Module 13

Financing Water and Wastewater Services

Summary

Financial investment is needed for the delivery of safe water to the consumers. This is the reason why consumers have to pay for having access to clean fresh water, but also for wastewater services. This module explains how the price of water is set and how it varies depending on different factors. An overview of the prices in the world and in various cities in Bulgaria and Europe are given. The needs and perspectives related to the water sector, in particular in Bulgaria, are discussed. Overall, the issue of required changes to improve the water sector and responsibilities are raised.

Objectives

Pupils understand the composition of the price of water. They acknowledge the importance of water and discover that access to clean fresh drinking water and a safe sewerage system is very expensive for some people. They get an idea of how much of the family budget is needed to cover the costs of access to clean drinking water. Furthermore, they learn about the price of drinking water in different places of the world, and also in Bulgaria, and about the trend in global changes.

Keywords and terms

Drinking water, sewerage, price, defining prices, payment, consumers, suppliers

Preparation/Materials

Materials	Preparation
Some examples of local water and wastewater invoices that household receive	Teachers or pupils bring some of their private invoices
Report on price setting for the local community	The water supplier needs to be consulted.
Yearly overview of the delivered water and costs by the supplier	The water supplier needs to be consulted.

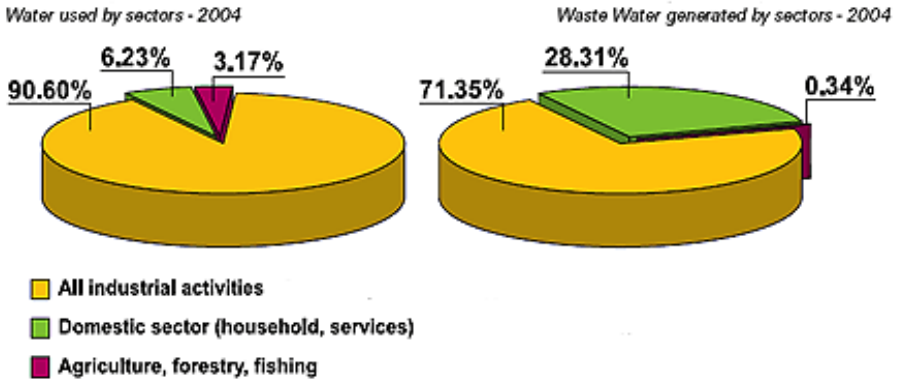
Financing water and wastewater services

Introduction

In several new Member States of the European Union, the water supply was transferred to another system of financing. The EU water framework directive includes the principle that the costs of water services should be cost covering. In many countries, the costs of water delivery are covered by several sources of financial means: by tax, tariffs and transfer. Depending on the needed investments, and the economic situation of the country, the level of several financial resources differs.
Countries in transition, like Bulgaria, have more need of transfers by e.g. loans; in countries with a long history of financing the water delivery on communal level, such as Germany or the Netherlands, the water delivery is mainly covered by tariffs.
In any case, the delivery of safe water and sanitation services to the consumers has its price. The price will depend on the availability and location of the water resources, on the quality of the raw water, and on the extension of the network. Therefore, all worldwide differences in water prices can be observed.

1. Water use and resources

Bulgaria is relatively poor in water resources compared to other European countries. Depending on the humidity during the year, the amount of water resources is between 9 and 24 billion cubic metres. The average water amount per capita is 2 300-2 500m^3. Regarding these water resources, Bulgaria is among the five most water stressed countries in Europe with Cyprus, Spain, Macedonia and Belgium (see also module 3, 11 and 12)
Graphic 1. shows that in Bulgaria that industry is the main user of water sources. Households and agriculture use respectively 6,23 and 3,17% of the delivered water. However, households produce 28% of the total amount of generated wastewater.



Graphic 1: The percentages of water used and wastewater generated by different sectors in Bulgaria
Source: http://ispa-mrrb.org/en/?id=111

2. Current situation of the water sector of Bulgaria

The state of water supply systems is insufficient in villages. Most of them were constructed in the period of 1960-1970. Over 20% of the systems are out-dated and need reconstruction. Some systems do not deliver the

needed quantity of water and should be expanded and replaced. Nearly 500 000 citizens do not have 24-hour access to water.
Since 2007 is Bulgaria a Member State of the European Union. Hence in the future Bulgaria should comply with the EU Directives on environment. Unfortunately Bulgaria is not complying with the directives currently. There are many different problems that contribute to this incompliance. Leakages in pipes can cause infiltration of contaminated groundwater or sewage water, which can lead to health risks. Infiltration of sewage water occurs mainly in cases of low pressure in the water pipe when it is being emptied. The costs for recovering the water supply and sewerage services with good quality are high for everyone.
About 98% of the population use the services of the "Water Supply and Sewerage Company" (WSSC). WSSC are trading companies operating under the Companies Act.
In Bulgaria, there are 64 WSSC service points, which have different levels of ownership structure:

- Some are 100% run by the state: Sofia, Blgoevgrad, Bourgas, etc.
- Others have a 51% state and 49% municipal participation: Varna, Vratsa, Dimitrovgrad, etc.
- Some are 100% run by municipal participation: Velingrad, Dupnitsa, Kresna, Petrich, etc.
- A few are given a concession such as Sofia city

2.1. Interconnection between water/sewerage services and costs

In the last 15 years, the water supply and sewerage sector has been suffering from a lack of investments. During the transition period, the state budget could not finance the recovery of the water sector. Concurrently, the income of the population did not allow a significant increase in tariffs. However, the effectiveness of activities on water management was not a priority before the transition period, and the attitude did not change after. These combined factors have led to inadequate services, high loss of water, environmental risks related to water quality and discharge of wastewater, as well as financial difficulties for companies. According to the law regulating the water supply and sewerage services, affordability of the price of water and sewerage services is given when their value (determined on a minimum monthly consumption of water for drinking and household needs of 2,8 cubic metres per person) does not exceed 4 per cent of the monthly average household income in the region.

Composition of the overall costs

The price of water is determined by several factors. Both the user and water operator have to cover costs to provide user access to safe drinking water. Providing clean drinking water is associated with different activities, which water companies are responsible for. For example:

- Supply of water for drinking, industrial and other uses, including the extraction and treatment of the water, investments and operation of the network and monitoring the system.
- Collection and treatment of sewage water and storm water from the property of the consumer in urban areas (cities, villages). According to the EU Wastewater Directive, wastewater should be treated before its release in the environment: for communities with more than 10 000 people equivalents (p.e.), for environmental sensible areas for communities with more than 5 000 p.e..
- Establishment, maintenance and operation of water supply and sewerage systems, including wastewater treatment plants and other facilities (Act to regulate the water supply and sewerage services).

All these activities determine the final price the consumer must pay in order to receive continuous access to water and wastewater services.

3. Water and sewage service prices for consumers in Bulgaria

The law regulating the water supply and sewerage services defines prices of water supply and sewerage services in Bulgaria. The State Energy and Water Regulatory Commission, which is created under the Law of Energy, regulates the water supply and sewerage services. The commission regulates prices of the operators' delivery of water to the consumers, discharging sewage wastewater and connecting new users to the system.

Further methods of regulating the prices are defined according to The State Energy and Water Regulatory Commission.

Water supply price

The price for water supply is calculated by the ratio between the annual revenue for the service and the water quantity. The water quantity is defined as the difference between the measured quantities for the previous year (at the entrance of the water supply system served by the operator) and the maximum allowable total loss of water according to the annual target levels of quality, which are established by the Commission.

Price for connecting consumers to the water supply and sewer system

The price covers the costs of preparation and connection of plumbing installations to the water supply system and/or sewer installations, which are recognised and defined by the Commission depending on the projected water quantities.

Wastewater removal price

The price is calculated by the ratio between the annual revenue for the service and the annual amount of discharged wastewater, and it depends on the level of contamination that is determined by an accredited laboratory for industrial and other business users. The annual amount of discharged wastewater for households, public facilities and other users is determined on the basis of the invoiced amount of water delivered. For industrial and other economic users, measured amounts of water from the previous year are used.

Price for wastewater treatment

The price is calculated by the ratio between the annual revenue for the service and the annual quantities of purified wastewater, depending on the level of contamination determined by an accredited laboratory for industrial and other business users. The annual amount of purified wastewater for households, treated as public and other users, is determined on the basis of invoiced amount of water delivered, and for industrial and other economic users – according to the measured amounts of water from the previous year.

3.1. Determination of water bills

The water bill for households is determined in two ways: as indicated in the water-metres or based on an average value according to the number of residents. If there is a water-metre installed on every plumbing deviation (riser), the measure is entered into the database of “Sofiyska voda”, after that, the metre is sealed with a plastic seal, and the bill can be determined by its indications. An auditor periodically reports the data from the individual water metres. For those months when no auditing takes place, an amount of water is automatically calculated on the bases of the average water consumption in the household from previous periods. After the actual report is done, the bill is equalised according to the real consumption. For users who do not have a water metre installed on every riser, or if metres are not calibrated or do not have a plastic seal, the bill is calculated based on an average value according to the number of residents.

Under Regulation № 4 every resident should be charged monthly for 6 cubic meters if the household has central heating and for 5 cubic meters – if it has none. For condominium buildings, when there is a difference between the reported amount of water according to the general (revenue) water meter and the total amount of consumption in separate properties (consumption according to individual water metres and amount for charging based on the number of residents), a corresponding quantity is added to the individual cost of each property which is called “total consumption”. This “total consumption” amount is included in the invoice only once in every 3 months.

Affordability of the price of the water and sewerage services

As mentioned above, according to the law regulating the water supply and sewerage services, affordability of the prices of water and sewerage services are given when their value determines a minimum monthly

consumption of water for drinking and household needs. The minimum is 2,8 cubic metres per person, and does not exceed 4 per cent of average monthly household income in the region.
According to the National Statistical Institute (data 2. Quarter of 2012), the average income per household is 1071 BGN per month. In 2011, the average water consumption per person per day was 99 liters or 0, 1 m^3. Hence, the average household should pay not more than BGN 42,84 monthly for the delivered water and sewerage services.

City	BGN/m^3
Blagoevgrad	1,35
Botevgrad	1,01
Burgas	1,74
Varna	1,79
Veliko Tarnovo	1,47
Gabrovo	1,72
Dimitrovgrad	1,55
Dobrich	2,24
Dupnitsa	1,14
Sofia	1,40
Stara Zagora	2,10
Lovech	1,88
Pernik	1,47
Pleven	1,58
Plovdiv	1,22
Razgrad	2,21
Shumen	2,08

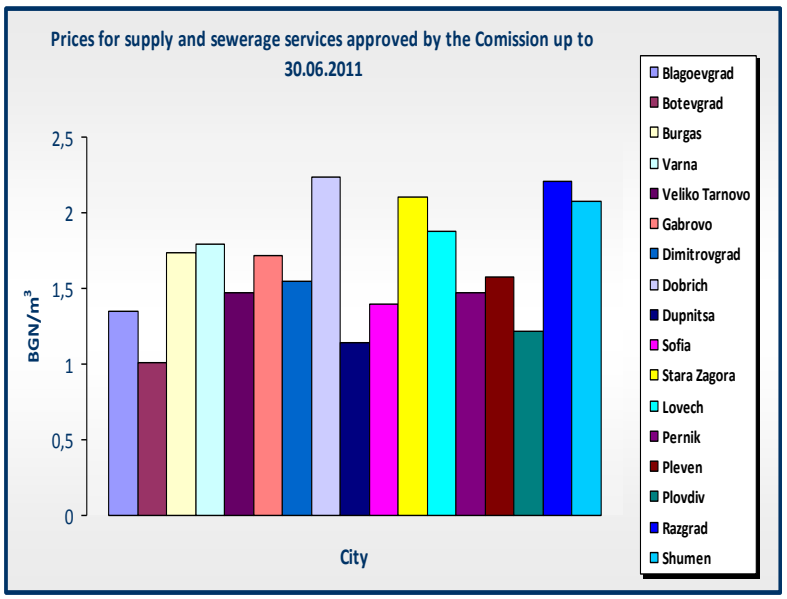


Table 1. and Graphic 2: Prices in some Bulgarian cities (30.06.2011); Data source: The State energy and water regulatory commission: http://www.dker.bg/indexen.php

City	$/$m^3$
1. Copenhagen (Denmark)	8,00
2. Aarhus (Denmark)	7.61
3. Honolulu (USA)	6,06
4. Glasgow (UK)	5,89
5. Ghent (Belgium)	5,79
6. Berlin (Germany)	5,67
7. Sydney (Australia)	5,03
8. Stuttgart (Germany)	4,93
9. San Diego (USA)	4,9
10. Frankfurt (Germany)	4,89

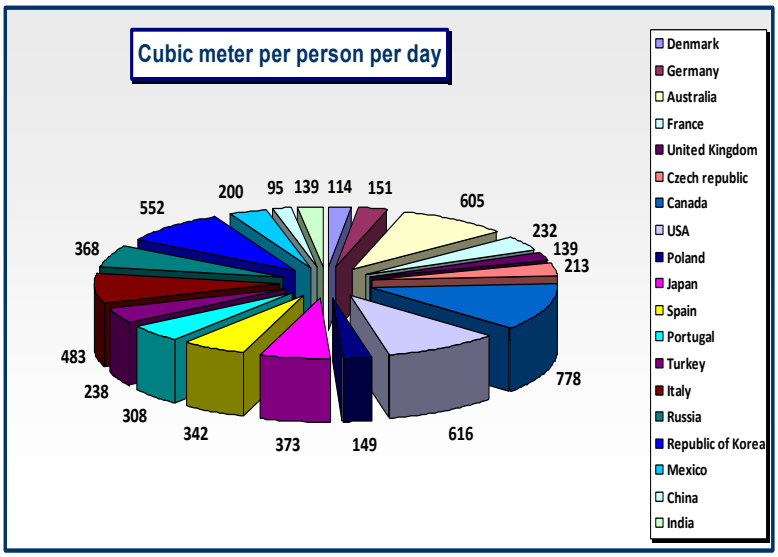


Table 2 and Graphic 3: Average prices $/1$m^3$ and the daily consumption per person cubic meter in several countries. Data source: Global water intelligence

Above, in table 1 and graphic 2 the Bulgarian prices for water supply and sewerage services of one cubic meter squared are provided. In table 2 and graphic 3 data from all over the world about the average daily water consumption per person and the water price per cubic meter are presented, and below in table 4, the average prices for water and wastewater services in several countries.

Country	Total price $	Water	Wastewater	m^3/ Person/day
Denmark	7,81	$7.81	$0.00	114
Germany	4,26	$2.74	$1.52	151
Australia	4,18	$2.17	$2.01	605
France	3,92	$3.54	$0.38	232
United Kingdom	3,76	$1.82	$1.94	139
Czech republic	2,75	$1.39	$1.36	213
Canada	2,75	$1.70	$1.05	778
USA	2,71	$1.13	$1.58	616
Poland	2,21	$1.02	$1.19	149
Japan	2,19	$1.26	$0.93	373
Spain	1,83	$1.22	$0.61	342
Portugal	1,77	$1.23	$0.54	308
Turkey	1,69	$1.39	$0.30	238
Italy	1,47	$0.81	$0.66	483
Russia	0,71	$0.43	$0.28	368
Republic of Korea	0,69	$0.51	$0.18	552
Mexico	0,59	$0.50	$0.09	200
China	0,42	$0.29	$0.13	95
India	0,16	$0.13	$0.03	139

Table 4. Average prices for water and wastewater services in dollars per cubic meter ($/1m^3) and consumption in several countries. 1$ = 0,81 Euro or 1,60 BGL.
Data source: Global water intelligence

4. Investment needs within the Bulgarian water sector

The main priorities within the Bulgarian water sector, which are defined by the Strategy for Management of Water Supply and Sewerage (March, 2004), have the following estimations of financial needs for the:

- rehabilitation of the water supply infrastructure in settlements : € 2 832 million;
- building of new water sources and water supply infrastructure, including dams, drinking water treatment plants, water supply networks : € 1 137 million;
- collection and treatment of wastewater: € 2 962 million.

Rehabilitation of water supply infrastructure

The estimated cost of € 2 832 million represents rehabilitation of the existing water distribution network which has not been adequately replaced over the past fifteen years. The total length of the water transmission and distribution network is 70 620 km, and the asbestos cement pipes which account for 70% of the network are in very poor condition. In Western Europe, typically 2 - 4% of the network is replaced each year. In Bulgaria, this ratio has been less than 1%, resulting in a considerable amount of (unaccounted) water losses within the network. This *unaccounted for water* (UFW) is estimated to be around 60% of the production volume.

New water sources and water supply

The estimated cost of € 1 137 million corresponds to ensuring water supply from surface and groundwater resources; this includes upgrading 42 drinking water treatment plans and about 3 500 pumping stations in the country. Water resources are unevenly distributed, which causes water shortages in many areas. To overcome the water supply problems in these areas, the government has plans to further explore groundwater sources and construct small dams, some of which have partially been completed.

The construction of dams is part of the government's plan to provide water resources uniformly throughout the country. This plan was developed earlier but not implemented due to the shortage of public funds. The strategy proposes to construct dams in areas that suffer from water shortage. These dams are small and will be used largely for the supply of drinking water and minor irrigation purposes.

Collection and treatment of wastewater

The estimated cost of € 2 034 million is to upgrade the existing sewerage network and expand the services to meet the requirements of the EU. The sewerage network services about 3,8 million people or about a little less than 50% of the population. The total length of the network is around 9 000 km, which is not in good condition and needs to be upgraded. The government plans to build additional 16 000 km of sewers to connect 2,4 million people as part of the strategic plan to meet the EU directives.

The estimated cost of € 928 million is to upgrade wastewater treatment plants (WWTPs). Currently, 35% of the population's wastewater is treated trough 61 WWTPs. Fifty of these plants are biological treatment plants, whereas the rest are plants with mechanical treatment. The strategic plan of the government is to treat wastewater generated by 85% of the population.

5. Operational needs within the Bulgarian water sector

Besides the needs of investment to improve the infrastructure within the water sector, the sector also needs to address several operational issues. Some key elements of a well functioning and sustainable system are listed:

- Increased operation and maintenance: Given the economic difficulties over the last fifteen years, the Regional Water Companies were not able to allocate sufficient resources towards operation and maintenance (O&M) costs. Currently, the O&M costs have been around € 0,30/m^3. The plan is that this cost will reach 0,70/ m^3 in 2014. Thus, it is important to increase tariffs to allow for a higher level of O&M costs;
- Reducing administrative losses: The high water losses resulting in unaccounted for water drains the economy. While the water distribution network rehabilitation programme helps to reduce the physical losses, equal emphasis should be put on the reduction of commercial losses, which account for a significant portion of the UFW. Incentives to reduce the commercial losses should be considered, including the introduction of the private sector, which would depend on the volume of collections;
- Increased Collection Rate: The present bill collection rate (with arrears) is 86%. This represents the ratio of all collections including overdue payments and the annual billings. On an annual basis the collection rate is around 75%. The dues to the utilities are from public institutions, central and local government buildings, industry (some of which are public) and the population. According to accounting standards in Bulgaria, overdue payments are not written off and provisions are not made to account for this loss.

For the first item, the tariffs need to increase to allow more operation and maintenance expenses. For the other two items, there needs to be an increased emphasis on operational efficiency, which may be supported by the private sector.

The above investment programme and operations are implemented by the Regional Water Companies (RWCs). Thus, it is essential that the RWCs function in an efficient manner. To this end, the staff and management in the RWCs should receive adequate training on technical and financial matters. Adequate incentives should be in place for the RWCs to provide good quality service. Representative of the RWCs should also be familiar with the recent developments and practices in the EU countries regarding operations and investments. This knowledge will help to strengthen operation of the Bulgarian RWCs.

The water sector of Bulgaria needs serious reforms to address problems with the out-dated water supply and sewer system. According to ISPA regulatory framework, reforms are needed, as well as institutional and financial reforms.

6. Institutional reforms needed

For the implementation of the needed reform for adequate infrastructure, operation and maintenance of the water supply and sewer systems, institutional reforms would benefit the process and make it more sustainable. The following institutional reforms were identified:

- clarify the roles of the Ministry of Regional Development, Public Works and Ministry of Environment and Water. Currently both ministries are responsible for policy setting and implementing policies;
- make the water regulator functional as soon as possible to regulate tariffs and service standards. The law for establishing the water regulator became effective on the 20th of January 2005. To make the regulator functional, the regulator must receive institutional support and secondary legislation has to be in place;
- clarify the asset ownership issue in Regional Water Companies where the ownership is shared between the state and the municipalities; the issue leads to delays in decision making. A model to establish operating companies has been discussed, in addition to separating the assets between the state and the municipalities. Appropriate legislation should be adopted to implement this model.
- attract the private sector as soon as possible through good examples so that a proper signal about the government's willingness to reform the sector is sent to the markets.

7. Financial reforms needed

An improvement of the financial structures in the Bulgarian water and wastewater sector are not dispensable. For example, the following financial reforms could be addressed:

- The Ministry of Finance could develop a financial framework that would specify the following in short, medium and long terms: level of public expenditure support, allowable public debt given so that utility borrowings will contribute towards this debt stock, and volume of sovereign guarantees.
- The programme of fiscal decentralisation should continue to address the core problem in the financing sector: lack of resources at the local level.
- Municipalities should be given more autonomy to raise local revenues, which in turn will help them to support investments in the sector.
- A proper financial management system for accounting should be put in place, and financial resources should be raised and utilised at the local levels.

8. Exercises and Questions

- Which interconnections occur between the need of clean drinking water and the access to it?
- How is the price of water defined?
- Why is the price of water different in different cities in Bulgaria?
- Discus changes in trends of past prices, now and in the future?
- What is the price of water all around the world – where is the water price high and where is it low?
- Discuss how to deal with families who cannot afford the connection and water supply costs?
- Should everybody, e.g. poor and rich consumers or consumers with low water and high water consumption, pay the same water price?
- Calculate how much 1 litre of water and 1 litre of Coca cola (or any other soft drink) costs.
- Make an interview to find out how many litres of bottled water residents of households drink in average monthly and how much they pay for water and sewage services?

WSP related activities:

- Who is the owner of the local water supply and who regulates the prices?
- How high are the costs for the water supplier to deliver 1 m^3 water?
- What are the local prices for 1 m^3 drinking water?
- How much is the local water consumption in average per person and per year?
- How are the water costs for the consumer compiled?
- Is there a local budget for operation and maintenance, for monitoring the water and network quality?
- Are there subsidies for the very poor households?
- Are there cases of drinking water unaffordability among the local villagers?
- Is there a local system guaranteeing access to safe water for all?
- Which percentage do households in your village spend in average monthly from their income for their water supply?

9. Text sources and further reading

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