WAREG
European Water Regulators

TARIFF REGULATORY FRAMEWORKS IN WAREG MEMBER COUNTRIES

2019

This Report was produced by a WAREG Task Force Group

Acknowledgements:
The realization of this Report would not have been possible without participation, feedback and support of WAREG Members in the survey and throughout the entire process.

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WATER AND SANITATION SERVICES TARIFFS METHODS AMONG WAREG MEMBERS

EXECUTIVE SUMMARY

The Water Framework Directive 2000/60/EC sets basic requirements for economic regulation of the water and sanitation services by introducing principles of recovery of the costs of water services, including environmental and resource costs and polluter pays.

However, the directive fall shorts of providing detailed and/or operational rules for tariff setting methods. The cost recovery principle can be applied differently depending on the approach adopted by a Member State. There are no requirements for tariff structure, for the process of tariff application from the service provider, and its approval by a relevant competent authority. Each Member State treats this matter in a different way.

Service providers are not required to prepare business plans, and there is no established framework or correlation between the provision of such business plans and the tariffs for water services. Furthermore, there are no provisions establishing the maximum periods for regulatory review of water tariffs.

Through Europe, different competent authorities approve water and sanitation services (WSS) tariffs and the list includes local municipalities, regional governments and regional regulators, national ministries and national regulator.

A summary of available surveys in the water tariff process, as well as tariff regulation in energy sector in the European Union (EU) is provided in the introduction of this report, together with brief information of existing tariff setting methods.

The paper analyses the tariff setting approaches for WSS among WAREG Member countries including the tariff methods used, the scope of services, the regulatory periods and tariff updates, the tariff structures, tariff blocks based on consumption and tariff components, approaches to determine and calculate operational costs (OPEX), capital costs (CAPEX) and investment accounting, regulatory asset base (RAB) including accounting and depreciation norms, calculation of weighted average cost of capital (WACC) and demand.

The main conclusions of the study are as follows:

- Various models and approaches are applied in Water and Sanitation services tariff regulation among European countries. EU legislation sets very general principles for water pricing and therefore countries apply different approaches.

- Water pricing regulation is introduced in different ways in Europe – at local or national level. Even if a national regulator is responsible for water pricing, there are many differences among approaches applied – scope of services under regulation, length of regulatory period, business planning and formal business plan approval, tariff design and structure.

- Assets are treated in various ways in terms of useful life and depreciation norms, and in most of the cases utilities accounting policies are applied. At the same time investments in WS assets by the utilities are not always fairly included in tariff, meaning that investment stimulus is not always provided. Furthermore ensuring return on investments through the tariff is not provided in number of cases.

- This survey shows that water pricing, although based on similar fundamental principles, is actually applied in very diverse ways among the European countries, thus water and sanitation sector is differently treated in terms of cost recovery, motivation for efficiency, investment stimulus and service improvement, leading to long term stability and resilience.

- One way to improve this situation would be to introduce more detailed and common principles, rules and algorithms for water and sanitation sector governance and regulation in the European legislation.

All conclusions and recommendations for further research are provided at the end of the paper.

WAREG MEMBERS

Albania	ERRU	Water Regulatory Authority
Armenia	PSRC	Public Services Regulatory Commission
Azores, Portugal	ERSARA	Water and Waste Services Regulation Authority of Azores
Belgium, Brussels	BRUGEL	The Brussels Energy Regulatory Commission
Belgium, Flanders	VMM	Flanders Environment Agency
Bulgaria	EWRC	Energy and Water Regulatory Commission
Croatia	VVU	Council for Water Services
Denmark	KFST	Danish Competition and Consumer Authority
Estonia	ECA	Estonian Competition Authority
France	MEDDE	Ministry of Ecology, sustainable development and energy
Georgia	GNERC	Georgian National Energy and Water Supply Regulatory Commission
Greece	YPEKA	General Secretariat for Natural Environment & Water
Hungary	HEA	Hungarian Energy and Public Utility Regulatory Authority
Ireland	CRU	Commission for Regulation of Utilities
Italy	ARERA	Regulatory Authority for Energy, Networks and Environment
Kosovo	ARRU	Water Services Regulatory Authority of Kosovo
Latvia	PUC	Public Utilities Commission
Lithuania	VERT	National Energy Regulatory Council
Malta	REWS	Regulator for Energy and Water Services
Moldova	ANRE	National Agency for Energy Regulation
Montenegro	RAE	Energy Regulatory Agency
North Macedonia	ERC	Energy Regulatory Commission
Portugal	ERSAR	The Water and Waste Services Regulation Authority
Romania	ANRSC	Romanian Authority for Public Services
Spain	MITECO	Ministry for the Ecological Transition
UK, Northern Ireland	NIAUR	Northern Ireland Utility Regulation Authority
UK, Scotland	WICS	Water Industry Commission for Scotland

WAREG OBSERVERS

Denmark	KFST	Danish Competition and Consumer Authority
Poland	PW	State Water Holding Polish Waters
Turkey	MoFWA	Ministry of Water and Forestry
UK, England and Wales	OFWAT	The Water Services Regulation Authority

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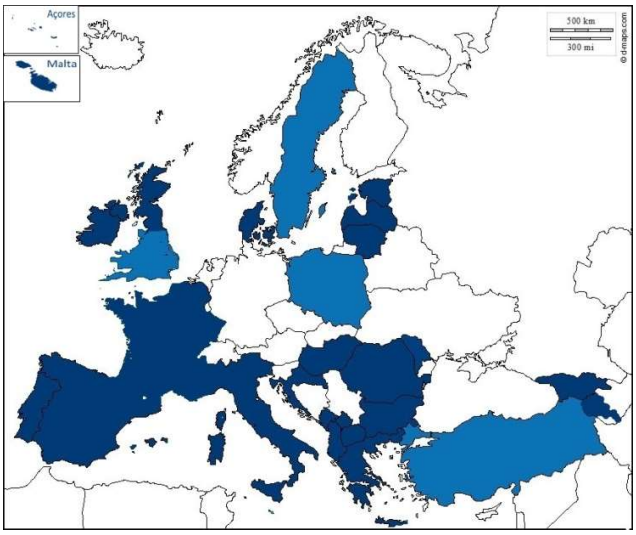
The Water Framework Directive represented a first step towards establishing a level of harmonization in the practices and principles of the European water sector. It was established to set the necessary standards to protect water resources and to promote their efficient employment in order to address sustainability concerns.

Water regulators across Europe have a pivotal role in safeguarding the efficiency and sustainability of the industry, and, despite the diversity in national frameworks and regulatory regimes, water regulators have recognized the need to establish a dedicated instrument for cooperation within the European water sector. WAREG was established upon this recognition as a network of economic regulators who came together to benefit from the sharing of common objectives on specific issues, challenges and conditions within the water sector.

WAREG is a group of economic regulators who cooperate and learn from each other's experiences and support the development of the effective regulation of the water and wastewater industry in Europe. The Association was formally established at a meeting of the initial participants in Milan on 23rd April 2014.

WAREG is made up of 31 members (26 members and 5 observers) from European countries who share the following objectives for cooperation:

- to exchange and share common practices;
- to enhance technical and institutional cooperation among WAREG members;
- to promote capacity building, stable regulation and consumer protection;
- to conduct an open dialogue with EU institutions, as well as with stakeholders at European and international levels.



Entities or legal bodies responsible for the regulation of water and/or wastewater services within a country in Europe may apply for membership or for observer status within WAREG. WAREG Members contribute towards the decision-making process and participate in the works of organizational bodies established within WAREG. Observers are invited to participate in the WAREG General Assembly and are also afforded the opportunity to be involved in studies, projects or other works carried within WAREG.

WAREG is organized into a General Assembly, a Board of President and four Vice-Presidents and a Secretariat based in Milan, hosted by the Italian Regulatory Authority for Energy, Networks and Environment (ARERA). Cooperation on specific regulatory topics is carried out by ad hoc Task Forces of Members, supported by the Secretariat.

INTRODUCTION

1. EU NORMATIVE FRAMEWORK

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive (WFD)) establishes provisions for European Union member states to achieve good qualitative and quantitative status of all water bodies. This directive is a framework directive in the sense that it prescribes steps to reach the common goal rather than adopting the more traditional limit value approach.
The directive sets basic requirements for economic regulation of the water and sanitation services (WSS) in Article 9 Recovery of costs for water services and Annex III Economic analysis.

Paragraph 1 of Article 9 of the WFD introduces two basic economic principles:

- The principle of recovery of the costs of water services, including environmental and resource costs; and
- The polluter pays principle.

Member States were required to ensure that by 2010 water-pricing policies provide adequate incentives for users to use water resources efficiently and thereby contribute to the environmental objectives of this Directive. This includes an adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services, based on the economic analysis conducted according to Annex III of the Directive and taking account of the polluter pays principle. Member States may in so doing have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected[1].

The economic analysis outlined in Annex III of the WFD needs to take account of long term forecasts of supply and demand for water in the river basin district and, where necessary estimates of the volume, prices and costs associated with water services, and estimates of relevant investment including forecasts of such investments; and make judgements about the most cost-effective combination of measures in respect of water uses to be included in the program of measures under Article 11 based on estimates of the potential costs of such measures [2].

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[1] Article 9, Paragraph 1: Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs, having regard to the economic analysis conducted according to Annex III, and in accordance in particular with the polluter pays principle.
Member States shall ensure by 2010

- that water-pricing policies provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives of this Directive,
- an adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle.

Member States may in so doing have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected.

[2] Annex III: ECONOMIC ANALYSIS
The economic analysis shall contain enough information in sufficient detail (taking account of the costs associated with collection of the relevant data) in order to:
(a) make the relevant calculations necessary for taking into account under Article 9 the principle of recovery of the costs of water services, taking account of long term forecasts of supply and demand for water in the river basin district and, where necessary:
- estimates of the volume, prices and costs associated with water services, and
- estimates of relevant investment including forecasts of such investments;

Paragraph 2 requires that Member States report in the river basin management plans on the planned steps towards implementing paragraph 1 which would contribute to achieving the environmental objectives of this Directive and on the contribution made by the various water uses to the recovery of the costs of water services[3].

Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption concerns the quality of water intended for human consumption. Its objective is to protect human health from adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean. **The directive doesn't set economic requirements for costs recovery and/or tariff setting.**

A proposal for a directive on the quality of water intended for human consumption (recast) was sent by the European Commission to the European Parliament and the Council of Ministers of the European Union on 1st February 2018. The objectives of the European Commission's proposal are set in the explanatory memorandum to the new Directive, which provides that `Drinking water was the focus of the first ever European citizens´ initiative `Right2Water´, which collected over 1.8 million signatures and to which the Commission responded positively.

The revision is also part of the plan to transition to a circular economy. The revised proposal is intended to help Member States manage drinking water in a resource-efficient and sustainable manner, thereby helping to reduce energy use and unnecessary water loss. It also is intended to help reduce the number of plastic bottles we use by improving people's confidence in tap water.

The proposed revision of the Directive includes suggested changes related to transparency of tariff setting methodologies. For example Article 14 Information to the public sets requirement in paragraph 2 (a) that *information on the cost structure of the tariff charged per cubic meter of water intended for human consumption, including fixed and variable costs, should be available for the public*.

At the same time however the proposed revision falls short from setting economic requirements for costs recovery and/or tariff setting. In the detailed explanation of the specific provisions of the proposal, Article 13 — Access to water intended for human consumption (new) it is noted that:

The concept of equitable access to water is usually three-dimensional, encompassing: geographic differences in services provided (for instance, due to lack of infrastructure), difficulties faced by vulnerable and marginalized groups (e.g. refugees, nomadic communities, homeless people and minority cultures such as Roma, Sinti, Travellers, Kalé, Gens du voyage, etc., whether sedentary or not) trying to access water services, and *financial affordability. Concerning affordability, any water pricing policy in the Union must take into account the principles of recovery of costs and polluter pays. Member States are also allowed to have regard, when establishing differentiated water tariffs, to the variation in the economic and social conditions in the population. The principle of recovery of costs therefore does not prevent Member States from adopting social tariffs or having measures*

(b) make judgements about the most cost-effective combination of measures in respect of water uses to be included in the programme of measures under Article 11 based on estimates of the potential costs of such measures.

[3] Article 9, Paragraph 2: Member States shall report in the river basin management plans on the planned steps towards implementing paragraph 1 which will contribute to achieving the environmental objectives of this Directive and on the contribution made by the various water uses to the recovery of the costs of water services.

safeguarding populations at a socio-economic disadvantage, in addition to the measures provided for in new Article 13 of this Directive.

In 2018 WAREG issued its own position on the proposal for new directive, available on WAREG web-site (www.wareg.org) [4].

Council Directive 91/271/EEC concerning urban waste-water treatment was adopted on 21 May 1991. The objective of this Directive is to protect the environment from the adverse effects of urban waste water discharges and discharges from certain industrial sectors and concerns the collection, treatment and discharge of domestic waste water, mixture of waste water, and waste water from certain industrial sectors. The directive does not set economic requirements for costs recovery and/or tariff setting.

Directive 91/271/EEC is currently evaluated by EC, and proposal for revision to this Directive may be expected in the near future.

Other EU directives related to WSS include the Groundwater Directive, the Bathing Water Directive, the Priority Substances Directive, as well as proposal for a Regulation for Water Reuse. However none of these directives establish provision related to tariff setting.

COM (2000) 477 Pricing policies for enhancing the sustainability of water resources [5] provides the following objectives:

[4] In the conclusions of its Common position on the proposal for a Directive of the European Parliament and of the Council on the quality of water intended for human consumption (recast), COM (2017) 753 final, WAREG highlighted that:

- WAREG, the Association of European Water Regulators, is, in principle, in favor of the process to recast the current EU Drinking Water Directive, and is submitting its opinion and comments on the whole proposals to recast the directive and on some of its provisions;
- economic regulation of water and wastewater services is fundamental to comply with the main objectives of the EC proposal of revision of the current DWD, which are also contemplated in the European citizens' initiative "Right2Water" and in the plan for the transition to a circular economy (i.e. better tap water, less bottled water);
- the action of economic regulators and any other authority established at national level, is highly relevant in measuring the efficiency and the results of the strategies taken in EU Member States to achieve specific objectives, such as for instance to ensure universal access to water, economic affordability of water bills for households and harmonization of information on KPIs in all EU countries;
- overall the proposal of the new directive is a good step forward, since more attention is paid to quality of drinking water, transparency of its treatment processes and delivery to the customer and the provision of information to the public;
- the human rights dimension of access to safe drinking water is fundamental and it should be addressed in this Directive;
- requirements, definitions and standards should constitute an integral part of this directive, and not be included in implementing acts that may be adopted at a later date (Refer Articles 14, 15 etc.);
- in the case of temporary non-compliance of specific obligations, other economic measures apart from penalties may be applied but this should be left at the discretion of Member States;
- the proposed amended directive seems to apply more stringent requirements on the parametric values and on monitoring obligations compared to the existing Directive. This can increase capital and operational costs for water suppliers that would need to be recovered through tariffs or other means. The effect on final bills for customers cannot be calculated at the moment, and at the same time it is not clear whether the benefits achieved will justify an increase of bills for households. Further clarification is therefore warranted;
- the proposed EU Directive should leave the opportunity for derogations, in order for the Member States to achieve adequate cost planning and tariff revisions;
- reporting scheme should be defined in order to clearly provide all information required by Article 14 of the EC Proposal in order to assure customers and stakeholders of a transparent and effective access to information;
- transparency and sharing of information are paramount in order to increase consumers' confidence in drinking water. WAREG considers that various tools can strengthen consumers' confidence in water quality and consumers' engagement and stakeholder participation in both the legislative and regulatory processes, for example through: raising awareness campaigns, customers' education and information campaigns on potable water quality.

[5] Communication from the Commission to the Council, the European Parliament and the Economic and Social Committee, Brussels, 26.07.2000 COM (2000) 477 final, Pricing policies for enhancing the sustainability of water resources.

(1) To clarify the main issues related to the use of water pricing for enhancing the sustainability of water resources;
(2) To present the rationale behind the Commission's preference for a strict application of sound economic and environmental principles in water pricing policies;
(3) To propose a set of guiding principles that will support the implementation of the proposed Water Framework Directive and more specifically its water pricing article.

According to section 2.1 of the communication, to play an effective role in enhancing the sustainability of water resources, water pricing policies need to reflect different cost types:

(1) **Financial costs** of water services, that include the costs of providing and administering these services. These include all operation and maintenance costs, and capital costs (principal and interest payment, and return on equity where appropriate).
(2) **Environmental costs** that represent the costs of damage that water uses impose on the environment and ecosystems and those who use the environment (e.g. a reduction in the ecological quality of aquatic ecosystems or the salinisation and degradation of productive soils).
(3) **Resource costs** that represent the costs of foregone opportunities which other uses suffer due to the depletion of the resource beyond its natural rate of recharge or recovery (e.g. linked to the over-abstraction of groundwater).

According to section 2.2 of the communication, the integration of economic and environmental objectives into water pricing policies is highly variable among Member States of the EU, within Member States and between economic sectors. Overall, the full recovery of financial costs is only partly achieved. This is particularly applicable for sewerage services and for the agricultural sector, especially in Southern European countries where this sector is by far the largest and least efficient consumer of water and where water scarcity problems are greatest. Environmental and resource costs are rarely considered in pricing policies. In most cases where countries have established abstraction and discharge charges, such charges are mainly aimed at revenue collection that can then be used for financing activities that enhance the quality of water bodies and related ecosystems.

Section 3 of the communication provides guidelines to policy makers and stakeholders to develop water pricing policies that enhance the sustainability of water resources, including:

3.1.Improving the knowledge and information base:

- Estimating the demand for water:

Assessing water use and pollution[6], Linking water prices and water demand [7];

- Estimating the costs of water services and use:

Financial costs [8], Assessing environmental and resource costs [9]

[6] COM (2000) 477, p. 13-14: *It is important to identify, test and make operational data collection methodologies (i.e. which data collection technology, at which spatial scale, with which temporal frequency) that provide a useful estimate at reasonable cost of current pollution and use.*

[7] COM (2000) 477, p. 14: *A systematic assessment of the price elasticity of demand and of damage costs of pollution is needed for the main economic sectors under different hydrological and socio-economic conditions*.

[8] COM (2000) 477, p. 14: *Accurate water supply information is needed to assess the long-run marginal costs of supply and develop relationships between water supply levels and costs. This is particularly true if water supplies are highly variable and unreliable.*
The main costs to be considered include operation and maintenance costs, and capital costs (principal and interest repayment and return on equity where appropriate). Today, the existing accounting rules used by Member States imply different ways of calculating costs. Also, the costs of different services can be included into water prices. As a result, comparisons between the costs of water supply and treatment services, water prices and existing levels of cost recovery are often misleading.

3.2. Setting the right water prices:
- Pricing structures should include a variable element (i.e. volumetric rate, pollution rate) to ensure they serve an incentive function to water conservation and reduction of pollution; - Water prices should be set at a level that ensure the recovery of costs for each sector (i.e. agriculture, households, industry). - Water pricing policies should consider both surface water and groundwater. - Assessment of the administrative costs of new pricing policies is necessary to guarantee that the predicted gains in efficiency out-weigh the costs of establishing and managing the new system. - The introduction of water pricing that better account for economic and environmental principles will need to be phased in for reasons of both affordability and political acceptability. - In situation of unsustainable water use, social concerns should not be the main objective of water pricing policies, although they need to be taken into account while designing new pricing policies. - A clear ex-ante and ex-post assessment of both the social welfare effects and impacts on household water demand of such pricing policies is necessary to ensure that both social and environmental objectives can be and have been met.
3.3. Pricing policies and spatial scale:
- Financial costs are better assessed and managed at the scale of the water service suppliers. - However, the river basin scale (or sub-basin scales according to the environmental issues considered) is the basis for assessing environmental and resource costs and benefits as it represents the level at which environmental externalities take place.
3.4.The role for users and consumers
- Bottom-up approaches to water pricing achieved through public participation and transparency are essential; - A broad stakeholder consultation involving all users concerned, is key to the development and acceptability of pricing policies with clear environmental goals. - As a result of the quasi-monopoly situation of most water suppliers (whether public or private), control of the water prices charged to consumers is necessary to ensure that prices adequately reflect existing costs and do not hide inefficiency.
3.5. Communication and information
- Water pricing policy should be transparent and easily understandable to ensure that its incentive effect can adequately play its role. - However, current benchmarking of water services falls short of assessing the impact of existing practices on the environment and need to be adapted to reflect more general environmental concerns.

The adoption of common definitions for key cost variables would facilitate the comparison between costs and prices and benchmarking for different water services, uses and countries.

[9] COM (2000) 477, p. 15: *Despite significant progress in recent years, the assessment of environmental and resource costs (and benefits) remains a challenge. It requires a good understanding of the functioning of the hydrological cycle within the river basin16, and the ability to assess the impact of particular uses on other uses and water bodies. This requires expertise and tools that are not always available or operational, but that constitute the basis for any sound decision made with respect to water resources management. Existing methodologies for the monetary valuation of environmental and resource costs, and more particularly ecology-related environmental costs, are often not sufficiently robust. These methodologies, which are mainly used by researchers, need to be further developed and made operational in the context of water policy planning.*
However, taking account of these costs while designing new water policies is urgently needed. Furthermore, and as illustrated in Box 1, methodologies to assess the costs of mitigation measures for restoring the environment are robust enough to assess and allocate major environmental and resource costs to the uses responsible for these costs.17 It is important to move forwards through a systematic integration of environmental and resource costs into the development of pricing policies. Efforts are needed to ensure that assessment and valuation methods are made easily available and understood fully in their strengths and limitations.

3.6.Integrating water pricing into river basin management plans
- Water pricing is a key instrument of the river basin management plan to achieve economic and environmental objectives in a cost-effective way. - However, water pricing needs to be complemented by other measures to tackle both water quantity and water quality issues.
3.7. Water pricing and other policy initiatives of the European Union
- Agricultural policies - Horizontal policies - Research and demonstration

2. MAIN HIGHLIGHTS FOR ECONOMIC REGULATION IN EUROPE

Directives 98/83/EC and 91/271/EEC provide technical requirements and standards for ensuring the quality of the drinking and wastewater, but they don't set any economic requirements and/or requirements for tariff setting.

Water Framework directive 2000/60/EC sets basic requirements for economic regulation of the water and sanitation services introducing principles of recovery of the costs of water services, including environmental and resource costs and polluter pays.

There are no detailed and/or operational rules for tariff setting methodologies. Consequently, the cost recovery principle is applied differently depending on the approach adopted by each Member State. For example, the WFD fails to clarify whether recovery of the allowable and justifiable costs is permitted, or whether this should be extended to allow for recovery of all costs.

COM (2000) 477 provides further clarifications on the costs that should be allowed in the tariff – Financial costs, including all operation and maintenance costs, and capital costs (principal and interest payment, and return on equity where appropriate); as well as environmental and resource costs. It also states that "control of the water prices charged to consumers is necessary to ensure that prices adequately reflect existing costs and do not hide inefficiency".

There are no requirements for adoption and implementation of tariff structures, or for the process of tariff application from the service provider, and its approval of the relevant authority. Each Member State treats this matter in a different way. COM (2000) 477 states that "*pricing structures should include a variable element*", but since this element is not obligatory one, many EU Members have not introduced it.

Even though water prices are relevant social topic, EU legislation does not require a process of stakeholder involvement during the tariff approval process. Neither is public consultation a mandatory requirement. COM (2000) 477 states that "*Bottom-up approaches to water pricing achieved through public participation and transparency are essential*" and "*A broad stakeholder consultation involving all users concerned, is key to the development and acceptability of pricing policies with clear environmental goal*s". There are no however any uniform obligatory rules for the public participation in the tariff procedures, and thus different practices are applied in the EU Member States.

The prices of the services are not related to the quality of the services, and there is no one uniform process for monitoring and controlling the quality of the service, with the exception on the quality of the water (both potable and wastewater).

Service providers are not required to prepare business plans, and hence there is no correlation between such business plans and the tariffs. There are also no mandatory requirements for establishing the length of the regulatory periods.

Different competent authorities approve the WSS tariffs and the list includes local municipalities, regional governments or regional regulators, national ministries or national regulators.

There are no provisions related to payments for innovation in wastewater treatments and how tariff for water reuse to agricultural and industrial users should be set.

3. AVAILABLE TARIFF METHODS FOR UTILITY PRICE REGULATION

Tariff regulation of monopolistic utilities started in USA at the beginning of 20th century by applying cost of service regulation (or rate of return regulation). The **Rate of Return (Cost-plus)** method is contrasted with incentive regulation, as **price or revenue cap** methods.

In all tariff setting methods the necessary revenues of the utility are divided into volumes of production in order to calculate the unit price per m^3. The building blocks of the required revenues are usually the same regardless of the tariff methodology applied, i.e.:

- operational costs of service (OPEX),
- depreciation costs,
- taxes and other costs,
- a rate of return on investments estimated by multiplying the regulatory asset base (RAB) by an allowable rate of return for both equity and debt (WACC).

The main differences between the cost-plus method and price / revenue cap methods are on how and when these building blocks are applied, the frequency of the tariff review, and the update and length of the regulatory periods.

Under **Rate of Return (Cost-Plus)** method, the revenue requirement is determined based on values for a specified test period which usually is the most recent 12-month period for which financial data is available. There is the possibility to make some adjustments to the reported costs in order to reflect changes in the future, but usually when this method is applied the utility has to convince the regulator that the changes are certain to occur, and the time and effect of the changes are known and can be proved with documents. The theoretical version of this method has no specified regulatory period, and tariffs are either reviewed annually considering the reported results, or are reviewed whenever the utility or the regulator requests for such a review

The Rate of Return method is usually not related to middle or long term business planning of the utility. This method emphasizes cost recovery and thus it does not provide incentives for cost optimization. One of the main advantages of the cost-plus method is that through it the regulator can control the level of the utility profit. On one hand the regulator can monitor which assets are

included in RAB and what accounting rules are applied to calculate their book value, and on the other hand the regulator can estimate the allowable rate of return on WACC which should be sufficient for the company to pay its financial costs[10].

Under the Rate of Return method, the regulator can investigate the actual costs of the utility for the past actual period during the price review and in the process may not approve all of such costs. In the process the Regulator may estimate whether the costs were necessary, or whether these are excessive based on pre-established benchmarks. Thus this method can lead to some incentives depending on the regulatory lag (the difference between the costs allowed in the tariff and the actual costs of the utility). However it is recognized that due to the lack of specified duration of the regulatory period (or price control period) such incentive is not always derived and can be manipulated by both the utility and the regulator. A Rate of Return method associated with a regulatory period longer than 1 year allows water utilities to retain their cost savings as profit, and can only be passed through customers following the next tariff update The Rate of Return determines efficiency incentives, and it is adopted in several countries in Europe.

Several disadvantages are associated with Rate of Return regulation. In cases where the regulator has not an efficient control of the reported information and of the estimates done by the utility, the utility could manipulate accounting information, and the regulator could be led to set higher prices. Even where the regulator has full control over the information, this method does not necessarily provide incentives for costs optimization and innovation. Additionally Rate of Return regulation does not provide incentives to reduce costs and it can also stimulate the utility to overinvest inefficiently (Averch – Johnson effect [11]).

There are possibilities to improve the Rate of Return method by introducing incentive mechanisms, for instance by extending the length of the regulatory period and by analyzing future costs, but the constraints of this method are still applicable. Thus in cases where incentive regulation is desired, regulators generally opt for Price / Revenue cap methods. “As a rough characterization, under rate-of-return regulation reviews are frequent, and the regulatory lag is endogenous because either side can request a review, whereas under price caps the lag is relatively long, and the date of the next review is fixed in advance. The difference is one of degree rather than kind.” [12]

The **Price cap** method is applied under fixed regulatory period (which periods may vary between 3 – 6 years). Prices are calculated based on allowed revenues and forecast demand. Tariff setting is usually combined with formal business plan for the regulatory period, in which the utility forecasts its OPEX, investments, new assets, future costs that may arise due to new activities or new assets operation and other. Often the regulator puts some targets to the utility with technical or financial KPIs levels to be achieved. Through this method the regulator sets maximum allowable price for regulated services for a pre-defined period of time, and these prices are adjusted throughout the period in accordance with general inflation (RPI) and efficiency growth (X) that represent potential savings of the utility due to increased efficiency or innovations (RPI-X).

[10] US Supreme Court case Bluefield Works, 1923, “The return should be reasonably sufficient to assure confidence in the financial soundness of the utility, and should be adequate, under efficient and economical management, to maintain its credit and enable it to raise the money necessary for the proper discharge of its public duties”.
[11] If the allowed return is greater than the required return on capital, the firm subject to rate-of-return regulation will tend to over-invest in capacity.
[12] Mark Armstrong, et al., 1994, Regulatory Reform: Economic Analysis and British Experience, p. 172.

One of the most significant differences between the Price Cap method and the Rate of Return method is that the prices are set to be independent from the controllable costs of the utility, while non-controllable changes of the costs (represented by the general inflation) are taken into account in the price adjustment. The regulator may include additional components in the price adjustments if it assumes that those are also outside the control of the utility.

As a result of the method, the prices of the services may not represent the actual costs for the provision of the service. The utility collects actual revenues during the regulatory period based on the determined prices and actual volumes supplied to the customers. This method provides several options for incentives (and risks) for the utility.

- With an increasing regulatory lag, the utility is motivated to optimize its efficiency by reducing its OPEX, so that efficiency gain can be kept as profit for a longer period of time. Under the cap methods, firms operating with lower costs increase their profits compared to their counterparts operating at higher costs. If pricing is related to with the business plan and KPIs targets, the reduction in costs should not lead to a reduction in the quality of the service.

- A utility also has the incentive to reduce its levels of non-revenue water, particularly levels of commercial losses in order to increase actual demand and thus increase its profit.

Approved prices are adjusted periodically with actual inflation and reduced with an efficiency coefficient. The regulator uses efficiency coefficients in order to split the effect of inflation between the utility and the customers, and to promote cost reduction, replacing the market "invisible hand" that is absent in the monopolistic markets. The efficiency coefficient could be alternatively estimated according to a discretionary approach adopted by the regulator, or in terms of the distance between firm's cost performance and efficiency frontier, designed through a benchmarking approach, on the base of statistical elaboration of sectors performance.

At the same time incentive options can turn to risks for the utility:

- The utility can achieve costs reduction and improve its margin, but if the demand is much lower than planned it will "eat" this margin;

- The costs can rise above the planned levels leading to profit reduction.

Thus the price cap method allows prices to be changed during the regulatory period when unplanned and/or unexpected events occur that have significant effect on the costs or allowed revenues. If the regulator approves such change, this negative financial effect can be added to the price, but nevertheless the company would recover this loss with a delay of at least one year.

In terms of sharing the risks between the utility and the customers, regulators can apply different types of price cap regulation [13]:

[13] Chris Decker, 2009, Characteristics of Alternative Price Control Frameworks: An Overview, A Report For Ofgem, Regulatory Policy Institute

- Cap of the total revenues of the utility – where the allowed revenue is equal to expected revenue at the time the price control is set. Under this approach the risks associated with demand volatility are transferred to consumers, and suppliers with significant fixed costs are protected from demand volatility risk. Prices tend to rise when demand falls and decrease when demand increase, an outcome similar to that of pure rate of return regulation.

- Cap of the average revenues of the utility per unit - where the risks associated with demand volatility are carried by the supplier. If demand is lower than expected when the average unit price is set, a fraction of the fixed costs would not be recovered by the firms, and conversely, where demand is higher than expected, the supplier will over-recover relative to its fixed costs.

- Cap of both total and average revenues (mixed model) – where the supplier‘s final revenue is a function of a few important fixed and variable revenue drivers, including the total quantity of output, but also other factors. The amount of revenue that is actually earned under this approach will depend on the form that the revenue function takes, and in particular, on whether the parameters are set in such a way so that the marginal revenue closely approximates the marginal cost of each unit sold.

- Weighted average price cap – where the allowed price increases are capped on the basis of a weighted average price for the supply of a basket of services. Under this approach the amount of allowable revenue is typically calculated by applying the quantities of services supplied in the previous year to an expected demand for that service in the current period. Once this weighted average price is established, the supplier has complete discretion to determine the individual prices for its different services subject to an overall average price constraint.

In order for the price cap to work properly, both the regulator and the utilities should be prepared with expertise in planning and forecasting, and quality of the reported information should be very high. Thus usually regulators start price regulation by using cost-plus method, then they focus on reported information quality and planning expertise of the utilities and if needed can move on to incentive regulation.

The Price cap regulation can lead to a reduction in the service quality due to the stimulus of the utility to reduce its costs and benefit from the regulatory lag. Therefore, the regulator has to introduce monitoring of the service quality through the regulatory period – e.g. through monitoring of KPIs.

The **Revenue cap** method eliminates demand risks, since any approved prices are adjusted for inflation, and reduced by an efficiency coefficient, and further reduced or increased by a correction factor for the actual quantity sold. Thus allowed revenues are corrected in positive or negative directions corresponding to the forecasted sales. Under this method, the utility again benefits from the effects of delays of at least one year.

In order to apply revenue cap pricing, the regulator has to be certain that the information for the inlet and outlet of the system is reliable and credible (inlet of the system is the total amount of raw water abstracted, while outlet of the system is the amount of potable water billed to the customers).

If the data is not reliable, then the utility can manipulate it and the pricing mechanism would fail to work according to predictions. Thus revenue cap is more often applied in energy sector compared to water one.

Other hybrid forms of price regulation are also available (Decker, 2009):

- **Yardstick competition** is an approach in setting regulated prices that link the prices charged by one supplier to the performance of other similar suppliers. There are two general variations to this approach: full yardstick performance competition and partial yardstick reporting or benchmarking approaches.

- **Profit-sharing** - the rate of return that the supplier can earn within a period is linked to the observed changes in actual variables (such as costs), and adjustments can be made to prices within that period to ensure that the rate of return lies within the bounds of a target rate of return.

- **Error correction mechanisms** that allow automatic adjustments to prices within period to reflect changes in the value of underlying exogenous variables, for example, to reflect unanticipated changes in demand and cost variables within the regulatory period that are beyond the control of the individual supplier.

- **Sliding-scale approaches to capital expenditure** - one way to address the information asymmetry between a regulator and suppliers is to present each supplier with a range, or menu of regulatory contracts which contain different profit-sharing possibilities.

- **LRIC-type approaches** - prices are periodically adjusted to reflect the costs associated with a hypothetical efficient supplier.

4. TARIFF COMPONENTS

Tariff structures should allow the utility to obtain several components from the revenues, received from water and sanitation services:

Operational costs (OPEX). These are expenses associated with the maintenance and administration of a business on a day-to-day basis. The total operating cost for a company includes the cost of goods sold, the operating expenses as well as overhead expenses. Operating expenses are shorter-term expenses required to meet the ongoing operational costs of running a business. They can be fully deducted on the company's taxes in the same year in which the expenses occur.

Operational costs include costs for materials (for water treatment, electricity, fuels, clothes, office, asset repairs, others); external services (insurance, rents, leasing, transportation services, utilities, consultations, security, laboratories, meters inspection, sludge treatment, repair works, others); personnel (salaries, social payments, others), taxes (local taxes, environmental fees, regulatory fees, others) and other costs.

OPEX costs are a very important tariff component, as they have serious influence in tariff. Therefore an important part of the price regulation is to understand and evaluate what is or should be reasonable and efficient level of OPEX that is needed to provide regulated services. As regulated utilities operate in monopolistic sectors, there are no drivers for them to optimize and reduce their costs, and they may tend to spend unreasonably. Therefore, regulators should not allow unreasonable or excessive costs levels in tariffs. At the same time, regulators should not overregulate and reduce costs beyond levels that may affect negatively service delivery.

Capital Expenditures (CAPEX). These are funds used by a company to acquire, upgrade, and maintain physical assets such as property, plant, or equipment (PP&E). Capital expenditures are amounts spent on acquiring fixed or intangible assets; repairing or improving an existing asset so as to prolong its useful life; preparing an asset to be used in business; restoring property or adapting it to a new or different use; starting or acquiring a new business.

CAPEX spending is important for companies to maintain existing property, plant and equipment, and invest in new technology and other assets for growth. These expenditures are for major purchases that will be used in the future. The life of these purchases extends beyond the current accounting period in which they were purchased. CAPEX expenditures are not fully deducted in the accounting period they were incurred. In other words, they are not fully subtracted from the revenue when computing the profits or losses a business has made. However, intangible assets are amortized over their lifespan while the tangible ones are depreciated over their life cycle. This is in contrast to OPEX expenses, which are fully deducted in the accounting period that are incurred.

A company can finance its CAPEX expenditures through 3 main options:

- Internal financing through liquid cash on hand to purchase the assets;
- External financing via a bank loan;
- External financing via an equipment lease.

In the case of the water and sanitation sector, CAPEX expenditures generally include:

- Reconstruction and replacement of existing water and sanitation network and aboveground installations – water-mains and sewers, house connections, network armatures, pumping stations, reservoirs and treatment plants;
- Network improvement and optimization – flow and pressure measurement, network sectorization (district metering areas), pressure measurement, SCADA and Telemetry systems, automatization processes, leak detection equipment, CCTV survey equipment, GIS system, hydraulic models, asset registers, field management software, others;
- Network and assets extensions to supply new customers and/or provide new services to existing customers (building new sewer network and wastewater treatment plant in area with existing potable water supply);
- Operational capacity of the utility – administrative buildings, vehicles, computers, office equipment, software, others.

As investment needs are much higher than the funding available, the regulatory framework should provide incentives in the investment process for *efficiency* (investments are performed in the best possible manner) and *effectiveness* (investments are adequate to accomplish the purposes). Utilities should be stimulated to invest in the right assets with the right approach, so the effect of the

investments is maximized for the customers and the society. Network utilities should be stimulated to apply life-cycle asset management approach, and to pay attention in all asset cycles – Asset needs, Pre-acquisition analysis, Acquisition and commissioning process, Logistic support, Operation and Maintenance, Asset disposal (end of life).

Therefore, the regulators should monitor:

- Cost-effectiveness of the investments in order not to allow overpriced CAPEX expenditures;
- Benefits for the service quality in order to avoid unneeded or bad planned investment projects;
- Future effect in prices through rate of return on investments in order to avoid overinvestments.

Recently some regulators tend to prefer the **TOTEX** approach, where a cap is applied to total expenditure, with no distinction being made between OPEX and CAPEX, and incentives are given to the utilities which comply with their planned costs and KPIs However, this approach requires a relative high capacity and expertise on the part of the utility, as it has to leverage CAPEX expenditure towards savings in reactive maintenance cost and at the same time improve maintenance towards predictive, preventive or condition-based and extend the useful life of the assets resulting CAPEX savings. With this approach, OPEX and CAPEX interrelation is acknowledged, and they receive the same level of attention in planning, implementation and regulation.

Application of the TOTEX approach requires that a utility is committed to apply life-cycle asset management at all organizational levels, while it should have full knowledge of its assets and their condition and applies effective organization and internal communication in all stages.

Depreciation. An accounting method of allocating the cost of a tangible asset over its useful life and is used to account for declines in the value of factory equipment each year as it is used and degrades. Businesses depreciate long-term assets for both tax and accounting purposes. For tax purposes, businesses can deduct the cost of the tangible assets they purchase as business expenses. For accounting purposes depreciation expense does not represent a cash transaction, but it shows how much of an asset's value the business has used over a period.

The decrease in value of the asset affects the balance sheet of a business or entity, and the method of depreciating the asset accounting-wise, affects the net income, and thus the income statement that such businesses report. Generally the cost is allocated as depreciation expenditures throughout the periods in which the asset is expected to be used. There are several standard methods of computing depreciation expense, including fixed percentage, straight line, and declining balance methods.

The Asset historical cost is a measure of value used in accounting by which the price of an asset on the balance sheet is based on its nominal or original cost when acquired by the company. In this report we refer asset historical cost with asset book value.

The Asset net book value is the amount at which an organization records an asset in its accounting records. The net book value is calculated as the original cost of an asset, minus any accumulated depreciation, depletion, amortization and impairment.

Straight-line depreciation is the simplest and most commonly used method, and this is usually the method applied for water and sanitation assets. There are no pre-established rules for useful life of water and sanitation assets in International Accounting Standards, as well as National Accounting Standards in European countries. Thus, each utility can define a different useful asset life according to its own accounting policy, and hence determine the annual depreciation norms.

On the other hand some regulators issue regulatory accounting rules, in order to provide national general framework for regulatory purposes. Annual depreciation costs are included in the tariff as a general internal source for CAPEX financing.

Regulatory Asset Base (RAB). Great Britain developed the RAB to provide comfort to investors in the privatized network utilities such as electricity, natural gas, railways, telecoms, transport and water that their investments would not be treated unfairly. RABs were initially developed in the early 1990s for UK infrastructure industries by Ofwat (economic regulator of the water industry in England and Wales). Ofwat created the first infrastructure RAB for the purpose of setting its five-year price limits in 1994[14].

RAB consists of the assets included in the utility balance sheet, used for regulated service provision. Regulators may also include in RAB the Net Working Capital, as well as the investments planned for the current regulatory period.

In most of the cases, value of the assets in RAB is the same as the net book value of the assets in the balance sheet, but other options are also available (asset historical costs, indexed historical costs, actual re-purchasing costs, re-evaluated assets, regulatory rules). RAB should include the assets necessary for the provision of the regulated service only, but other cases are also available (all assets owned by the company, public assets used for service provision).

Net working capital is the difference between a company's current assets, such as cash, accounts receivable (customers' unpaid bills) and inventories of raw materials and finished goods, and its current liabilities, such as accounts payable. It is a regulatory decision whether to include it in RAB or not.

The investments planned by the utility in the current regulatory period may be included in RAB. In this case the utility will receive preliminary rate of return on these investments before their actual completion (stimulus for investments). In the opposite case, the utility will receive rate of return on the investments after they are completed, assets are constructed and included in RAB.

Weighted Average Cost of Capital (WACC). A calculation of a firm's cost of capital in which each category of capital (equity and debt) is proportionately weighted. All sources of capital, including common stock, preferred stock, bonds, and any other long-term debt, are included in a WACC calculation.

WACC is calculated by the following formula:

$$WACC = E/V * Re + D/V * Rd * (1 - Tc)$$

[14] Oxera, 2014, The regulatory asset base and regulatory commitment

where:

Re = Cost of equity
Rd = Cost of debt
E = Market value of the firm's equity
D = Market value of the firm's debt
V = E + D = Total market value of the firm's financing
E/V = Percentage of financing that is equity
D/V = Percentage of financing that is debt
Tc = Corporate tax rate

Regulators calculate the WACC in order to determine the reasonable level of profit (%) that a service provider in a monopolistic sector should gain. The profit is calculated as nominal value (currency) based on the value of the regulatory asset base of the utility.

The calculation of the cost of equity (Re) is difficult, as capital does not have an explicit value. The cost of equity should be the amount that a company must spend in order to maintain a share price that will satisfy its shareholders.

The most commonly used approach by regulators to calculate Re is the Capital Asset Pricing Model (CAPM) which describes the relationship between systematic risk and expected return for assets, particularly stocks. CAPM is widely used throughout finance for pricing risky securities and generating expected returns for assets given the risk of those assets and cost of capital.

The formula for calculating the expected return of an asset given its risk is as follows:

$ERi = Rf + \beta i\ (ERm - Rf)$

where

ERi = Expected return of investment
Rf = Risk-free rate
βi = Beta of the investment
ERm = Expected return of market
(ERm - Rf) = Market risk premium

The risk-free rate in the CAPM formula accounts for the time value of money. The other components of the CAPM formula account for the investor taking on additional risk - the beta of a potential investment is a measure of how much risk the investment will add to a portfolio, and the market risk premium is the difference between the expected return on a market portfolio and the risk-free rate.

Cost of debt (Rd) represents the market rate that the company is currently paying on its debt. If however the company is paying higher rate than the market one, then benchmark data should be used in the calculations.

Regulators may use different approaches to determine the Equity / Debt ratios in WACC, depending on the regulatory goals – the ratio may be set according to regulatory rules, or by actual data from the utilities ratios.

5. AVAILABLE SURVEYS ON WATER TARIFF PROCESS IN EU

In 2014, the OECD conducted a survey on regulation in the water sector [15]. According to section 20 of the OECD report and not considering self-regulation, there are mainly four regulatory models:

1) regulation by government;
2) regulation by contract, which specifies the regulatory regimes in legal instruments (usually referred to as the French model);
3) independent regulation where independence has three dimensions: independence of decision-making, of management and of financing (usually referred to as the Anglo-American model), and
4) outsourcing regulatory functions to third parties, which make use of external contractors to perform activities such as tariff reviews, benchmarking, and dispute resolution.

In the first model, also referred to as the "public operator model" by Marques (2010), the public sector is responsible for the management of the water services and owns the assets. The provision of the WWS is usually delegated to public water operators while the regulatory functions are carried out directly by the State at its different levels (national, regional, municipal). This organizational model prevails in the Netherlands, in Belgium / Flanders, in Italy[16] and in to a lesser extent, in Germany (section 21 of the OECD report).

In a number of other countries, public authorities are responsible for WWS regulation but the provision of water services can be delegated to private operators through contract agreements. The contract agreements establish the set of rights and obligations for each contracting authorities. The provision of WWS is awarded to private companies following public tenders. The WWS infrastructure remains public property. Originated in France in the nineteenth century (Box 3 of OECD report), the "French model" of regulation by contract expanded rapidly across countries to become one of the dominant models, especially in countries where municipalities are responsible for WWS management (section 22 of the OECD report).

In a third model, also called the "English model", the regulatory framework for WWS is organized around the establishment of dedicated agencies with regulatory functions (Marques, 2010). The dedicated water agency supervises and regulates the water sector independently from the private operators, the government and the consumers. This model allows for a separation of powers between the regulator and the line Ministries. This separation concentrates the regulatory functions to a single body and limits potential conflicts between policy formulation and regulation and enforcement. While it initially originated in the United-Kingdom, this model has rapidly spread to other countries (section 23 of the OECD report).

The abovementioned models are not mutually exclusive and increasingly, regulatory frameworks have adopted features of the different models described above. For example, countries with contract agreements have not been prevented the establishment of dedicated WWS regulatory agencies to supervise the quality of service and to intervene in case of conflicts (Marques, 2010). As

[15] **Applying better regulation in the water service sector**, 2014, OECD, available at http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=GOV/RPC/NER(2014)6&docLanguage=En

[16] In Italy, drinking water and wastewater services are regulated by the independent Regulatory Authority for Energy, Networks and Environment (ARERA) since 2012.

highlighted in Malyshev (2007); "*observations suggest that a broad continuum exists in terms of the regulatory models available – from the institutional to the contractual – and modes can also be combined*". Transition from one model to another is also possible as institutional and human resource capacities develop.

According to the information provided in Annex II of the OECD report, the 32 regulators surveyed apply the different tariff methodologies:

- Some regulators apply the Cost Plus method;
- Some of the regulators that apply the Cost Plus method also apply other models - Consideration of revenue, Consideration of Performance and Profit Regulation, based on a rate of return rule;
- 4 regulators apply the Price Cap method. One (1) regulator applies Profit Regulation.

In 2018 EurEau conducted a survey on the governance of water services in Europe [17]. Information has been provided by EurEau members (National Associations of Water Services). 29 countries were reviewed (Belgium applying three (3) different regional models). According to this study, the level of tariff setting and approval is, as follows:

- In 10 cases tariff setting process is conducted at national level by regulator, while in 2 other cases tariff setting process is conducted at national level by ministry after supervision by a regulator;
- In 9 cases tariff setting process at local and/or regional level by the municipalities;
- In 7 cases tariff setting process is conducted at local level by the municipalities with supervision by regional or national authority – Water Service Council, Ministry of Finance, Federal Cartel Authorities, Departments of Regional Administration, National Inspectorate or National Regulator;
- In 3 countries the level and competent authority depend on the district or agglomeration, and mixed model of local and national level is applied. In some of the cases smaller utilities (less than 200.000 m3/year or agglomerations bellow 2000 population equivalent) are regulated at local level by the municipalities, while the bigger ones are regulated at national level by regulator or ministry. In other case local regulation is applied within water board, and national for the cases outside water board.

According to the information provided, there are certain rules and requirements in the national legislation in the cases where the tariffs are approved by the municipalities at local level.

[17] **The governance of water services in Europe**, 2018, EurEau, available at http://www.eureau.org/resources/publications/150-report-on-the-governance-of-water-services-in-europe/file

6. REGULATION IN ENERGY AND GAS SECTOR IN EUROPE

According to a CEER Report on Regulatory Frameworks for European Energy Networks[18] it is noted that in general, most countries use a mixture of a cap regulation (revenue or price) and a guaranteed rate of return. A revenue cap regulation can thereby be seen as an indirect price cap regulation, where the revenue is the result of price multiplied with the quantity and demand risk is not faced by companies. Today cost plus regulation in the energy and gas sector is considered as an exception and only used in a few countries.

Electricity transmission is regulated by incentive methods in 19 out of 25 countries. Revenue caps are set by 15 National Regulatory Authorities (NRAs).

In electricity distribution 21 NRAs apply incentive regulation. Price caps are used by seven (7) NRAs, while 13 NRAs say that they use revenue caps.

Gas transmission is regulated by incentive methods in 20 countries. A limitation by caps is used in 19 countries, sometimes even with a mixture of price and revenue caps. In seven (7) countries a rate of return is implemented.

In gas distribution incentive based methods are applied by 22 countries. In four (4) countries a mixture of incentive and cost-based methods is applied and eight (8) NRAs use cost-based regulation.

Efficiency requirements force the network operators to seek to reduce costs and to work more efficiently. One way of implementing these requirements is to reduce the permitted cost on an annual basis. The survey revealed that a majority of the regulators in electricity and gas alike require the cost saving mainly on the OPEX side. On the CAPEX side, nearly 20% of respondents have applied efficiency requirements. This result is independent of the energy (gas/electricity) and the market layer (transmission system operator/ distribution system operator -TSO/DSO). In some cases, an efficiency requirement is applied to TOTEX (CAPEX+OPEX).

In general, the majority of NRAs evaluate (or adjust) the rate of return parameters in the year before the regulatory period starts. The year before the regulatory period starts is used as ‘snapshot’ or base year in which the rate of return parameters are evaluated or adjusted for the TSOs as well as for the DSOs. Most NRAs make no distinction between regulation of the gas and electricity markets. There are only a few Member States who evaluate or adjust the parameters two (2) or three (3) years prior to the start of the regulatory period.

The typical regulatory period is between three (3) and five (5) years independent of the TSO or DSO and the electricity or gas sector. Just a few Member States use a yearly regulatory period or a period which is longer than five (5) years.

The CEER Report provides country information, as well as general information about calculation of Regulatory Asset Base and Rate of Return in the cap models used.

[18] CEER, 2019, Report on Regulatory Frameworks for European Energy Networks, Incentive Regulation and Benchmarking Work Stream, CEER Report Ref: C18-IRB-38-03, 18 January 2019

7. SCOPE AND OBJECTIVES OF THIS STUDY

Due to the lack of detailed and operational requirements for regulation of the prices of water and sanitation services in EU legislation, in each country different approaches are applied in terms of tariff model, competent authority, etc.

In 2017 WAREG carried out an Analysis of Water Efficiency KPIs in WAREG Member Countries[19] that showed different practices in use to regulate service quality, including business planning, KPIs targeting and monitoring, and its correlation to tariff setting. The conclusions of the report are that:

- *There are wide variations in the use and interpretations of KPIs in WAREG member countries. A comparative analysis of the different sets of KPIs, used is relatively complex since definitions and indicators vary widely;*

- *There are a number of KPIs frameworks (e.g. IWA's lists of KPIs, IBNET etc.) which are used by water utilities. However their use remains largely voluntary and there is no single set of regulatory KPIs to measure water efficiency or other aspects of water utilities performance which are used consistently across Europe. This makes comparison of water efficiency KPIs data difficult and requiring extreme caution to ensure consistency in definitions and the methodology of calculation adopted;*

- *Despite this lack of consistent KPI framework, KPIs are used by a number of regulatory authorities and entities to meet various objectives including in the tariff setting and approval processes, for benchmarking or comparing water utilities performance and for the publication of information purposes.*

During 17th WAREG General Assembly, held in February 2019 in Dublin, Ireland, WAREG decided to survey, review and report on how WSS tariffs are regulated among the members of the Association, and established a Task Force (TF) group for the study, coordinated by the Bulgarian Energy and Water Regulatory Commission.

In March-April 2019 the Task Force supported by the Secretariat prepared a questionnaire with 38 questions, which was circulated to WAREG Members in May 2019.

[19] An Analysis of Water Efficiency KPIs in WAREG Member Countries, 2017, A WAREG Report, available at https://www.wareg.org/

The survey seeks to collect and analyze information on the following aspects of tariff regulation through a questionnaire:

Panel I	**Regulatory information**	Tariff approval power, services under tariff regulation, established regulatory periods, planned and unplanned tariff updates, business plan requirements and correlation between business planning and tariffs.
Panel II	**Tariff calculations**	Tariff method applied and tariff blocks, existence and use of fixed and volumetric charges, tariff formula and components included in the numerator and denominator of formulae used for tariff calculations.
Panel III	**Operational costs (OPEX)**	OPEX items, including materials, external services, personnel, taxes and environmental fees, other costs. Assessment on whether financial costs for investment and for operational loans, sanctions, provisions, past obligations, asset re-evaluation costs and other costs are included in OPEX. How general costs are distributed among services.
Panel IV	**Capital costs (CAPEX)**	Assessment on how investments are financed – depreciation costs and loans, and applied approaches.
Panel V	**Regulatory Asset Base (RAB)**	Assessment on which assets are included in RAB, and how their value is calculated.
Panel VI	**Weighted average cost of capital (WACC)**	Investigation on whether the regulator calculates cost of equity and debt, what approach is applied in such cases.
Panel VII	**Demand**	Assessment on how water demands (volumes) are forecasted and calculated in the tariff formulae.

A total of 23 replies to the TF questionnaire were received from the following authorities:

Bulgaria	EWRC	Energy and Water Regulatory Commission
Georgia	GNERC	Georgian National Energy and Water Supply Regulatory Commission
Albania	ERRU	Water Regulatory Authority
Spain	MITECO	Ministry for the Ecological Transition
Montenegro	RAE	Energy Regulatory Agency
Hungary	HEA	Hungarian Energy and Public Utility Regulatory Authority
Romania	ANRSC	Romanian Authority for Public Services
Malta	REWS	Regulator for Energy and Water Services
Latvia	PUC	Public Utilities Commission
Lithuania	VERT	National Energy Regulatory Council
Estonia	ECA	Estonian Competition Authority
Belgium, Flanders	VMM	Flanders Environment Agency
Belgium, Brussels	BRUGEL	Thé Brussels Energy Regulatory Commission
Croatia	VVU	Council for Water Services
Poland	PW	Polish Waters
Italy	ARERA	Regulatory Authority for Energy, Networks and Environment
Armenia	PSRC	Public Services Regulatory Commission
North Macedonia	ERC	Energy Regulatory Commission
UK, Scotland	WICS	Water Industry Commission for Scotland
UK, England and Wales	OFWAT	The Water Services Regulation Authority
Ireland	CRU	Commission for Regulation of Utilities
Kosovo	ARRU	Water Services Regulatory Authority of Kosovo
Moldova	ANRE	National Agency for Energy Regulation

Information about the overall governance and regulation of water and sanitation services sector for some WAREG Members is provided in **Annex I: Country Notes**.

I. REGULATORY INFORMATION

In this chapter we investigate:

1. Regulatory status and scope of services for tariff approval;
2. Regulatory period, tariff updates and business planning.

I.1. REGULATORY STATUS AND SCOPE OF SERVICES FOR TARIFF APPROVAL

18 Members participating in this study are national regulators with independent regulatory power for setting/approving tariffs, meaning i.e. they approve WSS prices, and tariff decision of the regulator can only be appealed in relevant court (i.e. Bulgaria, Georgia, Albania, Malta, Latvia, Lithuania, Estonia, Flanders, Brussels, Poland, Italy, Armenia, Northern Macedonia, Scotland, England and Wales, Ireland, Kosovo, Moldova).

In the cases of Spain, Montenegro and Croatia, the WSS prices are approved at a local level by the municipalities. In Romania WSS prices are approved at local and regional levels by municipal administrative units / intercommunity development authorities, while in Hungary these are approved by the relevant Minister. The Regulators in Romania and Hungary advise the competent authority before taking the decision on tariffs-. The Regulator in Montenegro issues approval on the tariff proposal and the final approval is given by the municipality.

Regional Intervention Commissions are established in the case of Spain to monitor and review the process of tariff approval by the local municipalities without such Commissions being actual regulators. In the case of Croatia, the national authority provides ex-post control with repealing powers on the tariff decisions of the municipalities.

The scopes of services, whose tariffs are approved in the Members, are, as follows:

Scope of services for tariff approval	*Water supply - potable needs*	*Water supply - not potable needs*	*Water supply - to other utility*	*Wastewater collection*	*Wastewater treatment*
Bulgaria / EWRC	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Georgia / GNERC	**Yes**	No	No	**Yes**	**Yes**
Albania / ERRU	**Yes**	No	**Yes**	**Yes**	**Yes**
Spain / MITECO	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Montenegro / RAE	**Yes**	No	**Yes**	**Yes**	**Yes**
Hungary / HEA	**Yes**	No	**Yes**	**Yes**	**Yes**
Romania / ANRSC	**Yes**	No	**Yes**	**Yes**	**Yes**
Malta / REWS	**Yes**	**Yes**	No	**Yes**	**Yes**
Latvia / PUC	**Yes**	No	No	**Yes**	**Yes**
Lithuania / VERT	**Yes**	No	No	**Yes**	**Yes**
Estonia / ECA	**Yes**	No	**Yes**	**Yes**	**Yes**
Belgium, Flanders / VMM	**Yes**	No	No	**Yes**	**Yes**
Belgium, Brussels / BRUGEL	**Yes**	No	No	**Yes**	**Yes**
Croatia / VVU	**Yes**	No	**Yes**	**Yes**	**Yes**
Poland / PW	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Scope of services for tariff approval	*Water supply - potable needs*	*Water supply - not potable needs*	*Water supply - to other utility*	*Wastewater collection*	*Wastewater treatment*
Italy / ARERA	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Armenia / PSRC	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
North Macedonia / ERC	**Yes**	No	**Yes**	**Yes**	**Yes**
UK, Scotland / WICS	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
UK, England and Wales / OFWAT	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Ireland / CRU	**Yes**	**Yes**	No	**Yes**	**Yes**
Kosovo / ARRU	**Yes**	No	**Yes**	**Yes**	**Yes**
Moldova / ANRE	**Yes**	**Yes**	No	**Yes**	**Yes**
Total (Yes)	**23**	**10**	**15**	**23**	**23**
Total (No)	**0**	**13**	**8**	**0**	**0**

Table 1: Scope of services for tariff approval

In all cases the regulators or other relevant authorities approve prices of water supplied to population for potable needs, as well as prices for wastewater collection and treatment. In 10 cases prices of water supplied from utilities for non-potable needs (not treated water for industry needs provided by the WS utility in urban area) is approved, and in 15 cases the authorities approve price of water supplied from one utility to other (utility supplying treated water to nearby utility`s networks).

In the case of *Estonia*, generally a single tariff is set for wastewater collection and treatment service, and it is only rarely that the tariff is different for wastewater collection or/and treatment.

In the case of *Flanders*, tariffs for wastewater collection and treatment are regulated in different manner compared to drinking water.

In the case of *Poland*, the regulator approves price for wastewater treatment only if such service is provided together with wastewater collection by the same utility.

In the case of Latvia, separate tariffs for water supply to other utility are not regulated, as utilities are treated as standard customers. At the same time in the Law on Water Management Services there are provided rights for the service provider to agree with other service provider regarding fee for provision of public water management service which does not exceed the tariff laid down by the Regulator.

In the case of *Poland*, the regulator approves price for wastewater treatment only if it is carried out together with wastewater collection by the same utility.

In the case of *Armenia*, tariffs for wastewater collection and treatment are not separated.

I.2. REGULATORY PERIOD, TARIFF UPDATES AND BUSINESS PLANNING

Information about the length of the regulatory period, options for tariff updates during the period, as well as preparation and approval of business plans is presented at the following table:

Information about Regulatory period, tariff updates and business planning	Regulatory period	Planned tariff update during regulatory period	Option for unplanned tariff update during the regulatory period	Does the utility prepare business plan	Does the regulator approve the business plan	Is there correlation between the business plan and the tariffs
Bulgaria / EWRC	5 years	Annual tariff update	**Yes**	**Yes**	**Yes**	**Yes**
Georgia / GNERC	3 years	Tariff update on request	**Yes**	**Yes**	**Yes**	**Yes**
Albania / ERRU	1 year	No tariff update	No	**Yes**	No	**Yes**
Spain / MITECO			**n.r.**	n.r.	n.r.	n.r.
Montenegro / RAE	1 year	No tariff update	No	**Yes**	No	No
Hungary / HEA	1 year	No tariff update	No	**Yes***	No	No
Romania / ANRSC	1 year	annual adjustment with inflation	depending on the case	**Yes***	No	No
Malta / REWS		No tariff update	No	**Yes**	No	**Yes**
Latvia / PUC		No tariff update	No	**Yes***	No	**Yes**
Lithuania / VERT	3 years	Annual tariff update	**Yes**	**Yes**	**Yes**	**Yes**
Estonia / ECA	1 year	Tariff update on request	**Yes**	**Yes***	No	No
Belgium, Flanders / VMM – drinking water	6 years	Annual tariff update	**Yes**	**Yes**	No	**Yes**
Belgium, Flanders / VMM – wastewater	1 year	No tariff update	No	**Yes**	No	No
Belgium, Brussels / BRUGEL	2 years	Annual tariff update	No	**Yes**	No	**Yes**
Croatia / VVU			**n.r**	**Yes**	No	**Yes**
Poland / PW	3 years	No tariff update	**Yes**	No	No	
Italy / ARERA	4 years	Every two years	**Yes**	**Yes**	**Yes**	**Yes**
Armenia / PSRC	15 years	Annual tariff update	**Yes**	No	No	**n.r**
North Macedonia / ERC	3 years	Annual tariff update	**Yes**	**Yes**	No	**Yes**
UK, Scotland / WICS	6 years	Annual tariff update	**Yes**	**Yes**	No	**Yes**
UK, England and Wales / OFWAT	5 years	Annual tariff update	**Yes**	**Yes**	**Yes**	**Yes**
Ireland / CRU	5 years			**Yes**	**Yes**	**Yes**
Kosovo / ARRU	3 years	Annual tariff update	**Yes**	**Yes**	**Yes**	**Yes**
Moldova / ANRE	5 years	Annual tariff update	**Yes**	**Yes**	**Yes**	**Yes**
Total (Yes)			**13**	**21**	**8**	**16**
Total (No)			**7**	**2**	**15**	**5**

Table 2: Regulatory period, tariff updates and business planning

Regulatory period

The length of the regulatory period generally varies between 1 and 6 years, and there is a wide variety of periods across the cases surveyed. When regulatory periods are longer than 1 year, an option for unplanned tariff update is introduced.

In the case of *Armenia* the regulatory period is set by Lease contracts (15 years), but the main duration for tariff enforcement is 1 year, while in *Brussels* this is established at 2 years. In the cases of *Georgia, Lithuania, Poland*, *North Macedonia* and *Kosovo*, the regulatory period is 3 years, In *Italy* the regulatory period is 4 years, while in *Bulgaria, England and Wales* and *Moldova* this is set at 5 years, and in *Flanders* (drinking water) and *Scotland* the regulatory period is set at 6 years. Current regulatory period in *Ireland* is 2017-2019 and next regulatory period will be 5 years (2020-2024).

There is annual tariff update during the regulatory period in 11 of the cases reported in the study (*Bulgaria, Lithuania, Flanders* (drinking water)*, Brussels, Armenia, North Macedonia, Scotland,*

England and Wales, Kosovo Moldova). In *Georgia* tariff update is provided on request, while in *Poland* planned tariff update is not permitted. In *Italy* a planned tariff updated occurs in the middle of each regulatory period (two years). In *Ireland* it is planned to fix non-domestic tariff levels for 3-year period (2020-2023), and then consider the need to update tariff levels thereafter, which take place within the 5 year regulatory revenue period (2020-2024).

In the cases of *Albania, Malta, Latvia, Estonia* and *Croatia* tariffs are approved for indefinite period of time, until the utility or the regulator request a start to the procedure for tariff review. In Albania, the frequency of the utilities' right to apply for the new tariffs is not less than one year from the latest approved tariffs by the regulator. In Malta, any proposal for a tariff update is brought forward to the regulator by the utility according to needs and in the meantime the current tariffs continue to apply. In Latvia service providers are obliged every year to submit information about their performance including technical information and costs related to service provision. Regulator every year analyses whether service provider can continue working with approved tariff or have to submit a new draft tariff proposal. In Estonia there are no restrictions for a utility to submit price application. In the case of Croatia, there is a proposal under the new Water Services Act for the length of the regulatory period to be established for 4 years.

In the case of *Romania*, operator`s costs reported in the past 12 months are evaluated ahead registering for a new tariff endorsement/approval, and a further annual adjustment according with inflation may be requested.

In the case of *Hungary*, the regulator provides advice to the Minister for tariff review on annual basis. If no decision is taken, the utilities are required to continue to apply the existing tariffs.

In the case of *Spain*, where the municipalities are responsible for tariff approval, the operator provides an economic report to justify the tariff update, and the approval is subject of the municipality and the Regional Intervention Prices Commission.

In *Kosovo* the utilities present draft business plans which include the requested tariffs necessary to finance the activities in the plans. The regulator scrutinizes and challenges the plans and presents its final tariff determinations which may differ from the original request based upon the regulator's considered challenges to the plans.

Business planning

In 21 of the cases surveyed, the utility prepares a business plan or a certain strategic document, and in 16 cases there is correlation between the business plan and the tariffs.

Only in 8 cases however the authority that approves the tariff has regulatory power to approve the business plan (*Bulgaria, Georgia, Lithuania, Italy*, *England and Wales, Ireland, Kosovo, Moldova*), while in the other 15 cases the regulator has no authority on its determination (*Albania, Montenegro, Hungary, Romania, Malta, Latvia, Estonia, Flanders* – both drinking and wastewater, *Brussels, Croatia, Armenia, North Macedonia, Scotland*).

In *Bulgaria* the preparation of 5-year business plan is mandatory requirement at law (with technical and financial parts, operational and investment programs), and business plan approval is required for tariff approval. In the current regulatory period both administrative procedures are combined in

one administrative proceeding. The investment program of the business plan is required to be approved first by the public owners of the water and sanitation assets (the state and the local municipalities, combined in water associations). The figures of the business plan automatically refer in the tariff application model.

In *Lithuania* utilities' business plans are required to be adopted for each regulatory period, and since 2019 the regulator has responsibility to coordinate service provider investments.

In *Italy* the national regulator (ARERA) established a comprehensive definition of tariff proposal, named "specific regulatory scheme", to be adopted by local regulators (EGA) following involvement of service supplier, and to be detailed for a four-year regulatory period. This scheme includes the Infrastructure and Management Plan, the Financial and Economic Plan and the Entrustment contract. Local regulatory authorities propose the planning, under the supervision of regional authorities. The proposals for the regulatory period are investigated and approved by the national regulator.

In *England and Wales*, business plans are submitted by companies and these plans are assessed and challenged by the regulator and are taken into account when setting price controls. The regulator does not issue a separate legal act for approval of the business plans.

In *Ireland* the utility submits its business plan to the regulator for a regulatory period which the regulator then reviews and ultimately approves.

In *Albania* a legislative change is being proposed to establish the submission of a 5 year business plan as a mandatory requirement during the tariff application process.

In *Malta* the water utility is required to prepare estimates of income and expenditure on an annual basis and these are submitted for Parliament consideration and approval.

In *Flanders* the regulator does not approve the business plan. However, in the case of drinking water a poor business plan could threaten the tariff approval. The business plan is mandatory requirement at law (with technical and financial parts, operational and investment programs, and has to take into account efficiency progress). The business plan is required to be revised by an auditor and approved by the owners (associates) of the water company. The figures of the business plan automatically determine the maximum rates. The regulator approves the maximum-rates, and supervises the execution of the business plan.
In the case of wastewater, the economic supervisor advises the budget of the utility (Aquafin), including the remuneration model and investigates the historic and future costs of the sewer municipalities and the utility instead. VMM does decide on the investments for the expansion of the supra-municipal transport system and the waste water treatment infrastructure.

In *Scotland* the utility (Scottish Water) is required to prepare a strategic business plan and obtain agreement on its contents from the stakeholders. The regulator reviews and comments on the draft plan, and approve tariffs if the plan is agreed to by the stakeholders.

In North Macedonia the utility is required to prepare a business plan which is used as a basis for preparation of the Tariff Adjustment Plan. The regulator evaluates the compliance of the business plan with the Law on setting water services tariffs.

In 4 cases the utility prepares some form of business planning (*Hungary, Romania, Latvia*, *and Estonia):*

- In Hungary utilities are required to prepare and submit rolling development plans to the Regulator.

- In Romania the process is different whether the utility is funded through public and EU funds or otherwise. In the first case, the operator is required to update a strategy with the approval from Management Authority dealing with Large Infrastructure Operational Programs and with each municipal administrative unit's members of Intercommunity development authorities. In the second case, the operator which did not benefit from non-refundable funds can request updates on the tariff`s level for inflation reasons or due to an increase in its operational costs.

- In Latvia service providers are obliged prepare the strategy - business planning document for a period of at least three years on the basis of which are planed the activities of the service provider, the share of profits to be paid in dividends and the budget of the service provider.

- In Estonia the water utility prepares an investment plan and in price approving process the regulator is required to request an opinion of the rural municipality or city government on the compliance of investments with local water supply and sewerage development plan.

In the other 3 cases, business planning of the utility is not a mandatory requirement (*Spain, Poland* and *Armenia*). However, in Poland the utility is obliged to submit a detailed explanation note together with the tariff proposal although this is not a business plan. In Armenia there is no obligation for submitting a business plan to regulator. In Spain only some few operators elaborate business plans as such, regarding costs and investments, but most of the operators under municipal responsibility do not complete appropriate business plans as there is a great heterogeneity among them.

I.3. SUMMARY

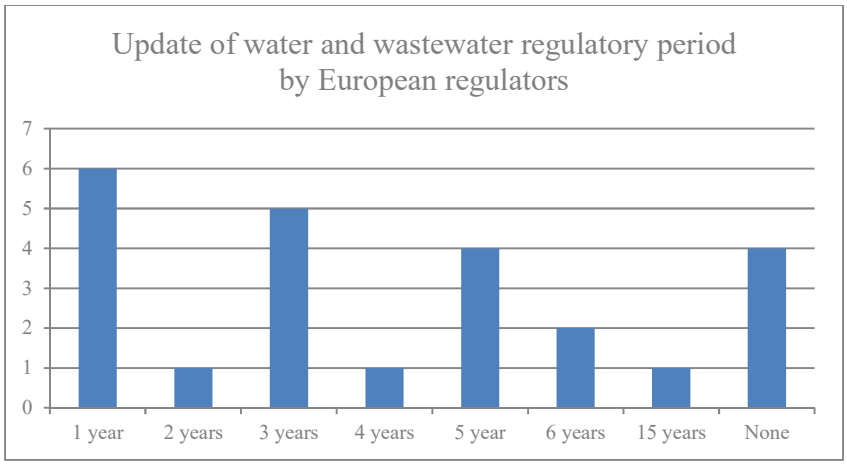
16 of the participants in the survey have independent tariff regulatory power. In the other 5 cases WSS tariffs are approved by local municipalities (3), municipal administrative units (1) and state ministry (1).

In all members that participated in the survey (23) tariffs for water supply, as well as collection and treatment of wastewater are subject to regulation by the relevant authority.

In less than half of the cases (10) there is regulation of the prices of water supplied from utilities for non-potable needs (not treated water for industry needs provided by the WS utility in urban area) – 10 cases, or price of water supplied from one utility to other (utility supplying treated water to nearby utility`s networks) – 15 cases.

The length of the regulatory period generally varies between 1 and 6 years, and there is a wide variety of periods across the cases surveyed.

Most common cases include length of regulatory period of one year (*Albania, Montenegro, Hungary, Romania, Estonia, Flanders – for wastewater*); three years (*Georgia, Lithuania, Poland, Northern Macedonia, Kosovo*) and five years (*Bulgaria. England and Wales, Ireland, Moldova*). Other cases available include two years (*Brussels*), four years (*Italy*), six years (*Flanders – for drinking water, Scotland*) and fifteen years (*Armenia*).
When regulatory periods are longer than 1 year, an option for unplanned tariff update is introduced.



In 21 of the cases surveyed, the utility prepares a business plan or a certain strategic document, and in 16 cases there is correlation between the business plan and the tariffs. Only in 8 cases however the authority that approves the tariff has regulatory power to approve the business plan, while in the other cases the regulator has no authority on its determination:

- There are countries where the authority that approve tariffs approve also the business plan - *Bulgaria, Georgia, Lithuania, Italy, England and Wales, Ireland, Kosovo, Moldova;*

- There are countries where the authority that approves tariffs do not approve business plan, which are approved by other institutions (e.g. Parliament in *Malta* or Intercommunity development authorities in *Romania* only for utilities dealing with Large Infrastructure Operational Programs);

- There are countries where the authority that approve tariffs do not approve the plan, but requires its agreement with stakeholders (*Scotland*) or an opinion by municipalities (*Estonia*);

- There are countries were utility prepares a business plan, and although it is not formally approved is used by the regulator in the tariff procedure as background material (*Albania, Hungary, Latvia, Flanders, Poland, North Macedonia*);

- There are countries where no obligation for business plan preparation exists (*Armenia, Spain*).

II. TARIFF CALCULATIONS

In this chapter we investigate:

1. Which tariff setting method is used by the regulator;
2. What is the tariff structure - is it volumetric only, or there is fixed and variable charges;
3. Are there tariff blocks based on consumption;
4. Which components are included in the tariff formula (nominator and denominator).

II.1. TARIFF SETTING METHOD

WAREG Members have reported the following tariff setting methods in usage:

Tariff setting model	Cost plus	Rate of return	Price Cap	Revenue Cap	Other
Bulgaria / EWRC			✓		
Georgia / GNERC					✓
Albania / ERRU	✓				
Spain / MITECO					✓
Montenegro / RAE	✓				
Hungary / HEA			✓		
Romania / ANRSC	✓				
Malta / REWS	✓				
Latvia / PUC		✓			
Lithuania / VERT		✓			
Estonia / ECA		✓			
Belgium, Flanders / VMM		✓			
Belgium, Brussels / BRUGEL			✓		
Croatia / VVU	✓				
Poland / PW	✓				
Italy / ARERA					✓
Armenia / PSRC					✓
North Macedonia / ERC				✓	
UK, Scotland / WICS			✓		
UK, England and Wales / OFWAT				✓	
Ireland / CRU				✓	
Kosovo / ARRU			✓		
Moldova / ANRE	✓				
Total	7	4	5	3	4

Table 3: Tariff setting models

Albania, Montenegro, Romania, Malta, Croatia, Poland and *Moldova* use cost plus, while *Latvia*, *Lithuania, Estonia*, *Flanders* have reported rate of return, *Bulgaria, Hungary, Brussels*, *Scotland* and *Kosovo* – price cap; *North Macedonia*, *England and Wales, Ireland* – revenue cap, and in *Spain*, *Georgia, Italy* and *Armenia* other methods are applied.

WAREG Members have shared the following information:

COST PLUS	REGULATORY MODEL INFORMATION
Albania / ERRU	Regulatory Model provides 3-year information of the utility, which includes the data for the previous year, expected data for the current year, and the foreseen data for the next year. The data consists about the income, expenses, billing, population served, number of connections with and without meters, etc. For utilities that intend to cover O&M costs, WRA analyzes them by determining the costs that will be covered by the tariff (justified/accepted costs), then defines the average tariff on the basis of which calculates volumetric tariffs for each category of the costumers. For utilities that are seeking to cover total costs, WRA also analyzes capital costs proposed for the network extension, asset depreciation costs to renew the capital, and interest of loans which utility has taken in the past. In addition to the financial analysis, WRA analyzes about ten performance indicators in order to define the objectives in the end of the next year, or in the end of the regulatory period of the regulatory for the utilities which have submitted a 5 Year Business Plan. The achievement of those objectives (performance indicators), will be considered by WRA in the next application by the utility for the new tariffs.
Montenegro / RAE	Aim of the regulatory model is to ensure recovery of the costs that are required for providing regulated services. Model does not include WACC.
Romania / ANRSC	Tariffs are based, respecting the calculation methodology established by ANRSC, on production and exploitation costs, amortization of investments done in tangible and intangible assets, environmental costs, reimbursement costs with bank loans, costs with delegation contract, and is also included a ratio for development of resources and modernization of networks and a profit ratio.
Malta / REWS	Tariffs are computed on the basis of full cost recovery. However part of the costs are carried through a Government subvention to the water operator. The full cost recovery method enables the operator to recover all its acceptable costs, earn a reasonable rate of return on the capital employed and to enable it to meet its current and future debt servicing obligations as and when they fall due.
Croatia / VVU	Legal requirement - Tariffs have to cover all maintenance and operational costs. Regulators requirement - The profit margin is not to exceed 5%.
Poland / PW	Tariff proposal should be built in a way that the utility is able to cover all reasonable costs (directly or indirectly related to water supply/wastewater collection and treatment) and the profit margin.
RATE OF RETURN	**REGULATORY MODEL INFORMATION**
Latvia / PUC	According to Methodology, approved tariffs must contain only such technologically and economically substantiated costs, which are necessary for efficient provision of the relevant water management services. This condition is developed in accordance with Water management law, where is determined that natural persons and legal persons cover all costs for water management services justified as a result of economic analysis, as well as pay for water resources and for damages caused thereto. As only costs related to provision of service can be referable, water management tariffs are considered as cost reflective. Furthermore, as water management tariffs must cover all referable costs, also cost recovery principle is in force.
Lithuania / VERT	NCC set direct costs, indirect costs, taxes, operating expenses, return of investment
Estonia / ECA	ECA has issued recommended principles of calculating price for water services. Water undertaking submit an application to set prices for water services and ECA verifies if the prices are justified and approves (or does not approve) the application. Water undertaking's rights to submit an application to set prices for water services are not restricted.
Belgium, Flanders / VMM - drinking water	Tariffs are set by determining the cost trend for a period of 6 years based on the business plan presented by the utility company. Prior approval of the business plan needs to be given by the board representing the member municipalities. The Regulator evaluates the consistency and legality of the business plan

Belgium, Flanders / VMM - wastewater	The water companies are obliged to sanitize the wastewater originating from the water they sell. They have a contract with the sewer companies (or municipalities) which transport the wastewater and a contract with Aquafin, which sanitizes the water. Both the sewer companies and Aquafin invoice their costs to the water companies. The water companies collect the funds from the water bill and also receive an operating grant from the Flemish government. They also get a contribution for the uncollected funds and operational cost for the billing process.
PRICE CAP	**REGULATORY MODEL INFORMATION**
Bulgaria / EWRC	The Regulator approves 5 tariffs for each of the years of the 5-year regulatory period, depending on the profile of OPEX, depreciation costs (investments) and volumes. The tariff for the 1st year comes into power, while the tariffs for the other years come into power after update with inflation minus X. The decision for update is undertaken automatically by EWRC at the end of the previous year.
Hungary / HEA	The Regulator manages OPEX and CAPEX ("building blocks") of utilities separately in the cost control system, but the price regulation applies to the total cost. During the cost review, the Regulator examines the operating costs of service providers in a batch manner
Belgium, Brussels / BRUGEL	Operators proposed an initial price approved by government, then they may ask each year for a rise based on operating costs and coming investments, finally approved or not by BRUGEL
UK, Scotland / WICS	WICS uses the RPI-X approach to regulation.
Kosovo / ARRU	ARRU sets out the business plan and tariff model framework for three years which comprises a revenue requirement made up of: operating costs, capital maintenance and return on RAB, which in turn determines the necessary tariffs for each of the three years based upon expected sales volumes and commercial efficiency expectations. The tariffs are determined at base year values and are adjusted for inflation for each year.
REVENUE CAP	**REGULATORY MODEL INFORMATION**
North Macedonia / ERC	Regulated revenue shall be set at the at the level which enables the water service provider to cover the justified operating costs and maintenance costs, capital investment costs, including costs for depreciation of assets for performing the relevant water service, as well as charges, taxes, and other fees prescribed by law.
UK, England and Wales / OFWAT	https://www.ofwat.gov.uk/regulated-companies/price-review/2019-price-review/pr19-final-methodology/
Ireland / CRU	CRU approves the tariffs charged to non-domestic customers (with particular tariff categories) per service to reflect the costs of providing water and/or wastewater services to customers. Non-Domestic tariffs: Irish Water submits to the CRU their cost allocation model, underlying costs, and the calculations to derive tariff levels for each customer category for approval. Irish Water's methodology and proposed tariffs are published for public consultation before the CRU comes to a decision on the method and charges. Domestic water and wastewater services are funded through central taxation where tariffs, approved by the CRU as economic regulator of Irish Water, are invoiced to the exchequer for water services use by domestic customers of Irish Water up to a defined threshold. For demand for water services above that threshold, domestic customers will be billed directly by Irish Water based on tariffs approved by the CRU.
OTHER	**REGULATORY MODEL INFORMATION**
Spain / MITECO	Since the Law 2/2015 (Law on no index to CPI) was issued and later developed by the Royal Decree 55/2017, urban water operators must reference significant cost to specific indexes; depreciation, financial and general cost and benefit are not revisable. Economic report must gather the rationale of these indexes, cost attribution for general costs, cost structure and risk coverage; labor cost is capped. In the absence of specific indexes for some relevant cost, the IGC index (Spanish Economy General Index) could be used. Changes in demand could be taken into account. These Law and Royal Decree are not in force for those concession agreement signed before them, which could be referred to CPI index until the contract expiration. Furthermore, it should be stressed that social mechanism actions in tariffs are becoming more important. These social actions are successful thanks to the solidarity of clients/users as a whole.
Georgia / GNERC	Mixed (OPEX Revenue cap and CAPEX Cost plus). OPEX is calculated based on the base year data using CPI/X-factor (Incentive based regulation). Planned investments for the regulatory period is included in tariff and corrected based on the actual figures at the end of the regulatory period.

Italy / ARERA	According to this model, each EGA (i.e. local authority) has to select the scheme better representing the initial operating circumstances of each operator (depending on the scale of planned investments with respect to the existing infrastructures, per capita operating costs and changes in operator's activities). The selected scheme is associated with the proper cost-reimbursement rules for the calculation of infrastructure/investment costs and for the evaluation of possible additional operating costs. Given the scheme, it's possible to calculate the total amount of costs and, then, to determine the tariff multiplier, θ. This model combines different sets of methods, in particular: - Limit on allowed amount of cost recovery expected in one year (revenue cap application); - Limit to annual price variation (price cap application) - a Rolling Cap mechanism on endogenous costs that allows the firm to partially earn the gains coming from cost reductions; - ex post reimbursement of "realized" investments and standardized parameters for the reimbursement of financial and fiscal costs of capital
Armenia / PSRC	Within the framework of public-private partnership a 15-year lease by one manager model is implemented from January 1, 2017

Table 4: Tariff setting models comments and explanations

II.2. TARIFF STRUCTURE

COM (2000) 477 states that pricing structures should include a variable element (i.e. volumetric rate, pollution rate) to ensure they serve an incentive function to water conservation and reduction of pollution.

The aims of a tariff structure should be economic efficiency, social affordability, and environmental sustainability. Generally, the tariff presents the revenues that the utility should receive in order to achieve operational and capital maintenance of the WS assets and provide the services to the customers. These necessary revenues however can be distributed to the customers in different ways:

- When the necessary revenues are distributed only by consumption, then the tariff is volumetric only (e.g. EUR per m^3). In these cases the tariff depends on the consumption, and customers with no consumption (abandoned or seasonal properties) do not support the maintenance of the system.

- When the necessary revenues are distributed only to properties then fixed charge is applied (e.g. EUR per property), usually annually. In these cases the charge is not related to the consumption in the property, and may depend by its value for example. Customers with more expensive properties support more to the maintenance of the system.

- When the necessary revenues are distributed to properties and to consumption then combined approach is applied – fixed charge (e.g. EUR per property) plus volumetric tariff (e.g. EUR per m^3). Fixed charge should recover some of the costs of the utilities, while the volumetric tariff should recover the rest of the necessary revenues.

In some of the cases the volumetric tariff can be divided into tariff blocks depending on consumption. Usually the principle applied is that the tariff for the 1st block of consumption is lower than the tariffs of the rest consumption blocks. In these cases tariff blocks are used to optimize and avoid excessive consumption.

In this section an analysis on whether such approach is applied in WAREG Members has been carried out. Information about tariff structure – volumetric only or additional fixed charge is provided, as follows:

Information about tariff structure	Is tariff volumetric only	Is there fixed charge	Are there tariff blocks based on volumes used	Is the tariff formula the same for each service
Bulgaria / EWRC	**Yes**	No	No	**Yes**
Georgia / GNERC	No	**Yes**	No	**Yes**
Albania / ERRU	No	**Yes**	**Yes**	**Yes**
Spain / MITECO	No	**Yes**	**Yes**	No
Montenegro / RAE	No	**Yes**	No	No
Hungary / HEA	No	**Yes**	No	**Yes**
Romania / ANRSC	**Yes**	No	No	**Yes**
Malta / REWS	No	**Yes**	**Yes**	**n.r.**
Latvia / PUC	**Yes**	No	No	**Yes**
Lithuania / VERT	No	**Yes**	No	**Yes**
Estonia / ECA	**Yes**	**Yes ***	No	**Yes**
Belgium, Flanders / VMM	No	**Yes**	**Yes**	No
Belgium, Brussels / BRUGEL	No	**Yes**	**Yes**	**Yes**
Croatia / VVU	No	**Yes**	**Yes**	**Yes**
Poland / PW	No	**Yes**	No	**n.r.**
Italy / ARERA	No	**Yes**	**Yes**	**Yes**
Armenia / PSRC	**Yes**	No	**n.r.**	**Yes**
North Macedonia / ERC	No	**Yes**	**Yes**	**Yes**
UK, Scotland / WICS	No	**Yes**	**Yes**	No
UK, England and Wales / OFWAT	No	**Yes**	**Yes**	No
Ireland / CRU	No	**Yes**	**Yes**	**Yes**
Kosovo / ARRU	No	**Yes**	No	**Yes**
Moldova / ANRE	No	**Yes**	No	No
Total (Yes)	**5**	**19**	**11**	**15**
Total (No)	**18**	**4**	**11**	**6**

- *Fixed charge is applied occasionally in Estonia*

Table 5: Information about tariff structure

There is established a methodology for tariff calculation for combined tariff in Romania, but at this moment this methodology is not applied by operators.

Discussion is held in Bulgaria for application of combined tariff in Bulgaria, with no clear progress at the moment.

Most of the WAREG Members (19) have reported that fixed charges are applied in conjunction with volumetric tariffs. Information for definitions is provided, as follows:

- *Albania*: The fix tariff (charge) is intending to cover the costs the utility has to face in order to maintain the water and wastewater services (ex. pressure, flow etc.) available to the customers at any time of the day, regardless whether they are using (benefiting) from such services or otherwise. The details of the fixed charge calculation are an open discussion matter.

- *Spain*: There is a great heterogeneity in tariff structures as each tariff is approved by each municipality (or group of municipalities). The Spanish water and wastewater association

completes every other year a report on urban water tariffs. The latest report was completed in 2018 and shows that for drinking water services there is always a volumetric charge (data received from operators), while in wastewater tariffs volumetric charges are set in 79% of the cases. It is worth bearing in mind that fixed charges are very common in drinking water tariffs (85%) and widely use in waste water tariffs (65%).

- *Montenegro*: There is fixed charge only for water supply. Calculation of the fixed charge takes into account the cost of maintenance, material cost except cost of electricity and fuel and costs for testing the water quality and number of customers.

- *Hungary*: In general there is a fix charge and a volumetric component of the tariff, but some providers only apply volumetric charge.

- *Malta*: Water tariffs are designed in the form of a rising block tariff plus a fixed charge.

- *Estonia*: Mostly the tariffs of water services are volumetric, but from time to time a basic fee can be set too together with the volumetric fee, if consumption in a certain area is seasonal or if an equal treatment of consumers cannot be provided otherwise.

- *Flanders*: The water bill has a mandatory structure consisting of a fixed charge and a variable part. For households, the fixed charge amounts to € 100 - € 20 per person and is charged per habitat and / or per water meter. The variable part has 2 progressive blocks. The block limit is 30 m³ per habitat + 30 m³ per person. For non-households, the fixed charge is the same as for households, but the variable part doesn't have progressive blocks, it's a flat structure for them. The regulation method for drinking water determines a tariff (Td; € / m³), which forms the basis for determining the rates applied for calculating the water invoice for the subscribers. The tariff for the sanitation is determined by calculating the cost for the purification of the wastewater and the transport at above municipal level minus the fee from the general funds from the Flemish government and taking the water consumption and inhabitants into account. The tariff for the transport of the wastewater at municipal level is legally limited to 1,4 times the tariff for the sanitation of the wastewater.

- *Brussels*: Fixed subscription to have access to water distribution.

- *Croatia*: Fixed charge has to cover the costs of water quality control, connections maintenance, meter readings, meter calibration, meter replacements and billing. Depreciation is to be covered through variable charge.

- *Poland*: Tariff structure varies among utilities. Some use volumetric component only. Others also use fixed element (standby costs).

- *Italy*: A fixed charge is separated for each service and reflects the costs to ensure water provision security and - concerning industrial discharges - the costs for contract management, metering and quality verifications of such discharges.

- *North Macedonia*: a two-part tariff comprising a fixed charge and a variable charge is applied.

- *Scotland*: Household customers pay their water and sewerage services' charges through their local councils. The tariff is uniform across the whole country and it depends on the Council Tax band of the property that the resident lives in. The higher the band the more the resident has to pay for their water services. The vast majority of household customers are unmetered; therefore, no volumetric component is seen in the charges. Households that have a meter can still choose to be charged on an unmetered basis.
  For non-household customers the structure of charges set by WICS is completely different. There is a fixed and a volumetric component to the charge and the vast majority of the non-household customers are metered. Each year WICS publishes the Wholesale Charges Scheme that outlines all charges that Scottish Water will charge the Licensed Providers for the wholesale services it will provide. [20]

- *England and Wales*: Not all customers are metered and therefore mix of volumetric and non-volumetric charges are applied. Companies determine the mix of fixed and volumetric charges.

- *Ireland*: Non-Domestic tariffs: Metered tariffs comprise both a fixed element and variable element.

- *Kosovo*: There is a fixed monthly charge for customers. For households is 1 €/month and for non-households is 2 €/month. Tariffs for non-domestic consumers are set at a higher level than for domestic consumers for social reasons although the regulator is encouraging the gradual removal of this cross-subsidy.

II.3. TARIFF BLOCKS BASED ON CONSUMPTION

A number of WAREG members (11) have reported that tariff blocks based on the volume used are applied:

- *Albania:* The tariff blocks are applied only for metered customers. In general utilities apply in two blocks volumetric water and wastewater tariffs. The first block of the tariffs (base tariffs) are proposed for the volume consumed within the limit of 4.5 m^3 per inhabitant per month or 150 liters per inhabitant per day. Further this limit the utility apply the second block tariffs, which are higher than the first one.

- *Malta*: Two tiers are applied for residential and domestic water tariffs – below and above 33m^3 per person per year, and the price of the 2nd tier is much higher, 3 tiers are applied for non-residential water tariffs – until 168m^3 per year, between 169 and 40 000 m^3, and above 40 000 m^3.

[20] The Wholesale Charges Scheme can be found here: https://www.watercommission.co.uk/view_Charges_for_201920.aspx

- *Spain*: It is very common to use tariffs based on blocks of consumption. In 62% of the cases for drinking water, 4 blocks or more are applied, while in 29% of the cases 3 blocks are applied. Only in 4% of the cases only 1 block (plain tariff) has been applied.
  Block tariffs are applied in wastewater collection and treatment, and in most of the cases are applied 4 blocks and more (25% in collection, and 7% in treatment).

- *Flanders*: For households 2 tiers are applied basic tariff and comfort tariff (2x basic tariff). No tariff blocks are applied for non-households.

- *Italy*: The dimension of classes in which is organized tariff variable charges is defined by each EGA. This structure includes a facilitated class - only for household domestic users - a basic class and up to three exceeding classes with an increasing charge, on a per capita base.

- *Scotland*: Non-household water charges: The water charge has two components: a meter based annual charge; and a volumetric charge. The water meter based annual charge is based on the size of the water meter on each water supply. In addition, Volumetric Charges feature three volume components:

  - Allocated Tranche – volume per meter (for metered supply points) up to 20m3 on every meter size, proportioned in accordance with how long the meter is installed. No volume charges apply.
  - Standard Volumes – all volumes beyond the Allocated Tranche (i.e. annual consumption above 20m3 at single meter Supply Points and annual consumption above the aggregate of 20m3 per meter at Supply Points with more than one meter). This charge element is a declining block tariff that is common across all meter sizes; and
  - Capacity Volume – volumes beyond the Allocated Tranche, up to the Capacity Volume Threshold (unique for each meter size). The Capacity Volume therefore overlaps with Standard Volumes.

  Non-household sewerage charges: Charges for the sewerage service relate to the four sewerage sub-services:
  - Foul Sewerage Meter Based Annual Charge - fixed;
  - Foul Sewerage Volumetric Charge - volumetric;
  - Ratable Value based Charge for Property Drainage - fixed; and
  - Ratable Value based Charge for Roads Drainage - fixed.

  Volumetric Charges feature three components:
  - Allocated Tranche – volume per meter (for metered supply points) up to $20m^3$ on every meter size, proportioned in accordance with how long the meter is installed. No volume charges apply.
  - Standard Volumes – all volumes beyond the Allocated Tranche; and
  - Capacity Volume – volumes up to the Capacity Volume Threshold, beyond the Allocated Tranche.

- *Ireland*: Irish Water has to introduce four separate tariff classes for metered connections for non-domestic tariffs based on annual consumption:

  - Band 1 Less than 1,000m^3
  - Band 2 Between 1,000m^3 and 19,999m^3
  - Band 3 Between 20,000m^3 and 249,999m^3
  - Band 4 Equal to or greater than 250,000m^3

II.4. TARIFF COMPONENTS

Information on the components of the numerator and the denominator of the tariff formulae is provided in the following table:

Components of tariff formula	What is included in the numerator of tariff formula	What is included in the denominator of tariff formula
Bulgaria / EWRC	OPEX + RAB * WACC Allowed OPEX, including depreciation costs. Regulatory Asset Base, calculated under Regulator rules. Rate on Return on the Capital, calculated by the Regulator	Water Supply Volumes are equal to System Inlet minus allowed level of Non-Revenue Water. Wastewater collection and treatment volumes are equal to prognosis water consumption
Albania / ERRU	Accepted Costs - staff salaries, power consumed, fuel, chemicals, costs of maintenance and repairs, depreciation of new capital investment, bank interests, and other provisions.	The quantity of the water in m3 billed metered or unmetered for all the categories of the customer, i.e. households, budgetary institutions and private industry (authorized consumption).
Montenegro / RAE	Regulated revenue for water supply. Fixed charge. Number of customers	Water supply quantity
Hungary / HEA	- JC=TOTEX-NJC+Δk+RAB*WACC - JC: all justified costs - TC: total audited cost, - NJC: Not justified cost, - Δk: additional cost changes - RAB * WACC: cost of capital.	Programed quantity within the current year of the proposal.
Romania / ANRSC	Exploitation costs (costs for materials, salaries and other activities with personnel), financial expenses. Reasonable profit, established between minimum and maximum levels negotiated with local public administration.	Programmed quantity within the current year of the proposal
Malta / REWS	Total variable retail tariffs should be equal to the sum of Electricity costs, wages, overheads and ROCE after making appropriate deductions or add backs in respect of Government subvention, fixed income charges and other services revenue	Sales volume of every water service.
Latvia / PUC	Depreciation of fixed assets and the book value of written-off intangible investments; Operating costs; Tax payments; Interest payments and repayment of the principal amount of long-term credits; Revenue in accordance with the Methodology; Service provider has rights to choose either include profitability, that cannot exceed 7% or calculate rate of return using WACC; Unforeseen costs in accordance with Methodology	Sales volume of every water service.

Components of tariff formula	What is included in the numerator of tariff formula	What is included in the denominator of tariff formula
Estonia / ECA	Justified operating expenses, which include costs for environmental fees and requirements, costs for quality and safety requirements, etc. Depreciation of fixed assets used for regulated activities. WACC (weighted average cost of capital) from fixed assets used for regulated activities (residual book value at the end of the regulation period + working capital- 5% of the allowed revenue in the regulation period).	Sales volume of every water service.
Belgium, Flanders / VMM	All costs related to the provision of drinking water. All revenues that are not generated by the regular water invoice are deducted	Expected volume of drinking water to be supplied
Italy / ARERA	The sum of the cost of capital (CAPEX), a component FoNI in support of new investments which are necessary to reach specific objectives, the sum of the operating costs (OPEX), the sum of the environmental and resource costs (ERC) and a balance adjustment component (Rc) linked to regulated revenues of the operator for the year (a-2)	Is the estimated revenue corresponding to the sum of the scalar products for each type of user, of the vector of tariff components, multiplied for the vector of scale variables actually measured;
North Macedonia / ERC	OPEX, including Depreciation, Return on the assets (RAB*WACC) and Liquidity assets	Sales volume of every water service.
Ireland / CRU	Operational and capital costs associated the provision water or wastewater services to a particular customer class.	Metered volumes - to derive the volumetric tariff levels per class. Connection numbers – to derive the fixed tariff level per class
Kosovo / ARRU	Operational costs, Capital Maintenance, Return on Capital	Sales volumes in m3 Cross subsidy coefficient Commercial efficiency (expected revenue collection performance)
Moldova / ANRE	Regulated revenue from the provision of regulated services, operational expenses, profitability, tariff deviations	Total volume of drinking water measured at the points of exit from the public drinking water supply networks

Table 6: Information about components of tariff formula

More information about the components in the numerator (operational costs, capital costs, rate of return on capital) and the denominator (volumes used) of the tariff formula is presented in the next chapters.

II.5. SUMMARY

A variety of tariff methods are used by WAREG Members in the process of WSS pricing as follows:

- Cost plus – *Albania, Montenegro, Romania, Malta, Croatia, Poland, Moldova*;
- Rate of Return – *Latvia, Lithuania, Estonia, Flanders*;
- Price Cap – *Bulgaria, Hungary, Brussels, Scotland, Kosovo*;
- Revenue Cap – *North Macedonia, England and Wales, Ireland*;
- Other – combination of previous methods – *Georgia, Spain, Italy, Armenia*.

Actual application of these tariff methods is shown in the next sections of this study.

Most of the WAREG Members (19) have reported that fixed charges are applied next to volumetric tariffs – *Georgia, Albania, Spain, Montenegro, Hungary, Malta, Lithuania, Estonia, Flanders, Brussels, Croatia, Poland, Italy, North Macedonia, Scotland, England and Wales, Ireland, Kosovo and Moldova*.

Information about fixed charges design and approach used is provided in section II.2 of this survey and shows that there is no common approach applied. In some cases fixed charge is applied only for one service. In some cases fixed charge is applied only locally or its application depends on utilities. Fixed charges are applied to properties / habitants / persons. Different costs are to be recovered from the fixed charges.

Bulgaria, Romania, Latvia and *Armenia* apply only volumetric tariff, meaning that utilities can recover necessary volumes only if service is consumed.

Some WAREG members (11) have reported that tariff blocks based on the volume used are applied – *Albania, Spain, Malta, Flanders, Brussels, Croatia, Italy, North Macedonia, Scotland, England and Wales, Ireland*. Information from the members provided in section II.3 of this survey shows that very different volumes ranges and quantities are applied in those cases.

In the most common cases members apply two blocks tariff (*Albania, Malta, Flanders*), although the dimensions of volumes very different (between 33 and 55 m3 per year for the 1st block).

Tariff blocks in *Scotland* and *Ireland* are applied only for non-domestic customers, and in the case of Scotland they are different for drinking and waste water.

Varieties of schemes are applied in the cases of *Italy* and *Spain*, where the decision is taken by the utilities or the local regulatory authorities.

III. OPERATIONAL COSTS

In this chapter we investigate:
1. Which of the OPEX categories are allowed in the tariff.
2. How general costs are distributed in order to include them in the prices of different services.
3. How the regulator ensures that the utility will achieve OPEX efficiency.

Article 9 of Directive 2000/60/EC requires the recovery of the costs of water services, including environmental and resource costs (cost recovery principle), although the directive does not provide operational requirements of how costs should be defined and regulated.

As a general principle however, a main aspect of regulators work is to define which costs are **allowable** in the tariff and which are to be excluded (for example costs for non-regulated activities should not be allowed in the regulated prices), and as a second step to allow **justified** size of the costs based on benchmarking or market surveys.

III.1. OPEX CATEGORIES

OPEX categories include costs for materials, external services, personnel, taxes and fees. An investigation on whether financial costs, sanctions and penalties, provisions, obligations from past periods, costs for re-evaluation of the asset stock value, and others are also included in this category is carried out. Financial costs are considered separately for investment and for operational loans, as different regulatory practices may occur.

Information reported in this study is provided below (Flanders is reviewed separately for drinking and wastewater, as there are some differences):

OPEX categories allowed in the tariff	Materials	External services	Personnel	Taxes and environmental fees	Other costs	Financial costs - investment loans	Financial costs - operational loans	Sanctions, penalties, forfeits,	Provisions, impairments, donations,	Obligations from previous periods	Costs for re-evaluation of asset or stock value	Other category
Bulgaria / EWRC	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No
Georgia / GNERC	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	No	No	No
Albania / ERRU	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	No	No
Spain / MITECO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	n.r.	n.r	n.r
Montenegro / RAE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Hungary / HEA	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	n.r
Romania / ANRSC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	n.r
Malta / REWS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Latvia / PUC	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No
Lithuania / VERT	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No
Estonia / ECA	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No

OPEX categories allowed in the tariff	Materials	External services	Personnel	Taxes and environmental fees	Other costs	Financial costs - investment loans	Financial costs - operational loans	Sanctions, penalties, forfeits,	Provisions, impairments, donations,	Obligations from previous periods	Costs for re-evaluation of asset or stock value	Other category
Belgium, Flanders / VMM - drinking water	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	No
Belgium, Flanders / VMM - wastewater	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**n.r**
Belgium, Brussels / BRUGEL	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No
Croatia / VVU	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Poland / PW	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No	**n.r**
Italy / ARERA	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No	No	**Yes**
Armenia / PSRC	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No	**Yes**
North Macedonia / ERC	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No	No	**n.r**
UK, Scotland / WICS	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No
UK, England and Wales / OFWAT	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	No	No	No	No	No
Ireland / CRU	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	**Yes**	No	No	No
Kosovo / ARRU	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	**Yes**	No	**n.r**
Moldova / ANRE	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	No	**Yes**	No	No	**n.r**
Total (Yes)	**24**	**24**	**24**	**23**	**20**	**12**	**13**	**8**	**10**	**4**	**6**	**4**
Total (No)	**0**	**0**	**0**	**1**	**4**	**12**	**11**	**16**	**14**	**19**	**17**	**12**

Table 7: OPEX categories allowed in the tariff

Table 7 shows that all regulators that participated in the study allow the following OPEX categories:

- **Materials**: electricity, fuel, treatment, office, repairs, etc.;
- **External services**: consultants, security, insurance, utilities, rents, treatment samples, personnel qualification, external repairs, sludge treatment, etc.;
- **Personnel**: salaries, social costs, etc.;
- **Taxes and environmental fees:** state and municipal taxes, regulatory fees, water take and discharge fees, etc... (excluding Scotland, where Scottish Water does not pay corporation tax as well as fees to the environmental regulator water abstraction);
- **Other costs:** business trips, court expenses, etc... (Excluding Estonia, England and Wales, Ireland, Moldova).

Table 7 shows that **financial costs** (interest rates, taxes and other charges) for investment and for operational loans are treated very different by the regulators:

- 9 regulators (*Spain, Montenegro, Romania, Malta, Flanders* for both drinking and wastewater [21], *Brussels, Scotland, England and Wales, Moldova*) allow financial costs for both investment and operational loans under OPEX;

- 3 regulators (*Georgia*[22], *Albania,* and *Croatia*) allow financial costs for operational loans under OPEX, but not for investment loans;

- 2 regulators (*Poland* and *Armenia*) allow financial costs for investment loans under OPEX, but not for operational loans;

- 6 regulators (*Bulgaria, Lithuania, Estonia, Hungary, Italy* and *Northern Macedonia*) do not allow any financial costs under OPEX.

As a general rule, rate of return on investments when provided in the tariff should finance payment of financial costs. Therefore cross-check information for those cases is provided in the next table:

WAREG Member	Financial costs - investment loans - included in OPEX	Financial costs - operational loans - included in OPEX	Tarff method applied	RAB is used in tariff regulation	Is WACC regulated
Bulgaria / EWRC	No	No	Price Cap	**Yes**	**Yes**
Georgia / GNERC	No	**Yes**	Other	**Yes**	**Yes**
Albania / ERRU	No	**Yes**	Cost plus	No	No
Spain / MITECO	**Yes**	**Yes**	Other	**n.r**	**n.r.**
Montenegro / RAE	**Yes**	**Yes**	Cost plus	No	No
Hungary / HEA	No	No	Price Cap	**Yes**	**Yes**
Romania / ANRSC	**Yes**	**Yes**	Cost plus	No	No
Malta / REWS	**Yes**	**Yes**	Cost plus	No	No
Latvia / PUC	No	No	Rate of return	**Yes**	**Yes**
Lithuania / VERT	No	No	Rate of return	**Yes**	**Yes**
Estonia / ECA	No	No	Rate of return	**Yes**	**Yes**
Belgium, Flanders / VMM	**Yes**	**Yes**	Rate of return	No	No
Belgium, Brussels / BRUGEL	**Yes**	**Yes**	Price Cap	No	No
Croatia / VVU	No	**Yes**	Cost plus	No	No
Poland / ME	**Yes**	No	Cost plus	No	No
Italy / ARERA	No	No	Other	**Yes**	**Yes**
Armenia / PSRC	**Yes**	No	Other	**Yes**	No

[21] *Flanders* wastewater : For Aquafin: Interest expenses for the major investments (such as the construction of treatment plants, etc.) are included in the OPEX but not in the remuneration model. They are reimbursed at the actual costs and the supervisor gives advice regarding the budget. Capital repayments for these investments are not included in the OPEX. Taxes and investments for software, hardware etc. are included in the remuneration model (and the OPEX). For the sewer companies (or municipalities) there are no guidelines, so both options are possible.

[22] Only cost of working capital

WAREG Member	Financial costs - investment loans - included in OPEX	Financial costs - operational loans - included in OPEX	Tarff method applied	RAB is used in tariff regulation	Is WACC regulated
North Macedonia / ERC	No	No	Revenue Cap	**Yes**	**Yes**
UK, Scotland / WICS	**Yes**	**Yes**	Price Cap	No	No
UK, England and Wales / OFWAT	**Yes**	**Yes**	Revenue Cap	**Yes**	**Yes**
Ireland / CRU	No	No	Revenue Cap	**Yes**	**Yes**
Kosovo / ARRU	No	No	Price Cap	**Yes**	**Yes**
Moldova / ANRE	**Yes**	**Yes**	Cost plus	No	No

Table 8: Cross-check information – financial costs included in OPEX categories

Some WAREG Members allow financial costs for investment and/or operational loans under OPEX categories. In 12 of the cases studied, the rate of return on investments is not included in the tariff, and therefore financial costs are included under OPEX, although we see different approach towards investment or operational loans – 8 of the cases surveyed allow financial costs for both types of loans (*Spain, Montenegro, Romania, Malta, Flanders, Brussels, Scotland, Moldova*), 2 of the cases surveyed allow financial costs for only operational loans (*Albania, Croatia*) and 2 of the cases surveyed – costs for only investment loans (*Poland, Armenia*).

In 8 cases, costs for **sanctions, penalties, and forfeits** charged by state, municipalities and/or private companies are allowed under OPEX categories (*Albania, Spain, Malta, Flanders* – for both drinking and wastewater, *Brussels, Croatia* and *Scotland*).

In 10 of the cases, costs for **provisions, impairments, donations, entertainment expenses and others** are allowed under OPEX (*Spain, Hungary, Malta*, *Flanders* for both drinking and wastewater*, Brussels, Croatia*, *Scotland*, *Ireland*, *Moldova*).

Only in 4 cases obligations from previous regulatory periods are allowed under OPEX (*Malta, Flanders* – for wastewater, *Croatia, Kosovo*).

In 6 cases costs for re-evaluation of asset stock value are allowed under OPEX (*Hungary, Romania*, *Malta*, *Flanders, Croatia).*

In 4 cases other costs (not included in the categories above) are allowed under OPEX:

- *Malta*: any other costs to ensure full cost recovery;
- *Croatia*: items listed in PLA that are nor CAPEX are considered OPEX;
- *Italy*: ARERA has introduced in his method a specific tariff component, ERC, separated by OPEX component, which made explicit both environmental costs – representing the cost of damage that water uses impose on the environment and ecosystems and those who use the environment – and resource costs - reflecting the costs of foregone opportunities which other uses suffer due to the depletion of the resource beyond its natural rate of recharge or recovery (e.g. linked to the over-abstraction of groundwater). Environmental costs are

calculated with a "cost based" principle, according to a ministerial specific disposition - balance components;

- *Armenia*: justified and necessary other expenses allowed by the legislation.

III.2. APPORTIONMENT OF OVERHEADS FOR SERVICES PROVIDED

Another aspect that is investigated is to determine how **overheads (general costs -** accounting, management, etc.) **are distributed in order to include them in the prices of different services** (water supply, wastewater collection and wastewater treatment). The methods used include apportionment by the proportion of the direct costs of each service, apportionment in proportion of volumes of each service, apportionment in proportion of the revenues of each service or other method used.

Overheads (General Costs) apportionment method	By direct costs in proportion of each service	By volumes in proportion of each service	By revenues in proportion of each service	By other principle	Comment
Bulgaria / EWRC	✓				Costs for administrative and support activities (general for all the business) are divided between the services (water supply, waste water collection and treatment) according to the portion of the direct costs.
Georgia / GNERC				✓	General costs are allocated based on the asset values and by number of employees.
Albania / ERRU			✓		General costs are distributed based on the percentage of revenues realized by each service of water and wastewater versus of total income.
Montenegro / RAE				✓	Costs can be distributed by following: total operational costs, total costs (operational and depreciation), operational revenues, number of customers, quantity of supplied water and quantity of collected wastewater and number of employees.
Hungary / HEA		✓			Operating overheads that have been shown to be closely related to production and can be subsequently assigned to water utility systems.
Romania / ANRSC					A key of costs allocation is used for distribution of costs accordingly to the income proportion generated by each activity.
Malta / REWS		✓			
Latvia / PUC			✓		The Merchant shall, in determining the amount of administrative costs to be indirectly distributed and attributable to water supply and sewerage services, take into account the proportion of revenue from water supply and sewerage services in total revenue of the Merchant from the provision of services in the previous reporting year, or the Merchant's approved method for accounting, distribution and attribution of costs by cost accounting centers.
Lithuania / VERT	✓				By direct + indirect costs portion

Overheads (General Costs) apportionment method	By direct costs in proportion of each service	By volumes in proportion of each service	By revenues in proportion of each service	By other principle	Comment
Estonia / ECA	✓				Sometimes by working hours of employee (divided between different services).
Belgium, Flanders / VMM				✓	Direct cost or volume depending on the service (drinking water or waste water) and needs to be substantiated by the utility company. The overhead related to invoicing the water bill is proportioned based on the revenue for the drinking water and wastewater components.
Belgium, Brussels / BRUGEL				✓	Fixed allocation based on Investment, wages and Turnover for supply and sewage
Croatia / VVU					At water utility discretion.
Poland / PW					No country-wide rules on this matter.
Italy / ARERA				✓	Where it's possible, general costs are distributed by direct cost proportion in integrated water services. In other cases costs are distributed by volumes and other technical indicators, as set by unbundling dispositions.
Armenia / PSRC	✓				
North Macedonia / ERC	✓				
UK, Scotland / WICS	✓				In our annual return we ask Scottish Water to split the general and admin costs. If we use these for modelling or anything else we use a proportion from these.
UK, England and Wales / OFWAT	✓				
Ireland / CRU				✓	90% of the General costs (i.e., utility's overhead costs) are allocated across the customer classes on the basis of share of 'connections' across the customer classes and 10% of utility's overhead costs are allocated across the customer classes on the basis of share of 'volume' across the customer classes
Kosovo / ARRU				✓	ARRU has designed specific cost centers for each service (water and wastewater). There are direct cost centers, for both services, and indirect cost Centers, and has developed Accounting Guidelines on how to allocate the costs.
Moldova / ANRE	✓				
TOTAL	**8**	**2**	**2**	**8**	

Table 9: Methods of apportionment of general costs between services

Information reported in this study shows that most commonly applied method for apportionment of overheads (general costs) is by in proportion of the direct costs for each service (7). Other methods applied include apportionment in proportion to the volumes supplied / treated (2), in proportion to the revenues generated (2) and other cases (6) including asset values, investments or a mix of above methods.

III.3. OPEX OPTIMIZATION

A very important topic is in determining how the regulator ensures that the utility will achieve OPEX efficiency.

Regulators apply different approaches, and as a general rule all costs are subject to detailed review when the utility submits its application to the regulator. The regulator questions and assesses costs levels reported for the base period.

In the cases where regulators measure performance through Key Performance Indicators (KPIs), these can be used to push for cost optimization (for example electricity consumption, measured as kWh per m^3 water delivered). In some areas the regulator may request that the utility plan cost reduction, based on benchmarking or cap of costs.

Methods of achieving OPEX optimization	By KPIs - technical and/or financial	By direct guidance to plan reduction	Other	No method applied	Comment
Bulgaria / EWRC	✓				EWRC provides individual goals for KPIs levels that are linked with OPEX. For example KPI for electricity consumption kWh/m3 leads to reduction of electricity in MWh and costs. KPI for NRW leads to reduction of losses and system inlet, therefore to reduction of variable costs. Furthermore, all OPEX is analyzed and benchmarked.
Georgia / GNERC	✓				
Albania / ERRU	✓				WRA estimates the OPEX efficiency based on KPIs. WRA analyzes all the costs of the utility and accepting only the justified costs. WRA analysis the water balance reported by the utility, breakdown of the NRW items (real and apparent losses), and the situation of the assets. Further WRA estimates the KPIs based on those data in order to setup the future objectives for the utility. The main objectives consist in improving KPIs regarding the financial efficiency (covering the O&M , or total costs), collection rate, NRW reduction, continuity of the service etc.
Spain / MITECO			✓		As water services are under municipal (group of municipalities) competences there is a political and administrative control in the water and wastewater tariff update process. Therefore, operators are extremely aware of the necessity of the OPEX control so as to achieve higher efficiencies.
Montenegro / RAE				✓	Draft methodology does not prescribe OPEX optimization; it is only based on costs.
Hungary / HEA				✓	
Romania / ANRSC			✓		Unjustified expenses are not to be included in costs
Malta / REWS		✓			Governmental direction, and Parliamentary approval of estimates of income and expenditure
Latvia / PUC			✓		The Tariff calculation methodology does not lay down special rules. Efficiency is analyzed during tariff evaluation process. Comparison of expenses and technical indicators are made between similar water management service providers.

Methods of achieving OPEX optimization	By KPIs - technical and/or financial	By direct guidance to plan reduction	Other	No method applied	Comment
Lithuania / VERT		✓			Electricity, wage, repair works and materials costs are setting be benchmarking methodology
Estonia / ECA	✓				1) Observation of the dynamics of expenses in time and its comparison with the dynamics of the consumer price index; 2) Detailed analysis of the justification of various cost components (incl. expert opinions); 3) Benchmarking - comparison of expenses and technical indicators with similar water companies
Belgium, Flanders / VMM - drinking water	✓				
Belgium, Flanders / VMM - wastewater			✓		An efficiency gain is imposed for the utility Aquafin. The percentages are set on the budget meeting and advised by the economic supervisor. The supervisor supports its advice by studies, econometric calculations, benchmarks
Belgium, Brussels / BRUGEL			✓		Operators must fill in a panel of KPI's but those are not monitored
Croatia / VVU				✓	
Poland / PW				✓	
Italy / ARERA			✓		Regulatory schemes allow more favorable tariff adjustment and incentives to operators which have a lower level of per capita OPEX respect to the national average value. Furthermore endogenous costs follow a Rolling Cap mechanism that allows the firm to partially earn the gains coming from cost reductions.
Armenia / PSRC			✓		In tariff calculations are included only necessary and substantiated costs needed for licensed activity
North Macedonia / ERC	✓				
UK, Scotland / WICS			✓		WICS sets efficiency targets for Scottish Water's operating and capital expenditures. Scottish Water's performance against these targets is measured through the regulatory period. Econometric benchmarking is used to establish a relationship between the costs incurred and appropriate external cost drivers. Such benchmarking allows for a robust comparison of different regulated companies, operating in quite diverse circumstances (customers, geography, size of company, asset base etc.).
UK, England and Wales / OFWAT			✓		By financial stimulus
Ireland / CRU			✓		The CRU benchmarks Irish Water against a range of comparable water utilities (at similar stages in evolution - post regulation) to establish Irish Water's level of efficiency. This benchmarking analysis identifies the efficiency gap between Irish Water and the median company. The CRU reviews evidence of the expected rate of change in OPEX unit cost efficiency and draws conclusions on Irish Water's ability to close the efficiency gap. The CRU then sets an appropriate efficiency challenge for Irish Water to reduce its OPEX costs while making productivity gains.
Kosovo / ARRU			✓		ARRU challenges the water companies to be more efficient in their operational costs by using regression analysis on comparing companies, and using the better performing companies to set the benchmarks for the rest to achieve.

Methods of achieving OPEX optimization	By KPIs - technical and/or financial	By direct guidance to plan reduction	Other	No method applied	Comment
Moldova / ANRE	✓				
Total	7	2	11	4	

Table 10: Methods of achieving OPEX optimization

In 7 cases (*Bulgaria, Georgia, Albania, Estonia, Flanders* – for drinking water, *North Macedonia, Moldova*) regulators use both technical and financial KPIs to stimulate the utility to achieve OPEX efficiency compared with improvement of service quality. Nevertheless regulators perform different benchmarking analysis and assessment of cost levels.

In the case of Bulgaria, 29 KPIs (technical and financial) are used by the regulator to monitor and measure the quality of the service. Prior the beginning of the next regulatory period EWRC analyzes the national levels of all KPIs, and sets individual targets for each utility in order to improve the national levels. Some of these KPIs have a direct impact on variable costs – for example Non-Revenue Water and Electricity consumption KPIs impact costs for materials (water treatment and electricity) and environmental fees. Other KPIs (network bursts, network sectorization, leakage control, meter improvement) have an indirect cost effect, as their implementation lead to better network management, and should lead to reduction of repair costs. Some costs are subject to benchmarking and direct guidance for optimization (costs for sludge treatment, personnel costs and others). Nevertheless the regulator provides strict control on all costs information during the review of the business plan and tariff applications.

In 2 cases (*Malta* and *Lithuania*) OPEX efficiency is achieved by direct guidance to the utility to plan reduction. In the case of Lithuania cost levels are based on benchmarking analysis.

In 11 of the cases studied, regulators apply different approaches to ensure OPEX efficiency:

- *Spain*: political and administrative control;
- *Romania*: process of costs justification;
- *Latvia*: Efficiency is analyzed during tariff evaluation process, Comparison of expenses and technical indicators are made between similar water management service providers;
- *Flanders* (wastewater): Parameter for the efficiency gain;
- *Brussels*: total payroll is analyzed;
- *Italy*: Regulatory schemes allow more favorable tariff adjustment and incentives to operators which have a lower level of per capita OPEX respect to the national average value;
- *Armenia*: In tariff calculations only necessary and substantiated costs needed for licensed activity are included;
- *Scotland:* WICS sets efficiency targets for Scottish Water's operating and capital expenditures;
- *England and Wales:* By financial stimulus.
- *Ireland:* Benchmark against a range of comparable utilities.
- *Kosovo:* Regression analysis methods on comparing companies and using the better performing companies to set the benchmarks for others to achieve

In 4 cases (*Montenegro, Croatia, Hungary* and *Poland*), regulators have not yet introduced methods for achievement of OPEX optimization. It is noted however that the water regulators in Montenegro and Poland were only established recently and are still developing their methodologies, while in Croatia the regulator ensures ex-post control on municipality's decisions.

III.4. SUMMARY

Information reported by WAREG members show huge variety of the type of costs that are allowed under OPEX expenses:

All WAREG members include costs for materials, external services and personnel under OPEX costs categories. Most of the members (with some minor exceptions) include costs for taxes and environmental fees and other costs (like business trips, court expenses).

Some WAREG Members allow financial costs for investment and/or operational loans under OPEX categories. In 12 of the cases studied, the rate of return on investments is not included in the tariff, and therefore financial costs are included under OPEX, although we see different approach towards investment or operational loans – 8 of the cases surveyed allow financial costs for both types of loans (*Spain, Montenegro, Romania, Malta, Flanders, Brussels, Scotland, Moldova*), 2 of the cases surveyed allow financial costs for only operational loans (*Albania, Croatia*) and 2 of the cases surveyed – costs for only investment loans (*Poland, Armenia*).

In 8 of the cases, costs for sanctions, penalties, and forfeits charged by state, municipalities and/or private companies are allowed under OPEX categories (*Albania, Spain, Malta, Flanders* – for both drinking and wastewater, *Brussels, Croatia* and *Scotland*).

In 10 of the cases, costs for provisions, impairments, donations, entertainment expenses and others are allowed under OPEX (*Spain, Hungary, Malta*, *Flanders* for both drinking and wastewater*, Brussels, Croatia*, *Scotland*, *Ireland*, *Moldova*).

Only in 4 cases obligations from previous regulatory periods are allowed under OPEX (*Malta, Flanders* – for wastewater, *Croatia, Kosovo*).
In 6 cases costs for re-evaluation of asset stock value are allowed under OPEX (Hungary, Romania, Malta, *Flanders* for both drinking and wastewater and *Croatia).*

Regulators apply different methodologies for apportionment of overheads between regulated services. The most commonly applied method for apportionment of overheads is according to the proportion of the direct costs for each service (8 cases – *Bulgaria, Lithuania, Estonia, Armenia, Northern Macedonia, Scotland, England and Wales, Moldova*).

Other methods applied include apportionment according to the volumes of water supplied/ treated (2 cases – *Hungary, Malta*), apportionment in accordance to revenues generated (2 cases – *Albania, Latvia*). In the other cases studied (*Georgia, Montenegro, Flanders, Brussels, Italy, Kosovo*) other methods are applied, including asset values, number of personnel or customers, investments or a mix of above methods. Flanders applies different approaches in tariff setting of drinking and waste water.

A very important topic is in determining how the regulator ensures that the utility will achieve OPEX efficiency. Different approaches are applied by the WAREG Members in this area - as a general rule all costs are subject to detailed review when the utility submits its application to the regulator.

In the cases where regulators measure performance through KPIs, these can be used to push for cost optimization. In 7 cases surveyed this approach has been applied (*Bulgaria, Georgia, Albania, Estonia, Flanders* – for drinking water*, North Macedonia, Moldova*).

Some regulators issue direct guidance to utilities how to plan costs optimization (*Malta, Lithuania*), while other members apply other approaches, usually mix of all mentioned in the above (*Spain, Romania, Latvia, Flanders* – for wastewater*, Brussels, Italy, Armenia, Scotland, England and Wales, Ireland, Kosovo*).

In 4 cases (*Montenegro, Hungary, Croatia* and *Poland*), the regulators have not yet introduced methods for achievement of OPEX optimization. It is noted however that the water regulators in Montenegro and Poland were only established recently and are still developing their methodologies, while in Croatia the regulator ensures ex-post control on municipality's decisions.

IV. CAPITAL COSTS

In this chapter we investigate:
1. How depreciation costs are calculated.
2. When investment loans are included in tariff.
3. How does the utility account investments.

Investments in infrastructure are financed by equity, revenues, loans and public funds. Overall, CAPEX expenditures of utilities are reimbursed through regulated tariffs through depreciations, while financial costs for loans through return on investments (although as we saw in previous chapter, in some cases financial costs are included in OPEX).

Utilities are stimulated to invest in infrastructure in order to fulfil legal requirements (for example potable and wastewater treatment, minimum pressure, metering); improve service quality (service continuity, network failure rate, customer service), optimize network operations and maintenance (GIS, SCADA systems) and others.

Utilities should be encouraged to invest by the allowed return on investment included in tariffs, although this factor motivates more private companies (owners or contract operators) rather than public companies owned by the state or local municipalities.

The size of the investments depends on the legal, contract or regulatory requirements set to the utilities. As a general economic principle, the utility should invest annually at least the level of depreciation norms, in order to maintain the assets. Different regulators apply different regimes for depreciation costs calculation – based on utility accounting policy or based on regulator rules, setting assets value to be depreciated and useful life. Furthermore several regulators monitor which assets may be allowed in depreciation costs calculation.

As depreciations are not sufficient for investment needs, utilities will have to provide external financing for CAPEX expenditures through investment loans. Different regulatory approach may be applied in these cases. The regulator may choose to include these funds in the tariff preliminary (as a revenue anticipation in order to ensure financing) or subsequently (after the utility construct the assets).

There are also very different approaches of how the utilities account the investments – based on their own accounting policies, on contract or legislative requirements, or based on regulatory rules.

IV.1. CALCULATION OF DEPRECIATION COSTS

It is a regulatory decision on whether to allow utility to calculate depreciation norms based on its own accounting policy, keeping in mind that utilities may apply national or international accounting standards (on one hand), and have freedom to change depreciation norms as part of their accounting policy (on the other hand), or to issue regulatory rules that will set a national standard and will apply to all utilities.

Another regulatory decision is on whether to allow the utility to calculate depreciation norms on all assets owned by the company or to allow only assets used for water and sanitation services (without assets used for non-regulated activities for example, if there are such).

WAREG members have reported the following methods:

Depreciation costs calculation	Depreciation costs for all assets	Depreciation costs for assets, used only for WSS
Depreciation costs based on utility accounting policy	Albania, Romania, Malta, Latvia, Flanders, Brussels Moldova	Montenegro, Hungary, Estonia, Croatia, Poland, North Macedonia, Ireland
Depreciation costs based on Regulator accounting policy	Georgia, Scotland	Bulgaria, Lithuania, Italy, Armenia, England and Wales Kosovo

Table 11: Depreciation costs calculation

Table 11 shows that all 4 options for calculating depreciation costs are used by WAREG members:

1. All assets owned by the utility, depreciation norms set as by utility own accounting policy – *Albania, Romania, Malta, Latvia, Flanders, Brussels, Moldova*;
2. Only assets used for water and sanitation services, depreciation norms set as by utility own accounting policy – *Montenegro, Hungary, Estonia, Croatia, Poland, North Macedonia, Ireland*;
3. All assets owned by the utility, depreciation norms based on Regulator rules – Georgia, Scotland, Kosovo;
4. Only assets used for water and sanitation services, depreciation norms based on Regulator rules – *Bulgaria, Lithuania, Italy, Armenia, England and Wales, Kosovo*.

Options 1 and 2 that admit the utilities accounting policy, are often associated to a cost plus approach, while options 3. and 4. are linked to more incentivized regulatory tools.

IV.2. WHEN INVESTMENTS FINANCED THROUGH LOANS ARE INCLUDED IN THE TARIFF

As a general rule investment loans generate cost items charged in tariffs after the investments were realized and the assets are constructed, as the depreciation costs and the return on capital (WACC). As noted in the previous sections, some regulators allow the financial costs (interest rates and taxes) in the OPEX, while in other cases these are paid through WACC.

WAREG members have reported the following:

Investment loans	Are investments financed through loans included ex-ante in tariff (before the actual investment):	Are investments financed through loans included ex-post in the tariff (after the actual investment):	Comment
Bulgaria / EWRC	**Yes**	No	Depreciation costs of public assets are allowed in the tariff to finance new investments in public assets, as well as to pay investment loans, used to invest in public assets. Financial costs are to be paid through rate of return on capital
Georgia / GNERC	**Yes**	No	In WACC
Albania / ERRU	No	**Yes**	WRA analysis case by case the utilities' loan/credit terms in regard of the time to pay it back, as grace period and other details of the obligations that they impose to the utility.
Spain / MITECO	**n.r.**	**n.r.**	
Montenegro / RAE	No	No	According to the Law, infrastructure is owned by municipality, so municipality has obligation to invest in it. Draft methodology prescribes that interest on loans is included in tariff.
Hungary / HEA	No	**Yes**	
Romania / ANRSC	No	**Yes**	In accordance with law stipulation, investments done by operators using public funding (non-refundable funds, state budget funds) are registered in public domain of the municipality and are recovered through royalty, and other investments done with operator`s own money (co-financing, bank loans) are registered in operator`s accounting program and are recovered through amortization.
Malta / REWS	**Yes**	No	
Latvia / PUC	No	**Yes**	
Lithuania / VERT	**Yes**	No	
Estonia / ECA	No	**Yes**	Overall loans are switched into tariff through depreciation (capital cost) of investments and interest are covered by WACC. As a regulation period-12 month, in tariff setting process could be coming year, an investments that is going to be made in this period, would be switched into price (depreciation). Whether the assets are financed by loan or not has no importance.
Belgium, Flanders / VMM - drinking water	**Yes**	No	The future tariffs are set based on the predictions/needs in the business plan
Belgium, Flanders / VMM - wastewater	**Yes**	No	The tariff is based on the predictions of the coming year
Belgium, Brussels / BRUGEL	**Yes**	No	Depreciation at the same rate than the loan
Croatia / VVU	No	**Yes**	The utility may charge development charge to raise funds for utility share in overall investment before it actually occurs. Through the development charge that is covering the debt service and financial costs, as they are. There is no WACC as regulatory limit.
Poland / PW	No	**Yes**	No country-wide rules on this matter.
Italy / ARERA	No	**Yes**	Investment loans are reimbursed once the investment is realized, that is to say when it enters in the asset book, covering the cost of capital investment in the years (a+2): the investment value through depreciation rules and interests through standardized financial costs.
Armenia / PSRC	No	**Yes**	

Investment loans	Are investments financed through loans included ex-ante in tariff (before the actual investment):	Are investments financed through loans included ex-post in the tariff (after the actual investment):	Comment
North Macedonia / ERC	No	**Yes**	Investment loans are not included preliminary in the tariff - but when assets are built and are in RAB - through rate on return on investment capital, and through new depreciations
UK, Scotland / WICS	**Yes**	No	During the Strategic Review of Charges (SRC) - the price setting process in Scotland - all Scottish stakeholders (including Scottish Water, Scottish Ministers, WICs and etc.) agree on the required investment needs and investment priorities. These decisions then feed into the price setting process for the upcoming regulatory period. Scottish Water has to finance all investments in 1 of the 2 ways: - gathering charges for water and sewerage services; or - borrowing money at the lowest available cost. All these considerations are taken into account when deciding on future prices.
UK, England and Wales / OFWAT	No	No	Methodology utilizes Notional capital structure rather than actual capital structure along with Ofwat determination of cost of debt and equity not actual cost of debt.
Ireland / CRU	**n.r.**	**n.r.**	
Kosovo / ARRU	No	**Yes**	Costs of finance are not directly included in the tariff. Assets financed by loans are added to the RAB. These new assets are then subject to a return on capital and depreciation which is passed through to tariffs.
Moldova / ANRE	No	**Yes**	The investment loans included subsequent in the tariff after the actual investment, if the investment loans are for the building assets, and if the assets were build and are in RAB - through rate on return on investment capital, and through new depreciations.
Total (Yes)	**8**	**12**	
Total (No)	**14**	**10**	

Table 12: Investment loans

Almost half of WAREG members (12) that participated in this survey report that investments financed with loans are included in the tariff after the investments are made and assets constructed – *Albania, Hungary, Romania, Latvia, Estonia, Croatia, Poland, Italy, Armenia*, *North Macedonia, Kosovo, Moldova*.

Seven WAREG members have reported that investments funded with loans are included preliminary in the tariff (before the actual investments) – *Bulgaria, Georgia*, *Malta, Lithuania, Flanders*, *Brussels* and *Scotland*.

In 2 cases the investment loans are not included in the tariff – neither preliminary nor subsequently – *Montenegro, England and Wales*. In the case of Montenegro it is noted that investments are made by the municipalities, not by the utilities, and financial cost on loans is included in tariff.

IV.3. REPORTING INVESTMENTS

As accounting standards (both national and international) provide general freedom for companies to separate operational and capital expenses, these rules are usually established in the company accounting policy.

Water and sanitation sector include both below-ground network assets (water-mains, sewers, house connections) as well as above-ground assets (pumping stations, treatment plants, reservoirs, chlorination stations, others) and different approaches can be applied to separate OPEX activities (pipe repair) from CAPEX activities (pipe replacement) especially when you take into account that often pipe repair can also include replacement of pipe section.

Some utilities are driven to report many of their repair works as OPEX, even if some of them should be treated as CAPEX due to financial reasons – these are costs for maintenance that are allowed in the tariff with their full size, and under cost-plus / rate of return tariff setting any changes in cost levels are quickly reflected in tariff updates. If these costs are reported as CAPEX however, they will be included only partially in the tariff through depreciations and rate of return. This case usually reflects public companies owned by the state or local municipalities that do not have requirements for investment levels.

On the other hand, if the utility is obliged to achieve certain investment levels and/or if it is stimulated with higher return on investment rates (through concession contract for example), it will be driven to report more of its activities as CAPEX, even if some of them are actually operational works. This case usually reflects private companies with long-term contracts.

Therefore, if no specific accounting rules are introduced in the legislation, regulators can accept information from utilities based on their accounting policy or issue regulatory guidance rules for investment accounting and reporting.

Information is provided in the next table:

How does the utility account investments	By regulatory accounting rules	By its own accounting policy	Are there regulatory accounting rules
Bulgaria / EWRC	✓		**Yes**
Georgia / GNERC		✓	No
Albania / ERRU		✓	No
Spain / MITECO			**n.r.**
Montenegro / RAE			No
Hungary / HEA		✓	No
Romania / ANRSC	✓		**Yes**
Malta / REWS		✓	No
Latvia / PUC		✓	No
Lithuania / VERT		✓	No
Estonia / ECA		✓	No
Belgium, Flanders / VMM		✓	No
Belgium, Brussels / BRUGEL		✓	No
Croatia / VVU		✓	No
Poland / PW		✓	No
Italy / ARERA	✓		**Yes**
Armenia / PSRC			**n.r.**
North Macedonia / ERC		✓	No
UK, Scotland / WICS	✓		**Yes**

How does the utility account investments	By regulatory accounting rules	By its own accounting policy	Are there regulatory accounting rules
UK, England and Wales / OFWAT	✓		**Yes**
Ireland / CRU			**n.r.**
Kosovo / ARRU		✓	**Yes**
Moldova / ANRE		✓	**n.r.**
Total (Yes)	**5**	**14**	**6**

Table 13: Investment reporting

Table 13 shows that in most of the cases (14) – in *Georgia*, *Albania, Hungary, Malta, Latvia*, *Lithuania, Estonia, Flanders, Brussels, Croatia, Poland*, *North Macedonia, Kosovo, Moldova* – utilities account investments in accordance with their own accounting policy.

In 5 cases (*Bulgaria, Romania Italy, Scotland, England and Wales*) utilities account investments to the Regulator based on regulatory accounting rules, and report that the regulator has issued regulatory rules. In *Kosovo*, ARRU has issued regulatory rules, but utilities account investments in accordance with conventional accounting.

Information on depreciation norms, as well as rules to separate network repair works (OPEX) and rehabilitation works (CAPEX) is provided in the following table:

WAREG Member	Information about depreciation norms	Rules to separate network repair works - accounted as OPEX and as CAPEX
Bulgaria / EWRC	EWRC assumes useful life of water mains and sewers of 50 years (2%), buildings 33,3 years (3%), machines and equipment 10 years (10%), transportation 10 years (10%), IT hardware and software 5 years (20%), intellectual rights (GIS, Hydraulic models) 5 years (20%).	EWRC has provided definitions for investment (capital cost, CAPEX) in accordance with the National and International Accounting Standards, meaning that utilities should account as CAPEX all costs for acquisition of the asset, including costs for materials, labor and external services. In terms of pipeline projects (water mains and sewers in the distribution network), EWRC has put the limit of 10 meters of pipe, regardless the value: - replacement of pipe ≥10 meters is accounted as CAPEX, - replacement of pipe < 10 meters as OPEX. Replacement of stop valves, air-leave valves, hydranths, house connections, meters and other network elements are accounted as CAPEX (regardless of the value) in separate code system.
Georgia / GNERC	For assets created before 01.01.2018 GNERC uses depreciation norms declared by companies. For assets created before 01.01.2018 GNERC uses depreciation norms declared by GNERC	
Albania / ERRU	The fiscal depreciation norms used are: 5% per year for the buildings, 20% the pipeline networks, and 25% IT items. The utilities assume however lifetime of 50 years for the pipelines. This fact is allowed and accepted by WRA.	In general the utilities account the repair costs as OPEX when the repair needs not more than 20 m pipeline material or the costs do not overpass the limit of 2,000 euro.
Hungary / HEA	The applicable accounting regulation contains the regulation in connection with asset management (including depreciation).	
Romania / ANRSC		Network repairmen expenses are included in exploitation expenses (OPEX)

WAREG Member	Information about depreciation norms	Rules to separate network repair works - accounted as OPEX and as CAPEX
Malta / REWS	Buildings 50 years Water infrastructure and related assets: 5 - 39 years Plant, equipment, furniture and fittings: 5 - 10 years Waste water infrastructure and related assets: 5 - 39 years Integrated utilities business systems: 2 - 12 years	Generally repair works and any replacement works are considered as OPEX. New investments and extensions and generally considered as CAPEX
Latvia / PUC	Regulator does not set depreciation norms, but usually they are: Buildings – 50 years Pipes – 40-50 years Mechanisms and installations – 10-15 years	The costs of maintenance and repairs of fixed assets shall include costs for maintenance works, servicing and repairs of fixed assets (buildings, structures, equipment etc.) used in the provision of water management services which the Merchant purchases as an outsourced service. The costs listed in this item shall be written off in the reporting period in which they have arisen. The repair necessity shall be determined by the duty to ensure safe and continuous provision of water management services. The repair costs which are capitalized shall not be included in this item. If repair work is done by staff of service provider, costs are divided between several costs positions like staff costs, costs of material and costs of transport
Belgium, Flanders / VMM - wastewater	For the nv Aquafin, the depreciation is not the same as the reimbursements that the nv Aquafin receives. Architecture is reimbursed at 30 years, 20 years for certain assets, electromechanics at 15/10 years, other one-off.	
Estonia / ECA	Pipes, buildings, reservoirs 2, 5% (40 years), machines, appliances 6, 7% (15 years).	No strict rules, but repair works which aim is to prolong the useful life of assets, should be accounted as capital cost (usually planned in the public water supply and sewerage development plan) and emergency repair works caused by immediate cases, are accounted as operational costs.
Italy / ARERA	During the present regulatory period water integrated assets are not bundled by service (e.g. water supply, sewerage, wastewater treatment), but are accounted by typology of asset (e.g. plant, network, tank etc.). The new unbundling dispositions set up by ARERA will provide for a more detailed accountability of assets, and its integration into cost reimbursement rules.	Operators have to follow national/international accounting standards.
Kosovo / ARRU	Depreciation, accounted for on a current cost basis, is applied to the RAB value of non-network assets only. The depreciation formula is on a percentage of declining balance of the RAB (non-network) based on average asset life of the collection of non-network assets.	Underground assets are regarded as having a useful life in perpetuity, i.e. depreciation is not applied and the RAB value of these assets is maintained in perpetuity. All repair and replacement activities for these assets are therefore regarded as operational expenditure. Expansion and reinforcement of the network is added to the RAB.
Moldova / ANRE	For the calculation of the depreciation for watermains and sewers, can be applied various methods: the method of linear disposal; proportional to the volume of products (services), the method of the digressive balance, the digressive method with decreasing rate. Usually the utilities use the method of linear disposal, which results in uniform breakdowns throughout the useful life of the asset. The useful life of the assets is regulated by a normative act.	OPEX - current maintenance, verification and repair expenses, incurred in its own or by third parties; the expenses for the replacement of parts or components of the fixed assets, not fully depreciated according to the rules on regulated depreciation, if by modernization the replacement, the capacity and / or the safety in operation or the prolongation of the life of the respective fixed assets are not achieved. This category includes maintenance and repairs that are not of the nature of the investments. CAPEX - network repair works which increase the capacity and / or operational safety of the tangible and intangible assets; and/ or extend of the initial technical and economic service life;

Table 14: Depreciation norms and rules to separate OPEX and CAPEX network works.

The information reported in table 14 show how different practices are applied in different countries for determining asset useful life (and depreciation norms), including differences in accounting standards and regulatory practices; as well as rules to separate network repair works (to be accounted as OPEX) and network rehabilitation works (to be accounted as CAPEX).

IV.4. SUMMARY

A variety of options are used for calculation of depreciation costs, allowed in the tariff for CAPEX funding:

- Depreciation costs for all assets owned by the utility, set with norms by utility`s own accounting policy – *Albania, Romania, Malta, Latvia, Flanders, Brussels, Moldova*;

- Depreciation costs for assets used only for water and sanitation services, set with norms by utility`s own accounting policy – *Montenegro, Hungary, Estonia, Croatia, Poland, North Macedonia, Ireland*;

- Depreciation costs for all assets owned by the utility, set with norms by Regulator rules – *Georgia, Scotland*;

- Depreciation costs for assets used only for water and sanitation services, set with norms by Regulator rules – *Bulgaria, Lithuania, Italy, Armenia, England and Wales, Kosovo*.

Data surveyed shows that in most of the cases WAREG Members rely on utilities to determine depreciation charges based on company`s own accounting policies. Only in 8 out of 23 cases studied the regulators have issued regulatory accounting rules with predefined depreciation norms.

When investments are financed through loans, in most of the cases (12) they are included in the tariff after the investments are made and assets constructed – *Albania, Hungary, Romania, Latvia, Estonia, Croatia, Poland, Italy, Armenia, North Macedonia, Kosovo, Moldova*.

Seven WAREG members have reported that investments funded with loans are included preliminary in the tariff (before the actual investments) – *Bulgaria, Georgia*, *Malta, Lithuania, Flanders*, *Brussels* and *Scotland*.

In 3 cases the investment loans are not included in the tariff – neither preliminary nor subsequently – *Montenegro, Hungary,* and *England and Wales*.

In most of the cases (14) – in *Georgia*, *Albania, Hungary, Malta, Latvia*, *Lithuania, Estonia, Flanders, Brussels, Croatia, Poland*, *North Macedonia, Kosovo, Moldova* – utilities account investments in accordance with their own accounting policy.

In 5 cases (*Bulgaria, Romania Italy, Scotland, England and Wales*) utilities account investments to the Regulator based on regulatory accounting rules, and report that the regulator has issued regulatory rules. In *Kosovo*, ARRU has issued regulatory rules, but utilities account investments in accordance with conventional accounting.

Information provided in the survey show that very different norms for asset useful life (respectively depreciation norms) are used in European countries:

- Buildings – between 33-50 years (annual norms of 2% - 3%);
- Pipes (water-mains, sewers) – between 40-50 years (annual norms of 2% - 2.5%);
- Machinery and equipment - between 5-15 years (annual norms of 6.7% - 20%)

In rare cases regulators have issued rules to separate OPEX from CAPEX activities and thus to report investments. This last issue is relevant, since utilities could be induced to follow a cost padding approach, by book keeping current costs as CAPEX for getting an extra rate of return, or by recording investments as OPEX, to get immediate cost coverage under a cost plus method.

A set of clear rules for costs recording is required to avoid such practices.

V. REGULATORY ASSET BASE

In this chapter we investigate:
1. Which assets are included in RAB
2. How asset value in RAB is calculated.

Regulatory Asset Base (RAB) is important regulatory tool. It represents the asset value owned or used by the utility to supply water and sanitation services, and is the base to determine rate of return on capital (RAB * WACC). Different approaches may be used to determine RAB.

V.1.WHAT ASSETS ARE INCLUDED IN RAB

WAREG Members report the following information:

Which assets are included in RAB	Utility assets, financed by the company, used to provide water and sanitation service only	Utility assets, financed by the company, not used to provide WSS	Utility assets, financed by other sources (state, municipality, others)	Other category	RAB is not used in tariff regulation
Bulgaria / EWRC	✓				
Georgia / GNERC	✓				
Albania / ERRU					✓
Spain / MITECO	n.r	n.r	n.r	n.r	n.r
Montenegro / RAE					✓
Hungary / HEA	✓				
Romania / ANRSC					✓
Malta / REWS					✓
Latvia / PUC	✓				
Lithuania / VERT	✓				
Estonia / ECA	✓				
Belgium, Flanders / VMM					✓
Belgium, Brussels / BRUGEL					✓
Croatia / VVU					✓
Poland / ME					✓
Italy / ARERA	✓				
Armenia / PSRC	✓				
North Macedonia / ERC	✓				
UK, Scotland / WICS					✓
UK, England and Wales / OFWAT	✓				
Ireland / CRU	✓				
Kosovo / ARRU	✓				
Moldova / ANRE					✓
Total (Yes)	12				10

Table 15: Which assets are included in RAB

Table 15 shows that in most of the cases (12), WAREG members calculate RAB with assets financed by the company, used to provide water and sanitation service only - *Bulgaria, Georgia, Hungary, Latvia, Lithuania, Estonia, Italy, Armenia, North Macedonia, England and Wales, Ireland*, *Kosovo*.

All members that apply cost-plus tariff model, do not use RAB as tariff element (e.g. return on capital is not provided in the tariff) - *Albania, Montenegro, Romania, Malta, Croatia, Poland, Moldova.*

Some members that apply other tariff methods do not use RAB as tariff element – *Flanders* (Rate of Return), *Brussels* and *Scotland* (Price Cap). Scotland reports that they do not use RCV (regulatory capital value) for price setting, but do use it as a proxy for assets in the gearing ratio for the financial tramlines. Brussels have no reported information.

V.2. HOW ASSET VALUE IN RAB IS CALCULATED

Fixed assets value can be calculated in RAB through different approaches:

(1) Asset value based on historical costs (book value);

(2) Asset value based on historical costs reduced with accumulated depreciation (net book value) calculated based on utility accounting rules;

(3) Asset value based on historical costs reduced with accumulated depreciation (net book value) calculated based on regulator accounting rules.

RAB may include also future investments planned in the current regulatory period, as well as other categories.

WAREG Members reported the following information:

How asset value in RAB is calculated	(1) Book Value	(2) Net book value (utility rules)	(3) Net book value (regulator rules)	Future investments, planed during the regulatory period	Other category	RAB is not used in tariff regulation
Bulgaria / EWRC			✓	✓		
Georgia / GNERC			✓	✓		
Albania / ERRU						✓
Spain / MITECO	n.r	n.r.	n.r.	n.r.	n.r.	n.r.
Montenegro / RAE						✓
Hungary / HEA		✓				
Romania / ANRSC						✓
Malta / REWS						✓
Latvia / PUC		✓				
Lithuania / VERT			✓	✓		
Estonia / ECA		✓		✓		
Belgium, Flanders / VMM						✓
Belgium, Brussels / BRUGEL						✓
Croatia / VVU						✓
Poland / PW						✓
Italy / ARERA					✓	
Armenia / PSRC			✓			
North Macedonia / ERC		✓		✓		
UK, Scotland / WICS						✓
UK, England and Wales / OFWAT				✓	✓	

How asset value in RAB is calculated	(1) Book Value	(2) Net book value (utility rules)	(3) Net book value (regulator rules)	Future investments, planed during the regulatory period	Other category	RAB is not used in tariff regulation
Ireland / CRU		✓				
Kosovo / ARRU						
Moldova / ANRE						✓
Total (Yes)	0	4	4	6	2	10

Table 16: How asset value in RAB is calculated

Table 16 shows that various approaches are used to determine asset value in RAB:

Bulgaria, Georgia and Lithuania determine RAB value with application of accumulated depreciation based on regulator rules, plus the investments planned in the current regulatory period. *Armenia* uses the same approach for RAB value calculation, but do not include future plan investments.

Hungary, Latvia, Estonia, Ireland and North Macedonia determine RAB value with application of accumulated depreciation based on utility accounting policy, North Macedonia allows future investments planned in the current period and only Estonia allows future investments planned in the coming regulation period.

Italy and *England and Wales* apply different approaches for RAB value determination, and England and Wales allows future investments planned in the current period.

The following information was provided:

- *Bulgaria*: RAB is calculated based on assets for provision of the service, applying Regulator depreciation norms. Investments expenditure is covered with tariffs through depreciation costs, based on regulator rules. Investments are included ex-ante in RAB (before their construction). RAB is used in the tariff setting in order to determine the rate of return on capital.

- *Albania*: The new draft of the methodology will involve the concept of regulatory asset base (RAB).

- *Lithuania*: Asset base is adjusted during the price recalculation.

- *Estonia*: RAB is calculated based on residual book asset value at the end of the regulatory period. In rare cases regulator uses set principles if water undertaking has revalued assets or has changed depreciation norms in the past. As a regulation period of 12 month, in tariff setting process could be coming year, an investment that is going to be made in this period, would be switched into price (depreciation).

- *Croatia*: RAB is not used in cost plus model.

- *Italy*: Asset Base is evaluated at historical costs, adjusted with inflation.

- *Armenia*: RAB is calculated by formula SH = OOOAA - CR + SH, where: OOOAA is the cost of non-current assets considered useful and used by the Commission, including land, buildings, structures and equipment, machinery and other tangible assets; CU - the accumulated depreciation of noncurrent assets calculated by the principle set out methodology; CRC is the amount of Working capital that is considered permissible by the Commission, including the cash flows, materials and spare parts required for the Performance of current liabilities.

- *North Macedonia*: $RAB_{ave}= (RAB_{start}+RAB_{end})/2$. New procured and commissioned fixed assets during the year are allowed as future investments.

- *Scotland*: RAB=RCV (Regulatory Capital Value). Consumers incur depreciation charges based on current replacement (MEA) costs, so that each period, consumers pay for the asset value used in the services supplied. The value is adjusted each year to take account of net investment. Capital expenditure to enhance and maintain the network, which has been assumed in setting price limits, is added to the value. This is after deducting the amount of depreciation (based on the MEA values of the assets) which is assumed in setting price limits. Any grants and contributions and associated amortization are also taken into account. Infrastructure renewals expenditure is not added to the RCV but the movement in the infrastructure renewals accrual or prepayment is included. Adjustments are also made in respect of disposals of land to remove the value of this from the RCV. The RCV is adjusted each year by RPI to take account of inflation. In Scotland RCV is not used for price setting, but is used as a proxy for assets in the gearing ratio for the financial tramlines.

- *Kosovo*: The work on setting the original RAB was conducted in 2008. The amount per connection was set at a level that would be common to all RWCs. The amount was tested at various levels and eventually set at EUR 200 per water connection as the highest level that could be tolerated by consumers (with respect to the impact on tariffs) according to the opinion of the Regulator. RAB for wastewater would normally be expected to be as high if not higher than that for water. In Kosovo at that time the wastewater systems were network only and did not include treatment facilities. Consequently, the RAB was set at half the value of the water RAB, i.e. EUR 100 per connection, but would be expected to increase as wastewater treatment assets were developed unless they were funded by grants. From this baseline, all future investments (excluding network capital maintenance which is regarded as an operational cost) were added to the RAB and therefore subject to a return on RAB and current cost depreciation (non-network assets) which are passed through to the tariffs.

V.3. SUMMARY

All members that apply Cost plus tariff model, do not use RAB as tariff element (e.g. return on capital is not provided in the tariff) - *Albania, Montenegro, Romania, Malta, Croatia, Poland, Moldova.* Some members that apply other tariff methods do not use RAB as tariff element – *Flanders* (Rate of Return), *Brussels* and *Scotland* (Price Cap).

In the cases when RAB is used as tariff element (12), it is composited of assets financed by the company, used to provide water and sanitation service only (*Bulgaria, Georgia, Hungary, Latvia, Lithuania, Estonia, Italy, Armenia, North Macedonia, England and Wales, Ireland*, *Kosovo)*.

No one WAREG Member has reported that RAB value is based on book asset value (historical costs). All members that use RAB as tariff element determine its value based on net book asset value (meaning that historical costs for asset acquisition are reduced with accumulated depreciation).

There are differences however whether these accumulated depreciations are based on utility accounting policy (5 cases – *Hungary, Latvia, Estonia, North Macedonia, Ireland*) or based on regulator rules (4 cases - *Bulgaria, Georgia, Lithuania*, *Armenia*).

3 of the cases surveyed (*Italy, England and Wales, Kosovo*) apply different approaches.

In 6 of the cases studied future investments planned in the regulatory period are included in RAB value (*Bulgaria, Georgia, Lithuania*, *North Macedonia, Estonia*, *England and Wales).*

VI. WEIGHTED AVERAGE COST OF CAPITAL

In this chapter we investigate:

1. Is cost of equity set by the regulator, if yes which model is used.
2. Is cost of debt set by the regulator, if yes which model is used.
3. Information about WACC calculation

One of the most important regulatory tools for promoting investments is to include adequate and economically justified cost of capital in the tariff. Regulators may use different approaches to calculate the Cost of Equity, Cost of Debt, and respectively WACC, especially the manner to assess and calculate the Cost of Equity.

VI.1. COST OF EQUITY

Information about regulation of Cost of Equity, method and formula used is provided in the following table:

Cost of Equity calculation method	Is CE set by the regulator	If yes, which model is used	Please provide formula used:	
Bulgaria / EWRC	**Yes**	Capital Asset Pricing Model (CAPM)	Re=Rf + βe(ERP) + RPs	Rate of Return on Equity = risk free rate + levered beta * market risk premium + size premium
Georgia / GNERC	**Yes**	Capital Asset Pricing Model (CAPM)	re=(rrf -ds) + cr + β × mp	Rate of Return on Equity(CoE) = (risk free rate – country default risk)+country risk+sector risk ratio x market risk premium [23]
Hungary / HEA	**Yes**	Capital Asset Pricing Model (CAPM)	re=rf+ βe *(rm-rf)	Rate of Return on Equity = risk free rate + levered (equity) beta * (market return rate – risk free rate)
Latvia / PUC	**Yes**	Capital Asset Pricing Model (CAPM)	$r_e = r_f + r_c + \beta_e \times r_m + s_e$	
Lithuania / VERT	**Yes**	Capital Asset Pricing Model (CAPM)	Re=Rf+β×Rerp	Rf – risk-free rate of return on investment,%; Rerp – equity risk premium,%; β – relative risk dimension reflecting the level of risk exposure of the industry relative to the overall risk exposure of the national economy (weighted β).

[23] **Georgia**: Regarding country default risk, we believe that it is government default risk only, which is calculated as an average credit default swap on long-term government bonds across countries with identical sovereign credit ratings. As of country risk, it is broader than country default risk itself. Country risk includes country default risk and additional risk factor, which comes from the undeveloped, illiquid and volatile capital markets. We think that Risk free rate (yield to maturity on local government bonds) includes only country default risk and in order to avoid double-counting and not to miss any component of total country risk in cost of equity, we subtract default spread from risk free rate and add country risk.
Market risk premium is calculated as a difference between market return and risk free rate but for the US capital market.

Cost of Equity calculation method	Is CE set by the regulator	If yes, which model is used	Please provide formula used:	
Estonia / ECA	**Yes**	Capital Asset Pricing Model (CAPM)		1. Yield (5 y average) of risk free 10-y German bonds 1, 47% 2. Estonian country risk premium 0, 78 % 3. Market risk premium (McKinsey) 5 % 4. Levered beta (unlevered beta 0,51*2) 1,02 % **Pre-tax cost of equity capital 7,35% (row 4 x row 3 + row 1 + row 2)**
Italy / ARERA	**Yes**	Adjusted Capital Asset Pricing Model (CAPM)	$(r_f^{real} + WRP) * \frac{1}{(1 + CS/CnS)}$ $\alpha = \beta * ERP * \frac{1}{(1 + CS/CnS)}$	As in the CAPM model, a risk free rate and a β rate expressing the system risk are allowed, but the formula is adjusted reducing the specific proportion of Net Invested Capital coming from public or private contributions
North Macedonia / ERC	**Yes**	Capital Asset Pricing Model (CAPM)	Ke = Rf + (MRP) * β	The price of own capital shall be defined by applying the model for defining prices of long-term investments (CAPM - Capital Asset Pricing Model), on the basis of revenues from risk-free investments, the average revenue from risky investments, and system risks expressed with the coefficient β
UK, England and Wales / OFWAT	**Yes**	Capital Asset Pricing Model (CAPM)	Ke = Rf + (Rm –Rf)* β	Ke is the cost of equity Rf is the risk-free rate Rm is the Total Market Return β is the equity beta of the notional company (Rm –Rf) is the Equity Risk Premium
Ireland / CRU	**Yes**	Capital Asset Pricing Model (CAPM)	re = RfR + (ERP x βe)	The CAPM states that the cost of equity should provide shareholders with a premium, over the risk-free return. This is determined by the market-risk premium (the premium that is earned by investors as a whole reflecting economy-wide systematic risk) and the correlation between the risk in the company's returns and those of the market as a whole, the beta. The beta is estimated from primary market data for listed companies, or by analyzing the betas of comparators for companies which are not listed.
Kosovo / ARRU	**Yes**	Capital Asset Pricing Model (CAPM)	$\bar{\gamma}_a = \bar{\gamma}_f + \beta(\bar{\gamma}_m - \bar{\gamma}_f)$	ARRU applies a rate of return on the total RAB regardless of capital structure (i.e. it does not determine separate returns for debt and equity) There is limited data available in Kosovo for a fully comprehensive CAPM analysis and the return on capital determination largely applies the results of similar analyses applied in more developed economies. ARRU largely disregards country risk on the basis that most financing comes from development agencies which, by their nature, absorb country risk, and that little or no private sector investment is expected in the foreseeable future.
Total (Yes)	**11**			

Table 17: Cost of Equity calculation method

In 11 cases WAREG members calculate the Cost of Equity *(CE) - Bulgaria, Georgia, Hungary, Latvia, Lithuania, Estonia, Italy, North Macedonia, England and Wales, Ireland, Kosovo*.

In all of these cases studied regulators use the Capital Asset Pricing Model (CAPM) to calculate the CE. It is noted that the basic concept of the CAPM (Re=Rf + βe*ERP) is used in all cases, and in 2 of the cases surveyed (*Bulgaria* and *Latvia*) it is upgraded with additional size premium, while in

the case of Italy the formula is adjusted reducing the specific proportion of Net Invested Capital coming from public or private contributions.

- In the case of *Bulgaria*, additional size-premium is added in the CAPM model. As market value of public utilities cannot be calculated, EWRC has introduced different approach based on revenues from regulated activities. The regulator separates utilities in four categories (big, medium, small and micro) for regulatory purposes. Size premium is calculated for medium, small and micro groups of utilities, based on the ratios of their revenue compared to revenues of the big group.

- In the case of *Latvia*, size premium for equity is also applied to regulated service providers that correspond to micro or small enterprise category.

- In Scotland financial strength is an input to the price setting process not an ex-post finance ability check. As a public sector company, the regulator does not need to assess an appropriate cost of equity. However, the regulator needs to ensure that the level of borrowing is prudent and does not result in any inter-generational transfer of wealth, by ensuring that Scottish Water generates sufficient free cash-flow (relative to its outstanding debt) such that it would achieve a strong investment grade rating if it were ever to issue bonds to investors. As such, the regulator does not need to use the RCV for price setting (although the investments are monitored by using the RCV).

The components used to calculate CE are investigated and reported as follows:

CAPM components used	Is Rf (risk free rate) calculated	Is βu (unlevered beta) calculated	Is βl (levered beta) calculated	Is ERP (expected risk premium) calculated	Is other component calculated (for example preemie for company size)
Bulgaria / EWRC	✓	✓	✓	✓	✓
Georgia / GNERC	✓		✓	✓	
Hungary / HEA	✓		✓	✓	
Latvia / PUC	✓	✓	✓	✓	✓
Lithuania / VERT	✓		✓	✓	
Estonia / ECA	✓		✓	✓	✓
Italy / ARERA	✓	✓		✓	✓
North Macedonia / ERC	✓	✓		✓	✓
UK, England and Wales / OFWAT	✓	✓	✓	✓	
Ireland / CRU	✓			✓	
Kosovo / ARRU	✓	✓		✓	
Total (Yes)	11	6	7	11	5

Table 18: CAPM components used

Information provided by WAREG Members on the calculations of CAPM components is provided in the next table:

CAPM components calculation	Rf (risk free rate)	β_u (unlevered beta)	β_l (levered beta)	ERP (expected risk premium)	Is other component calculated if yes - how and what information source is used
Bulgaria / EWRC	Average annual % of Government Securities. Information from State Bank	Information for average unlevered Beta of water and sanitation companies is taken from Aswath Damodaran - Stern School of Business.	The Beta is then levered by using information for debt levels for the utilities, considered in 4 groups, by using the formula: $\beta_L = \beta_U \times [1+(1-Tax) \times Debt/Equity]$	Damoradan data base, after benchmark with other sources, including World Bank	Additional size premium is given for the groups of medium, small and micro size. The group of large utilities does not get this premium.
Georgia / GNERC	Yield to maturity on local government 10 year bonds		based on the other regulators data with similar regulatory model and similar country risks	Based on the S&P 500 data	
Hungary / HEA	Annual average nominal yield of 10 year Hungarian government bond		Arithmetic average of the equity beta of the selected European companies (which are listed on the stock exchange, with significant market capitalization, and their main activity is water utility) over the last 5 years	Based on the calculation of Dividon-Marsh-Stauton US stock market risk premiums between 1990-2019 (Source: Credit Suisse Global Investment Returns Yearbook)	
Latvia / PUC	r_f - a risk-free rate determined as the annual average interest rate within a time period of 10 years (%) of the secondary market yields of German government bonds with a 10-year maturity published monthly by the European Central Bank. Until 2024, for determination of the risk-free rate rf, the statistical data published by the European Central Bank regarding the period starting from 1 January 2014 shall be used.	A.Damodaran database "Levered and Unlevered Betas by Industry, Europe" published in pages.stern.nyu.edu/~adamodar/; unlevered beta for utilities (water).	β_e - the average equity beta coefficient of the sector which is adjusted in conformity with the structure of equity and borrowed capital in conformity with the following formula: $\beta_e = \beta_a \times [1 + (1-t) \times (D/E)]$, where β_a - the average asset beta coefficient of the sector; D/E - the average ratio of borrowed and equity capital of the sector. Taking into account that the ratio of equity capital to total capital and the ratio of borrowed capital to total capital are equal, D/E=1.	r_m - market risk premium (%), Arithmetic mean of market risk premium used in CEER countries (according to the annual CEER Report on Investment Conditions in European Countries) with similar country risk profile.	r_c – country risk premium. Calculated as the difference of Latvian and German government bond (with 10-year maturity) yields published monthly by the European Central Bank; s_e – size risk premium for equity, which is applied to regulated service providers that correspond to micro or small enterprise category.

CAPM components calculation	Rf (risk free rate)	βu (unlevered beta)	βl (levered beta)	ERP (expected risk premium)	Is other component calculated if yes - how and what information source is used
Lithuania / VERT	The arithmetic mean of the average weighted profitability of the auctions of the Government bonds denominated in Litas (till December 31,2014) and Euros (from January 1, 2015) with the maturity period of no less than 3468 days), held during the recent ten-year period.		European countries, the utilities industry average degrees of risk, based on the basis of the latest assessment of βu values posted on A. Damodaran website.	The sum of the equity risk premium of the country with the developed capital market (the US) and the additional market risk premium of Lithuania. US equity risk premium is defined as difference between the return on investments (in percent) in the US securities market during a last twenty years, and the rate of return on the US treasury bonds with a ten-year maturity, on the basis of the S&P 500 index announced by the rating agency Standard&Poor's and the data of the US treasury bonds announced by the bank of the US Federal Reserve System. The additional market risk premium of Lithuania is determined as the difference between the risk ratio (in percent) corresponding to the credit rating of Lithuania and the risk ratio (in percent) corresponding to the US credit rating, on the basis of the data on prof. A. Damodaran website.	
Estonia / ECA	(Yield (5 y average) of risk free 10-y German bonds 1, 47%). For the calculation of the nominal risk free rate, ECA uses the 5-year average interest rate of the German government 10-year bonds. The reason for using the German bonds is the circumstance that the Estonian state has not issued long term bonds so far. The German bond is appropriate as it is the biggest Euro-zone country. The annual interest rates of the German 10-year bonds are published at: http://data.oecd.org/interest/long-term-interest-rates.htm.		To estimate levered beta, ECA uses an unlevered beta of the branch of economy as the basis and corrects it by an average financial leverage of respective sector, using Miller's formula (it is used by most CEER regulators; formula assumes that an increase in the proportion of debt capital raises the undertaking's risk). According to the Miller's formula: βl (levered beta) = βu (unlevered beta)* (1+ ratio of debt capital / ratio of equity capital)*. *regulatory determined ratio of debt and equity capital (50%/50%), which means βl = βu * 2. The formula does not reflect tax shield, as due to the Estonian income tax regulation the tax shield is not present. Finding a water undertaking's beta, ECA uses professor Aswath Damodaran's (Stern School of Business, New York University) latest data in his database. (Source: http://pages.stern.nyu.edu/~adamodar/22, Levered and Unlevered Beta by Industry (2. Europe)). An average	ECA takes into account an equity market risk premium that indicates how much investors can earn in addition to the risk-free rate of return, in other words -a compensation for taking a systematic risk. ECA uses in its regulation practice for the equity market risk premium the value of 5%, which corresponds to the recommendations of McKinsey (recommended risk premium 4,5%-5,5%, average 5%; source: McKinsey & Company; Koller, Tim; Goedhart, Marc; Wessels, David (2010) Valuation: Measuring and Managing the Value of Companies, 5th Edition. John Wiley & Sons, New Jersey, page 242).	ECA also takes into account Estonian country risk premium 0, 78%. According to an evaluation by the Bank of Estonia the country risk is determined by the relative amount of money that the Estonian state has to pay in excess compared to the countries with higher credit rating (e.g. Germany), when it borrows from international markets. Most simple way is to compare the differences in the interest rates of governmental bonds. The Government of Estonia has no such bonds and therefore the country risk is evaluated by the rating agencies (S&P/Moody's), which are AA-/A1 given to Estonia as a long term credit rating. Source: Damodaran 2016, http://pages.stern.nyu.edu/~adamodar/pc/datasets/ctryprem.xls, Risk Premiums for Other Markets. Based on the data from Moody's the long term credit rating A1 is equal to 78 points (0, 78%), what

CAPM components calculation	Rf (risk free rate)	βu (unlevered beta)	βl (levered beta)	ERP (expected risk premium)	Is other component calculated if yes - how and what information source is used
			unlevered beta of water sector undertakings in Europa was 0, 51 in 2016. Levered beta is to be found as following formula: 0, 51 * 2 = 1, 02, which is used in cost of equity calculation.		ECA considers as an Estonian country risk premium.
Italy / ARERA	It's defined as real risk free rate and standardized with a value of 0, 5%, based on Euro area 10-year Government bond yields with minimum rating AA.	Beta is a measure of the relative risk of integrated water service as compared to market average risk.		Considering water sector specificity, ARERA has set a standardized ERP which is equal to 4%.	Water Utility Risk Premium (WRP), reflecting an adjustment of real risk free rate which takes into consideration the following determinants: differential linked to risk free investments in Italy, average size of water sector operators, nature of water firms. ARERA has fixed a WRP rate equal to 1, 5% for the present regulatory period. (adjusted to 1, 7% in the update period 2018-2019).
North Macedonia / ERC	risk free return rate, defined as equal to the return on bonds issued by the Government of the Republic of Macedonia	beta of own capital (market portfolio) shall be defined as equal to 1 (one)		risk premium defined as difference between "average revenue of risky investments (Rm) and revenue from risk-free investments (Rf)"	Rm - average interest rates of long-term loans (in Euros, US dollars, and denars) granted to the service provider in the Republic of Macedonia, and published by the National Bank of the Republic of Macedonia
UK, England and Wales / OFWAT	https://www.ofwat.gov.uk/publication/pr19-draft-determinations-cost-of-capital-technical-appendix/				
Ireland / CRU	For the current regulatory period, the estimation of the risk-free rate takes account of the inflation-adjusted yields of sovereign bonds, especially in the period before 2008 when such bonds still provided a strong indicator of likely risk-free yields. The Irish data are compared to the government bonds yields of sovereign bonds of core European countries and peripheral European countries. The final range is based upon a combination of pre-2008 bond yields, regulatory precedent, and changes in the expected growth rate of the Eurozone economy. The final point estimate takes particular account of how Irish circumstances		Asset betas are determined to reflect the perceived riskiness of a company. The asset beta is a hypothetical measure of a company's beta if that company was financed entirely by equity. It is related to the company's beta as follows: βa = (1 – g)βe + g βd, Where βa is the company's asset beta, g is the company's gearing, βe is the company's raw equity beta and βd is the company's debt beta. Debt betas have generally been assumed as zero when calculating asset betas for comparators.	In order to determine the equity risk premium in the current regulatory period, the CRU predominantly relied on the 2014 edition of the "Credit Suisse Global Investment Returns Sourcebook" by Dimson, Marsh and Staunton. Previous regulatory determinations in Ireland and the UK were also taken into account. Emphasizing on the latest regulatory precedent and most recent DMS data, the CRU chose an upper bound of 4¾ per cent as the ERP for its WACC calculations.	

CAPM components calculation	Rf (risk free rate)	βu (unlevered beta)	βl (levered beta)	ERP (expected risk premium)	Is other component calculated if yes - how and what information source is used
	compare with that elsewhere in the Eurozone. Using recent regulatory precedent, which pointed to a range of around 1.8-2%, the CRU used an upper bound of 2% per cent as the risk-free rate point estimate in the WACC calculation.				
Kosovo / ARRU	The risk free rate is often interpreted as the long run yields of AAA graded treasury bonds (or gilts), e.g. bonds issued by central banks that enjoy AAA status.	For a specific asset, the risk may be greater or less than the market risk. This is determined by the asset's particular β_a as a multiplier of the risk premium. If an asset's risk (defined as volatility of returns) is greater than the average market risk the value of β_awill be greater than 1.0. Conversely, if the risk is less than the average market risk it will be less than 1.0. For example, high risk oil exploration companies may have a β_a in excess of 2.0, whereas very secure 'blue-chip' investments such as large utilities will have a β_a of, say, 0.5. The value of β_a is determined through long-run statistical analysis from which it is possible to determine β_a for specific sectors on average rather than individual companies.		The average equity risk premium in Europe has been estimated as 5.0% . In other economies (UK, USA, Canada etc.) the risk premium is almost identical ranging from 5.1% to 5.2%. Although, as an emerging economy it can be argued that the risk premium should be higher there is no firm evidence to suggest how much higher. In the most recent OFWAT review a cautious premium of 5.4% was applied. In the absence of any further information it is suggested that a risk premium of 5.5% (within a range of 5.0% to 6.0%) should be applied for Kosovo.	

Table 19: CAPM components calculation

VI.2. COST OF DEBT

Information about regulation of Cost of Debt, method and formula used is provided in the next table:

Cost of Debt method calculation	Is Cost of Debt set by the regulator	Please provide formula used:	
Bulgaria / EWRC	**Yes**	Rd = Rf + RCS + RPs	Rate of Return on Debt: risk free rate + rating corporative spread + size premium
Georgia / GNERC	**Yes**		
Hungary / HEA	**Yes**	rd = rf + DM	Rate of Return on Debt = risk free rate + debt risk margin
Latvia / PUC	**Yes**	rd = rdm * se	r_{dm} - The rate of return of the borrowed capital r_d shall be determined as the annual average interest rate within a time period of 10 years of credits (with the original maturity over 5 years; outstanding amounts) issued to non-financial corporations in euros published monthly by the European Central Bank. Until 2024, for determination of the rate of return of the borrowed capital rd the statistical data published by the European Central Bank regarding the period starting from 1 January 2014 shall be used. s_e – size risk premium for debt, which is applied to regulated service providers that correspond to micro or small enterprise category.
Lithuania / VERT	No		NCC use Cap of cost of debt (interest rate), percent, and RdThe average interest rate during the most recent twelve-month period of long-term loans given to non-financial corporations, as announced by the Bank of Lithuania.
Estonia / ECA	**Yes**		1. Yield (5 y average) of risk free 10-y German bonds 1, 47%; 2. Estonian country risk premium 0, 78%; 3. Risk premium of the debt of an undertaking 1,30%; Pre-tax cost of debt capital 3,55% (row 1+ row 2+row 3)
Italy / ARERA	**Yes**	$K_d^{real} * (1 - t_c) * \frac{CS/CnS}{(1 + CS/CnS)}$	where CS is approximately equivalent to Debt, and CnS is approximately equivalent to Equity, but the ratio is assumed to be fixed and equal to 1
UK, England and Wales / OFWAT	**Yes**	https://www.ofwat.gov.uk/publication/pr19-draft-determinations-cost-of-capital-technical-appendix/	
Ireland / CRU	**Yes**	rd = RfR + debt premium	The cost of debt of the regulated utility is the sum of the real pre-tax return required by investors in risk-free investments plus a premium over the risk-free rate representing the rate at which debt can be obtained by the company in question. The cost of debt, rd, can be determined by summing the risk-free rate, RfR, and the

		debt premium.
Kosovo / ARRU	No	Kosovo does not distinguish between debt and equity funded investment and determines a return on the total RAB which is set to finance both equity expectations and the cost of debt. Capital structure is considered to be a utility management issue and not a regulatory issue. The return on RAB is set using the CAPM. In practice, the utilities in Kosovo hold very little debt and separate calculations of the cost of debt and equity will make no material difference.
Total (Yes)	**8**	

Table 20: Cost of Debt calculation

8 WAREG members report that they regulate the Cost of Debt – *Bulgaria, Georgia, Hungary, Latvia, Estonia, Italy, England and Wales, Ireland*.

The other WAREG members that have reported to regulate the Cost of Equity do not regulate Cost of Debt – *Lithuania*, *North Macedonia* and *Kosovo* - Lithuania uses Cap of cost of debt (average interest rate percent), while Kosovo does not distinguish between debt and equity funded investment and determines a return on the total RAB, by applying CAPM.

In only 2 cases (*Bulgaria, England and Wales*) regulator report that they calculate different norms of the Cost of Debt based on different sizes of utilities.

In the cases of *Bulgaria* and *Latvia* size premium is applied to regulated service providers that correspond to medium, micro or small utilities (Bulgaria), or micro or small enterprise category (Latvia).

VI.3. WACC

Information is provided in the following table:

WACC calculation	Is WACC regulated	Please provide formula used:	How Equity and Debt ratios are defined in WACC	Please provide information for regulated WACC levels for current regulation period
Bulgaria / EWRC	**Yes**	WACC = E/V*(Re /1-TC/100) + D/V*Rd	Actual levels of equity and debt of the utilities	Large utilities: Re = 7.99%, Rd = 4,60%. Medium utilities: Re = 7.59%, Rd = 5.30%. Small utilities: Re = 7.58%, Rd = 5.54%. Micro utilities: Re = 7.56%, Rd = 5.59%. WACC levels depend on E/D actual ratios of the utilities
Georgia / GNERC	**Yes**	$WACC_{before\ tax} = g \times r_d + [(1-g) \times r_e/(1-T)]$	By regulator guidance	15.99%

WACC calculation	Is WACC regulated	Please provide formula used:	How Equity and Debt ratios are defined in WACC	Please provide information for regulated WACC levels for current regulation period	
		WACC - (before tax) is calculated in nominal terms in local currency			
Hungary / HEA	**Yes**	WACC = (E/V)*re*1/(1-t)+(D/V)*rd	By regulator guidance	Debt ratio is 0.55, according to benchmark on peer group of European water utility companies Pre tax WACC 5,34% (AVG values) Post tax WACC 4,86% (AVG values) "Vanilla" WACC 5,05% (AVG values)	
Latvia / PUC	**Yes**	$wacc_n = r_e \times [E/(E + D)] \times [1/(1 - t)] + r_d + [D/(E + D)]$ Nominal pre-tax WACC, t = 20% (the enterprise income tax rate)	By regulator guidance	The ratio is set by the regulator in the Methodology for calculating the rate of return on capital - 50% debt share and 50% equity share in capital.	4.47% is the most recent WACC for tariffs that will come into force in 2020. 4.39% was WACC for tariffs that came into force in 2019
Lithuania / VERT	**Yes**	Rate of profit – calculated as the return on investment (WACC) (up to 10 percent calculated from compulsory costs of the base price)	By regulator guidance	Methodology on Rate of Return on Investments used optimal capital structure: equity capital (E) - 0, 4 and debt capital (D) - 0, 6.	4,21%
Estonia / ECA	**Yes**	Yield, Country risk premium, Pre-tax cost of debt capital, Market risk premium [24]	By regulator guidance	According to the ECA guidelines debt and equity ratio is always 50% / 50%.	WACC is 5, 45% (4,81%, starting from 2020) for all water undertakings.
Italy / ARERA	**Yes**	As a consequence of a Referendum in 2011, no return on investment is recognized to integrated water service operators, but only the cost to obtain loans. $OF^{a} = (K_m + \alpha) * \left(1 - \frac{CIN_{fp}^{a}}{CIN^{a}}\right) * Cl$	By regulator guidance	Regulator has defined a standard ratio between debt and equity (equivalent to 1).	$K_m = (r_f^{real} + WRP) * \frac{1}{(1 + CS/CnS)} + K_d^{real} * (1 - t_c) * \frac{CS/CnS}{(1 + CS/CnS)}$ $\alpha = \beta * ERP * \frac{1}{(1 + CS/CnS)}$
North Macedonia / ERC	**Yes**	WACC=(1-Debt)*Ke/(1-Tp)+Debt*Kd	Actual levels of equity and debt of the utilities		
UK, England and Wales / OFWAT	**Yes**	https://www.ofwat.gov.uk/publication/pr19-draft-determinations-cost-of-capital-technical-appendix/	By regulator guidance		

[24] Estonia:
1.Yield (5 y average) of risk free 10-y German bonds 1,47%;
2. Estonian country risk premium 0,78%;
3. Risk premium of the debt of an undertaking 1,30%;
4. Pre-tax cost of debt capital 3,55% (row 1+ row 2+ row 3);
5. Yield (5 y average) of risk free 10-y German bonds 1,47%;
6. Estonian country risk premium 0,78 %;
7. Market risk premium (McKinsey) 5, 00 %; 8. Levered beta (unlevered beta 0,51*2) 1,02 %;
9. Pre-tax cost of equity capital 7,35% (row 8 x row 7 + row 5 + row 6);
10. Debt/equity ratio (50%:50%) 0,5;
11. WACC 5,45% ((row 4 + row 9) /2), valid until end of 2019 (WACC will be 4,81%, starting from 2020)

WACC calculation	Is WACC regulated	Please provide formula used:	How Equity and Debt ratios are defined in WACC	Please provide information for regulated WACC levels for current regulation period	
Ireland / CRU	**Yes**	WACC = (Cost of Equity x (1 – gearing)) + (Cost of Debt x gearing)	Irish Water, the sole regulated public water utility in Ireland, is notionally financed through a combination of debt and equity [25]	The CRU's aimed-up WACC for the current regulatory period was estimated at 5.2%.	
Kosovo / ARRU	**Yes**	As determined by CAPM for an all equity utility. Adjusted to a pre-tax return.	WACC is determined on the basis of an all equity return on capital as determined by the CAPM [26].	4% (real), i.e. 4% plus inflation where inflation effects are largely covered by inflationary adjustments to the RAB.	
Total (Yes)	**11**				

Table 21: WACC calculation

WAREG members that regulate WACC have provided detailed information on the formulas and calculations methodologies.

It is noted that in 3 cases (*Bulgaria*, *North Macedonia, Ireland*) regulators set actual levels of equity and debt in WACC. In the other cases the equity/debt ratios in WACC are set according to regulator guidance – in the cases of *Latvia* and *Estonia* it is 50%/50%, while in *Georgia* and *Lithuania* is 40%/60%.

In only 1 case (Bulgaria) the regulator splits the utilities into groups during WACC regulation (the utilities are grouped into four groups - large, medium, small and micro - based on population served, revenues from WS services, and volume of water at the system inlet).

In *Kosovo* WACC is determined on the basis of an all equity return on capital as determined by the CAPM. The regulator does not distinguish between debt and equity funded investment and determines a return on the total RAB which is set to finance both equity expectations and the cost of debt. Capital structure is considered to be a utility management issue and not a regulatory issue. This is in accordance with the Modigliani Miller theorem that states that capital structure should have no net bearing on the WACC (i.e. if gearing increases (which reduces WACC) the return on equity expectations increase (due to increased risk) and the WACC remains constant. In practice, the utilities in Kosovo hold very little debt.

Information about current levels of WACC for some of the members is provided in table 19.

VI.4. SUMMARY:

In 11 cases WAREG members calculate the Cost of Equity *(CE) - Bulgaria, Georgia, Hungary, Latvia, Lithuania, Estonia, Italy, North Macedonia, England and Wales, Ireland, Kosovo*.

[25] **Ireland**: The CRU measures its cost of capital by calculating the weighted average of its cost of debt and the cost of equity. The weights reflect the company's long-term target ratio between debt and equity invested in the company or its gearings.

[26] **Kosovo**: The regulator does not distinguish between debt and equity funded investment and determines a return on the total RAB which is set to finance both equity expectations and the cost of debt. Capital structure is considered to be a utility management issue and not a regulatory issue.

In all of these cases studied regulators use the Capital Asset Pricing Model (CAPM) to calculate the CE. It is noted that the basic concept of the CAPM (Re=Rf + βe*ERP) is used in all cases, and in 2 of the cases surveyed (*Bulgaria* and *Latvia*) it is upgraded with additional size premium, while in the case of Italy the formula is adjusted reducing the specific proportion of Net Invested Capital coming from public or private contributions.

8 WAREG members report that they regulate the Cost of Debt – *Bulgaria, Georgia, Hungary, Latvia, Estonia, Italy, England and Wales, Ireland*.

The other WAREG members that have reported to regulate the Cost of Equity don't regulate Cost of Debt – *Hungary, Lithuania*, *North Macedonia* and *Kosovo* - Lithuania uses Cap of cost of debt (average interest rate percent), while Kosovo does not distinguish between debt and equity funded investment and determines a return on the total RAB, by applying CAPM

WAREG members that regulate the WACC have provided detailed information about the formulas and calculations methodologies.

It is noted that in 3 cases (*Bulgaria*, *North Macedonia, Ireland*) regulators set actual levels of equity and debt in WACC. In the other cases the equity/debt ratios in WACC are set according to regulator guidance – in the cases of *Latvia* and *Estonia* it is 50%/50%, while in *Georgia* and *Lithuania* is 40%/60%.

Some of the members have reported current WACC levels, and these vary: 4% (Kosovo), 4.21% (Lithuania), 4.3% (Hungary), 4.47% (Latvia), 5.2% (Ireland), 5.45% (Estonia: 4,81% starting from 2020), 15.99% (Georgia).

VII. DEMAND

In this section we investigate:
1. How demand is regulated.
2. How future demand is planned.

In section III-VI the components of the necessary revenues of the utilities – OPEX, CAPEX, RAB and WACC were investigated. In order to calculate volumetric unit tariff, these need to be divided to consumption (demand).

It is very important to determine the approach to be set by the regulator towards the demand, as it is critical tariff component and may influence the final unit tariff significantly. This is even more critical for countries with high levels of Non-Revenue Water (NRW), as it includes commercial losses (water that has been used by the customers, but not measured or not invoiced by the utility. Forecasting future demand is also problematic in the cases with regulatory period may be longer than one year.

VII.1. HOW DEMAND IS REGULATED

WAREG members reported the following information:

Demand regulation	Are volumes used as denominator in tariff setting	If yes, how the volumes are calculated in the tariff	
Bulgaria / EWRC	✓	Billed volumes plus some NRW levels	The volumes for water supply tariff are prognosis on future system inlet, minus allowed level of NRW
Georgia / GNERC	✓	Billed volumes only	The volumes for water supply tariff are prognosis
Albania / ERRU	✓	Other, please specify	The unmetered volume of water billed is based using the approved norms of 4.5m3 per person per months, or 150 liters per person per day.
Spain / MITECO	**n.r.**	Other, please specify	Billing is based on real volumes. In relation to cost, the Law 2/2015 and Royal Decree 55/2017 state that prices have to take into account costs and demand. The case of Valencia Region Methodology is highlighted for Spain.
Montenegro / RAE	✓		The volumes for water supply tariff are based on future consumption
Hungary / HEA	✓	Billed volumes plus some NRW levels	
Romania / ANRSC	✓	Billed volumes only	P = established price/tariff; programmed value for the activity within the current year of the proposal; Q = programmed quantity within the current year of the proposal.
Malta / REWS	✓	Billed volumes only	
Latvia / PUC	✓	Billed volumes only	Amount of water supplied to customers [27]

[27] **Latvia**: Amount of water supplied to customers – the amount of water which is supplied to customers and accounted by commercial meters or which is determined according to the water consumption norms used in the settlement of accounts;

Lithuania / VERT	✓	Billed volumes only	
Estonia / ECA	✓	Billed volumes only	Sales volume (m3) of every water or sewerage service.
Belgium, Flanders / VMM	✓	Billed volumes only	
Belgium, Brussels / BRUGEL	✓	Billed volumes only	Please describe:
Croatia / VVU	✓	Billed volumes only	
Poland / PW	✓	Billed volumes plus some NRW levels	
Italy / ARERA	✓	Billed volumes only	
Armenia / PSRC	✓	Volumes to be adjusted are set in contract for 15 years of contract and in terms of license.	i-is the i-th contracting year, ΔTbi is the tariff adjustment by volume of retail water supply for the i-th year. Ti-1 is the total retail price for the year preceding the estimated year, without the deductions, Vb (i-1) is the basic volume of retail water supply for the preceding year, Vf (i-1) is the actual volume of Retail Water Supply to the Subscribers for the 12 months preceding the accounting year Vbi is the basic volume of retail water supply for the estimated year, ΔEPb is a coefficient that takes into account the adjusted share of the Basic tariff by electricity tariffs 0.7 is a coefficient that takes into account the distribution of risks associated with volumes of retail water supply volumes between the Licensor and the Subscribers.
North Macedonia / ERC	✓	Billed volumes only	
UK, Scotland / WICS	No		
UK, England and Wales / OFWAT	✓	Other, please specify	Price controls constitute revenue caps rather than tariff approval. Tariffs are set by individual companies within guidance provided
Ireland / CRU	✓	Billed volumes only	Recorded Metered Volumes
Kosovo / ARRU	✓	Projected billed volumes	Billed volume projections are based upon projected consumer numbers and expectations of improved water use efficiency from consumers (driven by improved metering) and other factors. The denominator for the tariff calculation is the billed volume adjusted to reflect expectations of improved commercial efficiency, i.e. the revenue collection rate.
Moldova / ANRE	✓	Billed volumes only	
Total (Yes)	**21**		
Total (No)	**1**		

Table 22: Demand regulation

- amount of wastewater collected from customers – the amount of wastewater collected from proprietary border which is determined according to commercial meters, or the water consumption or wastewater norms used in the settlement of accounts, and also the amount of content of waterless toilets and accumulation tanks drained into the centralized sewerage system;
- The Merchant shall use the amounts of water management services foreseen for the calculation of the draft tariff. When foreseeing the amounts of water management services, the Merchant shall take into account the actual amounts of water management services of the previous reporting year and the foreseen amounts for the current year, and also the changes in the number of connections to centralized water supply and centralized sewerage engineering networks planned, and other factors affecting the amount of water management service. The Merchant shall submit information regarding the planned changes in the number of connections to centralized water supply and centralized sewerage engineering networks together with the draft tariff.

It is noted that in almost all cases (21) demand (volumes) is used as denominator in the tariff formula. As noted in the previous chapter, tariff setting in *Scotland* for domestic consumers is made on different base (charges depends on the Council Tax band of the property that the resident lives in).

In 14 cases demand is calculated in the tariff based on billed volumes only (*Albania*, *Georgia*, *Romania, Malta*, *Latvia, Lithuania, Estonia, Flanders, Brussels, Croatia, Italy*, *North Macedonia*, *Ireland, Moldova*). In this case necessary revenues of the utility are divided by reported billed volumes, and no losses are taken into account in the tariff formula. In the case of Ireland it is mentioned that the volume cost driver within the tariff formula is adjusted (per tariff class) to account for the cost of network leakage when allocating operational and maintenance OPEX costs associated with water resource and treatment activates to each tariff class.

Albania reported that there are approved norms of per capita consumption used in the cases when there is no metering. It should be mentioned however that these are part of the billed volumes (similar case exists in Bulgaria where norms for unmetered customers are set in place).

In 3 cases demand is calculated in the tariff based on billed volumes plus NRW levels (*Bulgaria, Hungary* and *Poland*). In this case the regulator takes into account water losses and includes them in the tariff formula.

A different practice is adopted in Armenia, where provision of WSS is being delegated through a contract, and the price elements including the demand are negotiated in the contract.

In the cases of *Ireland* and of *England and Wales* the revenue cap tariff model is applied, meaning that actual demand is set in the tariff (and if there are changes in the actual demand compared to the one planned these are reflected in the planned tariff updates).

In the case of *Spain* "other" model is applied. Billing usually is referred to cubic meters. In relation to cost, the Law 2/2015 and Royal Decree 55/2017 state that prices have to take into account costs and demand.

VII.2. HOW FUTURE DEMAND IS PLANNED

In the cases where the regulatory period is longer than one year, planning of future demand is critical component of the tariff setting process. Options may include planning based on past consumption (actual data), future consumption (forecasting) or other methods. WAREG members report the following information:

Future demand planning	Regulatory period	How future billed volumes are planned	
Bulgaria / EWRC	5 years	Other, please specify	Average past consumption for 5 years + future new consumption due to new asset construction
Georgia / GNERC	3 years	Future consumption (prognosis)	Based on statistical data (last regulatory period)

Future demand planning	Regulatory period	How future billed volumes are planned	
Albania / ERRU	1 year	Past consumption (actual data)	In most of the cases 100% metered.
Spain / MITECO			Billing is based on real volumes. In relation to cost, the Law 2/2015 and Royal Decree 55/2017 state that prices have to take into account costs and demand. The case of Valencia Region Methodology is highlighted for Spain
Montenegro / RAE	1 year	Future consumption (prognosis)	
Hungary / HEA	1 year	Past consumption (actual data)	
Romania / ANRSC	1 year	Future consumption (prognosis)	actual consumption and is calculated also a trend of consumption depending on investments done or according to extension of the operational area.
Malta / REWS		Future consumption (prognosis)	
Latvia / PUC		Future consumption (prognosis)	The Merchant shall use the amounts of water management services foreseen for the calculation of the draft tariff. When foreseeing the amounts of water management services, the Merchant shall take into account the actual amounts of water management services of the previous reporting year and the foreseen amounts for the current year, and also the changes in the number of connections to centralized water supply and centralized sewerage engineering networks planned, and other factors affecting the amount of water management service. The Merchant shall submit information regarding the planned changes in the number of connections to centralized water supply and centralized sewerage engineering networks together with the draft tariff.
Lithuania / VERT	3 years	Past consumption (actual data)	
Estonia / ECA	1 year	Future consumption (prognosis)	Future sales volume would be derived through observation of the dynamics of consumption in time and adding possible changes in consumption in regulation period.
Belgium, Flanders / VMM - drinking water	6 years	Future consumption (prognosis)	
Belgium, Flanders / VMM - wastewater	1 year		
Belgium, Brussels / BRUGEL	2 years	Past consumption (actual data)	
Croatia / VVU		Other, please specify	Both methods are used (i) future prognosis - if there is investment under way, soon to be completed or if there is significant emigration to occur or (ii) past dana - in all other cases
Poland / PW	3 years	Other, please specify	Both components are taken into account – actual data (past consumption) + reasonably expected changes (related to e.g. development projects, new customers)
Italy / ARERA	4 years	Past consumption (actual data)	In the tariff method no forecast is considered for future volumes, but a balance component is included in VRG where volume variation, ex post, will result to have determined revenues higher or lower than the admitted VRG (component Rc vol). Then the balance component can be positive or negative.

Future demand planning	Regulatory period	How future billed volumes are planned	
Armenia / PSRC	15 years	Taking into account the base volumes of Lease contract and actual volumes of previous contracting year the future volumes are defined	
North Macedonia / ERC	3 years	Future consumption (prognosis)	
UK, Scotland / WICS	6 years		
UK, England and Wales / OFWAT	5 years	Other, please specify	https://www.ofwat.gov.uk/publication/setting-price-controls-2015-20-guidance-companies-producing-default-tariffs/
Ireland / CRU	5 years	Future consumption (prognosis)	Forecast volume growth rates. Assumed consumption growth rates included in generating tariffs
Kosovo / ARRU	3 years	Projected water consumption over the business planning and price control period.	Based on the projected number of consumers, water consumption. For the tariff determinations the billed volume is adjusted to reflect improved commercial efficiency (revenue collection rate).
Moldova / ANRE	5 years	Past consumption (actual data)	

Table 23: Future demand planning

In 10 cases (*Georgia, Montenegro, Romania, Malta, Latvia, Estonia, Flanders*, *North Macedonia, Ireland, Kosovo*) demand is planned based on a forecasted demand. As a most common scenario the utilities have to plan the consumption based on analysis of the trends of the actual consumption and possible changes in customer demands and future connections.

In 6 cases (*Albania, Hungary, Lithuania, Brussels*, *Italy, Moldova*) the demand in the tariff model is based on past consumption (actual data). *Italy* reports that a balance component is included in the tariff methodology that reflects changes in revenues due to changes in consumption.

In 4 cases a mixture of the above mentioned approaches is applied – *Bulgaria* (average past consumption for 5 years period plus future planning changes), *Croatia* (future planning only if investment or emigration is expected, otherwise past consumption is used), *Poland* (actual data plus reasonably expected changes) and *England and Wales* (link to methodology is provided).

Additional information is provided regarding regulatory rules treating Non-Revenue Water and planning changes in customers/consumption:

Demand planning regulatory requirements	Does the regulator set levels for Non-Revenue Water (NRW)		Does the regulator have rules for planning changes in customers / consumption	
Bulgaria / EWRC	**Yes**	The Regulator sets levels for all KPIs, including NRW - in both % and m3/km/d	**Yes**	Prognosis of statistics for changes in population in the concrete region plus new infrastructure that increases service coverage
Georgia / GNERC	**Yes**		**Yes**	

Demand planning regulatory requirements	Does the regulator set levels for Non-Revenue Water (NRW)		Does the regulator have rules for planning changes in customers / consumption	
Albania / ERRU	**Yes**	WRA analyzes the subcomponents of water losses in the water balance reported by the utilities to the WRA. WRA based on this analysis further setup the objectives in reducing the NRW indicator by the utility.	No	WRA does not have full authority to change the norms in customer consumptions. This is subject of decision by a wider involvement of high level institution which the WRA will participate
Spain / MITECO	**n.r.**	**n.r.**	**n.r.**	**n.r.**
Montenegro / RAE	No		No	
Hungary / HEA	No		No	
Romania / ANRSC	No	ANRSC approves audit documentations for water review (technological water consumption, total water leakage)	No	Attribute of local public administration
Malta / REWS	No		No	
Latvia / PUC	No		**Yes**	The Merchant shall use the foreseen amounts of water management services for the calculation of the draft tariff. When foreseeing the amounts of water management services, the Merchant shall take into account the actual amounts of water management services of the previous reporting year and the foreseen amounts for the current year, and also the changes in the number of connections to centralized water supply and centralized sewerage engineering networks planned, and other factors affecting the amount of water management service. The Merchant shall submit information regarding the planned changes in the number of connections to centralized water supply and centralized sewerage engineering networks together with the draft tariff.
Lithuania / VERT	**Yes**	20 present	No	
Estonia / ECA	No		No	ECA has no rules for that, but reasonable presumptions of changes in customer or consumption would be taken into account in future prognosis.
Belgium, Flanders / VMM	No		**Yes**	Mandatory SMART goals set by the utility for efficiency and performance gains and for sustainable water usage
Belgium, Brussels / BRUGEL	No		No	
Croatia / VVU	No	It will be done by the Governmental separate regulation.	No	
Poland / PW	No	No country-wide rules on this matter, however the utility may be required to explain NRW well above technically feasible average	No	
Italy / ARERA	No	A larger provision than NRW is envisaged by technical quality regulation, setting objectives for providers in terms of water losses minimization by mean of two indicators: linear water losses (mc/km/day), and the percentage of water losses (%).	No	Peculiar situations can be evaluated on a case by case basis, under formal request

Demand planning regulatory requirements	Does the regulator set levels for Non-Revenue Water (NRW)		Does the regulator have rules for planning changes in customers / consumption	
Armenia / PSRC	No	In rules of water supply and use water supply services are free of charge for 1) hydrants - in the case of water supply for firefighting purposes; 2) for fountains built up to 31 December 2016 inclusive;	No	
North Macedonia / ERC	No		No	
UK, Scotland / WICS	No	WICS does not set the amount of non-revenue water for SW. However, Scottish Water has a leakage target to meet each year. It is set at an economic level of leakage - a calculated point at which it gets more expensive to find and repair leaks. Scottish Water's performance against this target is measured each year.	No	
UK, England and Wales / OFWAT	No	NRW (Leakage of potable water from distribution network) reflected through cost allowances, performance commitments and outcome delivery incentives	**Yes**	https://www.ofwat.gov.uk/publication/setting-price-controls-2015-20-guidance-companies-producing-default-tariffs/
Ireland / CRU	**n.r.**	n.r.	**n.r.**	**n.r.**
Kosovo / ARRU	**Yes**		No	
Moldova / ANRE	No		No	
Total (Yes)	**5**		**5**	
Total (No)	**16**		**16**	

Table 24: Demand planning regulatory requirements

In 5 of the cases (*Bulgaria, Georgia, Albania*, *Lithuania, Kosovo*) the regulator set levels for Non-Revenue Water.

In *Croatia* this will be done by separate government regulation. *Italy* requires that utilities plan NRW levels reduction in a separate technical quality regulation model. There are no specific rules in *Poland* yet, but the utilities have to explain reported NRW levels.

In *Scotland* and *England and Wales*, the regulators do not set NRW targets for the utilities, but the operators are obliged to plan water losses reduction based on the economic level of leakage.

In 5 cases regulators have reported that they establish rules for planning changes in customers / consumption (*Bulgaria, Georgia, Latvia, Flanders*, *England and Wales*). Information on the methodologies used is provided in the table above.

VII.3. SUMMARY

It is noted that in almost all cases (21) demand (volumes) is used as denominator in the tariff formula.

In 14 cases demand is calculated in the tariff based on billed volumes only (*Albania*, *Georgia*, *Romania, Malta*, *Latvia, Lithuania, Estonia, Flanders, Brussels, Croatia, Italy*, *Northern Macedonia*, *Ireland, Moldova*).

In 3 cases demand is calculated in the tariff based on billed volumes plus NRW levels (*Bulgaria, Hungary* and *Poland*). In this case the regulator takes into account water losses and includes them in the tariff formula.

In 10 cases (*Georgia, Montenegro, Romania, Malta, Latvia, Estonia, Flanders*, *North Macedonia, Ireland, Kosovo*) demand is planned based on a forecasted demand.

In 6 cases (*Albania, Hungary, Lithuania, Brussels*, *Italy, Moldova*) the demand in the tariff model is based on past consumption (actual data).

In 4 cases a mixture of the above mentioned approaches is applied – *Bulgaria*, *Croatia*, *Poland*, *England and Wales*.

In 5 of the cases (*Bulgaria, Georgia, Albania*, *Lithuania, Kosovo*) the regulator set levels for Non-Revenue Water, regarding tariff setting.

In 5 cases regulators have reported that they establish rules for planning changes in customers / consumption (*Bulgaria, Georgia, Latvia, Flanders*, *England and Wales*).

SUMMARY

This survey covered 23 countries - WAREG Members (Flanders is considered as 2 cases in some of the sections, as different practices are applied for tariff setting of drinking and wastewater), and it shows that various practices in water and sanitation services tariff setting are applied in European countries.

Regulatory authorities:
16 of the participants in the survey have independent tariff regulatory power. In the other 5 cases WSS tariffs are approved by local municipalities (3), municipal administrative units (1) and state ministry (1).

Services under price regulation:
Tariffs for water supply, as well as collection and treatment of wastewater are subject to regulation by the relevant authority in all cases surveyed. In some of the cases prices for non-potable water supply (10 cases) or treated water delivery to other utility (15 cases) are regulated.

Length of regulatory period:
The length of the regulatory period generally varies between 1 and 6 years, and there is a wide variety of periods across the cases surveyed.
Most common cases include length of regulatory period of one year (6 cases); three years (5 cases) and five years (4 cases). Other cases available include two years (1 case), four years (1 case), six years (2 cases) and fifteen years (1 case). When regulatory periods are longer than 1 year, an option for unplanned tariff update is introduced.

Business plan preparation:
In 21 of the cases surveyed, the utility prepares a business plan or a certain strategic document, and in 16 cases there is correlation between the business plan and the tariffs. Only in 8 cases however the authority that approves the tariff has regulatory power to approve the business plan, while in the other cases the regulator has no authority on its determination.

Business plan approval:
There are countries where the authority that approve tariffs approve also the business plan (9 cases), while in other countries the business plan is approved by other institutions (2 cases), or an agreement or opinion on the business plan is required (2 cases). In some countries the utility prepares a business plan, and although it is not formally approved is used by the regulator in the tariff procedure as background material (5 cases). Finally there are countries where no obligation for business plan preparation exists (2 cases).

Tariff methods applied:
A variety of tariff methods are used by WAREG Members in the process of WSS pricing – Cost plus (7 cases), Rate of return (4 cases), Price Cap (5 cases), Revenue Cap (3 cases), Other methods – combination of previous (4 cases).

Fixed and variable charges vs. volumetric tariff only:

Most of the WAREG Members (19) have reported that fixed charges are applied next to volumetric tariffs
Information about fixed charges design and approach used shows that there is no common approach applied. In some cases fixed charge is applied only for one service. In some cases fixed charge is applied only locally or its application depends on utilities. Fixed charges are applied to properties / habitants / persons. Different costs are to be recovered from the fixed charges.

Only 4 of the members surveyed apply only volumetric tariff, meaning that utilities can recover necessary volumes only if service is consumed.

Block tariffs based on consumption:
Some WAREG members (11) have reported that tariff blocks based on the volume used are applied. Information from the members shows that very different volumes ranges and quantities are applied in those cases.
In the most common cases members apply two blocks tariff (*3 cases*), although the dimensions of volumes very different (between 33 and 55 m3 per year for the 1st block). In 2 other cases tariff blocks are applied only for non-domestic customers, and in one of the cases they are different for drinking and waste water. Varieties of schemes are applied in the other 2 cases, where the decision is taken by the utilities or local regulatory authorities.

Cost categories allowed under OPEX:
Information reported by WAREG members show huge variety of the type of costs that are allowed under OPEX expenses. All WAREG members include costs for materials, external services and personnel under OPEX costs categories, and most of them. include costs for taxes and environmental fees and other costs.

Some WAREG Members allow financial costs for investment and/or operational loans under OPEX categories. In 12 of the cases studied, the rate of return on investments is not included in the tariff, and therefore financial costs are included under OPEX, although we see different approach towards investment or operational loans.

In 8 of the cases, costs for sanctions, penalties, and forfeits charged by state, municipalities and/or private companies are allowed under OPEX categories, and in 10 cases are costs for provisions, impairments, donations, entertainment expenses and others. In rare cases obligations from previous regulatory periods (4 cases) or costs for re-evaluation of asset stock value (6 cases) are allowed under OPEX

Overhead approaches:
Regulators apply different methodologies for apportionment of overheads between regulated services. The most commonly applied method for apportionment of overheads is according to the proportion of the direct costs for each service (8 cases). Other methods applied include apportionment according to the volumes of water supplied/ treated (2 cases), apportionment in accordance to revenues generated (2 cases) or other methods including asset values, number of personnel or customers, investments or a mix of above methods (6 cases).

OPEX optimization:

A very important topic is in determining how the regulator ensures that the utility will achieve OPEX efficiency. Different approaches are applied by the WAREG Members in this area - as a general rule all costs are subject to detailed review when the utility submits its application to the regulator.
In 7 cases regulators who measure performance through KPIs use these indicators to push for cost. Some regulators (2) issue direct guidance to utilities how to plan costs optimization while other members apply other approaches, usually mix of all mentioned in the above (11 cases).
In 4 cases regulators have not yet introduced methods for achievement of OPEX optimization.

Calculation of depreciation charges:
In some of the cases regulators allow the utilities to calculate depreciations based on all assets owned by the companies (8 cases), while in most of the cases utilities can include only assets used for provision of regulated services (13 cases).
Only in 8 cases the regulators have issued regulatory rules with depreciation norms, while in the other 13 cases the depreciation norms are set by the utilities accounting practices.

Investments finances by loans:
When investments are financed through loans, in most of the cases (12) they are included in the tariff after the investments are made and assets constructed. Seven WAREG members have reported that investments funded with loans are included preliminary in the tariff (before the actual investments), and in 3 cases the investment loans are not included in the tariff – neither preliminary, nor subsequently.

Investments accounting:
In most of the cases (14) utilities account investments in accordance with their own accounting policy. In only 5 cases utilities account investments to the Regulator based on regulatory accounting rules, and report that the regulator has issued regulatory rules.

General depreciation norms used:
Information provided in the survey show that very different norms for asset useful life (respectively depreciation norms) are used in European countries

- Buildings – between 33-50 years (annual norms of 2% - 3%);
- Pipes (water-mains, sewers) – between 40-50 years (annual norms of 2% - 2.5%);
- Machinery and equipment - between 5-15 years (annual norms of 6.7% - 20%)

Separation between operational and capital works:
In rare cases regulators have issued rules to separate OPEX from CAPEX activities and thus to report investments. This last issue is relevant, since utilities could be induced to follow a cost padding approach, by book keeping current costs as CAPEX for getting an extra rate of return, or by recording investments as OPEX, to get immediate cost coverage under a cost plus method. To avoid these practices, a set of clear rules for costs recording is required.

Regulatory Asset Base composition:
All members that apply cost-plus tariff model, do not use RAB as tariff element (7 cases), and some members that apply other tariff methods do not use RAB as tariff element –Rate of Return (1 case), Price Cap (2 cases).

In the cases when RAB is used as tariff element (12), it is composited of assets financed by the company, used to provide water and sanitation service only.

Regulatory Asset Base value:
No one WAREG Member has reported that RAB value is based on book asset value (historical costs). All members that use RAB as tariff element determine its value based on net book asset value (meaning that historical costs for asset acquisition are reduced with accumulated depreciation), but there are difference whether these accumulated depreciations are based on utility accounting policy (5 cases) or based on regulator rules (4 cases). Three of the cases surveyed apply different approaches.
In 6 of the cases studied future investments planned in the regulatory period are included in RAB value.

Cost of Equity:
In 11 cases WAREG members calculate the Cost of Equity, and all of them apply the Capital Asset Pricing Model (CAPM). In only 2 cases additional size premium is added in the calculations under CAPM.

Cost of Debt:
8 WAREG members report that they regulate the Cost of Debt. The other regulators that have reported to regulate the Cost of Equity do not regulate Cost of Debt, and this matter is differently arranged.

Weighted Average Cost Of Capital:
WAREG members that regulate the WACC have provided detailed information about the formulas and calculations methodologies. In only 3 cases regulators set actual levels of equity and debt in WACC. In the other cases the equity/debt ratios in WACC are set according to regulator guidance – for example 50%/50% or 40%/60%.

Some of the members have reported current WACC levels, and these vary: 4% - 4.21% - 4.47% - 5.2% - 5,34% - 5.45% - 15.99%.

Demand:
It is noted that in almost all cases (21) demand (volumes) is used as denominator in the tariff formula. In 14 cases demand is calculated in the tariff based on billed volumes without taking into account water losses, and only in 3 cases demand is calculated in the tariff based on billed volumes plus Non-Revenue Water levels.

In 10 cases the demand in the tariff model is planned based on a forecasted demand, while in 6 cases it is based on past consumption, and in 4 cases a mixture of the above mentioned approaches are applied.

In 5 of the cases the regulator set levels for Non-Revenue Water, regarding tariff setting, and in 5 other cases regulators have reported that they establish rules for planning changes in customers / consumption.

CONCLUSIONS

Various models and approaches are applied in Water and Sanitation services tariff regulation among European countries. EU legislation sets very general principles for water pricing and therefore countries apply different approaches

Water pricing regulation is introduced in different ways in Europe – at national level by regulator or by ministry after supervision by a regulator, at local and/or regional level by the municipalities with or without supervision by regional or national authority, and in some cases the level and competent authority depend on the district or agglomeration.

Even if a national regulator is responsible for water pricing, there are many differences among approaches applied – scope of services under regulation, length of regulatory period, business planning and formal business plan approval. Tariffs are set based on fixed and variable charges in most of the cases studied, and in some cases tariff blocks are applied but diverse designs and approaches are applied.

Diversified approaches are applied towards operational costs (OPEX), and in some cases financial costs or costs for sanctions, penalties, and forfeits or for provisions, impairments, donations, entertainment expenses and others are included in the tariffs under OPEX. Different approaches for apportionment of overheads between regulated services are also used. Various schemes for OPEX optimization are used by the regulators, mostly using KPIs.

Different standards for asset useful life, respectively different depreciation norms are applied for the same type of water and sanitation assets. In most of the cases studied this matter is handled by utilities accounting policies or national accounting standards, and in less cases regulators issue regulatory standards. At the same time investments in WS assets by the utilities are not always fairly included in tariff, meaning that investment stimulus is not always provided.

Return on investments is differently treated in tariff setting. In some cases regulators do not allow such component in the pricing. When profit is allowed in tariff, it is usually calculated by application of WACC on the RAB value. In most of the cases regulators apply Capital Asset Pricing Model (CAPM) to calculate Cost of Equity, and issue requirements for Equity/Debt ratios in WACC.

In almost all cases surveyed demand is used as denominator in the tariff formula, but again different approaches are applied towards Non-Revenue Water and planning future prognosis.

This survey shows that water pricing, although based on similar fundamental principles, is actually applied in very diverse ways among the European countries, thus water and sanitation sector is differently treated in terms of cost recovery, motivation for efficiency, investment stimulus and service improvement, leading to long term stability and resilience.

One way to improve this situation would be to introduce more detailed and common principles, rules and algorithms for water and sanitation sector governance and regulation in the European legislation.

ANNEX I: COUNTRY NOTES

BULGARIA

Water and sanitation sector governance - asset ownership, operator's role, regulatory authority power, and other main stakeholders.

Water sector	Water and sanitation (WS) assets in Bulgaria are public property – either state owned (if the assets serve more than one municipality) or municipal owned (if they serve only the relevant municipality). Bulgaria has 28 districts and there is regional WS operator in each district – 27 are state owned, and there is one PPP in the capital of the country. There are 16 districts with only regional utility providing WS services to all municipalities in the district. In other 6 districts processes of merging the regional and the existing municipal utilities has recently finished, and in the other 6 districts some municipalities will continue to use local municipal utilities (meaning that the regional company will not serve all municipalities in the district). Companies that operate private WS assets are allowed to work as WS operators with approved business plans and tariffs by the Regulator.
Role of local authorities	In the case of the regional companies serving more than one municipality, the public owners – the state (represented by the district state governor) and all municipalities (represented by the mayors) are united in Water Association. This is the authority that choses the WS public assets operator and concludes contract for asset management and service provision. In the cases of municipalities where all WS assets are municipal ownership this role is played by the municipal council. The public owners are obliged to plan the development of the assets through regional master plans with long-term and short-term investment programs. The operators must prepare their business plans in accordance with these investment programs, and the public owners therefore have to agree on the business plans.
Role of national regulatory Authority/ Agency	The Energy and Water Regulatory Commission (EWRC) is national multisector regulator with powers in Energy (Electricity, Central Heating and Natural Gas) and WS sectors. The commission includes chairman and 8 commissioners (4 in the energy sector competence, 2 with WS sector competence, 1 lawyer and 1 economist). The commission works in Energy and WS sector compositions. In the water sector, EWRC regulates the quality and the prices of WS services. Quality is monitored by 30 Key Performance Indicators (KPIs) that cover technical, financial and organizational aspects of drinking water supply, waste water collection and treatment. WS prices can be regulated through Rate of Return (Cost Plus) or Price / Revenue Cap methods. The regulator agrees on the Common Terms for service provision and reviews customer complaints if they are related to prices and quality of services. There is no licensing regime in the WS sector of Bulgaria, in contrast of the energy sector.
Other water and sanitation stakeholders	Other main stakeholders in the sector besides EWRC and Water Associations / Municipal Councils are Ministry of Regional Development and Public works (it plans and executes the state policy in the sector, prepares sector strategy, agrees on the investment and reconstruction policies, and is principal of the state-owned regional companies); Ministry of Environment and Water (plans and executes the overall state policy towards water usage, issues permissions for

	water abstraction and discharge, and controls the wastewater quality), Ministry of Health (controls the drinking water quality), National Ombudsman, Commission for Consumer Protection, Bulgarian Water Association and WS operators Union, non-government organizations and others.

Regulatory Information – regulatory period requirements and preparation, tariff method applied, business plan (if such exists) requirement, tariff approval process.

Regulatory period and tariff model	The regulatory period is 5 years. Prior to each period, the regulator issues guidance for legislation application in the next period, tariff model that will be used, calculation of Cost of Equity / Debt and WACC, and issues individual goals for all KPIs to each utility.
Process of tariff approval	Operators are obliged by law to prepare business plans with technical and investment parts, investment, repair works and social programs that need to be agreed by the public asset owners. The review of the business plan and the tariff proposals are merged into one administrative procedure, and are combined into one electronic model (meaning that any changes in the business plan directly change the tariff proposal). Regulator is obliged to conduct at least one technical meeting with the utility to discuss the business plan and tariff proposal (with recording and protocol). After the utility present revised version of the business plan that is in compliance with all legislative requirement and EWRC guidance, the experts in the administration prepare report for business plan approval (or rejection if the application is not in compliance). After the commission agrees on the report, it conducts open session with the utility and public hearing (usually in the same day). After all stakeholders and/or customer representatives present their statements (up to 14 days after the public hearing), the commission makes it final decision to approve the business plan and the tariffs.
Tariff structure	EWRC applies Price Cap tariff method during the 5-year regulatory period. Tariffs are volumetric only (there is no fixed charge), and they are different for each year of the business plan (depending on the annual profiles of operational costs, investments, rate of return and volumes).
Rules on depreciation of assets	EWRC allows depreciation chargers of operators own assets (used to finance investments in own assets), and of the public utilities (used to finance new investments in the public assets as well as to pay principals of existing investment loans for public assets) in the tariffs. Depreciation charges are calculated based on regulatory rules.

Planned and unplanned tariff updates during regulatory period.

Planned updates of the approved tariffs	EWRC applies Price Cap method for 5-year regulatory period, and approves 5 tariffs for each year of the business plan. With the approval, the tariff for the 1st year comes into force (from the beginning of next month). The tariffs for the next years are approved and come into force from the beginning of the relevant year after their planned update P = RPI – X. Commission uses data for monthly inflation from the business plan and tariff approval. Coefficient X = E + Qr + Qi + Y, and includes the following components:

	- Coefficient E – represents efficiency. EWRC calculates individual coefficients for each utility before the regulatory period; - Coefficient Qr – represents the difference between planned and actual costs in the business plan that are required for new assets maintenance or new activities (these costs were not present in the base year. EWRC allows utility to plan such costs in the future, but has also chance to compensate customers if such costs are not realized, or can compensate the operator if the actual costs are higher than planned. - Coefficient Qi - represents the difference between planned and actual investments achieved by the utility. EWRC allows depreciation charges of public assets in the tariffs for investment funding, and has chance to compensate customers if the utility fails to invest as required (utility will not be compensated through this method if it invests more than planned). - Coefficient Y - represents the difference between planned and actual levels of KPIs achieved by the utility. With this coefficient EWRC links quality of the service with their prices and stimulates utilities to achieve higher results. Coefficients E and Qr are used in each annual tariff update, while Qi and Y are used twice in the regulatory period (after the 3rd year, and they affect the 5th tariff update based on differences from the first 3 years of the period, and after the period is over, and they will affect the 2nd tariff update of the new period, based on the differences from the last 2 years of the period). The reason for different application of Qi and Y in the RPI-X process is that the regulator wants to have the power to interact during the regulatory period, but at the same time to provide enough time to the utilities to achieve results in investment and KPI performance.
Unplanned tariff update	The utilities can start procedure for unplanned tariff update if unexpected event occurs (which could not be planned by the utility and/or the operator could not avoid its effects), and at the same time it has significant effect on the allowed revenues or approved costs with more than 2%. EWRC investigates the request and if all requirements are fulfilled, tariff is updated during the planned annual update. If the effect of the unexpected event is more than 10% the operator may request revision of the whole business plan.

Requirements for operators reporting, quality of information check, available regulatory accounting rules, annual control, information for the public.

Main accounting rules applied	EWRC issues regulatory accounting rules that include detailed chart of accounts for costs and assets accounting. These rules reflect the differences of public and private asset accounting - public assets operated by the utility based on contract with public owner (all water and sanitation networks and installations), and assets owned by the utility (land, buildings, transportation, equipment, other). The regulatory rules provide chart of accounts based on asset types, and follow the structure of repair and investment programs of the business plans. They also provide detailed instructions for separation of operational and investment costs, as well as guidance how to calculate value of assets build with internal resources of the operator.
Reporting tasks	Operators are required to provide annual report for implementation of the business plan, as well as annual financial reports based on regulatory accounting rules. The report for business plan implementation provides data for number of variables used for KPIs calculation, KPIs levels, water balance, water sources and discharge points, connection meters, network bursts, quality of potable and wastewater, sludge, investments, personnel, as

	well as some economic information. The financial report based on regulatory accounting rules provides data for balance, statement of income and expenses, billed volumes, assets and costs (detailed information for all regulated services and general assets / costs distribution), revenues, personnel and debt collection. These reports have to be verified by independent auditor.
Control and inspection on reliability of data	EWRC controls the quality of information for variables used for KPIs calculation. Thus the regulator issues guidance for quality of information sources and requires the operators to adopt number of registers and data bases (GIS, asset register, network bursts register, etc.) with certain technical requirements for information control (data access, procedures for information update) as well as requirements for information content for each register. EWRC annually assess the quality of information with 4 degrees, and assess reported level of KPIs implementation (with also 4 degrees). EWRC conducts annual on-site planned inspections of approved business plans implementation, and controls the quality of information and levels of KPIs achievement and application of regulatory accounting rules.
Accountability and transparency of water sector	At the end of each year EWRC publishes annual report for the WS sector, with general information for levels of KPIs (on national level) and their improvement, investments, operational costs and other information. This report contains also individual sections for each utility – including quality of information and KPIs levels, investments and other details.

ITALY

Water and sanitation sector governance - asset ownership, operators role, regulatory authority power, other main stakeholders.

Water sector	The Italian Regulatory Authority received powers to regulate water and wastewater services at the end of 2011. Currently, the regulated water services are the following 5 ones: extraction, transport and distribution of water for civil use, sewerage and wastewater treatment. According to European, national and local norms, such services can be entrusted individually or jointly to private companies (by mean of a public tender), to mixed private-public companies (where the private partner is chosen through a public competitive tender), or to public in-house companies (100% controlled by a Municipality). Presently there are more than 2000 operators; mostly public operators as the vast majority of them are municipal firms, but only about a hundred operators serve more than 80% population. Italian water service is managed as a local natural monopoly, because of the essential and non-replicable nature of the network infrastructure that ensures its operation (it is a capital-intensive service).
Role of local authorities	[ELIMINATO PERCHÉ SI TRATTA DI ASPETTI GIÀ ILLUSTRATI IN ALTRI PUNTI] The governance of water sector in Italy is coordinated at 3 different levels. At **national level**, the Ministry of Environment and Protection of Land and Sea provides the policy framework in respect of EU legislation, and the Italian Regulatory Authority for Energy, Networks and Environment (ARERA) is responsible to define, monitor and enforce tariffs for the entire country; At **river basin district** and **regional level**, river basin district Authorities establish water basin plans and regions define the size and competences of optimal territorial areas (generally corresponding to the regional one or to the province one) where water services shall be provided; At **local level**, the governing body (the EGA) of each one of the 62 optimal territorial areas, is an Assembly of the representatives of local municipalities and it is to organize water service on its relative territory, by mean of entrusting service to individual operator, planning infrastructure interventions, proposing tariffs and oversee operator activity in order to: • collect accounting data required by ARERA on the allowed costs for regulation, and the parameters related to criticalities on infrastructures and standard provision of services; • verifies compliance with legally binding parameters that have to be included among the target objectives and, accordingly, elaborates the Infrastructure and Management Plan (PdI) in which such parameters are included as priorities, and the Economic and Financial Plan (PEF) in which the economic and financial viability of operators is checked; • it evaluates possible additional operating and capital costs, necessary to improve current performances, hence updating accordingly the IMP and the FEP; • together with individual suppliers, it implements ARERA's regulation; • approves one of the six specific regulatory schemes defined by ARER's methodology and proposes it to ARERA for final approval.
Role of national regulatory Authority/ Agency	By Law n. 214 of December 2011, the Italian Regulatory Authority for Energy, Networks and Environment (ARERA) received regulatory, supervisory and enforcement powers over water services at national level, in the same independent way as provided for electricity and gas services by Law n. 481 of 14 November 1995. Main functions provided by law to ARERA are: • definition of the methodology to calculate tariff; • tariff approval; • definition of minimum standard quality levels • control over the local investment planning;

	• regulatory decisions enforcement; • users' protection. ARERA is governed by a Board of 5 Commissioners (including the President) nominated by the Parliament for 7 years. ARERA's decision-making on tariff setting, monitoring and enforcement, as well as on internal organization and financing is autonomous from Government and Ministries, and accountable only to Parliament. However, ARERA's decisions can be trialed in by Judiciary Courts. Dialogue with Government is open, since ARERA can be required non-binding opinions on specific water legislation.
Other water and sanitation stakeholders	Other main stakeholders, besides Parliament, Government, Regional and Local Authorities (including its association), are Ministry of Infrastructures and Transports, Ministry of the Environment, industry associations and consumer associations

Regulatory Information – regulatory period requirements and preparation, tariff method applied, business plan (if such exists) requirement, tariff approval process.

Regulatory period and tariff model

The regulatory period typically lasts 4 years. Prior to each period, the regulator issues a consultation with all stakeholders. Since receiving competences on water and sanitation services in 2011, a transitional regulatory period (2012 – 2013) and two regulatory periods (2014 – 2015, 2016 – 2019) have been applied. The 3rd regulatory period will apply from 2020 to 2023.
Tariffs are set by ARERA for all or some of the following specific services:

- extraction and tranport, also for multiple uses;
- water treatment;
- wholesale of water supply;
- distribution and commercialization to end users;
- sewerage (and wholesale service) and collection and removal of rainwaters (if already included into SII perimeter prior to ARERA regulation) and urban drainage;
- wastewater treatment (and wholesale service), for mixed civil and industrial uses;
- metering

The tariff model is by regulatory schemes which are made of innovative and asymmetric rules which, considering the initial operating circumstances of each operator, provides for incentives to invest and to rationalize operating activities. The model combines the ratio between planned investment expenditure and regulatory asset base, with operational costs related to the size of each operator (in terms of served population). As a result, 6 schemes (tariffs) are identified (see below), each one of them providing the proper cost-reimbursement rules for the calculation of infrastructure/investment costs and for the evaluation of possible additional operating costs. Each local Authority (EGA) has to select the most adequate scheme, in order to calculate the total amount of costs and to determine the tariff multiplier (θ).

Regulatory schemes:

		PER CAPITA OPERATING COSTS BELOW THE NATIONAL AVERAGE	PER CAPITA OPERATING COSTS OVER THE NATIONAL AVERAGE	AGGREGATIONS, CHANGES IN OPERATOR OBJECTIVES OR ACTIVITIES
INVESTMENTS	Limited investment needs compared to the value of existing infrastructures	SCHEME I Price limit: 6.0%	SCHEME II Price limit: 5.5%	SCHEME III Price limit: 6.5%

	High investment need compared to the value of existing infrastructures	SCHEME IV Price limit: 8.5%	SCHEME V Price limit: 8.0%	SCHEME VI Price limit: 9.0%

For each one of the six tariff schemes, a specific price limit is set. The Local Authority or other competent body adopts the relevant regulatory scheme, consisting of the following acts:

a) the Infrastructure and Management Plan **programme of interventions (PdI),** which specifies the objectives to be achieved on the basis of an accurate indication of the interventions for the regulatory period;
b) the **economic and financial plan (PEF),** which annually provides throughout the regulatory period, the trend of operating costs and investments, as well as the annual tariff earnings forecast and the operator's regulated revenues;
c) the **management agreement,** containing any updates on the implementation of the tariff scheme.

The Local Authority (EGA) identifies the relationship between the investment needs and the value of existing infrastructure, as well as any additional operating costs associated with specific objectives required in each year of the regulatory period.

Concerning tariff calculation rules, the Italian model combines the following regulatory techniques:

- limit on allowed amount of cost recovery expected in one year (revenue cap);
- limit to annual price variation (price cap);
- rolling cap mechanism on endogenous costs that allows the operator to partially earn the gains coming from cost reductions;
- ex post reimbursement of "realized" investments and standardised parameters for the reimbursement of financial and fiscal costs of capital.

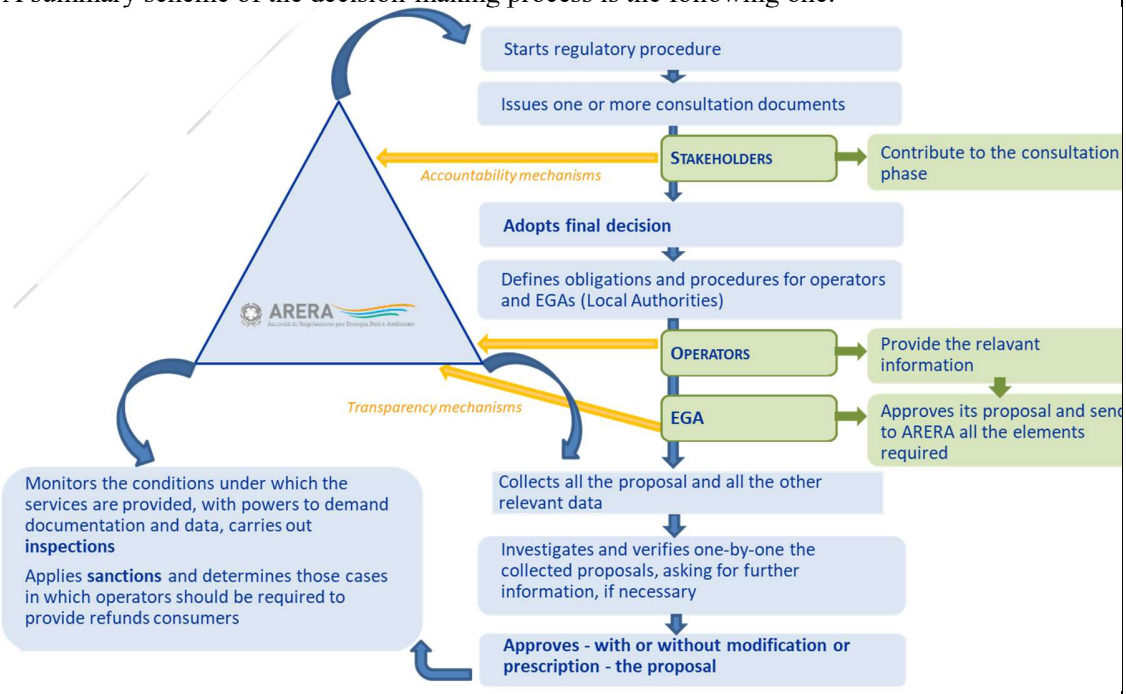
Starting from 1st January 2018, services and infrastructures targets are defined by performance index set by the Authority with the **technical quality regulation model (RQTI)**, which follow contractual quality regulation, previously adopted in 2015. RQTI is an output-based model, aimed at the achievement of annual objectives by each operator, defined by the positioning of the same operator in a given class based on the level of performance highlighted in a specific reference year. For each indicator (called macro-indicator), annual objectives are divided into two categories: maintaining (of the performance level under conditions of excellence) and improvement (divided into classes, with differentiated values based on the starting conditions). Macro-indicators cover the entire water service chain through the following targets: reduction of losses, (*macro-indicator M1 - Water losses*); service continuity (*M2 - Service interruptions*); adequate quality of the water intended for human consumption (*M3 - Water quality*); minimization of the environmental impact of collecting wastewater (*M4 - Sewerage system adequacy*); minimization of the environmental impact of wastewater treatment (*M5 - Sludge disposal* and *M6 - Quality of the treated water*).
Operators are incentivised to reach technical quality objectives by a **stick and carrot mechanism** (in addition to reputational effects), which rewards and penalties economically quantified according to different assessment stages and rankings (globally for all macro-indicators and separately for each one) , with the dual purpose of, on the one hand, encouraging the *maintaining* of quality levels for those operators who already have achieved the goals set by regulator and, on the other hand, promoting performance improvements for less advanced operators.

Process of tariff approval	Tariff approval is a bottom-up process. More specifically, tariffs for year "a" are prepared by the competent EGA on the basis of the

methodology defined by ARERA and the data collected from each operator for the year "a-2". For this purpose, each EGA validates the information provided by operators.
By April every year, the EGA has to carry out the following duties:

a) define specific objectives and receive the operator's proposal to achieve them (i.e. the Infrastructure and Management Plan);
b) calculate the tariff by observing the methodology defined by ARERA;
c) draft the economic and financial plan, aimed at ensuring "achievement of economic and financial balance, while complying with the principles of effectiveness, efficiency and economy of operations";
d) send the selected regulatory scheme to ARERA, and specifically:
    i. the Infrastructure and Management Plan;
    ii. the Economic and Financial Plan;
    iii. the Management agreement;
    iv. an accompanying report that explains the applied methodology;
    v. any possible updates on the information provided;
e) In the following 90 days after receiving the abovementioned documents, ARERA decides whether to approve or reject the proposed tariff or to ask EGA for more specific in-depth analysis.
f) In case the EGA fails to send the above-mentioned documents within compliance term, operator can send its tariff proposal to EGA, making a specific application and informing ARERA; then ARERA shall warn the EGA to comply with its duties within 30 days, and in case the EGA is again not compliant, operator request is intended as approved by EGA and ARERA decides whether to approve or reject the proposed application in the following 90 days; If tariff is approved, ARERA will cut the cost item covering for operating expenses of the Local Authority .
g) in certain cases, ARERA has the power to apply a reduction on allowed costs (e.g. regulatory scheme is lacking or non-coherent with financial statements) or to exclude tariff update (e.g. operators acting in force of a non-compliant title).

A summary scheme of the decision-making process is the following one:



The EGA can update the selected tariff scheme every 2 years.

Tariff structure	The tariff formula is the tariff multiplier Theta (ϑ), expressing the variation which has to be applied for each year "a" to the tariff on force at the end of the previous regulatory period: $$\vartheta^a = \frac{VRG^a}{\sum_u \underline{tarif}_u^{2015} \bullet (\underline{vscal}_u^{a-2})^T + R_b^{a-2}}$$ Tariff multiplier is calculated as the ratio between: • the amount of total allowed costs expected in one year (VRG), which is the sum of the following components: $VRG^a = Capex^a + FoNI^a + Opex^a + ERC^a + Rc_{TOT}^a$ ○ component Capex^a covers the cost of fixed assets, it includes interest payments, taxes, and depreciation in the year "a"; ○ component FoNI^a covers costs incurred to achieve specific objectives, it includes expenditure to finance additional investments, amortization of capital grants and expenditure for use of third parties infrastructures, in the year "a"; ○ component Opex^a covers operating costs in the year "a"; ○ ERC^a covers environmental and resource costs in the year "a" that are not already included in the other cost components of the tariffs; ○ Rc$^a_{TOT}$ is the equalization of costs incurred in the year "$(a-2)$", i.e. the difference in effective volumes billed in year "a" and in year $(a-2)$. • and the revenue corresponding to the tariff applied in the base year: $\sum_u \underline{tarif}_u^{2015} \bullet (\underline{vscal}_u^{a-2})^T$ which is the estimated revenue of the integrated water services operator corresponding to the sum of the scalar products for each type of user, of the vector of tariff components, multiplied for the vector of scale variables actually measured; Once (ϑ) is determined, it is multiplied for all existing end-user tariffs, in order to calculate, *ceteris paribus* the scale variables (for example, typology or number of consumers, volumes), a tariff structure coherent with the total amount of costs to be recovered. Tariffs are calculated according to total volumes. A fixed charge and a variable charge (depending on the volumes of water consumed) are applied. A minimum quantity of water (50 liters/person/ day) is ensured at a discounted rate and the remaining consumption is covered by 3 tariff blocks. Low-income households have the right to access (upon documented request to the operator) to a social bonus, implying that the "vital" amount of water is given for free.

Planned and unplanned tariff updates during regulatory period.

Process of tariff update	Tariffs can be updated every 2 years, in order to adjust cost components to most recent accountable data, ensuring cost effective recovery. Planned tariff update involves the acts composing the specific regulatory scheme (in particular the Infrastructure and Management Plan and the Economic and Financial Plan) and implies the redefinition of some financial parameters such as the Water Utility Risk Premium and the tax rate. In the last 2018-2019 update ARERA has introduced two new operating components to recover (new) technical quality service costs and costs due to further facilitations required by social bonus application (both on request by EGA). The tariff update process is the same as defined for tariff approval. According to Tariff Method resolution for years 2016-2019 (664/2015/R/idr) and to resolution 918/2017/R/idr, EGA can present - in each moment of 2016-2019 period - a justified application for a revision of approved tariff, to be evaluated by ARERA, as a consequence of extraordinary conditions which could compromise economic and financial balance of service supplier (unplanned tariff update).

Requirements for operators reporting, quality of information check, available regulatory accounting rules, annual control, information for the public.

Main accounting rules applied	Operators apply their accounting policy, accordingly with national/international accounting standards. For specific aspects of tariff calculation, regulator has adopted some rules concerning asset depreciation, using regulatory useful lives and applying higher depreciation rates depending on the scheme in which operators fall. During the present regulatory period 2016-2019 water assets are not unbundled by service (e.g. water supply, sewerage, wastewater treatment), but are accounted by typology of asset (e.g. plant, network, tank etc.). The new unbundling dispositions set up by ARERA since 2016 will provide for a more detailed assets accountability.
Reporting tasks	Periodically, with different deadlines (depending on the reporting subject) EGA validate and transmit to ARERA data and information provided by water service providers. Actually, mainly data reporting set by Authority concern regulatory schemes, including tariffs and technical data (every two years), contractual quality and unbundling data (every year) and information on water sector governance compliance (every six months).
Control and inspection on reliability of data	Enforcement powers has been granted by law to regulator concerning sanction application, documents & data demanding and inspection power. The main controls on reliability of data are made into tariff proposals analysis, aimed to specific regulatory schemes approvals.
Accountability and transparency of water sector	Every year, on an aggregate basis, ARERA published the results of its data collection into an annual report on the state of regulated services (which include a specific section on water services). Operators have the compulsory task to ensure the transparency of their water bills, illustrating separately the amounts due for water supply, wastewater collection and treatment, and making the user conscious of his consumed volumes.

ALBANIA

Water and sanitation sector governance - asset ownership, operator's role, regulatory authority power, and other main stakeholders.

Water sector	In Albania water supply and sanitation services are provided by 57 public utilities. The sector since 2007 is decentralized to the local government level owning 100% of the utilities assets. The new territorial administrative reform of 2014 divided the territory of Albania in 61 municipalities rather than of previous 374 local administrative units (municipalities and communes). The sector appears much fragmentized in small utilities. Only 2 utilities of Tirana and Durrës municipalities are covering about half of the country population. There are only 2 cases of water utilities aggregation (by two municipalities each), respectively regional utilities of Berat-Kuçova, and the utility of Librazhd-Prenjas. Anyway the aggregation makes part of the National Water and Sanitation Strategy, which needs to be considered as a high priority for the sustainability of the sector Currently there are not any private utilities providing WWS services in the sector.
Role of local authorities	The assets of water and sanitation are owned by the municipality councils, which give them in use to the utilities. In fact the WS assets are included in the utilities balance sheets, and not appearing on balance sheets of the municipalities. The assets previously were in ownership of the Central Government which transferred to the local government without obligation to include in their balance sheets. In the case of the regional companies serving more than one municipality, the municipalities (represented by the mayors) are shareholders of the regional utility with the percentages based on the number of the population served each. The delegation by the Municipalities to the utilities of the right to use the assets and provide the water and sanitation services is foreseen in the Statute of the company rather than by an act of service delivery agreement. The development of the assets by the investment programs in long-terms usually is referred to the feasibilities studies, when available. The operators usually had to prepare (not mandatory) their business plans in which are reflected the investment needs. The public owners therefore have to approve the business plans.
Role of national regulatory Authority	WRA is an independent institution reporting to the Parliament and to the Council of Ministers and it is responsible only for water and wastewater services. The institution is managed by National Regulatory Commission comprised of 5 members, including the Chair. The members of Commission are appointed by Council of Ministers Decree for a mandate of 4 years with the right of renewal once. The organizational structure of the institution is proposed by the Regulatory and approved with the decree of Parliament. The organigram of WRA comprises about 20 employees most of them with backgrounds in Economics, Engineering and Law. WRA regulates the prices of WS services, and also has the authority to license the utilities. The quality of the services by the utilities is controlled and monitored by 10 Key Performance Indicators. The KPIs serve also as an instrument for the utility's performance evaluation, based on the objectives setup by the WRA when approved the tariffs for the utility. The WRA use the cost plus criteria for the regulated prices to the utilities. WRA issues its sub acts for standards and rules for the entire sector, comments and provides feedback for policy recommendations to the central government; approve the template of the Customer-Utility Service Contract. WRA in annual basis monitor the sector and provide to the council of Ministers and the Parliament the Annual Performance Report of the Sector.
Other water and	Other main stakeholders in the sector besides WRA and Water Associations are:

sanitation stakeholders	1. Ministry of Infrastructure & Energy is the line ministry responsible for developing sector policies 2. Ministry of Health and Social Care through the Institute of Public Health is the body responsible for water quality & safety 3. Ministry of Environment & Tourism has the duty to monitor the quality of body waters where the treated water is disposed; 4. National Agency of WSS and Urban Waste is the subordinate entity of Ministry of Infrastructure& Energy. This is a body mainly responsible for planning & monitoring investment projects in water utilities, allocating government subsidies to utilities 5. Local Government are responsible by law to offer public services through the utilities operating in their jurisdiction area. 6. Utilities which are joint-stock companies (corporate public utilities) delegated by the municipalities to provide water supply and sewage services in their service area.

Regulatory Information, tariff method applied tariff approval process.

Regulatory model	WRA has full authority to set-up the WWS tariffs in the sector through a cost plus regulatory model. The current methodology of the tariff setting does not foresee a regulatory period, and it is not mandatory for the utilities to submit a business plan when they apply for the new tariffs. This model does not use the rate of return in investments estimated by multiplying the Regulatory Asset Base (RAB) with the allowable rate of return for both equity and debt. The criteria used by WRA to set tariffs are the following: • Covering 100% of the OPEX costs; • Affordability (tariffs should not exceed by more than 5% of the average monthly family expenditures); • Environmental protection (by means of tariff blocks and polluter-pays principle); The application of new tariffs should be based on information on the costs of the utility for 3 years, meaning the data of the previous year, the expected data for the current year, and the foreseen data for the next year. The required data consist of income, expenses, billing, population served, number of connections with and without meters, etc. The tariff is composed of a volumetric part and a fixed part, to be decided by the regulator. The OPEX categories of costs accepted by WRA are the following ones: o Materials: electricity, fuel, treatment, office, repairs, etc. o External services: consultants, security, insurance, utilities, rents, treatment samples, personnel qualification, external repairs, sludge treatment, etc. o Personnel : salaries, social costs, etc. o Taxes and environmental fees: state and municipal taxes, regulatory fees, water take and discharge fees, etc. (Water does not pay corporation tax as well as fees to the environmental regulator water abstraction); o Other costs: business trips, court expenses, etc. In the average price considered by the WRA, the nominator includes the accepted costs, i.e. staff salaries, power consumed, fuel, chemicals, costs of maintenance and repairs, new capital investment, bank interests, and other provisions, and the denominator includes the quantity of the water in m3, whether billed metered or unmetered, for all the categories of customers, i.e. households, budgetary institutions and private industry (only for authorized consumption). Only 47 out of 57 utilities do not cover the O&M costs, and the Central Government is still subsidizing them. The utilities do not have financial capacities to cover their investment needs (total costs), and they are not allowed by law to sign agreements with private banks for

	covering them. The investment in the sector are covered by the grants financed by the central government, and by the donors projects through the soft loans guarantee provided on behalf of the government by the Ministry of Finance. The unsustainable situation of the sector has not required including in the methodology the rate of return calculation.
Process of tariff approval	The procedure for tariff setting is based on the following steps: 1. The Operator prepares a proposal for the new tariffs, approved by the Administrative Council of the utility; 2. The proposal needs an OPINION by the Municipality Council (the owner of the utility); 3. The utility should develop a public hearing season for the new tariffs proposed; 4. For utilities that intend to cover O&M costs, WRA analyzes them by determining the justified costs that will be covered by the tariff, then defines the average tariff on the basis of which volumetric tariffs are calculated for each category of costumers (i.e. households, private, and budget entities); 5. For utilities that are seeking to recover total costs (including capital investments) through the tariffs, there are subsidies by the Central Government such as grants, or transfers by international donors, such as soft loans or credits. The loans include a Financial Model in the Credit Agreement, in which the grace period, the interests and the collateral payment terms are projected for a specific credit period. In the calculation of the average tariff the WRA considers the amount of capital investment in the financial model to be included in the costs for the investments. The submission of a 5 Year Business Plan is required in case of recovering the total costs by tariffs (not mandatory).
Tariff structure	The tariff structure set up by WRA is for the categories of customers, respectively households; private entities and state institutions. The structure of tariff for the metered customers is composed by a fixed and a volumetric component of the tariff. For unmetered consumers a flat rate tariff used based on the level of consumption 150 l/person/day.
Rules on depreciation of assets	Depreciation is based on the following fiscal national norms: 5% per year for buildings, 20% for pipeline networks, and 25% for IT items. The utilities assume however lifetime of 50 years for the pipelines. This fact is allowed and accepted by WRA. In general the utilities consider the repair costs as OPEX when the repair do not comprise more than 20 ml pipeline material or the costs do not exceed the limit of 2,000 euro.

Tariff setting	The current tariff setting methodology used by WRA take into consideration the following criteria:
	• Costs covering, (direct costs, total costs for a reasonable bill collection rate)
	• Management efficiency (mainly apparent losses)
	• Affordability (5% of the average household expenditures)
	• Environment protection (avoid negative impact and block tariffs)
	
	• Costs Covering The main elements of the costs considered are as follows:
	  • fixed costs (administrative costs)
	  • O&M costs (power, chemicals, staff etc.)
	  • depreciation cost
	  • network extension costs
	  • Loan interests.

	• Management Efficiency. This means that Cost Recovery should be improved by systematic efforts to reduce service costs through improved management by, reducing water losses, elimination of illegal connection, and improving collection rate. • Affordability: The tariff structure sets an affordable price for the basic consumption needs of households not more than 5% of the average monthly household income. • Environmental Efficiency: The tariff structure can set on blocks augmenting the price for higher consumption levels in order to encourage water resource conservation.
Unplanned tariff update	The operators have the right to apply for the new tariffs not more than once a year.

Requirements for operators reporting, quality of information check, available regulatory accounting rules, annual control, information for the public.

Main accounting rules applied	WRA does not issue regulatory accounting rules. The utilities use the chart of accounts for costs and assets accounting based on the n national standards on accounts.
Reporting tasks	Utilities are required to provide their annual financial balance sheets and water balance. The utilities report their annual data for number of variables through the Monitoring and Benchmarking Unit near the National Agency for Water and sanitation (AKUM), data used for KPIs calculation and KPIs levels. The financial report (balance sheets) based on national accounting rules, provides data for balance, statement of income and expenses, billed volumes, assets and costs, revenues, personnel and debt collection. These reports have to be certified by independent auditor. The water balance report submitted to WRA has to be drafted on compliance with the IWA standard containing all the details regarding the water produces, authorized and unauthorized billed, NRW with its elements of administrative and real losses.
Control and inspection on reliability of data	The WRA checks the data by examining the financial and water balance of the utilities for the last year and comparing with the data reported by the operator to AKUM. The accuracy of the reported data remain still a crucial issue for the sector. WRA starting from 2019 has built up his data base platform independent from AKUM, in which the utilities report direct to WRA. In this way WRA has more possibility to control on accuracy of the data reported by utilities. In meantime WRA organizes the inspection visits planned for the some utilities in order to verify if they are operating with the license requirements and are applying the tariffs set up by the WRA.
Accountability and transparency of water sector	At the end of each year WRA publishes annual report for the performance of the WSS sector, analyzing the levels of KPIs performance accomplished. This report gives also analyses the performance for each group of utilities divided by small, medium and big size and for each utility individually. The report contains also the recommendation to improve further the performance of the sector. The report is published in the web site of WRA and presented during an event in which are invited the representative from all utilities and the main stakeholders of the sector in central and local level.

KOSOVO

Water and sanitation sector governance - asset ownership, operator's role, regulatory authority power, and other main stakeholders.

Water sector	The water and wastewater service sector operates through seven (7) state owned Regional Water Companies that are responsible for providing services in their administrative areas. All these companies provide water and wastewater services and only one of them carries out the treatment of wastewater for a small number of customers. In addition to these companies there is also a company (licensed by Water Service Regulatory Authority /ARRU) which provides untreated bulk water services. Water and wastewater assets in Kosovo are public property.
Role of national regulatory Authority/ Agency	Water Service Regulatory Authority (ARRU) is an independent national single sector regulator with powers in water and wastewater sector. Authority has the President, Vice President and 19 employees working in five Units (Department of Law and Licensing, Tariff Department, Performance Department, Inspection Unit and Administrative Department). ARRU is responsible for licensing service providers, setting tariffs for licensed service providers, defining service standards, monitoring performance of service providers, review customer complaints, drafting and approving regulations and Regulatory decisions in accordance with the law, inspection of the implementation of service standards and legal acts of the Authority, etc.
Other water and sanitation stakeholders	Other main stakeholders in the sector besides ARRU are Ministry of Economic Development/ Policy and Monitoring Unit of Public Enterprises (plans and executes the state policy in the sector, prepares sector strategy, agrees on the investment and reconstruction policies, and is principal of regional companies), Inter Ministerial Water Council (coordinating and decision-making body that reviews systemic water issues, deals with the harmonization of different needs and interests, and proposes measures for development, utilization and protection of Kosovo's water reserves), Ministry for the Environment and Spatial Planning (plans and executes the overall state policy towards water usage, issues permissions for water abstraction and discharge, and controls the wastewater quality), Ministry of Health (controls the drinking water quality), National Ombudsman, Commission for Consumer Protection, Water and Wastewater Association of Kosovo, non-government organizations and others.

Regulatory Information – regulatory period requirements and preparation, tariff method applied, business plan (if such exists) requirement, tariff approval process.

Regulatory period and tariff model	ARRU applies the Price Cap method and sets out the business plan and tariff model framework for three years which comprises a revenue requirement made up of: operating costs, capital maintenance and return on RAB, which in turn determines the necessary tariffs for each of the three years based upon expected sales volumes and commercial efficiency expectations. The tariffs are determined at base year values and are adjusted for inflation for each year.
Process of tariff approval	Within the overall tariff setting framework ARRU develops tariffs policy for water supply and wastewater services, on which is designed the uniformity of the tariffs within the service area, cross subsidy, tariff affordability, sufficient tariffs to maintain the serviceability of the assets and finance investments etc. Tariff policies with regulatory accounting guidelines, business planning model and other relevant documents, comprises the tariff package that ARRU delivers to the utilities prior to

	submitting the tariff application for the new tariffs by the utilities. Afterward utilities present draft business plans which include the requested tariffs necessary to finance the activities in the plans. The regulator scrutinizes and challenges the plans and presents its final tariff determinations which may differ from the original request based upon the regulator's considered challenges to the plans. ARRU organizes discussions with the public and key stakeholders upon submission of the tariff application by utilities and prior to the approval of the Regulatory Business Plan for the three-year tariff process.
Tariff structure	ARRU tariff structure allows for a combination of fixed and volumetric charges. The tariffs for water supply comprise fixed and volumetric charges based upon metered consumption of water supply. The tariffs for wastewater services are determined on the basis o*f* volume of water sold except where a customer has a wastewater connection but not a water supply (or has an additional own source water supply) where charge is based upon estimated or metered wastewater generated. Tariffs for non-domestic consumers are set at a higher level than for domestic consumers for social reasons although the regulator is encouraging the gradual removal of this cross-subsidy.
Rules on depreciation of assets	For simplicity, all depreciable assets (i.e. non-infrastructure assets) are pooled in the Regulatory Asset Base and depreciated over the average asset life. This average asset life has been determined to be 35 years based on a review of assets held by all water companies in Kosovo. For the purposes of regulatory accounting all non-infrastructure assets commissioned in the financial year are deemed to have been commissioned at the mid-point of the year, i.e. 30 June and so will earn half a year's depreciation in that year. The value of depreciation is therefore 1/35 of the value of the opening regulatory asset base (indexed up to current year prices) plus 0.5 x 1/35 of the additions during the year. Assets that have been funded by grants, donations, constructed by third parties and adopted by the RWCs at no charge or capital contributions are not included in the regulatory asset base, and assets that are partially funded are only included to the extent that they are funded by the company. Hence there is no depreciation for these assets and customers are not made to pay tariffs for assets which the company has not funded itself.

Planned and unplanned tariff updates during regulatory period.

Planned updates of the approved tariffs	ARRU applies Price Cap method for 3 years and approves 3 tariffs for each year of the business plan. With the approval, the tariff for the 1st year comes into force from the 1st of January of the first year of the tariff process. For the first year (year "x") of the tariff process inflation adjustment takes into account the rate of inflation between November year "a" – October year "b" For the consequent two years of the tariff process, tariffs are adjusted with inflation as: Adjusted $\text{tariff}_{\text{year „y“}} = \text{model tariff}_{\text{year „y“}} \cdot (1+ \text{CPI}_{\text{Dec year „b“ – Nov year “x“}})$, and Adjusted $\text{tariff}_{\text{year”z”}} = \text{model tariff}_{\text{year“z“}} \cdot (1+ \text{CPI}_{\text{Dec year „x“ –Nov year „y“}})$. Where: Year a – two years prior to the tariff process Year b – prior year of the tariff process Year x – 1st year of the tariff process Year y – 2nd year of the tariff process Year z – 3rd year of the tariff process CPI – Consumer Price Index

Unplanned tariff update	In cases when an unexpected event occurs, that has not been anticipated by the utility, which has significant impact on the allowed revenues then utilities are entitled to submit an application for an extraordinary service tariff adjustment as explained on the tariff rule procedures. Extraordinary adjustments to the service tariff, where applicable, shall only be made at the start of each year within the tariff review period, unless the utility can demonstrate to ARRU the necessity to adjust the service tariff within the year. The ARRU shall confirm that the request for an extraordinary service tariff adjustment complies with the service tariff rule and appraise and respond within forty-five (45) business days from the date at which the authority has received such application.

Requirements for operators reporting, quality of information check, available regulatory accounting rules, annual control, information for the public.

Main accounting rules applied	ARRU issues regulatory accounting guidelines that include detailed chart of accounts for costs and assets accounting. Regulatory accounting also recognizes the different approach that regulators may take to certain items such as asset valuation compared to the approach taken in the financial statements following conventional accounting rules. ARRU has designed specific cost centers for each service (water and wastewater). There are direct cost centers, for both services, and indirect cost centers (e.g. overheads), and those are described to Accounting Guidelines on how to allocate the costs.
Reporting tasks	The reporting requirements of the ARRU to the RWCs are specified in: "Performance Monitoring and Comparative Evaluation (Benchmarking) Program in Kosovo". This process is implemented as a regular activity by the Authority. The ARRU has developed a unique model of reporting and evaluating the performance of the sector in general and for utilities providing water and wastewater services, based on the KPI, and the model is focused on results that impact directly to customers. The reporting framework is harmonized with regulatory accounting guidelines and the business model. Data reporting is done on an annual and on quarterly basis.
Control and inspection on reliability of data	Assessment of reliability and accuracy is done through the audit / verification process on an annual basis. Evaluation criteria are specified in issued guideline for advancement of monitoring system. In addition to audit, through inspections, ARRU controls the quality of data and information used for monitoring of compliance with service standards based on issued guideline for quality of information sources and required all the operators to adopt the advanced databases for registering and manipulating with data. These databases includes the GIS and other applications for asset management, finance information management for billing standards, SCADA for treatment and distribution data, customer relation management for customer complaints and requests etc. ARRU conducts annual on-site inspections for monitoring of the level of service against standards by ARRU as well as other license conditions. ARRU annually assesses the quality of data with 3 degrees and reports the level of information reliability based on these degrees, and also provides recommendations for improvements of the data management.
Accountability and transparency of	Every year the ARRU publishes annual performance related reports for the water and wastewater service operators with general information on level of service and other business

water sector	related KPIs and their year-to-year improvements. These reports contain also quality of information.

HUNGARY

Water and sanitation sector governance - asset ownership, operator's role, regulatory authority power, and other main stakeholders.

Water Sector	Municipalities and the state are responsible for water and sanitation service provision. Depending on the ownership of assets, there is a mixed responsibility for service provision between the central government and municipalities. Before 2012, there were close to 400 water utility providers. As a result of the water utility sector reform this number decreased to 40 by 2019. Act CCIX on Water Utility Supply declared that the integration of water utilities is a principle, setting a minimum size requirement of 150 000 population equivalent to be reached by December 31, 2016.
Service coverage	Hungarian utilities provide almost full access to drinking water services and there is a declining gap between water and sewer connections.
Responsibilities of national Authorities	The Hungarian Energy and Public Utility Authority (HEA), which is responsible for economic regulation, licensing and monitoring of the water and sanitation sector. Ministry for Innovation and Technology, which is responsible for approving the proposed tariffs.
Other stakeholders	Other main stakeholders besides the Hungarian Energy and Public Utility Authority, and the Ministry for Innovation and Technology: The General Directorate of Water Management (part of the Ministry of the Interior) – responsible for (by its regional bodies) management of the state-owned infrastructure against water damage . The National Public Health and Medical Officer services – responsible for monitoring drinking-water quality. The National Inspectorate for Environment, Nature and Water (part of the Ministry of Agriculture) – responsible for monitoring effluent discharges and the environmental status of water bodies. Hungarian Water Utility Association (MaVíz) – to act as an independent representative of the water industry's interests, offering trade development and engineering services.

Regulatory Information – regulatory period requirements and preparation, tariff method applied, business plan (if such exists) requirement, tariff approval process.

Tariff system	Two-part tariffs are prescribed by law, and no cross-financing is allowed. Until the proposed tariffs are not approved by the Ministry for Innovation and Technology, tariffs are frozen at current levels (with little modification on a 2012 basis). According to the Act on Water Utility Supply the tariff for water and sanitation services shall be determined for each water utility supplier or water utility system and for each water utility sector, using a comparative economic analysis on costs, prices and fees, also considering the following aspects: a) the prices shall encourage the safe water utility supply at the lowest cost, the improvement of the efficiency of management, the effective use of capacities, the continuous improvement of the quality of supply and the observation of the principle of preserving natural resources; b) the allowable costs of continuous and safe water utility supply shall be taken into account, as well as the allowable costs of performing environmental obligations, especially including the allowable costs of water base protection.

Tariff proposal	The Authority send its proposal concerning of the tariffs of public water supply and wastewater treatment (including their delivery prices) on or before October 15 every year to the Ministry for Innovation and Technology. In order to facilitate effective legislation, the Authority send to the Ministry for Innovation and Technology, as part of part of its tariff proposal, the detailed concept of establishing the tariffs, the advantages and possible risk of the alternative tariffs determined by the Authority for residential and non-residential consumers, as well as its proposal for the amendment of legal rules to be made contemporaneously with the decree on tariffs taking effect.

Requirements for operators reporting, quality of information check, available regulatory accounting rules, annual control, information for the public.

Reporting tasks	Operators are required to provide annual financial reports based on accounting rules of Act C of 2000 on Accounting. The financial report based on regulatory accounting rules provides data for balance, statement of income and expenses, billed volumes, assets and costs (detailed information for all regulated services and general assets / costs distribution), revenues, personnel and debt collection. These reports have to be verified by independent auditor.
Specific Accounting Rules: Separate accounting	The Hungarian Act on Water Utility Supply contains the principle of prohibition of cross-financing: the price of water utility supply for the sector shall be laid down by recovering all allowable expenditures and costs of the water utility supply sector and the reasonable business profit of the water utility supplier in connection with this activity, but it may not include the recovery of expenditures and costs of other economic activities of the supplier. The text of the law: "*16. Separate accounting* *Section 49* *(1) Subject to the exceptions set out in this Act, the regulations of AOA shall be applied to the reporting and bookkeeping obligations of the water utility supplier, the compilation of the annual report, bookkeeping, disclosure and publication.* *(2) Water utility supplier performing more activities of water utility supply sectors shall keep a separate record for each activity, that ensures the transparency of individual activities, the non-discrimination and excludes cross-financing and distortion of competition.* *(3) Water utility supplier performing more activities of water utility supply sector shall present each water utility supply sector activity in the notes to the annual report as if they had been performed by separate companies. The separate presentation of the activities shall at least include the isolated presentation of the assets, liabilities, accruals and an individual profit and loss account.* *(4) The auditor of the water utility supplier performing more activities of water utility supply sector shall certify in its independent audit report issued to the annual report and consolidated annual report that the rules relating to separate accounting elaborated and applied by the water utility supplier ensure the exemption of cross-financing between the lines of business of the water utility supplier.* *(5) Water utility supplier performing secondary activity shall present its activities performed in order to provide water utility supply in the notes to the annual report in such way as if it had been performed by separate companies. The separate presentation of the activity shall at least include the isolated presentation of the individual profit and loss account.* *Section 50* *(1) The water utility supplier shall provide the Authority to understand and to gain access to the financial-accounting reports of the water utility supplier and the related documents and information. The Authority shall justify for which of its tasks the given information is required.*

	(2) The water utility supplier shall submit its audited annual report together with the business report and the audit report prepared for the current year to the Authority at the same time of the deposit defined in the AOA." The Hungarian Energy and Public Utility Regulatory Authority issued a Recommendation in connection with separate accounting. The Hungarian Energy and Public Utility Regulatory Authority has a monitoring and controlling task in connection with separate accounting of suppliers.

PORTUGAL

In the beginning of the nineties, a sector reform introduced a separation between bulk and retail operators and between functions (water supply and wastewater management). The municipalities agreed to transfer the responsibility for bulk activities to newly created regional State-owned enterprises of the Águas de Portugal (AdP) holding with a rationale of raising technical and management capabilities of water operators and to promote economies of scale.
Bulk operations include abstraction, treatment, elevation, transport and storage of drinking water and the elevation, transport, treatment and rejection of wastewater. These activities were assigned to the new public state-owned company Águas de Portugal (holding company), with several regional companies for bulk water and wastewater management activities. The State had a majority stake in each of these companies and the municipalities agreed on variable minority stakes. These municipalities kept responsibility for retail operations (i.e. distribution of drinking water, drainage of wastewater, and the end-user interface)

Another structural reform introduced in 1993 was the opening of the water provision to private capital, thus establishing three basic **management models**, i.e., direct management, delegated management and concessions for water services, i.e. State-owned, municipal and private utilities. Currently, around 75% operate under direct management, 10% under delegated management and nearly 15% under concession contracts. The public bodies responsible for water services provision can freely choose from these different management models.
A **tariff policy** for public water services was also introduced with the goal of promoting a gradual transition towards cost recovery with affordability criteria, i.e., consistent with the economic capacity of the population.

The Water Law (Law n. º 58/2005 of 29 December) and the Economic and Financial Framework of Water Resources (Decree-Law n. º 97/2008 of 11 June), in line with EU law, determine that the tariff scheme for water services ensures the gradual recovery of the initial investment and new investments in expansion, modernization and replacement of infrastructure, as well as the maintenance, repair and renovation of all goods and equipment used for these services provision.

The country has thus sought to evolve from a situation of low tariffs, with major differences between operators not based on technical grounds and a lack of social equity to the gradual full recovery of costs with clear rules and tariff structures.
Although the process is not yet fully completed, the implementation of this principle has been consistent. Nowadays ERSAR is developing a regulatory tool (e.g. tariff regulations) based on the definition of clusters that aims to solve the remaining problems of unsustainability that still exists on some direct management operators.

The diversity of operators includes different management models from which the government and municipalities can choose:

- State owned multimunicipal concessions
- Municipally owned direct and delegated management operators
- Municipally concessions

Depending on each type of management model the economic regulation model adopted can be different:

- Price cap / regulation by contract (for municipal concession contracts)
- Revenue cap (being studied as a new model for water services, and already applied to solid waste)
- Cost of service (applied to multimunicipal concession contracts and direct/delegated management)

Accord with its statutes ERSAR's assignments regarding economic regulation include:

1. Establish the tariffs for State-owned systems and supervise other economic and financial aspects of the operators of State-owned systems, namely issuing opinions, proposals and recommendations, under the terms defined in the applicable legislation and regulations;
2. Regulate, assess and audit the establishment and application of tariffs in municipal-owned systems, irrespective of their management model, under the terms defined in the applicable legislation and regulations;
3. Issue recommendations about the compliance of the tariffs of municipal systems with that established in the tariff regulations and other applicable legislation, as well as inspecting and sanctioning their infringement;
4. Issue, in the situations and under the terms established in the law, binding instructions regarding tariffs charged by municipal-owned systems which do not comply with the legal and regulatory provisions in force;
5. Assure detailed invoicing by the operators, in a context of disaggregated identification of the various portions comprising the final value of the invoice, aimed at enabling the end user to perceive the different components of the costs relative to the water, sanitation, waste management and other activities.

The tariffs for retail municipal operators are approved by municipal bodies, but only after an opinion of ERSAR. If the municipal bodies decide a tariff that does not reflect ERSAR's opinion, this different approval has to be justified.
In 2015 the Portuguese regulator started an evolution on its regulatory model. ERSAR decided that the cost plus model advantage of simplicity was no more adequate to the Portuguese reality and that its price regulation methodologies should be adapted to a sector with more mature operators. The transition to a revenue cap model started in 2014 with the development of a new regulation to the solid waste sector and the same process is now being developed for the water sector.

The new price regulation methodology, based on a hybrid revenue cap model, seeks to:

- Assure cost recovery by the tariffs (water prices must allow cost recovery of water services);
- Promote efficiency by the introduction of an incentive mechanism;
- Ensure service quality (based on ERSAR's indicators);
- Promote Transparency, stability and reliability.

In a near future, the new tariff regulation will define regulatory accounting rules, the definition of a regulated assets base (RAB) where assets will be only considered in the proportion that is financed by the company (non-repayable funds are not considered) and assets that are not exclusively used for WSS must also be considered in proportion. The rate of return (WACC) will be calculated based on the Capital Asset Pricing Model (CAPM). Depreciation costs will include assets used only for WSS (regulated assets base).

$$Tariffs = \frac{OPEX\ efficient + Incentives + Return\ Rate\ x\ RAB + Depreciation}{Quantities}$$

The regulatory period is different depending on the regulatory model applicable to the operator. In the majority of operators, (retail municipal systems) the regulatory period is 1 year, and the regulatory period for water state companies is 5 years.

At present, the tariff regulation model applied to state companies is a "cost plus" type model that already includes some incentives to efficiency.

$$Tariffs = \frac{Depreciation + OPEX + financial\ cost\ of\ debt - other\ revenues + shareholders\ remuneration}{Quantities}$$

State companies have business plans in line with to the concession contracts. The Minister of Environment (representing the Government as grantor of the concession) approves the business plan following ERSAR's opinion. For these companies, the tariffs are already set for the first five-year period and ERSAR sets some OPEX caps with several efficiency indicators.
When setting the tariffs, ERSAR doesn't accepted all the costs with the operation of the services but only the ones considered acceptable on a scenario of efficiency. One of the examples of this situation is that only costs corresponding to a maximum of 5% of NRW (Non-Revenue Water) are acceptable.

The shareholder remuneration is calculated on the basis of a return on equity (10y Treasury Bonds plus 3% risk premium).

For retail services with a contract, tariffs follow the trajectory defined in the contract and ERSAR's role is to monitor the compliance with the contract.
For retail services with no contract, each operator submits the tariff proposal to ERSAR for analysis: ERSAR then issues a non-binding opinion that focuses on its compliance with the legislation and regulatory standards.

For bulk services, there is only a volumetric tariff. For retail services, there is a volumetric tariff and a fixed charge for each kind of user (domestic and non-domestic).
Bulk services apply a flat volumetric tariff. Retail services have increasing block tariffs, according to the volumes used. Increasing block tariffs recommended by ERSAR are 0-5 m^3, 5-15 m3, 15-25 m3, >25 m3.