



Empowered lives.  
Resilient nations.



**TARIFF SETTING  
METHODOLOGY  
FOR WATER SUPPLY  
AND SEWERAGE  
SERVICES IN  
BOSNIA AND  
HERZEGOVINA**



*Empowered lives.  
Resilient nations.*



# **TARIFF SETTING METHODOLOGY FOR WATER SUPPLY AND SEWERAGE SERVICES IN BOSNIA AND HERZEGOVINA**

## United Nations Development Programme (UNDP)

### **Author:**

Branko Vucijak

### **Collaborators on the Study:**

Alisa Grabus

Sanjin Avdic

*This Study was commissioned by the United Nations Development Programme (UNDP). The views expressed in this document are those of the authors and do not necessarily represent those of UNDP.  
2015*

# TABLE OF CONTENTS::

- 0. EXECUTIVE SUMMARY** ..... 9
- 1. INTRODUCTION** ..... 11
  - Context of the study ..... 11
  - Preceding activities ..... 13
  - Project Task of this study ..... 15
  - Methodological approach and contents of the document ..... 15
- 2. TARIFF STRUCTURE AND COSTS TO BE RECOVERED BY THE PRICE** ..... 17
  - Principles to be observed ..... 17
  - Existing practice of recording costs and revenues ..... 18
  - Types of costs to be recovered by price ..... 20
  - Basic models of the tariff structures ..... 21
    - Single unit price of a m<sup>3</sup> of water, paying according to volume of water used without a fixed charge ..... 21
    - Single unit price of a m<sup>3</sup> of water, paying according to volume of water used with a fixed charge ..... 21
    - Single unit price of a m<sup>3</sup> of water for all consumers ..... 22
  - Flat tariff ..... 22
  - Marginal cost tariff ..... 22
  - Tariff structure with two or more block tariffs ..... 22
- 3. PROPOSAL OF DRAFT TARIFF SETTING METHODOLOGY** ..... 23
  - The main tariff aspects ..... 23
  - Legal framework ..... 23
  - Methods for achieving the set principles ..... 24
  - Principle consumer pays ..... 24
  - Principle of equity and equality ..... 24
  - Principle of affordability ..... 24
  - Principle of conservation of natural resources ..... 25
  - Full recovery of costs ..... 25
  - Principle of economic efficiency ..... 26
  - Tariff structure proposal and method of price calculation ..... 27
- 4. SECURING PREREQUISITES FOR APPLICATION OF METHODOLOGY AND ACHIEVING ECONOMIC EFFICIENCY** ..... 30
  - Needed adjustments in bookkeeping records and facilitating adequate reporting ..... 30
  - Business plan ..... 32

Description of the existing regulations .....	32
Description of the existing practice and required changes .....	33
Key utility performance indicators and their target values .....	36
<b>ANNEX 1: OVERVIEW OF APPROACHES TO TARIFF SETTING METHODOLOGY FOR WATER IN OTHER COUNTRIES OR REGIONS</b> .....	40
Albania .....	41
Tariff setting methodology .....	41
Financing.....	43
Bulgaria .....	43
Tariff setting methodology .....	43
Financing.....	45
Portugal.....	45
Tariff setting methodology .....	45
Modification of prices .....	47
Financing.....	47
Romania .....	47
Czech Republic.....	48
Slovakia .....	49
Switzerland .....	50
Cantonal level.....	50
Municipal level.....	51
Tariff setting on the example of 4 cantons .....	51
Germany.....	52
United Kingdom.....	52
Hungary .....	53
Slovenia.....	53
Croatia .....	54
Serbia .....	55
Kosovo .....	57
<b>ANNEX 2: THE ROLE AND IMPORTANCE OF TARIFF SETTING METHODOLOGY FOR SERVICES WITHIN THE SCOPE OF ACTIVITIES OF OTHER REGULATORY AGENCIES IN BIH</b> .....	59
The State Electricity Regulatory Commission of Bosnia and Herzegovina (SERC) DERK .....	59
Responsibilities .....	59
Tariff setting methodology in use.....	59
The Electricity Regulatory Commission of the Federation of Bosnia and Herzegovina FERC.....	60
Jurisdiction and obligations.....	60

Tariff procedure and tariff setting methodology in use .....	61
The Regulatory Commission for Energy of Republika Srpska RERS.....	62
Competent administrative authority/ the founding body.....	62
Jurisdiction.....	63
Tariff setting methodology in use.....	63
<b>ANNEX 3: KEY PERFORMANCE INDICATORS</b> .....	65
Population coverage by service .....	66
Population coverage by water supply service (%).....	66
Population coverage by sewerage service (%).....	67
Percentage of wastewater purified only by primary treatment (%).....	68
Percentage of wastewater purified by at least secondary treatment (%).....	68
Production and consumption of water.....	68
Water production ( l/person/day).....	68
Water consumption ( l/person/day).....	68
Residential water consumption ( l/person/day).....	69
Non-revenue water.....	70
Non-revenue water (%).....	70
Non-revenue water (m <sup>3</sup> per kilometre per day).....	71
Non-revenue water (m <sup>3</sup> per connection per day).....	71
Additional indicator – Real losses (%).....	71
Additional indicator – Real losses (m <sup>3</sup> per connection per day).....	72
Additional indicator – Apparent losses (%).....	72
Additional indicator – Apparent losses (m <sup>3</sup> per connection per day).....	72
Additional indicator – Unavoidable Annual Real Losses (UARL).....	72
Additional indicator – Current Annual Real Losses (CARL).....	73
Additional indicator – Infrastructure Leakage Index (ILI).....	73
Metering.....	74
Percentage of metering of consumers (%).....	74
Percentage of metering consumption (%).....	74
Pipe breaks.....	74
Pipe leakages (leaks/km).....	74
Sewer system blockages (blockages/km).....	75
Costs.....	75
Unit operational cost for water and wastewater (KM/m <sup>3</sup> , relative to water sold).....	75
Unit operational cost for water and wastewater (KM/m <sup>3</sup> , relative to intake).....	76
Unit operational costs only for water (KM/m <sup>3</sup> , relative to water sold).....	76

Unit operational costs only for wastewater (KM/person, relative to the number of users) .....	77
Share of labour costs in operational costs (%) .....	77
Share of electricity costs in operational costs (%) .....	78
Share of outsourcing service costs in operational costs (%) .....	78
Staff productivity.....	79
Number of staff per 1,000 connections (# /'000 , water and wastewater).....	79
Number of staff per 1,000 connections (# /'000 , only water supply) .....	79
Number of staff per 1,000 connections (# /'000 , only wastewater) .....	80
Additional indicator – Number of staff per 1,000 people served (# /'000, water and wastewater) ....	80
Quality of service.....	81
Continuity of service (hours / day) .....	81
Quality of water supplied – number of tests for residual chlorine (%).....	81
Quality of water supplied – samples passing on residual chlorine (%).....	81
Billings and Collections.....	81
Average revenue per m <sup>3</sup> (KM/m <sup>3</sup> ) .....	81
Average annual revenue per connection (KM/connection) .....	82
Average revenue per m <sup>3</sup> , water only (KM/m <sup>3</sup> ) .....	83
Average revenue per user of wastewater service (KM/person) .....	83
Average collection period (days) .....	83
Collection ratio (%).....	84
Additional indicator – internal cross-subsidising between categories of customers (#).....	84
Financial performance .....	85
Operating costs coverage ratio (%) .....	85
Debt Service Ratio (%) .....	86
Affordability of services .....	86
Total revenues per user of services relative to Gross National Income per capita (%).....	86
Amount of water bill for a household (KM/year).....	87
Additional indicator – share of a monthly water bill for a household in its average income (%).....	87
Value of indicators for BiH presented in the IBNET Blue Book and comments on them.....	88
<b>ANNEX 4: METHODOLOGIES FOR PERFORMANCE ASSESSMENT</b> .....	90
IBNET Apgar score.....	90
Water Utility Vulnerability Index – (WUVI).....	92
AquaRating .....	92
<b>ANNEX 5: BRIEF FRAMEWORK TARIFF CALCULATION GUIDELINES FOR WATER UTILITIES</b> .....	95
<b>ANNEX 6: BRIEF FRAMEWORK CALCULATION AND BUSINESS PLAN REVIEW GUIDELINES FOR REGULATORY BODIES</b> .....	99

## List of figures in the document:

Figure 1 – Rating areas using the AquaRating model .....	98
--	----

## List of tables in the document:

Table 1: Possible content of a Business Plan .....	35
Table 2: Classification of given indicators .....	38
Table 3: Coverage of water supply services 2006–11 in % [1].....	67
Table 4: Coverage of wastewater services 2006–11 in % [1].....	67
Table 5: Water consumption in the world l/person/day [1].....	69
Table 6: Non-revenue water and managerial performance – average values [1] .....	70
Table 7: Non-revenue water in % [1].....	70
Table 8: Non-revenue water in m <sup>3</sup> /km/day [1].....	71
Table 9: Operational and maintenance costs per m <sup>3</sup> of water sold [1] .....	76
Table 10: Staff number per 1,000 people served (staff productivity) [1] .....	80
Table 11: Average revenues per m <sup>3</sup> of water sold in US\$ [1] .....	82
Table 12: Average collection period, in days [1].....	84
Table 13: Cross-subsidising [1].....	85
Table 14: Operating cost coverage ratio [1].....	86
Table 15: Affordability as % of GNI [1].....	87
Table 16: IBNET data for BiH [1].....	88
Table 17: Classification of Apgar scores [1] .....	91
Table 18: Average Apgar score, 2006–2011 [1].....	92
Table 19: Average Apgar scores by level of economic development [1].....	92
Table 20: AquaRating practices in the real loss management .....	93



# 0. EXECUTIVE SUMMARY

There is a consensus in Bosnia and Herzegovina that the current regulatory framework for water supply and sewerage utility services does not provide the necessary level of self-sustainability of these services. The key problems water utilities face are high network losses, inadequate tariff, ratio of collection of receivables, and staff number and expertise. A very high average percentage of non revenue water is usually justified by its low price, which consequently does not provide for recovery of all costs; thereby it is the investment maintenance that is often left without sources, i.e. regular renewal and reconstruction of the network. This is why the network is becoming obsolete and increasingly leaks, making real network losses grow year after year and hindering regular operations.

Recovery of costs is partly determined by the tariff rate, and in theory any level of costs may be recovered by sufficient rise in prices. Legislative framework for tariff setting is primarily governed by the Laws on Utility Services of RS; cantons in FBiH; and Brcko District, while tariff setting and method of utility service payment is determined by the decision of the local self-government unit (or canton) upon a proposal of the utility service provider.

It is well known that the European Union water policy requires setting of real prices for water supply services so as to ensure full recovery of costs incurred. Consequently, the Water Policy project concluded that a system should be set up in BiH where use of economically real rates of water fees and prices of water services would secure non-profit and self-sustainable financing of water sector.

On the other hand, control and cost optimisation, as entirely clear areas of management performance improvements under the direct authority of the company's management, are not often raised in discussions, and utility managers usually have limited understanding of the possibilities for performance improvements in this area.

During 2013 and 2014, in cooperation with the state, entity, cantonal and local authorities, UNDP prepared an analysis of the possibility for establishing a regulatory framework for tariff setting for water supply and sewage services. The main objective was to develop draft tariff setting methodology for water supply and sewage services in Bosnia and Herzegovina. The methodology defines such tariffs so as to enable recovery of all costs, including operating and investment maintenance costs, as well as capital investments costs, if so decided. This methodology also includes detailed guidelines for developing a business plan containing the selected key performance indicators as well as instructions for their calculating. Business plan includes detailed plans for improving financial and operating performance, while the methodology also provides guidelines for this purpose. Key performance indicators selected in one business period have to be projected for the entire planning period, as well as values achieved in the previous period compared with the earlier projected ones, and clearly justified why these values are not the same if there is a difference between them. At the same time, the proposed draft methodology does not require modifications of the respective legally regulated competencies.

Draft tariff setting methodology in this sector is based on implementation of the several key principles – as follows:

- ▷ Principle consumer pays, with suggestion to equalise water price for all consumer categories through a transitional period;
- ▷ Principle of equity and equality – UN Resolution UN 64/292 recognised the human right to water, the right of everyone to sufficient, safe, physically accessible and affordable water for personal or domestic uses, which leads to responsibility of the local community to assure water under equal conditions for its entire population;
- ▷ Principle of affordability, which determines the highest possible price that an average family can monthly pay from its income and the average consumption per person, followed by subsidies of the local community for those individuals who really cannot afford to pay their own water bill;

- ▷ Principle of conservation of natural resources or the Principle of environmental efficiency, which is to some extent already in use through application of the defined water fees, whereas the other options pertain to those local communities with scarce water sources, where the increasing block tariff models are proposed;
- ▷ Principle of full recovery of costs, which is an extremely important principle, while a baseline for its consistent application is full understanding of all costs pertaining to water supply and sewerage (and wastewater treatment) services. Several changes were suggested in the accounting and bookkeeping procedures in order to improve identification and verification of the justification of individual associated (financial) costs;
- ▷ Principle of economic efficiency, which is a principle of extreme importance for enhancing the BiH water supply and sewerage sector performance. Respecting this principle is actually critical for achieving the strategic objectives of the methodology, which is to achieve self-sustainability of these services.

The key performance indicators are also proposed for assessing gradual improvements in performance of these companies: Non-revenue water; Average collection period; Operating cost coverage ratio; Staff productivity; and Affordability of services. In their business plans, water utilities should foresee and regularly compare, analyse and provide justifications in case of differences between values of indicators achieved in the same period, and update their business plan every year.

The tariff structure proposal comprises a fixed charge, calculated separately for each contractual service user, and a charge depending on consumption pertaining to unit water price per m<sup>3</sup>. The fixed charge is aimed at covering the basic metering costs, i.e. all meters in the network, and the amount of the fixed charge for a consumer is determined by respective meter. Calculation of unit water price per m<sup>3</sup> requires for all related costs in the previous period, based on which the required revenues for the subsequent period are estimated, are properly kept in accounting records. It is calculated as a relation between all estimated operating costs and foreseen delivery of water in u m<sup>3</sup>, additionally adjusted by the target collection percentage. To avoid such calculation to lead to significant tariff increase, particularly if the water utility is inefficient, this calculation is compared with the assumed case of efficient operating (control tariff). This way, possible stimulation of the existing inefficiency is avoided, and making a decision on the transition period for gradual achieving real price with efficient operating is enabled. It is particularly emphasised that, especially if current situation is such that depreciation is, at least to some extent, partly included in the tariff along with parallel high losses and overstaffing, the final tariff rate of the future efficient company would possibly be lower than the existing one – therefore, it is not implied that the price will rise in any case.

# 1. INTRODUCTION

## Context of the study

There is a consensus in BiH that the current regulatory framework for water supply and sewerage utility services does not provide the necessary level of self-sustainability of these services. In discussions with management of water supply service providers on the key problems they are facing, they usually point out the following issues as critical to their operations:

- ▷ Non revenue water, i.e. network losses;
- ▷ Tariff rates;
- ▷ Ratio of collection of receivables;
- ▷ Staff number and expertise.

A very high percentage of non revenue water is usually justified by its low price, which consequently does not provide for recovery of all costs; thereby it is the investment maintenance that is often left without sources, i.e. regular renewal and reconstruction of the network. Due to poor maintenance, the network is becoming obsolete and increasingly leaks, making real network losses grow year after year and hindering regular operations. Actual value of losses is often not known but only roughly estimated, so as the first step it would be necessary to make a balance of waters and thus the assessment of real and apparent losses in order to identify the size of this problem. This is obviously an issue that can directly and independently be handled by managers of these companies, of course provided that they have sufficient funding for this purpose. They themselves may also affect the collection rate unless it is threatened by unreasonable tariff rates that far exceed the payment abilities of local population.

But the managers of utility companies are not in a position to set their own tariffs. Formally, the tariffs are outside the direct control of utility companies' managers, although they may have quite a strong influence on the approved level of prices through negotiations with municipalities and other stakeholders, and through preparing requests for tariff changes followed by well elaborated business plans. Recovery of costs is partly determined by the tariff rate, and in theory any level of costs may be recovered by sufficient rise in prices.

Legislative framework for tariff setting is primarily governed by the Laws on Utility Services of RS; cantons in FBiH; and Brcko District. Individual municipalities have adopted their own regulations pertaining to tariff setting of utility products and services.

Tariff setting and method of utility service payment is determined by the decision of the local self-government unit upon a proposal of the utility service provider. This rule is applicable in most cantons in FBiH, and in RS, with the exception of Sarajevo and Tuzla cantons. In Sarajevo Canton, utility services are governed at the cantonal level, thereby the tariff is set at the cantonal level too, whereas the Law on Utility Services of the Tuzla canton sets forth that the tariff rate is determined by the service provider based on the prior approval of the municipal council.

Tariff set for provided utility service shall be paid to the service provider on the basis of the contract concluded by the service provider and the customer of the service in accordance with cantonal laws on utility services/activities as well as the Law on Obligations FBiH ("Official Gazette of RBiH", No. 2/92, 13/93 and 13/94 and "Official Gazette of the Federation BiH", No. 29/03, 42/11), as well as in accordance with Article 16 of the Law on Utility Activities of RS, which reads that the provision and use of utility services shall be based on the contract concluded between the utility service provider and the user. However, both in FBiH and RS this provision is often not applied, i.e. the respective contracts are not concluded.

The described legal and institutional framework has predetermined the current practice of tariff setting for the water supply, sewerage and wastewater treatment in BiH. It is common for local communities, as

owners of the utility infrastructure, to establish public companies for provision of utility services, thus such a public company is in a position to prepare a tariff proposal, which the company's owner or its representative shall consider and accept or refuse (the exception is Tuzla canton where the final tariff rate is determined by the service provider based on the prior approval of the municipal council). Draft proposal (of a changed) tariff rate for these services is usually prepared by the accounting department on the basis of their own data on costs from the previous period, on the produced and billed volume of delivered water, i.e. sewerage and wastewater treatment, and on the basis of planned changes in the height of operating or maintenance costs submitted by the technical department (e.g. due to changes in energy prices or planned activities on reducing the losses by repairing or replacing the pipeline, water meters, etc.). These data are very often insufficiently detailed and entered in inadequate cost centre accounting, so they are not relevant enough (more about this will follow in the Chapter on the tariff structure and cost recovery).

Thus prepared draft shall be considered by the management and subsequently forwarded to the Steering Board (SB) or Supervisory Committee (SC), or the Assembly of the company (owner's representatives), which is not identical across BiH. If local community is a 100% owner, than the Assembly of the company may comprise only the mayor or head of municipality, or other delegated owner's representative, who, in that case, shall consider the submitted draft alone. If SB or SC agree with the draft proposal, than it is submitted to the municipal council for a consideration procedure. The tariff rate adopted by the Council shall be published (usually through the local community's official gazette).

Several years ago, the Association "Water Supply Companies of Republika Srpska" prepared a working document "Methodology for drinking water tariff setting in the water systems of Republika Srpska", as an effort to improve this process, but it neither turned into a regulatory act through a formal procedure nor was even informally implemented in any significant number of the RS companies.

The report "Regulatory Framework for Tariff Setting for Water Supply and Sewerage Services in BiH" from February 2014, in Chapter 3 presents a detailed overview of legal provisions pertaining to tariff setting, so it is not necessary to repeat it here.

It is well known that the European Union (EU) water policy requires setting of real tariff rates for water supply services so as to ensure full recovery of costs incurred. Consequently, the Water Policy Project concluded that a system should be set up in BiH where use of economically real rates of water fees and prices of water services would secure non-profit and self-sustainable financing of water sector.

On the other hand, control and cost optimisation, as entirely clear areas of management performance improvements under the direct authority of the company's management, are not often raised in discussions, and utility managers usually have limited understanding of the possibilities for performance improvements in this area.

The overall tariff setting issue is further complicated by the absence of studies to assess the ceiling of payment abilities of the population, as well as to identify the groups in need of support to be able to pay their bills. Another dimension that over time lost connection with the original reason for its existence is different tariff rate of water for physical persons and legal entities, specifically regular cross-subsidising of household payments by legal entities. Mainly, there is an assumption, the author did not manage to see a document to confirm it, that sometime in the past (after World War II) the opinion was created that legal entities (private or public) as producers of goods and services were "wealthier", thus it was logical for them to pay more for the same or even worse quality of water supply service (since they often had less need for high quality water). The soundness of such thinking in the current state of the economy in BiH needs no comment, but it is worth mentioning the examples of countries such as Brazil that considered it was better to stimulate development of economy by lower tariff rates, where, by higher employment and better wages, the inhabitants would be in a position to pay higher unit prices. Nevertheless, if we start from the principle "user pays", the principle of equal rates seems to be the most appropriate and most frequently in use in the EU.

The absence of actual, and truly needed research of the payment abilities and particularly identification of population categories in real need of support to pay their utility bills in BiH has been replaced

in practice by a general attitude in local communities that the overall population is poor and thereby cannot afford to pay higher bills. Such an attitude can be recognised in frequent non-approval of tariffs proposed by managers of utility companies. Tariff rates significantly differ from one local community in BiH to another but, in principle, it can be stated that all of them are considerably lower than the ones in the most recent new EU member, Croatia. Given that such tariff rates are not sufficient to cover all related costs, either the local community would settle the difference in the necessary revenue, or the network maintenance would be avoided and thus its value reduced (which is a common practice). Of course, it is all users that are subsidised in both cases, which is completely unjustifiable both from the moral and practical point of view, since their needs for support significantly differ.

### Preceding activities

It is clear from the aforementioned that the issue of the tariff setting method, if connected with the payment ability and cost optimisation, predominantly determines the position and viability of this sector. This was the reason for UNDP to initiate a project activity at the end of 2013 so as to define the regulatory framework for tariff setting for water supply and sewerage services in BiH. The activity was based on the idea of establishing a regulatory agency/body, whose detailed competencies were to be determined in the course of implementation of the activity, which would improve access to a very important issue of tariff setting in the sector, with the overall objective to ensure long-term sustainability of water supply and sewerage services in BiH.

In February 2014, after a number of consultations with the key stakeholders in the sector, the preliminary phase was completed by a review of the basic principles of further proposals for establishing a regulatory framework for tariff setting for water supply and sewerage services in BiH, comprising the following:

Changes in the sector to ensure implementation of the new regulatory framework should be minimally invasive compared to the existing normative as well as compared to the institutional framework – the goal is to come up with a high quality solution by least possible modifications and amendments to the existing regulations in this area, as well as using the existing institutions in the sector to the highest extent possible.

The reason for such a view was not only to simplify the change procedure and make enabling their political acceptability and implementability easier, but also a reflection of the opinion that the existing framework is not irregularly structured and it only needs additional assistance to become effective too.

Responsibility for self-sustainability of the function of water supply and sewerage service provision is undoubtedly on the local community's side, it can be relieved but not fully delegated to own utility company. It is desirable to separate the rights and obligations of the local community and the utility company in the performance of this function, and ensure both the quality of services and financing that will permanently maintain such quality.

The tariff setting methodology for water supply and sewerage services in BiH should be harmonised between the entities and prescribed at the entity level, because this would contribute to coordination of the approach in local communities and assist to their capacity development. Such methodology should also prescribe the documentation and data to be submitted in the procedures of requests for tariff changes.

In overseeing the consistent follow up of this methodology, checking the quality of the delivered data and the current and the business plan projected indicators of operational and financial performance, it is expected that many local communities will require professional assistance. In this respect, there is a need for a body that would be able and authorised for giving the official opinion/recommendation on compliance with the default tariff setting methodology, as well as examination and giving official opinion on the business plans proposed by service providers.

The sector could also benefit from collecting and publishing of the selected operating and financial performance indicators (benchmarking), which would enable easier and continuous monitoring of effectiveness of the utility company management and thereby make the review of the delivered business

plans easier too. Furthermore, attention should, of course, be paid to the already existing legal obligations (such as submission of the three-year business plans, which is not sufficiently respected) as well as appropriate measures to reinforce their implementation.

After the final meeting of the previous phase, the following conclusions and proposals of further steps in improving the regulatory framework for tariff setting for water supply and sewage services in BiH were made:

There is a consensus on the need of developing a tariff setting methodology for water supply and sewerage services in FBiH and in RS, as well as in Brcko District; as well as that it would be easier established by regulations of the entity governments with the aim of better implementation of the existing laws; and that the group of issues addressed by the methodology is very similar throughout BiH, on the basis of the RS Law on Local Self-Governance and the FBiH Law on Principles of Local Self-Government.

Detailed methodology shall prescribe such a water tariff to enable recovering of all operating costs as well as all investment maintenance costs. The methodology shall additionally emphasise the already existing responsibility of local community for keeping the accounts of all fixed assets and calculation and separation of depreciation. The methodology shall leave the option, but not specify as an obligation, for the tariff to cover the costs of capital investments. The methodology shall prescribe the obligation of utility companies to submit, along with the request for tariff change, at least a three-year business plan with a detailed plan of financial and operational improvements. The same plan shall include the values of the key indicators of operational and financial performance in the following three years as well as these same values for the previous three-year period, both the realised and the earlier projected ones. The methodology shall determine a set of such indicators and method of their calculation.

The methodology shall not derogate any existing legal obligations in the area of financial/accounting reporting nor make any changes in the authorities, responsibilities and/or disturb the existing state of play with regard to activities pertaining to utility services.

There is a consensus on the need for the existence of a professional body for reviewing the requests for price changes and checking full compliance with the prescribed methodology, as well as that any such request will ultimately be considered and approved by the local community.

It is necessary to further explore the possibility of locating such bodies, which would be established at the level of RS, i.e. cantonal levels in FBiH (with possible additional body at the level of FBiH in case when a canton decides to delegate this responsibility to a higher level). Alternatives to be further evaluated are for this body to be a part of the Association of Municipalities and Cities of FBiH, i.e. Association of Municipalities and Cities of RS, to be in a form of Commissions with the mandate engagement or within the permanent staff at the respective Governments (RS, i.e. cantons), or propose other suitable alternative that could be easily implemented without many additional interventions in regulatory environment.

In addition, the shortest path should be considered to harmonise the laws on utility services of RS, cantons and Brcko District so as to provide that, if the local community sets a lower tariff rate of the service than the actual costs, the difference in the amount shall be covered by the municipality. It should be considered whether this provision can be prescribed by the FBiH Law on Principles of Local Self-Government and thereby simplify the changes of 10 cantonal laws.

As for the function of benchmarking, namely comparing performance indicators of utility companies within the sector, it is proposed for this task to be implemented in collaboration with the Danube Water Programme (DWP) that has already made efforts to select and define indicators to be collected and presented in BiH, i.e. to wait at least for the initial results of this project before submitting the concrete subsequent steps in this area.

The following is the project task for development of the tariff setting methodology for water supply and sewerage services in BiH, which this study is dealing with. A separate study on establishing a system (regulatory framework/body) for tariff setting for water supply, sewerage services and wastewater treatment is being developed in parallel, and its proposals and conclusions will be harmonised with the

proposals and conclusions of this study. These two documents together represent an integral proposal of a solution for improving the regulatory framework.

## Project Task of this study

During 2013 and 2014, in cooperation with the state, entity, cantonal and local authorities, UNDP prepared an analysis of the possibility for establishing a regulatory framework for tariff setting for water supply and sewage services. After several meetings and intensive exchange of views, the document has been developed with the recommendations for subsequent steps.

Based on these recommendations, UNDP has launched further technical assistance in order to improve the overall situation in the water supply and sewerage sector and strengthen the required capacities. The main objective of this study is to develop draft methodology for tariff setting for water supply and sewage services in Bosnia and Herzegovina.

A consultant's task is to prepare draft methodology for tariff setting in the sector of water supply and sewage services in Bosnia and Herzegovina. The methodology shall define such tariffs so as to enable recovery of all costs, including operating and investment maintenance costs, as well as capital investments costs, if so decided. Investment maintenance assumes calculation of depreciation for the overall infrastructure, thus highlighting the responsibility of local community and companies providing these services for timely recording of their own fixed assets in the accounts. Indirect (opportunity) costs, such as costs of resources, also need to be considered, but they will be included in the tariff structure only if explicitly requested.

The methodology shall also include detailed guidelines for developing a business plan (for at least a three-year period) containing the selected key performance indicators as well as instructions for their calculating. Business plan shall include detailed plans for improving financial and operating performance, while the methodology has to provide guidelines and examples for this purpose. Key performance indicators selected in one business period have to be projected for the entire planning period. Values achieved in the previous period should be compared with the earlier projected ones, and clearly justified why these values are not the same if there is a difference between them.

The Consultant shall examine in detail all legal regulations in BiH pertaining to financial management and accounting, and ensure that the proposed draft methodology does not require modifications of the respective legally regulated competencies.

Draft methodology was publically presented at the workshop organised by UNDP at the end of the draft preparation period (February 2015), followed by an additional 15 day period for submission of comments and suggestions. Subsequent to their consideration, the Consultant has prepared a final proposal of the tariff setting methodology for water supply and sewerage sector in Bosnia and Herzegovina, with additional details for potentially different needs of the entities.

## Methodological approach and contents of the document

In developing the study, the Consultant has used several methodological approaches:

- ▷ Overview of practices and experiences in several EU and neighbouring countries in order to identify the key principles for setting a tariff structure and methodology for its calculation, as well as possible adjusting of the principles and methodology to specific needs of BiH;
- ▷ Analysis of the methodology for tariff setting in the sectors of energy and telecommunications in BiH, particularly from a view of optimisation of operating costs (given that the respective regulatory bodies in these sectors are already in place);
- ▷ Review and analysis of all costs to be recovered from revenues collected through the approved tariff for water supply and sewage services in BiH, as well as a proposal of their accounting method so as

to make them clearly and undoubtedly related only to service provision;

- ▷ Review, analysis of the applicability, and selection of the key performance indicators suitable for implementation in BiH, with the proposal of long-term benchmarks, including the possible stimulating annual pace of progress towards these benchmark values;
- ▷ Review of the selected existing methodologies for performance assessment of water supply and wastewater companies.

The structure of this document through chapters follows from the above stated:

- ▷ Chapter 1: Introduction to the study
- ▷ Chapter 2: Tariff structure and costs to be recovered by price
- ▷ Chapter 3: Proposal of draft tariff setting methodology
- ▷ Chapter 4: Proposal of business plan contents

Annexes 1-4 provide:

- ▷ Annex 1: Overview of approaches to tariff setting methodology for water in other countries
- ▷ Annex 2: The role and importance of tariff setting methodology for services within the scope of activities of other regulatory agencies in BiH
- ▷ Annex 3: Key performance indicators
- ▷ Annex 4 : Methodologies for performance assessments

Annexes 1-4 serve the purpose of proposals offered in chapters 3 and 4. These will refer their proposals to parts presented in the previous chapters and annexes, thus enabling the subsequent analysis of the quality of proposals as needed.

Brief note with regards to the language – there are three equal official languages in BiH, Bosnian, Croatian and Serbian, which are intertwined throughout the entire document, because it would not be cost-effective to make three separate documents for this purpose. Therefore, the alternating use of words in these languages for water supply, company, indicator, etc. may be observed. The consultant considers the language issue important, but not of key importance in this phase of development of the study (if the study would be subsequently used for development of regulations, the use of all three official languages would be mandatory), therefore this manner of writing is applied as a compromise that emphasises the equality of all three aforementioned languages.

## 2. TARIFF STRUCTURE AND COSTS TO BE RECOVERED BY THE PRICE

### Principles to be observed

Based on the previous reviews of practices applied in other countries or regions, internationally accepted principles and standards, and the needs of this sector in BiH, we can hereby highlight the following key principles in establishing the tariff structure.

The issue of financial sustainability of the water supply system is closely related to the principles that are broadly accepted in the EU – these are the principles “**full cost recovery**” and “**consumer pays**”. Another principle that can be applied, particularly in terms of sewerage services, is the “polluter pays” principle, which can also relate to possible environmental damages during the construction or operational use of the water supply system. These principles should represent the basis of setting a water tariff.

Principle “**consumer pays**” requires that the cost incurred by a specific request of a concrete consumer or a group of consumers (as is the case for water supply systems) should be borne by this very group. That this principle in BiH practice is not consistently respected can easily be seen from the example of commonly higher tariff rate of water for legal than the physical persons, despite the fact that it is physical persons who request higher quality of water and who have pronouncedly unequal daily (and seasonal) consumption, which requires the need for reservoirs. Such an approach, in fact, cross subsidises one category of consumers (physical persons) from another category (legal entities). Another principle applied in the water supply sector is the solidarity principle, which makes the water price the same for the same category of consumers (physical persons) living in remote or high altitude areas, which can cause higher related costs. While this solidarity principle is widely accepted throughout the world, it is not the case with the different tariffs for physical and legal persons supplied with the same quality of service, but instead equal tariffs are the most usual, even cases that higher tariffs for physical persons subsidise legal entities (with justification that this attracts new investments, for instance in Brazil).

Water is also frequently considered both as a social category and as an economic good. On 28<sup>th</sup> July 2008, through Resolution 64/292, the United Nations General Assembly explicitly recognised the human right to water and sanitation, and acknowledged that clean drinking water and sanitation are essential for the realisation of all human rights. In November 2002, The Committee for Economic, Social and Cultural Rights adopted General Comment No. 15 on the right to water. Article I.1 states that “The human right to water is indispensable for leading a life in human dignity. It is a prerequisite for the realisation of other human rights.” The same Comment also defined the right to water as the right of everyone to sufficient, safe, acceptable and physically accessible and affordable water for personal or domestic uses. Such a definition leads to another principle applied in water supply, the principle of **equity and equality**. It is this principle that causes the partial application of the previously mentioned principle “consumer pays” (with practical difficulties of such an application), since the objective is to assure water under equal conditions for the entire population.

Closely related to this is also the **principle of affordability**, which is used for assessing the highest possible tariff rate that an average family can monthly pay from its income, and the average consumption per person. In practice, this ceiling is usually set at 4% of the total monthly household income for the water and sewerage bill, but a separate approach can be developed for each type of service, particularly since considerably higher costs are expected in the sewerage sector in the coming period, when facilities for wastewater treatment will be constructed. It has to be noted that there will surely always be a certain number of persons /households in local community who cannot afford to pay their water bill, but also underlined that those persons, which have to be registered as socially vulnerable categories, should be assisted in some other way, through subsidies, vouchers or otherwise, and not by reducing the water tariff rate for all consumers. Such an approach will ensure realising the human right to water as recognised by the UN Convention (On 28<sup>th</sup> July 2008, through Resolution 64/292, the United Nations General

Assembly explicitly recognised the human right to water and sanitation, and acknowledged that clean drinking water and sanitation are essential for the realisation of all human rights).

Principle “**full recovery of costs**” is declaratively represented in the BiH practice. It relates to tariff setting of water supply services in a manner to include all the costs associated with this type of service. Its basic intention is to achieve sufficient revenues to enable long-term stability and sustainability of a utility company providing the respective services.

However, there is a problem related to understanding of the term “all costs”. In BiH practice, this principle is often implemented in a way to include operating costs and only a portion of real depreciation costs, since water supply and sewerage network and infrastructural facilities are not fully recorded in the fixed assets accounts. This way, the investment costs of maintenance and capital investments are neglected, which would serve for expansion of the network or service improvements through purchase of new infrastructure, as well as opportunity or indirect costs such as, for instance, costs of resources or possible environmental damage.

One should inevitably state another inconsistently implemented principle in BiH practice within this sector, the **principle of economic efficiency**. It includes, for example, optimisation of the use of pumps in the network, chemicals for disinfection, optimal fixed assets management and minimizing the network losses, minimum number of staff for implementation of all operational activities, etc. It can be said without hesitation that most utility companies suffer great losses in the network that hinder the realisation of the main company’s function, that the number of staff and their qualification structure is inadequate, etc.

Still, these are the consequences of other problems such as high unemployment in local community, sketchy responsibility for fixed assets maintenance expressed in inadequate calculation of depreciation, which, combined with poor collection, inevitably leads to weakening of the infrastructure, etc. These are not recent problems, and their consequences are long lasting, so it is important to identify the path, first to ease them, and subsequently to eliminate them. To this end, it is important to choose useful and applicable performance indicators, as well as their milestones and target values, which will serve as evidence for general application of the stated efficiency principle.

Another principle which should be mentioned, although it is still not implemented to its full meaning, is the principle of **conservation of natural resources** (“environmental efficiency”). Its application partly reflects in the existence of the defined water charges (e.g. special water charges on use of ground and surface waters, water conservation, abstraction from watercourses, etc.), but the same principle may also be applied through additional charges whose function would be to decrease consumption and thereby the water intake from the environment. Another option for applying this principle is to introduce charges which would neutralise possible adverse environmental effects that occurred during the construction or exploitation of the water supply system (internalisation of resource costs). In any case, the price should stimulate consumers to use water rationally, and not to threaten the existing capacities by excessive water consumption.

It should be noted that tariff setting, and this happens in the international practice, can also be guided by socio-political motives, e.g. low and subsidised water supply tariffs serving as incentive for development of underdeveloped areas of the country. In those cases, the tariff usually recovers the main operating costs (e.g. staff wages, basic maintenance costs), whereas the difference to the full price is covered by responsible administration level from own revenues. This approach is not really used in BiH, which is in fact good, since it leads to irrational water consumption.

## Existing practice of recording costs and revenues

There is another real problem of an accounting nature, which makes it very difficult to assess costs in the coming period to be recovered from the adequate tariff for water supply and wastewater services. Such an assessment is made on the basis of the existing information on realised (recorded) costs in the previous period, with possible adjustments and modifications due to changes in the market or potential new costs incurred by activities that were not performed in the previous period. It should be added that the EU Water Framework Directive defines the economic costs as costs of the entire society, while financial

costs are separately defined as costs of individual company, in this case, water utility.

The essence of the problem is that in most BiH utility companies, the incurred costs are not adequately recorded – they are mainly entered in general company balance, instead at the point of origin (accrual accounting), i.e. the defined cost centre. All accounting records are kept at the level of the company as a whole and the revenues, costs and financial statement are presented this way too. Systemic records are not kept about which services or activities the individual costs (or revenues) relate to. Even the fixed assets are not kept analytically against cost centres or business units.

The additional problem is that not all financial costs are registered in books of water utilities. This is particularly common in terms of the depreciation of fixed assets, which is considered a high cost for the utility and therefore avoided. This is enabled by less than fully defined responsibility – namely the fixed assets, i.e. all municipal infrastructure is owned by the local community, which in most cases failed to delegate the obligation of calculating depreciation to its own utility by a clear agreement. In addition, it is often the case that all the infrastructure is not registered in books of fixed assets (there are cases when only a small part of network is listed) and therefore calculation and allocation of funds for depreciation is avoided, which is crucial for investment maintenance and long-term sustainability of the network functioning. Thus, very important and high costs are simply not recorded in accounts, which disclose the wrong figures on them.

In complex utility companies, providing a series of other services such as solid waste disposal, management of green areas and parking lots, market places, cemeteries, etc., this problem is even more highlighted, but one should certainly note that this problem also exists in the companies such as “water supply and sewerage utility”, since, due to such kept accounting records, it is not possible to precisely calculate the respective water supply and sewerage system price. Given the lack of precise data on related costs, wastewater charges are usually set in some proportional relation to water tariffs, based on the company’s individual estimate (e.g. 30%, 50%, etc.).

This practice, by all means, in the upcoming period has to be replaced with accrual cost accounting. Recording costs and revenues on accrual basis is necessary not only to identify the tariff structure elements, but also to monitor operations of organisational units and enhance efficiency through cutting the operating costs and rising the related revenues. For the tariff setting needs, it is necessary to unbundle the cost centres water supply and sewerage (as two separate units), as well as to record separate (indirect) costs of common administrative services such as accounting service, commercial service, legal services, human resources, management, etc. Common services do not earn their own income, but their operations play an important role in providing the conditions for work of other business units as the cost centres. They serve the business units, thereby they finance their costs.

These indirect costs then need to be allocated according to the key, established based on direct costs of the business units, as follows:

- ▷ Staff wages;
- ▷ Number of employees;
- ▷ Depreciation;
- ▷ Other operating costs (electricity, maintenance of equipment, insurance, etc.)

The basic parameters for allocation of indirect costs are presented as a percentage of participation of an individual operating unit in the common administration services. The key for allocation of indirect costs must be adopted with the consent of all operating units.

Such a determination of cost centres in the company will enable separating water supply from sewerage costs, and also unbundling them from other services that this utility company provides. Revenues should be recorded according to cost centres too, as well as financial reporting kept through business units. The following direct costs, for instance, should be recorded exclusively on operating units as cost centres, if possible at the lowest possible level (hence, it can be cost centre for water supply or for sewerage, or

other services):

- ▷ Staff wages and compensations in business unit water supply, i.e. sewerage unit, and staff in other departments/units, including the common administration services;
- ▷ Depreciation of fixed assets (according to the function of asset, which of the services provided by the utility company it assures);
- ▷ Electricity costs;
- ▷ Fuel and lubricants costs;
- ▷ Costs of raw materials from monthly report of inventory accounting;
- ▷ Costs of registration and insurance of respective vehicles;
- ▷ Costs of respective assets maintenance; and
- ▷ Service contracts concluded by business units, etc.

Financial costs also need to be mentioned here, that occurred by borrowing and repaying loans, which should also be recorded at the point of origin, or namely the function for which the given funds were spent.

## Types of costs to be recovered by price

The first step to cost recovery is certainly a clear, accurate and transparent recording of all financial costs of water supply, sewerage and wastewater treatment service providers. Full cost recovery should include the following:

- ▷ Operating costs, namely the costs incurred directly by running the operations (costs of labour, energy, current maintenance, chemicals, etc.);
- ▷ Depreciation costs (investment maintenance costs – e.g. by regular application, 2% of pipeline will be replaced on average per year);
- ▷ Investment costs, i.e. capital investment costs funded from own sources; and
- ▷ Financing costs (capital expenses, capital servicing costs), if a local community decides to repay the loan through price of service for improvement of which the loan was spent (while a local community may also decide to repay this loan from its own budget instead of water price, namely to make repayment from the funds of all citizens, not only those who use the relevant service).

The inclusion of the following costs should also be considered, not necessarily in the initial period of the new tariff structure implementation, but certainly as a long-term objective:

- ▷ Economic costs of resources, related to lost water value for other potential purposes;
- ▷ Environmental impact costs; and
- ▷ Other costs such as those related to development of the required accounting and other information systems, development of human resources to the extent needed for sustainable provision of services, monitoring (including the benchmarking) and evaluation, planning and development of necessary strategies, etc.

It is also necessary to emphasise the relation among individual types of costs and delivered volume of water or users' consumption – namely, some of the costs do not largely depend on the volume of generated water and have similar values in equal but shorter period (e.g. on a monthly bases). Such costs

include, e.g. staff wages and compensations, or depreciation, and they are usually called the **fixed costs** (sometimes also the capacity costs). This group should also include the specific costs of consumers, such as meter maintenance (which depend on the size of the meter and the period when it has to be replaced), or metering and billing costs (which is carried out even when the dwelling is used, and therefore water consumed, only seasonally, unless otherwise regulated by a special Contract). In longer periods, the level of these fixed costs can be changed too, so this term should not be understood literally, but rather as an indication that these costs are not proportional to water production.

On the other side, there are costs whose level is relatively proportional to the volume of produced water; the example can include costs of electricity spent in the process of pumping or distribution, chemicals used for treatment of water, etc. In practice, these costs are called **variable costs**.

The key issue is, in fact, how to incorporate these two types of costs into the tariff structure and generally fulfil the previously stated principles. The following will present several tariff structure models that can be seen in practice.

## Basic models of the tariff structures

There are several different tariff structure models occurring in practice that we present below – the objective is to select the most appropriate model for the specific needs of local communities in BiH. These are, for example:

- ▷ Single unit price of a m<sup>3</sup> of water, paying according to volume of water used without a fixed charge;
- ▷ Single unit price of a m<sup>3</sup> of water, paying according to volume of water used with a fixed charge;
- ▷ Single unit price of a m<sup>3</sup> of water for all consumers;
- ▷ Flat tariff;
- ▷ Marginal cost tariff;
- ▷ Tariff structure with two or more block tariffs.
- ▷ The following is individual explanation of each of the above stated models.

### Single unit price of a m<sup>3</sup> of water, paying according to volume of water used without a fixed charge

This relates to tariff set per unit of the consumed water volume (KM/m<sup>3</sup>) where the unit price does not depend on the total volume of water consumed (every m<sup>3</sup> of water has equal price for the same consumer category). The tariff per m<sup>3</sup> still can be (but does not have to be) different for different categories of consumers. It includes specific consumer's costs such as meter maintenance or meter reading and billing. This method does not include fee for recovery of costs not depending on the delivered volume of water (consumer's costs). In BiH, this the most frequently used tariff structure. It is simple to analyse and apply and easily understandable for service users.

### Single unit price of a m<sup>3</sup> of water, paying according to volume of water used with a fixed charge

This differs from the previous structure in a way that, along with the volumetrically set charge, the fixed charge is added, which does not depend on the volume of water consumed. The two variants of this tariff structure relate to fixed charge which includes only specific consumer's costs, i.e. the fixed charge including, along with consumer's costs, also a certain volume of water consumed. In this case, the price per m<sup>3</sup> can (but does not have to be) different for different categories of consumers too.

In the former case, therefore, the fixed charge primarily concerns the specific costs of maintenance and replacement of meters, meter reading and billing, with possible adding of the (small) amount related to maintenance of the operational network. In the latter case, even a relatively small volume of water is in-

cluded in the fixed charge (usually 5%-15% of the average consumption in this category); the volume of water included in the fixed charge should not be large, because in that case the fixed charge could turn into a flat rate. The estimate of the volume of water to be included in the fixed charge can be conducted based on the minimum volume of water delivered to that category of consumers during the year. All other consumption above this volume that enters the fixed charge is calculated per  $\text{m}^3$  with equal unit price within the same category, and independently on the volume of water consumed. In this case, the price per  $\text{m}^3$  can (but does not have to be) different for different categories of consumers too.

### Single unit price of a $\text{m}^3$ of water for all consumers

A single price per  $\text{m}^3$  is set regardless of the category of consumers, irrespective of the volume of water consumed. A unit price per  $\text{m}^3$  is calculated by simple dividing of the total required revenues with the total estimated water consumption. This is mostly used in practice in the small systems where consumers have similar requirements. Specific consumer's factors such as inequality of consumption or the size of meters are not taken into account when setting the price.

### Flat tariff

This type of the tariff structure is mostly used when water consumption is not metered, mainly in the category of households. This structure is not cost-effective and should be avoided whenever possible. It is usually based on the number of household members, which may seem logical (although it is not always simple to obtain the updated information on the number of members, particularly in terms of seasonal, e.g. students' migrations), but in case of individual dwelling units this principle does not take into account the consumption of water for purposes such as watering the garden, washing and cooling terraces, etc. In practice, it is even possible to see the principle of the flat rate per household, regardless of the number of the household members, or even the dwelling size, which obviously has nothing to do with real consumption and puts consumers of services in unequal position.

### Marginal cost tariff

This tariff model is based on marginal costs related to production of the additional product unit. The prices are, thus, related to the costs of the required enhancement of the total water supply capacity, namely development of additional infrastructural facilities needed for the increased production driven by the increased demand. This way, an adequate signal on the real water price is sent to consumers. The application of this tariff structure is not practical for water supply and sewerage services.

### Tariff structure with two or more block tariffs

The structure with two or more block tariffs can have increasing or decreasing character. A distinctive market approach to sale appears when the unit price of a product or a service decreases with the quantity of order - in this case, this means that the unit price decreases as the consumption grows, within the given framework (e.g. the first 5  $\text{m}^3$  of consumption are billed at one price per  $\text{m}^3$ , then the price decreases for consumption of 6-10  $\text{m}^3$ , then the price decreases again, etc.). In principle, this tariff structure makes sense, since most of the costs incurred by service provision are captured by assuring the basic consumption; thereby the unit costs of users with lower consumption are higher. Nevertheless, increasing block tariff is used more frequently – when the unit cost per  $\text{m}^3$  of water increases with higher consumption. This is primarily used to stimulate water saving. After adopting the block tariff ceilings, it should also be checked whether the adopted elements create sufficient revenues to recover all related costs (for each of the categories of consumers).

The following chapters will provide recommendations for selection of the tariff model suitable for BiH, which will, at the same time, answer the above question on incorporation of the fixed and variable costs in the tariff model.

# 3. PROPOSAL OF DRAFT TARIFF SETTING METHODOLOGY

This one, and partly the following chapter present proposal of tariff setting methodology for water and sewerage services. All proposals are based on previously presented information.

## The main tariff aspects

It is important to highlight that water supply and sewerage services are of public interest with multiple aspects affecting the tariff setting – such as:

- ▷ Economic aspect;
- ▷ Social aspect; and
- ▷ Political aspect

In BiH practice, the political aspect sometimes plays a dominant role, although disguised by public emphasis of the social aspect. Namely, the low approved price is publically justified by poverty of local population (social aspect), without any differentiation of the poverty level so, in fact, even the richest get subsidised.

The Consultant proposes that the methodology should primarily focus on the economic aspect, with consistent and full compliance with the affordability principle, which would actually incorporate the social aspect as well. If there is a specific local political aspect, e.g. wish to attract investments and create new jobs, it can be considered, but also additional source of funding added for its achievement, which does not come from the tariff, i.e. revenue based on delivered services.

Sources of funding for provision of water supply and sewerage services, according to the Law on Utility Activities, can be multifold and in any case include the funds:

- ▷ From the tariff charged for utility service,
- ▷ From utility fees,
- ▷ From the local community's budget,
- ▷ From other sources.

This opens space for the local community, which in any case, pursuant to applicable regulatory acts, adopts the price of these services, to supply the missing funds for efficient and effective operation of a utility, if it fails to adopt the required tariff level for self-sustainable management.

## Legal framework

The legal framework which defines in detail and sets forth the manner of organisation and management of water supply in local communities comprises:

- ▷ Cantonal laws on utility services,
- ▷ RS Law on utility activities,
- ▷ Law on utility activities of Brcko District,

- ▷ FBiH Law on Utility Activities (unless repealed by the adoption of all cantonal laws on utility services)
- ▷ BiH Law on Consumer Protection,
- ▷ Laws on obligations of FBiH and RS,
- ▷ Laws on local governance and self-government (all public administration levels).

It is prescribed that local communities are responsible for provision of utility activities, therefore provision of water supply and sewerage activities too, and thus for regulation of the conditions and manner of organisation of utility services, including tariff setting and collection.

To this end, any tariff setting methodology for provision of these services will have to be incorporated in the aforementioned legal framework. **The Consultant suggests integrating this process with the process of establishing a regulator/s in this area. A separate study is devoted to this matter.** It should offer an answer is it possible to set a common legal authority of cantons and FBiH, which would simultaneously mean that this methodology in FBiH can be set by one federal law, instead of 10 cantonal laws.

## Methods for achieving the set principles

Chapter three presented several key principles to be taken into consideration when setting the price for water supply and sewerage services. The following is the Consultant's proposal for achieving these principles in BiH practice.

### Principle consumer pays

In line with considerations above, the Consultant suggests to systemically discontinue the existing cross-subsidising of one consumer category (physical person) by another category (legal person), i.e. to equalise water price for all consumer categories, through a transitional period of 3 to 5 years foreseen in the first utility's business plan, which will be submitted after the application of the new methodology is in place. Such an approach will simplify calculation of tariff, which will assume only total consumption instead of consumption classified per categories of consumers.

### Principle of equity and equality

UN Resolution 64/292 of 28<sup>th</sup> July 2010 recognised the *human right to water as essential for the realisation of all other human rights*. It is defined as the right of everyone to sufficient, safe, acceptable and physically accessible and affordable water for personal or domestic uses. This principle leads to responsibility of the local community to assure water under equal conditions for its entire population, which is currently not the case in many parts of BiH since it is assured only in core urban area through the so called central water supply system, whereas other systems outside this area are mainly out of control and local community management.

### Principle of affordability

This principle is directly related to the previous one, and only together they fulfil the goals of the UN Resolution on the human right to water. It determines the highest possible price that an average family can monthly pay from its income and the average consumption per person.

Although in practice, which is relatively recent in BiH and related to internationally funded projects, this ceiling is usually set at 4% of the total monthly household income for the water and sewerage bill, a real problem is the assessment of a family's overall monthly income in the relevant local community. Namely, this income does not include only wages earned in public and private sector, but also direct or opportunity income from agriculture, tourism, small services, residential and commercial rentals, etc., for which good quality inputs cannot be obtained.

Hence, in terms of affordability, instead of the previous indicator, the Consultant suggests to use *Total*

*income per user served as a proportion of per capita GNI (%)*. As stated in chapter 4, this is about a ratio of total annual costs of user of water and wastewater services (individual user, not family) and Gross National Income (GNI) per capita, expressed in percentage. The Consultant also suggests defining affordability at a highest rate of 1.5% if the system does not have a wastewater treatment facility, and 2% if it has (so as to disenable later avoidance of wastewater treatment facility construction due to non-affordability caused by existing high tariff rate for water supply only). In assessing the average annual water consumption per person, one should use data for the previous year (total volume of water billed to households during the year divided by real or estimated population served). This surely means that, when submitting the business plans and requests for tariff changes, they have to contain previous data on average consumption, GNI and upper affordability limit.

This principle has to be additionally followed by subsidies of the local community for those individuals who really cannot afford to pay their own water bill. Those persons should be registered as socially vulnerable by the competent social service in the local community. The Consultant suggests that the local community should choose the manner of subsidising (through vouchers for paying these services that utility will collect from the local community; through paying allowances to those persons; through exemption from payment of a limited volume of water per person, but with the appropriate amount for coverage of respected costs to utility paid by the local community, since it decided which persons needed assistance, etc.). The Consultant also suggests, in order to avoid excessive water consumption by such persons or even allowing “free” water use to neighbours, to limit the subsidised volume of water to up to 3 m<sup>3</sup> per person per month.

### Principle of conservation of natural resources

Principle of conservation of natural resources or the Principle of environmental efficiency is to some extent already in use through application of the defined water fees such as special water fees for use of surface and groundwaters, water protection fees, extraction of materials from watercourses, etc.

The other options pertain to those local communities with scarce water sources and insufficient quantities to meet all the stated needs without full exhaustion of natural resources. In those cases, the Consultant does not suggest introduction of additional general fees, but rather the application of the increasing block tariff models (can be on a seasonal basis, in case of uneven water scarcity), where any excessive consumption will be discouraged by higher price compared to basic consumption. Specifically, for such cases the block tariff model is proposed with the unit price covering the basic costs to the full amount for the first 5 m<sup>3</sup> of water consumed per person, increased by 50% for the subsequent 5 m<sup>3</sup> consumed, and increased by 100% for each subsequent m<sup>3</sup>. In case when the application of this tariff brings higher revenues than the respective costs, it is suggested to earmark them into activities of reducing losses in the network, or general improvement of service quality.

### Full recovery of costs

This principle is extremely important, while a baseline for its consistent application is full understanding of all costs pertaining to water supply and sewerage services. Currently, regular operating costs are well recorded and considered, including the material costs, energy costs, costs of spare and replacement parts, small inventory, wages and other remunerations to employees and associated taxes and contributions, etc., but there is a special problem of inappropriate relation toward depreciation of fixed assets and consequently the investment maintenance too. The Consultant, therefore, suggests the following:

- ▷ All operating costs should be recorded at the lowest level of their occurrence, in order to be unquestionably associated with the type of service they relate to. More details on this proposal can be found in the following chapter;
- ▷ By a contract between the local community, as the owner of the overall utility infrastructure, including the water supply and sewerage network, determine the obligation of company entrusted with water supply and sewerage services to make, in shortest possible period, and in cooperation with local community, a complete list of all fixed assets entrusted to its management, to perform revaluation of values of these assets, to include them into its accounting records and keep regular balances

and allocation of funds for depreciation. These funds should be recorded in a special sub-account or subsidiary ledger. Without the approval of the local community (with prior professional opinion and future regulatory body) these cannot be used for any other purpose except investment maintenance – this includes programmes for reducing non-revenue water, i.e. detection of leakages and repairs and replacements of pipes and other infrastructural components.

- ▷ By this contract, responsibilities for investment maintenance are transferred from the local community, as the owner, to the company entrusted with provision of relevant services. The same contract does not interfere with the existing ownership rights and they remain unchanged. In principle, the owner is obliged to keep the records of its own fixed assets, calculate and allocate depreciation, and manage the allocated funds in a way to keep the fixed assets in function and renew them – with such a procedure, this responsibility is transferred by contract to the operational system manager and thus the currently doubtful status of this responsibility, which caused the outdated network and high losses in the network of most water supply systems in BiH, removed.
- ▷ Investment costs assume extending the capacities of the existing water supply system, unlike investment maintenance whose objective is to preserve the existing system. Hence, this is about newly built reservoirs, treatment facilities for drinking or wastewater, etc. These costs can obviously be in the function of all or only one group of consumers, sometimes even in the function of one settlement or one or more legal persons. If we take into consideration the principle *Consumer pays*, then it is not logical to recommend a unified model for all cases of investments, which would answer the question of coverage of these costs, so the Consultant suggests that the local community, which is the only one (as the owner) that can make legitimate investments in this area, should decide on its own whether the respective investment costs, in full or partial amount, should be included in the price, or fully or partially covered from other sources (grant, local community budget, including the utility fees, etc.). Nevertheless, in principle, it can be suggested that, if the investment is made from credit funds and related to improvement of water supply and/or sewerage for local community inhabitants (improvement of service quality, increasing percentage of service availability, etc.), even then, regardless of the fact that the local community will probably be a (co)-signatory of the Loan Agreement and that the new fixed assets will be in its ownership, repayment of principal and interest is considered a cost to be covered from price, instead from own resources of the local community. This way, the principle “*consumer pays*” is respected too, since loan repayment from the local community’s budget would make the population living outside the central water supply system zone, hence those who cannot use these services, pay for improvement of the services too.
- ▷ The remaining issue is the one related to opportunity or indirect costs, such as, for instance, costs of resources or potential environmental damages. The Consultant suggests for the issue of these costs to be addressed outside the legal framework that defines and prescribes in detail the manner of organising and managing the water supply in the local communities, e.g. by regulations pertaining to environmental protection, including those related to setting relevant fees, concessions, etc. (which is currently also the case, e.g. with water use fees, water protection fees, fees for protection from waters, etc.).
- ▷ This does not mean that the related amounts do not make a part of the water supply and sewerage bill, but they just appear as separate items after calculation according to the adopted methodology and tariff, and therefore they neither represent its component nor the original utility’s revenue.

### Principle of economic efficiency

The Consultant finds that this principle is extremely important for enhancing the BiH water supply and sewerage sector performance. Respecting this principle is also one of the key reasons for the need for some type of a regulating body, as can be seen from the examples stated in Annexes 3 and 4. These Annexes, in fact, make a broader base for more detailed proposals that could fit the situation and specific circumstances in BiH, which will follow in the next chapter. The Consultant’s opinion is that this is so an important principle that it is actually critical for achieving the strategic objectives of the methodology, so the details of the proposals have to be explained in a separate section.

It should be highlighted here that the problems that lead to the existing low efficiency of water utilities are long-lasting and, unlike some previously stated principles, they require gradual application until the set goals are achieved.

## Tariff structure proposal and method of price calculation

Chapter 3 presented several models of water tariff structure (including the structure of sewerage service price). The most common model in BiH practice is the model of unit price per m<sup>3</sup> of water, paying according to water consumed, which is still different for different categories of consumers.

The Consultant suggests the application of the model of single unit price per m<sup>3</sup> of water with paying according to volume of water used with a fixed charge, where the tariff per m<sup>3</sup> is equal for all categories of consumers, with the following instructions on the price calculation method:

▶ **Fixed charge:** A very important aspect of the efficient water system management is metering. It assumes measuring of water production, flow (and pressure) in each of the defined metering zones (which is an important step for determining water balance and quality management of losses in the network), as well as metering the consumption of users served. In the current practice, this function is not understood and implemented in a way that corresponds to its importance, and it is quite often the case that there are no zone meters or water intake meters at all, and that consumer water meters are obsolete and not maintained in a fashion described in relevant regulations. All these lead to lack of information on the actual production and consumption of water, and reduced capacity to assess losses in the network.

Therefore, the Consultant suggests for the fixed charge to include (cover) the costs of regular meter maintenance as prescribed by relevant regulations in the amount corresponding to the real costs for each individual meter (e.g. in case of mechanical meter, which is prescribed to be replaced after 5 years of operation, the costs of purchase and replacement are divided by 60 and this amount included in a monthly fixed charge). In addition to this direct consumer meter-related cost, the Consultant also suggests for the costs of meter (installation and subsequently) maintenance of the zone and water intake points to be distributed to all service users and thereby added on the previous amount.

Revenues collected on this basis, thus pertaining exclusively to quality maintenance of the important function of metering in the water supply system, have to be entered in accounts separately, and funds collected on this separate account or sub-account may not be used for any other purposes. The bill should contain an explanation for customers that the fixed charge relates only to meter maintenance costs, and a note that they are entitled to file a suit against a service provider if their meter is not maintained pursuant to the regulations (although consumers may, in fact, have a totally opposite interest since the improperly maintained meter will display less consumption, such a note would still strengthen supervision over the spending of funds collected this way and increase transparency). Spending of collected fixed charges should be separately presented in the financial statements submitted to regulatory bodies.

The Consultant also proposes not to include other types of costs in the fixed charge, even the specific meter reading, billing or collection costs, which are directly related to individual service consumers. In case when there is a large number of consumers in the local community who do not live continuously in their dwellings and thus display only seasonal or temporary consumption (which is, indeed, the case in a specific number of local communities in BiH), it is suggested that the utilities make a record of these individuals and households and prepare, as well as confirm in individual contracts, a special meter reading and billing programme, in order to reduce the related costs.

It is also proposed not to include any volume of water in the fixed charge; i.e. fixed charge should assume 0 m<sup>3</sup> of consumption, while every m<sup>3</sup> of water consumed should be calculated per unit price as explained below. Namely, the essential goal of the fixed charge introduced in this proposal is to permanently assure good quality metering in the network and to avoid the danger of spending the funds collected this way for any other purpose.

It follows from the above that the fixed charge calculation formula is determined by:

$$\text{Fixed charge (i)} = \text{RMC(i)/Month(i)} + \text{Percentage (i)} \times \text{SumZon}$$

where:

Fixed charge(i) = amount of fixed charge for a concrete user (i) (legal or physical person)

RMC (i) meter replacement and maintenance cost for a concrete user (i) (thus, price of purchase and installation of a consumer meter of a matching profile and type)

Month(i) is number of months after which the respective meter (i) should be replaced (for mechanical meters the applicable regulations set this period to 60 months or 5 years; this period does not necessarily have to be the same for electronic meters)

Percentage(i) is a percentage of the replacement cost of the same consumer's meter (i) in the sum of replacement costs of all consumers' meters

SumZon is a sum of all replacement and maintenance costs of all zone and water intake point meters, therefore all meters in the network not related to end-users

▶ **Unit water price per m<sup>3</sup>**, given the proposal to be equal for all consumer categories, can actually be calculated very easily, provided that all related costs in the previous period, based on which the required revenues for the subsequent period are estimated, are properly kept in accounting records (this will be elaborated in more detail in the next chapter). Hence, all the estimated costs directly or indirectly related to production and distribution of water need to be divided by the total foreseen consumption in the corresponding subsequent period (the obtained price per m<sup>3</sup> can potentially be further divided by a certain percentage denoting the target collection rate – the Consultant suggests this percentage not to be less than 95%). The above costs can not include the costs pertaining to function of metering in the system any more (since they are included in the fixed charge), but certainly do include all regular operating costs as previously elaborated, as well as full costs of calculated depreciation of the fixed assets, and possibly capital investments, in accordance with the local community's decision on the financing method for expansion of infrastructure.

Revenues collected on this basis, in the amounts proportional to the foreseen stated costs should be recorded in at least three different accounts (for coverage of operating costs – which can be elaborated in even more detail if the local community finds it necessary, investment maintenance and capital investments). These revenues can be used for earmarked purposes only. Only upon prior approval of the local community and professional opinion of the regulatory body, and in situations of particular importance, they can be used for some other purpose too. Revenues collected based on a portion of price related to depreciation can be spent exclusively in a manner specified in the business plan, which will also include the plan and the programme for reduction of non-revenue water and regular replacement of the infrastructure system components. More details on the business plan, serving to fulfil the principle of economic efficiency, are given in the next chapter.

Within an explanation of the method for fulfilling the principle of conservation of natural resources, a suggestion is given as to when and how to supplement this tariff structure with the elements of the two or more block tariffs.

It follows from the aforementioned that the fixed charge calculation formula is determined by:

$$\text{Unit water price per m}^3 = (\text{Estimated operating costs (in KM)} / \text{Foreseen delivery of water (in m}^3)) \times (1/\text{Coll.})$$

where:

Estimated costs = all regular operating costs<sup>1</sup> + full costs of calculated depreciation on all fixed assets<sup>2</sup> + approved costs of capital investments<sup>3</sup>

Foreseen delivery of water = estimate of total delivered billed water to consumers for the subsequent period, which the estimated costs also relate to

Coll. = desired collection percentage, in u % (cannot be less than 95%)

---

1 As presented and explained in the previous text, they certainly include coverage of all material and other costs related to functioning of the system, funds for wages and collective consumption, legal and contractual obligations, current maintenance, and functioning of the system the price pertains to, and accumulation and reserve funds, pursuant to legislation; costs of maintenance and metering in the system are excluded since they are already separated to be covered by fixed charge.

2 Includes depreciation, consisting of fixed assets of the service provider and depreciation of permanent infrastructural systems, that is, goods in public use – funds collected this way are spent on investment maintenance and functioning of the system the price pertains to.

3 Includes loan repayments, all in line with the local self-government unit's plans.

# 4. SECURING PREREQUISITES FOR APPLICATION OF METHODOLOGY AND ACHIEVING ECONOMIC EFFICIENCY

## Needed adjustments in bookkeeping records and facilitating adequate reporting

There are variations in terms of the current state of play with regard to financial and accounting records and bookkeeping in water utilities. Most utilities have financial and accounting departments in their organisational structure. In case when a utility does not exclusively deal with water supply and sewerage activities, financial and accounting tasks are performed mainly within common administrative services, which carry out these services for the entire company. The employees of this sector mainly perform all purely financial and accounting tasks while, in many cases, they neither implement budgeting/planning of costs, particularly at the level of designed cost centres, nor analyse the implementation of the potential plan.

It has been observed that many tasks of these services are performed manually, and that, as a rule, there are overlaps in operations and records, where some data are entered multiple times. This results from the fact that the outdated or even incomplete accounting softwares in many water utilities do not allow making the links between different accounting modules. Only legally prescribed reports are produced using the accounting software, if it has such an option enabled, whereas many reports are done manually, by simple adding and computing, performed by a head of the department. There are also cases when all possibilities of the existing accounting softwares for preparation of various reports are not utilised because there are no adequate capacities in the relevant service.

The applicable entity-level Rulebooks on accounting frameworks and implementation of chart of accounts for legal persons, i.e. the companies, prescribe the accounting framework and contents of the accounts for legal persons. Pursuant to these Rulebooks, the assets and changes in assets, equity and liabilities, revenues and expenses, and business results are recorded in compliance with the International Financial Reporting Standards, in a form of a three-digit account in the framework chart of accounts. Rulebooks provide very detailed descriptions of 9 classes of accounts (one digit), with clear definitions of each group of accounts within a class (2 digits) and each account (3 digits). Legal persons may add additional digits to these accounts.

A frequent situation in BiH is that water utilities are not able to analytically differentiate every operation or activity (water supply, wastewater discharge, other activities such as management of waste disposal, heating, parks, etc.), since they keep only consolidated balance sheets on revenues and expenses for the entire company. The Consultant suggests that further regulation of water service market has to respond to the issue of mandatory charts of accounts and detailed elaborations within individual accounts – it is necessary to have harmonised and unique chart of accounts to enable uniform recording of revenues and expenses.

In any case, clearly separate cost centres in the utility have to be defined, which will enable unbundled records kept for costs (as well as revenues) of water supply from the ones of sewerage service, and of course, from the costs of all other services. Revenues need to be recorded per cost centres/operating units too, while the accounting software should enable cost and revenue reporting per operating units too. Of course, such a software also has to enable synthetic reporting by higher organisational levels, comprising the individual cost centres, hence, accordingly, the consolidated reporting for the entire company too.

The Consultant recommends at least 4 cost centres as follows:

- ▶ Water supply (can be broken further down to sub-cost centres of pumping, distribution, etc.);

- ▷ Wastewater collection and discharge;
- ▷ Wastewater treatment (this type of service will be introduced by all utilities on the long run; if they do not have it initially, this cost center will not record any revenues and expenses); and

Common services (which can be further broken down to sub-cost centres legal affairs, accounting, etc.).

It is obvious that all direct service-related costs should be recorded by the corresponding cost centres (or even better, in order to track and minimise costs, by the best sub-cost centre).

Indirect costs such as accounting, administration, etc. should be recorded to the appropriate sub(cost) centre of common administration services, according to the determined key (individual or cumulative for all such costs) serving for subsequent redistribution of these costs to all types of services, i.e. respective cost centres, with the consent of all business units. Common administration services do not realise their own revenues, but their activities play an important role in providing the conditions for operations of other business units. They serve other business units, therefore these should finance their costs too.

In case of a complex utility, it is recommended that other functions/services too should be set as a basis for establishing the cost centres, which would certainly help in efficient determination of these functions' costs and thereby their tariffs as well. In doing this, one should follow all basic principles of good accounting, such as the principles of consistency, continuity, truthfulness, comparability, prudence and comprehensiveness of data.

Therefore, all direct costs should be recorded exclusively on operating units as cost centres, at the lowest possible level, by all means including the following:

- ▷ Staff wages and compensations per operating/business units;
- ▷ Depreciation of fixed assets (pertaining to operations of individual/respective business unit);
- ▷ Electricity costs;
- ▷ Fuel and lubricants costs;
- ▷ Raw material costs;
- ▷ Costs of registration and insurance of vehicles associated with the respective business unit;
- ▷ Costs of assets maintenance related to respective business unit; and
- ▷ Service contracts concluded by respective business unit, etc.

It is necessary to further emphasise the need of proper and complete calculation of depreciation of fixed assets, since it is noted that this is not the case in current practice. Records of all fixed assets should be kept by cost centres, not only at the level of the entire company. If the fixed assets managed by the utility are not precisely listed in full, calculated depreciation and balance sheet will be incorrect. The organisational structure should follow the structure of cost centres, which enables separate monitoring of financial results for every level of the company.

In the opinion of the Consultant, the Rulebooks on accounting frameworks and implementation of chart of accounts for companies, which set forth the legal requirements for all types of legal persons, should be amended with regard to specific regulations for water and sewerage utilities in BiH. **This can, for instance, be left to the regulatory body, as a task to prepare an analytical accounting framework applicable specifically to water utilities.** In that case, all the analytical details would be stipulated, which would both ease the staff's task of analytical recording and meet the needs of the Institutes for Statistics in BiH and in both entities in terms of statistical analyses. Of course, this chart of accounts would still be flexible enough to be developed analytically for specific purposes of such companies. The Consultant adds that the applicable regulations providing for this area do not preclude the application

of the aforementioned recommendations, and that they require no modifications or amendments to this end – the legal framework is supportive and all it takes is to apply the stated rules of good business.

The primary purpose of the chart of accounts model is to facilitate preparation of a detailed balance sheet and profit-and-loss statement, as well as other earmarked financial reports required for operational and strategic management, as well as to ensure a base for operational and capital budgeting (in compliance with the international accounting practices serving as a basis for preparation of financial reports). This will enable tracking of revenues and expenses with more details, and, what is especially important, separating them by cost centres and business functions. Only such an improved accounting framework, which facilitates the insight into the real costs by types of services the utility provides, will enable the consistent tariff setting for these services too. The new model of chart of accounts should use a flexible accounts structure, which is based on the cost centres, while the utility itself should be able to decide on the level of details.

## Business plan

### Description of the existing regulations

Most utilities consider that planning, both financial and business planning in general, is an imposed and inherited activity that someone else needs ("state", i.e. public administration that the plan is submitted to), not the utility itself. In the applicable legislation, planning as a commitment is mentioned only within the entity-level Laws on Public Enterprises. Articles 22-24 of the FBiH Law on Public Enterprises, that is, Articles 21-23 of the RS Law on Public Enterprises, relate to business plan. These Articles stipulate that the management of the public enterprise shall develop and monitor the realisation of the three-year business plan of the public enterprise, which, after the enterprise adopts it, shall be submitted to the Auditor-General in the respective entity, and to the responsible ministry in RS, i.e. presented to the ministry competent for the public enterprise, and the competent municipal administrative body in FBiH.

The Business Plan is stipulated to include (both entity laws have almost identical provisions, so they are presented together):

- ▷ *Expected revenue and expenditure/revenue and expenditure plan;*
- ▷ *Capital expenditures proposed for the period covered by the Business Plan;*
- ▷ *Proposed sources of funding/financing for the above referred to capital expenditures, and other business targets;*
- ▷ *All loans planned to be taken out during the period covered by the Business Plan;*
- ▷ *Proposal of guarantees that should be issued as insurance for such credits;*
- ▷ *Proposals for the establishing or purchase of new enterprises or businesses (either in part or whole) or the sale of any subsidiaries of the public enterprise, and the employment of new staff, as well as the expenditure required for such activities;*
- ▷ *Proposals for the sale of immovable property;*
- ▷ *Proposals for the use of surplus profit in the period covered by the Business Plan;*
- ▷ *Planned financial statements, the functional and main budget with semi-annual analyses (variances) and the working capital budget, which must reflect the planned activities of the enterprise, and the revenue and expenditure resulting from those activities.*

During the period it covers, the Business Plan shall serve as the basis for all the business activities of the public enterprise in respect of the elements it contains. Exceptionally, the Management shall review the

Business Plan on an annual basis, and if required, and in compliance with the aims of the Business Plan, it shall revise and harmonise the Business Plan in order to adjust it to the (commercial) market developments.

Both entity Laws on Public Enterprises, in Article 47, foresee a fine in the amount not less than KM 5,000.00 and not more than KM 15,000.00 for a legal person/enterprise which fails to adopt/develop a Business Plan in compliance with the aforementioned Articles of the Law(s) and fails to submit it to the competent bodies, or, if the plan does not contain all the elements stipulated under the same law(s), and if the Business Plan is not considered, nor revised on an annual basis.

Hence, it is obvious that such defined business plans do not show clearly and unambiguously that the objective is to improve the economic efficiency. Also, the Consultant is not able to confirm the regular practice of submitting the business plan to the Auditor-General.

### Description of the existing practice and required changes

The existing situation in BiH water utilities is such that they approach the financial management and planning in a traditional manner, which implies that this function in the company is an activity imposed by the regulations, serving primarily as a support to other activities. Planning in most public enterprises is performed on the principle of proportional increase of business results (by increasing the amount from previous years by a selected percentage), without any specific additional assessments of activities or forecasts of business performance. Due to the legal obligations, medium-term three-year plans are prepared, mainly by a default and on the above mentioned principle.

Budgeting on the basis of detailed analyses and plans is not done. Annual business plans mostly represent reporting on the previous year's performance, with the percentage increase for the upcoming year. One should certainly note that performance reports are often only excerpts from the balance sheet and profit-and-loss statement, thereby only the book values, without any specific analyses and real performance indicators.

Future plans have to be prepared either directly by or in cooperation with the financial department, namely the person in charge of the budgeting. The budgeting process represents establishing and adopting the budget, and control and analysis of deviations during its realisation. Quantitative objectives within the budget should reflect the qualitative goals of the plan, with meaningful and formalised goals mutually aligned. By accepting the budget and releasing the money for its implementation, the budget itself becomes a target pursued, while its individual components become performance indicators for decision makers.

The process of control of budget realisation starts along with the budget implementation. Control shows deviations in terms of realised and original values, but it is also a very important source of information for correcting the decisions. In short, the purpose of budgeting is:

1. To provide a forecast of revenues and expenditures;
2. To enable monitoring of real financial performance against the forecasted one and immediate reaction by implementing the necessary corrective measures.

It is important to emphasise that this process is currently performed *ad hoc*, and the forecasts are mainly less than well-grounded.

The main purpose for creating a business plan, in a way modern utilities in EU and across the world understand it, is to improve all aspects within a company. Business plan sets policies and goals while the operational plan is used as a monitoring tool in assessing the set financial targets reached.

The planning process should comprise 3 components:

- ▶ Strategic plan;

- ▷ Annual operational plan;
- ▷ Capital investments plan.

Strategic plan should answer the question – what is the goal of the company and how to reach it; it defines long-term goals; analyses the environment in order to define activities; determines a set of activities to reach this goal; analyses the environment to adjust to changes; contains guidelines for formulating the operational plans.

Operational plan is of short-term character and it relates to operational activities of a company (sales plan, production plan, etc.). It focuses on implementation of goals set in a company's strategic plan, and represents a detailed elaborated strategic plan on an annual basis, and a tool for implementation of the strategic plan, as well as a guide for implementation and a clearly defined process.

Capital investments plan is developed based on the needs and capacities assessments from the strategic plan; it identifies capital projects and activities, as well as possible sources of funding. The capital investments plan represents a long-term budget containing all the planned investments and their time schedule in the period of more than one year.

Current practice in BiH utilities does not include developing operational plans by departments, or comparing the plan with the actual costs through departments. Therefore, most utilities do not have developed procedures for preparing the plans for operational activities, and this has to be changed. In addition to preparing an annual operational plan, reports on realisation of the operational plan have to be made too in order to supervise the actual realisation of revenues and expenditures against the forecasted ones. The Business plan, along with the financial goals, has to include all the aspects of utility plans for the upcoming period, including the operational objectives, human resources development, or relations with customers and other persons.

The FBiH and RS Laws on Public Enterprises stipulate that public utility enterprises shall prepare the business plans, which, in deed, is the current practice. Currently applicable FBiH and RS Laws on Accounting do not prescribe, but also do not prohibit development of operational plans and/or capital investment plans. It is mainly not the practice of providers of these services in BiH to prepare operational plans or compare the planned and achieved results through the departments; a very small number of them prepare operational plans within their business plans. A developed procedure for development of operational plans or capital investment plans does not exist. Many companies do not have an established reporting procedure on business plan monitoring.

The business plan has to become a formal document showing the performance, and should present future courses of action. In addition to the company's description, it should also capture an actual picture of problematic areas, challenges, risks and obstacles, as well as define the activities required to address the problems and future challenges. The business plan should set long-term and short-term individual (specific) goals, detailed descriptions of ways to achieve these goals in real situations, as well as explain how the expectations of external stakeholders can be fulfilled. The business plan should be developed for a given period of time (the consultant would rather recommend a 5 year period, but it has to be complied with the applicable legislation providing for this issue), so as to divide it into annual budgets, which have to be updated with actual data after each year of implementation. It can be decided to choose a longer period, which would make more sense in development of strategic plans, but it would also involve more assumptions and thereby be less reliable.

Development and introduction of a business plan should be structured through phases. Each sector/service of a utility should develop its own plan. These sector-based plans contain activities to be implemented during the following years in accordance with individual goals arising from the main objectives. The following is an example of a business plan meeting the stated criteria.

**Table 1: Possible content of a Business Plan**

<b>1</b>	<b>Characteristics of the utility's current operations and services</b>
<b>1.1</b>	<b>Description of a company</b> <ul style="list-style-type: none"> <li>• Legal status</li> <li>• Activity (responsibilities, water supply, wastewater discharge, etc.)</li> <li>• Service coverage area</li> <li>• Clients</li> </ul>
<b>1.2</b>	<b>Management and administration structure</b> <ul style="list-style-type: none"> <li>• Management structure</li> <li>• Number of staff</li> <li>• Organisation scheme</li> <li>• Staff qualifications</li> </ul>
<b>1.3</b>	<b>Characteristics of operations</b> <ul style="list-style-type: none"> <li>• Water production</li> <li>• Distribution network and metering within the network (defined metering and pressure zones)</li> <li>• Other facilities</li> <li>• Quality of service, reliability, etc.</li> <li>• Water trade and consumption metering</li> <li>• Non-revenue water</li> </ul>
<b>1.4</b>	<b>Characteristics of market and consumers</b> <ul style="list-style-type: none"> <li>• Socio-economic situation of the service coverage area</li> <li>• Average household income and payment ability in the service coverage area, Gross National Income per capita in the local community, and, based on these, affordability indicator</li> <li>• Number and structure of consumers by categories</li> </ul>
<b>2</b>	<b>Current financial performance of the utility</b>
<b>2.1</b>	<b>Balance sheet</b> <ul style="list-style-type: none"> <li>• Structure of assets</li> <li>• Structure of equity/liabilities</li> <li>• Assessment</li> </ul>
<b>2.2</b>	<b>Revenues and expenditures</b> <ul style="list-style-type: none"> <li>• Structure of costs and depreciation</li> <li>• Structure of revenues</li> <li>• Profit/loss</li> </ul>
<b>2.3</b>	<b>Cash flow (liquidity)</b> <ul style="list-style-type: none"> <li>• Cash inflow</li> <li>• Cash outflow</li> <li>• Over in/short in cash</li> <li>• Accounts receivable (uncollected receivables from consumers)</li> <li>• Collection rates (by categories of consumers)</li> </ul>
<b>2.4</b>	<b>Assessment of financial performance</b> <ul style="list-style-type: none"> <li>• Performance indicators (including the average collection period and/or collection percentage, and recovery of operating costs)</li> <li>• Qualitative assessment</li> </ul>
<b>3</b>	<b>Objectives and programmes for the planning period (3 - 5 years)</b>
<b>3.1</b>	<b>Objectives for production and services</b> <ul style="list-style-type: none"> <li>• Projection of the connection rate, demand for water and wastewater generation</li> <li>• Projection of losses (non-revenue water)</li> <li>• Projection of water production</li> </ul>
<b>3.3</b>	<b>Investment and rehabilitation programme</b> (on an annual basis, by the system components) <ul style="list-style-type: none"> <li>• Programme of expansion</li> <li>• Programme of replacement and rehabilitation</li> </ul>

<b>3.4.</b>	<b>Maintenance programme</b> (annual, based on objectives of services and investment programme)
<b>3.5</b>	<b>Operational programme</b> (annual, based on objectives of services)
<b>3.6</b>	<b>Human resources management programme</b> (annual, based on objectives of services and programme, as well as based on current and desired staff productivity)
<b>3.6</b>	<b>Objectives of financial performance</b>
<b>4</b>	<b>Projection of capital requirements and financing schemes</b>
<b>4.1</b>	<b>Assessment of capital requirements</b> (taking into consideration the expected inflation, unforeseen physical developments, costs of design, etc.)
<b>4.2</b>	<b>Expected financing scheme according to sources</b> <ul style="list-style-type: none"> <li>• Internal cash generation</li> <li>• External financing through loans</li> <li>• Other external financing sources</li> </ul>
<b>4.3</b>	<b>Expected annual loan repayment scheme</b> <ul style="list-style-type: none"> <li>• Interest payments</li> <li>• Cash payments</li> <li>• Total loan repayment (servicing)</li> </ul>
<b>5</b>	<b>Projection of financial results</b>
<b>5.1</b>	<b>Projection of annual labour and maintenance costs</b> <ul style="list-style-type: none"> <li>• According to the main cost categories and cost centres, of course including the depreciation</li> <li>• According to current prices, taking into account the expected inflation costs</li> </ul>
<b>5.2</b>	<b>Projection of annual revenues</b> <ul style="list-style-type: none"> <li>• According to the main categories of revenues (particularly by type of services)</li> <li>• Taking into consideration the expected tariff changes</li> </ul>
<b>5.3</b>	<b>Projections of profit-and-loss account</b>
<b>5.4</b>	<b>Liquidity plan (projection of cash flow report)</b>
<b>6</b>	<b>Conclusions</b>

By amending the Laws on Utility Activities, the obligation can be imposed to adopt such business plans and their components (strategic, operational and capital investment plan) and determine competencies for monitoring their implementation.

Particular attention in the following text is paid to several key performance indicators recommended to be inevitably included in the business plan.

## Key utility performance indicators and their target values

Relatively wide selection of utility performance indicators was presented in Annex 3, as a basis for selecting the most relevant ones for BiH. Also, in Annex 4, few models were shown for selection and integration of several performance indicators into one cumulative assessment, which would depict whether the utility performs well and faces a successful future or not.

It is the opinion of the Consultant that the WUVI and AquaRating are currently too complex models for application in BiH, and it is recommended to let them be expanded and tested in the world before considering their introduction into BiH practice. With regard to Apgar score, it is quick, and can be modified so as to respond to specific needs and situation in BiH, in a way as we present bellow.

The Apgar score model is interesting by the fact that it chose only 6 key areas the performance indicators relate to – Water supply coverage, Sewerage coverage, Non-revenue water, Collection period, Operating cost coverage ratio, and Affordability of water and wastewater services. The interpretation of the first two indicators (performance areas) can be debatable, since there is no clear consensus in BiH as to how to determine the *overall population under utility's responsibility*, which is the input value for calculation of these

indicators. Namely, although the existing legislation determines the local community's competence to assure provision of water supply and sewerage services in its territory without any defined restrictions, in practice, the public utilities established for this purpose, according to their own interpretation, limit this competence to a certain inner urban area in the local community.

Therefore, the Consultant suggests not considering these two indicators until the adoption of the undeniable interpretation of the population number under the utility's responsibility. At the same time, we propose adding another indicator of great importance for BiH – staff productivity, which is, according to the current values, very low.

Hence, we propose to certainly calculate the following selected key utility performance indicators for the previous period and estimate them for the upcoming 3-5 years, in the performance reports and business plan, including all their units of measure:

**1. Non-revenue water (%)**

- ▷ With possible Percentage of consumer metering (%)

**2. Average collection period (days)**

- ▷ Also including Percentage of collection (%)

**3. Staff productivity (#<sup>4</sup>/’000, water and wastewater together)**

**4. Operating cost coverage ratio (%)**

**5. Affordability of services – Total income per user served as proportion of Gross National Income per capita (%)**

- ▷ Alternatively Share of a monthly household bill in average income (%)

Details on calculation methods for these indicators, as well as their scores in BiH and across the world in the previous period are already elaborated in Annex 3, so we will not repeat them here. The Consultant suggests calculating and presenting these indicators for the previous three years and planning them for the upcoming 3-5 years in every performance report and business plan (Business plan refers to this period). Planning the values of these indicators for the following period has to be related to the activities foreseen in the same period (e.g. plan and programme of detection and reduction of losses, and replacement and repair of pipes in the function of decreasing the value of the indicator – non-revenue water; new billing and collection measures in order to reduce the average number of collection days; stop hiring new staff, make internal reorganisation and retire employees eligible for retirement, in order to reduce the value of indicator – staff productivity; improve financial management and tariff changes in order to increase the value of operating cost coverage ratio).

The Consultant further suggests, similar to the Apgar score, to rate each of these 5 criteria on a scale 0 to 2, and then provide a total score in the range 0-10. Values 0, 1 or 2 depend on the concrete scores of a chosen indicator, and, to differentiate between these three given values their adjusting to the future desirable/improved scores/conditions is expected.

The total score, ranging from 0 and 10, can be interpreted in a way that, if the maximum score is 3 – the utility performs critically low; if the score is 3-5 – the utility performs fairly low; and if the score is above 8 – the utility performs normally. This score is, nevertheless, only an additional indicator, while the attention of the regulatory body and the local community as the owner of the system has to be equally focused on each of the 5 stated indicators. We propose the following classification of values of these indicators to be applied in the initial period of at least 5 years, adjusted to the conditions in BiH:

---

<sup>4</sup> “#” denotes a numerical value, a number

**Table 2: Classification of given indicators**

Indicator	Value
Non-revenue water	0 if > = 50% 1 if > = 20% and < 50% 2 if < 20%
Average collection period	0 if > = 180 days 1 if between 90 and 180 days 2 if < 90 days
Collection ratio	0 if < 75% 1 if between 75% and 95% 2 if > = 95%
Staff productivity	0 if number of staff per 1,000 connections >2.5 1 if number of staff per 1,000 connections is between 1.2 and 2.5 0 if number of staff per 1,000 connections < 1.2
Operating cost coverage ratio	0 if < 1 1 if between 1 and 1.40 2 if > = 1.40
Affordability of services	0 if > 2.0% 1 if between 1.0% and 2.0% 2 if < = 1.0%

The goal of the plan is to foresee the period and activities for each of the stated indicators (or at least 5, since affordability of services can be considered a control indicator) to be brought to the score 2. Improvements have to be planned for every year individually and cumulatively for the entire planning period, with a detailed description of activities which will lead to better scores. The Consultant considers that the following improvements in the stated areas can be achieved on an annual level:

#### Non-revenue water:

- ▷ If the current value of non-revenue water is higher than 60%, an attainable activity plan can be prepared to gradually decrease this value by 10-15% a year;
- ▷ If the current value of non-revenue water is between 40% and 60%, an attainable activity plan can be prepared to gradually decrease this value by 6-10% a year;
- ▷ If the current value of non-revenue water is lower than 40%, an attainable activity plan can be prepared to gradually decrease this value by 4-6% a year;
- ▷ Given the very high amounts of non revenue water in BiH utilities, it is sufficient to set a final target of up to 20% of non-revenue water for the upcoming period of at least five years, later it should be analysed whether this target can be lowered to 15% or 10%.

#### Average collection period:

- ▷ Regardless of the existing collection period, it can be shortened by at least 30 days per year. In case this indicator is high due to enormously high amount of receivables caused by a long-year practice of avoiding any write-offs (which often and easily turns into political instead of operational issue), this value can be significantly reduced in quite a short period by changing an attitude towards the writing of realistically uncollectable receivables off.
- ▷ Target value should be up to 30 days.

#### Collection ratio:

- ▷ In case this indicator is very low, multiple activities have to be applied so as to increase its value, but even in such a case the target over one year can be set up to at least 85%.
- ▷ The target value should be set at 97% or up; in the initial period it can be set at lower value (e.g. 90%) if current collection ratio is very low.

#### Staff productivity:

- ▷ This is socially a very sensitive indicator, so the short- and long-term targets for its improvements (reducing the values) should be set carefully. The Consultant thinks that, in the 3-5 year planning

period, the value of this indicator can be reduced at a rate of 0.1 - 0.2 per year.

- ▷ Given the very high average values of this indicator in BiH, it is sufficient to set a final target of 1.2 employees per 1,000 service users for the coming period of 10 years. After this period, it should be analysed whether this target can be reduced to 1 or less (which, in fact, can be expected as a result of technological progress and increasing and more efficient role of outsourcing in utility operations).

#### Operating cost coverage:

- ▷ This is the matter of the tariff level and aforementioned proposals pertaining to bookkeeping methods and management of revenues and expenditures. The target value can be achieved in the planning period.

#### Affordability of services:

- ▷ This can be used as a control indicator, to check the level of tariff which can be approved. The Consultant has already proposed to set the affordability at 1.5% if the system does not have a wastewater treatment facility, at 2% if it has, i.e. at the water bill of 4% of the total monthly income, if affordability is assessed in this way.

In the previous section, we have already proposed a possible business plan format where one can easily identify the parts presenting these indicators with values realised in the previous three years, and the values planned for the upcoming 3-5 years (the period covered by the business plan). In each subsequent business plan, along with the values of indicators for the previous three years, earlier estimates of indicators' values for the same period should also be presented, and analysis of achieved results provided (if the planned values are exceeded or underachieved, a detailed explanation should be given on the causes, as well as if any correctional actions are needed for the upcoming period).

The Consultant also suggests for this proposal of a business plan to be considered by possible future regulatory bodies, which will prepare an adequate legal act so as to prescribe the contents and the obligation of applying such a content of a business plan. The process of adoption of this legal act should be harmonised with the proposals of the study on the administrative position and powers of such a regulatory body. **The Regulatory body will not approve the tariff if the business plan and its realisation do not show any visible improvements presented by the values of the aforementioned indicators.**

Hence, it can be seen from the aforesaid that good results of the selected indicators cannot be expected immediately, they will take a certain period of transition and gradual improvements in values of the selected indicators. This period will not be the same either for different utilities or for different indicators. The length of the transition period, during which the costs would be gradually decreasing by better utility efficiency should be supervised by local community, as well as future regulatory authorities. **In these periods of transition, particularly if the initial tariff charged for services is very low and not corresponding to real costs, the tariff should raise gradually rather than abruptly, until it reaches a simultaneously declining level of associated costs** (due to the expected increasing efficiency). Such an approach would avoid rewarding the inefficiency of utilities in the initial period, when the level of costs would, in fact, be unjustified.

Annexes 5 and 6 provide brief framework guidelines for water utilities on preparation of tariff application including the development of a business plan, as well as guidelines for regulatory body (Supervisory or Management Board, Local community bodies, possibly Regulatory authority in this field) on reviewing and providing opinion on the submitted application and business plan.

# ANNEX 1: OVERVIEW OF APPROACHES TO TARIFF SETTING METHODOLOGY FOR WATER IN OTHER COUNTRIES OR REGIONS

As a response to the issue of regulatory framework for tariff setting for water supply and sewerage services (including the wastewater treatment), many countries have established relevant regulatory bodies. As pointed out earlier, the aim of this overview is to identify the key principles for setting the tariff structure as well as analysis of detailed methodology for calculation of prices, if it exists. Of course, the principles themselves may be adjusted to specific needs of BiH, if needed.

The issue of tariff setting for water supply and wastewater services is regulated in different ways, so in some countries, there are prescribed methodologies for tariff setting as well as their approval procedures. In some other countries, again, there are no legally prescribed provisions pertaining to tariff setting, but instead there are guidelines or recommendations of relevant bodies or associations, either on tariff setting, principles to be followed or costs that should be taken into account when determining the production price of a specific volume of water. The local authorities, that in most cases make the final decision on the level of water price, usually take into account whether the set price is calculated in accordance with these recommendations.

Nevertheless, there is one relatively visible, only at first sight unexpected feature – it is the developed countries with long experience of market economy that have less regulations in this field. As a matter of fact, this is logical, since the experiences of the market approach were very early incorporated in governance of water supply and sewerage sector, and in fact, the biggest concern was overseeing the possible monopoly position and preventing generation of too high income.

Quite the opposite, countries that based their development on the concept of planned economy have more significant interventions in their regulations concerning the principles of tariff setting, sometimes even a detailed prescribed methodology. The reason is obvious – in these countries prices and efficient governance of water systems were not the focus for a long time, and it was considered (often even today) that the price has to be such to ensure social peace in the local community, even if the revenues collected on the basis of this price do not recover all the required costs. Hence, such regulatory interventions were necessary so as to raise awareness and way of thinking in this sector. In this respect, BiH has similar needs.

The following are the examples of some EU countries or broader regions that have adopted a specific form of methodology and/or at least recommendations/principles for tariff setting. The main objective of this chapter is to give a brief overview of experiences in this field in other countries so as to select and adjust to BiH needs the best practices from the neighbourhood, Europe and the world.

# Albania

## Tariff setting methodology

Pursuant to the *Tariff setting guideline* issued by the Water Regulatory Authority, the methodology used for tariff setting is the rate of return. More precisely, the structure of tariffs should include “*calculation of the revenues required to achieve the appropriate level of cost recovery for a service provider as approved by the Regulatory Authority*”.

Regulatory Authority in terms of tariff regulation performs the tasks of scrutinizing the costs, giving incentives to companies to improve to the benefit of all Albanians, structuring the tariff setting process, and finally, approves tariffs.

The main defined objectives of the Regulatory Authority in the process of approval of tariffs and other service fees are the following:

- ▷ To protect consumers against monopoly prices, and
- ▷ To enable the companies to recover justified costs incurred to deliver effective services, including the possibility to achieve some return on their investments that would be sufficient for operating improvements and investment works.

Given the particular importance of the second objective, the Regulator supports gradual progress in financial and operating activities so as to first achieve the recovery of the main operating costs and later, in more advanced stages, some return on investments.

Calculation of water supply price and sewage service price is done separately, with the note that cross-subsidising between these two services should be avoided.

Tariff setting procedure starts when the licensee, i.e. the licensed company, submits the proposal of tariff structure to the Regulatory Authority, including the tariff model that has to be approved by the Regulatory Authority. This is followed by the opinion of the local self-government units and completed by the Regulatory Authority’s approval of the final tariff.

Request for adjustments of the tariff or part of it can be applied only once a year. Given that the approval process may take up to 6 months, the companies are recommended to apply for tariff modifications once a year, immediately after the submission of the annual statement for the previous year, but also for a 2-5 year interval.

Companies have to pay regular mandatory fees to the Regulator. Its rate depends on the percentage of the companies’ cost recovery (more or less than 50%).

Procedure of tariff modification and approval has 4 stages:

- ▷ Analysis of costs and their justification (it is possible to approve/accept only a portion of the applied costs).
- ▷ In this stage, the Regulator analyses in detail the costs that the company applied as justified, compares them with costs of other companies, and accepts them as justified fully or only partially (explanation follows below).
- ▷ Performance analysis; it is important to note that there is a detailed elaborated scoring system for companies.
- ▷ The performance analysis is focused on specific indicators so as to determine whether there are deviations from the agreed performance. The Regulator scores each of the indicators. Points can be negative and positive. The performance indicators and scoring of the performance assessment are the following:

No.	Indicator	Minimum score	Maximum score
1.	Non-Revenue Water (NRW)	-20	+10
2.	Level of metering	-20	+10
3.	Drinking water quality	-15	+7.5
4.	Service hours	-15	+7.5
5.	Energy efficiency	-20	+10
6.	Staff efficiency (staff No./1000 connections)	-20	+10
7.	Coverage – water supply	-15	+7,5
8.	Coverage – sanitation/Environmental protection	-15	+7,5
9.	Regulators' perception	-10	+5
	Range of scores	-150	+75
	Bonus <sup>5</sup>		
10.	Extraordinary efforts and initiatives to improve efficiency, service or access	0	+75
	Overall range of scores	-150	+150

5

The total score is then transformed into monetary value, as a percentage of adjusted costs that subsequently determine the costs to be recognised in the tariff approval. The companies with lower or negative score will have poorer performance and thereby lower amount of approved costs.

#### ▷ Tariff setting

After the above stage is completed, the Regulator starts calculating the Average tariff using the following formula:

Level of costs (from the previous stage) / Projected quantity billed (in m<sup>3</sup>) = Average costs per m<sup>3</sup> = Average tariff per m<sup>3</sup>

Given that the above formula, thereby also the tariff set by it, assumes the collection efficiency of 100%, the Regulator here takes into account the agreed collection rate with the specific company and thereby determines the final water tariff. Thus, for example, if the average tariff obtained from the above calculation is 100 units, and the agreed indicator of collection efficiency is 85%, the proposed tariff will be 100/0.85= 11765 units.

#### ▷ Tariff implementation

After the approval of the tariff, the service provider shall give customers a one month notice prior to implementing a new tariff. The regulator shall subsequently monitor the implementation of the new tariffs.

The tariff structure is created to fulfil the following objectives:

Cost recovery: in a way that company gradually increase revenue collection until full cost recovery is achieved:

- ▷ Operating and maintenance costs;
- ▷ Operating and maintenance costs, plus depreciation; and

---

5 Indicator 10 is a qualitative indicator, granting additional points to service providers in case of extraordinary initiatives indicating to their commitment to improving efficiency

- ▷ Operating and maintenance costs, plus depreciation, plus interest charges on loans (if any).

Managerial efficiency: Cost recovery shall be conditioned and followed by systemic efforts to reduce operating costs through improving the management and operational efficiency, reducing water losses in the system, reducing the illegal connection, and by increasing revenues through improved collection efficiency. Regulatory authority shall consider any measurable progress in the improvement of operational and financial performance of operators before a tariff application is approved.

Affordability: The tariff structure shall set an affordable price for the basic consumption needs of the low-income households; the lowest income households should not have to pay more than 5% of their household income for water and sewage services.

Environmental efficiency: The tariff structure shall set an economic price for high consumption levels so as to encourage resource conservation and sustainable consumption.

Specificity of the tariff structure in Albania is the fact that it includes different prices for different customer categories (households, public institutions, and private/industrial customers), and that it sets a different price for low-income households.

Model for tariff calculation is not explicitly prescribed – every service provider develops its own model that has to be approved by the Regulator.

For the first tariff setting and approval, the Regulator carries out only the cost analysis, and also sets a first set of Performance indicator targets for each service provider.

## Financing

The activities of the Regulatory Authority are funded from the financial sources consisting of regular regulatory fees mandatory for water supply, sewage and wastewater treatment service providers, fees for issuing licenses, and different types of donations.

The regulatory Authority proposes its budget not later than three months from the beginning of the fiscal year and submits it to the Council of Ministers (Albanian: *Këshilli i Ministrave*) for adoption.

## Bulgaria

### Tariff setting methodology

Pursuant to the Water Supply and Sewerage Services Regulation Act, the State (Energy and Water) Regulatory Commission shall regulate the prices in accordance with two methodologies: (1) 'price cap' and (2) 'rate of return'. In determining the methodology for tariff setting, the Commission shall establish a target rate of return, taking account of the specific conditions of each water and sewerage service provider, the affordability of the price of these services, the requirements for future capital expenditure, and the indicators of financial stability.

It is these two approaches, **price cap** (the highest price ceiling) and **rate-of-return** that are most frequently used throughout the world in order to prevent too high prices set by monopoly companies. For instance, rate-of-return is widely used in Canada, Japan, and United States of America, where the highest allowed rate of return on own capital is set – then the price may be increased if such a rate is not reached, or decreased if the return rate exceeds the approved limit.

On the other hand, the price cap is occurring increasingly more often in the countries since it encourages utilities to operate more efficiently. Prices regulated using this approach are adjusted to the inflation rate and other set parameters regardless of the real values of profit or loss.

The price regulation methods, the pricing rules reflecting the structure of costs, the procedure for sub-

mission of price proposals and for the endorsement thereof, as well as the procedure for disclosure of information, shall be determined by an ordinance adopted by the Council of Ministers (Bulgarian: *Министерски съвет, Ministerski savet*) on a motion by the Commission.

The Commission shall be guided by the following principles:

- ▷ A correspondence between the economic part of the business plan and the proposed prices;
- ▷ Recoverability of the economically justified costs, such as:
  - ▷ The costs of operation, maintenance, repair and management of water supply and sewer systems;
  - ▷ Depreciation of fixed assets;
  - ▷ Fees due for water intake and pollutant discharge;
  - ▷ The regulation fees due within the meaning of the Commission's Act;
  - ▷ Environmental protection;
  - ▷ Additional obligations imposed by the competent state bodies;
  - ▷ Application of an economically justified rate of capital return;
- ▷ Correspondence between the prices for nucleated settlements and the actual costs of provision of water supply and sewerage services;
- ▷ Social affordability of the price of water supply and sewerage services;
- ▷ Avoidance of cross subsidisation between categories of customers.

The Commission shall regulate prices by:

- ▷ Setting an upper limit for prices or for revenues;
- ▷ A rate of return.

The Commission shall determine uniform efficiency indicators, which the water and sewerage utilities shall apply upon pricing.

Commission shall establish a target rate of return, taking account of the specific conditions of each water and sewerage service provider, the affordability of the price of these services, the requirements for future capital expenditure, and the indicators of financial stability.

The price regulation methods, the pricing rules reflecting the structure of costs, the procedure for submission of price proposals and for the endorsement thereof, as well as the procedure for disclosure of information, shall be determined by an ordinance adopted by the Council of Ministers on a motion by the Commission.

This regulation shall provide the pricing method at which the service providers:

- ▷ Deliver water to consumers;
- ▷ Collect and remove wastewater;
- ▷ Treat wastewater;
- ▷ Connect consumers to the water supply systems; and

- ▷ Connect consumers to the sewer systems.
- ▷ The Commission shall conduct control so as to:
- ▷ Analyse information presented in the report as well as information foreseen in the previously approved plan of the operator;
- ▷ Assess the proposed prices against the parameters set in the business plan;
- ▷ Approve the estimated required revenues in accordance with the economically justified operating costs and capital return;

These costs are calculated using the formula:

$$NP = P + (RAB \times HB)$$

where NP is annual revenue requirement, P the allowed annual costs, RAB regulatory asset base and HB the rate of return on capital for the regulatory period.

RAB represents the value of assets on which the operator acquires return on capital, calculated using the formula

$$RAB = A - F - Am + Ok + Inv$$

where A represents the entered value of useful assets, F the value of assets acquired through gratuitous transfer, Am depreciation of assets, Ok the working capital for the regulated period, and Inv investments approved by the Commission, which will be invested during the regulatory period.

- ▷ Approval of prices according to the planned annual intake volume and delivery of water, and
- ▷ Setting a period for which the price is approved and the conditions under which the price may be modified.

In the Water Supply and Sewerage Services Regulation Act there are no provisions on how often the application for modification of prices may be accepted or considered.

## Financing

The activities of the State Energy and Water Regulatory Commission shall be financed from the funds comprising the regulatory fees for water supply and sewage services, fines and penalties pursuant to the Water Supply and Sewerage Services Regulation Act, as well as fees for registration of experts.

## Portugal

The Water and Waste Services Regulation Authority (ERSAR) shall operate and regulate prices at the state level.

### Tariff setting methodology

When it comes to methods of tariff setting and approval of prices set by service providers, ERSAR is guided by the 'rate of return' methodology. The 'rate of return' method implies setting the target rates of return, while the tariff structure is set subsequently so as to achieve these target rates of return.

The tariffs for water and wastewater services shall comply with the principles of the Environmental Act, the Water Act, the Economic and Financial Framework for Water Resources, the General Framework for Waste Resources and the Local Finances Law, and specifically respect the following principles:

- ▷ **Cost recovery** principle, meaning that water and waste services tariffs should allow an increasing recovery of the economic and financial costs of their provision, in order to ensure the quality of service and the operator's sustainability, and based in an efficiency scenario in order not to unduly penalise end-users with costs resulting from inefficient management of the system;
- ▷ **Sustainable use of water resources** principle, meaning that the water services tariffs should contribute to the sustainable management of water resources through the growing internalisation of costs and benefits of their use, penalising waste and high consumption;
- ▷ Principle of **users' interest protection**, meaning that the tariffs should ensure the proper protection of end-users, avoiding possible dominant position abuses by the operator with regard to service continuity, quality and costs for end-users, on the one hand, and with regard to their supervision and control mechanisms, on the other hand. These mechanisms become essential under monopoly situations;
- ▷ Principle of **affordability**, meaning that tariffs should allow for the financial capacity of end-users, to the extent necessary to guarantee a trend towards universal access to water and wastewater services;
- ▷ Principle of the relevant authority's **autonomy**, meaning that this recommendation seeks to respect Local Government Autonomy, without compromising the pursuit of its fundamental objectives.

The elaboration of tariffs should avoid cross-subsidization practices among different services and activities provided by operators, which occurs when the economic outcome generated by one or more activities is used to determine another's price.

Tariffs must have a uniform structure throughout the national territory, as simple and as transparent as possible, enabling their understanding by end-users.

In accordance with the above principles, these tariffs must ensure adequate recovery of operating and investment costs, as well as recovery of environmental costs.

In accordance with the cost recovery principle, tariffs for water and wastewater services should ensure the recovery of the following costs:

- ▷ Revaluation and depreciation, on time and according to the relevant accounting practices, of the value of the assets allocated to service provision, resulting from investments made with the implementation, maintenance, modernisation, rehabilitation or replacement of infrastructure, equipment and resources assigned to the system;
- ▷ Operating costs of the operators, including those incurred in the acquisition of materials and supplies, transactions with other operators, outsourced services, including the values resulting from the allocation of costs incurred with activities and shared means with other services provided by the operator, or in the salaries of their staff;
- ▷ Financial costs attributable to financing the services and, when applicable, the appropriate return on capital invested by the operators;
- ▷ Costs which legally arise from service provision, including those of tax nature.

For the purposes of the cost recovery principle, costs unrelated to tariffs should also be considered, particularly reimbursements and non-repayable grants, according to the period of revaluation and depreciation of assets arising from subsidised investments; operational subsidies which, due to exceptional social reasons, were allocated to the provision of these services and other income related to the service provision or use of resources related to them.

The specific costs associated with the collection and drainage of storm water and public cleaning should be excluded from the universe of costs to be recovered through the tariff of urban wastewater and waste

management services, by segregation or estimation in the accounts. These costs should be recovered through distinct revenues obtained by the responsible authorities.

The methodology provides clear definitions of different tariff structures, for each category of consumers, as well as the ways for tariff implementation.

The rules pertaining to tariff structure are the following:

- ▶ Tariff should include a fixed component and a variable component in order to equitably reflect the costs on all consumers;
- ▶ No additional fees shall be included in the water tariff;
- ▶ Tariff should be differentiated in terms of the categories of consumers (households and others; public institutions are treated as the category of other consumers);
- ▶ Operator should be able to differentiate tariffs depending on the period of the year; this difference is then included in the variable tariff component (max. up to 30% increase);

The tariff should be affordable for all categories, in a sense that annual water bill cannot exceed the double amount of minimum monthly income. In these cases, it is recommended to apply the reduction to the so called social tariff, achieved by the exemption of the fixed tariff and application of the first block of the variable tariff, up to a monthly limit of 15 m<sup>3</sup>.

### Modification of prices

The Law does not include any details as to how often the application for price modification may be accepted and considered, but the guidelines clearly specify that the tariff for the subsequent year has to be approved prior to the end of the current year.

### Financing

ERSAR generates its revenues by charging regulatory fees and fees for water quality control from the providers, whereby this latter fee concerns only those utilities that provide service of drinking water supply. Regulatory fee and fee for water quality control shall be approved by the Ministry of Agriculture, Sea, Environment and Spatial Planning.

## Romania

National Regulatory Authority for Municipal Services (NRAPS) is a regulatory authority responsible for all the issues related to water and wastewater services. This Authority is responsible not only for water supply and sewerage services but also other different public municipal services. NRAPS has prescribed regulations related to tariff setting and their calculations. This regulation is a legally binding instrument for all water companies in Romania.

In the tariff approval procedure, there is a clear distinction between a tariff increase and adjustment. Tariff increase assumes a rise in a certain percentage, whereas adjustment takes only inflation into account. The Regulator also prescribed the application forms and a data set to be submitted both in case of tariff increase and the adjustment. The application form contains different tables to be filled in, with mandatory initial state of the previous year's results, and earlier proposals for tariff increase/adjustment. In addition, the results of the last three-month operations have to be presented too. The last part of the form presents the tariff proposal and projected expenditures. All expenditures have to be presented in detail. The reasons for presentation of the three-month results are periodical projections and deviations. There are separate forms for water supply and sewerage service, but their structure is the same.

With regards to inflation, the water companies cannot foresee its rate or include it in the tariff proposal.

The legislation does not prescribe any limits as to how often the tariff increase/adjustment can be applied. However, there are practical limits, since the application has to contain the results of the last three-month operations, and the approval is a long-term process.

The most important part of the application form is the real result of the previous year and what was proposed in the previous request for tariff increase or adjustment. If there is a difference between them, the proposal for tariff increase shall not be accepted. Only in case when expenditures exceed the revenues acquired by the previously proposed tariff, the companies become eligible for a tariff increase/adjustment. At first sight, this way seems to be counter-productive since there are not any incentives for companies to achieve savings in their operations.

Given that no description of measures to achieve savings is required for tariff approval, such a structure fails to encourage improvements in operational efficiency. Nevertheless, the Law on Utility Companies, in one section, states that public water operators have to ensure, inter alia, increase in efficiency and capacity of the system, in order to reduce the prices by eliminating the losses in the system, reducing the production costs, specific consumption of inputs, fuel and electricity, and enable technological renewal of the company.

Such a structure also fails to take into account the affordability of tariffs for population.

## Czech Republic

In Czech Republic, local authorities set tariffs whereas the Ministry of Finance is responsible to “control” the prices.

The Ministry of Finance is responsible for regulation of tariffs in the water supply and sewerage sector. According to the Tariff Act, providing for prices of individual commodities and services, drinking water and wastewater are subject to the so called soft regulations. The Ministry sets guidelines for tariff calculation and develops by-laws specifying the calculation formula:

$$\text{Tariff} = [ \text{“justified costs”} + \text{“reasonable profit”} + \text{taxes (VAT)} ] / \text{foreseen volume.}$$

The ministry of Finance is also responsible for supervision of relevant regulations. While legal responsibilities are maintained by the Ministry, audits and tariff controls are performed by Financial Administrations, regional offices of the Ministry. When audits show that the tariff is too high, or not calculated in accordance with the applicable rules, this administration has the right to impose a fine.

As of 1994, tariffs for water supply and sewerage services have been subject to soft regulation – there are no centrally established value limits. Regulation of tariffs, performed by the Ministry, relates to commodity or service, not the companies providing the service. The Ordinance pertains to tariff components, i.e. justified costs and reasonable profit.

The notion of justified costs is stemming from the pricing legislation. These are the costs related to conducting core activities in a specific field. In terms of water supply, justified costs include water costs, technological/operating costs, costs of staff, utility costs and depreciation of assets. All the costs that can be considered justified are listed in the Newsletter of the Ministry of Finance, published once a year. In establishing which costs are justified and which are not, it is not important whether the company operates as a mixed or operational model (operational model implies that the assets are owned by someone else, most frequently municipality, whereas the mixed model implies that the operator is also the owner of the assets); justified costs will always include costs related to the core business activity. For instance, a mixed company will include the required infrastructural investments in its justified costs, whereas the operational model of the company will include rent payment to the owner of the infrastructure.

Interest on debt will be a justified cost only if the debt relates directly to provision of water supply services (e.g. loan for development of infrastructure). On the other hand, the interest is not justified if the loan is used for purchasing a company or its shares.

The decision on whether the interest is a justified cost or not will be made by an Auditor.

The Ministry does not have the official concept for calculation of reasonable profit as a percentage of any basis (basic capital, costs etc.); this has not been stipulated by any law, or defined by any internal document of the Ministry. Since relevant regulations vaguely define reasonable profit as “usual long-term profits achieved in comparable field of economic activity”, the Ministry compares it with profits of other water companies to establish “reasonableness”. Reasonable profit does not depend only on the size, but also on the purpose for which the profit is used. As a result, a company with higher capital expenditures can justify higher net profit.

There are no explicit rules or methods to *a priori* assess whether the profit is reasonable; this can be determined only by ex-post course of the tariff audit. All is based on the auditor’s subjective criteria. A company is entitled to file a complaint on the results of the auditor’s report to the Ministry.

Nevertheless, the Ministry usually uses the following ratios: “Net profit / basic capital”; “Net profit / Total assets” and “Net profit / Fixed assets”, when comparing the companies. At the same time, however, these ratios are not taken into account as indicators of profitability during the performance of audit. Water companies usually use EBIT (y + 1) (expected profit before taxation in the coming year) / Justified costs or only EBIT / Justified costs in calculation of tariff for the coming year.

As for private water supply companies, the line ministries agree that such a company should be able to distribute dividends to its shareholders. Yet, the position of the Ministry shows that, if the entire net profit is distributed to shareholders for several consecutive years, this may affect the assessment of its reasonableness in the subsequent years. In other words, the rate of dividend payments should also be reasonable (or, on average, comparable with other similar companies).

## Slovakia

Water supply sector in Slovakia, as well as all other municipal services, is regulated by a Regulatory Office for Network Services.

This Office has passed an Ordinance prescribing a clearly defined procedure of tariffs set for production, distribution and supply with potable water as well as sewage and treatment of wastewater. The Ordinance stipulates a series of “justified costs”, both positive and negative; depicts a list of documents to be submitted along with the tariff proposal; gives a precise mathematical formula for calculation of average price for potable water supply (and wastewater discharge) per unit of annual consumption; and provides a precise mathematical formula for calculation of “reasonable profit”. The final tariff can be charged as a unified tariff for all consumers (must not exceed the average price), or as a variable tariff for differentiated groups of consumers (weighted average of these tariffs must not exceed the average price).

Pursuant to this Ordinance, justified costs are something which is clearly and obviously related to regular business activities:

- ▷ Water costs, operating costs, costs of staff, depreciation of tangible and intangible assets, utility costs, rental costs for property which is not fully used within the regulated business activity;
- ▷ For the purpose of accounting the costs of wages of staff, the average salary per one employee can be increased relative to the previous year up to the National Index of Nominal Wage Growth (published by the Slovak Institute for Statistics).

Documents to be submitted along with the tariff proposal include: excerpt from the commercial register; profit and loss account (income statement) for the year preceding the previous one (t-2); earlier planned calculation for average tariffs, justified costs, reasonable profit (together with the inputs required for these calculations) for the current year; real current calculation using formulas for average prices, justified costs, reasonable profit for two previous years (t-1; t-2), and completed tables that comprise the Annex of this Ordinance (for standardised calculations).

## Switzerland

In Switzerland, there is no central regulatory body responsible for tariff setting for drinking water and sewerage services. However, at the federal level, there is a body called the Price Supervisor. The price Supervisor is a part of the Federal Department of Economics, whose main responsibilities are to monitor the evolution of prices, to prevent the establishment of abusive prices, and to inform the general public about its activities. The Price Supervisor performs supervision so as to ensure that price as a monopoly is not aimed at too high a profit.

Tariff setting for water supply and sewerage services in specific cases falls within the cantonal level, although it is usually on municipal level. Given the fact that the country is highly decentralised, every canton and municipality are free to choose and establish their regulatory instruments, both in terms of tariff setting for drinking water and sanitation services, and for quality of water, distribution, etc. Cantons mostly delegate these responsibilities to municipalities, thus it can be stated that every individual canton or municipality define their regulatory framework regarding the water sector. The structure of the tariffs is therefore highly heterogeneous (e.g. some municipalities have fees for connection, for the meter, or for consumption), as is the way of calculating prices. In practice, water prices vary from municipality to municipality, depending on issues such as availability of the resources, the topography and the length of pipes.

Subsidies are quite rare in terms of water supply services, but they are possible for the extension of the infrastructure (as subsidies for investments to local communities by higher level authorities). As for sanitation, this sector benefits from more subsidies at the federal and cantonal level.

Although municipalities in Switzerland have a competence to decide on prices independently, there are also cases when a municipality proposes tariffs, but they have to be approved by a canton. Prices may also be adjusted so as to balance relative to deficits or surpluses.

In this context, we can mention the Swiss Gas and Water Industry Association. This body has no competencies regarding the tariff setting, but the Association published its Guidelines with recommendations for financing of water companies. The Recommendations for financing water supply sector are about the principles for tariff setting and propose the following for the tariffs:

- ▷ To ensure the principle of full cost recovery, so as the full income does not exceed the total costs;
- ▷ To ensure the principle of equivalence, i.e. that the amount of charges in each concrete case equals the value received for this price;
- ▷ To respect fundamental rights and equality, particularly when there are differences in collection of these charges from various categories of consumers (social categories);
- ▷ To include costs of all potential additional services;
- ▷ To ensure adequate rate of return on the invested capital;
- ▷ To avoid cross-subsidisation among different groups of consumers;
- ▷ To ensure transparency, enabling understanding by end-users.

Given that the Association has a database on over 300 companies, these data are used to calculate real operating costs. They are also used in most of the companies as a base for tariff calculation.

### Cantonal level

Cantons have the responsibility to assure the administrative, legal, technical and financial control of the water sector. Each canton passes its own legislation to regulate water supply and sewerage services, so there are different laws on water in Switzerland, as well as different methods of water sector regulation

and management of water supply system. Although distribution of water, as a rule, falls within the competence of the cantons, this type of responsibility is usually delegated to municipalities.

Cantons are also responsible for the construction of the public sewerage systems and treatment stations, and for their economic operations. A very important role of the cantons is to ensure that construction, exploitation, maintenance and replacement costs from drainage and treatment plants are recovered by those who produce the wastewaters.

### Municipal level

As already mentioned, cantons normally delegate to municipalities the responsibility for the provision of water services. The degree and type of competencies awarded to municipalities change from canton to canton, making the Swiss water sector highly diverse and decentralised.

Municipalities keep a very broad autonomy in water supply services, especially concerning the choice of the structure and organisation of the service. Municipalities may choose to provide the service directly, through their own administration, or to delegate this competence to a third body. In the latter case, delegated management involves the transfer of responsibility for a limited period of time to a public or (rarely) private partner.

The provision of water sanitation services rests upon the responsibility of municipalities. In contrast to the provision of water supply services, water sanitation services must be directly managed by the municipality, i.e. municipal department with own resources and with no separate accounts from the municipal budget. The only possible form of indirect management is through an association or syndicate of municipalities.

### Tariff setting on the example of 4 cantons

Since there are very diverse tariff setting methods in Switzerland, we will present the examples of 4 cantons reflecting different degrees of autonomy.

#### **Geneva**

In the Canton of Geneva, municipalities have limited responsibilities for water tariffs since the Canton keeps most of the functions of water resources management and water protection within its responsibility. In the cantonal Law on Waters from 5<sup>th</sup> July 1961, it is stated that prices for water supply and sanitation services shall be proposed by the service provider, but the final price shall be approved by the Cantonal Council. In the Canton of Geneva, water supply providers calculate annual charges for the volume of drinking water consumed by the end-users. The billed amount comprises two components, namely the drinking water and the sewerage system (including the costs of public cantonal network and wastewater treatment facilities).

#### **Vaud**

The Canton of Vaud is an example of a canton where municipalities have larger competencies including the process of water supply and sanitation tariff setting. In the Canton of Vaud, the prices of water supply and sewerage services are set pursuant to the municipal decision. In the Law on Waters of the municipality of Savigny, the municipal decision is also set as a basis for pricing of these services.

#### **Canton of Valais**

The Canton of Valais represents a case where all competencies concerning regulation of the water sector are left to municipalities. Thus the municipalities are responsible for water pricing, monitoring of quality, as well as for managing all water supply and sewerage infrastructures.

#### **Canton of Feiburg**

The village of Düdingen in the Canton of Freiburg is supplied with water through a local company. This company consists of the Executive Board and the Shareholder Assembly. In this concrete case, the Executive Board proposes new water tariff once in a period of 2-6 years. The procedure is such that this tariff

first has to be approved by the Shareholder Assembly and then, finally the Local Community Council, i.e. the Village Council.

## Germany

In Germany, there is no central regulator for water supply and sewerage sector. There are different forms of ownership in terms of service providers. Municipality is most frequently involved in some type of ownership structure, but there are also concessionaires.

The Federal Network Agency (Bundesnetzagentur) was recently established, covering telecommunications, postal services, energy, gas, and railways, but not water supply and sewerage services since they are in the sphere of competencies of the provinces. Water and sewerage tariffs are approved through different procedures in every province, usually within the department of the Federal Ministry for Economic Affairs, after a request for the tariff increase is reviewed by the independent auditor.

Tariff setting is decentralised; price is determined locally, but the framework for pricing is set at the federal level, which, in fact, transposes the EU legislation in this field. In Germany, water prices have to recover all costs (protection of water resources, abstraction, treatment; transmission where necessary, accumulation and distribution; collection of wastewaters and stormwaters, effluents, discharges and environmental measures).

Local authorities (municipalities) organise provision of water supply and sewerage services on their own. Many municipalities regulate all public utility services within one company, in order to reduce costs of operation.

Smaller municipalities associate and provide public services through one company, again to reduce costs of operations.

Competitiveness is determined through benchmarking, either voluntarily or under the pressure of the civil sector, particularly consumers, while the price can be submitted to competition authority for assessment. National Consumer Satisfaction Survey, carried out in 2007, shows that consumers greatly overestimate the water price as compared to real price and costs.

The Professional Association of Water Utilities established a voluntary system of reference values used during benchmarking.

## United Kingdom

10 water supply companies in United Kingdom were privatised in 1989. Then the independent Regulator (Ofwat) was established to supervise water service providers, to ensure quality provision at favourable price for consumers (value for money), to take care of public interest, to set requirements for efficiency, etc.

All water prices have to be approved by Ofwat. Water companies calculate their price and subsequently submit to the Regulator.

Prices are set based on metering and without metering (based on the value of property, number of members or type of property). All water companies in United Kingdom send their bills once or twice a year.

Companies submit their business plans, including the planned capital investments.

Ofwat prescribes revenue requirements as well as price limits.

The revenue requirement should recover all costs, while the objectives of the price limits are to introduce accountability for all actors, to encourage efficiency, environmental protection and sound management.

This requirement should recover operating costs, capital costs, reward good performance of companies over the past five years, continue financing earlier investments through return on capital, and pay taxes.

Ofwat sets a price limit RPI-X (Retail Price Index) as maximum that can be charged to consumers. This process is known as the price control.

Ofwat carries out periodical controls – there have been 5 by now. The last control was conducted in 2009 and set a price limit for the period 2010-2015.

If a company delivers service with costs under the price limit, it may keep the earned income until the next control procedure.

## Hungary

The role of the Hungarian Energy and Public Utility Regulatory Authority has been continuously changing along with the development of the market structures and operational models, as well as European legislation. Its main responsibilities are consumer protection, providing regulating access to all networks and systems, carrying out regulatory competencies in order to maintain security of supply and fostering competition. Within the complex field of consumer protection, its key task – besides regulating the quality of supply – is to keep end-user prices on an affordable level, especially under the circumstances of economic and financial crisis. The scope of the infrastructure that has to be overseen has been extended in 2012 with the public water utilities.

Water supply sector, in terms of water prices, is based on the principles of full cost recovery and the principle of the lowest cost for efficient operating. It is also based on the principle of avoidance of cross-subsidising across different business activities.

The regionalised water supply companies have a better status, in a sense of certain more favourable treatments in decision making on the tariff level.

Prices of services are determined for each company individually, by using a comparative economical analysis of costs, prices and fees, but also taking into account the following aspects:

That the price enables continuous service **at the lowest possible cost**, along with improvement of operational efficiency, effective use of capacities, permanent enhancement of the quality of supply, taking care of the conservation of natural resources, and contributions from the budget and municipalities.

The Regulator issues a decision whether the price was calculated in an adequate way, while the final approval of price is given by the competent minister.

## Slovenia

The Slovenian model of regulatory framework for water pricing resembles the model currently applied in BiH, where there is no regulatory authority, except that the process requires participation of eight companies and municipal councils as well as the Ministry of Economic Development.

The Law on Public Commercial Services (ZGJS), in Article 59 (price of product or service) stipulates that for the use of public goods, a price of a product or a service has to be paid, in a form of tariff, tax, fee, or return, as well as that a price is formed and set in the manner and following the procedure determined under the law, or decision of local community according to the law. The same Article allows differentiated prices through the categories of consumers, as well as subsidising, but does not specify the pricing method.

Within the current practice, the price of water (per cubic meter), upon the proposal of Water utility, is set and approved by the Municipal Council. To the price approved by the Council, the Ministry of Economic

development also has to give its consent (after which it is published in newspapers and the websites of the utility companies).

## Croatia

Water supply and sewerage activities are performed as public utility services. These activities are of interest for local self-governance units on the served area. Local self-governance units are obliged to secure provision of water supply and sewerage services. Units of territorial (regional) self-governance in the activities of water supply and sewerage act upon obligations and responsibilities stipulated by the Water Act.

Activities of units of water supply and sewerage services are governed by the following principles:

- ▶ Water services shall be provided under the non-discriminatory, and socially acceptable conditions;
- ▶ Public water supply and sewerage activities shall be performed in an efficient, cost-effective and purposeful manner;
- ▶ Public water supply and sewerage activities shall be carried out so as to secure their sustainable development and continuous quality improvement of water services;
- ▶ Municipal water structures shall be permanently maintained in the state of functional capability;
- ▶ Water service costs shall be determined according to the principle of full cost recovery as laid down by the Law on Water Management Financing, social acceptability of water price and protection from the monopoly;
- ▶ The price of water services may not cover the costs of the service provider's inefficient operations;
- ▶ The general public has to be aware of the important information on water service provision;
- ▶ Financing of the construction of municipal water facilities shall be regulated by the law providing for water management financing;
- ▶ The activity of public water supply and sewerage shall be carried out by the public service providers. Exceptionally, local-self government units may give a concession to other physical persons or legal entities.

Public supplier of public water supply and sewerage services is a company in which the shares or stock of the share capital or the founding rights is the exclusive right of local self-government unit.

If a third party acquires a business share, stocks or founder's rights in public water supplier, or if the public water supplier is performing or is registered in a court registry for performing the activity in contravention of the Water Act, his legal status of public water supplier and the right to perform activities of public water and public sewerage services shall cease.

Public water service supplier may not perform other activities, except public water supply and sewerage, namely the activity under Article 125, paragraph 3 of the Water Act (stormwater drainage activity). Exceptionally, public water service supplier may carry out the activity of drinking water health-safety testing for own needs, setting connections, calibrating the meters, and energy generation for own needs, if meeting the requirements of special regulations.

Provider of public sewerage system services possessing an act referred to in Article 65, paragraph 1 of the Water Act (a water license for wastewater discharge), and managing structures for public sewage systems and / or device for wastewater treatment with a receiving load of more than 100 000 population equivalent (ES) shall operate a sampling and testing the quality of own wastewater, if meeting the requirements of special regulations.

For performing the public water supply and sewerage activities and their recording in a court registry, legal entities shall fulfil special conditions of technical equipment, number and expertise of employees, that the Minister regulates by a Rulebook. Fulfilment of the special conditions from the above regulation is determined by the Ministry, issuing a decision in the administrative proceeding.

The Government of the Republic of Croatia determines catchment areas and their boundaries and, as needed, prescribes a method for making and implementing decisions which, pursuant to this Law, in the activities of public water supply and sewerage services, shall be issued by the local self-government unit and the service provider, if these decisions, in the same wording, have to be made in a water supply area, agglomeration or the service area. Ordinance on the service areas may be issued after carrying out a consultation process with the local and regional self-government units and public water service providers. The Government shall pass this regulation by the end of the current year.

Pursuant to the Water Act in Croatia, the Ordinance is passed on the lowest basic tariff for water services and the type of costs that this price recovers. According to this Ordinance, the **lowest basic price of water services** is the basic price of water services that enables full recovery of water service cost, except for the costs of construction of water utility structures. The lowest basic price of water services may be modified if the total increase or decrease of costs, namely increase or decrease in the volume of water service, exceeds 5% a year.

The tariff consists of the fixed and the variable part. **The fixed part** of the lowest basic water service serves to recover costs not related to the volume of delivered services, which occur as a consequence of connection of an estate to water utility infrastructure. **The variable part** of the lowest basic water service is depending on the volume of the delivered water services.

## Serbia

Pursuant to the Draft Law on Municipal Utility Activities, state administration and professional tasks related to improvement and development of utility services are performed by the Republic Municipal Utility Directorate of the Republic of Serbia. The Directorate, inter alia, determines the tariff setting methodology and gives opinion on the application for utility price modification.

The Standing Conference of Towns and Municipalities (SCTM) initiated the development of the **proposal for a unified methodology** for calculation of all utility prices, thus the water supply and sewerage services as well. During 2012, within the project funded by the Swiss Agency for Development and Cooperation (SDC), the SCTM engaged a team of experts for developing the initial proposal of this document, which was supported by the representatives of local self-government units at the meetings of the SCTM bodies. Work on the methodology included pilot testing on a representative sample in several towns and municipalities.

For enactment of the methodology for utility pricing, it will not be necessary to significantly modify the legal framework, since the proposed methodology for utility services tariff setting fully relies on the existing legal solutions and starts from them, so the Government of the Republic of Serbia, if it accepts this SCTM initiative, can prescribe the methodology in a form of a by-law.

The estimated amount of water supply losses in Serbia, when summing up all their causes, on average exceed 40%. The economic logic tells that such a situation, among other things, is a result of low prices as well as tolerance of the irregular settlement of obligations based on the delivered service. The initiative for endorsement of the Methodology was motivated by a notion of creating a realistic basis allowing to create long-term and efficient utility system functioning, such as to enable operations based on economic principles of management in public economic sector.

The methodology is a tool which would, as a binding act, change the previous practice and enable local self-government units to make decisions on prices in line with realistic possibilities of citizens, but on a basis of a precise costs calculation. The Law, in Article 25, defines the main principles set for determination of utility pricing. These five principles should secure equality and sustainability of utility prices.

Principle **“consumer pays”** – also proposes modernisation of the system by applying the consumption standards applicable in the EU, such as individual metering of water used by consumers, as well as introducing discipline in execution of obligations, namely fulfilling the deadlines set for payment of utility providers’ services.

Principle **“Polluter pays”** – sewerage price is directly related to this principle, while it can be applied to the water supply price only indirectly.

Principle **“Price recovers all costs”** – This is the most important of all 5 principles but, due to lack of implementing mechanisms, it is applied inconsistently and non-selectively. Pursuant to the Law, the costs include all expenditures, including depreciation and accumulation costs (losses or profit from previous years are increased by accumulation to finance the development). The application of this principle assures the economic basis for operations and development of the utility companies, and reduces or eliminates their dependence on financing through the local self-governments’ budgets.

Principle of **price affordability** – this principle means *“economic prices – yes, but to the limit that the citizens can stand”*. The methodology also contains and provides quantifications of affordability. The methodology proposes maximum limits of a household burden in the following relevant amounts:

- ▷ Drinking water – average monthly water charge of up to 3% of the average net wage in the concrete municipality;
- ▷ Sewerage – average monthly sewerage charge of up to 2% of the average net wage in the municipality.

Principle **“one service – one price”** – Changing this principle requires changing of current practice, which implies that households pay lower price for these services than the industry. It is in the interest of municipal utility systems to introduce this principle gradually, by establishing a transitional period of at least 2 years.

The Directorate, by its act on utility activities, prescribes the methodology for determination of operating cost accounting through individual utility services, which can be recognised in a utility price, and sets the **operation** indicators, standards and norms of use of energy, materials and other inputs that can be recognised in a calculating part of the methodology.

Elements for setting prices of utility products and services are:

- ▷ Operational costs stated in business accounts and financial statements, that can be recognised within the utility service price, according to the methodology, standards and norms established by the Direction;
- ▷ A part of costs for construction and reconstruction of utility infrastructure facilities and purchase of equipment, according to the adopted investment programmes and plans of the municipality, which are funded from the price of utility services;
- ▷ Profit of the utility service provider, which cannot be higher than the level established by the Directorate.

Funds earmarked to finance reconstruction and development of the municipal infrastructure facilities are shown separately and can be used only for the earmarked purposes.

Local self-government units have a duty to monitor price trends in utility products and services, and in particular compliance of utility prices with the methodology and standards prescribed by the Directorate. The decision on modification of utility service prices is made by the service provider, and it becomes effective after the approval of the competent body of the local self-government unit.

Provider of utility services submits the justified request for modification of the utility service price to the competent body of the local self-government unit for approval, while one copy of the request is submit-

ted to the Directorate.

The competent body of the local self-government unit is obliged, within the time limit of 15 days from the reception of the request, to submit the assessment of justification of the request to the Directorate, including the assessment of the accuracy of data presented in the request.

The Directorate has to give the **opinion on compliance** of the request for modification of the utility service price with the prescribed methodology within the period of 15 days, and to submit it to the local self-government unit and utility service provider.

If the Directorate fails to submit the opinion within the set time limit, it will be considered that it gave a positive opinion.

After obtaining the Directorate's opinion, the competent body of the local self-government unit decides on the request for modification of the utility service price.

If the competent body of the local self-government unit, within the time limit of 30 days from the reception of the positive Directorate's opinion, fails to decide on the request for modification of the utility service price, it will be considered that the request is approved.

## Kosovo\*<sup>6</sup>

Water and Waste Regulation Office, in charge of economic regulation within the sectors of water supply, wastewater drainage and solid waste management, is directly responsible to the Kosovo's Assembly. The Office is, *inter alia*, obliged to ensure that providers of the above mentioned services, mainly public companies, do not abuse their monopoly role, and that they provide the adequate standard of service at the fair price.

One of the main tasks of the Office is tariff setting in such a manner to ensure the companies to finance their activities, but, at the same time, to promote the efficiency, so that the prices would not be higher than necessary. The Office also conducts comparative benchmarking of the companies and regularly reports on their results, thereby supporting the competitive spirit among the companies.

The Office prescribes the rules and the tariff setting methodology in accordance with the institutional set up in the water supply sector in Kosovo. There are currently seven regional water companies operating in the conditions of local monopolies.

The tariff policies are set taking into account the following:

- ▷ All legal tariff setting obligations;
- ▷ Social responsibility and the role of service providers:
- ▷ Uniformity of tariffs throughout service areas where appropriate,
- ▷ Different categories of customers, their affordability constraints and their respective costs of service,
- ▷ Tariff structures including the block tariffs and fixed charges,
- ▷ Service levels;
- ▷ Connection fees;
- ▷ The environment;

---

<sup>6</sup> \*This designation is without prejudice to the position of status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

- ▷ Cost recovery, including the definitions of operating costs, efficiency expectations, and recovery of capital investment costs;
- ▷ Financing, capital structure and return on capital;
- ▷ Process of tariff revisions.

The tariff policies include no more than three categories of consumers: households, public institutions, and commercial/industrial consumers.

The tariffs are set for water supply services and sewerage services separately, according to the real costs, without cross-subsidising among these types of services.

When applying for tariff approval, the service providers submit short-term and medium-term business plans for the Regulator to approve. The Regulator publishes annual performance and results reports of the water companies, taking into consideration whether the planned targets were achieved.

According to the 2012 Report, this method of analysing and publishing proved to be an efficient mechanism, and the companies continuously compare their operations, and achieve increasingly better results. These reports also provide specific recommendations for new improvements, for each company individually.

The price approval depends on the progress achieved by the company. Along with every approval (or refusal), the Regulator gives recommendations for further improvements.

# ANNEX 2: THE ROLE AND IMPORTANCE OF TARIFF SETTING METHODOLOGY FOR SERVICES WITHIN THE SCOPE OF ACTIVITIES OF OTHER REGULATORY AGENCIES IN BIH

The key reason for reviewing other regulatory agencies, not related to the sector observed in this study, is to identify possible elements of efficiency with the potential of being replicated in the water supply and sewerage sector. The Consultant is, at the same time, particularly interested in the method of checking the operational efficiency of electricity generation and distribution companies, and the basic principles of the tariff setting applied in the defined methodology, although all the methodological details are not fully replicable, due to completely different operational process.

## The State Electricity Regulatory Commission of Bosnia and Herzegovina (SERC) DERK

The State Electricity Regulatory Commission (SERC) is an independent and not-for-profit institution of Bosnia and Herzegovina, which acts in accordance with the principles of objectivity, transparency and equality, and has jurisdiction over the responsibility for transmission of electricity, the transmission system operations, and international electricity trade, as well as generation, distribution and supply of electricity for customers in Brcko District of Bosnia and Herzegovina.

SERC was established by the BiH Parliamentary Assembly by enacting the *Law on Transmission of Electricity, Regulator and System Operator* ("Official Gazette of BiH, Nos. 07/02, 13/03, 76/09, and 01/11) and by appointing the members of the Commission.

### Responsibilities

Responsibilities of SERC include: regulation, **approval and monitoring of tariffs and tariff methodologies** for transmission and ancillary services and the work of Independent System Operator (ISO), and supply of electricity for customers in Brcko District of Bosnia and Herzegovina, as well as issuance of rules and regulations within the scope of its authorities, including the review and adoption of market rules and grid codes, and terms and conditions for connection and access to networks; establishment, monitoring and enforcement of the quality standards for electricity transmission and ancillary services; coordination and approval of the investment plans of the electricity transmission companies, including the plans related to the transmission network and the quality of electricity transmission, etc.

### Tariff setting methodology in use

SERC prescribes the tariff setting methodology for electricity transmission services as well as methodology for development of the system service tariffs for the Independent System Operator, and tariffs for ancillary services. The methodology was published in the "Official Gazette of BiH". No. 93/11, of 22<sup>nd</sup> November 2011.

In determining the tariff methodology, the following objectives and principles are taken into consideration:

- ▷ Fairness, transparency and non-discrimination;
- ▷ **Encouraging the efficiency** of the regulated providers and users of the transmission network;

- ▷ Encouraging mechanisms to improve energy efficiency;
- ▷ Creating stable relations in the electricity market and stable conditions for investors in the electrical energy sector;
- ▷ Stimulating the transmission network development so as to continuously maintain or increase the quality of service delivery.

In order to achieve the aforementioned, the tariffs have to be **based on justified costs** of operation, maintenance, replacement, construction and reconstruction of facilities and equipment, including a reasonable return on investment, depreciation and taxes, with consideration of environmental protection.

The methodology describes in detail and mathematically the calculation of the tariff for each type of operation, noting that, along with the justified operational costs, the Regulatory fee is also included.

Tariff regulation ensures:

- ▷ Long-term operation of companies dealing with the regulated activities, with the recovery of justified costs and adequate return on assets;
- ▷ Improved productivity of operations within the regulated activities, with reasonable and efficient investing;
- ▷ Justified development of the transmission network and management of the transmission network in order to ensure safe and high quality supply for users.

## The Electricity Regulatory Commission of the Federation of Bosnia and Herzegovina FERC

The Electricity Regulatory Commission of the FBiH was founded on the basis of the *Law on Electricity* ("Official Gazette of FBiH", No. 41/02, 24/05, 38/05 and 83/11) as a specialised, independent, autonomous and non-profit organisation in the Federation of Bosnia and Herzegovina. Since the *Law on Electricity* was enacted by the FBiH Parliament, it can be concluded that the FBiH Parliament is the founder of the Commission.

The management and organisation of the Regulatory Commission are regulated by the Statute. The FBiH Parliament approves the Statute of the Regulatory Commission.

The FBiH Electricity Regulatory Commission operates and regulates tariffs at the entity level.

### Jurisdiction and obligations

In order to achieve the objectives set by the Law on Electricity, the FERC competencies in conducting their authorities and functions have been stipulated by the Articles 14 and 15 of the Law.

Article 14 of the Law sets forth the following FERC's competencies: supervision and regulation of relations between generation, distribution and electricity consumers, including traders with electricity; prescription of methodology and criteria for tariff setting for supply of non-eligible electricity buyers; setting the tariffs for distribution system users and tariffs for non-eligible buyers; issuing or revoking licenses for generation, distribution and trade with electricity; issuing preliminary licences for construction and licenses for using electricity sector facilities, except power transmission utilities; defining general conditions for electricity supply.

In executing its powers and performing its functions under Article 15 of the Law, the Regulatory Commission is obliged, on the basis established by the State Commission, to regulate the electricity market

in such a manner to ensure transparent and fair relations between all participants; to protect the rights of buyers, electricity distribution companies and electricity producers, and oversee the relations in the electricity sector; to create conditions for the establishment of an efficient, reliable and cost-effective system of electricity generation, distribution and supply; to create conditions for efficient, cost-effective and safe use of electricity; to create conditions for the development of the electricity system (generation and distribution); to regulate the quality of service at all levels, including the tariffs and charges for the monopoly services in the distribution, taking into account both the interests and needs of all electricity supply users; to oversee the effectiveness of the mechanisms and processes at play to ensure a reasonable balance between the demand and supply side; to take care of protection of human health and safety and the environmental protection.

### Tariff procedure and tariff setting methodology in use

FERC, through the *Rules for Tariff Methodology and Tariff Proceedings* (Official Gazette FBiH, Nos. 45/05 and 77/10) prescribes the basis for initiating the tariff proceedings necessary for FERC to fulfil its responsibilities pursuant to the Law and the Procedural Rules.

The tariff proceedings are initiated upon request of the electricity company to FERC, or at the FERC's initiative. The tariff proceedings may be initiated so as to change the required revenue due to change of one or more components of the required revenues.

FERC conducts the proceedings and makes decisions in a manner established under these Rules, the FERC's Procedural Rules, and the Rules of Hearing Procedures and Resolving Requests and Complaints.

Accordingly, service providers propose their tariffs and submit them to Regulatory Commission for approval. In the *Law on Electricity*, it is not stated how often the request for price change can be considered and approved. Over 9 years of its functioning, FERC conducted 9 tariff proceedings in total.

For the Regulatory Commission to be able to carry out its authorities and fulfil its obligations, Article 30 of the Law on Electricity prescribes that the Regulatory Commission may require any licence holder to provide data and information required for the purpose of enforcement of this Law, and that these data and information must be provided within the defined deadlines and must cooperate with the Regulatory Commission. Pursuant to Article 86, paragraph 4 of the Law on Electricity, FERC shall adopt the implementing regulation in accordance with its aforementioned authorities.

By the Rules for Tariff Methodology and Tariff Proceedings, in Article 53, FERC prescribes the mandatory contents of the request for tariffs, including the required documents and data to be attached, while Article 63 of these Rules and Article 81 of the Rules of Hearing Procedures and Resolving Requests and Complaints, it prescribes that, whether or not the proceedings are pending, the participants shall cooperate with any reasonable FERC's request for information in order to enable FERC execute its jurisdiction under the Law and the FERC's Rules.

In Article 2, paragraph 4 of the Decision on the Regulatory Chart of Accounts, FERC prescribes the application of the Regulatory Chart of Accounts for unified recording of the assets, sources of revenues, costs, income and expenses, which will contribute to more efficient reporting of electricity companies in the territory of the Federation BiH for the purposes of the regulatory process, while in Article 17, paragraph 1 it prescribes that FERC may, as needed, adjust the prescribed forms to be submitted in the tariff proceeding, to the Regulatory Chart of Accounts.

Within the tariff proceeding, FERC considers in detail various types of reports that the companies are required to submit (some on a monthly, some on a quarterly, semi-annual or annual basis), in a clearly prescribed way, and on prescribed forms (over 200 different tables). The manner and the dynamics of the reporting are prescribed by the Rules on Reporting, No. 01-07-1436-02/10 effective as by 2011.

Pursuant to the Rules for Tariff Methodology and Tariff Proceedings, the Regulatory Commission uses the so called "rate of return" method for tariff setting in the electricity sector. The "rate of return" method includes setting targeted rates of return, and then the tariff structure is determined so as to achieve these

targeted rates of return.

The objective of this tariff methodology is to establish such tariffs/prices that are:

- ▶ Economically justified, non-discriminatory, based on objective criteria, and determined in a transparent manner;
- ▶ Based on justified costs of operation and maintenance, replacement, construction and reconstruction of facilities, depreciation costs and taxes, taking into account the approved rate of return;
- ▶ Established in a way to eliminate cross-subsidies among different activities and different groups of customers;
- ▶ Established to provide the electricity companies with an adequate flow of revenues which will allow them with an opportunity to earn the approved return, if they operate their activities in line with the approved expenses;
- ▶ Established to recover the accompanying justified costs of generation and supply to non-eligible (tariff) customers, and costs of network use.

The tariff methodology prescribes the manner for determining: the required revenues for electricity generation activities, electricity generation prices, tariffs for users of the distribution system, and tariffs for electricity supply to non-eligible (tariff) customers.

FERC performs the analysis of income and expenses so as to determine the revenue requirement. During the analysis and verification of costs, FERC may use the reports of the independent auditor and auditing institutions which are authorised under the Law for the performance of audits of the electricity companies in the Federation BiH, and which the electricity companies shall submit to FERC. All electricity companies shall keep the unbundled accounts for all regulated and non-regulated activities. In analysing and approving the costs, FERC may use benchmarking against the same or similar electricity companies.

The methodology provides a very detailed method of calculation of justified costs and required revenues for all types of activities and all categories of consumers. In addition to the established costs, FERC may also declare other costs as justified.

FERC performs a control of justification of costs, as well as truthfulness and accuracy of all other elements attached to the request for tariff approval. This procedure, inter alia, includes requesting the additional explanations, additional documentation, as well as preliminary hearings where the presence of the intervenor is allowed, as a third person with the interest different from the general public's interest (the number is not specified, the hearings are agreed as needed). FERC is entitled to have access to any document or operation of the company, as well as to request justification for each cost type. Among other things, control of justification of costs of, for example the employees, is performed in accordance with the Collective Agreement, the approved number of staff pursuant to the existing systematisation of jobs, etc.

## The Regulatory Commission for Energy of Republika Srpska RERS

### Competent administrative authority/ the founding body

The Regulatory Commission for Energy of Republika Srpska was founded in 2002 as a Regulatory Commission for Electricity of Republika Srpska, pursuant to the *Law on Electricity* (Official Gazette of RS, Nos. 8/08, 34/09 and 52/09). In 2007, the *Law on Amendments to the Law on Electricity* (Official Gazette of RS, No. 60/07) became effective, which, apart from its competencies, also changed the name of the Regulatory Commission for Electricity of Republika Srpska to the Regulatory Commission for Energy of Republika Srpska (hereinafter in the text: the Regulatory Commission).

The *Law on Energy* (Official Gazette of RS, No. 49/09) became effective on 19 June 2009. This law contains provisions of the *Law on Electricity* related to the organisation and the competencies of the Regulatory Commission for Energy of Republika Srpska.

The administrative body responsible for the work of the Regulatory Commission is the National Assembly of Republika Srpska. The Regulatory Commission for Energy of Republika Srpska operates and regulates prices at the entity level.

## Jurisdiction

The jurisdiction of the Regulatory Commission for Energy concerning the electricity sector includes: **Prescribing the methodology and tariff setting criteria** for the use of distribution network and electricity price for supply of non-eligible customers, and methodology for determination of the fee for connection to the distribution network; the tariff system for sale of electricity and use of the distribution network; the tariff rates for distribution system users and the tariff rates for non-eligible customers; setting the price of electricity at the plant outlet, etc.

## Tariff setting methodology in use

Pursuant to the *Rule on Tariff Methodology and Tariff Proceedings* (Official Gazette of RS, No. 96/12), the Regulatory Commission applies the so called “**rate of return**” methodology for tariff setting in the electricity sector. The “rate of return” method includes setting targeted rates of return, and then the tariff structure is determined so as to achieve these targeted rates of return. Article 5 of the aforementioned Rule, provides for calculation of the annual required revenue of the regulated electricity company, which is called “the approved required revenue” throughout the remaining provisions of the Rule.

Service providers propose their prices and submit them to the Regulatory Commission for approval.

The *Law on Electricity* and the *Law on Energy* do not mention how often the application for price change can be approved or considered.

Procedures related to tariff setting in the energy sector are initiated upon submission of the request by a company to the Regulator, or on initiative of the Regulator.

Subsequently, the Regulator announces a public notice on initiating the tariff proceedings and the manner how the stakeholders may obtain the necessary information and participate in the proceedings. After the procedure prescribed by the Regulator in the *Rule on Tariff Methodology and Tariff Proceedings* (official Gazette of Republika Srpska, No. 61/05), *Rule on Methodology for Determination of the Fee for Connection to the Distribution Network* (Official Gazette of Republika Srpska, No. 123/08), *Rule on Tariff Methodology in the System of Transport, Distribution, Warehousing and Supply with Natural Gas* (Official Gazette of Republika Srpska, No. 9/09), (hereinafter: *Tariff methodology*), *Procedural Rules of the Regulator* ( Official Gazette of Republika Srpska, No. 96/04), and *Rule on Public Hearing and Settlements of Disputes and Complaints* (Official Gazette of Republika Srpska, No. 71/05) , the Regulator makes decision. Each decision should contain sufficient evidence and facts to enable the public to understand the reasons behind such a decision.

Tariff methodologies define the process for determination of the tariffs in Republika Srpska, i.e. the basic settings of the tariff system: the tariff elements, categories of consumption and groups of customers, method for determining the prices and tariff rates, as well as the method for determining the connection fee. They define the following:

- ▷ Classification of costs;
- ▷ Allocation of costs on the tariff elements, categories of consumption and groups of customers;
- ▷ Setting prices and tariff rates as well as connection fee pursuant to the prescribed tariff methodology.

In the Rule for Tariff Proceeding, the Regulator prescribes the basis of the proceedings for the purposes of analysing the application and other tariff related submissions, which are necessary to enable the Regulator to fulfil its obligations under the Law on Electricity, the Law on Gas, and the Procedural Rules of the Regulator.

Along with the Tariff methodology, the Regulator also prescribes the content and the form of the **application for the tariff's approval**, as well as the **forms for submission of data** and other documents supporting the application for the tariff's approval.

# ANNEX 3: KEY PERFORMANCE INDICATORS

The main task of this Annex is to give a general overview of possible performance indicators, so as to be able to select several key ones for BiH, in order to benchmark the efficiency of water utility companies. Chapter 4 recommends which of the stated utility performance indicators should be calculated in the tariff setting procedure, as well as define prerequisites for their application. They will be treated as a component of the tariff setting methodology, therefore that will be a part of the tariff adoption process as well.

One of the conclusions of the previous phase of establishing a Regulatory Framework for Tariff Setting for Water Supply and Sewerage Services is related to benchmarking too, or rather comparability of utility sector performance indicators. It was concluded that this task should be carried out in cooperation with the Regional Danube Water Programme, which, at that point started the process of selection of indicators. Of course, indicators can be compared for similar water utility companies according to the size of the utility, GDP per capita in local community or region, type of service, density of population, etc.

Collection of the water indicator values in BiH should commence, and the preliminary list has been prepared. They are divided through the categories they relate to, such as:

- ▷ Service coverage;
- ▷ Water consumption and production;
- ▷ Non-revenue water;
- ▷ Metering;
- ▷ Pipe network breakage /performance;
- ▷ Costs;
- ▷ Staffing;
- ▷ Quality of service;
- ▷ Billing and collections
- ▷ Financial performance; and
- ▷ Affordability of services.

The above categorisation is detailed enough for introducing the function of performance indicators, whereas this programme states two or more indicators for each of these groups. They are presented in the following text, and comments are given if adjustments to the BiH conditions are needed. For certain number of indicators comments are similar (e.g. relate to the method of recording revenues and costs), but they are anyway repeated in order to be complete, since it can happen that the reader of the study finds only some of the indicators important. Furthermore, additional performance indicators are offered in the areas where it was considered useful.

**IBNET Water Supply and Sanitation Blue Book** (referenced as [1] <sup>7</sup>), developed in 2014 by the Water and Sanitation Program of the World Bank (WSP) will be often cited as reference data source on the global values of the presented indicators. This publication summarises water sector development in the

---

7 [1] The IBNET Water Supply and Sanitation Blue Book 2014, The International Benchmarking Network for Water and Sanitation Utilities Databook, Alexander Danilenko, Caroline van den Berg, Berta Macheve, L. Joe Moffitt, © 2014 International Bank for Reconstruction and Development / The World Bank, ISBN (paper): 978-1-4648-0276-8, ISBN (electronic): 978-1-4648-0277-5, DOI: 10.1596/978-1-4648-0276-8

period 2006-2011 describing trends and monitoring effects of the recent crisis (fuel, food, financial crisis in this period). Presentation of values from this publication is a very important tool for determining short-term and long-term benchmark values for BiH utilities for the selected performance indicators, serving as a measuring tool for checking the improvements in efficiency of these companies.

It should be highlighted that the IBNET Blue Book gives an overview not only of average values in the sense of the arithmetic mean of the performance results, but also observes the median as the key value of the reported results, thereby the value with the equal number of higher and lower ones. These are always followed by a standard deviation, as a measure of dispersion of the performance results of this indicator. For selected indicators, the best-performing and worst-performing quartile of utilities are also observed, i.e. those 25% with the highest of the lowest results.

The objective of this Chapter is to show a general base for establishing a system for assessment of utility performance by well selected key indicators. The following is a presentation of individual indicators.

## Population coverage by service

### Population coverage by water supply service (%)

**Description:** This indicator relates to population in local community with access to water supply service, regardless of direct service connection in dwelling or within reach of a public water point, as a percentage of the total population under the utility's nominal responsibility.

**Unit of measure:** %

**Comment:** BiH regulations prescribed the local self-government's jurisdiction for water supply as well as wastewater disposal and treatment, and this jurisdiction is not limited only to a part of local community or population. Hence the provision "as a percentage of the total population under the utility's nominal responsibility" should be read as "as a percentage of the total population in local community".

The interpretation of the part "population in local community with access to water supply service, regardless of direct service connection in dwelling or within reach of a public water point" is also questionable, since it can be read in a way to include the rural area population who built their own village water supply systems, without systemically addressed water management or control.

The Consultant suggests for this indicator in BiH to be calculated as "population in local community with access to water from the public water supply system, as a percentage of the total population in local community".

IBNET Blue Book [1] published that, between 2000 and 2010, median water supply coverage expanded from 82% to 88%, despite the rapidly growing urban population. This can be primarily attributed to the Millennium Development Goals - MDGs, which were the major driver of growth in the sector in the past decade. Water coverage varied with average income level in the country – hence in 2009, median water coverage for households in low-income countries was 62%, 81% in lower middle-income countries (the group where BiH belongs to), 93% in upper middle-income countries, and virtually 100% in high-income countries. Due to the outbreak of financial crisis in 2008, median water coverage slipped from 92% in 2008 to 88% in 2010, as a result of the decline in water coverage in low- and middle-income countries.

In 2010, the best performing quartile of utilities had water coverage rate of 98% or more, while the worst performing quartile of utilities had water coverage rates of 69% or less.

**Table 3: Coverage of water supply services 2006–11 in % [1]**

Indicator	2000	2006	2007	2008	2009	2010	2011
Median water coverage	82	92	92	92	90	88	89
Average water coverage	77	84	83	83	81	81	80
Standard deviation	23	20	21	20	21	21	22
Number of utilities reporting	630	1,454	1,534	1,507	1,725	1,686	1,453

Values reported in the IBNET Blue Book for BiH are: 91% in 2005, 93% in 2006 and 2007, but they obviously relate to narrow urban areas as zones under the utilities' responsibility, rather than all population in the respective municipality.

Formula:  $\text{Number of population with access to water from the public water supply system} / \text{the total population in local community (expressed in \%)}$

### Population coverage by sewerage service (%)

Description: This indicator relates to population in local community with access to wastewater connection, as a percentage of the total population under the utility's nominal responsibility.

Unit of measure: %

Comment: BiH regulations prescribed the local self-government's jurisdiction for water supply as well as wastewater disposal and treatment, and this jurisdiction is not limited only to a part of local community or population. Hence the provision "as a percentage of the total population under the utility's nominal responsibility" should be read as "as a percentage of the total population in local community".

The Consultant suggests for this indicator in BiH to be calculated as "population in local community with access to sewerage connection from the public water supply and sewerage system, as a percentage of the total population in local community".

IBNET Blue Book [1] published that, 2000 and 2010, median wastewater coverage increased from 61% to 76%. The number of utilities that provide wastewater services significantly increased but, nevertheless, wastewater coverage significantly lags behind water coverage. Levels of wastewater coverage vary with average income in the country – hence in 2009, median wastewater coverage for households in low-income countries was only 14%, 48% in lower middle-income countries (the group where BiH belongs to), 77% in upper middle-income countries, and 89% in high-income countries). Most of the increase occurred in middle-income countries. In 2010, the best performing quartile of utilities had wastewater coverage rates of 91% or more, while the worst performing quartile of utilities had coverage rate of 45% or less.

**Table 4: Coverage of wastewater services 2006–11 in % [1]**

Indicator	2000	2006	2007	2008	2009	2010	2011
Median wastewater coverage	61	72	75	77	75	76	75
Average wastewater	58	65	68	69	67	66	68
Standard deviation	33	28	28	28	29	29	28
Number of utilities reporting	438	957	1,031	993	1,069	1,144	1,028

Values reported in the IBNET Blue Book for BiH are: 56% in 2005, 56% in 2006 and 55% 2007, but they obviously relate to narrow urban areas as zones under the utilities' responsibility, rather than all population in the respective municipality.

**Formula:** Number of population with access to sewerage connection from public water supply system / the total population in local community (expressed in %)

### Percentage of wastewater purified only by primary treatment (%)

**Description:** Percentage of collected wastewaters purified only by primary treatment, e.g. removal of suspended solids without biological treatment. This can include lagoons and mechanical treatment, when appropriate.

**Unit of measure:** %

**Comment:** Indicator is applicable in BiH in an equal way.

**Formula:** Load of wastewater purified only by primary treatment /total volume of wastewater (expressed in %)

### Percentage of wastewater purified by at least secondary treatment (%)

**Description:** Percentage of collected wastewaters purified at least by secondary treatment, e.g. removal of BOD and suspended solids, includes biological treatment. This can include lagoons and mechanical treatment, when appropriate.

**Unit of measure:** %

**Comment:** Indicator is applicable in BiH in an equal way.

**Formula:** Load of wastewater purified by at least secondary /total volume of wastewater (expressed in %)

## Production and consumption of water

### Water production ( l/person/day)

**Description:** It represents total volume of water supplied to the distribution system (included purchased water, if any) expressed by population served per day.

**Unit of measure:** litres per person per day

**Comment:** This indicator is applicable in BiH in a similar way, with a note that such an interpreted total annual water supplied to the distribution system relates to measuring after potential drinking water treatment, although, for the reason of ecological efficiency, it would be more logical to talk about bulk treatment supply, with inclusion of potentially purchased water from other water supply systems.

Values that the IBNET Blue Book stated for BiH are 464 litres per person per day in 2005, 423 litres/person/day in 2006 and 411 litres/person/day in 2007.

**Formula:** Total annual supplied water (including purchased water, expressed in litres) / number of population served / 365

### Water consumption ( l/person/day)

**Description:** It represents total annual water sold, expressed by population served, per person per day.

Unit of measure: litres per person per day

Comment: This indicator is applicable in BiH the same way. If all the existing meters in the water supply system are functional, this indicator can be precisely calculated; otherwise it is based on estimated consumption for persons or buildings lacking the working meter (and decreased volumes if mechanical meters have been in a function for a long time without calibration or replacement, so they consequently read decreased values).

It should be highlighted that such a defined indicator does not assume any volume of unbilled water, which, however, is the case in BiH practice.

IBNET Blue Book states that median water consumption in 2010 was 158 l/person/day, ranging from 114 l/person/day for worst performing quartile to 218 l/person/day for best performing quartile. Consumption in the reporting period increased from about 150 l/person/day in 2000 to 162 l/person/day in 2010, but the trend varied in different parts of the world. Consumption was increasing in the regions of East Asia, Latin America and the Middle East, while there was no increase in the countries of Eastern Europe and Central Asia, whereas consumption in African countries and South-East Asia decreased.

**Table 5: water consumption in the world l/person/day [1]**

Indicator	2000	2006	2007	2008	2009	2010	2011
Median water consumption	151	150	150	150	146	158	162
Average water consumption	181	171	172	172	168	180	182
Standard deviation	109	95	97	97	99	103	95
Number of utilities reporting	586	1,206	1,449	1,379	1,416	1,482	1,268
Highest performing quartile	112	110	110	110	107	114	119
Lowest performing quartile	216	206	205	204	203	218	221

Values that the IBNET Blue Book stated for BiH are 183 litres per person per day in 2005, 162 litres/person/day in 2006 and 164 litres/person/day in 2007.

Formula: Total annual volume of billed water (expressed in litres)/population served/ 365

### Residential water consumption ( l/person/day)

Description: It represents total water sold to households, expressed per person per day.

Unit of measure: litres per person per day

Comment: This indicator is applicable in BiH in the same way, since all water utilities have a separately defined category of “physical persons”, and data on total volume of water billed only to this category can be singled out, with the same note on water meters as for the previous indicator.

An indicator such as this one would make no sense for legal persons, since the industries are so diverse in terms of type and intensity, therefore water consumption values per legal person are not indicative for comparison.

Formula: Total annual volume of water billed to households (expressed in litres)/population served/ 365.

## Non-revenue water

This is one of the most important utility performance indicators. There are several types of indicators, depending on which unit of measure is presented – it is important to note that, although it is likely to assume that different indicators are highly correlated, this does not appear to be so, the same as the fact that utility with high performance in one indicator may have low performance in the other (as clearly stated in the IBNET Blue Book [1]). Reduction of non-revenue water is not only a technical (and financial) issue, but it is also closely related to weak network management. Indicators pointing to this are, for example, percentage of metering, average collection period, staff productivity, average revenues per m<sup>3</sup>, and operating cost coverage ratio, which can clearly be seen from the following table provided by the IBNET Blue Book:

**Table 6: Non-revenue water and managerial performance – average values [1]**

Level of NRW	Metering level (%)	Hours of supply per day	Collection period (days)	Staff per 1.000 connections	Aver. revenues US\$/m <sup>3</sup>	Operating cost coverage ratio
High	86%	22	107	1.13	0.53	1.06
Average	99%	22	76	1.00	0.68	1.14
Low	100%	22	70	1.04	0.86	1.14

Along with three types of indicators proposed by the Danube Programme, we hereby propose the additional ones.

### Non-revenue water (%)

**Description:** Represents a difference between water supplied in the system (accounted for and purchased) and sold in the period of one year, expressed as a percentage of total volume of water supplied in the system in the same period.

**Unit of measure:** %

**Comment:** This indicator is applicable in BiH in the same way, and it is as such that it is most frequently calculated or estimated (since the volume of water supplied in the system is often unknown so it has to be estimated, mainly on the basis of rated power and the pumping period).

IBNET Blue Book [1] published that median non-revenue water declined from 31% in 2000 to 27% in 2011, while the standard deviation slightly increased (indicating to higher range of performance values). The highest performance is observed in low-income countries, while the lowest performance is observed in high-income countries).

**Table 7: Non-revenue water in % [1]**

Indicator	2000	2006	2007	2008	2009	2010	2011
Median non-revenue water	31	26	31	29	29	28	27
Average non-revenue water	32	33	32	31	31	31	30
Standard deviation	17	16	17	17	17	17	17
Number of utilities reporting	589	1,242	1,448	1,349	1,403	1,488	1,253

Values that the IBNET Blue Book stated for BiH are 61% in 2005, 62% in 2006 and 60% in 2007.

**Formula:** A difference between water supplied in the system (accounted for and purchased) and

sold / total volume of water supplied in the system (expressed in %).

### Non-revenue water (m<sup>3</sup> per kilometre per day)

**Description:** It represents a difference between water supplied in the system (accounted for and purchased) and sold, expressed per kilometre of water distribution network per day.

**Unit of measure:** m<sup>3</sup>/km/day

**Comment:** This indicator is applicable in BiH in the same way.

IBNET Blue Book [1] published that median non-revenue water measured by this indicator decreased from 26 m<sup>3</sup>/km/day in 2000 to 17 m<sup>3</sup>/km/day in 2010. In 2010, the best-performing quartile of utilities had a median non-revenue water of 6 m<sup>3</sup>/km/day or less, while the worst performing quartile of utilities had median indicator of 36 m<sup>3</sup>/km/day or higher.

**Table 8: Non-revenue water in m<sup>3</sup>/km/day [1]**

Indicator	2000	2006	2007	2008	2009	2010	2011
Median non-revenue water	26	20	21	18	19	15	17
Average non-revenue water	41	34	32	29	30	27	28
Standard deviation	46	38	35	33	35	33	33
Number of utilities reporting	590	1,196	1,429	1,287	1,328	1,409	1,251
Highest-performing quartile	18	9	8	7	7	6	7
Lowest-performing quartile	68	45	44	40	41	36	37

Values that the IBNET Blue Book stated for BiH are 77 m<sup>3</sup>/km/day in 2005, 63 m<sup>3</sup>/km/day in 2006 and 60 m<sup>3</sup>/km/day in 2007.

**Formula:** A difference between water supplied in the system (accounted for and purchased) and sold in one year (m<sup>3</sup>), total length of water distribution network (km) /365.

### Non-revenue water (m<sup>3</sup> per connection per day)

**Description:** It represents a difference between water supplied in the system (accounted for and purchased) and sold, expressed per connection to water distribution network per day.

**Unit of measure:** m<sup>3</sup>/connection/day

**Comment:** This indicator is applicable in BiH in the same way. The number of connections can be calculated as average number in one year (e.g. average number of connections at the beginning or the end of each month in a year), if the network was extended during the year.

**Formula:** A difference between water supplied in the system (accounted for and purchased) and sold in one year (m<sup>3</sup>) / total number of connections to water distribution network / 365.

### Additional indicator – Real losses (%)

**Description:** It represents network leakages, expressed as a percentage of the total volume of water supplied in the system in the same period.

**Unit of measure:** %

**Comment:** Total annual value of leakages (physical losses) in the network is calculated during assess-

ment of water balance.

**Formula:** Total annual volume of water representing physical losses in the network (m<sup>3</sup>) / total annual volume of water supplied in the system.

#### Additional indicator – Real losses (m<sup>3</sup> per connection per day)

**Description:** It represents network leakages, expressed per connection to water distribution network per day.

**Unit of measure:** m<sup>3</sup>/connection/day

**Comment:** Total annual value of leakages (physical losses) in the network is calculated during assessment of water balance.

**Formula:** Total annual volume of water representing physical losses in the network (m<sup>3</sup>) / total number of connections to the network / 365

#### Additional indicator – Apparent losses (%)

**Description:** It represents losses due to water theft, metering inaccuracies and misread meters, etc., expressed as percentage of the total volume of water supplied in the system in the same period.

**Unit of measure:** %

**Comment:** Total annual value of apparent (administrative) losses is calculated during water balance assessment.

**Formula:** Total annual volume of apparent network losses (m<sup>3</sup>) / total annual volume of water supplied in the system.

#### Additional indicator – Apparent losses (m<sup>3</sup> per connection per day)

**Description:** It represents apparent losses in the network due to water theft, metering inaccuracies and misread meters, etc., expressed per connection to mains per day.

**Unit of measure:** m<sup>3</sup>/connection/day

**Comment:** Total annual value of apparent losses in the distribution network is calculated during water balance assessment.

**Formula:** Total annual value of apparent losses in the network (m<sup>3</sup>) / total number of connections to the distribution network / 365.

#### Additional indicator – Unavoidable Annual Real losses (UARL)

**Description:** This indicator was identified by the IWA (International Water Association) and the AWWA (American Water Works Association), as Unavoidable Annual Real Losses. It represents a reference value of the lowest possible leakage in the pipes (when using up-to-date technologies for reduction of losses).

**Unit of measure:** l/service connection/day

**Comment:** This indicator, in fact, serves the function of the next indicator, ILI, which requires the value of unavoidable and current annual real losses in order to be calculated.

**Formula:**  $UARL = (18 \times L_m + 0,8 \times N_c + 25 \times L_p) \times P$

where:

Lm: network pipe length (km),

Nc: total number of connections to the network,

Lp: total length of connection pipes through private estates,

P: average value of pressure in the system (m).

### Additional indicator – Current Annual Real Losses (CARL)

**Description:** This indicator was also defined by the IWA (International Water Association) and the AWWA (American Water Works Association), as the Current Annual Real Losses. It represents real value of leakages in the pipes, i.e. volume of water lost due to leakages caused by all types of system failures, including, for example storage tanks overflows.

**Unit of measure:** l/connection/day

**Comment:** Total annual real losses in the network are calculated during water balance assessment.

This indicator, in fact, serves the function of the next indicator, ILI, which requires the value of current annual real losses in order to be calculated.

**Formula:** It is calculated during water balance assessment, based on measured mains leakages including the night flow measuring, when the highest percentage of water “consumption” is made up by leakages. One can say it is calculated as

$$\text{Total annual network leakages/number of connections} / 365.$$

### Additional indicator – Infrastructure Leakage Index (ILI)

**Description:** This is a key indicator defined by the IWA (International Water Association) and the AWWA (American Water Works Association), as the Infrastructure Leakage Index. It represents ratio between current annual real losses and unavoidable annual real losses, i.e. it describes as how many times is the water leakage in the system higher than the minimum expected amount of leakage.

**Unit of measure:** non-dimensional indicator

**Comment:** This is currently the most important indicator for measuring losses in the network, but its calculation requires sufficient technical knowledge of the water utility staff on the water balance assessment, as well as for carrying out the required measurements. Hence, it has to be highlighted that, without such knowledge, it is unrealistic to expect reduction of losses. This is why this indicator has to be introduced in practice of BiH water utilities, quite accustomed to express losses (non-revenue water) only in percentages.

Value of ILI indicator determines one of the 4 defined classes of water utility performance, with the recognised need for different classification for developing and developed countries (class values for developing countries are double). This classification is presented in the following table:

CLASSIFICATION – PERFORMANCE CATEGORIES:		ILI	Litres/connection/day				
			Average pressure in the network:				
			10m	20m	30m	40m	50m
DEVELOPED COUNTRIES	A	1 - 4		<50	<75	<100	<125
	B	4 - 8		50-100	75-150	100-200	125-250
	C	8 -16		100-200	150-300	200-400	250-500
	D	>16		>200	>300	>400	>5000
DEVELOPING COUNTRIES	A	1 - 4	<50	<100	<150	<200	<250
	B	4 - 8	50-100	100-200	150-300	200-400	250-500
	C	8 -16	100-200	200-400	300-600	400-800	500-1000
	D	>16	>200	>400	>600	>800	>1000

Formula:  $ILI = CARL / UARL$

## Metering

### Percentage of metering of consumers (%)

Description: It represents ratio of the number of connections with the operating meter and the total number of connections, hence, it measures the percentage of metered consumers.

Unit of measure: %

Comment: This indicator is applicable in BiH in the same way, adding that it would be preferable to separate the regularly read meters which have not been calibrated or replaced for at least 10 years (thus, their reading is unreliable) and calculate this indicator without them.

Formula: Number of connections with operating meter/total number of connections (expressed in %)

### Percentage of metering consumption (%)

Description: It represents ratio of metered and billed water and the total volume of billed water, therefore it measures the metered percentage of the total water consumption.

Unit of measure: %

Comment: This indicator is applicable in BiH in the same way, with the same comment as for the previous indicator on regularly read meters which have not been calibrated or replaced for at least 10 years. It can refer to values from any (same) period, but, in principle, it implies annual values.

Values that the IBNET Blue Book stated for BiH are 99% in 2005, 98% in 2006 and 99% in 2007.

Formula: Volume of metered and billed water / total volume of billed water (expressed in %)

## Pipe breaks

### Pipe leakages (leaks/km)

Description: It represents the number of pipe ruptures and leakages during one year, expressed per kilometre of mains.

Unit of measure: leakage/km/year

Comment: This indicator is applicable in BiH in the same way.

Formula: Number of failures (leaks) per year / total length of water supply mains (km).

### Sewer system blockages (blockages/km)

Description: It represents number of pipe blockages per one year, expressed per kilometre of mains.

Unit of measure: blockages/km/year

Comment: This indicator is applicable in BiH in the same way.

Formula: Number of pipe blockages per year / total length of water supply mains (km).

## Costs

With regard to costs, the Danube Water Programme provides several performance indicators – some of them have the same name but they are differently calculated – they are:

### Unit operational cost for water and wastewater (KM/m<sup>3</sup>, relative to water sold)

Description: It represents ratio of total annual water and wastewater operating expenses and total annual volume sold.

Unit of measure: KM/m<sup>3</sup> (or MU/m<sup>3</sup>, where MU is any monetary unit, such as EUR or US\$)

Comment: This indicator is applicable in BiH in the same way, with the condition of recording all the costs through cost centres and unbundled to utility functions/services, so as to clearly identify the respective costs.

It should, however, be highlighted that recording the highest level costs (company level) is quite often in BiH practice, as well as lack of indirect cost distribution to cost centres which can be clearly associated with the services the utility provides, so, consequently, this condition is rarely fully met.

IBNET Blue Book [1] published that median unit operational costs increased rapidly in the previous period, from 0.28 US\$/m<sup>3</sup> in 2000 to 0.75 US\$/m<sup>3</sup> in 2010. High standard variation indicates to wide ranges of performance results. There are noticeable differences when observing countries by income categories – for the low-income countries this performance indicator in 2010 was 0.68 US\$/m<sup>3</sup>, for lower-middle income countries it was 0.73 US\$/m<sup>3</sup>, for upper-middle income countries it was 0.70 US\$/m<sup>3</sup>, while for high-income countries it was 1.69 US\$/m<sup>3</sup>.

Although it could be generally said that lower costs indicate to more efficiency, this does not have to be the case, either for technical reasons (gravity-fed or non-gravity flow systems, existence or lack of wastewater treatments), or for financial management, since inevitable costs are often postponed (e.g. investment or maintenance), while part of costs can be subsidised by public administration.

In 2010, the performance of the “most expensive” water utility quartile was 1.16 US\$/m<sup>3</sup>, while the performance of the lowest cost water utility was 0.44 US\$/m<sup>3</sup>. In low-income countries, for the most “expensive” quartile this cost was 0.72 US\$/m<sup>3</sup>, while the cost for the least expensive ones was only 0.12 US\$/m<sup>3</sup>. In lower middle-income countries, these values were \$1.20 US\$/m<sup>3</sup> and 0.16 US\$/m<sup>3</sup> respectively, in upper middle-income countries this difference is lower and reached 1.02 US\$/m<sup>3</sup> and 0.43 US\$/m<sup>3</sup> respectively, while the values in high-income countries were 2.22 US\$/m<sup>3</sup> and 1.18 US\$/m<sup>3</sup> respective-

ly. Differences get smaller because water utilities in high-income countries also provide services of wastewater treatment.

**Table 9: Operational and maintenance costs per m<sup>3</sup> of water sold [1]**

Indicator	2000	2006	2007	2008	2009	2010	2011
Median O&M costs	0.28	0.50	0.58	0.60	0.62	0.75	0.70
Average O&M costs	0.36	0.65	0.75	0.80	0.79	0.88	0.82
Standard deviation	0.29	0.53	0.58	0.65	0.62	0.61	0.57
Number of utilities reporting	544	1,264	1,468	1,381	1,415	1,565	1,304
Highest performing quartile	0.14	0.28	0.32	0.33	0.34	0.44	0.40
Lowest performing quartile	0.87	0.87	0.99	1.03	1.05	1.16	1.12

Values that the IBNET Blue Book stated for BiH are 0.60 US\$/m<sup>3</sup> in 2005, 0.80 US\$/m<sup>3</sup> in 2006 and 0.84 US\$/m<sup>3</sup> in 2007.

Formula: Total annual water supply and wastewater operational costs (KM) / total annual volume sold (m<sup>3</sup>)

#### Unit operational cost for water and wastewater (KM/m<sup>3</sup>, relative to intake)

Description: It represents ratio of water and wastewater operating costs and total volume of water intake (i.e. water entering the system, including, for example purchased water too).

Unit of measure: KM/m<sup>3</sup> (or MU/m<sup>3</sup>, where MU is any monetary unit, such as EUR or US\$)

Comment: This indicator is applicable in BiH in the same way, with the condition of recording all the costs through cost centres and unbundled to utility functions/services, so as to clearly identify the respective costs.

It should, however, be highlighted that recording the highest level costs (company level) is quite often in BiH practice, as well as lack of indirect cost distribution to cost centres which can be clearly associated with the services the utility provides, so, consequently, this condition is rarely fully met.

Formula: Total annual water supply and wastewater operational costs (KM) / total annual intake volume (m<sup>3</sup>)

#### Unit operational costs only for water (KM/m<sup>3</sup>, relative to water sold)

Description: It represents ratio of operating costs for water supply only and total volume of water sold.

Unit of measure: KM/m<sup>3</sup> (or MU/m<sup>3</sup>, where MU is any monetary unit, such as EUR or US\$)

Comment: This indicator is applicable in BiH in the same way, with the condition of recording all the costs through cost centres and unbundled to utility functions/services, so as to clearly identify the respective costs.

It should, however, be highlighted that recording the highest level costs (company level) is quite often in BiH practice, as well as lack of indirect cost distribution to cost centres which can be clearly associated with the services the utility provides, so, consequently, this condition is rarely fully met.

Formula: Total annual operating costs for water supply only (KM) / total annual volume of water sold (m<sup>3</sup>)

### Unit operational costs only for wastewater (KM/person, relative to the number of users)

Description: It represents ratio of operating costs only for wastewater and the number of population served.

Unit of measure: KM/person

Comment: This indicator is applicable in BiH in the same way, with the condition of recording all the costs through cost centres and unbundled to utility functions/services, so as to clearly identify the respective costs.

It should, however, be highlighted that recording the highest level costs (company level) is quite often in BiH practice, as well as lack of indirect cost distribution to cost centres which can be clearly associated with the services the utility provides, so, consequently, this condition is rarely fully met.

Formula:  $\text{Total annual operating costs only for wastewater (KM)} / \text{total number of population served.}$

### Share of labour costs in operational costs (%)

Description: It represents percentage of labour costs in total operating costs, as staff is one component of these costs.

Unit of measure: %

Comment: This indicator is applicable in BiH in the same way, with the condition of recording all the costs through cost centres and unbundled to utility functions/services, so as to clearly identify the respective costs.

It should, however, be highlighted that recording the highest level costs (company level) is quite often in BiH practice, as well as lack of indirect cost distribution to cost centres which can be clearly associated with the services the utility provides, so, consequently, this condition is rarely fully met.

An additional comment is that it is not clear whether the Danube Programme, in case of this indicator, proposes considering the costs of all staff, or only those who actually work in water supply service or only staff employed in sewerage service (and of course, the respective costs), so it follows that three separate indicators can be calculated in this respect.

In this case, it will be considered that this indicator pertains to both water supply and sewerage services, and that indirect costs related to all services provided by the utility company were previously disaggregated on respective individual services by the internal decision, as well as that the share of water supply and the share of sewerage services is known.

IBNET Blue Book stated that share of labour costs in total operational and labour costs increased from 36% in 2006 to 41% in 2010.

The combined share of energy and labour costs increased from 55% in 2006 to 62% in 2010, which likely crowded out other expenditures. When a crisis hits, the first casualty is spending on maintenance, which is often accompanied by a decline in the quality of services provided.

Formula:  $\text{Total annual water and wastewater labour costs (KM)} / \text{total annual operating costs (KM)}$

### Share of electricity costs in operational costs (%)

**Description:** It represents percentage of electricity costs in total operational costs, as a component of these costs.

**Unit of measure:** %

**Comment:** This indicator is applicable in BiH in the same way, with the condition of recording all the costs through cost centres and unbundled to utility functions/services, so as to clearly identify the respective costs.

It should, however, be highlighted that recording the highest level costs (company level) is quite often in BiH practice, as well as lack of indirect cost distribution to cost centres which can be clearly associated with the services the utility provides, so, consequently, this condition is rarely fully met.

In this concrete case, these are primarily electricity costs for the purpose of water pumping or wastewater treatment.

IBNET Blue Book states that the share of electricity costs in the total operating and maintenance costs increased from 19% in 2000 to 21% in 2010. There are large variations between utilities for this indicator, from 13% in the lowest-performing utilities to 34% in the highest-performing ones. In 2010, electricity made up 36% of operating and maintenance costs in low-income countries, compared to 22% in middle-income countries and 11% in high-income countries.

Values that the IBNET Blue Book states for BiH are 13% in 2005, 13% in 2006 and 119% in 2007, where this third figure is obviously a misprint and should be either 11% or 19%.

**Formula:**  $\frac{\text{Total annual costs of electricity used for water supply and wastewater treatment (KM)}}{\text{total annual operational costs (KM)}}$

### Share of outsourcing service costs in operational costs (%)

**Description:** It represents percentage of costs of all individual outsourcing service contracts with private sector in total operational costs, as a component of these costs.

**Unit of measure:** %

**Comment:** This indicator is applicable in BiH in the same way, with the condition of recording all the costs through cost centres and unbundled to utility functions/services, so as to clearly identify the respective costs.

It should, however, be highlighted that recording the highest level costs (company level) is quite often in BiH practice, as well as lack of indirect cost distribution to cost centres which can be clearly associated with the services the utility provides, so, consequently, this condition is rarely fully met.

In this concrete case, these are the costs arising from contracts for outsourcing services provided by third parties (private sector).

**Formula:**  $\frac{\text{Total annual costs of outsourcing service contracts with private sector (KM)}}{\text{total annual operational costs (KM)}}$

## Staff productivity

### Number of staff per 1,000 connections (#<sup>8</sup> / '000 , water and wastewater)

**Description:** It represents total number of staff engaged in water and wastewater services expressed as per number of connections to the network.

**Unit of measure:** # (number of staff) / '000 connections

**Comment:** This indicator is applicable in BiH in the same way, with the condition of well structured organisation structure and clear identification of the number of staff positions related to provision of water and wastewater services. This also implies allocation of staff from common services so as to denote the percentage of their work devoted to each specific utility service (e.g. manager works 50% for water supply, 15% for wastewater, and 35% for waste management service).

Furthermore, the Danube Programme did not specify whether the number of connections refers to water supply connections or, perhaps, some statistical mean of the respective number of water supply and sewerage connections. It will be taken here that this number concerns water supply connections.

IBNET Blue Book [1] states that staff productivity improved from 9 employees per 1,000 connections in 2000 to 7 employees in u 2010. Yet, staff productivity varies widely from about 11 employees per 1,000 connections in low-income countries to slightly more than 3 in upper middle-income countries. It should be highlighted that this variance in staff productivity is partially linked to differences in connection practices ( if water connections are shared among multiple households, such is the case in residential buildings in BiH; such an environment is globally often correlated with very low staff productivity). Thus, for instance, in Latin America, where most households have individual water connections, staff productivity is 3 employees per 1,000 connections, while, by contrast, in Eastern Europe and Central Asia, (many apartment buildings are still fitted in a single connection) staff productivity is around 9 staff per 1,000 connections.

**Formula:** Number of staff engaged in water and wastewater services (#) / total number of water connections (in thousands)

### Number of staff per 1,000 connections (# / '000 , only water supply)

**Description:** It represents ratio of total number of staff engaged only in water services and total number of network connections.

**Unit of measure:** # (number of staff) / '000 connections

**Comment:** This indicator is applicable in BiH in the same way, with the condition of well structured organisation structure and clear identification of the number of staff positions related to provision of water services only. This also implies allocation of staff from common services so as to denote the percentage of their work devoted to each specific utility service (e.g. manager works 50% for water supply, 15% for wastewater, and 35% for waste management service), or percentage devoted only for water supply in case of staff engaged in both water and wastewater services.

**Formula:** Number of staff engaged only in water services (#) / total number of water network connections (in thousands).

---

<sup>8</sup> "#" denotes a numerical value, number

### Number of staff per 1,000 connections (# /'000 , only wastewater)

**Description:** It represents total number of staff engaged in wastewater services expressed as per number of connections to the network.

**Unit of measure:** # (number of staff) /'000 connections

**Comment:** This indicator is applicable in BiH in the same way, with the condition of well structured organisation structure and clear identification of the number of staff positions related to provision of wastewater (sewerage) services only. This also implies allocation of staff from common services so as to denote the percentage of their work devoted to each specific utility service (e.g. manager works 50% for water supply, 15% for wastewater, and 35% for waste management service), or percentage devoted only for wastewater in case of staff engaged in both water and wastewater services.

**Formula:** Number of staff engaged only in wastewater services (#) / total number of wastewater connections (in thousands).

### Additional indicator – Number of staff per 1,000 people served (# /'000 ,water and wastewater)

**Description:** It represents total number of staff engaged in water supply and wastewater services, expressed as per people served with at least one of these services.

**Unit of measure:** # (number of staff) /'000 population

**Comment:** This indicator is applicable in BiH in the same way, with the condition of well structured organisation structure and clear identification of the number of staff positions related to provision of water and wastewater services. This also implies allocation of staff from common services so as to denote the percentage of their work devoted to each specific utility service (e.g. manager works 50% for water supply, 15% for wastewater, and 35% for waste management service).

IBNET Blue Book [1] states that in 2010, the best-performing quartile of utilities had median staff productivity of 0.62 or less staff per 1,000 people served, while the worst-performing quartile had median staff productivity of 1.57 or more. The following table shows that the gap between the best and worst-performing quartile gradually decreased, which can be the result of outsourcing staff functions, as well as the fact that the increasing number of utilities from middle-income countries submit their reports.

**Table 10: Staff number per 1,000 people served (staff productivity) [1]**

Indicator	2000	2006	2007	2008	2009	2010	2011
Median staff number per 1,000 served	1.36	1.06	1.21	1.00	1.00	0.99	1.00
Average staff per 1,000 served	2.02	1.37	1.51	1.28	1.26	1.29	1.29
Standard deviation	1.77	1.09	1.22	1.04	0.98	1.03	1.01
Number of utilities reporting	598	1,421	888	1,440	1,679	1,803	1,574
Highest performing quartile	0.78	0.67	0.69	0.63	0.65	0.62	0.64
Lowest performing quartile	2.68	1.66	1.87	1.54	1.50	1.57	1.60

Values that the IBNET Blue Book states for BiH are 1.40 staff per 1,000 people served in 2005, 1.30 staff per 1,000 people served in 2006 and 1.30 staff per 1,000 people served in 2007.

**Formula:** Total number of staff engaged in provision of water supply and wastewater services (#) / total population served with at least one of these services (in thousands).

## Quality of service

### Continuity of service (hours / day)

Description: It represents average hours per day of provided water supply service.

Unit of measure: hours / day

Comment: This indicator is applicable in BiH in the same way.

Values that the IBNET Blue Book states for BiH are 23.20 hours in 2005, 23.30 hours in 2006 and 24.00 hours in 2007.

Formula:  $\text{Average hours of water supply service in a year (total annual number of water supply service hours) / 8760 (total number of hours in a year)}$

### Quality of water supplied – number of tests for residual chlorine (%)

Description: It represents the number of tests carried out for residual chlorine as a percentage of the number of tests required by the applicable standard (thereby it may not exceed 100%). Operational samples that were not taken to check compliance with the standard are excluded.

Unit of measure: %

Comment: This indicator is applicable in BiH in the same way.

Formula:  $\text{Number of tests carried out for residual chlorine / number of tests required by the applicable standard.}$

### Quality of water supplied – samples passing on residual chlorine (%)

Description: It represents the number of samples tested for residual chlorine that pass the relevant standard as a percentage of total number of carried out tests.

Unit of measure: %

Comment: This indicator is applicable in BiH in the same way.

Formula:  $\text{Number of tests carried out for residual chlorine that passed the relevant standard / total number of tests carried out.}$

## Billings and Collections

### Average revenue per m<sup>3</sup> (KM/m<sup>3</sup>)

Description: It represents total annual operating revenues from water and wastewater expressed by total amount of water sold (as a proxy for the tariffs).

Unit of measure: KM/m<sup>3</sup>

Comment: This indicator is applicable in BiH in the same way, with the condition of recording all the revenues through cost centres and unbundled to utility functions/services, so as to clearly identify the respective revenues.

It should, however, be highlighted that recording the highest level revenues (company level) is quite often in BiH practice, since consumers' payments are not linked to the con-

crete account or the type of service, instead the payment only reduces total debit based on all used services), so, consequently, this condition is rarely fully met.

IBNET Blue Book states that median revenues increased from 0.34 US\$/m<sup>3</sup> in 2000 to 0.81 US\$/m<sup>3</sup> in 2010. The increase in operating and maintenance costs was accompanied by a simultaneous increase in revenues that utilities tried to cover the costs with. This was especially pronounced in low-income countries, where median revenues grew from 0.25 US\$/m<sup>3</sup> in 2000 to 0.56 US\$/m<sup>3</sup> in 2010. In middle-income countries, median revenues increased from 0.51 US\$/m<sup>3</sup> in 2000 to 0.77 US\$/m<sup>3</sup> in 2010, while in high-income countries, the same indicator stood at 2.42 US\$/m<sup>3</sup> in 2010.

The following table shows the difference between the highest and lowest-performing quartile of utilities by years. In high-income countries, the lowest quartile of utilities registered median revenues of 1.80 US\$/m<sup>3</sup>, compared to 3.03 US\$/m<sup>3</sup> for the highest quartile. In upper middle-income countries, median revenues for the lowest-performing quartile of utilities were 0.45 US\$/m<sup>3</sup>, and 1.22 US\$/m<sup>3</sup> for the highest quartile of utilities. In lower middle-income countries and low-income countries, median revenues show much more diversity, from 0.23 US\$/m<sup>3</sup> to 0.87 US\$/m<sup>3</sup> in lower middle-income countries in 2010, i.e. from 0.13 US\$/m<sup>3</sup> to 0.80 US\$/m<sup>3</sup> in low-income countries.

**Table 11: Average revenues per m<sup>3</sup> of water sold in US\$ [1]**

Indicator	2000	2006	2007	2008	2009	2010	2011
Median average revenues	0.34	0.54	0.66	0.69	0.70	0.81	0.72
Mean average revenues	0.40	0.74	0.87	0.95	0.94	1.00	0.91
Standard deviation	0.30	0.64	0.74	0.88	0.82	0.81	0.75
Number of utilities reporting	572	1,290	1,498	1,400	1,480	1,567	1,299
Highest performing quartile	0.56	0.97	1.15	1.19	1.23	1.34	1.23
Lowest performing quartile	0.17	0.29	0.33	0.34	0.36	0.41	0.35

Values that the IBNET Blue Book states for BiH are 0.71 US\$/m<sup>3</sup> in 2005, 0.77 US\$/m<sup>3</sup> in 2006 and 0.82 US\$/m<sup>3</sup> in 2007.

Formula:  $\text{Total annual water supply and wastewater revenues (KM)} / \text{total volume of water sold (m}^3\text{)}$

### Average annual revenue per connection (KM/connection)

Description: It represents total annual water and wastewater revenues as per total number of connections in the system.

Unit of measures: KM/per connection per year

Comment: This indicator is applicable in BiH in the same way, with the condition of recording all the revenues through cost centres and unbundled to utility functions/services, so as to clearly identify the respective revenues.

It should, however, be highlighted that recording the highest level revenues (company level) is quite often in BiH practice, since consumers' payments are not linked to the concrete account or the type of service, instead the payment only reduces total debit based on all used services), so, consequently, this condition is rarely fully met.

Furthermore, the Danube Programme did not specify whether the number of connections refers to water supply connections or, perhaps, some statistical mean of the respective number of water supply and sewerage connections. It will be taken here that this number concerns water supply connections.

Formula:  $\text{Total annual water supply and wastewater revenues (KM)} / \text{total number of water connections (\#)}$ .

### Average revenue per m<sup>3</sup>, water only (KM/m<sup>3</sup>)

Description: It represents ratio of total annual water supply revenues and total volume of water sold.

Unit of measure: KM/m<sup>3</sup>

Comment: This indicator is applicable in BiH in the same way, with the condition of recording all the revenues through cost centres and unbundled to utility functions/services, so as to clearly identify the respective revenues.

It should, however, be highlighted that recording the highest level revenues (company level) is quite often in BiH practice, since consumers' payments are not linked to the concrete account or the type of service, instead the payment only reduces total debit based on all used services), so, consequently, this condition is rarely fully met.

Formula:  $\text{Total annual water supply revenues (KM)} / \text{total volume of water sold (m}^3\text{)}$

### Average revenue per user of wastewater service (KM/person)

Description: It represents ratio of total annual wastewater revenues and the number of customers served.

Unit of measure: KM/person

Comment: This indicator is applicable in BiH in the same way, with the condition of recording all the revenues through cost centres and unbundled to utility functions/services, so as to clearly identify the respective revenues.

It should, however, be highlighted that recording the highest level revenues (company level) is quite often in BiH practice, since consumers' payments are not linked to the concrete account or the type of service, instead the payment only reduces total debit based on all used services), so, consequently, this condition is rarely fully met.

Formula:  $\text{Total annual wastewater revenues (KM)} / \text{number of customers served (\#)}$ .

### Average collection period (days)

Description: It represents the number of days required to collect the billed revenues.

Unit of measure: days

Comment: This indicator is applicable in BiH in the same way, with the condition of recording all the revenues through cost centres and unbundled to utility functions/services, so as to clearly identify the respective revenues.

It should, however, be highlighted that recording the highest level revenues (company level) is quite often in BiH practice, since consumers' payments are not linked to the concrete account or the type of service, instead the payment only reduces total debit based on all used services), so, consequently, this condition is rarely fully met.

Average collection period can be calculated separately for each type of service if the records are kept as described above, or together for several or all services that the utility provides (e.g. together for water supply and wastewater).

IBNET Blue Book states that the median collection period decreased from 154 days in

2000 to 70 days in 2010, which is a rapid improvement. Yet, the following table shows a large difference between median and average values that reflect the wide variations in the efficiency of collection between the utilities reporting.

**Table 12: Average collection period, in days [1]**

Indicator	2000	2006	2007	2008	2009	2010	2011
Median collection period	154	96	87	82	76	70	66
Average collection period	233	157	142	139	125	116	121
Standard deviation	239	181	158	175	154	153	160
Number of utilities reporting	474	1,179	1,244	1,174	1,237	1,155	975

Values that the IBNET Blue Book states for BiH are 227 days in 2005, 246 days in 2006 and 334 days in 2007.

Formula:  $365 * \text{total year-end accounts receivable (KM)} / \text{total annual wastewater revenues (KM)}$

### Collection ratio (%)

Description: It represents ratio of collected and issued bills in the same period.

Unit of measure: %

Comment: This indicator is applicable in BiH in the same way, with the condition of recording all the revenues through cost centres and unbundled to utility functions/services, so as to clearly identify the respective revenues.

It should, however, be highlighted that recording the highest level revenues (company level) is quite often in BiH practice, since consumers' payments are not linked to the concrete account or the type of service, instead the payment only reduces total debit based on all used services), so, consequently, this condition is rarely fully met.

This indicator can be calculated separately for each type of service if the records are kept as described above, or together for several or all services that the utility provides (e.g. together for water supply and wastewater), or it can be calculated for any period instead of one year.

Values that the IBNET Blue Book states for BiH are 79% in 2005, 83% in 2006 and 159% in 2007. The third piece of data seems incoherent – it is not likely to be real given the above way of payment recording – therefore, this figure should be taken with reserve.

Formula:  $\text{Total revenue collection in the observed period (KM)} / \text{total billed in the observed period (KM)}$

### Additional indicator – internal cross-subsidising between categories of customers (#)

Description: It represents ratio of the tariff for legal persons (industrial consumers) and the residential (household) tariff.

Unit of measure: #

Comment: This indicator is certainly applicable in BiH, given the quite usual situation that the water tariff for legal persons is significantly higher than the tariff for physical persons, although managers of these utilities have no clear rationale for the reasons of such differences and refer to long-time practice.

IBNET Blue Book states that it is not uncommon in practice that certain categories of con-

sumers (mostly commercial and industrial users) subsidise residential consumers. Only a small number of utilities provided this type of data; yet, it can be seen in the following table that, in 2010, the median utility charged industrial users up to 1.98 times more per m<sup>3</sup> of water than they charged residential users. The large standard deviation shows that utilities display very wide variations in these values. About 5% of low-performing utilities registered cross-subsidies, with industrial users paying at least 15 times more than residential users, which suggests that, when faced with the need for higher revenues, utilities tried to reduce the impact on residential customers by putting more of the burden on industrial water users.

There is also a direct relationship between the level of cross-subsidies and the proportion of industrial water consumption. In the level of this indicator is limited to less than 1, then industrial water consumption makes up 30% of the total water consumption. If the level is between 1 and 2, then industrial water consumption drops to 26%, whereas at a level of more than 2, it drops to less than 14% of the total consumption.

**Table 13: Cross-subsidising [1]**

Indicator	s	2006	2007	2008	2009	2010	2011
Median cross-subsidy rate	2.40	1.89	1.69	1.99	1.99	1.98	1.96
Average cross-subsidy rate		4.22	3.24	3.98	4.02	4.21	3.80
Standard deviation	9.73	6.04	4.37	5.39	5.63	5.54	5.24
Number of utilities reporting	303	553	691	574	589	464	371

Values that the IBNET Blue Book states for BiH are 2.79 in 2005, 2.94 in 2006 and 2.73 in 2007.

Formula:  $\text{Water tariff for industrial users (legal persons)(KM/m}^3\text{)} / \text{Water tariff for residential users (physical persons) (KM/m}^3\text{)}$ .

## Financial performance

### Operating costs coverage ratio (%)

Description: It represents ratio of annual operating revenues and annual operating costs.

Unit of measure: ratio (or %)

Comment: This indicator is applicable in BiH in the same way, with the condition of recording all the revenues and costs through cost centres and unbundled to utility functions/services, so as to clearly identify the respective revenues.

It should, however, be highlighted that recording the highest level revenues and costs (company level) is quite often in BiH practice, so, consequently, this condition is rarely fully met.

This indicator can be calculated separately for each type of service if the records are kept as described above, or together for several or all services that the utility provides (e.g. together for water supply and wastewater). The Danube Programme proposes to present it as a non-dimensional ratio (coefficient), but it can also be presented as a percentage.

IBNET Blue Book states that the median operating costs coverage ratio remained more or less constant in the period 2006-2010, at a level of 1.09. It can be seen that operating and maintenance costs (O&M) were barely covered, and that there was no capacity to replace the assets once they wear out, let alone expand services. In 2010, the high-performing utilities had a median value of 1.40 or more, compared to the low-performing

quartile with the median value of 0.86 or less. Between 2006 and 2011, utilities in low-income countries registered a median operating cost coverage ratio of 1.09, compared to 0.99 in lower middle-income countries, 1.12 in upper middle-income countries, and 1.42 in high-income countries. However, while the value of 1.4 means that utility can cover its operating and maintenance and depreciation costs, this is still far below the full cost recovery levels that utilities aspire to. Hence, subsidies – whether investment and/or operating subsidies- remain a crucial resource for many utilities around the world. The proportion of utilities that could not cover their basic operating and maintenance costs increased from 34% in 2000 to 37% in 2010, which is especially noticeable in low-income countries (increased from 28% in 2000 to 50% in 2010). Utilities in lower middle-income countries were the most affected, with 70% of them not being able to cover these costs (as opposed to 40% of utilities in upper middle-income countries, and 7% in high-income countries).

**Table 14: Operating cost coverage ratio [1]**

Indicator	2000	2006	2007	2008	2009	2010	2011
Median OCCR	1.10	1.09	1.11	1.10	1.15	1.09	1.09
Average OCCR	1.23	1.17	1.22	1.21	1.22	1.15	1.15
Standard deviation	0.50	0.52	0.58	0.56	0.59	0.54	0.58
Number of utilities reporting	565	1,447	1,420	1,494	1,449	1,664	1,429
Highest performing quartile	1.43	1.38	1.39	1.40	1.45	1.40	1.38
Lowest performing quartile	0.93	0.88	0.91	0.90	0.89	0.86	0.83

Values that the IBNET Blue Book states for BiH are 1.05 in 2005, 0.94 in 2006 and 0.97 in 2007.

Formula: Total annual operating revenues (KM) / total annual operating costs (KM)

### Debt Service Ratio, (%)

Description: It represents ratio of cash revenues and debt service; indicates ability to repay debt regularly.

Unit of measure: %

Comment: This indicator is applicable in BiH in the same way, in principle even without the condition of recording all the revenues through cost centres and unbundled to utility functions/services, because debt can generally be repaid from any achieved revenues. However, it would certainly make more sense to talk only about respective revenue, i.e. revenue from services that are improved from the loan which is repaid.

Formula: Total cash revenues (KM) / total debt service (KM) , expressed in %

### Affordability of services

#### Total revenues per user of services relative to Gross National Income per capita (%)

Description: It represents ratio of total annual operating revenues per consumer served and Gross National Income – GNI per capita, expressed in percentage.

Unit of measure: %

Comment: This indicator is applicable in BiH in the same way, with the condition of recording all the revenues through cost centres and unbundled to utility functions/services.

Gross National Income (GNI) is total income that residents of a country earned in a given period of time (usually a year). Gross National Income comprises the sum of value added and accumulated income.

National Income per capita is a national income put in relation with the number of residents of a certain country.

IBNET Blue Book highlights that this is a major challenge in many countries. Yet, the median of reported affordability significantly improved – dropped from 1.05% in 2000 to 0.69% in 2010. Average affordability in 2010 was 0.70% for households using both water and wastewater services, and 0.40% for those using only water supply services.

In 2010, median affordability for households in low-income countries was 0.82%, compared to 0.55% in middle-income countries, and 0.79% in high-income countries. Hence, middle-income countries are best-performing in this indicator, but the rapid increase in affordability values indicates a need to address tariff issues more constructively, especially in these countries.

**Table 15: Affordability as % of GNI [1]**

Indicator	2000	2006	2007	2008	2009	2010	2011
Median affordability	1.05	0.86	1.00	0.92	0.76	0.59	0.55
Average affordability	1.37	1.14	1.27	1.11	0.84	0.73	0.71
Standard deviation	1.03	1.01	1.00	0.89	0.73	0.59	0.59
Number of utilities reporting	594	1,437	1,521	1,476	1,600	1,633	1,383

Values that the IBNET Blue Book states for BiH are 1.57 in 2005, 1.36 in 2006 and 1.28 in 2007.

Formula:  $\text{Total annual operating revenues per user served (KM/person)} / \text{Gross National Income (GNI) per capita (KM/person)}$

### Amount of water bill for a household (KM/year)

Description: It represents monthly water bill for a household (on an annual basis) consuming 6 m<sup>3</sup> of water per month.

Unit of measure: KM/year

Comment: This indicator is applicable in BiH in the same way. The Danube Programme proposes, for the sake of international comparability, the amount expressed in US\$/year; however, for the needs of BiH, KM/year is sufficient.

Values that the IBNET Blue Book states for BiH are 44.59 US\$ in 2005, 46.39 US\$ in 2006 and 53.72 US\$ in 2007.

Formula:  $\text{Total sum of 12 monthly bills for a household consuming 6 m}^3 \text{ of water per month (KM)}$ .

### Additional indicator – share of a monthly water bill for a household in its average income (%)

Description: It represents ratio of the average monthly water supply and wastewater bill and the average monthly household income, expressed in percentage.

Unit of measure: %

Comment: This is a proposal of an additional indicator, which has to show the share of monthly water supply and wastewater costs of an average family in its overall income from all sourc-

es, and pertains to affordability of paying such a bill. Depending on the part of BiH, the average family has between 2.5 and 4 members, so, based on this local fact, it is possible to calculate total consumption and consequently, the amount of bill.

On the other hand, average income in the same local community is more difficult to calculate, and it is mainly estimated on the basis of the average wage paid in this community with all the supplements such as the meal allowance, transportation allowance, etc., income from activities other than employment (agriculture, tourism, hunting, etc.), and the average number of employed family members.

In the recent years, there are talks in BiH practice about setting the affordability ceiling of 4% of the total household monthly income for the combined water and sewerage bill (we can find in literature that as high as 5% can be applied, especially if income is very low). With the expected increased development of wastewater treatment facilities, we should also expect splitting of this indicator into two separate ones – one for water and one for wastewater – with separately set affordability ceilings.

Formula: The amount of a monthly water supply and wastewater bill for an average family (KM) / total monthly income of an average family (KM) , expressed in u %.

## Value of indicators for BiH presented in the IBNET Blue Book and comments on them

IBNET Blue Book also presents values of the selected indicators through countries from which utilities are reporting, therefore it also provides certain data for BiH. Data are supplied only for 2005, 2006 and 2007, and they are presented individually in descriptions of each of the indicators – they are only shown together in this table.

**Table 16: IBNET data for BiH [1]**

	Data refer to year:	2005	2006	2007
<b>GENERAL DATA</b>				
1	Surface area (km <sup>2</sup> )	51,209	51,209	51,209
2	GNI per capita, Atlas method (current US\$ exchange rate)	3,020	3,350	3,820
3	Total population (in '000)	3,781	3,782	3,779
4	Urban population (%)	45	46	46
5	Total urban population (in '000)	1,711	1,730	1,748
<b>IBNET SOURCED DATA</b>				
6	Number of utilities reporting in IBNET sample	20	20	20
7	Population served – water supply (in thousands)	1,179	1,185	1,230
8	Total population living in service area (water supply) (in thousands)	1,301	1,279	1,328
<b>SERVICES COVERAGE</b>				
9	Population covered with water supply service (%)	91	93	93
10	Population covered with sewerage service (%)	56	56	55
<b>OPERATIONAL EFFICIENCY</b>				
11	Electricity costs vs. Operating costs (%)	13	13	119
12	Non-revenue water (%)	61	62	60
13	Non-revenue water (m <sup>3</sup> per km per day)	77	63	60
14	Staff number per 1,000 population served	1.40	1.30	1.30
15	Continuity of service (hours/day)	23.20	23.30	24.00
<b>FINANCIAL EFFICIENCY</b>				
16	Water sold that is metered (%)	99	98	99
17	Average collection period (days)	227	246	334
18	Collection ratio (%)	79	83	159
19	Average revenue per m <sup>3</sup> (US\$/m <sup>3</sup> ), water and sewerage	0.71	0.77	0.82

20	Unit operational costs for water supply and wastewater (US\$/m <sup>3</sup> , water sold)	0.60	0.80	0.84
21	Operating cost coverage (ratio) (%)	1.05	0.94	0.97
<b>PRODUCTION AND CONSUMPTION</b>				
22	Water production ( l/person/day)	464	423	411
23	Total water consumption ( l/person/day)	183	162	164
24	Residential water consumption ( l/person/day)	137	121	122
<b>AFFORDABILITY</b>				
25	Total revenues per served person/GNI per capita (%)	1.57	1.36	1.28
26	Annual bill for households consuming 6 m <sup>3</sup> of water per month (US\$/year)	44.59	46.39	53.72
27	Ratio of industrial to residential tariff (level of cross-subsidy, #)	2.79	2.94	2.73

We have previously highlighted that the value of indicator 11 (*Share of electricity costs in operational costs*) for 2007 was most probably misprinted, as well as that the value of indicator 18 (*Collection ratio*) for 2007 should be taken with reserve. It is also evident that values stated in item 8 (*Total population living in water supply service area*) do not relate to the total number of population from local communities served by utilities reporting to the IBNET, but rather an estimate of the number of population living in areas covered by urban water supply network; or maybe the figures in item 7 (*Number of population served with water supply*) also include population from rural areas not connected to the urban water supply systems but have their own locally developed water supply systems. Such a perception consequently provides high values for indicator 9 (*Population covered with water supply service*).

Indicators for Non-revenue water (items 12 and 13) indeed have high values, which is consistent with real situation in BiH, but it is questionable how these values are obtained, unless the reporting utilities have their own measuring devices on all water intake points.

Indicator *Staff number per 1,000 population served* appears to be completely unrealistic, having values between 1.30 and 1.40, the actual values in BiH exceed these ones several times by far. Metered consumption of 99% (meaning that only 1% of recorded consumption is not metered) does not seem realistic for BiH situation either. The increasing period of collection is also in contradiction with the growing collection ratio – the reason may be inadequate recording of revenues. Furthermore, the figure on operating cost coverage is not completely consistent with values for indicator - average revenue per m<sup>3</sup> of water and unit operational costs. Data on average production and consumption of water are consistent with data on non-revenue water. One can observe (and it appears realistic) ratio of industrial to residential tariff too.

# ANNEX 4: METHODOLOGIES FOR PERFORMANCE ASSESSMENT

Individual performance indicators show status of one narrow aspect of utility's operations. Thereby, a natural need occurred to integrate several such indicators into one, consolidated indicator. This chapter reviews three such approaches, in order to explore whether such an approach can be appropriately applied in BiH. The Consultant does not propose adoption of similar methodology for tariff setting in BiH, but considers it can be used in benchmarking procedure – therefore this will be proposed in chapter 7.

One of the crucial questions that requires as precise and as measurable reply as possible is what is, in fact, a successful utility, i.e. how to check whether the economic efficiency principle, uncontested as it is, is met. Operating efficiency definitions applied for water utilities do not fully comply with those for manufacturing or for-profit service undertakings. Their task is, for example, to satisfy the human right to water at affordable prices, including privileged supply for vulnerable groups, safeguarding public health through distribution of high quality drinking water, protection of natural resources, and not using the advantages of natural monopoly.

While operating efficiency is often understood as “*(long-term) stable supply with high-quality water, 24 hours a day, for a utility's service area consumers*”, financial performance depends on a variety of indicators, such as, affordability of service (reflected in proportion of a family's income spent on water services and collection rate); electricity price, tariff setting principles and timely tariff corrections when needed; local development and political objectives; cross-subsidies among different categories of users; exemption or discount for social category of users. Thereby the elements of the original operating efficiency, such as non-revenue water or staff efficiency, have significant direct impact on a utility's financial performance.

Hence, there have been several initiatives across the world to create one uniform score to reflect a utility's performance. This score usually uses 10-15 performance indicators that are aggregated in a given way to one consolidated indicator. This aggregation process often includes weighting of each indicator, as well as adequate normalisation of indicators with diverse weights and score ranges, so as to make them comparable across countries. Such is, for instance IBNET Apgar score, Water Utility Vulnerability Index (WUVI), or AquaRating. The following are their brief descriptions, which can be indicative of deciding on the BiH utilities' efficiency system.

## IBNET Apgar score

IBNET Apgar score assesses a utility's performance based on 5 different indicators, with the additional sixth if the utility also provides sewerage services. These are:

- ▷ Water supply coverage;
- ▷ Sewerage coverage;
- ▷ Non-revenue water;
- ▷ Collection period;
- ▷ Operating costs coverage ratio;
- ▷ Affordability of water and sewerage services.

Each of these 6 criteria is rated on a scale of 1 to 2 (discrete individual score values), and then a total score is provided, in the 0 to 10 range (or 0 to 12 for utilities that provide both water supply and sewerage services). Values 0, 1 or 2 depend on the concrete value of the selected indicator and differentiation

between these three set values are expected to be adjusted to the future scores (e.g. water coverage in developed countries become less relevant, since coverage is 99% or 100%, so all utilities have the same score).

With six components, the score will be in the 0 to 12 range (provision of both services). Utilities are then classified as **critically low** (with the score of 3.6 or less), **fairly (relatively) low** ( a score between 3.6 and 5) and **normal** (a score above 7). Statistical analysis of reporting utilities revealed that about 90% of utilities that reached the score 3.6 or less experienced bankruptcy or had to obtain significant incentives and delayed planned investments. The score of 5 pertains to utilities in fast increasing urban areas that barely cover operating and maintenance costs.

**Table 17: Classification of Apgar scores [1]**

Indicator	Value	Average Apgar value for 2010
Water coverage	0 if $\leq 75\%$ 1 if between 75% and 90% 2 if $> 90\%$	1.14
Sewerage coverage	0 if $\leq 50\%$ 1 if between 50% and 80% 2 if $> 80\%$	1.20
Non-revenue water	0 if $\geq 40\%$ 1 if $\geq 10\%$ and $< 40\%$ 2 if $< 10\%$	1.09
Affordability	0 if $> 2.5\%$ 1 if between 1.0% and 2.5% 2 if $\leq 1.0\%$	1.78
Collection period	0 if $\geq 180$ days 1 if between 90 and 180 days 2 if $< 90$ days	1.61
Operating cost coverage	0 if $< 1$ 1 if between 1 and 1.40 2 if $\geq 1.40$	0.82
Overall Apgar score	Critically low $\leq 3.6$ 3.6 < Fairly low $\leq 7.2$ Normal $> 7.2$	7.92

If the service coverage would be considered in a way stipulated by the Law on Utility Activities and the Law on Local Self-Government (defining that the water supply is under direct jurisdiction of local community, not restricted to core urban area, but applies to the entire territory of the municipality), then the overall Apgar score for most BiH water utilities would be as follows:

- ▷ **Water coverage: 0** (urban percentage of population served with public water supply usually covers up to 60% in a municipality);
- ▷ **Sewerage coverage: 0** (often even the urban share of population in the municipality is not covered by this service);
- ▷ **Non-revenue water: 0** (usual value is 55-60% of non-revenue water);
- ▷ **Affordability: 1** (according to IBNET, in 2007 this value was 1.28);
- ▷ **Collection period: 0** (values of BiH utilities often range between 180 and 360 days, due to, inter alia, common practice of avoiding to write the expired and irrecoverable debts off);
- ▷ **Operating cost coverage: 0 or 1;**
- ▷ **Overall Apgar score: 1 or 2**

Hence, according to this criterion, numerous BiH water utilities would be classified as critically low-performing companies, which justifies the need for this type of studies, especially if we observe the values in the following tables.

**Table 18: Average Apgar score, 2006-2011 [1]**

Year	2000	2006	2007	2008	2009	2010	2011
Apgar score	6.12	6.90	6.81	7.09	7.53	7.69	7.55
Standard deviation	2.30	2.31	2.17	2.16	2.23	2.03	2.00
Number of reporting utilities	526	935	1,119	983	997	1,006	891

**Table 19: Average Apgar scores by level of economic development [1]**

Year	2000	2006	2007	2008	2009	2010	2011
Low-income countries	4.53	4.99	5.87	5.49	6.74	5.01	4.53
Lower middle-income countries	6.81	5.84	5.53	6.15	5.50	6.48	6.81
Upper middle-income countries	8.21	7.39	7.60	8.02	7.82	7.82	8.21
High-income countries	8.95	8.96	8.10	8.85	9.93	n/a	8.95

## Water Utility Vulnerability Index – (WUVI)

Water Utility Vulnerability Index was envisaged as an estimated probability that a utility would experience a performance problem (two years in the future) in performing its functions, thus a sort of a warning. High score indicate to possible problem in the future, but does not indicate the specifics of that problem. The authors relate to the above mentioned Apgar score approach, so as to predict utility vulnerability two years in the future. For this purpose, the following indicators are also considered – *Water coverage*, expressed in %, *Sewerage coverage*, also expressed in %, *Non-revenue water*, expressed as m<sup>3</sup>/km/day, *Affordability*, defined as the utility's revenue as a percentage of per capita GNI, and *Collection period*, expressed in the number of days.

Mathematical model of turning these values into three separate WUVI indicators, compliant with Apgar classification, where probability is estimated (in %) that, in two years, Apgar score will be less than 3.6, between 3.6 and 5, or between 5 and 7 (WUVI 3.6, WUVI 5 and WUVI 7), was not sufficiently explained in relevant studies<sup>9</sup>. IBNET Blue Book states the examples of this indicator in Moldova, where WUVI (3.6) had a value of 75 % in 1996 for water utilities in Chisinau and Balti, suggesting that there was more than 75 % probability that these utilities would have an Apgar score lower than 3.6 in 1998, in other words, that they would face serious challenges in their work.

## AquaRating

AquaRating is another attempt to make comprehensive assessment according to several selected performance indicators – the title indicates that it had been developed specifically for water utilities. The Inter-American Development Bank (IDB), in cooperation with the International Water Association (IWA), developed the system for assessment of water utilities. In addition to overall rating, the system offers detailed assessments of its various rating areas. Simultaneously, reliability of the information provided by the utility is also assessed, and guidance provided to improve management practices. The pilot version of the system is completed (2012) and tested (2013) in Spanish. The model is developed as a novelty compared to the usual benchmarking or financial rating, assessed by independent body.

The goal of introducing such a system is for water utilities to get credible performance rating and thus foster the overall reputation and access to financial market, and attract qualified staff. Utilities will be able to identify areas of improvement and receive recommendations, get access to knowledge and foster continuous learning. Benefits for public administration and regulators is that they can use the system

<sup>9</sup> L.J. Moffitt, N. Ziropiannis, A. Danilenko (2012) "Developing a robust water utility vulnerability index", IWA Publishing, Water Asset Management International, March 2012

to stimulate providers to maintain or improve their performance, while consumers will obtain better services in terms of quality, access, efficiency, sustainability and transparency.

AquaRating assesses utility's performance in eight rating areas:

- ▷ Access to service,
- ▷ Quality of service,
- ▷ Operating efficiency,
- ▷ Planning and investment execution efficiency,
- ▷ Business management efficiency,
- ▷ Financial sustainability,
- ▷ Environmental sustainability,
- ▷ Corporate governance.



**Figure 1 – AquaRating Programme evaluation criteria**

The complexity of the model is best shown by the fact that, under these eight rating areas, there are 27 sub-areas, 113 elements for assessment, 61 indicators, 99 variables... E.g. quality of service contains sub-areas CS1 – quality of drinking water, CS2 – distribution of drinking water, CS3 – wastewater collection, CS4 – relations with customers/client service, and each of them has its own performance indicators.

Apart from results, practices and processes are assessed too, as well as quality of reported data. The following example indicates to evaluation method of practices in managing real water losses:

**Table 20: AquaRating practices in the real loss management**

Practice	Score
There is a utility unit responsible for the management of real losses or, there is a well defined operating procedure.	1
A procedure for estimating real loss volumes is in place, with standard criteria (IWA or similar) for estimating uncontrolled water components; and real loss volumes are computed at least monthly.	3
Efficiency of different detection, localisation and repairing techniques of real losses are analysed and compared for each one of the sectors or zones in which uncontrolled water balances are determined.	2
Performance levels and referential parameters are determined in order to guide practice and scope of real loss searching and reduction (evaluation and tracking at least annually).	1
Renovation, substitution and pressure management policies are guided by the reduction of real losses potential.	2
References and records of water loss incidents are available in GIS data bases.	2
Evaluation of real losses is performed based at least on balance contrasting and minimum night flows.	1
Reliance indicators are available for measurements of minimum night flows supplied to the sectors or to the points where they are recorded and used for loss management.	1
Surveillance procedures (on a daily basis, at least) of fluctuations in average and minimum flows at sector level are in place, as support to loss reduction actions.	1

AquaRating is relying on measurable indicators (e.g. number of hours with disruption of water supply during one year), but also the descriptive ones, or Yes/No indicators, such as whether there is a communication centre for clients available for complaints or questions 24/7. Values of all indicators and measures are then reduced to range 1-100, where higher score denotes better utility management. If the reported data are identified as unreliable, then the previous score is reduced.

The entire model is envisaged as voluntary and looks like certification procedure – utilities voluntarily apply for assessment by a relevant Agency (managed by IWA), which charges a fee for this service, while assessments are performed periodically. Utilities have interest in this similar to certification of ISO standard implementation. The Agency has to become financially self-sustainable and work on a non-for profit basis. Utilities submit data using an online system, and they also include audited financial reports. First the information validity check is performed, followed by final performance assessment.

The system was successfully tested in Spain, the while implementation in Latin America and the Caribbean has started.

# ANNEX 5: BRIEF FRAMEWORK TARIFF CALCULATION GUIDELINES FOR WATER UTILITIES

Steps to follow when calculating the water tariff rate are the following:

- ▷ **Preparatory steps**, necessary to facilitate a high quality calculation of water tariff include:
  - ▷ **Accounting preparations:** To define cost centres, at least for water supply, wastewater treatment if this function exists, and common administrative services (as well as other services if the company provides them), and enable keeping records of all revenues and expenses exclusively per these cost centres;
  - ▷ **Inventory of fixed assets:** To make a complete and detailed list of the overall infrastructure and all other fixed assets managed by the utility. To unbundle community-owned fixed assets (e.g. water supply network) from the fixed assets owned by the utility (e.g. vehicles or IT equipment). To revalue asset values at market prices;
  - ▷ **Technical preparations:** These preparations serve the function of setting up high quality measuring and management of non-revenue water. They include mapping of the complete network and other existing infrastructure (facilities, mains, valves, connections – it is recommended to use electronic mapping, which will later serve to create a geographic information system enabling adequate hydraulic and other analyses) and to divide the system into measuring zones. Each zone should include between 500 and 3,000 consumers (or possibly a large industrial complex etc.) with only one water inflow (and 1-2 points of outflow from the zone), which will represent a measuring point. Updated data on all consumers should be kept within each zone. Each successive zone should be leaning on the previous one. Thus determined measuring points should be supplied with zone meters of adequate diameter. It should be planned, if not foreseen previously, to supply meters for each of the water intakes too;
- ▷ **Preparation of the business plan** in the initial period implies calculating the baseline values of the selected key indicators and foreseeing their values for the subsequent 3-5 years. If the current value of non-revenue water is higher than 60%, activities should be planned in detail, operationally and financially, so as to decrease this value by 10-15% the following year; if the current value of non-revenue water is between 40% and 60%, this value should decrease by 10-15% the following year, i.e. if the current value of non-revenue water is lower than 40%, this value should decrease by 4-6% the following year; with a final target of up to 20% of non-revenue water for the upcoming planned or somewhat longer period, if the initial losses are very high.

Activities should also be planned to reduce the average collection period by at least 30 days per year and to achieve the collection target of 97% in the observed period.

All necessary activities should be planned (retirement, reassigning employees to other services, non-hiring, re-training, possible lay-offs) to reduce the value of staff productivity indicator by at least 0.1 - 0.2 annually.

All necessary activities should be planned to achieve target value of at least 1.40 with regards to operating cost coverage ratio.

Affordability of services should be checked using the described methodology.

Regular comparisons, analyses and justifications should be made in the upcoming years if there are differences between the projected and the achieved values of indicators in the observed period.

Business plan should be updated every year with new achieved values and projections for the upcoming period.

The costs of all aforementioned activities should be included in tariff calculation in the next steps.

- ▷ **Calculation of the fixed charge** – this segment targets covering of the main metering costs, i.e. all meters in the network (water intake, zones and consumers). The amount of the fixed charge is related to individual service consumers, and determined by the corresponding water meter. To determine individual amount of fixed charge, we first need to add up all unit values of consumer meter reduced to a monthly level in case of monthly billing. Hence, we calculate

$$CM(i) = RMC(i) / \text{month } (i), \quad P = \sum (CM(i)) \quad \text{as well as } Perc(i) = CM(i) / P$$

where:

CM(i) monthly share of replacement and maintenance cost of a concrete consumer meter (i)

RMC(i) total replacement and maintenance cost of a concrete consumer meter (i) (thus, price of purchase and installation of a consumer meter of a matching profile and type)

Month(i) is a number of months after which the respective consumer meter (i) should be replaced or calibrated (for mechanical meters the applicable regulations set this period to 60 months or 5 years; this period does not necessarily have to be the same for electronic meters)

Perc(i) is a percentage of the replacement cost of the same consumer's meter (i) in the sum of replacement costs of all consumers' meters

Then, we need to add up all unit values of the zone water meters reduced to a monthly level in case of monthly billing. Hence, we calculate

$$RM(i) = CRMM(i) / \text{month } (i), \quad \text{SumZon} = \sum (RM(i))$$

where:

RM(i) monthly share of replacement and maintenance cost of a concrete zone meter (i)

CRMM(i) total replacement and maintenance cost of a concrete zone meter (i) (thus, price of purchase and installation of a zone meter of a matching profile and type)

Month(i) is a number of months after which the respective zone meter (i) should be replaced or calibrated

SumZon is a sum of all replacement and maintenance costs of all zone and water intake point meters, therefore all meters in the network not related to end-users

And, finally, each individual fixed charge amount is calculated as:

Fixed charge(i) = amount of fixed charge for a concrete user (i) (legal or physical person))

$$\text{Fixed Charge } (i) = CM(i) + Perc(i) \times \text{SumZon}$$

Total amount of all expected monthly revenues on this basis is a Sum (Fixed charge (i)), is **strictly recommended** to enter this type of revenue in the separate sub-cost center (within the water supply cost centre) where only meter replacement and maintenance costs can be entered.

- ▷ **Calculation of unit water price per m<sup>3</sup>** – all related costs in the previous period, based on which the required revenues for the subsequent period are estimated, should first and foremost be properly kept in accounting records (including, by all means, the depreciation of all fixed assets etc. – see notes in Chapter 2). The above costs cannot include the costs pertaining to function of metering in the system (since they are included in the fixed charge – hence all meters in the network should immediately be separated from depreciation of fixed assets too). These costs certainly include all regular operating costs as previously elaborated, as well as full costs of calculated depreciation of the fixed assets, and possibly capital investments, in accordance with the local community's decision on the financing method for expansion of infrastructure. Based on consumption and its trend in the previous 2-3 years, the best possible estimate should be made for the expected consumption in the upcoming year (or other respective period the foreseen total costs have to be related to). Water price per m<sup>3</sup> is then calculated based on the following formula

$$\text{Unit water price per m}^3 = (\text{Estimated operating costs (in KM)} / \text{Foreseen delivery of water (in m}^3)) \times (1/\text{Coll.})$$

where:

Estimated costs = all regular operating costs + full costs of calculated depreciation on all fixed assets + approved costs of capital investments

Foreseen delivery of water = estimate of total delivered billed water to consumers for the subsequent period, which the estimated costs also relate to

Coll. = target collection ratio in % (cannot be less than 95%)

Revenues collected on this basis, in the amounts proportional to the foreseen stated costs should be recorded in different accounts (for coverage of operating costs – which can be elaborated in even more detail if the local community finds it necessary, for investment maintenance and capital investments). For instance, if calculated depreciation costs on all fixed assets amount 25% of all foreseen costs, then 25% of revenues collected on this basis will be kept in accounts and used exclusively for the needs of investment maintenance (only upon prior approval of the local community and professional opinion of the regulatory body, and in situations of particular importance they can be used for some other purpose too), exclusively in a manner specified in the business plan, which will also include the plan and the programme for reduction of non-revenue water and regular replacement of the infrastructure system components.

It can be expected that, for a large number of water utilities, such a calculation will lead to rise in water tariff rates (particularly if depreciation was not previously properly calculated), **but this would not be justified if the utility is inefficient**. Hence, it is necessary to additionally assess all costs for the ideal case of efficient operating. Given the selected indicators, this would mean that the assumed non-revenue water should reach up to 20%, collection period of up to 90 days, collection rate of at least 95%, maximum 1.2 employees per 1,000 service users, operating cost coverage ratio of at least 1.40, and ensured affordability of services. In this sense, the **Consultant proposes** the control tariff to include the assessment of staff costs, and costs directly related to water production (electricity costs at pumping stations, chemicals, etc.) for the future efficient state and, based on such determined costs, set the control unit water price per m<sup>3</sup> in the above described way. This can **approximately** (for the needs of not so precise, but indicative enough control) be done in the following way:

$$\text{ESC} = \text{CSC} \times 1.2 / \text{ENS}$$

Where

ETZ – **assessment** of efficient staff costs (for the state of 1.2 employees per 1,000 service users)

PTZ – current (existing) staff costs

ENS – existing number of staff per 1,000 service users (=number of employees/number of service users, i.e. number of population served with water)

As well as

$$ECWP = CCWP \times (1 - EPNRW) \times 1.25$$

where

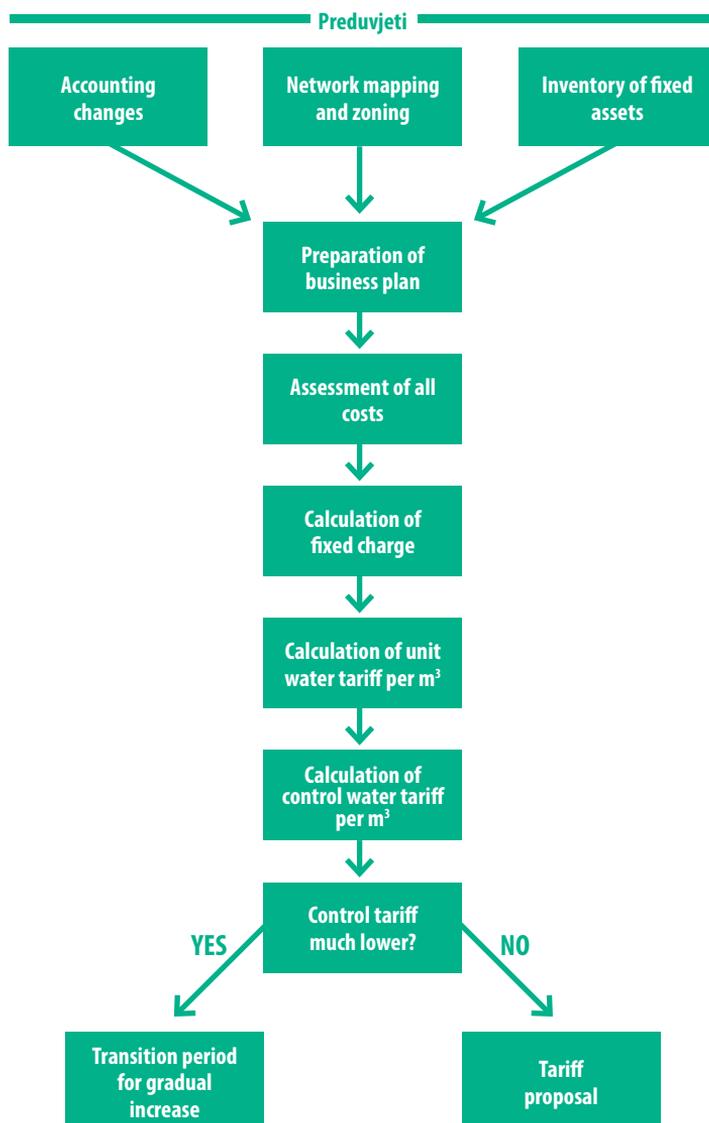
ECWP – **assessment** of efficient costs of water production (non-revenue water 20%)

CCWP- current (existing) costs of water production

EPNRW – existing percentage of non-revenue water

By comparing the calculated and control tariff with the existing price, it will be possible to determine a rational proposal of the new tariff rate such as to avoid stimulation of possible existing inefficiency, and to assume a transition period for achieving real price with efficient operating. **The Consultant points out that it is quite possible for the final tariff of the future efficient water utility, particularly if current situation is such that depreciation is, at least to some extent, partly included in the tariff rate along with parallel high losses and overstaffing, to be lower than the existing one**, therefore it is not implied that the tariff will rise in any case.

The entire procedure is presented in the following flowchart:



# ANNEX 6: BRIEF FRAMEWORK CALCULATION AND BUSINESS PLAN REVIEW GUIDELINES FOR REGULATORY BODIES

In reviewing requests for approval of water tariff and/or business plan, particular attention should be paid to the following:

- ▷ Check whether the adequate cost centres are defined and all costs (by method of random samples) recorded at the appropriate level of the cost centre (paying particular attention to recording direct costs respective to individual service);
- ▷ Check whether the keys are defined for distribution of common costs by direct cost centres of individual services and whether they are consistently applied;
- ▷ Check whether a complete and detailed inventory and revaluation of all fixed assets managed by the utility was made (establish if this responsibility is clearly and unambiguously assigned to the utility under a contract or other legal act);
- ▷ Check whether mapping of the complete water supply (and sewage) network was carried out, and whether all measuring zones were properly determined and listed all required zone and water intake point meters;
- ▷ Check whether the baseline values of all the selected key indicators were calculated and forecasts of their values for the subsequent 3-5 years presented, with detailed review of all activities to improve values of all indicators and verification of justification of related costs compared to the expected results. Seek clear evidence on achieving improvements in management and support such an approach;
- ▷ Check whether comparisons and analyses were provided, as well as whether given explanations are justified in case of differences between projected and achieved values of indicators in the observed period;
- ▷ Check calculation of the fixed charge segment;
- ▷ Calculation of unit water price per m<sup>3</sup>, as well as calculation of control tariff rate of the unit water price per m<sup>3</sup>. In case that the control tariff is significantly lower than the calculated one at current value of costs (but higher than the existing one), a proposal of a transition period should be analysed of gradual tariff reduction towards the control (efficient) tariff rate, which would be followed by a period of gradual water production cost reduction (by reducing non-revenue water) and reduction of staff costs (by reducing their number). **DO NOT approve a tariff increase that would justify the existing inefficient management of the system, if no improvements were achieved in the previous period.**

Check affordability of proposed tariff rate prior to making a final decision.

***“GoAL WaSH is part of the UNDP Water and Oceans Governance Programme, and is coordinated by the Water Governance Facility at the Stockholm International Water Institute (SIWI).”***