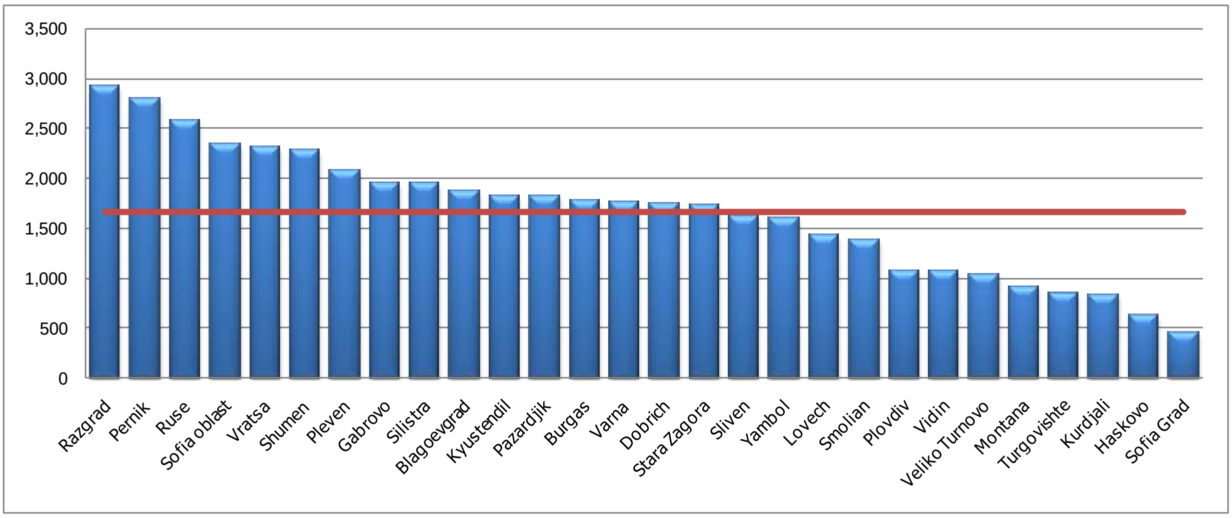
50 Source: WYG (2013) figure 12
51 Source: WYG (2013) figure 17

Figure 21: Wastewater investment needs until 2038 per district[52]



The districts of Turgovishte, Montana, Vidin, Kurdjali and Haskovo require relatively small investments in wastewater collection due to the fact that they have high level of coverage for wastewater collection and relatively short sewers system[53].

Figure 22: Wastewater investment needs until 2038 per capita per district[54]



In summary, as assessed, the expenditure needs present three challenges: 1) How to achieve and finance a historically high level of investments? 2) How to achieve a profile of investments which is so heavily front loaded; and 3) How to finance relatively high per capita needs in relatively poor districts? These issues are discussed in the following chapter.

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[52] Source: WYG (2013) figure 16

[53] Results at district level are available from the World Bank upon request.

[54] Source: WYG (2013) figure 18

4 Financing: Options and Scenario Analyses

4.1 Approach, Methodology and Overview

This chapter assesses alternative options for financing the expenditure needs identified. The expenditure needs identified in Chapter 3 are the starting point for the analyses in this chapter. The methodology and assumptions are described in detail in the appendices. However, there are alternative options to finance these needs. Some of these options are described in scenarios. The selected scenarios are described below. CAPEX may influence financing needs directly and indirectly. Naturally, CAPEX need to be financed. At the same time, some investments increase OPEX (for example the construction of a new wastewater treatment plant) while others decrease OPEX (for example refurbishment of pumping stations with new and energy efficient pumps). A common methodology has been utilized to assess how investments in new infrastructure influence operational expenditure (OPEX) and similarly, how refurbishment and replacements reduce OPEX. This is also described in the appendices.

It is essential to consider financing and expenditure needs jointly. Financing strategies provide the necessary link between the general programs on the one hand, and project pipelines and public budgets on the other. Failure to consider financing may result in the expenditure needs, even prioritized expenditure needs becoming a mere wish list. At the same time it is essential to consider the financing of both CAPEX and OPEX. Failure to do so may result in the construction of "white elephants", large and beautiful infrastructure that is not functioning because there is insufficient funding for its proper operation. There are many examples of such "white elephants" in Bulgaria and in other countries. The methodology in this chapter follows the strategic financial planning methodology for water supply and sanitation developed jointly by the OECD/EAP Task Force and the Government of Denmark[55]. The methodology was designed to help countries improve their financial planning for the water supply and sanitation sector and has been used by the OECD, by the World Bank and by the European Union in a number of countries.

A number of scenarios for financing have been considered. These include: 1) business as usual; 2) 100% utilization of EU grants and maximum tariff increases; 3) Scenario 2) plus government grants to ensure that all needed investments can be funded; 4) A combination of tariffs, EU grants, government grants and debt financing; 5) Similar to 4) but with reduced OPEX resulting from efficiency gains from consolidation and enhanced technical efficiency. Some sources of finance may only finance CAPEX (for example EU grants), while other sources may finance either CAPEX or OPEX for example tariff revenues. It has been assumed that those sources that may finance either CAPEX or OPEX first finance all OPEX requirements. Any surplus can then be used to co-finance investments. As a consequence of this methodological choice, financing gaps will manifest themselves as insufficient funding for capital investments.

Institutional complexities related to ownership, management of operation and maintenance and funding of both investments and operational expenditure are not the subjects of this chapter. Infrastructure is public and those infrastructure assets that are constructed thus will belong to the state and the municipalities and will be managed through the water supply and sanitation as-

[55] See http://www.oecd.org/environment/outreach/improvingfeasibleandextendingfinancingstrategymethodologybeyond watersupplyandsanitationtoissuesofwaterresourcesmanagement.html

sociation (WSSA). Contracts between the WSSA and the WSSC chosen as operator for the district will specify the terms on which the WSSC uses these public assets to provide WSS services and generate WSS revenues. These arrangements and the related tariff regulation practices by the SEWRC are complex and raise a number of issues in relation to how tariff revenues can contribute to financing of capital investments and how WSSCs can be compensated for operation and maintenance of public assets. These issues were discussed in Word Bank (2012a). The purpose of this chapter is not to focus on the institutional arrangements but rather on the challenges related to the magnitude, timing and composition of expenditure needs and their funding. Therefore, this chapter has been written as if WSSCs own and operate the infrastructure and no complexities exist, including but not limited to, no issues of state aid. In Chapter 4.1 some issues related to these complexities are raised again.

Investment needs and financing are calculated separately for each district (oblast). IT is assumed that there is one WSSC per district (WSSA). This again is a simplifying assumption that enables the report to focus on the challenges related to the magnitude, timing and composition of expenditure needs and their funding rather than on the challenges of individual companies.

In the business as usual scenario a large financing gap exists. The financing gap is larger in the early years both because the CAPEX needs are larger up to 2020, but also because tariff revenues grow as incomes grow, and incomes are assumed to grow in line with GDP growth. In other words, in the business as usual scenario it is not possible to finance all the investments included in the short term investment programs. As a result there will not be full compliance with national legislation and the pertinent EU directives, and penalties for non-compliance are to be expected. In many districts is also not possible to fully finance investments after 2020. Continued underfinancing of needed infrastructure renewal will also make it very difficult to achieve the long term levels of services required as per Bulgarian legislation and will eventually threaten the sustainability of WSS services. Due to the lack of real tariff increase 2,700 million BGN EU grant money are not utilized because the districts cannot finance the operation and maintenance of new assets to be created with these funds.

Even considering 100% utilization of EU grants and maximum tariff increases leaves a funding gap of around 2,000 million BGN for the short term investment program and a financing gap in 11 of 28 districts over the full 25 year period. It also means that it is likely to be not possible to comply with the requirements of the UWWTD by the end of 2020 if EU grants (and related co-financing) plus tariff based own sources are considered to be the only sources of capital expenditure for the period up to 2020. Thus this scenario also implies penalties for non-compliance and non-achievement of long term levels of service as required by Bulgarian legislation. Furthermore, increasing tariffs in many districts to the legal limit of 4% of average household incomes equivalence will imply that the poorest quintile will have to pay 10-15% of their household income for water. The social and equity consequences hereof will have to be addressed.

Adding Central Government grants in excess of 4,000 million BGN before the end of 2020 enables compliance and meeting the investment needs for wastewater and limited water cycle and water supply investments. Such central government financing is within the means of the Bulgarian public finances, but will require significant reconsideration of sector priorities for central government funding compared to the current priorities. It should be noted that Government grants will need to be targeted to specific regions with larger needs and less ability to self-finance. Furthermore, in this scenario the steep tariff increases have been retained (without those, the Government grant funding would have to be even higher than 4,000 million BGN). And the social and equity consequences hereof still have to be addressed, which will further increase Central Government outlays related to the WSS sector.

Alternatively, the Government of Bulgaria may consider a package of grants, debt financing and tariff increases. This is illustrated in scenario 4. Debt financing may reduce the need for Government grants to a sector and to districts which generates a considerable cash flow and is creditworthy. The most interesting results in scenario 4 are district specific. The scenario illustrates that even if debt financing is available some districts will not be able to afford to incur debt to finance water and wastewater infrastructure. These districts, e.g. Vidin, will not be able to generate sufficient revenues from EU grants and tariffs to cover annual OPEX and debt servicing even for long term (15 years) debt. The exact shares of funding from tariffs, loans and government grants depend on the specific assumptions made, but under most assumptions a very sizeable volume of government grants (in addition to the national co-financing related to EU grants) will be needed before the end of 2020 to secure compliance. Furthermore, this scenario will require specific changes to better create a policy environment in which WSSCs and/or municipalities can demonstrate credit worthiness and access the markets.

Another issue is the observed inefficiencies of the WSSCs. There are significant operational costs associated with service provision, which are far away from best international practice (staff/1000 connections, kWh/m3 produced or treated water, breaks/100 km of network and etc.) and lead to low utilization of tariff revenues to achieve the required levels of service. Furthermore, sector inefficiencies are a traditional stumbling block to achieve commercial financing and even public financing from finance ministries reluctant to finance sectors seen to be inefficient in their resource use. The scenario is an attempt to quantify the improved efficiency that could arise from improved governance, consolidation and improved technical performance in the WSS sector, and to assess how such improved efficiencies may contribute to reduce the funding challenges. The increased efficiencies are leading to increased debt financing and significant reductions of the required governmental grants.

4.2 Key assumptions

As mentioned in Chapter 3 the short term investment programs and master plans have been used where available. Similarly, for financing: Where EU grants have been committed already, this funding is allocated to those districts. For a future programming period these grants have been allocated proportionally to the population in the district and 100% utilization of available funds has been assumed. A detailed set of assumptions can be found in appendices.

Household water consumption has been assumed to increase to 125 litres per capita per day for districts where it is lower today. For (a few) districts where current consumption is higher, it has been kept constant.

All revenues, CAPEX and OPEX costs and etc. calculations in the model are without VAT. VAT is only used when calculating the final tariffs to consumers to properly calculate the affordability level (by applying the regulatory requirements). It is consistent with having VAT on revenues and transferring the VAT to the National Revenue Agency, having VAT on CAPEX and OPEX and recovering the VAT from the National Revenue Agency. The calculations in the model are VAT neutral. How VAT works in practice is crucially determined by several factors including:
1) Whether VAT continues to be an eligible expense under OPE in the next programming period;

2) Who will be the beneficiaries and if this is the municipalities if any arrangements are made for them to recover their VAT outlays from the National Revenue Agency. Some of the related issues are discussed in Chapter 4.1.

All calculations are in real terms. In other words it is assumed that there is no inflation or that all prices changes with the same percentage allowing us to ignore inflation. This also implies that income growth is in real (or inflation adjusted) terms and interest rates on debt are in real terms. Household incomes are assumed to grow in line with GDP which is assumed to grow a healthy 3.2% p.a. thus doubling the incomes over the planning period.

4.3 Results of the Analyses of Financing Options

As mentioned analyses have been carried out on a district by district basis and on a year by year basis. This section presents a national overview of the assumptions and results of each of the analysed scenarios. An appendix with district specific results for 28 districts (plus Sofia municipality) is available from the World Bank upon request.

4.3.1 Business as usual scenario

This scenario is developed using the following approach:

1. No tariff increase – under this scenario WSSAs/WSSCs, except of Sofia municipality, do not invest regularly in tangible WSS assets, hence, tariffs increased mainly due to inflation and corresponding increase in electricity costs. Since our analysis is in real terms no tariff increase is assumed;

2. Already committed EU grants are applied for the corresponding district. Utilization of EU grants is very limited – around 25%. Investments are only co-financed with EU money if their operation and maintenance can be performed with the existing tariffs (no real tariff increase because of new assets in operation, see above);

3. For Sofia municipality no loan is applied under this scenario (although debt financing is more likely to be considered as usual business for this company) in order to make the district consistent with the other districts for the needs of this analysis. There are also some other big WSSCs like Burgas, Plovdiv, Ruse and Stara Zagora which have loans from EBRD to finance part of their investment programs. However, those investments are sporadically and hence – they are not considered as usual business for those WSSC either;

4. Investment programs are prioritized due to the limited funding sources. First priority is given to investments in WWTPs and integrated water cycles, to follow:

   a) already committed for EU funds for integrated water cycle projects;

   b) the compliance requirements, based on the logic that about 35% of the population already connected to sewerage is not connected yet to wastewater treatment, which should be a priority, as investments for sewerage for those agglomerations are already done.

   A second priority was given to investments in water treatment facilities which are also compliance requirements.

However, considering that investments in WWTPs and water treatment facilities can be realized only "in package", a construction of such a plant can start only if there is enough cash to cover its overall completion. Thus, when no sufficient cash was available for covering corresponding WWTP and water treatment investments, those investments were either postponed, or not realized.

The results show that under this Scenario only Sofia municipality can cover its investment needs, but only after some postponement of investments in water supply and sewerage up to 2022. This is due to the fact that there have been significant investments in Sofia municipality WSS system for last 5+ years, which is not the case for all other WSSAs, where a huge CAPEX funding gap exists.

Figure 23: Investment needs and investments completed under Business as usual scenario (data WYG, 2013)

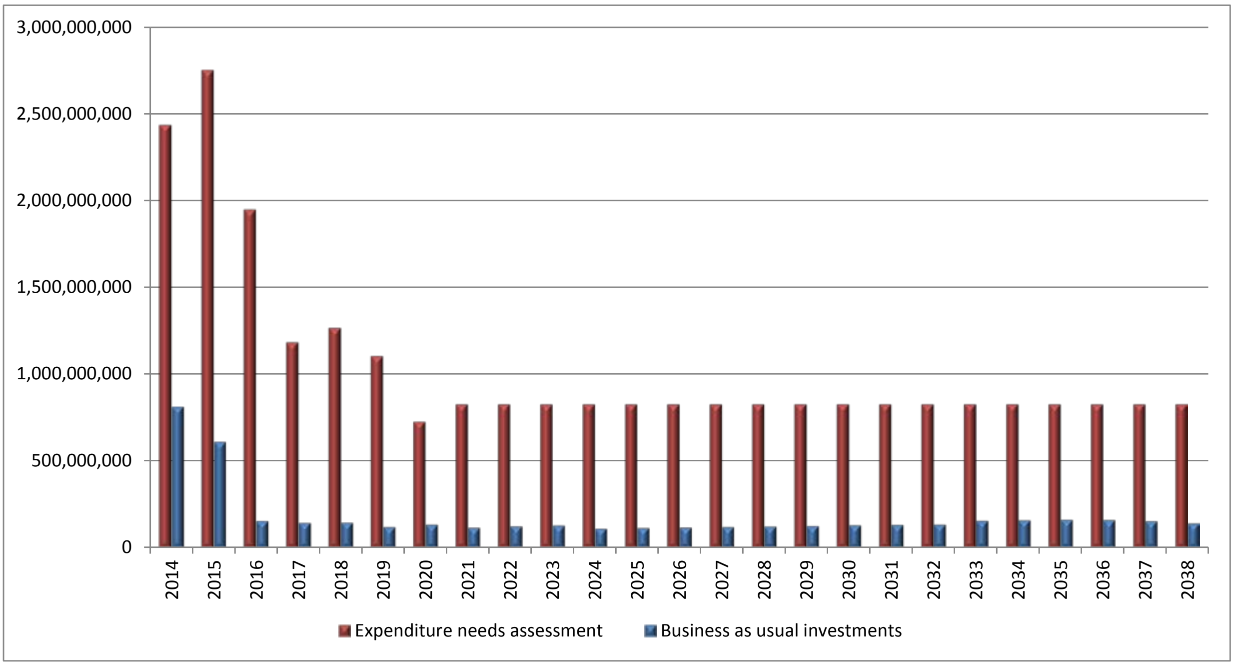


Table 11: Summary of the results under Business as usual scenario (data WYG,2013).

Business as usual									Funding sources, MBGN
Period	Investment needs	Investment financed	Investment cost of debt	EU co-financed projects		Government grant	WSSCs		Investment gap (postponement)
				Grant from EU funds	National contribution		Internal funds	Loans	
2014-2020	11,456.2	2,143.7	-	861.9	352.4	-	929.4	-	9,312.5
2021-2028	6,646.7	963.1	-	-	-	-	963.1	-	5,683.5
2029-2038	8,308.3	1,459.1	-	-	-	-	1,459.1	-	6,849.3
TOTAL, MBGN	**26,411.2**	**4,565.9**	**-**	**861.9**	**352.4**	**-**	**3,351.6**	**-**	**21,845.3**

					Key indicators
Key indicator, Unit	2011	2020	2028	2038	Target 2039
NRW, %	60.0%	58.1%	56.4%	54.2%	30.0%
population connected to WWC, % of water supplied population	66.0%	68.6%	69.8%	70.9%	75.3%
population connected to WWT, % of water supplied population	50.0%	58.0%	59.3%	62.3%	75.3%
compliance with UWWTD, year: -	last year of deferred investments:				**after 2038**
compliance with UWWTD, % of target	66.4%	77.0%	78.8%	82.8%	non compliance
water supply (savings) / additional costs, MBGN since 2014	NA	3.3	4.0	(0.6)	NA
wastewater collection (savings) / additional costs, MBGN since 2014	NA	0.1	0.2	0.2	NA
wastewater treatment (savings) / additional costs, MBGN since 2014	NA	18.8	19.5	21.5	NA

Table 12:Results achieved per district under Business as usual scenario (source WYG, 2013)

District	Water supply					Wastewater collection					Wastewater treatment					Compliance with UWWTD achieved by year:	Deferred investment (if any), last year:
	Investment, MBGN		NRW, %		Additional (Saving) costs, MBGN	Investment, MBGN		Population connected, %		Additional (Saving) costs, MBGN	Investment, MBGN		Population connected, %		Additional (Saving) costs, MBGN		
	Needs	% Financed	2011 base	2038 result		Needs	% Financed	2011 base	2038 result		Needs	% Financed	2011 base	2038 result			
Blagoevgrad	523.9	1.3%	49.7%	47.1%	(0.1)	342.5	2.5%	72.1%	72.1%	(0.0)	260.5	23.6%	4.6%	22.4%	1.6	-	after 2038
Burgas	961.5	11.6%	54.3%	49.7%	0.1	360.3	11.4%	68.8%	70.5%	0.1	377.2	63.8%	51.2%	68.3%	2.7	-	after 2038
Dobrich	778.6	1.5%	79.8%	79.2%	0.7	108.9	1.7%	54.3%	54.8%	0.0	218.9	58.3%	54.0%	54.8%	1.4	-	after 2038
Gabrovo	532.8	9.9%	61.9%	56.4%	(0.1)	122.8	11.5%	72.9%	74.1%	(0.0)	113.1	60.6%	52.3%	70.2%	0.7	-	after 2038
Haskovo	590.4	6.7%	49.1%	48.2%	0.2	97.2	5.6%	65.3%	66.0%	0.0	54.7	8.8%	9.6%	56.6%	0.2	-	after 2038
Kurdjali	332.5	4.5%	49.9%	46.6%	0.2	87.4	6.0%	39.9%	40.0%	0.0	39.7	75.0%	0.0%	40.0%	0.9	-	after 2038
Kyustendil	412.3	0.1%	64.6%	64.8%	(0.0)	158.9	0.1%	69.7%	69.7%	-	87.1	18.7%	53.4%	57.0%	0.2	-	after 2038
Lovech	441.8	7.7%	51.3%	48.1%	0.0	115.4	7.7%	38.2%	40.4%	(0.0)	84.0	81.3%	36.0%	40.4%	0.8	-	after 2038
Montana	367.4	9.7%	64.8%	62.9%	(0.1)	51.8	11.7%	51.0%	52.7%	(0.0)	81.8	100.0%	51.0%	52.7%	0.9	-	after 2038
Pazardjik	444.3	9.2%	58.4%	54.7%	0.2	362.3	5.5%	70.8%	71.1%	0.0	136.6	2.8%	33.0%	34.6%	0.1	-	after 2038
Pernik	299.5	2.7%	61.1%	60.9%	(0.3)	241.2	3.7%	51.9%	53.2%	-	128.3	0.7%	44.6%	44.6%	(0.0)	-	after 2038
Pleven	625.4	1.0%	52.6%	50.2%	(0.5)	307.7	0.0%	51.8%	51.8%	(0.0)	246.4	75.9%	41.4%	51.8%	2.0	-	after 2038
Plovdiv	819.3	9.1%	59.9%	54.6%	(0.8)	531.5	15.0%	66.0%	68.1%	0.0	194.3	8.8%	49.2%	51.9%	0.2	-	after 2038
Razgrad	550.4	1.0%	67.3%	67.5%	(0.2)	291.8	1.2%	30.3%	30.5%	0.0	69.6	28.0%	30.3%	30.5%	0.2	-	after 2038
Ruse	628.8	6.2%	42.2%	39.6%	(0.2)	486.8	9.3%	63.5%	64.9%	0.0	113.4	42.2%	0.0%	64.9%	0.8	-	after 2038
Shumen	604.9	2.5%	67.9%	63.5%	0.7	166.5	3.0%	60.4%	60.4%	0.0	241.3	50.7%	35.2%	50.7%	1.3	-	after 2038
Silistra	362.0	1.8%	54.2%	51.1%	0.1	186.5	2.7%	55.0%	55.3%	0.0	43.1	56.6%	0.0%	47.3%	0.7	-	after 2038
Sliven	512.0	3.9%	85.6%	83.7%	0.3	223.2	5.8%	57.6%	58.1%	0.0	95.7	0.0%	55.8%	55.8%	0.1	-	after 2038
Smolyan	369.5	2.4%	46.9%	44.2%	0.1	111.4	2.4%	64.5%	64.5%	0.0	55.3	7.4%	38.4%	41.0%	0.1	-	after 2038
Sofia District	757.8	2.4%	55.7%	52.8%	(0.3)	387.0	2.5%	66.7%	66.8%	(0.0)	189.2	63.6%	13.7%	53.3%	1.7	-	after 2038
Sofia municipality	879.6	100.0%	58.6%	31.1%	(0.5)	532.7	100.0%	87.4%	94.5%	0.0	52.7	100.0%	86.8%	94.5%	1.1	2023	2023
Stara Zagora	486.1	13.1%	53.9%	48.7%	(0.1)	465.3	16.2%	68.8%	69.1%	0.0	105.2	16.6%	35.3%	54.2%	0.2	-	after 2038
Targovishte	409.0	9.7%	62.1%	56.3%	0.2	51.6	8.4%	58.6%	58.9%	0.0	48.9	6.8%	0.0%	54.0%	0.2	-	after 2038
Varna	921.9	13.5%	66.8%	59.5%	(0.1)	492.8	16.6%	74.5%	76.4%	0.1	337.3	10.4%	66.8%	72.7%	0.5	-	after 2038
Veliko Tarnovo	758.9	24.0%	65.4%	55.3%	0.1	223.5	28.4%	61.6%	64.0%	0.0	39.8	76.5%	31.9%	64.0%	0.5	-	after 2038
Vidin	316.1	5.8%	50.6%	47.3%	(0.1)	80.8	8.2%	42.3%	44.2%	(0.0)	24.5	73.5%	0.0%	44.2%	0.5	-	after 2038
Vratsa	513.9	4.5%	64.1%	60.0%	(0.2)	244.3	4.8%	51.2%	52.1%	0.0	181.6	89.5%	29.5%	52.1%	1.7	-	after 2038
Yambol	478.1	2.2%	75.7%	75.0%	0.1	132.2	2.6%	76.4%	76.7%	0.0	74.9	25.4%	0.0%	30.2%	0.5	-	after 2038
TOTAL	**15,678.6**	**12.1%**	**61.0%**	**54.2%**	**(0.6)**	**6,964.2**	**15.3%**	**66.9%**	**70.9%**	**0.2**	**3,695.3**	**42.9%**	**43.8%**	**62.3%**	**21.5**	**-**	**after 2038**

4.3.2 Full utilization of EU grants, max increase in tariffs and postponing investments (if and when needed)

This scenario is developed using the following approach:

1. Tariffs increase: an increase of 25% annually for maximum 3 consecutive years, then an increase of 15% annually for maximum 3 consecutive years, then an increase by 10% annually for maximum 3 consecutive years, then an increase by 5% annually for maximum 3 consecutive years. This approach was systematically applied to all districts, but some steps were omitted in case the tariffs generate sufficient cash or reach the socially affordable limit. Since the average household monthly income increase with the real GDP increase the tariffs increase with the same rate 3.2% as well.

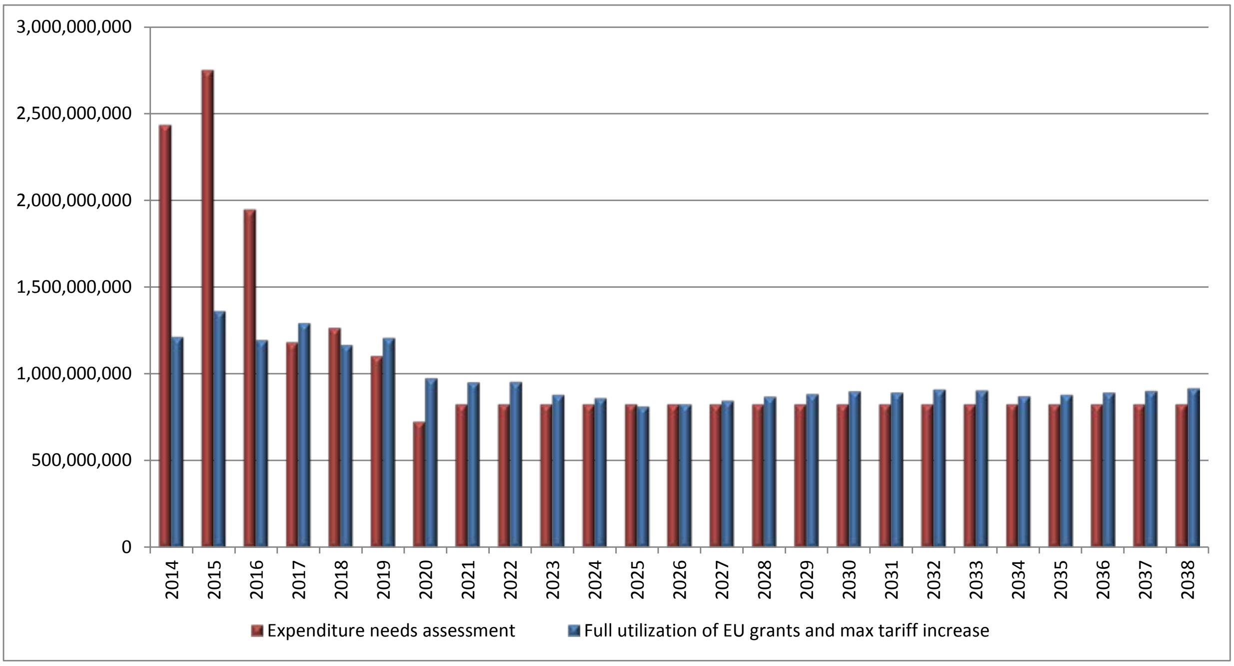
2. Already committed EU grants are applied for the corresponding district and the new EU grants are distributed based on the per capita approach to each district. The approach used in prioritizing investments for financing under postponement conditions is the same as under business as usual scenario plus it takes into consideration that the absorption of new EU funds (2014-2020) in the sector would not start before 2015 and will continue by the end of 2022. Total EU grants exceed 3,500 million BGN in this scenario reflecting that a large share of the 2007-2013 programming period grants are expected to be disbursed in 2014 and 2015. EU grants are complemented by national co-finance. The co-financing from the state budget and municipalities is assumed to be grant for the districts (for details on the calculation of EU gap funding see Appendices)

3. 100% absorption of EU funds is assumed for all districts.

The increased tariffs will in many districts reach the legal limit of 4% of average household income equivalence. This will imply that the poorest quintile will have to pay 10-15% of their household income for publicly supplied water. The social and equity consequences hereof will have to be addressed. Already today, some utilities experience that poorer households in rural areas disconnect from the public water supply and rely on water from private wells.

The results show that 92.5% of all investment needs will be covered under this scenario, 11 districts will not be able to achieve the coverage needed for compliance even by 2038; 9 districts will be compliant but after 2021. However, the average coverage of 92.5% disguises that funding for needs in the near years is much smaller (74% up to 2021). In other words, only 8 WSSAs/WSSCs (the biggest ones) will be in compliance by 2021, however of those, only Sofia municipality and Montana will implement their investment programs without any investments postponement. Hence, Bulgaria will neither be in compliance with UWWTD nor with the broader policies related to resource efficiency under this scenario as well.

Figure 24:Investment needs and investments completed under full utilization of EU grants and max increase in tariffs scenario (data WYG, 2013)



More capital expenditure implemented than expenditure needs assessment after 2016 just shows that some of the districts are trying to catch up with the deferred investments if the available funds allow. Around BGN 2 billion are not financed by 2039.

Table 13:Summary of the results under full utilization of EU grants and max increase in tariffs scenario (data WYG, 2013)

Full utilization of EU grants and max increase in tariffs scenario							Funding sources, MBGN		
Period	Investment needs	Investment financed	Investment cost of debt	EU co-financed projects		Government grant	WSSCs		Investment gap (postponement)
				Grant from EU funds	National contribution		Internal funds	Loans	
2014-2020	11,456.2	8,439.0	-	3,222.4	1,858.5	-	3,358.1	-	3,017.2
2021-2028	6,646.7	7,015.3	-	341.3	196.8	-	6,477.2	-	(368.7)
2029-2038	8,308.3	8,983.3	-	-	-	-	8,983.3	-	(675.0)
TOTAL, MBGN	**26,411.2**	**24,437.7**	**-**	**3,563.7**	**2,055.3**	**-**	**18,818.6**	**-**	**1,973.5**

Key indicators

Key indicator, Unit	2011	2020	2028	2038	Target 2039
NRW, %	60.0%	55.0%	45.2%	33.1%	30.0%
population connected to WWC, % of water supplied population	66.0%	73.5%	75.7%	76.6%	75.3%
population connected to WWT, % of water supplied population	50.0%	70.0%	75.7%	76.6%	75.3%
compliance with UWWTD, year: -	last year of deferred investments:				**after 2038**
compliance with UWWTD, % of target	66.4%	93.0%	100.5%	101.7%	compliance reached in 2028
water supply (savings) / additional costs, MBGN since 2014	NA	0.2	(9.5)	(19.1)	NA
wastewater collection (savings) / additional costs, MBGN since 2014	NA	0.6	0.7	0.6	NA
wastewater treatment (savings) / additional costs, MBGN since 2014	NA	39.9	48.9	51.1	NA

The 2011 figures on population connected to wastewater collection and treatment and compliance with UWWTD show the aggregated data for the population in the districts living in agglomerations above 2,000 p.e. at national level according to 2011 census. The percentages for 2020, 2028 and 2038 are showing data as per the projected population in the respective years (NSI recent forecast data). Since the expenditure needs assessment is done based on 2011 population due to the negative demographic trend in Bulgaria the compliance exceeds 100%. This has considerable implication of the projected compliance CAPEX and needs further addressing and optimization. The national contributions to EU grant financing is around 15% higher than currently reported by MOEW due to the following reasons: ineligible costs (for example land based on the latest information by the contracting authorities) and investment discounting as per the EU requirements.

Table 14: Results achieved per district under full utilization of EU grants and max increase in tariffs scenario (source WYG, 2013)

District	Water supply					Wastewater collection					Wastewater treatment					Compliance with UWWTD achieved by year:	Deferred investment (if any), last year:
	Investment, MBGN		NRW, %		Additional (Saving) costs, MBGN	Investment, MBGN		Population connected, %		Additional (Saving) costs, MBGN	Investment, MBGN		Population connected, %		Additional (Saving) costs, MBGN		
	Needs	% Financed	2011 base	2038 result		Needs	% Financed	2011 base	2038 result		Needs	% Financed	2011 base	2038 result			
Blagoevgrad	523.9	100.0%	49.7%	31.2%	0.7	342.5	100.0%	72.1%	72.6%	0.0	260.5	100.0%	4.6%	72.6%	6.5	2021	2020
Burgas	961.5	100.0%	54.3%	31.2%	0.1	360.3	100.0%	68.8%	78.1%	0.3	377.2	100.0%	51.2%	78.1%	4.6	2021	2020
Dobrich	778.6	68.0%	79.8%	48.0%	(4.0)	108.9	73.2%	54.3%	70.5%	0.0	218.9	100.0%	54.0%	70.5%	2.3	-	after 2038
Gabrovo	532.8	88.3%	61.9%	34.8%	(0.2)	122.8	90.5%	72.9%	80.9%	(0.0)	113.1	100.0%	52.3%	80.9%	1.2	-	after 2038
Haskovo	590.4	100.0%	49.1%	30.7%	(1.1)	97.2	100.0%	65.3%	72.0%	0.0	54.7	100.0%	9.6%	72.0%	1.3	2021	2019
Kurdjali	332.5	100.0%	49.9%	30.7%	0.0	87.4	100.0%	39.9%	42.1%	0.0	39.7	100.0%	0.0%	42.1%	1.0	2035	2034
Kyustendil	412.3	92.4%	64.6%	34.9%	0.0	158.9	93.4%	69.7%	71.0%	-	87.1	100.0%	53.4%	71.0%	1.0	-	after 2038
Lovech	441.8	100.0%	51.3%	31.2%	0.5	115.4	100.0%	38.2%	64.1%	0.0	84.0	100.0%	36.0%	64.1%	1.1	2021	2020
Montana	367.4	100.0%	64.8%	31.5%	(0.6)	51.8	100.0%	51.0%	62.7%	0.0	81.8	100.0%	51.0%	62.7%	0.9	2021	-
Pazardjik	444.3	100.0%	58.4%	31.5%	(0.2)	362.3	100.0%	70.8%	75.2%	0.0	136.6	100.0%	33.0%	75.2%	1.8	2032	2031
Pernik	299.5	100.0%	61.1%	31.1%	(0.5)	241.2	100.0%	51.9%	80.0%	(0.0)	128.3	100.0%	44.6%	80.0%	1.4	2025	2024
Pleven	625.4	100.0%	52.6%	30.7%	(1.2)	307.7	100.0%	51.8%	63.1%	0.0	246.4	100.0%	41.4%	63.1%	2.6	2026	2025
Plovdiv	819.3	100.0%	59.9%	31.3%	(2.8)	531.5	100.0%	66.0%	76.1%	0.0	194.3	100.0%	49.2%	76.1%	2.9	2021	2019
Razgrad	550.4	26.7%	67.3%	58.9%	(0.8)	291.8	46.3%	30.3%	39.0%	0.0	69.6	100.0%	30.3%	39.0%	0.7	-	after 2038
Ruse	628.8	100.0%	42.2%	30.7%	(0.4)	486.8	100.0%	63.5%	76.9%	0.0	113.4	100.0%	0.0%	76.9%	2.0	2034	2033
Shumen	604.9	78.4%	67.9%	40.4%	(1.2)	166.5	83.6%	60.4%	62.6%	0.0	241.3	100.0%	35.2%	62.6%	2.5	-	after 2038
Silistra	362.0	39.5%	54.2%	43.6%	(0.1)	186.5	63.6%	55.0%	60.4%	0.0	43.1	100.0%	0.0%	60.4%	0.9	-	after 2038
Sliven	512.0	100.0%	85.6%	31.9%	(1.0)	223.2	100.0%	57.6%	66.2%	0.0	95.7	100.0%	55.8%	66.2%	1.2	2035	2034
Smolyan	369.5	92.8%	46.9%	31.9%	0.3	111.4	96.5%	64.5%	64.5%	0.1	55.3	100.0%	38.4%	64.5%	0.8	-	after 2038
Sofia District	757.8	83.1%	55.7%	35.0%	(0.4)	387.0	90.8%	66.7%	69.9%	0.0	189.2	100.0%	13.7%	69.9%	2.7	-	after 2038
Sofia municipality	879.6	100.0%	58.6%	31.1%	(0.5)	532.7	100.0%	87.4%	94.5%	0.0	52.7	100.0%	86.8%	94.5%	1.1	2021	-
Stara Zagora	486.1	100.0%	53.9%	30.1%	(1.5)	465.3	100.0%	68.8%	70.2%	0.0	105.2	100.0%	35.3%	70.2%	1.3	2025	2024
Targovishte	409.0	58.8%	62.1%	43.3%	0.0	51.6	59.3%	58.6%	60.9%	0.0	48.9	100.0%	0.0%	60.9%	0.7	-	after 2038
Varna	921.9	100.0%	66.8%	31.2%	(2.1)	492.8	100.0%	74.5%	83.5%	0.1	337.3	100.0%	66.8%	83.5%	3.6	2025	2024
Veliko Tarnovo	758.9	100.0%	65.4%	31.2%	0.2	223.5	100.0%	61.6%	68.1%	0.0	39.8	100.0%	31.9%	68.1%	0.6	2021	2020
Vidin	316.1	59.5%	50.6%	38.0%	(0.1)	80.8	82.8%	42.3%	61.2%	0.0	24.5	100.0%	0.0%	61.2%	0.6	-	after 2038
Vratsa	513.9	100.0%	64.1%	31.3%	(1.3)	244.3	100.0%	51.2%	68.3%	0.0	181.6	100.0%	29.5%	68.3%	2.1	2030	2029
Yambol	478.1	92.6%	75.7%	35.5%	(1.0)	132.2	95.1%	76.4%	86.3%	0.0	74.9	100.0%	0.0%	86.3%	1.7	-	after 2038
TOTAL	**15,678.6**	**89.9%**	**61.0%**	**33.1%**	**(19.1)**	**6,964.2**	**94.5%**	**66.9%**	**76.6%**	**0.6**	**3,695.3**	**100.0%**	**43.8%**	**76.6%**	**51.1**	**-**	**after 2038**

Investing in your future

4.3.3 Full utilization of EU grants, max increase in tariffs and government grants (to implement all required investments)

This scenario is developed using the following approach:

1. Same approach for tariff increase. Due to the fact though that additional government grants (EU grants are co-financed) are used to finance the expenditure needs (especially during the period 2014 – 2020) there less need for subsequent tariff increases, which lead to BGN 2.7 billion less in tariff revenues up to 2038 compared to the previous scenario;
2. Same approach for EU Grant funds;
3. No postponement of investment needs. Government grants are used to fill in the funding gap for each district.

The results show that under this scenario Bulgaria will be in compliance by 2021, but this will cost additional BGN 4.7 billion to the state budget. Additional government grants are not needed only for Montana and Sofia municipality – both being able to complete the required investments under the previous scenario. It should be noted that these 4.7 billion are in addition to the 2.1 billion required as government (Central Government and Municipal) for co-funding of projects that receive EU funds. Thus the total Government contribution for the period 2014-2020 is 6.8 billion BGN

Investment costs are distributed quite unevenly among the three investigated sub-periods, with 43% of them corresponding to the first period (2014-2020) and 20% of all investment cost – only in 2014 and 2015. This is mainly because of compliance deadlines and EU funds commitments. EU grants would be available for the last time for water and wastewater infrastructure in Bulgaria in the next programming period (2014-2020), so they have to be used at maximum level. It should be noted that these grants are only 13% of all investment needs (together with national co-financing 21% in total). Affordability level is a big issue during the first investment period and it is not surprising, that, 85% of all government grants are concentrated only in 2014-2020. The remaining amounts of government grant are used to support those districts that are not capable to cover their investment needs after 2020 on their own: Razgrad, Silistra, Vidin, Shumen, Targovishte, etc.

Another issue applicable to this scenario is that in the period 2014-2020 the investments in WSS assets are on average BGN 1.6 billion per year. In 2014 and 2015 alone the amount that needs to be invested is BGN 7.6 billion. Even if the financing is not an issue (which is not the case), the availability of technical resources and capacity to construct so many WWTPS in parallel is highly questionable, having in mind the long-time consuming procurement, environment and construction permitting procedures and etc.

Figure 25: Investment needs and investments completed under full utilization of EU grants, max increase in tariffs and government grants scenario (data WYG, 2013)

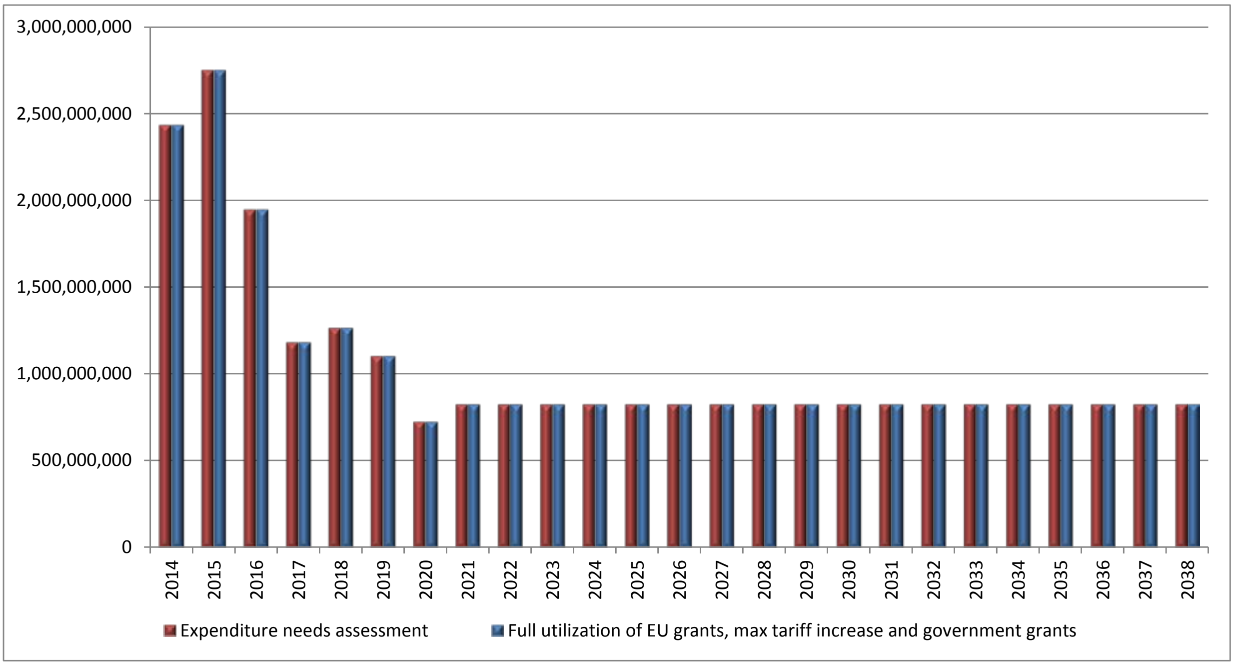


Table 15: Summary of the results under full utilization of EU grants, max increase in tariffs and government grants scenario (data WYG, 2013)

Full utilization of EU grants, max increase in tariffs and government grants							Funding sources, MBGN		
Period	Investment needs	Investment financed	Investment cost of debt	EU co-financed projects: Grant from EU funds	EU co-financed projects: National contribution	Government grant	WSSCs: Internal funds	WSSCs: Loans	Investment gap (postponement)
2014-2020	11,456.2	11,456.2	-	3,222.4	1,858.4	4,012.6	2,362.8	-	-
2021-2028	6,646.7	6,646.7	-	341.3	196.8	474.2	5,634.3	-	-
2029-2038	8,308.3	8,308.3	-	-	-	213.9	8,094.5	-	-
TOTAL, MBGN	**26,411.2**	**26,411.2**	**-**	**3,563.8**	**2,055.3**	**4,700.6**	**16,091.5**	**-**	**-**

Key indicators

Key indicator, Unit	2011	2020	2028	2038	Target 2039
NRW, %	60.0%	52.1%	42.2%	30.9%	30.0%
population connected to WWC, % of water supplied population	66.0%	75.5%	76.3%	76.8%	75.3%
population connected to WWT, % of water supplied population	50.0%	75.4%	76.3%	76.8%	75.3%
compliance with UWWTD, year: **2021**	last year of deferred investments:				-
compliance with UWWTD, % of target	66.4%	100.2%	101.3%	102.0%	compliance
water supply (savings) / additional costs, MBGN since 2014	NA	(6.1)	(14.2)	(21.3)	NA
wastewater collection (savings) / additional costs, MBGN since 2014	NA	0.7	0.8	0.7	NA
wastewater treatment (savings) / additional costs, MBGN since 2014	NA	47.2	49.4	51.4	NA

Table 16: Results achieved per district under full utilization of EU grants, max increase in tariffs and government grants scenario (source WYG, 2013)

District	Water supply					Wastewater collection					Wastewater treatment					Compliance with UWWTD achieved by year:	Deferred investment (if any), last year:
	Investment, MBGN		NRW, %		Additional (Saving) costs, MBGN	Investment, MBGN		Population connected, %		Additional (Saving) costs, MBGN	Investment, MBGN		Population connected, %		Additional (Saving) costs, MBGN		
	Needs	% Financed	2011 base	2038 result		Needs	% Financed	2011 base	2038 result		Needs	% Financed	2011 base	2038 result			
Blagoevgrad	523.9	100.0%	49.7%	31.1%	0.7	342.5	100.0%	72.1%	72.6%	0.0	260.5	100.0%	4.6%	72.6%	6.5	2021	-
Burgas	961.5	100.0%	54.3%	31.2%	0.1	360.3	100.0%	68.8%	78.1%	0.3	377.2	100.0%	51.2%	78.1%	4.6	2020	-
Dobrich	778.6	100.0%	79.8%	31.1%	(4.7)	108.9	100.0%	54.3%	71.6%	0.0	218.9	100.0%	54.0%	71.6%	2.4	2020	-
Gabrovo	532.8	100.0%	61.9%	30.8%	(0.2)	122.8	100.0%	72.9%	81.1%	(0.0)	113.1	100.0%	52.3%	81.1%	1.2	2017	-
Haskovo	590.4	100.0%	49.1%	30.7%	(1.1)	97.2	100.0%	65.3%	72.0%	0.0	54.7	100.0%	9.6%	72.0%	1.3	2020	-
Kurdjali	332.5	100.0%	49.9%	30.7%	0.0	87.4	100.0%	39.9%	42.1%	0.0	39.7	100.0%	0.0%	42.1%	1.0	2020	-
Kyustendil	412.3	100.0%	64.6%	31.2%	0.0	158.9	100.0%	69.7%	71.0%	-	87.1	100.0%	53.4%	71.0%	1.0	2021	-
Lovech	441.8	100.0%	51.3%	31.2%	0.5	115.4	100.0%	38.2%	64.1%	0.0	84.0	100.0%	36.0%	64.1%	1.1	2021	-
Montana	367.4	100.0%	64.8%	31.5%	(0.6)	51.8	100.0%	51.0%	62.7%	0.0	81.8	100.0%	51.0%	62.7%	0.9	2021	-
Pazardjik	444.3	100.0%	58.4%	30.9%	(0.2)	362.3	100.0%	70.8%	75.2%	0.0	136.6	100.0%	33.0%	75.2%	1.8	2020	-
Pernik	299.5	100.0%	61.1%	31.1%	(0.5)	241.2	100.0%	51.9%	80.0%	0.0	128.3	100.0%	44.6%	80.0%	1.4	2021	-
Pleven	625.4	100.0%	52.6%	30.6%	(1.2)	307.7	100.0%	51.8%	63.1%	0.0	246.4	100.0%	41.4%	63.1%	2.6	2021	-
Plovdiv	819.3	100.0%	59.9%	31.2%	(2.8)	531.5	100.0%	66.0%	76.1%	0.0	194.3	100.0%	49.2%	76.1%	2.9	2020	-
Razgrad	550.4	100.0%	67.3%	31.7%	(1.5)	291.8	100.0%	30.3%	48.6%	0.0	69.6	100.0%	30.3%	48.6%	0.8	2020	-
Ruse	628.8	100.0%	42.2%	30.4%	(0.4)	486.8	100.0%	63.5%	76.9%	0.0	113.4	100.0%	0.0%	76.9%	2.0	2020	-
Shumen	604.9	100.0%	67.9%	30.8%	(1.7)	166.5	100.0%	60.4%	63.0%	0.0	241.3	100.0%	35.2%	63.0%	2.5	2020	-
Silistra	362.0	100.0%	54.2%	30.1%	(0.4)	186.5	100.0%	55.0%	63.1%	0.0	43.1	100.0%	0.0%	63.1%	1.0	2020	-
Sliven	512.0	100.0%	85.6%	30.5%	(1.0)	223.2	100.0%	57.6%	66.2%	0.0	95.7	100.0%	55.8%	66.2%	1.2	2020	-
Smolyan	369.5	100.0%	46.9%	30.2%	0.3	111.4	100.0%	64.5%	64.5%	0.1	55.3	100.0%	38.4%	64.5%	0.8	2020	-
Sofia District	757.8	100.0%	55.7%	30.1%	(0.3)	387.0	100.0%	66.7%	70.0%	0.0	189.2	100.0%	13.7%	70.0%	2.7	2021	-
Sofia municipality	879.6	100.0%	58.6%	31.1%	(0.5)	532.7	100.0%	87.4%	94.5%	0.0	52.7	100.0%	86.8%	94.5%	1.1	2021	-
Stara Zagora	486.1	100.0%	53.9%	30.1%	(1.5)	465.3	100.0%	68.8%	70.2%	0.0	105.2	100.0%	35.3%	70.2%	1.3	2020	-
Targovishte	409.0	100.0%	62.1%	30.4%	(0.1)	51.6	100.0%	58.6%	61.4%	0.0	48.9	100.0%	0.0%	61.4%	0.8	2020	-
Varna	921.9	100.0%	66.8%	31.2%	(2.1)	492.8	100.0%	74.5%	83.5%	0.1	337.3	100.0%	66.8%	83.5%	3.6	2020	-
Veliko Tarnovo	758.9	100.0%	65.4%	31.2%	0.2	223.5	100.0%	61.6%	68.1%	0.0	39.8	100.0%	31.9%	68.1%	0.6	2020	-
Vidin	316.1	100.0%	50.6%	30.3%	(0.1)	80.8	100.0%	42.3%	63.2%	0.0	24.5	100.0%	0.0%	63.2%	0.7	2021	-
Vratsa	513.9	100.0%	64.1%	31.3%	(1.3)	244.3	100.0%	51.2%	68.3%	0.0	181.6	100.0%	29.5%	68.3%	2.1	2021	-
Yambol	478.1	100.0%	75.7%	30.4%	(1.0)	132.2	100.0%	76.4%	86.4%	0.0	74.9	100.0%	0.0%	`	1.7	2020	-
TOTAL	**15,678.6**	**100.0%**	**61.0%**	**30.9%**	**(21.3)**	**6,964.2**	**100.0%**	**66.9%**	**76.8%**	**0.7**	**3,695.3**	**100.0%**	**43.8%**	**76.8%**	**51.4**	**2021**	**-**

4.3.4 Full utilization of EU grants, max increase in tariffs, debt financing and government grants (to fill in the gap and implement all required investments)

This scenario is developed using the following approach:

1. Same approach for tariff increase;
2. Same approach for EU Grant funds;
3. Loans (max 5 x EBITDA) are used where possible and applicable. They reduce the burden on state budget (government grants). The loan amounts are not fully optimized and one can think that the team is a bit conservative about the leverage (for additional information see appendices);
4. No postponement of investment needs. Government grants are used to fill in the funding gap for each district after the loan financing.

Results show, that Vidin, Silistra and Razgrad districts cannot borrow as their tariffs stay at the maximum socially affordable level during the whole period. A number of other districts can borrow, but their borrowing ability is limited by the affordability level of their population. Tariff revenues will first have to cover operational expenditure (excl. debt service) and only then can the residual cashflow be directed to debt service.

84% of the loans are concentrated in the period 2014-2020, because of the investment profile. Remaining 16% of loans are disbursed in the next sub-periods to reduce government grants, where applicable for the corresponding districts. It is clear that if the investment needs were not so heavily front-loaded if would be possible to cover a larger share of the investment needs with loans.

Loan contributions are only 3.7% of the total CAPEX, while the cost of debt comprises 2.7 % of the total CAPEX.

WSSCs that can borrow are usually considered suitable for private sector participation. Experienced private operators can not only bring additional capital (increase access to finance (debt) and equity), but also know-how and practices to achieve further efficiencies, which can compensate for their higher cost of equity compared to public companies. From the analysis at district level one might suggest that there are districts that are more suitable for private sector participation while if this is to happen the state can focus on districts with significant investment needs, social affordability and etc. issues.

There are various forms of public-private partnerships in the water sector: Management Contract, Lease Contract, Concession Contract as well as different hybrid models. It seems that the Water Act limits PSP options to a concession procedure for the selection of a new WSS operator for the provision of water supply and sanitation services on the designated territories. As per the current legislation PSP can only happen if the following conditions are met:

- Designation of WSS assets as public state and public municipal property,
- Removal of these public assets from the balance sheet of WSSCs;
- Provision of the WSS assets to the WSSA for management;
- Announcement of tender for the selection of new WSS operator following the Concession Act by the WSSA.

At this level of analysis we can only recommend that debt and private capital financing should be assessed on case by case bases depending on district specifics characteristics to determine the best approach for the provision of WSS services.

To sum up, under this Scenario the country would be able to meet the compliance requirements by the end of 2020, and the financial burden on the state budget will be reduced by 16%.

Figure 26: Investment needs and investments completed under full utilization of EU grants, max increase in tariffs, debt financing and government grants scenario (data WYG, 2013)

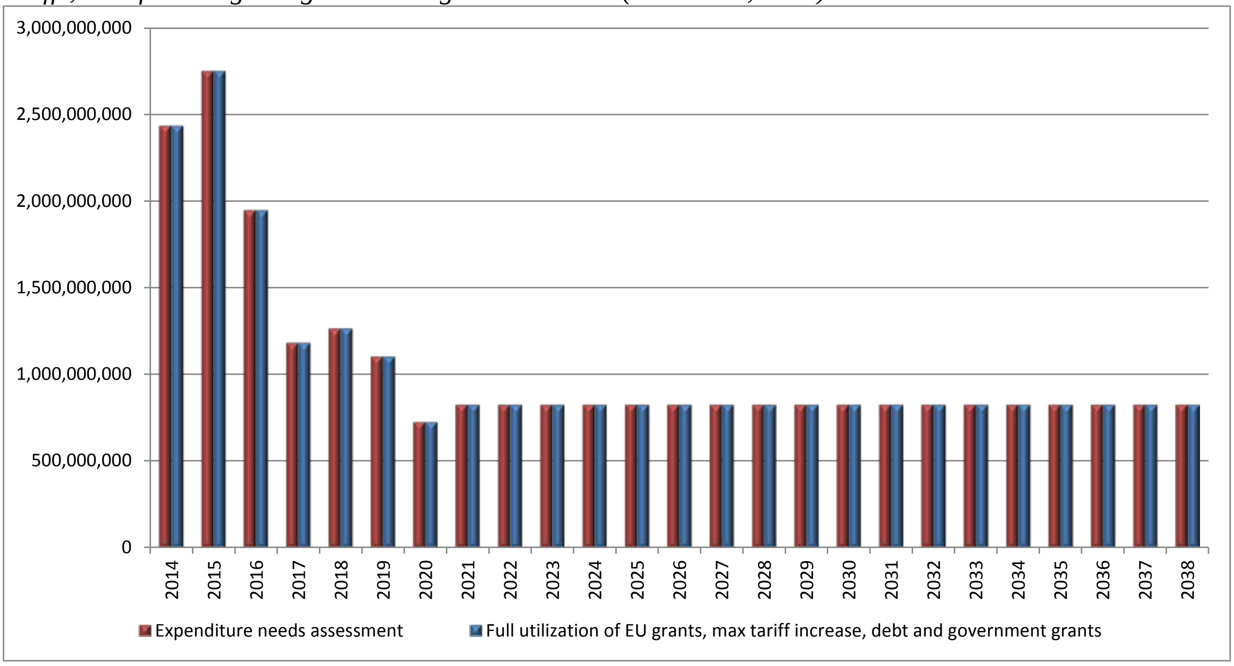


Table 17: Summary of the results under full utilization of EU grants, max increase in tariffs, debt financing and government grants scenario (data WYG, 2013)

Full utilization of EU grants, max increase in tariffs, debt and government grants									Funding sources, MBGN
Period	Investment needs	Investment financed	Investment cost of debt	EU co-financed projects		Government grant	WSSCs		Investment gap (postponement)
				Grant from EU funds	National contribution		Internal funds	Loans	
2014-2020	11,456.2	11,456.2	245.7	3,222.4	1,858.4	3,316.1	2,206.7	852.5	-
2021-2028	6,646.7	6,646.7	303.1	341.3	196.8	456.0	5,522.6	129.9	-
2029-2038	8,308.3	8,308.3	192.0	-	-	188.1	8,087.9	32.3	-
TOTAL, MBGN	**26,411.2**	**26,411.2**	**740.8**	**3,563.8**	**2,055.3**	**3,960.2**	**15,817.3**	**1,014.7**	**-**

Key indicators

Key indicator, Unit	2011	2020	2028	2038	Target 2039
NRW, %	60.0%	52.1%	42.2%	30.9%	30.0%
population connected to WWC, % of water supplied population	66.0%	75.5%	76.3%	76.8%	75.3%
population connected to WWT, % of water supplied population	50.0%	75.4%	76.3%	76.8%	75.3%
compliance with UWWTD, year: **2021**	last year of deferred investments:				-
compliance with UWWTD, % of target	66.4%	100.2%	101.3%	102.0%	compliant
water supply (savings) / additional costs, MBGN since 2014	NA	(6.1)	(14.2)	(21.3)	NA
wastewater collection (savings) / additional costs, MBGN since 2014	NA	0.7	0.8	0.7	NA
wastewater treatment (savings) / additional costs, MBGN since 2014	NA	47.2	49.4	51.4	NA

Table 18: Results achieved per district under full utilization of EU grants, max increase in tariffs, debt financing and government grants scenario (source WYG, 2013)

District	Water supply					Wastewater collection					Wastewater treatment					Compliance with UWWTD achieved by year:	Deferred investment (if any), last year:
	Investment, MBGN		NRW, %		Additional (Saving) costs, MBGN	Investment, MBGN		Population connected, %		Additional (Saving) costs, MBGN	Investment, MBGN		Population connected, %		Additional (Saving) costs, MBGN		
	Needs	% Financed	2011 base	2038 result		Needs	% Financed	2011 base	2038 result		Needs	% Financed	2011 base	2038 result			
Blagoevgrad	523.9	100.0%	49.7%	31.1%	0.7	342.5	100.0%	72.1%	72.6%	0.0	260.5	100.0%	4.6%	72.6%	6.5	2021	-
Burgas	961.5	100.0%	54.3%	31.2%	0.1	360.3	100.0%	68.8%	78.1%	0.3	377.2	100.0%	51.2%	78.1%	4.6	2020	-
Dobrich	778.6	100.0%	79.8%	31.1%	(4.7)	108.9	100.0%	54.3%	71.6%	0.0	218.9	100.0%	54.0%	71.6%	2.4	2020	-
Gabrovo	532.8	100.0%	61.9%	30.8%	(0.2)	122.8	100.0%	72.9%	81.1%	(0.0)	113.1	100.0%	52.3%	81.1%	1.2	2017	-
Haskovo	590.4	100.0%	49.1%	30.7%	(1.1)	97.2	100.0%	65.3%	72.0%	0.0	54.7	100.0%	9.6%	72.0%	1.3	2020	-
Kurdjali	332.5	100.0%	49.9%	30.7%	0.0	87.4	100.0%	39.9%	42.1%	0.0	39.7	100.0%	0.0%	42.1%	1.0	2020	-
Kyustendil	412.3	100.0%	64.6%	31.2%	0.0	158.9	100.0%	69.7%	71.0%	-	87.1	100.0%	53.4%	71.0%	1.0	2021	-
Lovech	441.8	100.0%	51.3%	31.2%	0.5	115.4	100.0%	38.2%	64.1%	0.0	84.0	100.0%	36.0%	64.1%	1.1	2021	-
Montana	367.4	100.0%	64.8%	31.5%	(0.6)	51.8	100.0%	51.0%	62.7%	0.0	81.8	100.0%	51.0%	62.7%	0.9	2021	-
Pazardjik	444.3	100.0%	58.4%	30.9%	(0.2)	362.3	100.0%	70.8%	75.2%	0.0	136.6	100.0%	33.0%	75.2%	1.8	2020	-
Pernik	299.5	100.0%	61.1%	31.1%	(0.5)	241.2	100.0%	51.9%	80.0%	0.0	128.3	100.0%	44.6%	80.0%	1.4	2021	-
Pleven	625.4	100.0%	52.6%	30.6%	(1.2)	307.7	100.0%	51.8%	63.1%	0.0	246.4	100.0%	41.4%	63.1%	2.6	2021	-
Plovdiv	819.3	100.0%	59.9%	31.2%	(2.8)	531.5	100.0%	66.0%	76.1%	0.0	194.3	100.0%	49.2%	76.1%	2.9	2020	-
Razgrad	550.4	100.0%	67.3%	31.7%	(1.5)	291.8	100.0%	30.3%	48.6%	0.0	69.6	100.0%	30.3%	48.6%	0.8	2020	-
Ruse	628.8	100.0%	42.2%	30.4%	(0.4)	486.8	100.0%	63.5%	76.9%	0.0	113.4	100.0%	0.0%	76.9%	2.0	2020	-
Shumen	604.9	100.0%	67.9%	30.8%	(1.7)	166.5	100.0%	60.4%	63.0%	0.0	241.3	100.0%	35.2%	63.0%	2.5	2020	-
Silistra	362.0	100.0%	54.2%	30.1%	(0.4)	186.5	100.0%	55.0%	63.1%	0.0	43.1	100.0%	0.0%	63.1%	1.0	2020	-
Sliven	512.0	100.0%	85.6%	30.5%	(1.0)	223.2	100.0%	57.6%	66.2%	0.0	95.7	100.0%	55.8%	66.2%	1.2	2020	-
Smolyan	369.5	100.0%	46.9%	30.2%	0.3	111.4	100.0%	64.5%	64.5%	0.1	55.3	100.0%	38.4%	64.5%	0.8	2020	-
Sofia District	757.8	100.0%	55.7%	30.1%	(0.3)	387.0	100.0%	66.7%	70.0%	0.0	189.2	100.0%	13.7%	70.0%	2.7	2021	-
Sofia municipality	879.6	100.0%	58.6%	31.1%	(0.5)	532.7	100.0%	87.4%	94.5%	0.0	52.7	100.0%	86.8%	94.5%	1.1	2021	-
Stara Zagora	486.1	100.0%	53.9%	30.1%	(1.5)	465.3	100.0%	68.8%	70.2%	0.0	105.2	100.0%	35.3%	70.2%	1.3	2020	-
Targovishte	409.0	100.0%	62.1%	30.4%	(0.1)	51.6	100.0%	58.6%	61.4%	0.0	48.9	100.0%	0.0%	61.4%	0.8	2020	-
Varna	921.9	100.0%	66.8%	31.2%	(2.1)	492.8	100.0%	74.5%	83.5%	0.1	337.3	100.0%	66.8%	83.5%	3.6	2020	-
Veliko Tarnovo	758.9	100.0%	65.4%	31.2%	0.2	223.5	100.0%	61.6%	68.1%	0.0	39.8	100.0%	31.9%	68.1%	0.6	2020	-
Vidin	316.1	100.0%	50.6%	30.3%	(0.1)	80.8	100.0%	42.3%	63.2%	0.0	24.5	100.0%	0.0%	63.2%	0.7	2021	-
Vratsa	513.9	100.0%	64.1%	31.3%	(1.3)	244.3	100.0%	51.2%	68.3%	0.0	181.6	100.0%	29.5%	68.3%	2.1	2021	-
Yambol	478.1	100.0%	75.7%	30.4%	(1.0)	132.2	100.0%	76.4%	86.4%	0.0	74.9	100.0%	0.0%	86.4%	1.7	2020	-
TOTAL	**15,678.6**	**100.0%**	**61.0%**	**30.9%**	**(21.3)**	**6,964.2**	**100.0%**	**66.9%**	**76.8%**	**0.7**	**3,695.3**	**100.0%**	**43.8%**	**76.8%**	**51.4**	**2021**	**-**

4.3.5 Full utilization of EU grants, max increase in tariffs, efficiency gains, debt financing and government grants

This scenario is developed using the following approach:

1. Same approach for tariff increase;
2. Same approach for EU Grant funds;
3. Efficiency gains:
   a. Efficiency gains from staff reduction (from current level of 8 to 2.5 persons per 1,000 connections) as follows:

2014	2015	2016-2038
20% efficiency gain	Maximum 20% efficiency gain	3% annually until reaching 2.5/1000 connections

   b. Efficiency gains from other costs, namely transport costs and other material costs are applied until “other costs” reach 20% of OPEX – then kept constant. For those WSSCs where other costs currently are lower than 20% the actual percentage is kept constant for the whole period.
   c. Efficiency gains are not applied for Sofia municipality, as it is assumed that this WSSC has insignificant efficiency gains to realize.
4. Loans (max 5 x EBITDA) are used where possible and applicable. They reduce the burden on state budget (government grants). The loan amounts are not fully optimized and one can think that the team is a bit conservative about the leverage (for additional information see Appendices);
5. No postponement of investment needs. Government grants are used to fill in the funding gap for each district after the loan financing.

Results show that Razgrad district cannot borrow as its tariffs stay at the maximum socially affordable level during the whole period, while Vidin and Silistra – due to efficiency gains – are capable to utilize loans.

89% of the loans are concentrated in the period 2014-2020, because of the investment profile. Remaining 11% of loans are disbursed in the next sub-periods to reduce government grants, where applicable for the corresponding districts. Loan contribution is 4.1%, while cost of debt comprises 3.0% of the total investment costs.

To sum up, under this Scenario the country would be able to meet compliance requirements by the end of 2020, and the financial burden for the state budget will be reduced by 29%. This is mainly due to efficiency gains realized in combination with increased creditworthiness of the WSSC.

Figure 27: Investment needs and investments completed under full utilization of EU grants, max increase in tariffs, efficiency gains, debt financing and government grants scenario (data WYG, 2013)

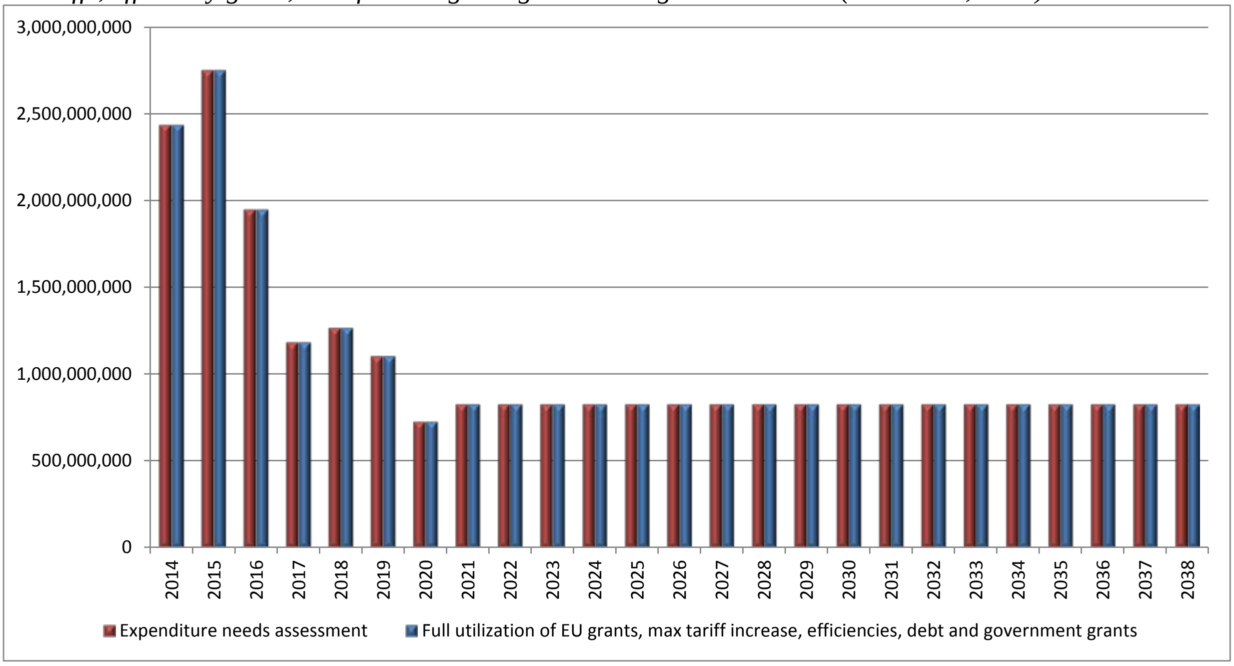


Table 19: Summary of the results under full utilization of EU grants, max increase in tariffs, efficiency gains, debt financing and government grants scenario (data WYG, 2013)

Full utilization of EU grants, max tariffs, efficienciy gains, debt and govern. grants **Funding sources, MBGN**

Period	Investment needs	Investment financed	Investment cost of debt	EU co-financed projects		Government grant	WSSCs		Investment gap (postponement)
				Grant from EU funds	National contribution		Internal funds	Loans	
2014-2020	11,456.2	11,456.2	290.3	3,222.4	1,858.4	2,923.4	2,452.3	999.7	-
2021-2028	6,646.7	6,646.7	336.0	341.3	196.8	319.5	5,714.0	75.0	-
2029-2038	8,308.3	8,308.3	199.4	-	-	84.0	8,176.4	47.9	-
TOTAL, MBGN	**26,411.2**	**26,411.2**	**825.7**	**3,563.8**	**2,055.3**	**3,326.9**	**16,342.7**	**1,122.6**	**-**

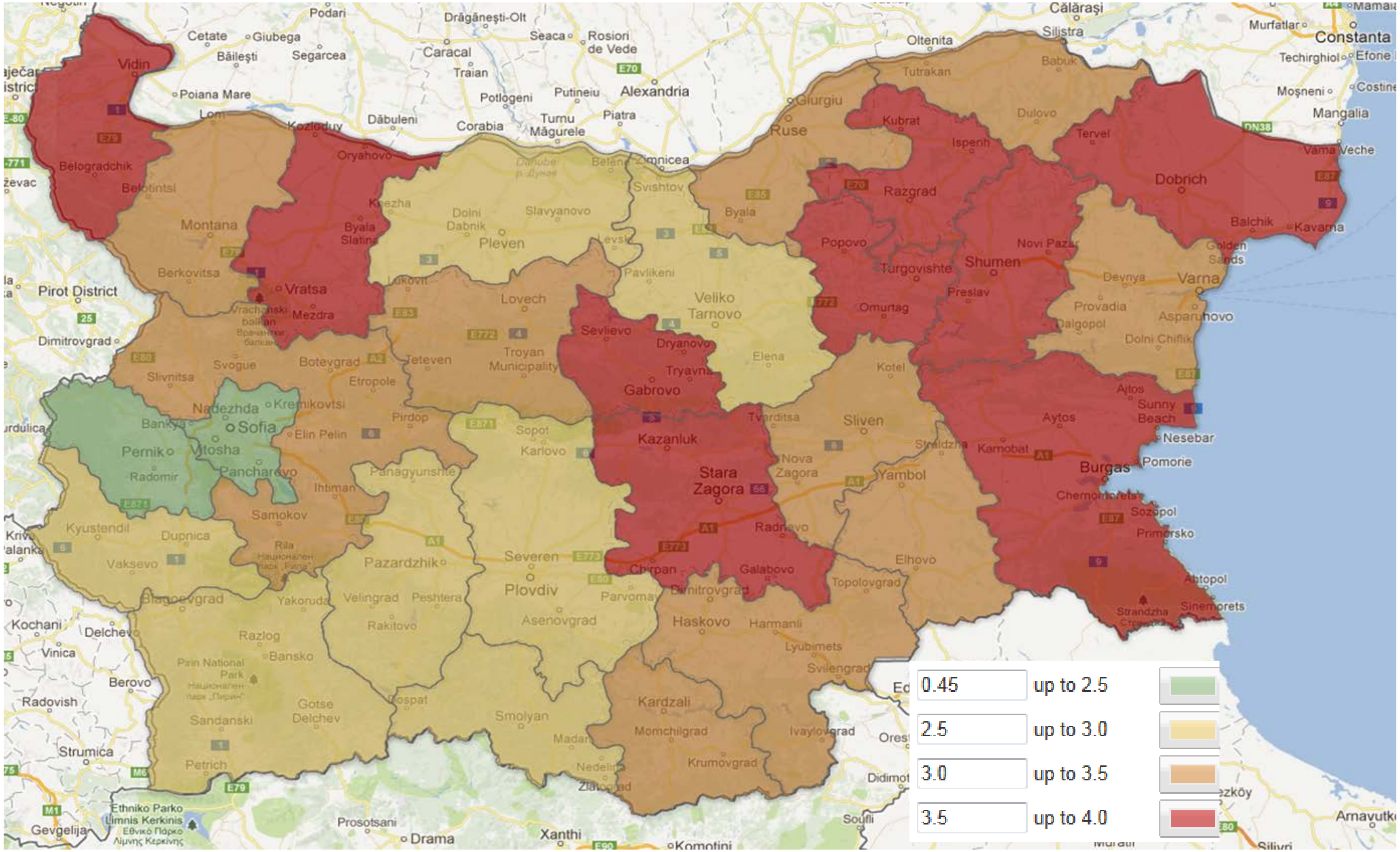
Key indicators

Key indicator, Unit	2011	2020	2028	2038	Target 2039
NRW, %	60.0%	52.1%	42.2%	30.9%	30.0%
population connected to WWC, % of water supplied population	66.0%	75.5%	76.3%	76.8%	75.3%
population connected to WWT, % of water supplied population	50.0%	75.4%	76.3%	76.8%	75.3%
compliance with UWWTD, year: **2021**	last year of deferred investments:				**-**
compliance with UWWTD, % of target	66.4%	100.2%	101.3%	102.0%	compliant
water supply (savings) / additional costs, MBGN since 2014	NA	(6.059)	(14.165)	(21.286)	NA
wastewater collection (savings) / additional costs, MBGN since 2014	NA	0.717	0.763	0.657	NA
wastewater treatment (savings) / additional costs, MBGN since 2014	NA	47.154	49.353	51.387	NA
additional efficiency gains					
(savings) from personnel costs, MBGN since 2013	NA	(68.5)	(86.9)	(104.5)	NA
(savings) from other costs, MBGN since 2013	NA	(17.4)	(22.1)	(26.3)	NA

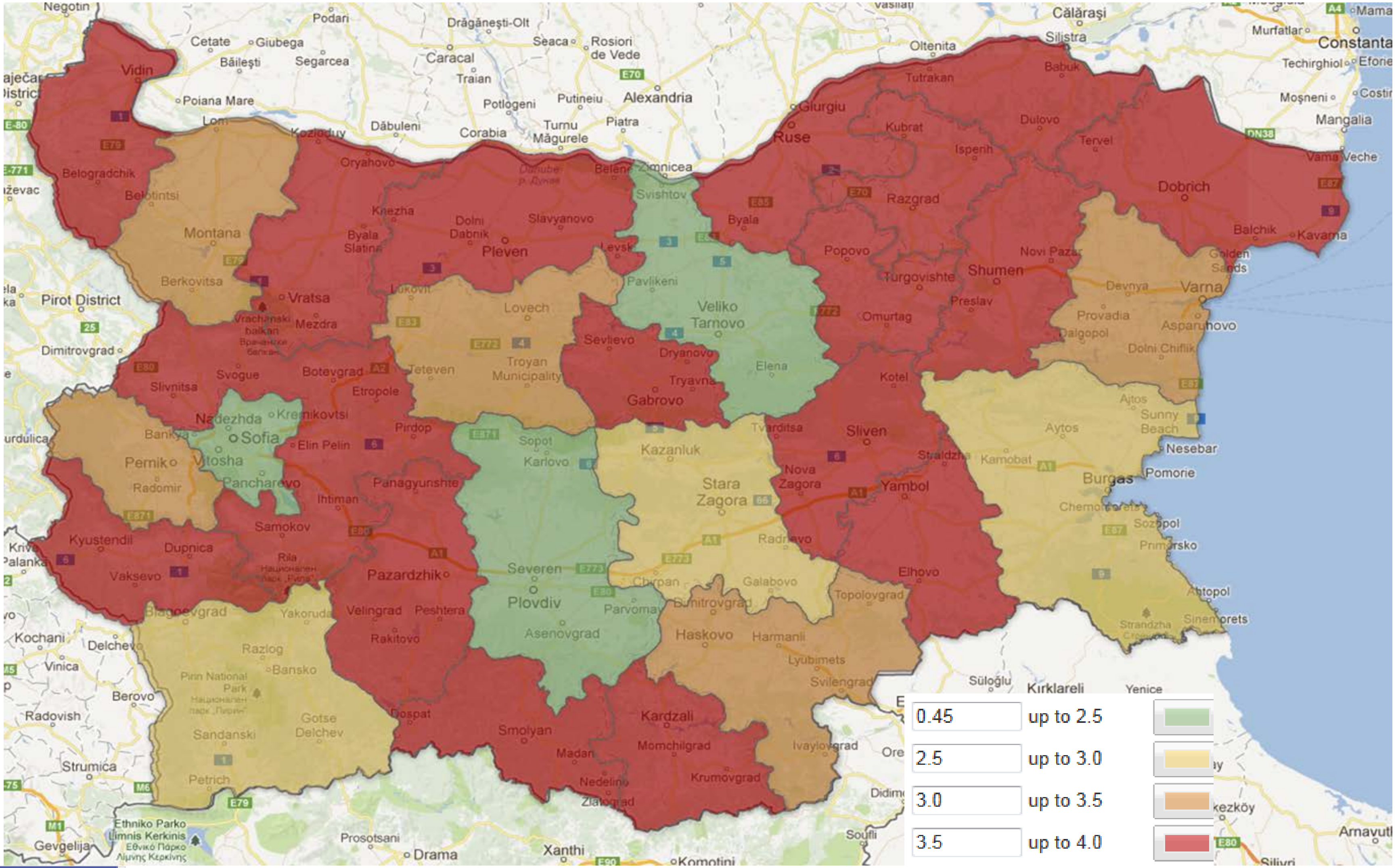
Table 20: Results achieved per district under full utilization of EU grants, max increase in tariffs, debt financing and government grants scenario (source WYG, 2013)

District	Water supply					Wastewater collection					Wastewater treatment					Compliance with UWWTD achieved by year:	Deferred investment (if any), last year:
	Investment, MBGN		NRW, %		Additional (Saving) costs, MBGN	Investment, MBGN		Population connected, %		Additional (Saving) costs, MBGN	Investment, MBGN		Population connected, %		Additional (Saving) costs, MBGN		
	Needs	% Financed	2011 base	2038 result		Needs	% Financed	2011 base	2038 result		Needs	% Financed	2011 base	2038 result			
Blagoevgrad	523.9	100.0%	49.7%	31.1%	0.7	342.5	100.0%	72.1%	72.6%	0.0	260.5	100.0%	4.6%	72.6%	6.5	2021	-
Burgas	961.5	100.0%	54.3%	31.2%	0.1	360.3	100.0%	68.8%	78.1%	0.3	377.2	100.0%	51.2%	78.1%	4.6	2020	-
Dobrich	778.6	100.0%	79.8%	31.1%	(4.7)	108.9	100.0%	54.3%	71.6%	0.0	218.9	100.0%	54.0%	71.6%	2.4	2020	-
Gabrovo	532.8	100.0%	61.9%	30.8%	(0.2)	122.8	100.0%	72.9%	81.1%	(0.0)	113.1	100.0%	52.3%	81.1%	1.2	2017	-
Haskovo	590.4	100.0%	49.1%	30.7%	(1.1)	97.2	100.0%	65.3%	72.0%	0.0	54.7	100.0%	9.6%	72.0%	1.3	2020	-
Kurdjali	332.5	100.0%	49.9%	30.7%	0.0	87.4	100.0%	39.9%	42.1%	0.0	39.7	100.0%	0.0%	42.1%	1.0	2020	-
Kyustendil	412.3	100.0%	64.6%	31.2%	0.0	158.9	100.0%	69.7%	71.0%	-	87.1	100.0%	53.4%	71.0%	1.0	2021	-
Lovech	441.8	100.0%	51.3%	31.2%	0.5	115.4	100.0%	38.2%	64.1%	0.0	84.0	100.0%	36.0%	64.1%	1.1	2021	-
Montana	367.4	100.0%	64.8%	31.5%	(0.6)	51.8	100.0%	51.0%	62.7%	0.0	81.8	100.0%	51.0%	62.7%	0.9	2021	-
Pazardjik	444.3	100.0%	58.4%	30.9%	(0.2)	362.3	100.0%	70.8%	75.2%	0.0	136.6	100.0%	33.0%	75.2%	1.8	2020	-
Pernik	299.5	100.0%	61.1%	31.1%	(0.5)	241.2	100.0%	51.9%	80.0%	0.0	128.3	100.0%	44.6%	80.0%	1.4	2021	-
Pleven	625.4	100.0%	52.6%	30.6%	(1.2)	307.7	100.0%	51.8%	63.1%	0.0	246.4	100.0%	41.4%	63.1%	2.6	2021	-
Plovdiv	819.3	100.0%	59.9%	31.2%	(2.8)	531.5	100.0%	66.0%	76.1%	0.0	194.3	100.0%	49.2%	76.1%	2.9	2020	-
Razgrad	550.4	100.0%	67.3%	31.7%	(1.5)	291.8	100.0%	30.3%	48.6%	0.0	69.6	100.0%	30.3%	48.6%	0.8	2020	-
Ruse	628.8	100.0%	42.2%	30.4%	(0.4)	486.8	100.0%	63.5%	76.9%	0.0	113.4	100.0%	0.0%	76.9%	2.0	2020	-
Shumen	604.9	100.0%	67.9%	30.8%	(1.7)	166.5	100.0%	60.4%	63.0%	0.0	241.3	100.0%	35.2%	63.0%	2.5	2020	-
Silistra	362.0	100.0%	54.2%	30.1%	(0.4)	186.5	100.0%	55.0%	63.1%	0.0	43.1	100.0%	0.0%	63.1%	1.0	2020	-
Sliven	512.0	100.0%	85.6%	30.5%	(1.0)	223.2	100.0%	57.6%	66.2%	0.0	95.7	100.0%	55.8%	66.2%	1.2	2020	-
Smolyan	369.5	100.0%	46.9%	30.2%	0.3	111.4	100.0%	64.5%	64.5%	0.1	55.3	100.0%	38.4%	64.5%	0.8	2020	-
Sofia District	757.8	100.0%	55.7%	30.1%	(0.3)	387.0	100.0%	66.7%	70.0%	0.0	189.2	100.0%	13.7%	70.0%	2.7	2021	-
Sofia municipality	879.6	100.0%	58.6%	31.1%	(0.5)	532.7	100.0%	87.4%	94.5%	0.0	52.7	100.0%	86.8%	94.5%	1.1	2021	-
Stara Zagora	486.1	100.0%	53.9%	30.1%	(1.5)	465.3	100.0%	68.8%	70.2%	0.0	105.2	100.0%	35.3%	70.2%	1.3	2020	-
Targovishte	409.0	100.0%	62.1%	30.4%	(0.1)	51.6	100.0%	58.6%	61.4%	0.0	48.9	100.0%	0.0%	61.4%	0.8	2020	-
Varna	921.9	100.0%	66.8%	31.2%	(2.1)	492.8	100.0%	74.5%	83.5%	0.1	337.3	100.0%	66.8%	83.5%	3.6	2020	-
Veliko Tarnovo	758.9	100.0%	65.4%	31.2%	0.2	223.5	100.0%	61.6%	68.1%	0.0	39.8	100.0%	31.9%	68.1%	0.6	2020	-
Vidin	316.1	100.0%	50.6%	30.3%	(0.1)	80.8	100.0%	42.3%	63.2%	0.0	24.5	100.0%	0.0%	63.2%	0.7	2021	-
Vratsa	513.9	100.0%	64.1%	31.3%	(1.3)	244.3	100.0%	51.2%	68.3%	0.0	181.6	100.0%	29.5%	68.3%	2.1	2021	-
Yambol	478.1	100.0%	75.7%	30.4%	(1.0)	132.2	100.0%	76.4%	86.4%	0.0	74.9	100.0%	0.0%	86.4%	1.7	2020	-
TOTAL	**15,678.6**	**100.0%**	**61.0%**	**30.9%**	**(21.3)**	**6,964.2**	**100.0%**	**66.9%**	**76.8%**	**0.7**	**3,695.3**	**100.0%**	**43.8%**	**76.8%**	**51.4**	**2021**	**-**

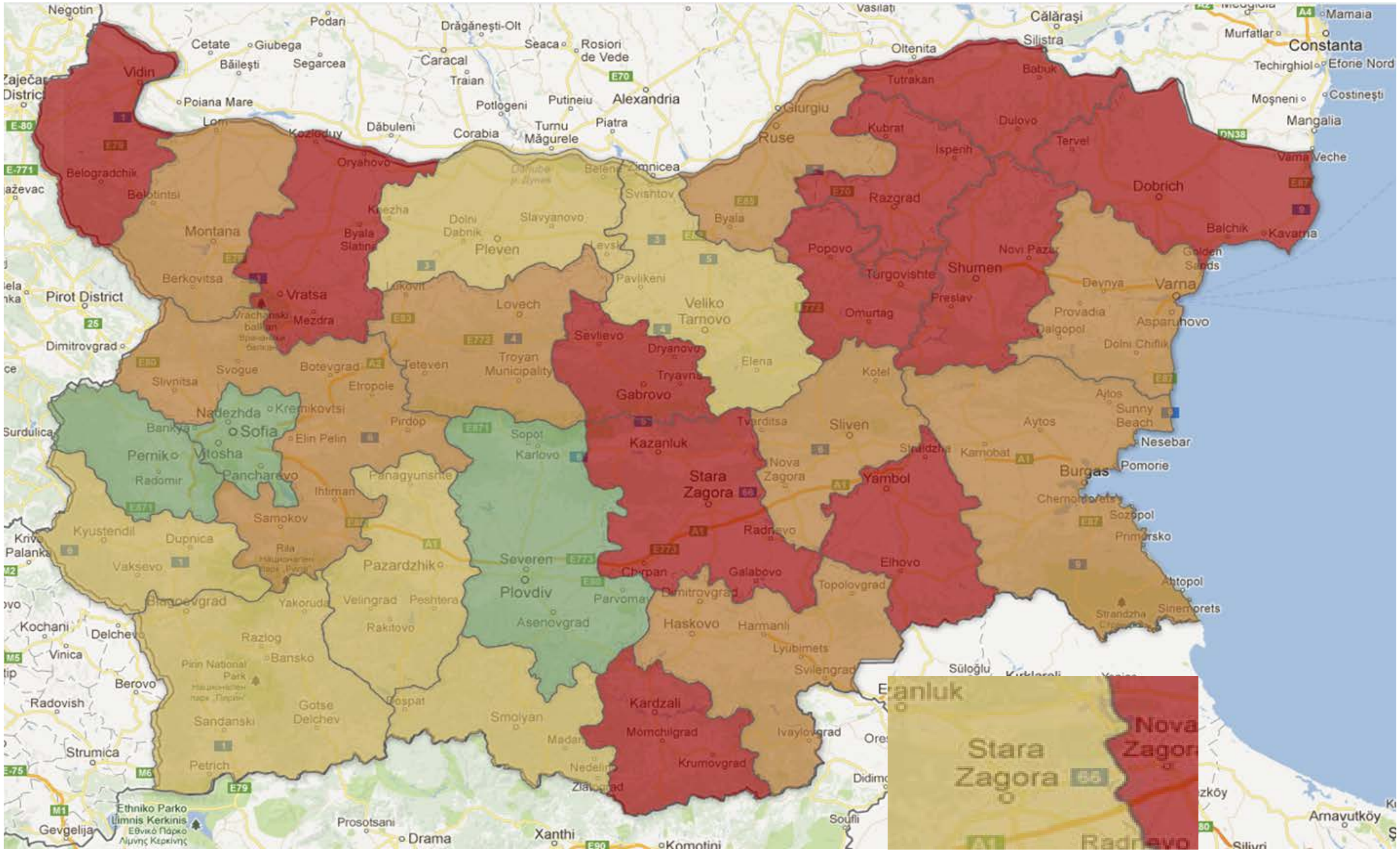
Affordability Level in Scenario 2 in 2016



Affordability Level in Scenario 2 in 2026

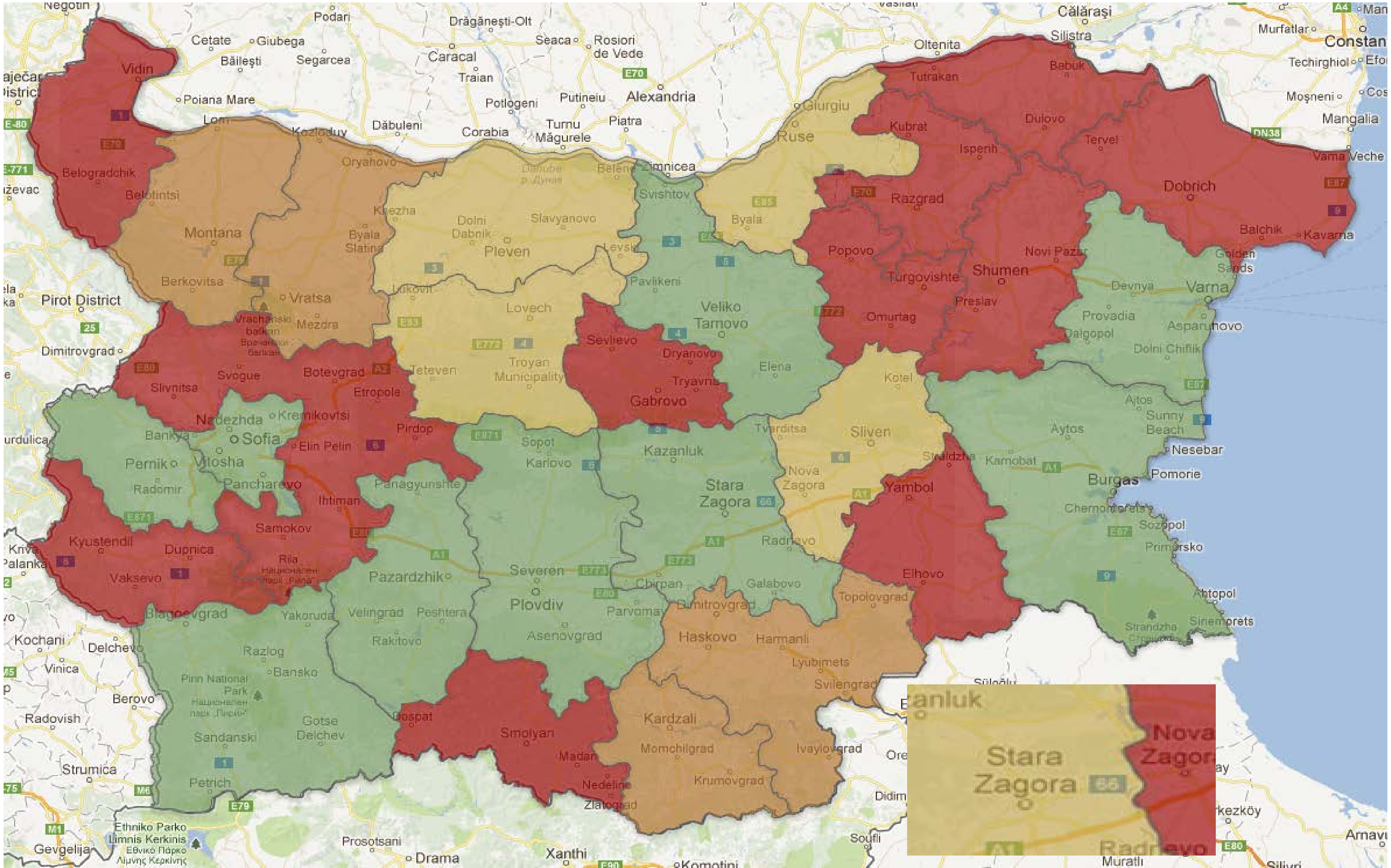


Affordability Level in Scenario 5 in 2016



Investing in your future

Affordability Level in Scenario 5 in 2026



Investing in your future

Maximum affordable tariffs are deemed to be equal to 4% of the average monthly household incomes as per SEWRC ordinance. The maps illustrate the necessary tariff for household consumers in two different financing scenarios, namely scenario 2: Full utilization of EU grants and max tariff increase, and scenario 5: Full utilization of EU grants, max tariff increase, efficiencies, debt and government grants; and for two different years 2016 (at the peak of tariff increases and investments) and ten years later in 2026.

The maps illustrate the following:

- A high level of future tariff is needed in both financing scenarios;
- Tariff levels are higher in 2016 and can be reduced (relative to incomes) in future years as income increases and the most urgent needs for financing of additional investments have been met
- Tariff levels can generally be lower in scenario 5, which takes improved sector efficiencies and debt financing into account. Improved efficiency will reduce revenue needs and debt financing can spread revenue needs over time. Of course there are still districts where the tariffs are at the affordability level like Dobrich, Smolyan, Vidin, Yambol and etc. (mainly due to the significant investment costs and low affordability level of the consumers) but far less than in scenario 2 where in 17 out of 28 districts have tariffs that stay very close or at the affordable level for a decade.
- The careful reader will notice a few counterintuitive results: In the districts of Kardzali, Silistra and Yambol the tariffs in scenario 5 are higher than scenario 2. This is because of the savings and new financing sources allowed for earlier investments in wastewater treatment. Thus Scenario 5 implies earlier compliance, a higher level of service therefore larger tariffs. These counterintuitive effects appear because investments are lumpy, and we have assumed that a, say, wastewater treatment plant is only constructed, if it can be fully funded.

5 Challenges and Opportunities for Reform

The above analyses and scenarios have helped identify the financing needs and constraints associated with Bulgaria's WSS sector development objectives. Such findings are based on the best data available or reconstructed under the time-constrained circumstances of SFP development. No claim is made as to the accuracy of results. Despite data limitations56, the costs and revenues derived are deemed sufficiently representative at the district or subsector level to support the screening of sector financing policy options.

As a result of decades of underinvestment and inadequate asset management, the sector faces a huge investment backlog to renew and rehabilitate WSS systems and to expand wastewater collection and treatment coverage. Necessary investments vastly exceed the scope of foreseen EU Structural grants, and pose an unprecedented sector financing challenge for sector actors, including GoB, municipalities, utilities and users. Considering the importance of proper WSS service for the sustainable social, economic and environmental development of Bulgaria's urban and rural communities, a deferment of these already overdue investments beyond the 2038 strategy horizon is not a viable policy option, lest the quality and efficiency of service are allowed to collapse, or EU Accession commitments are neglected. It is thus recommended that of the various investment and financing scenarios elaborated above, MEW only consider those ensuring full and timely achievement of infrastructure targets (i.e. scenarios 3, 4, and 5).

Of these, scenario 5 is obviously the one to retain. It integrates six principles:

- Full achievement of infrastructure upgrade targets for compliance and sustainability;
- Full utilization of available EU funding;
- Full cost recovery where affordable;
- Sizeable Cost reduction through gains in efficiency and governance;
- Debt financing to the extent compatible with affordable tariffs;
- Coverage of the remaining financing gap through central government grant funding

5.1 Compliance and the magnitude of short term investments

5.1.1 Challenges related to the time profile of investments

Are the short term investment programs realistic? Chapter 3 concludes that capital investment expenditure needs in the short term exceed 11,000 million BGN of which more than 7,000 million BGN is for wastewater and approx. 4,000 million BGN is for water supply. These results reflect the short term investment programs and imply a strong frontloading of investments in water supply, wastewater as well as integrated water cycle investments. If these short term investments are implemented this will ensure compliance of the UWWTD[57]. However, an investment level of 11,000 million BGN over 7 years is equivalent to more than 1,500 million BGN annually. Furthermore, the profile of the short term investment programs is such that a higher level of investments (approximately 2,500 million BGN per year) will be implemented in 2014 and 2015.

[56] Absence of MP CAPEX and OPEX data, limited historical O&M data.

[57] Actually, the current description of the short term investment programs do not allow to make such a statement with certainty, but it seems to be a reasonable assumption that the short term investment programs have been composed to ensure compliance.

It is difficult to imagine how the sector will be able to implement investments for 2,500 million BGN in 2014 and again in 2015. In recent years the level of capital investments in the WSS sector has not been above 450 million BGN in any year and for the past five years the average has been around 300 million BGN, see World Bank (2013. It is understood that EU funding for WSS infrastructure under the Operational Program Environment[58] is in front of a peak as large commitments have been recently made and contracts are in the process of being signed. This implies a large overhang of commitments that may potentially be spend and disbursed in 2013, 2014 and 2015[59]. However, even considering this it is difficult to see how expenditure levels in excess of 2,000 million BGN will be achieved in 2014 and again in 2015 in practice.

Delays could occur for any number of reasons, including: Dispute of awards, other delays in procurement, inability of contractors to mobilize the required resources, in addition to the usual list of unforeseen problems that occur with any major project. A large share of contract awards and procedures are appealed in front of the Commission for protection of the competition and to the Supreme Court causing major delays in the process. Even if the managing authority has prepared itself very well, it has so far processed a much smaller volume of contracts and additional bottlenecks in processing of contracts under committed projects may occur. If procurement is not delayed contractors will find themselves with the pleasant surprise that they have to implement a much larger number of projects than in recent years. Whether they are able to do so in the short term remains an open question. Industry specialists assess that for the next year or two, contractors will find it difficult to implement much more than 700 million annually.

5.1.2 The VAT issue

Currently, VAT is included as an eligible expense in EU co-funded projects. The municipalities typically co-finance a small share of project costs (approx. 5%) with the remainder not covered by EU grant financed from other national contributions[60].

The question: Who shall finance VAT on EU-co-funded projects has the potential to derail the implementation schedule for the OPE for the 2014-2020 programming period. However, the European Commission has signalled that it will no longer consider VAT as an eligible expense. In this case VAT would have to be fully borne by the national counterpart co-financing. How this would affect the projects fully depends on the mechanisms to be established. In the worst case scenario the municipality as beneficiary will have to pay the VAT and will not be able to offset these

[58] It is understood that as of September 30 1,725 million EUR (or 3,385 million BGN) have been committed under the Operational Program environment axis 1, and so far only 200 million EUR (392 million BGN) have been disbursed. This implies an overhang of a maximum of 3,000 million BGN. The maximum overhang is actually less as OPE is currently overcommitted by 34 % for axis 1 and 20% in total. Thus not all commitments can be funded within this program Source: Presentation by Malina Krumova, Head of the Managing Authority, Environment to the Committee for Monitoring of the National Strategic Reference Framework, December 2012.

[59] According to EU budgetary rules cohesion funds must be disbursed according to the so-called N+3 and N+2 rules. The funds available under the 2007-2013 program must be disbursed before the end of 2015.

[60] Furthermore, the municipalities typically have a cash flow issue. Contractors need to be paid first, whereupon the managing authorities reimburse the beneficiary (the municipality). This process can take up to six months and create considerable draw on municipal cash flows. Advance payments only assist in the beginning of project implementation. Many municipalities cover such gaps through bridging loans from the Fund for Local Authorities and Governments (FLAG).

VAT payments on incoming VAT (VAT on sales). In this scenario, projects are likely to come to a halt as municipalities will not have the funds needed to pay the VAT. If on the other hand a solution is found whereby either the Treasury can cover the VAT (through re-imbursements, VAT funding facility, exceptions or another solution) or the VAT can be based on to an entity which has incoming VAT, for example the water utility, then the change in EC policy may not impact on the implementation schedule for the OPE.

5.1.3 Recommended policy initiatives and measures

The challenges in this section need to be addressed in order to avoid a long period of non-compliance with the Accession Treaty. A number of policy initiatives and measures need to be considered, including, but not limited to:

- **As part of the completion of the final master plans there needs to be a careful analyses of the short term investment programs to ensure that they only include the necessary and sufficient measures for compliance**. It should be noted that compliance should be understood to include appropriate measures to reduce inefficient resources use (primarily water and energy). This analysis will imply a careful consideration of sequencing of the master plan measures.

- **The quality of preparation of projects (feasibility studies and tender documents) should be improved through the establishment of a centralized facility for project preparation support.** Currently many feasibility studies are inadequate and tender documents often do not provide an optimal basis for a transparent and fast procurement process. Other countries, most recently Romania, have had positive experience with engaging a team of international consultants to centrally review and revise feasibility studies and tender documents, to combine smaller projects to larger and to support the municipalities in the tendering process. It is recommended to ensure effectiveness of investment program implementation, through recruitment of dedicated Program Management specialist firms for the next programming period. Such firms could be retained through a few regional Program Management contracts mobilizing top international expertise, for management and coordination, feasibility study and design support, and support to preparation of tender documents and procurement processes. It may be considered to also include works supervision as needed. It is understood that JASPERS has offered support in drafting terms of reference and in supporting such a team of consultants. Thus it seems, that this recommendation can be implemented immediately.

5.2 Cost – effective capital investments

5.2.1 Challenges related to wastewater collection and treatment

The investment needs calculations (WYG 2013) take into account that more than 9,600 kilometres of sewers and 85 WWTPs exist today. In order to comply with the UWWTD based on the current (2010) identification of agglomerations with more than 2,000 p.e., an additional 3,250 kilometres of new sewers need to be built. This will enable Bulgaria to connect 670,000 people in addition to the 4,850,000 already connected to sewers and to comply with the UWWTD at a total estimated cost of approximately 4,000 million BGN. Similarly, the investment needs calculation takes into account the need to provide wastewater treatment for all wastewater collected. Since currently not all wastewater collected is treated, the additional number of p.e. to be connected to treatment is larger. The investment needs analysis envisages to connect 1,850,000 people in addition to the

3,670,000 already connected to sewers and to comply with the UWWTD at an approximate investment cost of 3,150 million BGN.

A key question is whether such investments entail excessive costs or provide no environmental benefits. The construction of sewers in agglomerations that are not densely populated, possible outside a very small core, may involve excessive costs. In such cases, the UWWTD allows for alternative decentralized and appropriate solutions[61]. At the moment no guidance exist with regard to the interpretation of excessive costs and the practical solution in other EU member states seems to have been that when collection systems have been replaced by decentralized solution the argument has typically been that the environmental benefits of a centralized solution in the particular case have been negligible[62].

Currently in Bulgaria the only legal individual systems seem to be closed tanks. While closed tanks clearly provide a high level of environmental protection if regularly emptied and the contents transported and disposed to fully functional wastewater treatment plants, such a solution imposed very high operational costs on the user. Therefore, in practice such systems are not built as intended or not operated as intended. Other solutions for individual or other appropriate systems need to be considered and legalized.

Finally, it is questionable whether households outside dense cores of agglomerations will in fact connect to sewers. Such a connection both involves a considerable connection fee and additional monthly costs. For households in small agglomerations with low incomes it is likely to be unattractive to connect. Currently, connection is not mandatory. In principle households not connected need to have a closed tank that is regularly emptied, but this is legal requirement is difficult to enforce and is rarely enforced.

5.2.2 Recommended policy initiatives and measures

A number of policy options exist to deal with these challenges, including:

- Prepare guidelines for how to interpret “no environmental benefit or excessive costs” in order to reduce the risk of overinvestments in wastewater in settlements with sparse population
- Consider alternative decentralized wastewater solutions and change the legalisation to allow a wider range of appropriate decentralized solutions that provide adequate environmental protection
- Establish rules or incentives to maximize and accelerate access to new sewerage service, including connection subsidy mechanisms.

[61] The relevant section of Council Directive 91/271 EC article 3 states: “*Where the establishment of a collecting system is not justified either because it would produce no environmental benefit or because it would involve excessive cost, individual systems or other appropriate systems which achieve the same level of environmental protection shall be used”*

[62] Personal communication with consultants and former employees of environmental agencies.

- Review and as appropriate revise construction norms as appropriate including Ordinance № 2/22.03.2005 for the design, construction and operation of water supply systems, Ordinance № 4/17.06.2005 for the design, construction and operation of WSS systems in buildings and Notification to EC is sent for Ordinance for design, construction and operation for wastewater collection systems.

5.3 Investment needs and the funding gap

5.3.1 The magnitude of the challenge

The analyses in Chapter 4 illustrate that:

- **Business as usual funding will leave a large funding gap and Bulgaria will neither be able to comply with its obligations under the Accession Treaty,** nor will the WSS sector be able to maintain, let alone, improve the current state of the water supply and wastewater infrastructure. On the contrary the WSS systems will continue to be under-maintained, the assets will further deteriorate, which sooner or later will lead to significant problems with WSS services;

- **Even if 100% absorption of EU grants and tariff increases to the maximum affordable level are assumed, 20 districts (out of 28) will not have the infrastructure necessary for compliance by 2020** and 11 of these will still lack this infrastructure by 2038. This scenario includes approx. 3,600 million EU grants for co-funded projects and approx. 2,100 million national co-financing for these projects.

- **In consequence of the above, additional funding is needed either in the form of central government grants and / or debt financing.** The third scenario illustrate that in the situation without debt financing an additional approx. 4,000 million to the national contribution of grants to co-finance the EU co-financed project are needed. In total approx. 6,700 million government (central and municipal) grants will be needed. Hereof approx. 5,900 million are needed before 2021.

- While government funding of the WSS sector of approximately 5,900 million over 7 years might be fiscally doable, it is unlikely that the Government of Bulgaria will want to reorganize and prioritize its investment spending in favour of the WSS sector in such a major way. In this case, debt financing becomes necessary if Bulgaria is to meet its compliance requirements prior to 2020. Even in this scenario, considerable amounts of central government grants will be needed to co-finance EU supported investments and in support of investments in the poorer districts.

- **Improved efficiency and a concomitant reduction of OPEX may be highly effective in reducing the share of Government grants needed.** A reduction in OPEX directly increases the funding available for capital investments and for districts where debt financing is an option, this increase is leveraged through the debt financing mechanism. This finding underscores the importance of improving the governance and the efficiency of the Bulgarian WSS sector.

5.3.2 Recommended policy initiatives and measures

Based on meetings with a large number of stakeholders in the sector it is clear to the authors of this report that the magnitude of the funding challenge is not (yet) appreciated by sector stakeholders, and possibly not by Ministry of Finance. In this light, the following initiatives and measures are recommended:

- **EU funds cover only a minor share of needs**. The Government including, but not limited to, the Ministry of Regional Development and Public Works and the Ministry of Environment and Water need to engage in a public campaign primarily aimed at Mayors and other local WSS sector stakeholders to explain that EU grants can only cover a share of the required investments – probably between 25% and 40% of the total required investments in the 2014-2020 period.

- **The Government must prepare and agree on a detailed plan for funding of sector needs.** Possibly such a plan would imply that some investments are postponed compared to the scenarios in the report. Planned postponements of selected investments will increase the chance of compliance earlier rather than later and the chance of selecting cost-effective investments for implementation. Implementation of the 2004 WSS strategy illustrates the risks of a strategy with measures for which funding has not been clearly identified.

- **Debt funding must be part of a future funding package.** Whether this includes IFI loans is a separate policy issue, but the analyses clearly shows that without debt funding the amount of government grants needed are likely to be in excess of the reallocation of investment funds that will be found to be politically acceptable.

5.4 Infrastructure Funding, Social equity and Tariffs

5.4.1 The cost of constructing and operating a future WSS system raises social equity issues

Table 21: WSS Investment needs per capita and per district

#	District (Oblast)	2011	Investments / capita
1	Blagoevgrad	322,025	3,499
2	Burgas	414,947	4,095
3	Varna	474,344	3,694
4	Veliko Turnovo	256,279	3,988
5	Vidin	99,481	4,235
6	Vratsa	184,662	5,089
7	Gabrovo	121,389	6,333
8	Dobrich	188,088	5,882
9	Kurdjali	152,009	3,023
10	Kyustendil	134,990	4,877
11	Lovech	139,609	4,593
12	Montana	145,984	3,432
13	Pazardjik	273,803	3,445
14	Pernik	131,987	5,069
15	Pleven	266,865	4,420
16	Plovdiv	680,884	2,269
17	Razgrad	123,600	7,377
18	Ruse	233,767	5,257
19	Silistra	118,433	4,996
20	Sliven	196,712	4,224
21	Smolian	120,456	4,452
22	Sofia oblast	245,616	5,431
23	Sofia Grad	1,296,615	1,130
24	Stara Zagora	331,135	3,191
25	Turgovishte	119,865	4,251
26	Haskovo	243,955	3,043
27	Shumen	179,668	5,637
28	Yambol	130,056	5,268
Total		7,329,235	3,594

There is a strong argument for central government support to WSS infrastructure in poorer districts. The table illustrates the needed investments per capita and per district. Sofia municipality stands out as having the lowest needs for future investments per capita. This reflects both the relatively high coverage with both wastewater collection and treatment and the density of the population which means that network maintenance costs per person are lower than in smaller agglomerations. However, even outside Sofia the investment needs per capita over the 25 year period vary substantially from 2,269 BGN/capita in Plovdiv district to 7,377 BGN/capita in Razgrad district. Similar factors are at play: Current coverage and density of population.

Unfortunately, some (but not all) of the districts that require relatively high investments per capita are also relatively poor, for example Razgrad. The analysis show that these districts can only afford the needed WSS infrastructure if a substantial part is funded from central government grants.

Sections Error! Reference source not found.**,** Error! Reference source not found. **and** Error! Reference source not found. **clearly illustrate that for many of the districts government grants have to play a major role in addressing the infrastructure needs**. The details for each district are available in appendices.

The calculations show that in several districts, tariffs will have to be increased to the maximum the law allows, namely 4% of average household income[63]. As mentioned in Vidin and Razgrad, this increase is necessary even with grant funding of the investments, just to achieve that

[63] In accordance with SEWRC ordinance this is calculated at 2.8 m^3 per person per month or 95 lcd. While poor people may reduce their consumption (and thus there water bill) consumption significantly below 70 lcd in households with WCs is not realistic.

OPEX (both existing and new as result of created WSS assets) can be covered by tariffs. Available information about the income distribution suggests that water expenditure equivalent to 4% of average household implies that the poorest three deciles pay more than 10% on average for water.

5.4.2 Recommended policy initiatives and measures

There is a number of opportunities to address the identified issues, including but not limited to:

- Establish policies for targeting central government grants to poorer districts for which investment needs are relatively large;

- Establish policies and mechanisms to mitigate impacts of tariff adjustments on vulnerable households, including targeted consumption tariff mechanisms (something similar to the currently applied social aid for heating during the winter period).

5.5 Sector Governance and Efficiency

5.5.1 Improved efficiency is sine qua none

This report has demonstrated that the WSS sector in Bulgaria is less efficient that most of its peers. Furthermore, among Bulgarian WSSCs there are large differences in their efficiency and thus a significant potential for improved efficiency.

In addition, the analysis above (see section 4.3.5 Error! Reference source not found.**) clearly illustrates that improved sector governance and efficiency can provide a major contribution to resolving the financing gap**. It should be noted that such improvements may de facto be a necessary condition for the central government to agree to transfer large amounts of additional funding to the sector.

The regulatory review (World Bank (2012a)) identified a number of opportunities for revisions in the regulatory framework which could contribute to a more predictable and transparent regulatory environment and thus in turn create opportunities for enhanced efficiency.

5.5.2 Recommended policy initiatives and measures

Based on the regulatory review and the analyses in this report a number of potential policy initiatives and measures have been identified, including:

- Strengthen regulatory functions to effectively promote operational efficiencies of WSSCs, and to ensure effective and predictable decisions on tariff adjustments.

- Create regulatory and financial incentives to promote consolidation of WSSCs and their service perimeters conducive to operational efficiencies.

- Promote competitive pressures in the sector, including through publicly disclosed benchmarking findings,

- Promotion of competitive pressures through promotion of performance based outsourcing contracts, and introduction of new selected PSPs.

- Establish licensing programs to ensure minimum levels of WSSCs capacity and qualifications, and tie license renewal to effective skill management plans for continuing education, training, certification or replacement of WSSCs staff.

5.6 An enabling environment for enhanced WSS sector self-financing

5.6.1 Substantial barriers to debt financing today

The SFP argues that debt financing must be an integrated part of an expenditure needs and financing package for the water supply and sanitation sector. As described in World Bank (2013) some debt financing of the WSS sector through WSSCs and to some extend municipalities has taken place in recent years. This includes both direct loans from EBRD to WSSCs and loans from FLAG to municipalities, groups of municipalities or municipal owned utilities.

However, currently there are substantial barriers for debt financing to the WSS sector.

Barriers to WSSC debt funding include:

- **Uncertainty about asset ownership.** Due to the changes in the Water Act the WSS infrastructure is to become public state and public municipal property. These assets need to be extracted from the balance sheet of the WSSCs where they currently are (with minor exceptions of WSS assets co-financed by EU grant money). This process is still to happen. No lender will provide commercial loan to a company that is about to lose almost all its assets[64] within a year.

- **There is no long term contract between the WSSA and water operators.** When the WSS infrastructure assets are removed from WSSCs' balance sheets, the companies will become operators rather than owner-operators. At present the WSSCs provide WSS services because they own the assets and as owners they are regulated by SEWRC through a 5 year business plan and tariff methodology (Sofia water company is regulated because they have a long-term concession contract with Sofia municipality). For the future operators to be regulated by SEWRC they need to have a contract with the representative body of the owners of WSS infrastructure – the WSSA through which the assets need to be transferred to the operator for operation and maintenance and provision of WSS service. Only then a lender can provide long term financing based on the expected future cash-flow of the operator as per the terms of its contract with the WSSA.

- Somewhat uncertain future revenue streams of WSSCs partly due to the implementation of the current regulatory regime.

- **Generally, there has been no assessment of WSSCs' creditworthiness**. Thus any lender will have to start with such an assessment. However, due to the lack of lending history

[64] A good example is RWC Haskovo. The company managed to secure 0.5 million euro investment loan in 2011 by pledging is own building and the some land. This is not how an investment loan should be structured but accounting for the current conditions in the sector it might be the only possible way.

commercial lenders in Bulgaria typically do not have the sector specific expertise necessary for such an assessment.

Barriers to municipality debt funding include:

- **Municipal budgets are small relative to the needed investment projects.** There is a national requirement that the municipalities should finance 5% of the project costs of WSS revenue generating project co-financed by EU grant money. This requirement turns out to be very difficult not only to small municipalities but also to big ones since the project amounts in general are quite significant compared to the annual capital expenditure budget of municipalities. Municipalities can borrow the amount but since the revenue flow from the created asset will not be assigned to them (the public asset should be provided to the WSSA and then to an operator for O&M and provision of services) the municipalities are forced to come up with different sources for the repayment of the debt. There is an example of transferring the burden of WSS asset debt repayment from a municipality to an operator[65] but this is rather an exemption than anything else.
- **Fairly strict limits on municipal borrowing.** According to the Law on Municipal Debt, municipalities are allowed to borrow from banks and other financial institutions. There are no limits to the amount of borrowing, but there are limits to the amount of payments, as follows (Article 12, Law on Municipal Debt):
    - The annual amount of payments on the debt during each particular year may not exceed 25% of the sum total of revenues from own sources and the block equalizing grant under the last audited report on the implementation of the budget of the municipality.
    - The nominal value of the municipal guarantees issued may not exceed 5% of the sum total of revenues from own sources and the block equalizing grant under the last audited report on the implementation of the budget of the municipality.

5.6.2 Recommended policy initiatives and measures

In order to address the identified barriers it is recommended to undertake a number of policy initiatives and measures, including:

- **Clarification of legal and contractual provisions ruling asset ownership and asset management responsibilities** between municipalities, state, WSSAs and WSSCs, towards streamlined application of operational revenues to depreciation and debt service.

[65] Sofia municipality and Sofia water company signed a contract in 2008 for the transfer of annual funds from the company to the municipality to service the EIB debt (co-financing of ISPA funded WSS project). The transfer of the necessary funds is totally dependent whether the SEWRC will allow the inclusion of the financing costs in the OPEX of the company for tariff calculation purposes.

- The envisioned transfer of assets from WSSCs to municipalities and/or to the state, must be accompanied by **formal provisions to allow any associated debt service to be included as costs in the tariff approval process** and to be served by the WSSC revenues.

- Introduce a change in the tariff methodology to **allow the WSSCs to accumulate the necessary funds to repay municipal debts for WSS infrastructure creation**;

- **Establish financial management and reporting capacity-building programs** to improve the creditworthiness and borrowing capacity of operators;

- **Support and build capacity of lenders to understand the creditworthiness,** business plans etc. of water and sanitation sector companies, and to support such companies in the design of projects that are suitable for lending

- **Promote the consolidation of operators** to achieve improved creditworthiness.

- **Promote the availability of tailored commercial lending products**. Promote the availability of concessional lending/on-lending to municipalities/WSSCs. Promote access to loan guarantees by municipalities/WSSCs. Expansion of the remit of the Fund for Local Authorities and Governments (FLAG) to include also lending to state owned WSSCs and WSSCs with mixed state/municipal ownership

- As a temporary measure retain all profits in state owned and mixed owned WSSCs in order to improve their balance sheet and creditworthiness.

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FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AC pipes	Asbestos cement pipes
CAPEX	Capital expenditures
CLA	Collective Labour Agreement
CoM	Council of Ministers
EEA	European Environment Agency
EU	European Union
EUR	Euro
GoB	Government of Bulgaria
FLAG	Fund for Local Authorities and Governments
IFIs	International Financial Institutions
IAWBD	Internationale Arbeitsgemeinschaft fuer WasserBetriebe in der Donau Gebiet
IWA	International Water Association
JASPERS	Joint Assistance to Support Projects in European Regions
MIDP	Municipal Infrastructure Development Project
MOEW	Ministry of Environment and Water
MP	Master Plan
MRDPW	Ministry of Regional Development and Public Works
NSI	National Statistical Institute
OPE	Operational Programme Environment
OPEX	Operating expenditures
PAG	Program Advisory Group
PER	Public Expenditure Review
PPP	Public Private Partnership
SEWRC	State Energy and Water Regulatory Commission
SFP	Strategic Financing Plan
TA	Technical Assistance
UIS	Unified Information System
UWWTD	Urban Wastewater Treatment Directive
UWWTP	Urban Wastewater Treatment Plant
WSSA	Water Supply and Sanitation Association
WSSC	Water Supply and Sanitation Company
WSS	Water Supply and Sanitation
WTP	Water Treatment Plant
WWT	Wastewater Treatment
WWTP	Wastewater Treatment Plant

Country Manager:	Markus Repnik
Sector Manager:	Sumila Gulyani
Task Team Leader/Project Manager:	Pier Mantovani/Michael Jacobsen

DISCLAIMER

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This report was produced by a core team led by Pier Mantovani and Michael Jacobsen (Lead Water Supply and Sanitation Specialists), comprising Ivaylo Hristov Kolev (Senior Financial Analyst), Stella Ilieva (Country Economist), Orlin M. Dikov (Senior Operations Officer), Albena Alexandrova Samsonova (Program Assistant), with contributions by Eolina Petrova Milova (Operations Officer), Ivelina Todorova Taushanova (Communications Officer), Toma Alexandrov Yanakiev (ET consultant, Economist). The contributions of Elisabetta Capannelli (Sector Leader), Michael John Webster (Senior Water Supply and Sanitation Specialist, Peer Reviewer), Alexander Danilenko (Senior Water Supply and Sanitation Specialist, Peer Reviewer) and Diego Rodriquez (Senior Economist, Peer Reviewer) in quality assurance and advice is gratefully acknowledged.

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APPENDICES

Appendix 1: Methodology, data and assumptions for calculation of capital and operational expenditure needs[1]

The capital and operational expenditure models have been developed to achieve the following objectives by 2038:

- Wastewater collection:
  - 75% coverage for household users;
  - 100% coverage for non-household users.
- Wastewater treatment:
  - 75% coverage for household users;
  - 100% coverage for non-household users.
- Reduction of NRW to 30%[2].
- Sustainability of water resources in order to address raw water scarcity.

1.1.1 Approach in Undertaking CAPEX Estimates

Structuring the CAPEX models

In developing the CAPEX models, the consultant has looked at the overall management and operations of a typical water utility. Therefore, the capital expenditure plans were structured to cover the following functions:

- Water Supply Estimated Investments:
  - Abstraction sources (reservoirs/gravity sources/wells/boreholes, etc.);
  - Water treatment (DWTP/Disinfection facilities);
  - Transmission pipes;
  - Pumping stations;
  - Service reservoirs;
  - Distribution pipes
  - Revenue meters.
- Wastewater Estimated Investments:
  - Rehabilitation of large collectors;
  - Rehabilitation of sewer network;
  - Rehabilitation of wastewater pumping stations;

[1] This appendix is extracted from WYG 2013

[2] 30% NRW will in actual fact be achieved in 2039, as investments carried out in 2038 will contribute to achieving this objective.

- Construction of new sewers;
- Rehabilitation of existing WWTPs;
- Construction of new WWTPs;
- Sludge disposal.

- Other Investments:
  - Vehicles;
  - Heavy plant and machinery.
- Business systems:
  - Laboratories;
  - MIS.

Calculating the Investment Needs

In developing the capital expenditure models, the consultant has used data provided from the WSS masterplan assignments. The masterplan assignments are contracts carried by international consultants for the Ministry for Regional Development and Public Works. Three consortiums are engaged to prepare short term, medium term and long term capital expenditure models for three regions of Bulgaria: Eastern, Central and Western. Unfortunately, only few full masterplans (to include short, medium & long term investment programmes) were made available to us. However, short term investment programmes (STIP) for all three regions were presented to us. In view of this, the consultant has developed a methodology for calculating the investment needs for those regions that only have short term investment programmes. The section below describes in detail the methodology applied for calculating the capital expenditure needs, steps taken and assumptions applied.

Using the investment estimates from the WSS master plans

At the outset of the assignment, two Regional masterplans were made available to us: (a) RMP for Pernik, (b) RMP for Yambol and (c) MP for Botevgrad. For those districts that the draft plans have been developed (Pernik and Yambol), the investments included in these documents were taken into account. The information from Botevgrad MP has been added to the investment needs of the corresponding district – Sofia Oblast.

In studying the plans, the consultant has noted that they are rather projects based oriented, for instance addressing water quality issues, compliance with EU directives and replacing specific sections of the networks. Therefore, the consultant has built upon the MP investments in order to prepare a capital **planning** expenditure programme with the aim to meet the objectives described in section IV.

The approach in calculating the additional investments is as described below (steps 2 to 4).

Using the investment estimates from the short term investment programmes

Short term investment programmes covering the period 2014-2020 were made available to us for three regions: West, Central and East (with the exception of Sofia City). A short term investment programme for Sofia City, covering the period 2014-2018 was provided to us separately.

The short term investment programmes for West region were split by year over the 2014-2020 period and therefore, the consultant has simply used the investments per year as presented in the STIP. Whereas, the investments for Central and Eastern regions, had a total amount for the period. Therefore, the consultant has developed a methodology for implementing the STIP investments over the period. The assumptions for splitting these investments over the period 2014-2020 are as follows:

- Investments that are linked to compliance with UWWTD, i.e. wastewater investments;
- Investments that are not linked to compliance with UWWTD, i.e. water supply investments.

Table 1 provides the details of the assumed profile of these investments over the period 2014-2020.

Table 1: Assumed profile of short term investments

	2014	2015	2016	2017	2018	2019	2020
Wastewater investments	25%	40%	25%	5%	5%		
Water supply investments	5%	5%	10%	15%	25%	25%	15%

During this period, no additional investments for the period (2014-2020) are assumed. The approach here is different from the approach in using the masterplans because it is assumed that the consultants who have prepared the short term investment programmes have best understanding of the needs of these districts in the short term.

The methodology for estimating the investment needs post the short term period (i.e. 2021-2038) and building upon the masterplans, involved making a number of assumptions, including:

- Nominal asset life for the various asset categories;
- Replacement/refurbishment rate per year;
- Average unit cost.

As a base for determining the average unit cost, the consultant has used the unit prices developed by the masterplan consultants.

Water sources

This category includes surface and underground water sources. The average nominal asset life of water sources is assumed at 20 years. The type of facilities that are included in this category include the actual water abstraction facilities, the sanitary protection facilities and building parts. The replacement/refurbishment rate is assumed at 5% per annum. The assumed unit cost for replacement of water sources is as follows:

- Surface water sources – BGN 20,000 per replaced/refurbished unit.
- Underground water sources – BGN 50,000 per replaced/refurbished unit.

Therefore, the assumed average cost is BGN 35,000 per replaced/refurbished unit.

Water treatment plants

The nominal asset life of water treatment plants (WTP) is assumed to be 30 years. The assumptions for the refurbishment of existing water treatment plants are as follows:

- For WTPs with capacity ≤100 l/s, BGN 60,000 for every l/s capacity;
- For WTPs with capacity 100-1,000 l/s, BGN 30,000 for every l/s capacity;
- For WTPs with capacity 1,000-2,000 l/s, BGN 22,000 for every l/s capacity;
- For WTPs with capacity ≥2,000 l/s, BGN 9,200 for every l/s capacity.

Disinfection facilities

Nominal asset life for disinfection facilities is assumed to be 10 years. The replacement rate is assumed to be 10% per year. The cost for replacement of disinfection facilities with capacity of ≤30 l/s is assumed to be BGN 50,000.

Transmission pipes

In Bulgaria, large proportion of the pipes used (for transmission pipes around 65%) are asbestos cement pipes. The nominal asset life of these type of pipes is around 50 years. The consultant has assumed a 2% replacement rate per year. The average cost for replacement of a kilometre of transmission pipes is calculated to be BGN 499,750. This is calculated based on the below methodology, where it is assumed that 55% ofthe pipes are with a diameter of up-to 280 mm.

Diameter (mm)	% representa-tion	BGN/m	BGN/km	Weighted average price/m	Weighted average price/km
225	20%	360	360,000	72	72,000
250	20%	395	395,000	79	79,000
280	15%	435	435,000	65	65,250
315	10%	480	480,000	48	48,000
355	10%	530	530,000	53	53,000
400	10%	585	585,000	59	58,500
450	5%	680	680,000	34	34,000
500	5%	800	800,000	40	40,000
560	2%	880	880,000	18	17,600
630	2%	1,020	1,020,000	20	20,400
710	1%	1,200	1,200,000	12	12,000
				500	**499,750**

Distribution pipes

Similarly to transmission pipes, asbestos cement pipes are most commonly used in the water distribution network in Bulgaria (around 70%). The asbestos cement pipes have a life expectancy of around 50 years. For the purpose of this assignment, a 2% replacement rate per year is assumed. This rate is assumed because in practice, this is quite realistic average replacement rate per year. Some water companies may be able to carry out a more extensive pipe replacement programmes in certain years. However, other may not. Carrying out extensive pipe replacement programmes is most often dependent on availability of financial resources. It is also dependent on suppliers and contractors able to implement large construction projects. It should be stressed that most of the pipe network in Bulgaria has been laid in the 60s and 70s. The last 20 years have not seen any significant pipe replacement programmes. Therefore, these pipes have already reached or about to reach their end of life time. The assumptions for calculating the average cost for replacing a kilometre of distribution network pipes are provided below:

Diameter (mm)	% representation	BGN/m	BGN/km	Weighted average price/m	Weighted average price/km
90	35%	210	210,000	74	73,500
110	30%	230	230,000	69	69,000
125	15%	250	250,000	38	37,500
140	10%	280	280,000	28	28,000
160	5%	300	300,000	15	15,000
180	3%	315	315,000	9	9,450
200	2%	330	330,000	7	6,600
				239	**239,050**

In this case, it is assumed that 65% of the distribution pipes are with a diameter of up-to 110 mm.

Service reservoirs

The nominal life of service reservoirs is assumed to be 30 years. The refurbishment rate is assumed to be 3% per year. To calculate the average price for the refurbishment of service reservoirs, the consultant has made the following assumptions:

Capacity (m^3)	% representation	BGN/m^3	Weighted average m^3
100	15%	2,500	15
150	20%	2,150	30
200	20%	2,000	40
350	20%	1,800	70
500	10%	1,550	50
1000	7%	1,320	70
2000	5%	1,250	100
3000	3%	1,150	90
	Average price / m^3	**1,715**	**58**
	Average price BGN	**99,684**	

It is assumed that the smaller sizes of service reservoirs are more commonly used. Therefore, the weighted average capacity of service reservoirs is taken into account when calculating the average cost.

Pumping stations – water supply

The average price for replacement of a pumping station is assumed to be BGN 64,530. Pumping stations are assumed to have a nominal asset life of 20 years and therefore, the replacement rate per year is assumed to be 5%.

kW	% representation	BGN/kW	Weighted average BGN/kW
10	15%	2,600	3,900
25	20%	1,400	7,000
50	25%	850	10,625
100	15%	670	10,050
200	7%	470	6,580
300	5%	355	5,325
400	3%	300	3,600
500	3%	260	3,900
1000	4%	175	7,000
1500	2%	145	4,350
2000	1%	110	2,200
		Average	**64,530**

Revenue meters

Revenue meters, which are used throughout the water supply network to measure flow are expected to have a life of 10 years, therefore the replacement rate per is assumed to be 10%. The average price of a meter is assumed to be BGN 300/unit.

Large collectors

For large collectors we have assumed nominal asset life of 50 years and a replacement rate of 2% per annum. The average price for replacement of a kilometre of large collectors is calculated as follows:

Diameter	% representation	BGN/m	BGN/km	Weighted average price/m	Weighted average price/km
1,000	40%	1,500	1,500,000	600	600,000
1,100	35%	1,700	1,700,000	595	595,000
1,200	10%	1,900	1,900,000	190	190,000
1,400	5%	2,300	2,300,000	115	115,000
1,600	4%	3,000	3,000,000	120	120,000
1,800	3%	3,500	3,500,000	105	105,000
2,000	2%	4,100	4,100,000	82	82,000
2,200	1%	4,500	4,500,000	45	45,000
2,400	0%	5,200	5,200,000	0	0

				1,852	**1,852,000**

Sewer pipes

As per large collectors, sewer pipes have been assumed to have asset life of 50 years and to be replaced at a rate of 2% per annum.

The average price for replacement of a kilometre of sewer pipe is calculated as follows:

Diameter	% representation	BGN/m	BGN/km	Weighted average price/m	Weighted average price/km
315	35%	460	460,000	161	161,000
400	30%	590	590,000	177	177,000
500	15%	720	720,000	108	108,000
600	10%	950	950,000	95	95,000
700	5%	1,100	1,100,000	55	55,000
800	3%	1,200	1,200,000	36	36,000
900	2%	1,350	1,350,000	27	27,000
				659	**659,000**

Pumping stations – wastewater

The average price for replacement of a pumping station is assumed to be BGN 76,910. Pumping stations are assumed to have a nominal asset life of 20 years and therefore, the replacement rate per year is assumed to be 5%.

kW	% representation	BGN/kW	Weighted average BGN/kW
10	15%	3,300	4,950
25	20%	1,650	8,250
50	25%	900	11,250
100	15%	800	12,000
200	7%	600	8,400
300	5%	400	6,000
400	3%	380	4,560
500	3%	300	4,500
1000	4%	210	8,400
1500	2%	180	5,400
2000	1%	160	3,200
		Average	**76,910**

Rehabilitation of wastewater treatment plants

The annual rehabilitation cost for wastewater treatment plants is assumed to be at 2% per annum of the initial investment cost. This only applies to the WWTP that are to be build in the period 2014-2020. Therefore, the rehabilitation investment cost is applied from 2020 onwards.

The table below summarises the assumptions made for estimating the capital expenditure investments.

Table 2: Assumptions for calculating the capital expenditure investments

	Nominal Asset Life (years)	Refurbishment/ Replacement Rate per Year	Unit	Average BGN
Water sources	20	5%	#	35,000
Water treatment plants ≤100 l/s	30	2%	#	60,000
Water treatment plants 100-1,000 l/s	30	2%	#	30,000
Water treatment plants 1,000-2,000 l/s	30	2%	#	22,000
Water treatment plants ≥ 2,000	30	2%	#	9,200
Disinfection facilities	10	2%	#	50,000
Transmission pipes	50	2%	km	499,750
Pump stations	20	5%	#	64,530
Service reservoirs	30	3%	#	99,684
Distribution pipes	50	2%	km	239,050
Revenue meters	10	10%	#	300
Large collectors	50	2%	#	1,852,000
Sewer network	50	2%	#	659,000
Pump stations	20	5%	#	76,910
Rehabilitation of existing WWTPs	30	2%	#	
Vehicles	5	20%	#	30,000
Heavy plant and machinery	15	7%	#	100,000

Integrated Water Cycles projects

Integrated Water Cycles (IWC) are projects funded by the current Operational Programme Environment. The purpose of these projects is to fund wastewater investments in order to comply with UWWTD. However, they also include investment elements for rehabilitating existing water supply network as well as rehabilitating the existing sewer system. Usually the large part of these investments is to address wastewater treatment. Unfortunately, the available information for the IWC projects is limited (including the information received from the masterplan assignments) and the consultant was unable to obtain reliable information in order to split these investments into water supply, wastewater collection and wastewater treatment. Therefore, for the purpose of this assignment, it is assumed that they cover just wastewater treatment investments.

Additional cost

Additional costs for project preparation and execution are also taken on board. However, additional cost are applied only to those investments that are not considered straight on replacements. For example, pump replacements, revenue metres replacements and/or vehicle and machinery replacements. The applied assumptions for the additional costs are as follows:

Additional costs assumptions	Rate (of total investments cost)
Feasibility study	1%
Design	4%
Supervision	5%
Project management	3%
Contingency	10%
Total additional cost	23%

Obtaining facilities/asset number of units

Information on the number of facilities/assets were obtain from the latest available business plans (2009-2013). These were inserted in the CAPEX models. Where more than one W&SC exists in a given district, their facilities have been consolidated to provide a total number for the district as a whole.

1.1.2 Approach in Undertaking OPEX Estimates

As a base for calculating the operational expenditure, the consultant has used data submitted to the State Energy and Water Regulatory Commission by the water companies for 2010 and 2011. For calculating the operational expenditure for the period 2014-2038, the consultant has made the following assumptions:

Direct O&M costs for water supply

- The significant direct O&M costs for water supply are those associated with electricity, chemicals, water abstraction and maintenance:
- Electricity costs depends on electricity consumption, electricity price and abstracted water quantities. Electricity consumption is assumed to decrease proportionally to investments realized in water pumps reaching 10%[3] overall decrease in electricity consumption a year after all planned investments in CAPEX are realized. Electricity price is in 2011 constant terms.
- Chemical costs depend on chemicals price and abstracted water quantities. Chemicals price is in 2011 constant terms.
- Costs for water abstraction fee depend on fee per m^3 and abstracted water quantities. Water abstraction fee in m^3 is in 2011 constant terms.

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[3] This figure is based on discussions with some managers of existing WSSC, where water pumps were already replaced and efficiency - monitored.

- Maintenance costs depend on existing maintenance costs (kept constant) and additional maintenance costs (1% of all new investments in water supply infrastructure (except for those in water supply pipes), realized in the previous year).

While first three types of direct costs contribute mainly to the savings in water supply (due to reduction in electricity consumption/ m^3, decrease in NRW and decrease in abstracted water quantities), the maintenance costs are directly linked to the corresponding investments in water supply infrastructure. Hence, the trade-off between decrease in water supply direct costs due to realized savings and increase in water supply direct costs due to increased maintenance costs depends a lot on how high is the NRW in the base year (2011), how electricity-consuming is water abstraction and transmission, and what are the investments needs associated with new water supply treatment plants.

Direct O&M costs for wastewater collection

The significant and sensitive direct costs for sewerage are those associated with electricity, wastewater discharge and maintenance.

- Electricity costs depend on electricity consumption, electricity price and collected wastewater quantities. Electricity consumption is assumed to decrease proportionally to investments realized in wastewater pumps reaching 10% overall decrease if all planned investments in CAPEX are realized. Electricity price is in 2011 constant terms.
- Costs for wastewater discharge fee depend on fee per m^3 and collected wastewater quantities. Discharge fee per m^3 is in 2011 constant terms.
- Maintenance costs depends on existing maintenance costs (kept constant) and additional maintenance costs (1% of all new investments in sewerage infrastructure (except for those in wastewater pipes) realized in the previous year).

Hence, the trade-off between decrease in overall sewerage direct costs due to realized savings and increase in maintenance costs depends a lot on how electricity intensive is the sewerage system and how much of it is already constructed and put into operation.

Direct O&M costs for wastewater treatment

The significant and sensitive direct costs are those associated with electricity, chemicals, wastewater discharge and maintenance.

- Electricity costs depends on electricity consumption, electricity price and wastewater quantities treated. Electricity consumption is assumed to decrease proportionally to investments realized in wastewater pumps reaching 10% overall decrease if all planned investments in CAPEX are realized. Electricity price is in 2011 constant terms.
- Chemical costs depend on chemicals price and wastewater treated quantities. Chemicals price is in 2011 constant terms
- Costs for wastewater discharge fee depend on fee per m^3 and treated wastewater quantities. Discharge fee per m^3 is in 2011 constant terms.
- Maintenance costs depends on existing maintenance costs (kept constant) and additional maintenance costs (1% of all new investments in WWTP, realized in the year before the previous year).

Due to lack of envisaged CAPEX in electricity savings, and low degree of completion of wastewater treatment plants, there are no savings expected to be realized in wastewater treatment, but only costs.

Indirect O&M costs

Those are personnel costs and other costs.

- Personnel costs are in 2011 constant terms, assuming that salaries will increase, while personnel will decrease reaching European good practices for the sector[4].
- Other expenses are assumed as % of the total expenses less other expenses (2011 base). All OPEX that are not explicitly mentioned above, even if they are direct costs by nature, are part of other expenses. Those are such costs that are either not significant or sensitive enough, or for which there is no enough reliable input data.

[4] Due to lack of sufficient raw data it is assumed, that salaries will increase only following the increase in real GDP (3.2% annually on average for the period 2011-2038). Thus, the assumption made means that the personnel will decrease by 3.2% on average on annual basis due to improved efficiency of the existing staff and reduction of staff due to consolidation of WSSC at regional level. At the same time, personnel will increase due to new assets acquired (for instance WWTPs), but this number is less than the number to be reduced following the consolidation of the WSSCs. In sum, salaries' increase is compensating personnel decrease.

Appendix 2: Methodology, data and assumptions for scenarios for financing of capital and operational expenditure needs[5]

1.1.3 Overall methodology

In order to develop models enabling the testing of options and scenarios for the financing of the expenditure needs assessments the following approach was used:

1. CAPEX and OPEX data gathering;
2. Data verification;
3. Additional data collection;
4. Construction of a 'master' Financial Model (in Excel) for the period 2014-2038 at district level.
5. Modification of the 'master' Financial Model to accommodate specific district issues and run all scenarios for each district.
6. Summary of all scenarios at national level.

Re 1: Data gathering: for the development of expenditure needs assessment model (CAPEX) see the approach and methodology in the previous chapter; OPEX – the main source of historical data for WSSCs' operational expenditures was the SEWRC (WSSCs Business plans, WSSCs annual reports to the regulator). 2010 and 2011 actual WSSCs OPEX data that was reported to the regulator was summarized at district level (to reflect the total OPEX of all WSSCs operating in a district) and then used to construct the WSS operational expenditures at district level;

Re 2 Data verification: the OPEX data reported by the WSSCs to the regulator for 2010 and 2011 was verified against WSSCs financial statements, SEWRC decisions on Business plans and tariffs;

Re 3 Additional data collection – additional data needed for the construction of the 'master' Financial Model was collected from reliable public sources as NSI, MRDPW, MOEW, WSSCs, other recent WSS reports, etc.

Re 4 Construction of a 'master' Financial Model (in Excel) for 25 years as a basis to produce all scenarios needed for the period 2014-2038 at district level. The main pillars of the model are the historical OPEX data (see assumptions below) for each WSSC (consolidated per district) and results from expenditure needs assessments (CAPEX, see assumptions above). The model was created following the steps below:

   a. Developing a dynamic model based on spreadsheets for facilitating the development and analysis of different scenarios and the impact of CAPEX and its financing on OPEX, water quantities, tariffs, affordability and sustainability of a WSSCs;
   b. Filling out the model with actual data for 2010, 2011;

[5] This appendix is based on WYG 2013a

c. Summation of different WSSCs in a district and main inputs (for example averaging the tariffs per district);

d. Forecasting based on the specific district assumption (for example EU funds distribution is based on the population living in the district);

e. Assessing the impact of the expenditure needs on the tariffs considering affordability level for the district;

f. Estimation of possible savings from operations due to CAPEX realization (for example electricity costs);

g. Illustration of main results: contribution of different funding sources, impacts on tariffs, impacts on OPEX, achieved results and expenditures covered by different scenarios.

h. The model contains: assumptions (unified across all districts); CAPEX, OPEX, Quantities, Tariffs, EU Grant Calculation, Government Grant Calculation, Loan Calculation, Cashflow, Scenario and Results (specific for each district).

1.1.4 Assumptions

General assumptions

Assumptions affecting the revenues:

Revenue	Unit	Comments
Change in Population connected to w ater supply	%	No change assumed
Change in Water consumption	l/c/d	Assumed annual increase, Water consumption is increasing constantly (2011 is the base year) unless reaching 125 l/c/d, then, stays constant. If w ater consumption rate in 2011 is more than 125 l/c/d, it stays constant during the investigated period. Population served is increasing constantly form 2011 base rate until reaching 100 % of the population in the district, then stays constant. Population in the district is as per NSI recent forecast data.
Change in Water sold to non-household customers	mil m^3	No change assumed
Change in Water sold to other VIK	mil m^3	No change assumed
Population connected to w astew ater collection as % of w ater supplied pop.	%	as % of pop connected to WS
Wastew ater collected from non-household users as % of w ater sold to non-household users	%	as % of w ater sold to non-household users
Population connected to Wastew ater treatment as % of w ater supplied pop.	%	as % of pop connected to WS
Wastew ater treated for non-households as % of w ater sold to non-households	%	as % of w ater sold to non-households
Change in volume of Wastew ater treated for industry	mil m^3	No change assumed
Change in average w ater supply tariff for households	BGN/m^3	Assumed annual increase depending on the investments profile and up to the affordability level
Change in average w ater supply tariff for non-household customers	BGN/m^3	Assumed annual increase w ith the same profile as for the households
Change in average w ater supply tariff for other ViK	BGN/m^3	Assumed annual increase w ith the same profile as for the households
Change in average sew erage tariff for households	BGN/m^3	Assumed annual increase w ith the same profile as for the households
Change in average sew erage tariff for non-households, 1st category	BGN/m^3	Assumed annual increase w ith the same profile as for the households
Change in average sew erage tariff for non-households, 2nd category	BGN/m^3	Assumed annual increase w ith the same profile as for the households
Change in average sew erage tariff for non-households, 3rd category	BGN/m^3	Assumed annual increase w ith the same profile as for the households
Change in average Wastew ater treatement tariff for population	BGN/m^3	Assumed annual increase w ith the same profile as for the households
Change in average Wastew ater treatement tariff for non-households, 1st category	BGN/m^3	Assumed annual increase w ith the same profile as for the households
Change in average Wastew ater treatement tariff for non-households, 2nd category	BGN/m^3	Assumed annual increase w ith the same profile as for the households
Change in average Wastew ater treatement tariff for non-households, 3rd category	BGN/m^3	Assumed annual increase w ith the same profile as for the households
Change in persons per household	%	No change assumed
Change in average income per person for the region	%	Assumed annual increase equal to annual increase in real GDP

Assumptions affecting operational expenditures:

Operational Expenses	Unit	Comments
change in electricity price	BGN/kWh	No change assumed
change in electricity consumption (WS) business as usual	kWh/m3	No change assumed
change in electricity consumption (WS) due to CAPEX realization	kWh/m3	Assumed annual decrease depending on the investment profile
change in w ater abstraction fee	BGN/m3	No change assumed
change in w ater discharge fee	BGN/m3	No change assumed
change in chemicals price	BGN/kg	No change assumed
change in electricity consumption (WWC) business as usual	kWh/m3	No change assumed
change in electricity consumption (WWC) due to CAPEX realization	kWh/m3	Assumed annual decrease depending on the investment profile
change in electricity consumption (WWT) business as usual	kWh/m3	No change assumed
change in electricity consumption (WWT) due to CAPEX realization	kWh/m3	Assumed annual decrease depending on the investment profile
existing maintenance	BGN mil	Equal to existing
new maintenance	%	Of investment made in previous years
Change in Personnel costs	BGN mil	No change assumed
Depreciation	BGN mil	Of investments made in previous years
Other expenses	BGN mil	As % of Total Operational less Other Expenses
Bad debts	BGN mil	As % of Revenue

Other assumptions:

Water quantity	Unit	Comments
Change in w ater bought from other ViK (mil m3)	mil m^3	No change assumed
Non-revenue w ater-real (%)	%	UFW (%) reductions assumed depending on the investment profile

Population in the district living in agglomerations w ith more than 2,000 p.e.	thousand #	Comments
Total population in the district living in agglomerations, 2,000 p.e. - 10,000 p.e	district specific	from MoEW report for compliance w ith Directive 91/271 concerning urban w astew ater treatment
Total population in the district living in agglomerations, above 10,000 p.e	district specific	same as above
Total population in the district living in agglomerations above 2,000 p.e.	district specific	same as above

Other assumptions	Unit	Comments
Discount rate	5%	as per EU guidelines for CBA for investment projects, 2008
Percent of financing gap (%)	95%	as avearge for 2007-2013 programming period
EU grant amount from Cohesion Fund 2014-2020, mil BGN	1,956	similar to the CF amount available for integrated w ater projects in 2007-2013 programming period
EU grant amount from EAFRD 2014-2020, mil BGN	489	similar to the EAFRD amount available for integrated w ater projects in 2007-2013 programming period
EU grant amount from CF and EAFRD, 2014-2020	80%	as for CF in 2007-2013 programming period
State budget amount co-financing EU grant, 2014-2020	20%	as for 2007-2013 programming period
total population in Bulgaria in 2011, thousand #	7351.234	as per National Statistics Institute
maximum EU grant amount applicable for the disctrict, % of total EU grant amount	district specific	on the basis of the population

CAPEX assumptions – see above expenditure needs assessment. The figures in the model are 2011 real prices;

OPEX assumptions – on the basis of historical data for 2010 and 2011 provided by the SEWRC and forward looking O&M costs and expected savings associated with the implementation of the investments depending on the profile of the realized investments (see the explanations in scenarios). The figures in the model are 2011 real prices.

Details of OPEX assumptions:

a. <u>Direct O&M costs for water supply</u>. The most significant direct O&M costs are those associated with electricity, chemicals, water abstraction and maintenance.

- Electricity costs depends on electricity consumption, electricity price and abstracted water quantities. Electricity consumption is assumed to decrease proportionally to investments realized in water (for example in pumps) reaching 10%[6] overall decrease in electricity consumption. Electricity price is in 2011 constant terms. Changes in abstracted water quantities influence overall electricity costs are described below.

[6] This figure is based on discussions with managers of WSSC, where water pumps were already replaced and efficiencies monitored.

- Chemical costs depend on chemicals price and abstracted water quantities. While chemicals price is in 2011 constant terms, changes in quantities of abstracted water influence overall chemical costs.
- Costs for water abstraction fee depend on fee per m3 and abstracted water quantities. While water abstraction fee in m3 is in 2011 constant terms, changes in quantity of abstracted water changes influence the total costs for water abstraction.
- Maintenance costs depend on the existing maintenance costs and additional maintenance costs (1% of all new investments in water supply infrastructure, realized in the previous year).

There is a trade-off between decrease in overall water supply direct costs due to realized savings and increase in water supply direct costs due to increased maintenance costs to reflect proper maintenance practices.

b. <u>Direct O&M costs for sewerage</u>. Those are mainly electricity and maintenance.

- The existing electricity consumption is assumed to decrease proportionally to the investments realized in wastewater pumps but at the same time there will be new consumption due to the extended network. Electricity price is in 2011 constant terms. The change in collected wastewater quantities is described below.
- Maintenance costs depends on existing maintenance costs and additional maintenance costs (1% of all new investments in sewerage infrastructure realized in the previous year).

Similarly to the above there is a trade-off between decrease in overall sewerage direct costs due to realized savings and increase in direct costs due to maintenance costs reflecting proper maintenance practices and increased network.

c. <u>Direct O&M costs for wastewater treatment.</u> Those are mainly electricity, chemicals, wastewater discharge fee and maintenance.

- Rehabilitation of the existing WWTPs and possible electricity savings are offset by the low degree of coverage with treatment services and new WWTP put in operation. There are no savings realized here, but only additional costs. Electricity price is in 2011 constant terms. The change in wastewater treated quantities is described below.
- Chemical costs depend on chemicals price and wastewater treated quantities. Chemicals price is in 2011 constant terms.
- Costs for wastewater discharge fee depend on fee per m3 and treated wastewater quantities. Discharge fee per m3 is in 2011 constant terms.
- Maintenance costs depends on existing maintenance costs and additional maintenance costs (1% of all new investments in WWTP, realized in the year following the investments).

d. <u>Indirect O&M costs</u>. Those are personnel costs, depreciation, provisions and other costs.

- Personnel costs are in 2011 constant terms, assuming two trends: salary increase and personnel decrease reaching European good practices for the sector (except for Business as usual scenario).[7]
- Bad debts are assumed 5% of revenues[8].
- Other expenses are assumed as % of the total expenses less other expenses and depreciation (2011 base). All OPEX that are not explicitly mentioned above are part of other expenses.

Water Quantities:

e. Abstracted water – depends on water sold and NRW.

f. Water sold – depends on water consumption rate and population served (see general assumptions).

g. Non-revenue water (NRW) – depends on real and commercial losses. It is assumed that 10% of initial (2011) NRW is due to commercial losses. Commercial losses decrease with the increase of the per capita consumption and the overall improvement of sales but do not drop below 5% of the current total NRW. Physical losses decrease as a result of the realized investments in water transmission and distribution networks. The base year is 2011. The expected result at the end of the period after realization of all planned corresponding CAPEX is 30%, effective in 2039.

h. Wastewater collected – depends on the % connected users, which depends on the realized investments in sewerage. The base year is 2011. The expected results in the end of the period, in case all CAPEX investments are made, is 100% coverage ratio for households living in agglomerations above 2,000 p.e. within the district.

i. Wastewater treated – depends on the % connected users, which depends on the investments in WWTPs and investments in sewerage. The base year is 2011. The expected results in the end of the period, in case all CAPEX investments are made, is 100% coverage ratio for households users living in agglomerations above 2,000 p.e.

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[7] The general assumption is that salaries will only increase if there is an increase in real GDP (assumed at 3.2% annually on average for the period 2011-2038). Thus, the assumption made means that the personnel will decrease by 3.2% on average on annual basis until it reaches European good practices for the sector of staff per 1000 connections due to improved WSSCs efficiency. At the same time, personnel will increase due to new assets acquired (for instance WWTPs), but the increase is considered to be marginal to the reductions following the consolidation of the WSSCs.

[8] There is lack of sufficient and reliable data for the existing bad debts within the sector. We used data from the audited WSSCs financial reports were available. Most of the data show bad debts of around 5% of revenues. This does not mean that the average collection ratio is 95%. For calculation of collection rate WSSCs use different calculations methodologies: total billed amounts in a period to the total collected amounts from the billed amounts; total billed amounts in a period to total collected amounts in a period etc. Bad debt (as expenditure) refers to revenues that will never be collected – the assumption is for 5% for bad debts for all WSSC for the period 2014-2038.

Tariffs:

j. Affordability – affordable tariff level is calculated following the applicable regulatory methodology: on the basis of income per person per district, number of persons per household for the same district, and on the basis of 2800 l/c/month water consumption. The affordable level for 10 and 10-30 decile of the population is estimated on the basis of information provided by NSI.

k. Tariffs – tariffs forecast for different scenario vary depending on the expenditures incurred. The highest annual tariffs increase is 25%, not applicable for more than three consecutive years. Some WSSC have different tariffs for water supply, while in some districts there are many WSSC (for example, 9 in Pazardjik district) all having different tariffs, which required tariffs aggregation per district. Aggregated tariffs are calculated as total revenues per district divided by total water quantities by type of user and type of service using the information from SEWCR for 2010 and 2011. As a result aggregated tariff is achieved for each district, where at the moment more than one tariff is applied. Tariffs decrease is applied where the end cash in 2038 is too high in comparison to the end cash in 2010 and 2011, and DSCR is above 1.3.

2. **VAT:** All revenues, CAPEX and OPEX costs and etc. calculations in the model are without VAT. VAT is only used when calculating the final tariffs to consumers to properly calculate the affordability level (by applying the regulatory requirements). It is consistent with having VAT on revenues and transferring the VAT to the state, having VAT on CAPEX and OPEX and recovering the VAT from the state. The calculations in the model are VAT neutral.
3. **EU Grant calculations**: EU grant contribution consists of EU grants already committed for 2014-2015 and new EU grants for the next programming period (2014-2020). Existing EU grants are applied to already committed integrated water cycles and WWT projects for the respective district, while the new EU grants are applied based on the following general assumptions:
   a. EU funding from cohesion and rural development funds was estimated based on the existing rules and levels of cohesion and rural development funding, requirements as per draft EU regulations for 2014-2020 and EU guideline for CBA, 2008. The funding was distributed among districts based on the population living in the district (per capita approach);
   b. 100% absorption of the EU grants is assumed.

4. **Loan** assumptions: Loans are applied only for Scenario 4 calculations under the following assumptions: the purpose of loan is to smooth-out tariff increase and reduce government grant amount; two options for loans/credits were used – from IFI and commercial banks. Where applicable, the first option was applied to IFI loans, under the assumption that commercial banks feel more comfortable to provide loans to companies in which IFIs have already demonstrated interest. If IFI loan was not sufficient, then a commercial loan to fill in the remaining funding gap (if any) was applied.

Assumptions	IFI loan	Commercial bank loan
Year start	2014	2017
Total amont	473.5	166.4
Interest rate (all in), %	5%	7%
Tenor, years	25*	15**
Grace, years	3	3

*debt rolled-over in year 15; **debt rolled-over in year 10.

For all the loans no more than three consecutive years of disbursement are considered. A maximum applicable loan per district is equal to 4 times EBITDA as per the corresponding year. Applied DSCR is minimum 1.3. If a WSSC cashflow do not provide for the minimum DSCR or its tariff is already at the socially affordable level, it is considered not capable of borrowing. Only WSSCs (aggregated at district level) that meet simultaneously both requirements are eligible to borrow for the purposes of this analysis.

5. **Government grant:** Government grants are applicable only after exhausting all other possible sources of financing and in case there is still a funding gap.
6. **Subsidies:** Not applicable for water sector in Bulgaria[9].

1.1.5 Data issues

1. Revenues – lack of reliable input data per WSSC for different categories of revenues (per users and in many cases per type of services). We used as a basis the information available in the audited financial 2010 and 2011 reports of the WSSCs published in the Commercial Register.

2. Water quantities – lack of reliable input data per WSSC for water quantities by category of user. The team calculated quantities based on the estimated revenues by type of service and type of users using the corresponding aggregated water tariff for each district.

3. Aggregated tariffs – calculated on the basis of the information provided in the corresponding price decisions of the SEWRC. For the WSSC with more than one tariff for water supply, aggregated tariffs for 2010 and 2011 are calculated on a weighted average basis (revenues divided by water quantities as provided into the respective SEWRC's price decision for the respective years, adjusted for the months for which the corresponding price was applied). The same approach was applied for sewerage and wastewater tariffs per category of users. Aggregated water tariffs per district are further used for the needs of the modelling.

4. The modelling is developed on district level, to correspond to the scope of the investments forecast. For the districts – "oblasts" with more than one operating WSSC, aggregation of the raw data is done. Summation of WSSCs in a district impact water quantities, revenues and costs.

[9] Only transport sector is applicable for subsidies in Bulgaria.

5. For several WSSC, which have significant investments in WWTP in 2011-2013, corresponding adjustments for 2012 and 2013 for costs, revenues and water quantities were made as follows:

   a) Regarding **Ruse, Stara Zagora, Turgovishte, Haskovo**: These WSSC have introduced WWTPs in 2011 and in 2012, therefore there are no history reports on full year operations for 2011. Data for quantities and tariffs, hence revenues from the State Regulator Decisions on WWTP tariffs are being used. Additional quantities are being added for 2012, respectively 2013 depending on months in operation in 2011, respectively 2012.

   b) Regarding **Vidin, Kurdjali, Silistra, Yambol:** These WSSC do not provide WWTP operations up to date of this report. Forecasts for the WWTP quantities are being made on the basis of the forecast for the % connected population; forecasts for the tariffs/revenues/OPEX are being made on a weighted average basis from the latest WWTPs introduced in the country. Quantities, therefore revenues and OPEX are forecasted 2 years after the respective investment on pro rata basis regarding investments done.

Appendix 3: IWA water utility self-assessment methodology applied to Bulgaria

The international water association provides a self-assessment methodology which water utilities may use for benchmarking, see the International Water Utility Efficiency Assessment at http://www.iwahq.org/1q4/themes/managing-utilities/utility-efficiency/utility-efficiency-assesment.htmlThis methodology has provided the starting point for the assessment of water utilities in Bulgaria which has been carried out by POVVIK in collaboration with Witteveen + Bos and the World Bank Bulgaria Country Office staff. Furthermore, the assessment has been inspired by the International Benchmarking Network methodology and data (http://www.ib-net.org/).

The assessment in this report is partly based on self-reported facts from the annual submission of the Water Supply and Sanitation Companies to the SEWRC, partly based on assessments by the consultant, POVVIK. As such individual assessments may be open to clarification and modification. It is not the intention to claim that the individual or overall scores given to a specific utility represent the final truth about that utility.

However, the data presented represent the first unified and transparent attempt to benchmark Bulgarian utilities in a non-anonymous manner. As such it is our hope that the data may provide the starting point for a dialogue on the value of benchmarking and how to enhance governance and efficiency among Bulgarian water utilities, and how to improve the standing of Bulgarian water utilities relative to their international peers.

The following sources of data have been used:

- MRDPW data. Data from the ministry was used for the financial and economic analysis of the WSSCs with majority state ownership. Data for 2009, 2010 and 2011 was provided by the MRDPW along with reports on the implementation of the business plans of WSSCs with majority state ownership – Table No 4 for the annual levels of WSS services for the SEWRC.
- **Information available on the IWA web site and more precisely the International Water Utility Efficiency Assessment matrix.** The matrix was reviewed on the base of the applicability of its indicators in the local context. Moreover, the use of such internationally recognized matrix allows the international comparison of the efficiency of Bulgarian water companies.
- **IBNET database.** The database provides information on important parameters related to the level of efficiency of water companies as: water and sewerage coverage, total and residential water consumption, non-revenue water, average revenue, operational cost, collection period etc. Two main obstacles for using this information were identified: 1/ Last IBNET database year is 2008, i.e. the information is not up-dated and 2/ most of the companies are anonymous (represented as A,B,C etc.). Only Stara Zagora, Turgovishte and Sofiyska voda are officially presented.
- **Business plans of the water companies for the period 2009–2013**. After reviewing all business plans we decided that the information is applicable for the needs of this project. Information in BPs provides good and relatively wide background for assessment.
- **National Strategy for management and development of water sector in Bulgaria.** Special attention was paid on the sections dedicated to the analysis of the water companies as: institutional capacity, current financial status. The conclusions made in this

Strategy were carefully investigated, as well as the strategic goals for water sector development in this document.

- **Data from SEWRC.** After reviewing the initial data and making analysis of its applicability to our project goals, a need for more recent data appears, as the assessment of the efficiency of the water companies is much more useful based on recent information. For that purpose the World Bank acquired last reported data from the Regulator – "Target Levels" for 2011.

Table 3 Indicators from three sources: IWA, IBNET and this report

Performance Area	IWA indicators	IBNET indicators	World Bank/POVVIK
Governance			Quality of Business Plan/Strategy
			PR/Customer communications
			Quality control/Quality management
Human resources			Recruitment and staffing levels
			Staff training and education programs
			Remuneration level
Accountability to customers			Service coverage WS
			Service coverage – WWC
			Service coverage – WWT
			Continuity of service
			Water quality – physio chemical
			Water quality - microbiological
Financial			Working ratio

			Operating Unit costs
			Creditworthiness
Commercial			Collection ratio
			Collection period
			Metering
			Customer information
Technical			Non-revenue water
			Regular maintenance
			Breakages

Table 4 Indicators, values and criteria used

Performance Area	Indicator	Score	Criteria / Benchmarks
Corporate Governance	Quality of Business Plan/Strategy	1	None
		2	In relation to some activities
		3	Some departments have documented mission statement
		4	Most departments have documented mission statement
		5	Mission statement at utility level and in all departments
	PR/Customer communications	1	No dedicated PR person, no website, no communication tools and policy
		2	Some PR actions are taken but without any formalized policy and no established tools
		3	PR actions do exist on a permanent basis, with website, but no policy is in place
		4	PR tools and actions exist, including website, and are regularly activated and updated
		5	PR recognized as a full process, website, communication tools, and formalized policy is in place
	Quality control/Quality management	1	No procedures or certificates for quality control
		2	Some internal procedures for quality control
		3	Internal procedures for quality control signed by the management
		4	ISO certificates

Performance Area	Indicator	Score	Criteria / Benchmarks
		5	EMS certificate
Human Resources	Recruitment and staffing levels	1	Above 9 per 1000 water connections
		2	Between 9 and 7 per 1000 water connections
		3	Between 7 and 5 per 1000 water connections
		4	Between 5 and 3 per 1000 water connections
		5	Below 3 per 1000 water connections
	Staff training and education programs	1	No staff training or education and no related budget
		2	Basic training for some functions provided, mostly on-the-job training
		3	Limited staff training and capacity building, availability of a minimal education plan
		4	Actively managed staff training and capacity building, availability of education plan, staff encouraged to make own suggestions
		5	Actively managed staff training and capacity building, comprehensive and budgeted education plan, staff encouraged to make own suggestions, participation in third party courses, participation in conferences possible
	Remuneration level	1	Average remuneration level below 550 BGN
		2	Average remuneration level between 550 and 650 BGN
		3	Average remuneration level between 650 and 750 BGN
		4	Average remuneration level between 750 and 850 BGN
		5	Average remuneration level above 850 BGN
Accounta-	Service coverage - *water supply*	1	Water supply below 96%
		2	Water supply between 96% and 97%
		3	Water supply between 97% and 98%
		4	Water supply between 98% and 99%
		5	Water supply above 99%
	Service coverage - *wastewater collection*	1	Waste water collection below 20%
		2	Waste water collection between 20% and 40%
		3	Waste water collection between 40% and 60%
		4	Waste water collection between 60% and 80%
		5	Waste water collection above 80%
	Service coverage - *wastewater treatment*	1	Waste water treatment below 20%
		2	Waste water treatment between 20% and 40%
		3	Waste water treatment between 40% and 60%
		4	Waste water treatment between 60% and 80%
		5	Waste water treatment above 80%
	Continuity of service	1	Inadequate water pressure is chronic, or hours of supply are limited
		2	Inadequate water pressure is chronic in several areas, supply is not 24/7

Perfor-mance Ar-ea	Indicator	Score	Criteria / Benchmarks
bility to Customers		3	Inadequate water pressure is chronic in some of the service area, or there are frequent service disruptions
		4	Mostly demand driven level of service, but service disrup-tion objectives are not met
		5	Demand driven level of service to agreed targets; 24/7 supply
	Water quality - *physiochemical and radiologi-cal indicators*	1	Less than 95% of tests compliant with regulations
		2	
		3	
		4	
		5	More than 95% of tests compliant with regulations
	Water quality - - *microbiologi-cal indicators*	1	Less than 95% of tests compliant with regulations
		2	
		3	
		4	
		5	More than 95% of tests compliant with regulations
Financial	Working ratio (Opex/Op-Rev)	1	Above 1.00
		2	Between 1.00 and 0.90
		3	Between 0.90 and 0.80
		4	Between 0.80 and 0.70
		5	Below 0.70
	Operating unit cost (Opex/Water sold)	1	Above 2.00
		2	Between 2.00 and 1.50
		3	Between 1.50 and 1.00
		4	Between 1.00 and 0.80
		5	Below 0.80
	Creditworthi-ness	1	Utility has no rating or no access to credit
		2	Utulity has access to local and limited credit under its owner's guarantee
		3	Utulity has access to limited international credit under its owner's guarantee or to local credit
		4	Utulity has access to limited international credit without its owner's guarantee
		5	Utulity has an investment grade credit rating and has ac-cess to banks and competitive offers
Commer-	Collection ef-ficiency- *collection ratio*	1	Less than 70% of bills actually collected
		2	Between 70% and 80% of bills actually collected
		3	Between 80% and 90% of bills actually collected
		4	Between 90% and 99% of bills actually collected
		5	More than 99% of bills actually collected
	Collection ef-ficiency- *collection pe-*	1	Average collection period above 90 days
		2	Average collection period between 90 and 60 days
		3	Average collection period between 60 and 45 days

Performance Area	Indicator	Score	Criteria / Benchmarks
cial	*riod* (days receivables outstanding)	4	Average collection period between 45 and 30 days
		5	Average collection period below 30 days
	Customer metering	1	No metering
		2	Limited metering
		3	All industrial clients are metered; not all domestic clients are metered; no metering of public clients
		4	All customers are metered. No regular testing and calibration of meters. No scheduled meters replacement
		5	All customers are metered. Regular testing and calibration of meters. Scheduled meters replacement
	Customer information	1	Paper customers files, not updated
		2	Computerized customers database, not updated
		3	Computerized customers database, regularly updated
		4	Computerized customers database, internal quality control system
		5	Computerized customers database, internal quality control system. Total control of customers database evolution. Customer relationship management.
Technical	Non-revenue water management (NRW/Water delivered)	1	Above 0.60
		2	Between 0.60 and 0.50
		3	Between 0.50 and 0.40
		4	Between 0.40 and 0.30
		5	Below 0.30
	Maintenance level – *number of timely completed interruptions / planned interruptions*	1	Below 0.60
		2	Between 0.60 and 0.70
		3	Between 0.70 and 0.80
		4	Between 0.80 and 0.90
		5	Above 0.90
	Maintenance level - *number of timely completed planned interruptions per 1000 connections*	1	Below 1.50
		2	Between 1.50 and 3.00
		3	Between 3.00 and 4.00
		4	Between 4.00 and 5.50
		5	Above 5.50
	Level of asset management – number of breakages per 1000 connections	1	Above 120
		2	Between 120 and 90
		3	Between 90 and 60
		4	Between 60 and 30
		5	Below 30

Appendix 4: Data on Current Situation in the WSS Sector

The table below illustrates the total population and the share living in agglomerations with a population and economic activity that corresponds to more than 2,000 person equivalent (p.e.). As of end of 2011, 75% (about 5.5 million people) of the population of Bulgaria lives in settlements with population greater than 2,000 PE. The table illustrates that the share of the population, which lives in agglomerations that require wastewater collection as per the UWWTD, differs significantly between different districts. This has implications for the investment requirements in these districts.

Table 5: Overall population and population living in settlements >2,000 per district

#	District (Oblast)	Overall population	Population > 2,000 PE	
			#	%
1	Blagoevgrad	322,025	233,683	96%
2	Burgas	414,947	324,206	78%
3	Varna	474,344	396,136	84%
4	Veliko Turnovo	256,279	174,572	68%
5	Vidin	99,481	62,823	63%
6	Vratsa	184,662	126,066	68%
7	Gabrovo	121,389	98,430	81%
8	Dobrich	188,088	134,591	72%
9	Kurdjali	152,009	64,035	42%
10	Kyustendil	134,990	95,837	71%
11	Lovech	139,609	89,539	64%
12	Montana	145,984	91,592	63%
13	Pazardjik	273,803	205,941	75%
14	Pernik	131,987	105,635	80%
15	Pleven	266,865	168,501	63%
16	Plovdiv	680,884	517,977	76%
17	Razgrad	123,600	60,082	49%
18	Ruse	233,767	179,733	77%
19	Silistra	118,433	74,679	63%
20	Sliven	196,712	130,180	66%
21	Smolian	120,456	77,717	65%

#	District (Oblast)	Overall population	Population > 2,000 PE	
			#	%
22	Sofia oblast	245,616	171,890	70%
23	Sofia Grad	1,296,615	1,225,158	94%
24	Stara Zagora	331,135	232,565	70%
25	Turgovishte	119,865	73,611	61%
26	Haskovo	243,955	175,532	72%
27	Shumen	179,668	113,146	63%
28	Yambol	130,056	112,390	86%
Total		**7,329,235**	**5,516,247**	**75%**

Sources: MoEW Report on the implementation of 91/271/EC Directive

Table 6: Current WWC coverage and population to be connected to WWC per district

#	District (Oblast)	Population connected to WWC (of the pop. >2,000 PE)		Population > 2,000 PE to be connected to WWC	
		#	%	#	%
2	Blagoevgrad	224,129	96%	9,554	4%
2	Burgas	285,118	88%	39,088	12%
3	Varna	353,237	89%	42,899	11%
4	Veliko Turnovo	157,454	90%	17,118	10%
5	Vidin	41,812	67%	21,011	33%
6	Vratsa	94,201	75%	31,865	25%
7	Gabrovo	88,095	90%	10,335	10%
8	Dobrich	102,030	76%	32,561	24%
9	Kurdjali	51,804	81%	12,231	19%
10	Kyustendil	93,075	97%	2,762	3%
11	Lovech	52,565	59%	36,974	41%
12	Montana	73,610	80%	17,982	20%
13	Pazardjik	193,520	94%	12,421	6%
14	Pernik	60,157	57%	45,478	43%
15	Pleven	137,392	82%	31,109	18%

#	District (Oblast)	Population connected to WWC (of the pop. >2,000 PE)		Population > 2,000 PE to be connected to WWC	
		#	%	#	%
16	Plovdiv	444,624	86%	73,353	14%
17	Razgrad	37,353	62%	22,729	38%
18	Ruse	148,368	83%	31,365	17%
19	Silistra	65,186	87%	9,493	13%
20	Sliven	113,267	87%	16,913	13%
21	Smolian	71,030	91%	6,687	9%
22	Sofia oblast	162,102	94%	9,788	6%
23	Sofia Grad	1,133,809	93%	91,349	7%
24	Stara Zagora	227,074	98%	5,491	2%
25	Turgovishte	70,234	95%	3,377	5%
26	Haskovo	158,427	90%	17,105	10%
27	Shumen	108,454	96%	4,692	4%
28	Yambol	99,274	88%	13,116	12%
Total		**4,847,401**	**66%**	**668,846**	**12%**

Sources: WYG (2013) based on MoEW Report on the implementation of 91/271/EC Directive

Table 7: Current WWT coverage and population to be connected to WWT per district

#	District (Oblast)	Population connected to WWT (of the pop. >2,000 PE)		Population > 2,000 PE to be connected to WWT	
		#	%	#	%
2	Blagoevgrad	143,813	62%	89,870	38%
2	Burgas	212,173	65%	112,033	35%
3	Varna	316,927	80%	79,209	20%
4	Veliko Turnovo	81,658	47%	92,914	53%
5	Vidin	0	0%	62,823	100%
6	Vratsa	54,312	43%	71,754	57%
7	Gabrovo	63,185	64%	35,245	36%
8	Dobrich	101,466	75%	33,125	25%

#	District (Oblast)	Population connected to WWT (of the pop. >2,000 PE)		Population > 2,000 PE to be connected to WWT	
		#	%	#	%
9	Kurdjali	0	0%	64,035	100%
10	Kyustendil	71,290	74%	24,547	26%
11	Lovech	49,558	55%	39,981	45%
12	Montana	73,610	80%	17,982	20%
13	Pazardjik	90,350	44%	115,591	56%
14	Pernik	51,681	49%	53,954	51%
15	Pleven	109,930	65%	58,571	35%
16	Plovdiv	331,403	64%	186,574	36%
17	Razgrad	37,353	62%	22,729	38%
18	Ruse	140,121	78%	39,612	22%
19	Silistra	0	0%	74,679	100%
20	Sliven	109,716	84%	20,464	16%
21	Smolian	42,269	54%	35,448	46%
22	Sofia oblast	33,414	19%	138,476	81%
23	Sofia Grad	1,125,395	92%	99,763	8%
24	Stara Zagora	170,923	73%	61,642	27%
25	Turgovishte	58,819	80%	14,792	20%
26	Haskovo	130,636	74%	44,896	26%
27	Shumen	63,188	56%	49,958	44%
28	Yambol	0	0%	112,390	100%
Total		**3,663,190**	**66%**	**1,853,057**	**34%**

Source: WYG (2013)

Table 8: Proportion of people currently connected to WWC that have WWT too

#	District (Oblast)	Population already connected to WWC that have WWT too		Population already connected to WWC that require WWT	
		#	%	#	%
2	Blagoevgrad	224,129	64%	143,813	36%

#	District (Oblast)	Population already connected to WWC that have WWT too		Population already connected to WWC that require WWT	
		#	%	#	%
2	Burgas	285,118	74%	212,173	26%
3	Varna	353,237	90%	316,927	10%
4	Veliko Turnovo	157,454	52%	81,658	48%
5	Vidin	41,812	0%	0	100%
6	Vratsa	94,201	58%	54,312	42%
7	Gabrovo	88,095	72%	63,185	28%
8	Dobrich	102,030	99%	101,466	1%
9	Kurdjali	51,804	0%	0	100%
10	Kyustendil	93,075	77%	71,290	23%
11	Lovech	52,565	94%	49,558	6%
12	Montana	73,610	100%	73,610	0%
13	Pazardjik	193,520	47%	90,350	53%
14	Pernik	60,157	86%	51,681	14%
15	Pleven	137,392	80%	109,930	20%
16	Plovdiv	444,624	75%	331,403	25%
17	Razgrad	37,353	100%	37,353	0%
18	Ruse	148,368	94%	140,121	6%
19	Silistra	65,186	0%	0	100%
20	Sliven	113,267	97%	109,716	3%
21	Smolian	71,030	60%	42,269	40%
22	Sofia oblast	162,102	21%	33,414	79%
23	Sofia Grad	1,133,809	99%	1,125,395	1%
24	Stara Zagora	227,074	75%	170,923	25%
25	Turgovishte	70,234	84%	58,819	16%
26	Haskovo	158,427	82%	130,636	18%

#	District (Oblast)	Population already connected to WWC that have WWT too		Population already connected to WWC that require WWT	
		#	%	#	%
27	Shumen	108,454	58%	63,188	42%
28	Yambol	99,274	0%	0	100%
Total		**4,847,401**	**76%**	**3,663,190**	**24%**

Source WYG (2013)

Quality of water in big water supply zones (zones that supply more than 1000 m^3 water per day and/or supply more than 5000 people connected constantly to the water supply system

Parameter	2007					2008					2009					2010				
	zones where the indicator has been tested	zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	complian ce %	zones where the indicator has been tested	of zones with deviatio	Total number of analyses	number of non-compliant analyses	complian ce %	zones where the indicator has been tested	of zones with deviatio ns from	Total number of analyses	number of non-compliant analyses	complianc e %	zones where the indicator has been tested б	of zones with deviation s from	Total number of analyses	number of non-compliant analyses	complian ce %
Escherichia coli	235	71	26,516	243	99	253	58	24,896	179	99	199	54	18,816	186	99	196	69	17,803	355	98
enterococci	232	22	6,058	53	99	249	21	5,836	65	99	186	16	4,754	25	99	183	19	4,763	23	100
antimony	39	0	199	0	100	62	0	251	0	100	111	0	1,731	0	100	126	0	1,638	0	100
Arsenic	160	0	773	0	100	195	0	725	0	100	185	0	2,116	0	100	178	0	1,957	0	100
benzene	27	0	95	0	100	49	0	109	0	100	89	0	249	0	100	131	0	347	0	100
Benzo (a) pyrene	24	0	103	0	100	46	0	89	0	100	94	0	259	0	100	112	0	313	0	100
Boron	86	0	451	0	100	131	0	597	0	100	131	0	736	0	100	154	0	697	0	100
Bromates	1	0	1	0	100	17	0	54	0	100	5	0	5	0	100	15	0	40	0	100
cadmium	181	0	916	0	100	213	0	871	0	100	181	0	2,094	0	100	177	0	2,005	0	100
Chromium	220	0	1,401	0	100	234	0	1,323	0	100	190	0	2,456	0	100	187	0	2,398	0	100
Copper	223	0	1,250	0	100	242	0	1,183	0	100	192	0	2,304	0	100	180	0	2,180	0	100
Cyanides	152	0	799	0	100	143	0	823	0	100	137	0	830	0	100	171	0	903	0	100
1,2-Dichloroethane	20	0	84	0	100	48	0	119	0	100	89	0	249	0	100	134	0	393	0	100
Fluorides	215	0	1,412	0	100	234	0	1,389	0	100	184	1	1,100	1	100	182	0	1,017	0	100
Lead	179	0	943	0	100	226	0	890	0	100	190	0	2,136	0	100	180	0	2,013	0	100
mercury	24	0	91	0	100	34	0	76	0	100	90	0	261	0	100	130	0	328	0	100
nickel	116	0	462	0	100	138	0	679	0	100	168	0	2,057	0	100	168	0	2,027	0	100
Nitrates	235	21	17,563	203	99	251	24	19,055	305	98	198	23	14,022	255	98	196	24	12,992	207	98
Nitrates output treatment plants	21	1	10,256	5	100	28	0	10,784	0	100	24	0	3,000	0	100	19	0	3,291	0	100
Nitrates at consumer's tap	235	3	23,176	10	100	253	1	23,518	2	100	199	1	17,111	11	100	196	1	16,558	1	100
Nitrates/Nitrites formula	235	22	17,563	204	99	226	24	19,055	305	98	199	28	14,000	295	98	196	27	12,946	240	98
Pesticites - total	35	0	2,961	0	100	63	0	150	0	100	118	0	302	0	100	137	0	442	0	100
Polycyclic aromatic hydrocarbons	28	0	92	0	100	42	0	65	0	100	92	0	257	0	100	113	0	316	0	100
selenium	74	0	328	0	100	100	0	351	0	100	147	0	1,837	0	100	159	0	1,751	0	100
Tetrachloride and trichloroethane	20	0	84	0	100	46	0	112	0	100	89	0	248	0	100	134	0	391	0	100
trihalomethanes- total	37	0	139	0	100	55	0	170	0	100	100	0	264	0	100	139	1	402	1	100
aluminum	166	2	3,088	6	100	170	2	5,438	4	100	167	0	5,190	0	100	162	1	5,602	47	99
ammonia ion	235	2	32,106	11	100	253	3	23,049	21	100	199	2	17,154	22	100	196	3	16,810	3	100
Chlorides	234	0	9,866	0	100	251	1	10,957	1	100	197	0	6,008	0	100	196	1	5,710	2	100
Clostridium perfringence	76	1	1,275	1	100	88	1	1,744	1	100	87	5	3,161	11	100	104	4	3,079	14	100
conductance	226	0	17,255	0	100	251	0	20,086	0	100	198	0	16,123	0	100	196	0	15,976	0	100
Active reaction (pH)	235	1	22,075	3	100	253	1	22,060	1	100	199	8	16,950	12	100	196	8	16,688	12	100
Iron	234	24	8,221	60	99	251	22	9,753	58	99	196	20	7,582	94	99	195	22	7,559	282	96
Manganese	235	16	16,171	409	97	251	15	17,033	334	98	198	20	14,522	302	98	196	25	14,386	279	98
oxidation	230	3	10,552	6	100	253	4	11,102	51	100	197	6	7,289	213	97	196	10	7,386	245	97
sulphates	232	1	2,100	7	100	251	3	1,801	13	99	192	2	1,440	10	99	190	2	1,189	3	100
sodium	81	0	430	0	100	83	0	425	0	100	102	0	466	0	100	139	0	513	0	100
coliforms	235	127	26,010	757	97	253	127	23,961	1,102	95	199	92	18,816	653	97	196	80	17,799	704	96
tritium	1	0	1	0	100	16	0	5	0	100	35	0	114	0	100	44	0	68	0	100
Total indicative dose	97	0	174	0	100	47	0	78	0	100	58	0	96	0	100	59	0	110	0	100
Colour	235	18	23,097	49	100	253	19	21,742	47	100	199	14	16,818	33	100	196	22	16,802	65	100
Odour	235	6	2,274	16	100	253	4	21,597	5	100	199	11	17,128	25	100	196	7	16,860	11	100
Taste	235	4	21,686	10	100	253	4	20,719	6	100	198	11	15,688	22	100	195	6	15,540	12	100
Number of colonies at 220C	175	4	6,814	7	100	198	7	5,610	34	99	181	21	5,843	106	98	178	20	4,332	87	98
Total organic carbon	6	0	23	0	100	30	0	322	0	100	23	0	87	0	100	28	0	160	0	100
Turbidity	234	35	22,188	286	99	242	34	22,395	202	99	198	31	16,474	474	97	195	46	16,519	749	95

Quality of water in small water supply zones – category 3[10]

Parameter	2009					2010				
	zones where the indicator has been tested	zones with deviation from the	Total number of analyses	number of non-compliant analyses	complianc e %	number of zones where the indicator has been tested	zones with deviation from the	Total number of analyses	number of non-compliant analyses	complian ce %
Aluminum	207	0	578	0	100	211	1	536	1	100
Arsenic	212	1	438	1	100	222	1	464	26	94
Boron	177	0	331	0	100	196	0	378	0	100
Benzo (a) pyrene	82	0	102	0	100	129	0	167	0	100
benzene	81	0	99	0	100	143	0	178	0	100
Bromates	0	0	0	0	0	8	0	8	0	100
Number of colonies at 22^oC	228	14	632	17	97	229	13	643	17	97
cadmium	218	0	429	0	100	229	0	465	0	100
chlorides	252	1	1,875	1	100	263	1	2,031	2	100
Clostridium perfringence	102	0	390	0	100	108	2	404	2	100
Cyanides	167	0	352	0	100	217	0	463	0	100
coliforms	259	116	4,600	250	95	263	93	4,381	203	95
Colour	260	4	4,300	8	100	263	13	4,275	20	100
Chromium	236	4	636	22	97	239	2	635	11	98
Copper	234	0	515	0	100	243	0	541	0	100
1,2-Dichloroethane	74	0	95	0	100	150	0	189	0	100
Conductivity	260	0	4,199	0	100	263	0	3,970	0	100
enterococci	238	15	910	16	98	246	12	945	15	98
Escherichia coli	259	46	4,597	79	98	263	64	4,374	158	96
Fluorides	237	2	566	16	97	237	2	575	20	97
Iron	251	8	1,695	15	99	258	13	1,584	18	99
Mercury	82	0	117	0	100	133	0	184	0	100
Manganese	253	10	3,662	81	98	263	10	3,623	92	97
sodium	96	0	149	0	100	172	0	261	0	100
ammonia ion	260	1	4,519	28	99	263	4	4,278	16	100
nickel	192	0	363	0	100	216	0	440	0	100
Nitrates at consumer's tap	260	2	4,500	38	99	263	3	4,221	15	100
Nitrates output treatment plants	19	0	115	0	100	21	0	95	0	100
Nitrates	253	41	4,244	353	92	263	49	3,880	390	90
Odour	260	7	4,495	14	100	263	3	4,301	3	100
oxidation	258	0	1,709	0	100	260	0	1,554	0	100
Polycyclic aromatic hydrocarbons	82	0	102	0	100	129	0	167	0	100
Lead	229	0	453	0	100	238	0	482	0	100
Active reactions (pH)	260	10	4,524	15	100	263	5	4,295	6	100
antimony	113	1	188	1	99	161	0	245	0	100
selenium	146	0	251	0	100	191	1	307	1	100
Sulphates	243	2	599	5	99	243	2	626	4	99
Taste	257	2	3,984	6	100	261	4	3,739	5	100
trihalomethanes- total	84	0	116	0	100	157	0	194	0	100
Total indicative dose	42	0	53	0	100	98	0	120	0	100
Total organic carbon	4	0	5	0	100	6	1	15	5	67
Tetrachloride and trichloroethane	82	0	103	0	100	150	0	188	0	100
tritium	34	0	40	0	100	46	0	51	0	100
Turbidity	258	11	4,340	26	99	262	27	4,240	48	99
Pesticides -total	115	0	148	0	100	169	0	248	0	100

[10] Small water supply zones: category 3 (small zones supplying water from 400 to 1000 m^3 per day), category 2 (small zones supplying water from 100 to 400 m^3 per day), category 1 (small zones supplying water from 10 to 100 m^3 per day) and category 0 (small zones supplying water below 10 m^3 per day).

Quality of water in small water supply zones – category 2

Parameter	2009					2010				
	number of zones where the indicator has been tested	zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	complianc e %	number of zones where the indicator has been tested	of zones with deviation from the norms	Total number of analyses	number of non-compliant analyses	complianc e %
Aluminum	561	0	1,227	0	100	564	0	1,103	0	100
Arsenic	550	2	863	3	100	578	0	967	0	100
Boron	457	0	687	0	100	526	0	859	0	100
Benzo (a) pyrene	144	0	150	0	100	311	0	385	0	100
Bensene	137	0	142	0	100	343	0	419	0	100
Bromates	1	0	1	0	100	31	0	32	0	100
Number of colonies at 22°C	598	50	1,252	82	93	621	32	1,282	33	97
cadmium	550	0	811	0	100	593	0	991	0	100
chlorides	681	2	3,484	3	100	717	2	3,719	11	100
Clostridium perfringence	249	5	601	5	99	265	7	664	8	99
Cyanides	414	0	776	0	100	556	0	1,035	0	100
Колиформи	707	255	8,291	591	93	723	246	8,446	485	94
Colour	707	10	7,979	15	100	723	17	8,434	21	100
Chromium	642	13	1,307	59	95	633	13	1,394	67	95
Copper	604	0	1,064	0	100	652	0	1,217	0	100
1,2-Dichloroethane	122	0	128	0	100	346	0	423	0	100
Conductivity	706	1	7,588	5	100	723	1	7,838	4	100
enterococci	625	23	1,603	23	99	654	32	1,717	34	98
Escherichia coli	707	105	8,301	171	98	723	191	8,434	354	96
Fluorides	621	3	1,148	4	100	633	4	1,262	10	99
Iron	677	18	3,439	44	99	692	17	3,249	31	99
Mercury	133	0	160	0	100	274	0	345	0	100
Manganese	681	20	6,649	42	99	719	22	6,864	30	100
sodium	193	0	233	0	100	390	0	557	0	100
ammonia ion	707	1	8,396	1	100	723	5	8,454	6	100
nickel	467	0	688	0	100	564	0	981	0	100
Nitrates at consumer's tap	707	3	8,388	3	100	723	0	8,383	0	100
Nitrates output treatment plants	24	0	105	0	100	19	0	100	0	100
Nitrates	684	107	7,966	612	92	722	120	7,650	693	91
Odour	707	20	8,370	34	100	723	6	8,497	7	100
oxidation	699	1	3,657	1	100	710	1	3,684	1	100
Polycyclic aromatic hydrocarbons	143	0	149	0	100	310	0	384	0	100
Lead	585	0	889	0	100	639	0	1,072	0	100
Active reactions (pH)	707	6	8,405	16	100	723	7	8,492	20	100
antimony	190	0	241	0	100	333	0	454	0	100
selenium	273	0	383	0	100	398	1	622	1	100
Sulphates	646	2	1,215	3	100	646	4	1,285	6	100
Taste	703	14	7,555	21	100	719	6	7,704	6	100
trihalomethanes- total	136	0	143	0	100	347	0	426	0	100
Total indicative dose	109	0	132	0	100	216	0	245	0	100
Total organic carbon	15	0	19	0	100	15	0	18	0	100
Tetrachloride and trichloroethane	136	0	142	0	100	346	0	423	0	100
tritium	21	0	22	0	100	145	0	151	0	100
Turbidity	704	32	7,927	41	99	720	50	8,274	69	99
Pesticides -total	220	0	239	0	100	412	0	529	0	100

Quality of water in small water supply zones – category 1

Parameter	2009					2010				
	zones where the indicator has been tested	zones with deviation from the	Total number of analyses	number of non-compliant analyses	compliance %	zones where the indicator has been tested	zones with deviation from the	Total number of analyses	number of non-compliant analyses	complianc e %
Aluminum	851	0	1,661	0	100	828	0	1,532	0	100
Arsenic	821	1	1,123	1	100	845	1	1,220	13	99
Boron	612	1	836	1	100	696	1	1,058	1	100
Benzo (a) pyrene	160	0	167	0	100	279	0	327	0	100
Bensene	159	0	166	0	100	349	0	396	0	100
Bromates	0	0	0	0	0	22	0	23	0	100
Number of colonies at 22°C	927	152	2,208	266	88	967	85	2,059	106	95
cadmium	832	0	1,112	0	100	868	0	1,229	0	100
chlorides	1,092	0	4,844	0	100	1,187	0	5,365	0	100
Clostridium perfringence	374	8	886	8	99	365	22	879	24	97
Cyanides	711	0	1,216	0	100	896	0	1,516	0	100
Колиформи	1,148	447	9,452	1,024	89	1,202	425	9,984	838	92
Colour	1,146	18	9,223	27	100	1,203	36	10,079	55	99
Chromium	978	4	1,708	18	99	970	3	1,858	13	99
Copper	914	0	1,488	0	100	963	0	1,643	0	100
1,2-Dichloroethane	152	0	158	0	100	350	0	399	0	100
Conductivity	1,147	0	9,015	0	100	1,200	0	9,612	0	100
enterococci	962	63	1,945	65	97	1,011	87	2,291	92	96
Escherichia coli	1,148	243	9,487	406	96	1,202	337	10,019	760	92
Fluorides	933	4	1,557	7	100	949	3	1,707	8	100
Iron	1,061	23	4,343	57	99	1,086	23	4,302	57	99
Mercury	198	0	225	0	100	263	0	316	0	100
Manganese	1,083	29	8,290	98	99	1,162	26	8,810	127	99
sodium	214	0	239	0	100	384	0	499	0	100
ammonia ion	1,150	7	9,639	36	100	1,202	8	10,088	28	100
nickel	707	0	1,010	0	100	751	0	1,220	0	100
Nitrates at consumer's tap	1,150	1	9,637	3	100	1,203	4	9,989	4	100
Nitrates output treatment plants	60	0	373	0	100	55	0	392	0	100
Nitrates	1,106	176	9,176	962	90	1,198	180	9,226	920	90
Odour	1,150	49	9,634	62	99	1,203	31	10,148	49	100
oxidation	1,111	5	5,218	5	100	1,115	8	5,341	10	100
Polycyclic aromatic hydrocarbons	160	0	167	0	100	286	0	335	0	100
Lead	859	2	1,192	2	100	890	0	1,283	0	100
Active reactions (pH)	1,151	16	9,661	27	100	1,203	14	10,146	30	100
antimony	296	1	344	1	100	335	0	415	0	100
selenium	442	0	532	0	100	467	0	614	0	100
Sulphates	1,003	5	1,662	5	100	995	5	1,816	7	100
Taste	1,143	36	8,613	45	99	1,194	31	9,200	36	100
trihalomethanes- total	169	0	176	0	100	359	0	409	0	100
Total indicative dose	130	0	136	0	100	231	0	247	0	100
Total organic carbon	11	0	13	0	100	29	0	35	0	100
Tetrachloride and trichloroethane	154	0	161	0	100	350	0	399	0	100
tritium	30	0	40	0	100	104	0	109	0	100
Turbidity	1,139	55	8,812	88	99	1,197	91	9,584	140	99
Pesticides -total	249	0	266	0	100	401	0	462	0	100

Quality of water in small water supply zones – category 0

Parameter	2009					2010				
	zones where the indicator has been tested	zones with deviation from the	Total number of analyses	number of non-compliant analyses	compliance %	zones where the indicator has been tested	zones with deviation from the	Total number of analyses	number of non-compliant analyses	complian ce %
Aluminum	169	0	270	0	100	177	0	261	0	100
Arsenic	145	0	161	0	100	125	0	142	0	100
Boron	126	0	154	0	100	128	0	157	0	100
Benzo (a) pyrene	38	0	40	0	100	52	0	55	0	100
Bensene	38	0	40	0	100	55	0	58	0	100
Bromates	1	0	1	0	100	1	0	1	0	100
Number of colonies at 22°C	204	20	388	22	94	211	17	391	18	95
cadmium	158	0	190	0	100	146	0	179	0	100
chlorides	250	0	965	0	100	263	0	1,155	0	100
Clostridium perfringence	59	0	166	0	100	40	1	116	1	99
Cyanides	171	0	233	0	100	161	0	224	0	100
Колиформи	258	136	1,393	230	83	274	119	1,576	237	85
Colour	260	8	1,398	8	99	272	19	1,568	24	98
Chromium	199	0	280	0	100	181	0	287	0	100
Copper	193	0	259	0	100	182	0	244	0	100
1,2-Dichloroethane	38	0	40	0	100	56	0	59	0	100
Conductivity	248	0	1,313	0	100	273	0	1,571	0	100
enterococci	201	17	355	20	94	223	35	436	36	92
Escherichia coli	258	70	1,403	95	93	274	101	1,583	175	89
Fluorides	201	0	285	0	100	176	0	276	0	100
Iron	237	3	696	7	99	249	13	685	13	98
Mercury	59	0	62	0	100	32	0	34	0	100
Manganese	252	2	1,212	2	100	264	5	1,404	6	100
sodium	12	0	13	0	100	35	0	36	0	100
ammonia ion	260	2	1,389	2	100	273	1	1,574	1	100
nickel	135	0	166	0	100	123	0	171	0	100
Nitrates at consumer's tap	260	0	1,398	0	100	273	0	1,558	0	100
Nitrates output treatment plants	18	0	119	0	100	17	0	110	0	100
Nitrates	260	4	1,310	19	99	271	10	1,422	42	97
Odour	260	20	1,404	24	98	273	25	1,580	38	98
oxidation	240	0	883	0	100	250	2	1,033	2	100
Polycyclic aromatic hydrocarbons	38	0	40	0	100	52	0	55	0	100
Lead	160	0	194	0	100	146	0	181	0	100
Active reactions (pH)	260	2	1,406	3	100	273	3	1,579	4	100
antimony	77	0	79	0	100	56	0	56	0	100
selenium	114	0	120	0	100	85	0	91	0	100
Sulphates	209	0	311	0	100	193	0	293	0	100
Taste	254	20	1,259	24	98	269	14	1,447	14	99
trihalomethanes- total	38	0	40	0	100	56	0	59	0	100
Total indicative dose	33	0	33	0	100	42	0	43	0	100
Total organic carbon	1	0	1	0	100	2	0	2	0	100
Tetrachloride and trichloroethane	38	0	40	0	100	56	0	59	0	100
tritium	40	0	41	0	100	7	0	10	0	100
Turbidity	255	13	1,243	18	99	271	37	1,503	48	97
Pesticides -total	46	0	48	0	100	58	0	61	0	100

Breakdown of water quality per regional health inspectorate

RHI	Number of water sources for the supply of drinking water	Of them :open water sources		Number of stations of the water supply network of the settlements	Monitoring				Analyses conducted							
										Under the SHC						
		Number	Of them: with treatment facilities		Number of samples under the continuous monitoring indicators	Of them : complying with Ordinance № 9	Number of samples under the periodic monitoring indicators	Of them : complying with Ordinance № 9	All tests conducted	Number of samples under the chemical, organoleptic and radiological indicators	Of them: complying with Ordinance № 9	% non-compliant	Number of samples under the microbiological indicators	Of them: complying with Ordinance № 9	% non-compliant	Upon requests
2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
BLAGOEVGRAD	232	32	4	493	1 195	1 152	119	110	19 980	12 050	11 975	0.62%	4 029	3 970	1.46%	3 901
BOURGAS	284	2	2	520	709	582	64	41	13 782	8 834	8 795	0.44%	1 674	1 562	6.69%	3 274
VARNA	324			337	724	676	74	56	17 919	8 062	7 973	1.10%	2 716	2 667	1.80%	7 141
VELIKO TURNOVO	226	1	1	259	273	232	59	39	9 936	5 722	5 631	1.59%	1 447	1 447		2 767
VIDIN	65	3		257	120	117	43	41	3 853	2 524	2 524		424	419	1.18%	905
VRATSA	189			261	557	526	64	60	12 275	9 369	9 334	0.37%	1 529	1 465	4.19%	1 377
GABROVO	328	18	12	406	559	511	132	102	9 600	7 800	7 693	1.37%	1 432	1 362	4.89%	368
DOBRICH	186			414	532	450	88	66	10 910	8 192	8 106	1.05%	1 316	1 267	3.72%	1 402
KURDZHALI	111	2	2	226	169	165	96	95	6 729	4 704	4 698	0.13%	925	882	4.65%	1 100
KYUSTENDIL	222	36	6	185	267	234	77	48	8 713	4 955	4 950	0.10%	1 263	1 159	8.23%	2 495
LOVECH	288	6		217	147	141	44	42	9 103	3 409	3 401	0.23%	587	575	2.04%	5 107
MONTANA	202	21	16	208	772	683	34	29	12 612	8 955	8 936	0.21%	1 868	1 733	7.23%	1 789
PAZARDZHIK	189	17	12	240	274	254	85	78	10 355	6 236	6 223	0.21%	945	907	4.02%	3 174
PERNIK	182	7	3	347	507	476	70	63	14 093	8 183	8 177	0.07%	1 491	1 448	2.88%	4 419
PLEVEN	431			277	614	487	113	76	16 720	13 507	13 325	1.35%	1 849	1 817	1.73%	1 364
PLOVDIV	228	17	17	228	386	345	243	220	15 249	11 253	11 218	0.31%	1 389	1 338	3.67%	2 607
RAZGRAD	111			208	228	196	82	71	8 512	4 676	4 632	0.94%	686	666	2.92%	3 150
ROUSSE	165			165	316	273	49	35	5 615	4 085	4 020	1.59%	654	643	1.68%	876
SILISTRA	82			234	159	136	30	22	3 949	2 817	2 812	0.18%	368	337	8.42%	764
SLIVEN	254	3	1	235	510	480	23	21	9 491	7 151	7 131	0.28%	1 135	1 096	3.44%	1 205
SMOLYAN	225	8	7	337	246	235	56	56	6 748	4 488	4 483	0.11%	728	717	1.51%	1 532

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SRIPCPH	38	19	2	78	1 275	1 260	28	27	43 225	27 619	27 619		3 965	3 949	0.40%	11 641
SOFIA REGION	396	52	26	782	2 829	2 807	254	245	26 420	20 003	19 985	0.09%	3 382	3 316	1.95%	3 035
STARA ZAGORA	403	2		420	1 486	1 404	299	289	24 805	18 328	18 243	0.46%	3 858	3 839	0.49%	2 619
TURGOVISHTE	224	1	1	365	534	413	82	58	12 164	8 759	8 564	2.23%	1 479	1 400	5.34%	1 926
HASKOVO	351			416	946	658	209	155	21 336	17 170	16 791	2.21%	2 720	2 610	4.04%	1 446
SHOUMEN	233	1		317	303	263	68	49	9 348	4 756	4 715	0.86%	1 517	1 483	2.24%	3 075
YAMBOL	188			220	204	178	58	54	5 592	3 636	3 610	0.72%	644	627	2.64%	1 312
TOTAL	**6 357**	**248**	**112**	**8 652**	**16 841**	**15 334**	**2 643**	**2 248**	**369 034**	**247 243**	**245 564**	**0.68%**	**46 020**	**44 701**	**2.87%**	**75 771**

Appendix 5: What does the DEA analysis say about the potential for consolidation?

This annex presents a DEA analysis conducted for illustrative purposes only. Data have only been available for two years and for 48 companies and results may change when more data become available. The results of DEA analysis are known to be susceptible to data quality and therefore the results in the appendix should be seen as indicative only.

The question asked in this appendix is: Are their potential gains from economies of scale by merging companies in Bulgaria to one per district?

Consolidation of the water supply and sanitation sector in Bulgaria to 28 districts requires mergers, but does not affect all companies as some already cover a complete district. For the remaining companies the DEA is carried out. At this point it is stressed that the presented mergers are just chosen on basis of districts and for demonstration purposes, and is not to be regarded as a recommendation for actual mergers.

In the following, we have amalgamated all companies in a district into one and analysed the potential for efficiency gains. DEA analysis provides indications of gains from economies of scale (size effect) from harmonization within a group and from all members of the group performing like the "best in class".

There are no general guidelines as when to embark on a merger, as mergers may be difficult and time consuming processes. The analysis has been constrained to merging within one district, whereas in reality merging operators across district boundaries (or having the same operator for two water associations) may be more efficient. Furthermore, it must be noted that the analyses above does not take into account potential gains from better access to debt finance by bigger companies. While this effect may be considerable this analysis only includes non-financial inputs.

The results indicate:

- A limited size effect, potential efficiency gains from consolidation only in the order of 10% to 20%
- Very considerable potential efficiency gains from performing as best in class (in all districts more than 50%)
- Very small or insignificant harmonization effect.

Table 9 DEA results for potential efficiency gains from mergers within districts

District	WSSC	Potential gains (%)		
		Technical efficiency	Harmonization effect	Size effect
Blagoevgrad	ViK Blagoevgrad; ViK Kresna; ViK Strimon (Mikravo);	51	2	15

	ViK Petrich; ViK Sandanski			
Veliko Turnovo	ViK Yovkovtsi; ViK Svishtov	58	2	18
Gabrovo	ViK Gabrovo; ViK Sevlievo	54	none	9
Kyustendil	ViK Kyustendil; ViK Dupnitsa; ViK Panichishte (Sapareva Banya)	57	2	23
Lovech	ViK Lovech; ViK Troian	48	none	22
Montana	ViK Montana; ViK Berkovitsa	56	1	18
	(ViK Burzia): *No data available*			
Pazardjik	ViK Pazardjik; ViK Batak; ViK Bratsigo-vo; ViK Velingrad	55	3	12
	ViK Panagyurishte; ViK Peshtera; ViK Rakitovo			
	ViK Belovo and ViK Strelcha - *No data available*			
Razgrad	ViK Razgrad; ViK Isperih; ViK Kubrat	51	1	16
Sofia Oblast	ViK Sofia; ViK Botevgrad	53	6	13
	ViK Samokov - *No data available*			
Haskovo	ViK Haskovo; ViK Dimitrovgrad; ViK Stambolovo	45	1	18
Pernik	ViK Pernik; ViK Breznik - *No data availa-ble*			
Pleven	ViK Pleven; ViK Kneja - *No data available*			
Turgovishte	ViK Turgovishte; - *No data available*			

For the districts not listed – these districts are already covered by one district company.