

## Long-term evaluation of water price growth in Serbia\*

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**Summary:** Structural reforms in the water sector have been initiated during the last two decades. This trend has resulted in numerous transformations. In accordance with the EU Water Framework Directive 2000/60/EC, one of the priorities of the reform is to establish sustainable funding, i.e. introduce the economic price of water. The Serbian water sector is only at the beginning of the reforms. The central question of the paper is volume of investments and investment dynamics into water resources in Serbia, for the next twenty years. The price of water is one of the main determinants of investment growth. Given the increasing number of important factors for the price of water, this paper presents three long-term scenarios of growth of the economic price of water.

**Key words:** water sector, investments, water price, water sector reform, regulation, the European Union.

**Rezime:** Strukturne reforme u sektoru voda su započete tokom poslednje dve decenije. Ovakav trend je rezultovalo brojne transformacije. U skladu sa EU Okvirnom direktivom o vodama 2000/60/EC jedan od prioriteta reformi je uspostavljanje samoodrživog finansiranja, odnosno uvođenje ekonomske cene vode. Vodoprivreda Srbije je tek na početku reformskog procesa. Centralno pitanje rada je nivo i dinamika investicija u sector vodoprivrede za narednih dvadeset godina. Cena vode je glavni faktor koji određuje dinamiku rasta investicija. Imajući u vidu veći broj faktora od značaja koji određuje cenu vode, u radu su predstavljene tri dugoročna scenarija rasta ekonomske cene vode.

**Ključne reči:** vodoprivreda, investicije, cena vode, reforma sektora voda, regulativa, Evropska unija

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## **1. INTRODUCTION**

Water supply and wastewater treatment belong to the network activities having the characteristics of natural monopolies. Since the services of water supply and collection, as well as wastewater disposal and purification (treatment) are of public importance, with a series of characteristics, their provision is subject to state regulation worldwide.

Regulation of this activity is justified by the fact that private interests may impose price for the services of water supply and wastewater treatment that would allow so-called monopoly profit. Therefore, general interests such as security and reliability of supply, as well as quality of the service could be challenged. Contrary to that, Government's interventions in the water sector frequently mean keeping prices at low levels, resulting in low interest of private investors in this industry. Water supply and wastewater treatment pricing policy, both at the national and local levels, has often led to significant inefficiencies in the quality of the service and in the operations of utility companies dealing with this activity.

In the European Union (EU), at the beginning of the 1990s, we witnessed the development of awareness that although the competition is not feasible in all activities regarding water supply and wastewater treatment, there are areas in which efficiency could be increased and competition could play an important role. Subsequently, water sector has undergone numerous transformations, both in terms of its organization and proprietary character. This was followed by the activities in the fields of deregulation, market opening and transition of public utility companies from the state into the local communities' ownership, and later into the private one.

Establishing of sustainable funding is one of the priorities in the regulations and compliance with those principles involves the introduction of economic price of water and water services. The aim of this paper is to present long-term projections of water price in Serbia that would provide sustainable funding of the sector taking into account international practices and analyzing numerous factors of importance. Along with the introductory part, the paper consists of five chapters. Current changes and regulatory requirements in the EU water sector are presented in the first chapter. Comparative experiences in running water pricing policy are analyzed in the second chapter, while the problems challenged by the Serbian water sector are considered in the third chapter. An overview of the three scenarios of long-term projections of water prices growth that would enable unimpeded growth and development of the sector based on investments is presented in the fourth chapter. Final conclusions are made at the end of the paper.

## **2. WATER SECTOR REFORM IN THE EUROPEAN COUNTRIES**

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EU Water policy is made at supra-national level and implemented by national bodies, such as: ministries, state agencies, commissions or councils. At the end of 2000, the European Parliament and the Council of Europe adopted the Water Framework Directive 2000/60/EC which is a basic document for the activities in the water sector. The Directive promotes the principle of sustainable funding of the water sector, i.e. introduction of the economic price of water and water services. It directs all Member States to provide adequate contribution of different categories of water consumers (agriculture, industry, households) in covering water price, in order to achieve sustainable use of water resources.

With a view to better protecting of consumers and increasing the efficiency, many countries of the EU have established independent regulatory agencies responsible for the water sector. The regulatory agencies can be in charge of a range of activities, including first of all, tariff policy making and consumers' interest protecting. The regulators are expected to be more competent and objective in the area of market regulation than the executive authorities. Although the regulators should be independent from the executive authorities, according to economic theories, they do not have any autonomy in many countries. In the EU, the only independent regulator was established in England and Wales (Ofwat – The Water Services Regulation Authority) in 1989 during the process of the privatization of utility companies. Tasks of regulators are to ensure that companies providing services in the water sector and wastewater treatment, offer high quality services at a price that covers justifiable costs and generates an agreed profit necessary for smooth operations. Apart from that, regulatory bodies make binding decisions and prescribe penalties.

In its annual reports (Transition Report, 2010), the European Bank for Reconstruction and Development (EBRD) continuously monitor and evaluates the progress of water sector reforms in the European countries in transition. Depending on the progress made in implementing reforms, countries are classified into four groups. The first group consists of countries with a minimum degree of decentralization and vertically integrated utility system operated by the government. Those countries have not started the commercialization of services yet. Their water prices are depressed so that the central authorities subsidize them. The second group of countries, which includes Serbia, is made up of countries with a moderate degree of decentralization and the commenced commercialization of services. Utility companies are owned by municipalities and partially cover the costs, and therefore there is still a considerable amount of transfers from the budgets of local governments. The third group is composed of countries with relatively high degree of decentralization and commercialization of services. Utility companies' managing is independent from the municipal authorities. Since the tariff policy implies cost coverage, the amount of subsidy is

minimal. There is a private capital in the form of concession contracts. The fourth group of countries has almost completely reformed their water sector so that there is a high level of decentralization and commercialization of services. Companies supplying water are independent and financially sustainable without budgetary transfers. The presence of private capital is significant. Semi-autonomous agencies, that determine tariff policy and monitor the quality of services, are also present in this system.

<i>The first group</i>	<i>The second group</i>
Turkmenistan	Albania, Bosnia and Herzegovina, Macedonia, Montenegro, Serbia, Azerbaijan, Belarus, Moldova, Ukraine, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Uzbekistan
<i>The third group</i>	<i>The fourth group</i>
Croatia, Latvia, Lithuania, Slovak Republic, Slovenia, Bulgaria, Romania, Turkey, Armenia, Russia	Estonia, Hungary, Poland

Source: (Transition Report, 2010)

**Figure 1. EBRD's evaluation of implementation of reforms in water sector**

In the countries which joined the EU in 2004, private capital is present in the area of water supply and at least one operator has concession rights in the largest cities. For example, a British operator is present in Bulgaria and that is in Sofia, while a French operator is present in Romania and that is in Bucharest and two additional larger cities. Similar to that, an investor was interested in Budapest and several other larger cities in Hungary. On the other hand, in the Czech Republic, local government retained for the most part its jurisdictions over capital investments, but even 70% of activities are performed by private companies. Although experiences with concessions in the water sector in the Eastern Europe differ, private investments have contributed to the modernization and improvement of the service quality.

In the last three years, in the EU member states, there have been no major changes in the water sector, regarding the ownership. Most companies dealing with water supply are still public. Among private companies, a trend of ownership concentration is observed, first of all, of French companies Suez and Veolia dealing in France, Czech Republic, Germany, Hungary, Italy, Romania, Slovak Republic and Great Britain. Suez also has a share in the ownership of utility companies in Spain, while Veolia is active in Bulgaria and Estonia. Apart

from the mentioned French companies, in the EU water sector, very important role is played by the Spanish company FCC/Aqualia (dealing in Spain, Czech Republic, Italy and Portugal), German company Gelsenwasser (dealing in Germany, France, Hungary and Poland), Austrian company Energie AG (dealing in Austria, Czech Republic and Slovenia), French company SAUR/Seche (dealing in France and Poland) and Spanish company Sacyr Vallehermosa/Valoriza (dealing in Spain and Portugal).

It can be observed that those companies have taken the financial support of EBRD and International Finance Corporation (IFC) in recent years. However, there are also opposite trends. In 2010, some utility companies in France and Hungary were transferred to the state. After 25 years of having concession contracts, the city of Paris took management over the utility company. The same happened in Pecs, Hungary. Furthermore, in Italy, an intensive campaign was led against the Government's proposal on limiting the ownership of local governments over utility companies to 40% as of 2012.

### **3. COMPARATIVE EXPERIENCE REGARDING THE PRICING POLICY IN WATER SUPPLY**

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Reforms and restructuring of the water sector mean tariff reforms, commercialization, legal and institutional development. The tariff reforms mean forming prices that cover the costs in the short term, eliminate subsidies and improve the yield rates (collection). Commercialization includes corporatization and introduction of strict budgetary limits and competitiveness, including different forms of participation of the private sector. The legal and institutional development includes establishing and improving of laws protecting consumers from monopoly powers, but also investors, by promoting fair and healthy competition. (Poznanic, Benkovic, & Jednak, 2011)

The basic principle of sustainable funding means that price is established at a level providing coverage of production and system maintenance costs. As a permanent source of funding could come only from the revenues, the price must cover the costs and also contain a part that represents a profit. Profit should not be intended only for private interests of the owners or needs of the founders, but must also constitute a source of development funding.

Costs of providing services of water supply and wastewater treatment (price of water) should cover total costs and secure return of capital as well as moderate profit to investors. In doing so, consumers should pay for the common (general) costs depending on the level of consumption. In accordance with the principles of sustainable business, the price of water should allow the development of business without the support and transfers from state and local budgets.

In practice, several methods are used for water pricing. The simplest and the most common used water pricing method is based on the principle of cost per unit (m<sup>3</sup>). The price is formed when the real cost per unit is increased for a certain rate of return:

$$C = TR / (1 - P)$$

Where: C – unit price, TR – unit cost, calculated as the quotient of the expected, actual total costs and the planned quantity of water that will be distributed to all consumers (regardless of category of consumers) and P – expected profit as a percentage.

The disadvantage of this method is that it does not take into account the relationship of supply and demand, as well as the cost structure of products. Therefore, it may happen that a company applies a lower price compared to the price that could be realized in the market and thus loses profit. Alternatively, it can require too high a price, due to which the amount of distributed water could be small, which in turn leads again to profit loss.

Another method is the formation of prices based on cost of capital, where the company predetermines the amount of profit expected from the invested capital. The formula for calculating the price, as it does not take inflation into account, is as follows:

$$C = TR + (P \times I) / Q$$

Where: C – unit price, TR – unit cost, calculated as the quotient of the expected total costs and the planned quantity of water that will be distributed to all consumers (regardless of category of consumers), P – expected profit, I – invested capital (investment) and Q – sold quantities.

In practice, the quantity that the company intends to sell has a determining role, since the profit begins to be realized only when fixed costs are covered, which participate in the cost structure even with app. 80%. The quantity with which fixed costs are refunded and profit is zero, represents a turning point and can be expressed as a critical (minimum) volume of water production. It is calculated by using the following formula:

$$Q_0 = FTR / (C - VTR)$$

Where: Q<sub>0</sub> – placed quantity, which does not make profit, FTR – fixed costs, C – price, VTR – variable cost per unit.

If the company does not reach this quantity, it produces a loss. This way of calculating rates can be used only after reaching the economic price, i.e. the expected cost per unit (m<sup>3</sup>), plus profit, from which the development can be financed. Using of this pricing method is based on market analysis, i.e. structure and number of consumers, their economic power, regional and national social policies, etc. It requires answering the question of how much the market is willing to pay for the product of quality that is pre-planned by the company, as well as which quantities can be sold at that price. Further analysis and calculations are focused on verifying whether the profit provides a sufficient level

of repayment, allowing the company to realize the necessary investments. Although this method of pricing is less suitable for use in public services, it is widely present in Serbia.

In any case, regulating prices of potable water supply and wastewater treatment services involves the definition of tariff policy based on a number of formal and informal criteria. The most common formal criteria defined by the law are: financial (cost recovery criteria), economic (cost efficiency criteria based on marginal cost) and environmental criteria (incentives for preservation of water quality). Among the most important informal criteria are the following: protection of vulnerable categories of population, availability, security and continuity of supply, transparency of pricing policy, etc.

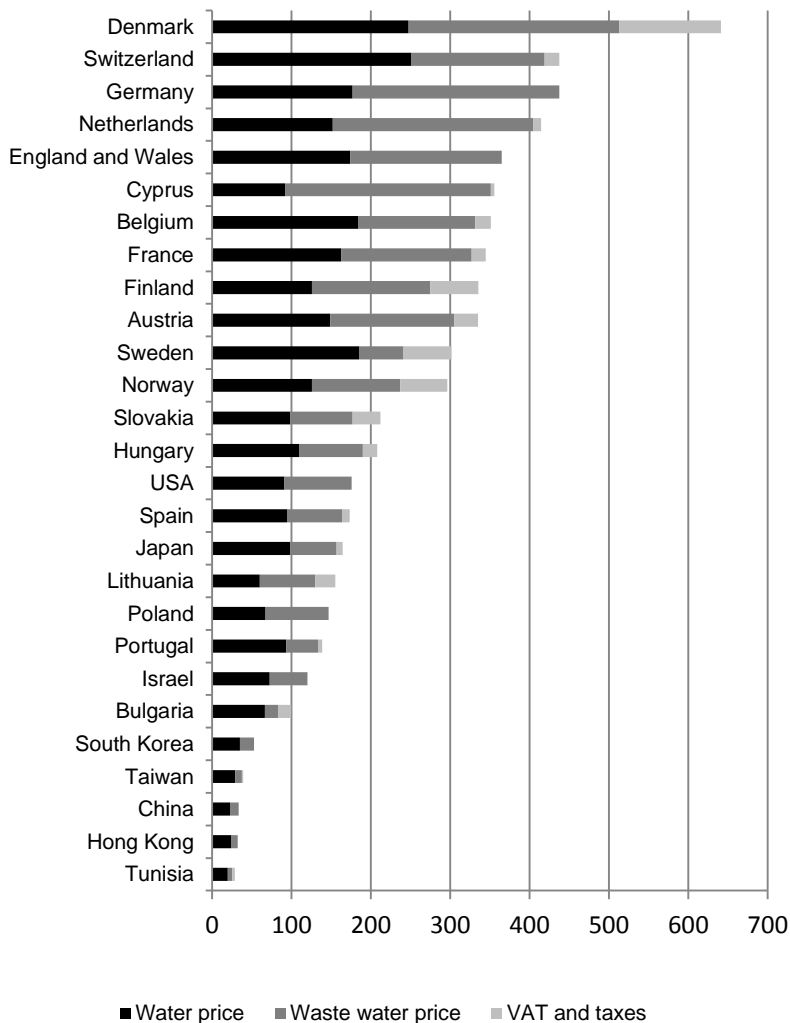
The tariff policy is different in structure, mode of formation and the level of the territory to which it relates. It often depends on the categories of consumers (households, industry, agriculture, public sector, etc). Apart from that, the structure of tariff for potable and wastewaters includes at least one of the following components: a fixed fee (does not depend on the amount consumed, so that consumption should not be measured) and volumetric tariff (directly dependent on the consumed amount so the measurement of consumption is necessary). So-called two-part tariff that combines fixed fee and volumetric tariff that can be: linear (price per m<sup>3</sup> of water is the same for all levels of consumption), the increasing block tariff (price per m<sup>3</sup> of water increases with an increase in spending), the declining block tariff (price per m<sup>3</sup> of water decreases with an increase in spending) is often in use.

Application of fixed fees for water services is very rare. An example of fixed rates in Europe is Island, whose residents pay the same price regardless the consumed water. Some cities in the world, such as Houston, the USA, apply a fixed fee per number of different blocks of consumption. Thus, any consumer within a certain block of spending pays the same amount, although the consumed amount may vary considerably. The largest number of companies dealing with water supply in Europe and OECD countries uses a linear tariff. In addition, the calculation of prices often includes an additional fixed fee the amount of which is usually low. Where there is a fixed fee as a part of the two-tariff system, there is a tendency toward its reduction or even elimination.

In practice, most often used is an increasing block tariff. Price for the first block of this tariff is usually very low, in order to protect poor inhabitants. In some countries, the first block of water is even free. In the Republic of South Africa, 6 m<sup>3</sup> of water per month is free, while the quantities over this amount are charged.

Declining block rates were typical of many OECD countries during the 1980s. (Competition and Regulation in the Water Sector, 2004) Today, however, they are rarely present and usually relate to the United States of America and some cities in the UK. For the first block of the declining tariff, a high price is charged, but the spending limit for the first block is mostly low. So, consumers in Glasgow pay EUR 2.56 for consumption by 2.08m<sup>3</sup>, while for consumption over this quantity, only EUR 0.94 per m<sup>3</sup> is charged.

Charges for wastewaters generally follow the same structure as the tariffs for potable water. In the case of industry, wastewater tariffs are sometimes formed on the basis of the quantity and type of contamination. Tariffs for wastewater can be expressed as a fixed percentage of water tariff. However, in most cases they are determined separately. In addition to regular bills, many companies impose an one-time tariff (fee) to connect users to the water and sewage systems.



Source: (International Statistics for Water Service, 2010)

**Figure 2. Water prices at the annual level for the consumption of 100m<sup>3</sup>, in 2009, in EUR**



Prices determined on the basis of tariffs may be below the costs of the company, at the level of the company's costs without a capital return or at the level of the company's costs, including the previously determined rate of capital return. In many developing countries, tariffs are below cost recovery, without taking into account the rate of capital return. This often leads to inadequate maintenance and requires substantial subsidies for investments, and even for everyday operations. In developed countries, on the other hand, rates for water and to a lesser extent, wastewater, are usually near or at the level of cost recovery, and sometimes they include profit.

In most developing countries, water prices are far below the economic cost, while in developed countries, operators are allowed to realize profit. In some countries, water is completely free (Ireland). The figure below shows the structure of water prices, using the same methodology, per year, for the consumption of 100m<sup>3</sup>. Serbia was not taken into consideration because it uses a different methodology for calculating water prices. By comparison, the calculated average price of water in Serbia for all categories of consumers stands at around EUR 0.8 per m<sup>3</sup>.

#### **4. PROBLEMS IN THE SERBIAN WATER SECTOR**

In Serbia, there is no independent regulatory body for water management activities, but this role is played by the Ministry of Agriculture, Forestry and Water Management, i.e. Republic Directorate for Waters. The Ministry, i.e. the Directorate for Waters is responsible for planning and normative activities, control and supervision of the water management activities. A part of regulatory functions is delegated to the Government setting out the methodology and criteria for calculation of the reference price of potable water supply for the public water system as well as price of collection, disposal and wastewater treatment through the system of public sewages. Based on the new Law on Waters (Law on Water, 2010), the Directorate has been given an authority to impose standards and issue licences to companies dealing with water and utility activity.

Water resources, as goods of general interest, are in the state ownership. Water management is the responsibility of the Republic, while the autonomous province and the city of Belgrade implement water management within their administrative boundaries. In Serbia, there are three public water management companies: Srbijavode, Vode Vojvodine i Beogradvode. JVP Srbijavode was established by the Law on Water of 1991 (Law on Water, 1991), JVP Vode Vojvodine was founded by the Assembly of AP Vojvodina in 2002 while JVP Beogradvode was founded by the City Assembly of Belgrade in 2008 (Decision on the organization of social water management company „Beogradvode“ within JVP Beogradvode).

According to the Law on Local Governments (Law on Local Governments, 2007), local governments are responsible for the management of the II order waters, which includes the management of water facilities, control of floods and erosions, issuing acts on waters for the facilities under their jurisdiction. They are also authorized to issue acts on discharging wastewater into public sewage, as well as on water acts for the facilities of local importance. Conducting and developing utility activities (purification and distribution of potable water, collection and purification of wastewaters, etc) which is regulated by the Law on Utility Services (Law on utility Services, 1998) is among their most important activities.

At the local government level, in accordance with the mentioned Laws, performing utility activities of water purification and distribution, as well as treatment and disposal of rainwater and wastewater, is transferred to public utility companies (PUCs). If a creation of a public company is irrational, these activities may be delegated to another company or entrepreneur.

Based on the data in the Business Registry Agency, there are about 310 PUCs in Serbia which are founded by local governments. Based on the analysis of their business dealings, some general conclusions can be made.

Almost all PUCs have prominent financial problems. Due to very low prices of water and provision of utilities, PUCs established by cities or towns, regularly have to be subsidized from the city/municipal budget. Existing water prices cover only operating costs which are insufficient for funding maintenance and development. Since PUCs are not able to realize profit, there is no interest of private capital. In addition to price distortions, cross-subsidization is present between customer groups (eg. tariffs are significantly higher for commercial consumers than for households). In addition, there is a problem of low collection rates and public institutions are among the biggest debtors. The problem is also an illegal consumption.

According to a Survey of the Republic Statistical Office of 2007, for water and sewage services along with the removal of garbage, on average 1.4% of household income (1.9% of urban households) is spent (Predlog strategije restrukturiranja JKP u RS, 2011)]. Tariffs could be increased from three to six times and still remain acceptable. This supports the notion of raising the prices of key services within the sphere of the PUCs. Given the low prices as a percentage share in total expenditures, even considerably raising the price will have little impact on overall inflation.

A big problem is the fact that the PUCs do not have a long-term financial planning practice. Investment planning and the way of financing investments are often made with insufficient impact of PUCs (decisions are made in the Directorates for construction or executive bodies of local governments). The process of making decisions about priorities in building utility infrastructure is unpredictable and uncertain, the construction of utility infrastructure is often given a low priority, so that projects for which non-refundable grants may be obtained are insufficiently prepared.

A major constraint to private investments is the fact that the assets used by PUCs are owned by the state, and not by their founders. Here the questions of responsibility for keeping records of fixed assets (sometimes they are kept in the balances of the founder, sometimes of the Directorate for construction land, and sometimes in the very PUCs), financing of investments and depreciation calculation are raised. Due to lack of funds and property of the state over fixed assets and total assets of PUCs, there is a systematic long-term under-investment into fixed assets resulting in an inadequate provision of services, higher maintenance costs, high losses in the network, etc.

Inefficient performance of activities is a consequence of the fact that the management staff is generally incompetent and prone to political changes after local elections. Hence, the PUCs are often seen by founders as institutions suitable for new employment and politicized management, all of which result in inefficient performance of the activity.

## **5. WATER PRICE AS A FACTOR IN THE REALIZATION OF ESTIMATED INVESTMENTS INTO THE SERBIAN WATER SECTOR**

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Estimated volume of investments and investment dynamics into water resources in Serbia, for the next twenty years were made based on the following parameters:

- taking into consideration the current situation in the system for water supply and sewage
- level of existing prices of services and fees in the water sector
- prepared project documentation
- projections of macroeconomic indicators' growth (Postkrizni model ekonomskog rasta i razvoja Srbije 2011-2010, 2010) and
- demographic trends in Serbia.

Total investments in water resources in the period 2007-2010 ranged from 0.4 to 0.5% of gross domestic product (GDP), accounting for 0.25% of total investments in the country (Revidirani memorandum o budžetu i ekonomskoj i fiskalnoj politici za 2011 sa projekcijama za 2012 i 2013, 2010). Most of the funding was provided by local governments and observed by areas, the majority of investments were directed towards water supply (including dams and reservoirs) and water protection. In 2011 investments were planned to amount to EUR 120 million of which EUR 88.5 million for water and sewage, EUR 12 million for flood control and per EUR 10 million for irrigation and drainage, ie. atmospheric sewage.

With general economic and social development, needs for water are progressively increasing, so that water in higher stages of development may occur as a serious limiting factor for economic development. (Savic & Boskovic, 2011). In accordance with the concept of economic development of the country (Serbia 2020, 2010) and the estimates of demographic trends and migrations, higher level of development, raising of the living standard and urbanization will significantly increase the level of water consumption. In this sense, the next decade will mean a qualitative breakthrough in the recognition of the role of water in the overall economic development (Instrumenti za razvoj sektora voda u RS, 2011).

Given all these problems that characterize the water sector of the Republic of Serbia, the total amount of investments in the coming years must be notably increased, in order to achieve a share of investments in GDP of almost 1% by 2020. This would correspond to the increase of the share of investments into water sector in total public investments from 11.8% in 2011 to about 18% in 2020. Cumulatively observed, the minimum investment by 2020 would amount to EUR 3.6 billion or about EUR 360 million on average per year.

To achieve a satisfactory condition in the water sector in the next twenty years, it is necessary to invest about EUR 8.36 billion of which 88% for water supply (including regional systems and sewage - atmospheric sewage) and 12% for water protection and hydro-melioration.

**Table 1. Projected funds needed for the water sector development, in mil EUR**

	Area	Needed funds		Share in %
		Total	EUR/per year	
1	Water supply	850	42,5	10,17
2	Regional systems	1.150	57,5	13,75
3	Wastewater sewage	3.900	195	46,65
4	Atmospheric sewage	1.500	75	17,94
	Total (1+2+3+4)	7.400	370	88,51
5	Water protection	500	25	5,98
6	Hydro-melioration	460	23	5,51
	Total	8.360	418	100,00

Source: (Instrumenti za razvoj sektora voda u RS, 2011)

According to the projection of investments by 2030, the construction of new source capacities will result in an increase in the percentage of population with access to water supply and sewage network from the current 81% to 92%. Improvement in performance of source capacities and distributive network will

contribute to loss reduction from the current 31.5% to about 20% at the end of the analyzed period. Based on the data of the Institute for Water Management on completed documentation and investment projects, it is estimated that about EUR 850 million should be invested into the expansion of the existing and opening of new sources. Investing into the sewage system of around EUR 3.9 billion, would enable meeting the standards for sanitation in all urban areas. Thus, the population connected to sewage systems from the current 50% would be raised to 75%, i.e. to almost 5.8 million inhabitants in Serbia in 2030.

Based on the fact that the existing infrastructure is in the public ownership, in addition to investments into the development, it is necessary to provide significant resources for its effective functioning (maintenance, depreciation and operation). In the table below, it can be observed that the functioning of the existing infrastructure needs almost twice the amount for the development while the highest demands are in the areas of water supply and channeling (about 88%, the same as for development).

**Table 2. Funds needed for the functioning of water sector, mil. EUR per year**

	Area – branch	Depreciation	Operation and current maintenance	Total expenditures per year	Share in %
1	Water supply	187.450	162.200	349.650	55,38
2	Channeling and protection of water quality	82.950	110.850	193.800	30,70
3	Regional systems (dams and reservoirs)	1.400	10.950	12.350	1,96
	TOTAL (1+2+3)	271.800	284.000	555.800	88,04
4	Drainage	14.000	20.000	34.000	5,39
5	Irrigation (regional systems)	4.500	6.500	11.000	1,74
	TOTAL (4+5)	18.500	26.500	45.000	7,13
6	Flood control	6.500	16.500	23.000	3,64
7	Erosion control	2.000	5.500	7.500	1,19
	TOTAL (6+7)	8.500	22.000	30.500	4,83
	TOTAL (1 to 7)	298.800	332.500	631.300	100,00

Source: (Instrumenti za razvoj sektora voda u RS, 2011)

The price of water is one of the main determinants of investment growth, but an inverse impact of the investment dynamics on the increase in the economic price of water is also present. At the beginning of the analyzed period, we took the current average calculated price for services of water supply and channeling that

is for all consumers at the level of about EUR 0.8 per m<sup>3</sup>. In the zero-year of the analyzed period, the economic and the reference price of water are at the same level, since the fees paid by consumers through PUCs are very low. The new Law on Waters adopted in 2010 prescribes that the fee for used water and the fee for discharged water amount to at least 10% of the reference price of water, resulting in an increase in economic price compared to the reference one.

**Table 3. The dynamics of investment into the development of water supply and sewage, in mil. EUR**

New investments	1-5 years	6-10 years	11-15 years	16-20 years	Total
Water supply systems	102	170	255	323	850
Sewage systems	468	780	1.170	1.482	3.900
Regional systems	138	230	345	437	1.150
TOTAL	708	1.180	1.770	2.242	5.900
Share in %	12	20	30	38	100

Source: (Instrumenti za razvoj sektora voda u RS, 2011)

Beginning of the investment cycle causes significant increase in the reference price, which is gradually increasing during the two following decades, since it follows the dynamics of investment into new capital facilities. The economic price of water has a different dynamics, because its height is affected both by the dynamics of investing and directly by the sources of new investments' financing. Thus, the water sector development can be financed also from the following sources: the budgetary fund for waters of the Republic of Serbia and budgetary fund for waters of the Autonomous Province, the EU's IPA funds, funds of the Environmental Protection Fund, revenues of local governments, investors' own funds, loans by the banks engaged in financing infrastructural projects, etc.

Depending on the participation of individual sources in the structure of development financing, three variants are presented. Since the reference price is an accounting category whose elements do not change because of changes in the sources and structure of investments' financing, its dynamics and the level of growth in the projected period will remain the same in all variants.

The first version (V1) is based on the assumption that the budget of the Fund for Waters of the Republic of Serbia and the budget of the Fund for Waters of Vojvodina, in the next two decades, will secure substantial funds derived from charging fees for use of water resources and fees for discharged water, primarily from those dealing with the public water supply and channeling. These funds would be about 33% of necessary funds for investment into facilities and systems in the field of water supply, channeling and treatment of wastewaters,

i.e. 24% of the total funds needed for the development of water sector. It should be mentioned that the fee for water pollution is an income of the Environmental Protection Fund.

In addition to these fees, the height of the economic cost of water is affected by the financial and other operating costs. As one of the sources for funding the construction of facilities for water protection (mainly wastewater treatment plants), loans of banks financing infrastructural projects are prescribed. Financing costs burden economic price of water, according to the estimated terms of the loan usage. The following credit terms are assumed: repayment period of 15 years, grace period of 5 years, the annual interest rate of 5% on average and equal semi-annual installments. On the other hand, the high share of IPA funds (22%) and planned own funds of potential investors (11%) result in the situation in which operating expenses and financing costs are not significantly increased.

The average economic price for services of water supply and wastewater channeling for all consumers in the first year of the investment cycle should be 1.01 EUR/m<sup>3</sup> while at the end of investment period it should reach 1.57 EUR/m<sup>3</sup>. The average price of water for twenty-year period is 1.30 EUR/m<sup>3</sup>. The calculations do not include VAT.

The second version (V2) is based on the assumption that the reduction of the share of IPA funds to 16% (in V1 the share of IPA funds is 22%) will increase the share of the state funds, i.e. Environmental Protection Fund which is also formed from the pollution fees paid by all those obliged. Increase of the fee paid by all payers of utility services directly influence the amount of the economic price of water. The average economic price of water for all consumers in the first year of the investment cycle should be 1.09 EUR/m<sup>3</sup> while at the end of investment period it should reach 1.63 EUR/m<sup>3</sup>. The average price of water for a twenty-year period is 1.36 EUR/m<sup>3</sup>, i.e. 4.6% higher than the average price per V1.

The third version (V3) is based on the assumption that the share of IPA funds is 15% and that the share of credits is increased to 25%. Due to the increased volume of debt, financing costs directly influence the increase of the economic price of water. The terms of borrowing are explained in V1. The average economic price of water for all consumers based on V3 in the first year of the investment cycle should be 1.01 EUR/m<sup>3</sup> while at the end of the investment period it should reach 1.59 EUR/m<sup>3</sup>. The average price of water for a twenty-year period is 1.35 EUR/m<sup>3</sup>, i.e. 3.8% higher than the average price per V1 and almost the same as the average price per V2.

The analysis shows that the economic price of water per V1 provides a smooth increase in the projected twenty-year period and equal responsibility of all categories of consumers. In V2, the price of water is higher than the price of V1 during the entire period, while the price in V3 is different from the first variant only in the period of loan repayment.

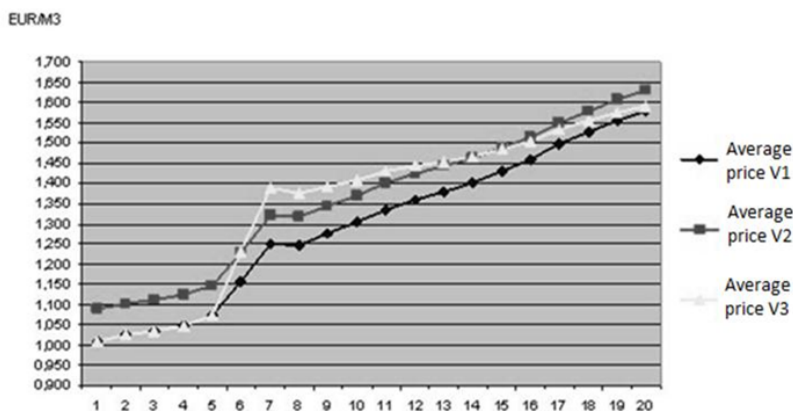


Figure 3. Projections of an increase in economic price of water per different variants

## 6. CONCLUSION

In order to ensure self-financing of the water sector, one of the priorities is the introduction of the economic price of water which is in accordance with the provisions of the EU Water Framework Directive 2000/60/EC. The new Law on Waters provides the conditions for stable funding and operation of the water sector on the principle of its self-financing. Realizing the economic price of water would enable the PUCs to engage a part of the revenues generated from their basic activities in the development and expansion of capacities. Given the estimated volume of investment, it is necessary that in the next twenty years water prices increase at a rate of at least 3.43% on average, annually.

In addition, by establishing budgetary Fund for Waters of the Republic of Serbia and budgetary Fund for Waters of the Autonomous Province, it is possible to record and appropriately use special funds intended for financing the activities of water management. The state is also significantly committed to the creation of a favorable environment for the utilization of the EU pre-accession funds for the financing of development projects and conditions for more substantial private investments.

Although water sector development can be funded from multiple sources, the budget of the Republic of Serbia in the next decades will remain the decisive source of investment financing in the part regarding the regional systems and water protection sector, while water supply will be increasingly funded by bank loans.



As the investments in water management are capitally intensive, one of the modalities of its funding is a partnership of private and public sector. Although private companies are interested in participating in the provision of utility services, there have not been any major investments in Serbia so far. The reasons for this are unclear legal environment, unreliable mode of determining tariffs, reluctance of local authorities to cooperate with private sector, as well as the current financial conditions that prevent the private sector to invest more.

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