WAREG Report • 2023

Key Performance Indicators Frameworks in Wareg Member Countries

WAREG
European Water Regulators

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EXECUTIVE SUMMARY

The Water Framework Directive 2000/60/EC has set only basic requirements for economic regulation of the water and sanitation services through principles of recovery of the costs of water services, including environmental and resource costs and polluter pays. It did not require monitoring of service quality and/or efficiency, nor has introduced legal basis for measuring service providers` performance. Requirements for the assessment and monitoring the quality of drinking water and wastewater were introduced in Directives 98/83/EC and 91/271/EEC, but they also did not establish standardized performance indicators for the needs of economic regulation.

However, with the approval of the new drinking water Directive 2020/2184, the EU Taxonomy Climate Delegated Act of 4.6.2021, and with the 2022 proposal for recast of Wastewater directive 91/271/EEC, change of consideration of water and sanitation sector is introduced in the EU legislation. Authorities responsible for water and sanitation governance and regulation and water and sanitation operators in Member states are facing new requirements for allowing public access to information for the sector, as well for performance of utilities. Performance indicators are or is expected to be introduced allowing more standardized approach for evaluation of directives implementation and performance monitoring. Nevertheless, EU legislation is still lacking detailed definitions and legal requirements in that area.

Various organizations have established lists of Key performance indicators in order to evaluate utilities performances. Such lists however have been designed with different objectives and are not easily adaptable across the industry in different European countries.

This paper analyses the monitoring of the performance, efficiency and quality of water and sanitation services and service providers, implemented by the economic regulators – WAREG members as part of the economic regulation of the prices and quality of services. The analysis seeks to identify, and describe various aspects of technical, economic and service efficiency in WAREG member countries, with the aim to draw out commonalities as well as differences in monitoring of efficiency measures and performance.

Overview and analysis of the entire monitoring process is presented in the paper, starting with the (1) process of data collection from the service providers, (2) tools used by regulators to inspect and verify reported data, (3) how regulators set targets for monitored KPIs, (4) how do they monitor annual performance by the companies, (5) are there any links between performance and tariff setting, (6) what are the possible regulatory actions in case of target non-implementation, and (7) how information is revealed by regulators to the public.

Finally, (8) thorough analysis is presented on the methodologies used for performance indicators, including definitions of the indicators, formulas for their calculation, and the variables used for calculation of the numerators and denominators of the indicators, demonstrating that diverse approaches have been implemented among WAREG members.

ABBREVIATIONS

COM	Communication
EBC	European Benchmarking Cooperation
EC	European Commission
EEA	European Environmental Agency
EEC	European Economic Community
EU	European Union
GHG	Greenhouse Gas Emissions
IAS	Individual or other Appropriate Systems (wastewater)
IWA	International Water Association
JMD	Joint Ministerial Decision
KPIs	Key Performance Indicators
MS	Member State(s) of the EU
N/P	Nitrogen/Phosporus
RPI-X	Retail Price Inflation (minus) efficiency factor
UK	United Kingdom
UWWTD	Urban Wastewater Treatment Directive
WAREG	European Water Regulators
WFD	Water Framework Directive
WG	Working Group
WRF	Water Research Foundation
WS	Water and Sanitation
WSO	Water and Sanitation Operators
WSS	Water and Sanitation Services

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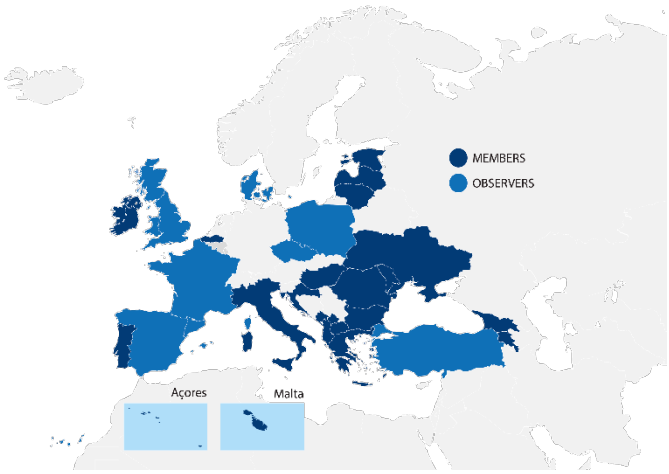
INFORMATION ON WAREG

The Water Framework Directive[1] 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, have recognized the need to cooperate. 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.

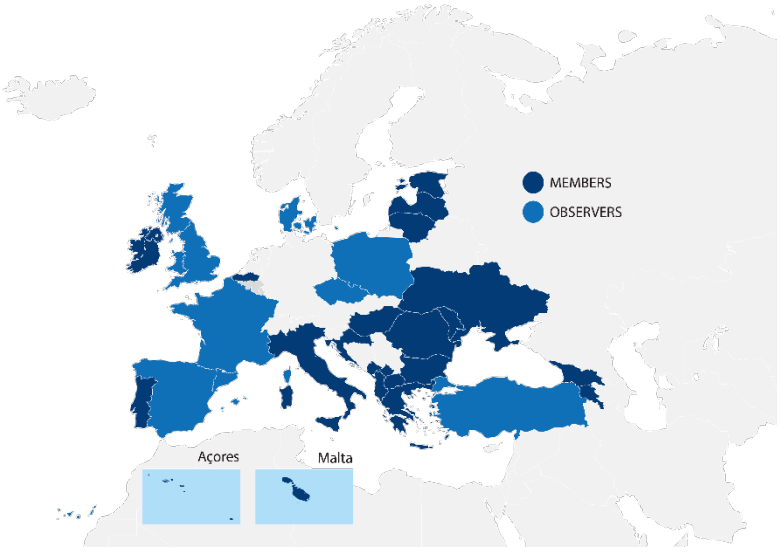
WAREG is formed by 24 Members and 8 Observers from 17 EU Countries, UK and 8 EU candidate or potential candidate Countries who share the following objectives for cooperation:

- 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.



[1] 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.

WAREG is the Association of Public Authorities with economic responsibilities in the drinking water and wastewater sector. Established in 2014, with headquarters in Milan and Brussels, it is made up of 24 Members and 8 Observers, coming from 17 EU Countries, UK and 9 EU candidate or potential candidate Countries, who exchange and share common practices, and promote the approximation of EU candidate Countries to the EU acquis on water. WAREG facilitates dialogue and closer collaboration, knowledge exchange and capacity-building among its Members, while supporting the implementation of the European legislative *acquis* on water. WAREG[2] advocates within the European Institutions and stakeholder associations for the advantages of economic regulation as an instrument to promote:



- effectiveness and efficiency of operational and investment costs in the water industry;
- protection of water customers;
- safeguarding of water resources and the environment to guarantee a water-safe future;
- convergence of service quality standards;
- technological innovation.

[2] 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 up to 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. WAREG's strategy is defined by the Board, composed of a President and four Vice-Presidents, and it is implemented by the Secretariat, composed of a team of national experts lead by the Italian regulator ARERA. The Secretariat supports the Board, the Members and the ad hoc Task Forces in the implementation the Association's Work Program, it supervises and contributes to the preparation of studies and recommendations developed by WAREG Task Forces, it ensures the overall coherence of WAREG messages through the drafting of strategic documents, speeches, presentations and statements delivered by the President or by any Board Member on behalf of WAREG, it conceives and organizes the capacity-building activities provided by WAREG to its Members. Finally, the Secretariat is responsible to manage the accounting, logistical and administrative aspects of the Association. More information on WAREG's organization and activities is available on the website www.wareg.org.

WAREG MEMBERS

COUNTRY	REGULATORY AUTHORITY NAME	
Albania	WRA	Water Regulatory Authority
Armenia	PSRC	Public Services Regulatory Commission
Azores, Portugal	ERSARA	The Water and Waste Services Regulation Authority of Azores
Belgium (Brussels)	BRUGEL	The Brussels Energy Regulatory Commission
Belgium (Flanders)	VMM	Flemish Water Regulator (drinking water)
Bulgaria	EWRC	Energy and Water Regulatory Commission
Croatia	VVU	Council for Water Services
Czech Republic	Ministry	Ministry of Agriculture
Estonia	ECA	Estonian Competition Authority
Georgia	GNERC	Georgian National Energy and Water Supply Regulatory Commission
Greece	Ministry	General Secretariat of Natural Environment and 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	WSRA	Water services Regulatory Authority
Latvia	PUC	Public Utilities Commission
Lithuania	NERC	National Energy Regulatory Council
Malta	REWS	Regulator for Energy and Water Services
Moldova	ANRE	National Agency for Energy Regulation
Montenegro	REGAGEN	Energy and Water Regulatory Agency
North Macedonia	ERC	Energy and Water Services Regulatory Commission
Portugal	ERSAR	Water and Waste Services Regulation Authority
Portugal (Azores)	ERSARA	Water and Waste Services Regulation Authority of Azores Islands
Romania	ANRSC	National Regulatory Authority for Community Services of Public Utilities
Ukraine	NEURC	National Energy and Utilities Regulatory Commission

WAREG OBSERVERS

COUNTRY	REGULATORY AUTHORITY NAME	
Denmark	KFST	Competition and Consumer Authority
France	Ministry	Ministry for Ecological Transition and Cohesion of Territories
Great Britain (England & Wales)	OFWAT	Water Services Regulation Authority
Great Britain (Northern Ireland)	NIAUR	Northern Ireland Authority for Utility Regulation
Greece	RAEWW	Regulatory Authority for Energy, Water and Waste
Poland	Ministry	State Water Holding Polish Waters
Scotland	WICS	Water Industry Commission for Scotland
Spain	MITECO	Ministry for Ecological Transition and Demographic Challenge
Spain (Catalunya)	ACA	Catalan Water Agency
Turkey	Ministry	Ministry of Water and Forestry of the Republic of Turkey

INTRODUCTION

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) introduced 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 in 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, including 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.

Directive 2000/60/EC did not require monitoring of service quality and/or efficiency, nor introduced any legal basis for measuring service providers` performance.

COM (2000) 477 Pricing policies for enhancing the sustainability of water resources [3] provided the following objectives:
(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.
It included some requirements for improving knowledge and database, setting the right water prices, pricing policies, role of users and consumers, communication and information.

Council Directive 98/83/EC on the quality of water intended for human consumption was adopted on 3 November 1998 with objective to set requirements for the quality of water intended for human consumption and to protect human health from adverse effects of any

[3] 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.

contamination of water intended for human consumption by ensuring that it is wholesome and clean. The directive did not set economic requirements for costs recovery and/or tariff setting.

Council Directive 91/271/EEC concerning urban waste-water treatment was adopted on 21 May 1991 with objective 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 also did not set economic requirements for costs recovery and/or tariff setting.

Neither Directive 2000/60/EC, nor COM (2000) 477 have established requirements for monitoring the quality of service and the efficiency of service providers through performance indicators. Both directives 98/83/EC and 91/271/EEC introduced requirements for tests and analysis of the quality of drinking water and wastewater, but they did not introduce standardized performance indicators for the needs of economic regulation. However, in the latest years it is obvious that new approach has been introduced in the EU legislation concerning water and sanitation sector.

Council Directive 98/83/EC has been replaced by ***Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption (recast)*.** Apart from the technical requirements for the monitoring the quality of drinking water, the new Directive instituted number of requirements for provision of information to the public, including water consumption, overall performance of the water system in terms of efficiency and leakage rates, ownership structure of the water supply by the water supplier, structure of the tariff per cubic meter of water, including fixed and variable costs, summary and statistics regarding consumer complaints received by the water suppliers on matters within the scope of the Directive.
The new directive also brought in requirements for Member States to ensure that an assessment of water leakage levels within their territory and of the potential for improvements in water leakage reduction is performed using the infrastructural leakage index (ILI) rating method or another appropriate method. That assessment shall take into account relevant public health, environmental, technical and economic aspects and cover at least water suppliers supplying at least 10 000 m3 per day or serving at least 50 000 people.

On 26 October 2022 the EC issued ***Proposal for a Directive of the European Parliament and of the Council concerning urban wastewater treatment (recast)***, where it is suggested that public access should be ensured to operators' key performance indicators, such as the level of treatment achieved, the costs of treatment, the energy used and produced, and the related GHG emissions and carbon footprint. In order to make the public more aware of the implications of urban wastewater treatment, key information on the annual wastewater collection and treatment costs for each household should be provided in an easily accessible manner. EC suggests that in order to improve the governance of the sector, wastewater operators should be requested to monitor and make transparent key performance indicators.

Number of indicators to measure success are suggested, such as: the existing compliance rate and distance to target per MS and per treatment level, which provide an excellent overview of the Directive's implementation; the number of facilities equipped with additional treatment for N/P and micro-pollutants, and the related reduction of N/P releases and toxic load; the energy use by MS and the related GHG emissions; the number of agglomerations covered by integrated management plans for storm water overflows and urban runoff and their compliance

with the EU objective; the measures taken by MS to improve access to sanitation and better control IAS, and a summary of the main health indicators surveyed in the MS; as well as other data to be used to measure specifically the impacts of the UWWTD.

EU Taxonomy Climate Delegated Act of 4.6.2021 - the Taxonomy Regulation establishes the framework for the EU taxonomy by setting out four conditions that an economic activity must meet in order to qualify as environmentally sustainable (Article 3).
A qualifying activity must:
(a) contributes substantially to one or more of the environmental objectives set out in Article 9 in accordance with Articles 10 to 16;
(b) does not significantly harm any of the environmental objectives set out in Article 9 in accordance with Article 17;
(c) is carried out in compliance with the minimum safeguards laid down in Article 18; and
(d) complies with technical screening criteria that have been established by the Commission in accordance with Article 10 (3), 11(3), 12(2), 13(2), 14(2) or 15(2).

The environmental objectives laid in Article 9 are:
(a) climate change mitigation (Article 10, stabilization of *greenhouse gas concentrations* in the atmosphere);
(b) climate change adaptation (Article 11, reduce the risk of the adverse climate impact);
(c) the sustainable use and protection of water and marine resources (Article 12; effects of *urban and industrial waste water discharges; contamination of drinking water, water management and efficiency*);
(d) the transition to a circular economy (Article 13, waste prevention, re-use and recycling);
(e) pollution prevention and control (Article 14, air, water, soil);
(f) the protection and restoration of biodiversity and ecosystems (Article 15).

As a conclusion - EU legislation is changing and is introducing new requirements for Member states, authorities responsible for water and sanitation sector governance and regulation, as well as to water and sanitation operators to provide information to the public, and to establish and apply performance indicators. However, EU legislation is still lacking detailed definitions and legal requirements in the area of the performance indicators.

BENCHMARKING SYSTEMS OVERVIEW

Key Performance Indicators (KPIs) are essentially systematic and consistent ways of measuring an organization's performance against others in the same industry. They are widely used by organizations and industries for various reasons. Performance indicators assist organizations to understand how they are performing in relation to their strategic objectives and targets. They provide detailed information and quantitative analysis which permit organizations to make sound business decisions and monitor their progress. In addition, they permit comparison of an organization's performance against its peers.

KPIs are also increasingly used by regulatory bodies to analyse and review organization's performance, compare organizations and measure progress against set targets. They are assessment tools which enable regulators to evaluate the performance of water supply services. Various organizations, such as the International Water Association (IWA), the World Bank and a wide range of national regulators have established lists of key performance Indicators by which to evaluate utilities performances. Such lists however have been designed with different objectives and are not easily adaptable across the industry in different European countries.

In 2017 WAREG developed a ***Report on Analysis of water efficiency KPIs in WAREG member countries*** [4], where available benchmarking systems existing in water sector and categories of indicators were reviewed and analyzed.

Benchmarking systems

The ***IBNET***[5] platform provides direct access to the largest international database of performance indicators of water and sanitation operators (WSOs). The platform is funded by the Water and Sanitation Program of the World Bank and Department for International Development, UK. It currently contains information on more than 2000 WSOs in 85 countries. The platform provides guidance on indicators and definitions for them; it helps to create national and regional benchmarking schemes and make a comparative analysis. The IBNET database indicates that information is available for 8 out of the total 20 WAREG Members that are considered in this report .

European Benchmarking Co-operation (***EBC***[6]) platform is organized by cooperation of national WSO associations of Denmark, Finland, Norway, Netherlands and IWA. It is aimed to support WSOs to improve their performance and visibility. The platform holds information about 100 WSOs. The EBC analyses five key performance areas, to provide a balanced view on utilities' performance: Water quality; Reliability; Service quality; Sustainability and Finance & Efficiency (EBS, 2012).

The ***Sigma***[7] platform, developed by Universitat Politecnica de Valencia, is based on the IWA software for performance indicators and permits upgrade with different indicators. Participants connect to the server by web-page, fill the data and the software calculates indicators and graphics.

Other benchmarking platforms exist, e.g. ***Aquabench***[8], which involves 800 national operators of water and wastewater management, including European operators from Belgium, Poland, Switzerland and Austria and Germany. Federal and state ministries and specialist associations and organizations are reported to use the Aquabench platform.

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[4] WAREG Report on Analysis of water efficiency KPIs in WAREG member countries, 2017, available at: https://www.wareg.org/documents/an-analysis-of-water-efficiency-kpis-in-wareg-member-countries/

[5] The International Benchmarking Network for Water and Sanitation Utilities (IBNET) is an initiative started by the World Bank in the late 1990s. The World Bank regards benchmarking as an important activity to improve the performance of water and sanitation utilities worldwide. In order to encourage and promote benchmarking the World Bank developed a suite of software tools and guidance documents to help utilities compile, analyze and share performance information. IBNET seeks to encourage water and sanitation utilities to compile and share a set of core cost and performance indicators, and thus meet the needs of the various stakeholders. It sets forth a common set of data definitions; a minimum set of core indicators, and provides software to allow easy data collection and calculation of the indicators, while it also provides resources to analyze data and present results. https://www.ib-net.org

[6] EBC was initiated in 2005 by the national water utility associations of The Netherlands and the Nordic countries (DANVA, FIWA, Norsk Vann, Svenskt Vatten, Vewin) and several utilities of the 6-Cities Group (Copenhagen Energi, Helsinki Water, Oslo kommune VAV, Stockholm Vatten. EBC has developed a Performance Assessment Model. In it reports EBC also shows the main results from the annual benchmarking exercise in Western Europe. 45 utilities from 20 countries participated. Key indicators are clustered around the performance areas distinguished within the EBC benchmarking methodology: Coverage, Water quality, Reliability, Service quality, Sustainability and Finance & Efficiency. www.waterbenchmark.org

[7] Sigma is a benchmarking and performance indicators software for drinking water and wastewater utilities. The software is based on the International Water Association (IWA) system of performance indicators. www.sigmalite.com

[8] The benchmarking method of Aquabench GmbH is widely used management instrument of the industry available for the water and sewage industry. This is based on recognized standards of the industry including:

- "DVGW, DWA Guidelines Benchmarking for Water Supply and Wastewater Disposal Companies" (2005)
- DVGW Leaflet W 1100 / DWA M 1100 - Benchmarking in water supply and sewage disposal (2008)
- DIN ISO 24523 "Guidelines for benchmarking of water utilities" www.aquabench.de

Categories of indicators:

In 2004, the **EEA** identified a core set of 37 indicators.[9] The core set covers six environmental themes (air pollution and ozone depletion, climate change, waste, water, biodiversity and terrestrial environment) and four sectors (agriculture, energy, transport and fisheries) (EEA, 2005). While the indicators are mainly of an environmental nature, there are also indicators on the use of freshwater resources. In 2014 the EEA published a technical report based on the knowledge shared by water utilities associations and other organisations linked with water utilities in Europe, in order to support environmental and resource efficiency policies, and technical improvements. The focus of this report was environmental performance based on data from a voluntary benchmarking exercises (EEA, 2014).[10]

The **International Water Association** (IWA) developed a set of 170 PIs based on 232 variables that need to be monitored regularly (Alegre et al., 2016). These were broadly categorised as follows:

- ✓ Water Resources
- ✓ Personnel
- ✓ Physical
- ✓ Operational
- ✓ Quantity of Water Supplied
- ✓ Economic and Financial

In 2014 the **Water Research Foundation (WRF)** published a report on Performance Benchmarking for Effectively Managed Water Utilities". The research project developed a framework for utility management that would result in effectively managed water utilities and identified the following "Ten Attributes of Effectively Managed Water Sector Utilities":

1. Product Quality
2. Customer Satisfaction
3. Employee and Leadership Development
4. Operational Optimization
5. Financial Viability
6. Infrastructure Stability
7. Operational Resiliency
8. Community Sustainability
9. Water Resource Adequacy
10. Stakeholder Understanding and Support.

The WRF (2014) outlines the benchmarking framework, the system tools and a recommended approach for utilities to conduct a self-assessment. The research also outlines leading practice documentation used by participating utilities[11].

[9] The purposes of the core set of indicators are:

- to prioritise improvements in the quality and coverage of data flows, which will enhance comparability and certainty of information and assessments
- to streamline contributions to other indicator initiatives in Europe and beyond
- to provide a manageable and stable basis for indicator-based assessments of progress against environmental policy priorities. (EEA, 2005)

[10] In its Technical Report, the EEA remarks that benchmarking conducted by the water utility sector itself has been developed as a utility management tool, focused on improving performance in the industry. The data collected helps to increase transparency in the sector and satisfy the demands of the public, supervisory bodies and politicians. Furthermore, it can help improve the sector's image. Moreover, EEA notes that experience has shown that utilities participating in benchmarking projects acknowledge these advantages and are willing to continue the recurring cycle process in order to constantly improve. (EEA, 2014).

[11] WRF reports that about 30 water sector utilities from the United States, Canada, UK and Australia participated in this project. They were of different sizes (from less than 100,000 customers to over millions of customers), geographies (different parts of North America), and types (water, wastewater, and stormwater).

The **IBNET** platform contains definitions of the indicators and context information from the IBNET data entry and from the indicator calculation files. These indicators were designed for utilities that distribute water and/or collect wastewater; and may also abstract and treat water and/or treat wastewater. They have been grouped under 12 headings as follows:

- ✓ Service Coverage;
- ✓ Water consumption and production;
- ✓ Non revenue water;
- ✓ Metering Practices;
- ✓ Pipe Network Performance;
- ✓ Costs and Staff;
- ✓ Quality of Services;
- ✓ Billings and Collections;
- ✓ Financial performance;
- ✓ Assets;
- ✓ Affordability of Services;
- ✓ Process Indicators.

The main objective of ***the WAREG Report on water efficiency KPIs*** of 2017 was to analyse the application of KPIs and to describe efficiency of water services in WAREG member countries, in order to draw out commonalities and differences in monitoring of water efficiency measures and performance. It tried to outline how different European regulators can promote water efficiency within their regulated industries, keeping in mind that although various KPIs and benchmarking platforms exist in the water industry, there appears to be a lack of consistency in the definitions, descriptions, application and consistency of KPIs used to measure water efficiency across Europe. It was further noted that while some countries use KPIs for benchmarking purposes, this practice has not yet been fully embraced by regulators in WAREG member countries.

At the same time, the European Commission appears to be exploring the idea of benchmarking quality and efficiency of water and sanitation service provision, and to cooperate with existing initiatives to provide a wider set of benchmarks for water and sanitation services. This would contribute to improving the transparency and accountability of water service providers by giving citizens access to comparable data on the key economic, technical and quality performance indicators of water operators.

THIS REPORT integrates and goes beyond the WAREG report of 2017, as it analyses the monitoring of the performance, efficiency and quality of water and sanitation services and service providers, implemented by WAREG regulators, within their mandate to set economic regulation of the prices and quality of drinking water and wastewater services. Our analysis seeks to identify, and describe various aspects of technical, economic and service efficiency in WAREG member countries, with the aim to draw out commonalities and differences in monitoring of efficiency measures and performance. This report describes how different European regulators can promote and measure water and sanitation services efficiency within their regulatory powers.

It is noted that although various performance indicators and benchmarking platforms exist in the water industry, there appears to be a lack of consistency in the definitions, descriptions, application and consistency of methodologies and approaches used to measure water and sanitation services efficiency across Europe. It is further noted that while some countries use

performance indicators for benchmarking purposes, this practice has not yet been fully embraced by all regulators in WAREG member countries.

The process of monitoring efficiency and performance by using various indicators is complex and has a long-term perspective. Therefore, this paper tries to assess the details of data provision from regulated entities to regulatory authorities, the aspects of data validation methods and techniques used by WAREG members in order to assess the level of data accuracy and reliability including any regulatory requirements for service providers` internal information systems.

We have investigated how water regulators set targets for indicators used to water operators, how do they monitor annual performance by the companies, if there are any links between performance and tariff setting, what are the possible regulatory actions in case of non-implementation of targets, and how information is revealed by regulators to the public.

ANALYSIS METHODOLOGY

The WAREG Working Group on KPIs (KPIs WG) was established in March 2022 to collect the necessary information for this report, based on a survey that included the following sections:

- ✓ Authority data and scope of regulatory authority competences;
- ✓ Data collection and data validation process;
- ✓ KPIs monitoring process;
- ✓ Data publicity;
- ✓ KPIs methodology and definitions.

20 WAREG Members participated in the survey[12]:

COUNTRY		REGULATORY AUTHORITY NAME
Albania	WRA	Water Regulatory Authority
Armenia	PSRC	Public Services Regulatory Commission
Azores, Portugal	ERSARA	The Water and Waste Services Regulation Authority of Azores
Belgium (Brussels)	BRUGEL[13]	The Brussels Energy Regulatory Commission
Belgium (Flanders)	VMM	Flemish Water Regulator (drinking water)
Bulgaria	EWRC	Energy and Water Regulatory Commission
Estonia	ECA	Estonian Competition Authority
Georgia	GNERC	Georgian National Energy and Water Supply Regulatory Commission
Greece	GSNEW	General Secretariat of Natural Environment and 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	WSRA	Water services Regulatory Authority
Latvia	PUC	Public Utilities Commission
Lithuania	NERC	National Energy Regulatory Council
Malta	REWS	Regulator for Energy and Water Services
Montenegro	REGAGEN	Energy and Water Regulatory Agency
North Macedonia	ERC	Energy and Water Services Regulatory Commission

[12] 18 WAREG members provided information on the KPIs applied in 2022. Information received was analysed and preliminary results were shared at the 24th WAREG General Assembly, hosted by the Water and Waste Services Regulation Authority of Azores Islands in April 2022.
[13] The BRUGEL regulator introduced KPIs methodologies and monitoring only in 2023, and the data for its indicators has been supplemented in the analysis. The regulator of Armenia does not apply monitoring through performance indicators.

Portugal	ERSAR	The Water and Waste Services Regulation Authority
Romania	ANRSC	National Regulatory Authority for Community Services of Public Utilities

During discussions on Non-revenue water / Water losses KPIs a need was determined to identify understanding and reporting of IWA Standard Water Balance elements, new questionnaire was prepared and submitted on 14.11.2022. Information was provided by 17 WAREG Members.

This report has been prepared on the basis of the information collected with the above-described questionnaires during the survey, as well as information presented by WAREG Members during WG meetings[14]. Report`s structure follows the organization of the questionnaire:

- ✓ Scope of regulatory authority competences;
- ✓ Data collection and data validation process;
- ✓ KPIs monitoring process;
- ✓ Data publicity;
- ✓ KPIs methodology and definitions.

Information was received from 19 WAREG Members for a total of 425 KPIs. Considering that various indicators cover different organizational, technical and economic scope of water and sanitation activities, for the needs of this analysis they are structured and analyzed in the following 5 categories:

- ✓ Service coverage;

[14] The following WG working meetings have been organized during 2022 - 2023, where different aspects of KPIs monitoring process and methodologies were discussed among WAREG Members, and collected information during the survey for KPIs definitions and methodologies was presented by the WG Chair:

- ✓ 1st WG meeting was hold with remote access on 08.06.2022, where preliminary analysis was shared and plan for future activities was agreed
- ✓ 2nd WG meeting was hold with remote access on 22.06.2022 with discussion on Provisions of reporting information from water operators (WSOs) through online platforms. Case studies were presented by Latvia, Lithuania, North Macedonia and Azores;
- ✓ 3rd WG meeting was hold with remote access on 13.07.2022 with discussion on WSOs reporting information validation instruments. Case studies were presented by Georgia, Kosovo and Montenegro
- ✓ 4th WG meeting was hold with remote access on 13.09.2022 with discussion on Requirements for WSOs internal information systems. Case studies were presented by Portugal and Bulgaria
- ✓ 5th WG meeting was hold on 29.09.2022 during WAREG 25th General Assembly, hold in Torino, Italy, with discussion on New requirements of Drinking Water Directive. Presentation was held by WG Chair
- ✓ 6th WG meeting was hold with remote access on 11.10.2022 with discussion on KPIs target setting and monitoring performance. Case studies were presented by Italy and Bulgaria
- ✓ 7th WG meeting was hold with remote access on 20.10.2022 with discussion on Reflection of KPIs targets into tariffs. Case studies were presented by Italy, Lithuania and Bulgaria
- ✓ 8th WG meeting was hold with remote access on 10.11.2022 with discussion on KPIs definitions – Non Revenue Water / Water Loss KPIs. Survey results were presented by WG Chair, Portugal presented case study
- ✓ 9th WG meeting was hold on 24.11.2022 during WAREG 26th General Assembly, hold in Budapest, Hungary, with discussion on Review of reported information for IWA Water Balance elements used by WAREG Members. Analysis of Energy Efficiency KPIs. Survey results were presented by WG Chair
- ✓ 10th WG meeting was hold with remote access on 25.01.2023 with discussion on KPIs definitions – Asset Management, Water continuity and bursts, Sewerage flooding and bursts KPIs. Survey results were presented by WG Chair
- ✓ 11th WG meeting was hold with remote access on 23.02.2023 with discussion on KPIs definitions – Costs, Personnel, Complaints and communication KPIs. Survey results were presented by WG Chair
- ✓ 12th WG meeting was hold on 08.03.2023 during WAREG 27th General Assembly, hold in Lisbon, Portugal, where WAREG Position on Drinking Water Directive 2020/2184 requirement in Article 4 for assessment of water leakage levels by using infrastructural leakage index (ILI) rating method or another appropriate method was approved by General Assembly. Position was prepared by WG Chair with ERSAR support
- ✓ 13th WG meeting was hold with remote access on 20.04.2023 with discussion on KPIs definitions – Water quality, Water pressure, Wastewater quality, Wastewater discharge, Sludge KPIs. Survey results were presented by WG Chair
- ✓ 14th WG meeting was hold with remote access on 18.05.2023 with discussion on KPIs definitions – Water / Sewerage / Wastewater coverage, New Connections, Affordability, Billing, Debt Collection, Meters and reading, Revenue and Profit KPIs. Survey results were presented by WG Chair
- ✓ 15th WG meeting was hold on 06.06.2023 during WAREG 28th General Assembly, hold in Pristina, Kosovo, where first draft of the report was presented by WG Chair.

- ✓ Service quality;
- ✓ Environment;
- ✓ Asset efficiency;
- ✓ Economic efficiency.

The KPIs in these 5 categories are then structured in 23 sub-categories for the needs of this analysis, based on WG Chair expertise, and it does not follow any Benchmarking methodology.

STRUCTURE OF THE REPORT

This report is organized in chapters and sections. Information is presented in tables with WAREG members' answers, as well as detailed information received from each member.
Chapter I presents information on the scope of regulatory authority's competences in regulation of water and sanitation services.
Chapter II presents information on the process of data collection and data provision from regulated entities to the regulatory authorities; tools that regulators use to analyse and validate reported data, regulatory requirements for internal information systems of the operators, as well as period of reports presented.
Chapter III presents information on the WAREG members` practices of KPIs monitoring, including how the indicators are defined and adjusted through a specific span of time in which regulatory rules apply (the so-called "regulatory periods"); what are the approaches of regulators in setting targets for the regulated entities against the monitored KPIs; how is WS operators` performance monitored by the regulators; how is the quality of reported data assessed and reflected in the monitoring process; what actions are undertaken by the regulators in case of non-compliance by the operators. Cases of other KPIs monitoring regimes (apart from the regulatory ones) are also investigated.
Chapter IV presents information on KPIs data publicity practices adopted by the regulators, including links to their webpages.
Chapter V provides analytical data for the methodologies and definitions of the reported lists of monitored KPIs in categories and sub-categories. The analysis is done on the basis of information received about definitions, formulas and variables used to calculate indicators in the numerator and the denominator, which demonstrate similarities and differences in the approaches of the WAREG members.

Additional information on specific cases in some countries is presented in **ANNEX I**, based on presentations made by WAREG members in the workshops organized by WAREG, providing more details for their practices in the process of data collection, data validation and KPIs monitoring.

Information of the KPIs methodologies and definitions adopted by the WAREG members is presented in **ANNEX II**.

I. SCOPE OF REGULATORY AUTHORITY COMPETENCES

The WAREG Report on water efficiency KPIs of 2017 included a survey on WAREG members` functions and competences, which are different but typically include:

- ✓ Tariffs approval;
- ✓ Key performance indicators (KPIs) monitoring;
- ✓ Collection of economic data from utilities;
- ✓ Collection of technical data from utilities.

Other functions may include: tariff calculation, licensing of the utilities and approval of business plans.

In 2019 WAREG prepared **Report on Tariff regulatory frameworks in WAREG member countries** [15], where an overview of the WAREG members` competences in tariff setting, business plan approval and regulatory periods applied was also presented.

In 2022 WAREG made a survey on KPIs methodologies to update information on the scope and competences of regulatory authorities. A summary of information collected is presented in this chapter, including data reported and additional information received from WAREG members.

The majority of the Regulatory authorities that participated in the survey powers to collect technical and economic data from utilities (19 cases), to monitor KPIs (17 cases), to calculate tariffs (17 cases) and to approve tariffs (18 cases).
However, less than half participants in the survey have powers related to licensing of utilities (9 cases) and business plans approval (8 cases). The same is related to usage of KPIs in the tariff calculation process (9 cases) and possibility to calculate/report KPIs levels on national level (11 cases). More details of WAREG Members regulatory competences are provided in the sections below.

a. General information on WAREG Members

Information provided by 20 WAREG Members participating in the survey is aggregated as follows:

SCOPE OF REGULATION AUTHORITY COMPETENCES	Yes	No
Tariff calculation	**17**	**3**
Tariff approval	**18**	**2**
Licensing utilities	**9**	**11**
Business plans approval	**8**	**12**
Key performance indicators (KPIs) monitoring	**17**	**2**
Collection of economic data from utilities	**19**	**1**
Collection of technical data from utilities	**19**	**1**
Usage of KPIs in the tariff calculation process	**9**	**11**
Calculation of KPIs on national level	**11**	**9**

Table I-1: Scope of competences – aggregated data

Information on WAREG Members' competences is presented in the next table:

[15] WAREG Report on Tariff regulatory frameworks in WAREG member countries, 2019, available at: https://www.wareg.org/documents/water-tariffs-frameworks-in-europe/

SCOPE OF REGULATION AUTHORITY COMPETENCES	Tariff calculation	Tariff approval	Licensing utilities	Business plans approval	(KPIs) monitoring	Collection of economic data from utilities	Collection of technical data from utilities	Usage of KPIs in the tariff calculation process	Calculation of KPIs on national level
Albania	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Armenia	Yes	Yes	Yes	No	No	Yes	Yes	No	No
Azores	No	Yes	No	No	Yes	Yes	Yes	No	No
Belgium / Brussels	Yes	Yes	No	No	Yes	Yes	Yes	No	No
Belgium / Flanders	Yes	Yes	No	No	Yes	Yes	Yes	No	No
Bulgaria	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Estonia	Yes	Yes	No	No	No	No	No	Yes	No
Georgia	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Greece	No	Yes	No	No	Yes	Yes	Yes	No	Yes
Hungary	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Ireland	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No
Italy	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Kosovo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Latvia	No	Yes	No*	No	Yes	Yes	Yes	No	No
Lithuania	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Malta	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Montenegro	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes
North Macedonia	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes
Portugal	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes
Romania	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes

Table I-2: Scope of competences – data by Members

b. Detailed information on WAREG Members

Albania. The WRA is an independent institution reporting to Council of Ministers and the Parliament of Albania. It is responsible only for drinking water and wastewater services provided to the customers. The main tasks of the WRA are licensing the utilities, setting up tariffs, and protecting customer interests in a monopoly environment, where the operators can abuse by providing low quality services and by applying very high and unjustified prices. Proposals for new tariffs are submitted by utilities respecting the methodology defined by WRA. The current methodology used by WRA in the tariff approval process is "Cost Plus" when the tariffs proposed by the utilities intend to cover less the 100% of the O&M costs, and it is "Price Cap" when the tariffs will cover fully or partially the total costs of the services, i.e. including CAPEX. In the second case the submission of a 5-years business plan is mandatory for the new tariff proposed by a utility. The WRA analyses the utilities' proposals on the basis of the justified costs presented to the regulator, the utility's performance estimated through KPIs, and an affordability criteria. The economic data used are referred to the annual financial balance sheet certified by an authorized audit expert, while the technical data are referred to the Water Balance Report, which utilities have to submit every year to the WRA. By the end of each calendar year, utilities submit to the WRA via e-mail in excel sheet also any technical and economic data. During the process of tariff proposals' analysis the WRA takes into account 10 KPIs to estimate the performance of utilities.

Armenia. The control of the key performance indicators (KPIs) specified in the lease agreement is carried out by the Water Committee, through a hired international technical auditing organization, which is a party of the agreement. The Public Services Regulatory Commission issues drinking water supply and drainage (wastewater) licenses, approves water supply

exemplary rules (supplier-consumer relationship regulation), and approves/revises tariffs in accordance with the contract and methodology approved by the Commission.

Azores. ERSARA was established in 2010 as the regulatory authority for public water supply services, wastewater management services and waste management services in Azores. It has two main missions, namely the regulation of these sectors and the supervision and control of drinking water quality. ERSARA ensures the regulation of the quality of service, by assessing the service provided to end users through the application of a set of indicators (KPIs), in order to promote efficiency and benchmarking. Annually, a report is published with the results of this assessment, specifically with respect to the protection of users' interests, operators´ sustainability and environmental sustainability.

Belgium (Brussels). BRUGEL has set the first regulatory methodology "Cost Plus" for the period 2022-2026. A set of KPI's has been determined and its reporting will be applied progressively, from 2023 when data will be available, to 2025 for the most complex indicators. The goal is to follow the evolution of the quality of the services provided by water operators and to build a historical baseline for the possible definition of goals to achieve in the next regulatory period (starting in 2027), based on these KPI's. Only the 33 KPIs already monitored in 2023 are taken in account for this survey.

Belgium (Flanders). The VMM/Water Regulator focuses on tariff regulation for tap water, comparison of performance and efficiency of water companies, and exploratory and policy preparatory studies to advise the Flemish Government and to bring transparency to the sector. The water companies may apply new tariffs or tariff increases without approval by the Water Regulator. The method of regulating the tariffs is laid down in regulations. The maximum tariffs per water company for the coming 6 years are laid down in tariff plans. The tariffs are indexed annually. In addition to tariff regulation, the Water Regulator also monitors the process of benchmarking carried out by the water companies. Every year, one process between all water companies is compared, the results are reported and an action plan is drawn up to improve the process. To conclude, the Water Regulator carries out studies on its own initiative or at the request of the Flemish Government to improve cost allocation and regulation, and it advises the Flemish Government.

Bulgaria. EWRC regulates tariffs and service quality through 5-year business plans approval, KPIs monitoring, target-setting and performance evaluation, and price-cap tariff-setting.
Operators prepare 5-years business plans following the regulators` guidance for each regulatory period. The approval of such business plans by EWRC is a pre-condition to approve tariffs.
EWRC approves business plans and tariffs with one decision, as both procedures are integrated. The operators apply the tariffs for the 1st price period, while the tariffs for the next years are updated with subsequent decisions of the regulator, based on RPI-X approach, where X includes number of different coefficients evaluating operators` efficiency, realization of investments and KPIs target achievement.
Targets for KPIs levels are set in the business plans, and their annual achievement is monitored by the Regulator. 5 KPIs are selected and used in the tariff update procedure through financial bonuses/penalties, twice during the regulatory period i.e. after the first 3 years and in the last 2 years. EWRC also monitors levels of reported investments and updates the tariffs on the basis of defection of realization of investments in accordance with the approved business plans and funds included in the tariffs (depreciation of corporate and public WS assets).

Georgia. GNERC gives water supply licenses, calculates and approves 3-years tariffs. GNERC also approves an "Investment Appraisal Rule" according to which, WS companies submit long-term and short-term (3 years) investment plans. GNERC reviews and takes a decision on approval of such plans. According to this rule, GNERC can also approve 11 KPIs, which should be improved by the plans submitted by the WS companies. The GNERC chooses 3 of such KPIs when calculating the tariff.

Greece. Regarding price regulation at a national level, the Directorate of Planning and Management of water Services (Ministry of Environment and Energy) implements a Joint Ministerial Decision (JMD) which establishes arrangements for costing and pricing rules applicable to drinking water and sanitation services, as well as to irrigation water. This JMD sets up the full cost recovery principle while, at the same time, it contains flexibility to allow for exceptions to such principle when social, economic and environmental reasons occur, anyways in accordance with the river basin management plans. Moreover, the Directorate monitors and evaluates the procedures, methods and levels of cost recovery of water services and the adoption of costing and pricing rules by the service providers, using a digital tool entitled "Mechanism for the Supervision of Water Services". In addition, it ensures the provision of reliable water services, in terms of quality, quantity and affordability for users-consumers, it coordinates the elaboration of the economic analysis of the River Basin Management Plans and it monitors and coordinates the specific rules and measures that contribute to the improvement of water services in combination with the economic development needs of the country.

Hungary. Supplying drinking water and managing wastewater can only be behaved in the possession of the license granted by the regulatory Authority (MEKH). The Authority also has the right of granting the application of prices differing from the utility tariff (Licensing powers).
It is also the right of the Authority to approve the “rolling development plans”, which are long-term (15 years) development plans and consist of development, replacement and investment design plans. The Authority also approves the operational agreements between the responsible entity and the service provider (Approving authority).
The Authority – in the favour of public interest for service – can designate an operator of last resort to provide water services, in case the service is endangered and the local government or the state has not ensured to provide the necessary supply (Designation of the operator of last resort).
The consent of the Authority is required for the merger, division (transformation), reduction of the registered capital or equity capital by at least 25 % of the service provider (Approving changes governed by company law).
The Authority is entitled to control the service provider company’s adherence to the granted license and the application of lawful prices. The Authority also supervises whether the operation of the service provider is adherent to the law (Monitoring authority).
Another important responsibility of the Authority is the management of public registry of water utility systems, service providers, and responsible entities. Regarding data collection, the regulator has the right to collect any type of data which is necessary to fulfil its duties. This provides the Authority with a high liberty in defining and validating economic and technical datasets. There is no regulation regarding KPIs and the service providers are not obliged to submit KPIs. The Authority is gathering the basic data in order to calculate KPIs.

Ireland. *Uisce Éireann* (formerly Irish Water) is predominantly funded by the Exchequer on an annual basis. The CRU consults on and approves all charges (connections, non-domestics charges, etc) set by *Uisce Éireann*. The CRU is also involved in policy setting for aspects of work that *Uisce Éireann* does not have policies in place for, or that may vary in different Local Authorities across the state (e.g., First Mover Disadvantage, Disconnections, Self-Lay etc.). The CRU reviews

technical data yearly relating to *Uisce Éireann* service delivery and performance as well as progress on its Capital Investment Plan.

Italy. By Law number 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. The main functions provided by law to ARERA include:

- **definition of the tariff methodology and tariff approval.** The tariff methodology is based on regulatory schemes, selected by Local Authorities (EGAs), which - considering the initial operating circumstances of individual operators/territories - provide for incentives to increase investment and operate costs efficiently. The model combines the ratio between the planned investment expenditure and the regulatory asset base, and the situation in terms of operating costs (weighted on the supplied population). As a result, 6 schemes are identified, each one identifying the specific cost-reimbursement rules that shall be used to calculate the regulated revenues (maximum amount allowed by regulation). The regulated revenues, then, determine the tariff multiplier (maximum allowed tariff increase), and submits it to ARERA for approval, at the beginning of each regulatory period (lasting 4 years, but updated every 2 years);
- **definition of minimum standard quality levels.** Starting from 1st January 2018, the technical quality regulation model (RQTI) has fixed the performance indicators and the related targets, thus completing quality regulation, which had already adopted (in 2015) the contractual rules. The RQTI is an output-based model, strictly linked to tariff regulation, consisting both in a set of KPIs which define targets to be reached by operators every year, and in an incentive (stick and carrot) mechanism related to target implementation and to the observed performance (see the further sections for details);
- **control over the local investment planning.** Planning activity is of the upmost importance, to link tariffs to quality performance. Among the acts necessary to set the relevant regulatory scheme, the local Authority (EGA) have to submit: the investments plan for the regulatory period (PdI), which specifies the objectives to be achieved according to the criticalities of the territory, and the strategical infrastructure plan, underlining the broad infrastructures, needing more time to be realized;
- **regulatory decisions enforcement**, through inspections and penalty powers;
- **users' protection.** This broad aim, to be reached first of all through tariff and quality regulation, has also brought ARERA to introduce specific measures, such as: the social bonus, to help vulnerable customers to pay their bills, the end users' tariff regulation (TICSI), which pursues equitable tariff progressivity (per-capita) and the arrearage regulation (REMSI), giving instruments in order to minimize the economic impact of nonpaying customers.

Kosovo. The national regulator WSRA is calculating and approving tariffs for water and wastewater services; usually the tariffs are approved for a period of at least 3 years and maximum 5 years. The WSRA calculates the tariffs and sets the targets for the KPIs to be achieved during the period for which the tariffs are approved. The WSRA is monitoring that by the regulated water companies achieve the targets defined in the KPIs (KPIs adopted for tariff calculation are same as in the business plans).

Latvia. The national regulator PUC determines the methodology for calculation of tariffs, and evaluates and approves tariffs. Tariffs are approved for an indefinite period of time, and they are in force until a new tariff is approved and comes into force. Every year, water service operators

are obliged to submit information about their performance, including technical information and costs related to service provision. The national regulator annually analyses whether water services operators can continue working under the approved tariff or they must submit a new draft tariff proposal. In order to provide services, the water operators must be registered. The PUC registers the operators, maintains the register and provides that the register is publicly available.

Lithuania. The national regulator VERT approves methodologies for setting the state-regulated prices (i.e. water supply, wastewater treatment and surface water). The regulator also sets the requirements on accounting separation, it sets rules for imposing fines, it approves and sets (in some cases unilaterally) the state-regulated prices, it issues, modifies and cancels licenses for the activities, it defines the technological, financial and management capacities of the water sector undertakings, and the procedure of their assessment, it imposes fines for infringements in performing the regulated activity, it approves the investments, it performs costs audits.

Malta. The national regulator REWS regulates tariffs on the basis of a 'Full Cost Recovery' method for the sole water service provider in Malta. The 'Full Cost Recovery' method assumes that the proposed tariffs will enable the Corporation to recover all its acceptable costs and earn a reasonable rate of return on its capital employed necessary to enable it to meet its current and future debt servicing obligations as and when they fall due.

Montenegro. The national regulator REGAGEN issues, changes and revokes licenses for performing utility services; supervises the work and performance of operators within the conditions from licenses; implements benchmarking; gives consents to the tariff requests of operators; prepares and submits the annual report to the Parliament of Montenegro; and issues by-laws. Benchmarking was the first bylaw in this field that REGAGEN has published. It came into force in October 2018. REGAGEN collects data from the operators, then calculates indicators and, on its basis, it determines individual and local indexes (i.e. individual for each operator and local for each municipality) and at the end it calculates a national index. As a consequence, a database was created, that contained 320 data and 130 indicators for each operator for every year since 2015. Additionally, REGAGEN's benchmarking considers reliability of data in such a way that indicators can be reduced in case the data provided by operators are unreliable, in order to motivate operators to improve their databases. Currently, benchmarking does not influence tariff calculations, but it could be possible in the future.

North Macedonia. The Energy and Water Services Regulatory Commission provides services through the data received from the water services operators, thus regulating the tariffs through the business plans and the annual reports provided by the operators, and taking into consideration their requirements. One of the most important elements of tariff setting is determining the regulated income approved by the water service provider during a calendar year, excluding the revenues realized from other activities that are not related to water services. The tariff for water services is determined for each year of the regulated period (which lasts 3 years). The Regulator provides a range of the tariff from min. to max. which will be easier for the WSOs to decide about it depending on their needs and financial statement.

Portugal. The Water and Waste Services Regulation Authority (ERSAR) is the regulatory agency that, according to its statutes, exercises important regulatory functions over all water and sanitation services and urban waste operators in mainland Portugal. ERSAR aims to ensure the quality of the services rendered by drinking water supply systems, urban wastewater and municipal waste systems, supervising the creation, execution, management and operation of those systems. Its primary duty is the protection of consumer rights and the safeguarding of sustainability and

economic viability of the municipal and regional water and waste utilities. As a national authority, ERSAR also has the duty to monitor and control the drinking water quality for all the operators in mainland Portugal. ERSAR adopted the sunshine regulation model as its main method of regulation, by determining a set of performance indicators for operators, systematically comparing them and publicly displaying the results. In this way, operators with a poor performance are incentivized to correct their deviations. This approach has led to good outcomes by fostering the improvement of performance in the whole sector. To this end, ERSAR annually publishes a report comprising the operators' results, obtained from a set of performance indicators. More recently (2014), additional powers were attributed to ERSAR, namely enabling a stronger intervention in the adoption of adequate tariff structures by municipalities. Recently, Law no. 75-B/2020, of 31 December, reduced the scope of the regulator's powers. This law, by amending ERSAR's Statutes, removed the regulator's power to set tariffs in state ownership systems - exclusively managed or majority-owned public entities, as well as the power to issue binding instructions for municipal ownership systems.

Romania. The National Regulatory Authority for Community Services of Public Utilities (ANRSC) is a public institution of national interest, with legal personality, having as main object the regulation, monitoring and control at central level of the activities in the field of community services of public utilities. regulation, respectively: a) Water supply and sewerage service; b) The locality sanitation service; c) Public lighting service; d) The public passenger transport service by regular flights, according to the competencies granted by the special law. The ANRSC has established the competencies and attributions in the Law on community services of public utilities no. 51/2006, republished, with subsequent amendments and completions, and are mainly the following ones: to elaborate and establishes mandatory tertiary level sectoral regulations; to grant, modify, suspend or withdraw licenses or authorizations, as the case may be; to approve the establishment, adjustment or modification of prices and tariffs for water supply and sewerage services; to organize the information system for collecting, by processing and synthesizing data on public utility services in its regulatory sphere, technical infrastructure related to them, as well as to the activity of the operators; to monitor the application and observance by the operators and by the local public administration authorities of the primary legislation in the field, of the regulations issued in its application, of the system of prices and tariffs in force and applies sanctions in case of non-compliance; to monitor the observance and fulfilment by the operators of the obligations and measures established in the conditions of issuing or maintaining the license or authorization.

II. DATA COLLECTION AND DATA VALIDATION PROCESS

Monitoring service providers` performance and efficiency through performance indicators is complex and long-term process. This paper aims to overview the entire process of KPIs application and performance monitoring, beginning with regulatory prerequisites for data gathering, the arrangement of report submission by regulated parties, the tools regulators employ for inspection, analysis, and confirmation of reported data by operators, and the timeframe of the reports submitted.
Data collection and data verification is the foundational stage that regulators need to overcome, since subsequent decisions rely on the reported data. Therefore, the regulators must ensure that data from the companies has been properly collected and verified, assuring all stakeholders that the decision-making process is based on accurate data, not estimated and/or intentionally manipulated by the regulated entities. As regulation of water and sanitation services is public process involving representatives of different public authorities on national and local levels, as well as institutions representing business and households, efforts need to be undertaken by the regulators to increase the credibility of the regulatory process, with the cornerstone being the utilization of trustworthy data for regulatory purposes.

II.1. DATA COLLECTION PROCESS

A Summary of the information collected during the survey in the area of *Data collection process organization* is presented in this chapter; including a summary of data collected, as well as additional information presented by the members that participated in the survey.

Most of WAREG Members receive economic and technical information through excel files (16). Around half of the regulators (11 cases) have developed specific online platforms for data submission with different scopes and capabilities.
Only 2 cases (Georgia and Latvia) report that they have introduced direct link with WSO information systems, but it is only for commercial data.
Other options include filling benchmarking model prepared by the regulator (Montenegro), filling standard forms for small operators (Romania) and introduction of local authorities in the process of data submission (Italy).
More details of WAREG Members data collection practices are provided in the sections bellow. Additional data on some country-cases on the online platforms used is provided in **ANNEX I**.

a. General information in table view for WAREG Members

Information provided by 20 WAREG Members participating in the survey is aggregated as follows:

DATA COLLECTION PROCESS	Yes	No
How is economic data provided by the WS operators		
Excel files	**16**	**1**
Online platform for data submission	**11**	**6**
Direct link with WS operators information systems	**2**	**12**
Others (please define)	**3**	**7**
How is technical data provided by the WS operators		
Excel files	**16**	**1**
Online platform for data submission	**11**	**6**

Direct link with WS operators information systems	**0**	**13**
Others	**3**	**7**

Table II.1-1: Data collection process – aggregated data

Information for WAREG Members is presented in next table:

	HOW IS ECONOMIC DATA PROVIDED BY THE WS OPERATORS				HOW IS TECHNICAL DATA PROVIDED BY THE WS OPERATORS			
Data Collection Process	**Excel files**	**Online platform for data submission**	**Direct link with WS operators information systems**	**Others**	**Excel files**	**Online platform for data submission**	**Direct link with WS operators information systems**	**Others**
Albania	Yes	No	No	Yes	Yes	No	No	Yes
Armenia	Yes	Yes	No		Yes	Yes	No	
Azores	Yes	Yes	No		Yes	Yes	No	No
Belgium / Brussels	Yes	No	No	No	Yes	No	No	No
Belgium / Flanders	Yes	No	No	No	Yes	No	No	No
Bulgaria	Yes				Yes			
Estonia	Yes	No	No	No	Yes	No	No	No
Georgia	No	Yes	Yes	No	No	Yes	No	
Greece		Yes				Yes		
Hungary	Yes	Yes	No		Yes	Yes	No	
Ireland	Yes	No	No	No	Yes	No	No	No
Italy	Yes	Yes	No		Yes	Yes	No	
Kosovo	Yes				Yes			
Latvia		Yes	Yes			Yes		
Lithuania	Yes	Yes	No	No	Yes	Yes	No	No
Malta	Yes				Yes			
Montenegro	Yes	No	No	Yes	Yes	No	No	Yes
North Macedonia		Yes				Yes		
Portugal	Yes	Yes	No	No	Yes	Yes	No	No
Romania	Yes	Yes		Yes	Yes	Yes		Yes

Table II.1-2: Data collection process – data by Members

b. Detailed information for WAREG Members

Albania: WRA has prepared excel files sheets data for each type of services to be provided by the utilities. The utilities fill and send them to WRA after 6 months and in the end of each calendar year. The data usually are compared with the previous year data. For the data with a relatively strong deviation are requested explanation by the utilities via e-mail, or phone call, and when it is necessary the verification and the data validity is double checked during the site visit, or inspection.
WRA is refers to the financial data from the annual financial report (financial balance sheet) certified by an authorized audit expert. Regarding the other technical data, WRA has prepared a template form with the required data to fill by the utilities. Another source of technical data used by WRA are the Annual Water Balance report in IWA format which the utilities submit each year near the WRA.

Armenia: To confirm penalty report accuracy due to water cutoff violations, checks include water supply schedules, incident counts, planned outages, restoration times, and complaint records.

Azores: Economic and technical data are reported though the ERSARA's online platform, together with Excel files that support the data submitted.

Belgium (Brussels): The water operators` fill-in the excel files made by BRUGEL with the technical data needed to calculate the (technical) KPIs by the 31st of March of each year. The operators also provide financial data in July.

Belgium (Flanders): The tariff plan reporting template contains technical data on water quantity, subscriber composition, investments as well as economic data on costs, revenues and expenses. Each water company reports in its tariff plan for 10 years (3 years past, current year and 6 years' future. During a tariff period, the water company reports every year with an update of the past year (actuals) and an extra forecast year. The reporting is still done via excel, from where the data is transferred to a database by the Water Regulator. VMM is working on an automatic transposition of the data in the database by the water companies. A reporting on the database by each water company would also be possible.

Bulgaria: EWRC has developed internally integrated and locked Excel model for annual report on business plan implementation as well as report on implementation of the regulatory accounting rules. The internal integration of the model contributes for avoiding technical mistakes.
Operators can submit the report either through E-portal, or through standard office provision procedure.

Estonia: All data (mentioned also above) is collected only in price approval process, not separately. Water companies are not obligated to submit economic data to the regulator annually.

Georgia: WS companies provide all kind of information (including technical information) through reporting forms that can be filled out on the Website.

Greece: The General Secretariat of Natural Environment and Waters has developed an integrated monitoring system. The WS operators provide the annual data through an online platform (http://wsm.ypeka.gr/). For every WS operator a designated person has access in the data base for data entry reasons.

Hungary: The deadline of economic (10 June each year) and technical data (20 March each year) submission is defined by the decree of the regulator. Every service provider gets their datasheets with the list of their utility systems and the non- or rarely variable data filled out for the previous year. MEKH also organises data workshops with them and upload guidance on its website to help them to provide the correct data. Usually, all of the operators submit the datasheets by the deadline and we only start monitoring procedures if they fail to submit their responses.

Ireland: Uisce Éireann is provided with a template excel file containing information on the various projects and programs the utility has committed to completing over its five-year revenue control cycle. Each year Uisce Éireann is allowed 3 months to update and return the file. Following submission, the file is reviewed and any queries or discrepancies are identified and followed-up on. This file forms the basis of the annual Capital Investment Plan Monitoring report.

Italy: Each local Authority (EGA), for the related operator, upload on an online platform the tariff proposal, within a fixed term that is the same for each one. Tariff proposal is formed by an excel file (using a format predefined by ARERA) and a group of the relevant acts (e.g. explanation reports, approval acts, entrustment contract, truthfulness declaration).

Kosovo: WSRA has developed templates in Excel and in Word format for the data that need to be reported by the RWCs.

Latvia: From 2016, WSOs can register and submit reports via an online merchant system, with options to manually enter data, upload Excel files, or integrate the system with their accounting software.

Lithuania: WSO downloads NERC managed IT tool, which is a package of excel forms, that have to be filled. The filled forms are audited by an auditor who is contracted by WSO. The auditor checks data against Journal entrances and accounting data. The filled package with audited reports is then uploaded back to IT tool by WSO.

Malta: REWS has optimized a Locked Excel Sheet (referred to as the 'License Monitoring Report') with all pre-defined parameters (as agreed in the Water Services Corporation License) to be reported on an annual basis. This was done to have i) a standard method/report how data is sent by the WS operator, ii) to avoid having data missing/not submitted between years, and iii) makes it easier for us the Regulator to compare the results with those of preceding years.

Montenegro: Operators are obligated to fill data on monthly basis and to send it to REGAGEN quarterly. At the end, annual data are subject of REGAGEN's Benchmarking report, but data on monthly level are used for REGAGEN's internal research and monitoring of changes.

North Macedonia: ERC has developed an online platform in which the WSO can submit data and make request for tariff together with an Excel model, according to their annual reports and accounting system. The procedure continues with the approval of their request by our staff. The analysis is being done to avoid technical mistakes and other omissions regarding the final works.

Portugal: ERSAR has developed several locked Excel models for the annual reporting of technical and financial information by the WS operators; formulas are locked, and data are integrated into the internal information system ("Portal ERSAR").

Romania: Standardized reporting forms have been established and the operators have the obligation to complete them. For the annual report, the data and information are in excel format, which also includes the reports from previous years.

II.2. DATA VALIDATION PROCESS

A summary of the information collected during this survey in the area of *Data verification process organization* is presented in this chapter, including a summary of the data reported, as well as additional information presented by the members that participated in the survey.

Information available indicates that the prevalent validation tools are comparative analysis of current and previous year data (19 instances) and of similar data within the current year's reports (17 instances), widely used among surveyed WAREG members.

15 of the members request physical documents in the process of data validation, and 13 regulators validate data during on-site inspections.
Furthermore, 13 regulators have introduced or are planning to introduce regulatory requirements for the information systems used by the regulated entities for reporting data.
Almost half of the regulators (9) use all of the above-mentioned tools together for data validation, and therefore are doing their best to make sure that data reported by WSOs is consistent and reliable and comes for trustful sources.
More details of WAREG Members data validation practices are provided in the sections below.
Additional data on some country-cases on tools for data validation is provided in **ANNEX I**.

a. General information in table view for WAREG Members

Information provided by 20 WAREG Members participating in the survey is aggregated as follows:

DATA VALIDATION PROCESS	Yes	No
Cross-check of similar data in the reports for reported year	17	1
Cross-check of specific data reported for reported and previous years	19	1
Request of physical documents for data validation	15	4
On-site inspections	13	6
Internal information sources analysis (registers/data bases)	13	6
Others	1	2

Table II.2-1: Data validation process – aggregated data

Information for WAREG Members is presented in next table:

Data Collection Process	Cross-check of similar data in the reports for reported year	Cross-check of specific data reported for reported and previous years	Request of physical documents for data validation	On-site inspections	Internal information sources analysis (registers/data bases)	Others
Albania	No	Yes	Yes	Yes	Yes	No
Armenia	Yes	Yes	Yes	Yes	Yes	
Azores	Yes	No	Yes	Yes	No	
Belgium / Brussels	Yes	Yes	No	No	Yes	No
Belgium / Flanders	Yes	Yes	Yes	No	No	
Bulgaria	Yes	Yes	Yes	Yes	Yes	
Estonia	Yes	Yes	Yes	No	No	
Georgia	Yes	Yes	Yes	Yes	Yes	
Greece	Yes	Yes	No	No	No	
Hungary	Yes	Yes	Yes	Yes	Yes	
Ireland	Yes	Yes	No	No	No	
Italy	Yes	Yes	Yes	Yes	Yes	
Kosovo	Yes	Yes	Yes	Yes	Yes	
Latvia	Yes	Yes	No	No	Yes	Yes
Lithuania	Yes	Yes	Yes	Yes	No	
Malta		Yes				
Montenegro	Yes	Yes	Yes	Yes	Yes	
North Macedonia	Yes	Yes	Yes	Yes	Yes	
Portugal	Yes	Yes	Yes	Yes	Yes	
Romania		Yes	Yes	Yes	Yes	

Table II.2-2: Data validation process – data by WAREG Members

b. Detailed information for WAREG Members

Albania: The validity of the technical data reported are compared and cross-checked with the previous year data, regarding the reports of water balance, economic and technical, and those referred to the sales, assets and billing systems, staffing, accounting etc.
Sometime data validity is subject of site visits or inspections in order to verify their accuracy, particularly when discrepancies or unconvincing data are presented by utilities..

Armenia: In order to verify the accuracy of the water volumes report, comparisons are made between the data of water supply volumes of the given period and the previous years, the revenue generated, the collection as well as the weather conditions.

Azores: ERSARA conducts annual audits on water quality, quality of service and finance to validate the data submitted by the WSOs. The validation process involves cross-checking of information, analysis of physical documents and on-site inspections.

Belgium (Brussels): It is the responsibility of the water operators to provide valid data. However, BRUGEL verifies if the data provided are coherent with the historical data, the internal information and external sources. BRUGEL may ask questions to the operators if required. Moreover, BRUGEL has the competence to ask for all documents required for tariff approval and may also investigate on site. However, the first costs control and the KPIs monitoring are occurring in 2023. Up to now BRUGEL hasn't asked for physical documents for validation yet. No site-inspection is planned for this first year of control.

Belgium (Flanders): The economic data of the closed years are validated by the auditor of the water company. The Water Regulator itself carries out a number of checks and analyses on the data, such as comparisons with previous years, comparison with other reports to the VMM, checking for missing data, etc.

Bulgaria: EWRC has requested WSOs to establish and maintain internal data registers and data bases, together with official internal procedures for data input, monitoring and validation. Data registers cover information for assets, network repairs and investments, laboratory tests for drinking and wastewater quality, customer complaints, sludge from WWTPs, meters on service connections, billing and regulatory accounting. Databases cover information for measured water at system entry, DWTP and WWTPs entries, network meters and data loggers, electricity consumption, unbilled authorized consumption calculation, contracts for new connections to the network and personnel.
Each year the Commission monitors the level of integration of the required registers and data bases, provides guidance and requests for measures to be undertaken by the operators.
Annual reported data for KPIs variables is proved by the WSOs by screenshots from the registers and data bases (if provided from unproven source, is not considered). Data is also validated by cross-check from different information in the annual report as well as previous reports. On-site inspections are done each year in order to guarantee that registers and data bases in use are in compliance with regulatory requirements.

Georgia: GNERC checks information that companies are giving with reporting forms. It may be done by comparing them with similar data reported in previous month, quarter, or year. If inconsistencies are identified, GNERC returns the forms for correction.

Greece: The monitoring system includes arrangements for ensuring internal consistency within the system (automated error messages etc.). In addition, the staff of the agency validates the submitted data through cross checks, longitudinal analysis, and comparative analysis.

Hungary: Data validation is conducted in 2 rounds. We developed a data validation software based on our experience and we are always adding new rules for validation. In the first round this software shows us the formal mistakes and we send the datasheets back for correction. In the second round we run another program for historical and cross-checks and our colleagues also make sure that the data in their documents are in line with the data in the datasheets. If there are any problem with compliance or data correction, we are entitled to impose a fine for enforcement. We rarely use these fines because they are very high and can make a company bankrupt.

Ireland: Figures and data provided are reviewed and where outliers are identified the utility is asked to explain these. In some instance the data can be validated against independent reports provided by the utilities environmental regulator: the Environmental Protection Agency.

Italy: Process of data validation and monitoring derives from a complex inquiry implying:
- collection of data validated by Local Authorities (EGAs) for the basis year (e.g. 2016 for the first application of the technical quality mechanism) and for evaluating years (e.g. 2018 and 2019 for the same proceeding);
- collection of technical quality registries and other documentation for a wide range sample of operators (on a large sample of operators);
- check of completeness and coherency, analysis of specific situations/requests.

After having identified critical cases, the process implies different regulatory outcomes:
- identification of operators having (not having) reached the set quality objectives and calculation of awards and penalties, for years under evaluation (2018-2019 in the previous example);
- identification of operators which are not admissible to the incentive mechanism (entirely or partially, for some stages), concerning all macro-indicators or a part of them;
- ranking operators for each macro-indicator each year, and for all macro-indicators combined through a multi-criteria approach (TOPSIS method), each year.

Kosovo: WSRA in the Q1 of each year, via its department for licensing and the unit of inspection, is performing the inspection in the RWC HQ's to confirm and validate the data about fulfilment of quality standards as set in the condition of license.
WSRA in the beginning of Q2 of each year, via its tariff and performance monitoring department, is performing the visits in the RWC HQ's to confirm and validate the operational and financial data.

Latvia: Principles for data verification: All necessary economic and technical data should be submitted; Income must comply with the amounts of provided services; Amounts of abstracted water and treated wastewater should comply with data submitted for the national statistical report 2-Water; Significant deviations from previous year's data and tariff data should be explained, that also helps to identify incorrect data.

Lithuania: During the uploading procedure Excel package is checked by IT tool if all the necessary data is filled. Then NERC employees do the data check. They check if there are no logic errors.

Malta: Data provided is checked and compared with previous years which includes both Excel file and Report (word document) provided. Any numbers or trends which require clarification are communicated with the WS Operator for verification and clarification.

Montenegro: Pursuant to the Rules, the operators are obliged to submit data to REGAGEN together with the evidence of reliability. If operators skip this part, REGAGEN orders them to send evidences, checks them, compares with data provided, and demands to correct if something isn't matching.

North Macedonia: ERC uses the data received in the online platform by verifying the validation of the documents and the accuracy of the files attached. Each year WSOs are required to provide annual reports about their achieved results during the calendar year and comparing them with the previous year. They have to include the investments plan, expenses, incomes and other accounting variables to make sure the differences that may appear in the aspect of the financial result. If there is a need for additional data, we ask WSOs to provide it to us. The best way to verify the information is by comparing with the official status in the accounting report.

Portugal: ERSAR, at the beginning of each year, requests that the WS operators fill in the excel files made available for the reporting of technical and financial information, which they submit to the ERSAR Portal with other supporting documents. For this purpose, instructions are given for completion, and training actions may take place.
The reported data are later analysed and validated at ERSAR, with internal technicians or external auditors who travel to the sites. For this purpose, different information is used and cross-referenced, both from the same year and from previous years.
If the reported data does not meet the requirements, it is not validated and, consequently, is not used in the calculation of KPIs, being considered as a non-response to that specific KPI.
The process ends with the publication of several KPIs in the sector's annual report (RASARP), which presents national and single WS operators results. These results are compared between them as a benchmarking exercise and against reference values established by ERSAR.
For technical information (Quality of Service), the entire procedure is described in the Quality Assessment Guide for Water and Waste Services Provided to Users (https://ersar.pt/pt/publicacoes/publicacoes-tecnicas/guias#BookID=6453).

Romania: Data validation is done by comparison with previous year's reports and by comparison with existing data at the level of other institutions - National Institute of Statistics, Ministry of Environment, Water and Forests, Ministry of Health or from documents submitted for licensing, establishment / adjustment / price modification / rates.

II.3 OPERATORS` INTERNAL INFORMATION SYSTEMS REQUIREMENTS

Additional aspect of data verification process used by some regulators would be application of regulatory requirements for the operators` internal information systems, used for data reporting. A summary of information collected during this survey in this area is presented in this chapter, including a summary of data reported, as well as additional information presented by the members that participated in the survey.

Regulators have started to enforce rules and standards for the internal information systems (data registers and databases) used by WS operators to store, analyse and archive respective

data. This is part of the efforts to increase reported data quality and reliability, as most of the technical and economic data on WS services is generated inside the utilities and cannot be verified by external sources.

Thus, WAREG members have specific exactions on the reported information for water volumes (15 cases); electricity consumption (14 cases); accounting information for costs and assets (14 cases); assets and repair works; billing data, meters and customers` complaints; as well as personnel in the WSOs (13 cases); water quality (11 cases).

Out of the regulators surveyed, over half, numbering 12, have enforced comprehensive requirements that encompass all the aforementioned types of information collected by WSOs. More details of WAREG Members requirements to internal information systems are provided in the sections bellow.

a. General information in table view for WAREG Members

Information provided by 20 WAREG Members participating in the survey is aggregated as follows:

REQUIREMENTS TO OPERATORS` INTERNAL INFORMATION SYSTEMS USED FOR REPORTING DATA	Yes	No
Do you request and/or validate WS operator internal information sources, used to report data to Regulator	**12**	**3**
Assets and repair works	**13**	**4**
Drinking and wastewater quality	**11**	**6**
Billing, meters, customer complaints	**13**	**4**
Water volumes	**15**	**2**
Electricity consumption	**14**	**3**
Staff	**13**	**4**
Accounting (costs, assets)	**14**	**3**
Others	**5**	**2**

Table II.3-1: Internal information systems requirements – aggregated data

Information for WAREG Members is presented in next table:

Requirements to operators` internal information systems used for reporting data	Assets and repair works	Drinking and wastewater quality	Billing, meters, customer complaints	Water volumes	Electricity consumption	Staff	Accounting (costs, assets)	Others
Albania	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Armenia	No	No	Yes	Yes	Yes	No	No	
Azores	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Belgium / Brussels	No	No	No	No	No	No	No	No
Belgium / Flanders								
Bulgaria	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estonia	Yes	No	No	Yes	Yes	Yes	Yes	Yes
Georgia	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Greece								
Hungary	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Ireland								
Italy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Kosovo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Latvia	No	No	No	Yes	No	No	Yes	
Lithuania	No	No	No	No	No	No	No	No

Malta	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Montenegro	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
North Macedonia	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Portugal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Romania	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Table II.3-2: Internal information systems requirements – data by WAREG Members

b. Detailed information for WAREG Members

Azores: WSOs have a legal duty to provide all the relevant information when requested by ERSARA. Internal information may be requested while conducting audits, such as water quality analysis, costumer complaints, billings etc. to validate the data submitted to ERSARA.

Bulgaria: EWRC has requested WSOs to establish and maintain internal data registers and data bases, together with official internal procedures for data input, monitoring, and validation. Data registers cover information for assets, network repairs and investments, laboratory tests for drinking and wastewater quality, customer complaints, sludge from WWTPs, meters on service connections, billing, and regulatory accounting. Databases cover information for measured water at system entry, DWTP and WWTPs entries, network meters and data loggers, electricity consumption, unbilled authorized consumption calculation, contracts for new connections to the network and personnel.
The Commission has issued regulatory requirements that these information sources should cover, including general requirements (internal rules and procedures for data entry, control and verification; user names / passwords / access levels; keep records for data entry / data update); export to MS Office; possibility for integration with other information systems; possibilities to generate reports and others, as well as individual specific requirements for data content and information required available for each register and data base.
Implementation of these requirements is subject to annual control and is linked with the formal evaluation of the quality of reported data.

Georgia: When WS companies submit reporting forms they also provide information about the sources of the filing and GNERC regularly checks these sources.

Hungary: The state-owned companies have SAP software for internal registries. Other companies use SCADA system or simple accounting software.

Kosovo: WSRA is comparing and validating the data only when these data are audited by the internal and external auditor of the RWCs. During the visits that are performed by WSRA (described above), the WSRA is also verifying and validating/ auditing the data.

Montenegro: REGAGEN insists on authenticated validation for all information entered into the Benchmarking framework. Should any data not be reflected in the operator's official reports, additional substantiation is necessitated. This typically involves selections from the operator's internal database or distinct internal reports, duly verified and endorsed by a person with proper authority.

Portugal: The financial information reported by the WS operators derives from the respective internal accounting systems. In order to report technical information, the WS operators use various records and documents, such as work sheets and cadastral records or Geographic Information Systems, measurements, readings of internal information, implementation data of the Water Quality Control Program, inspection by ERSAR, etc.

II.4 PERIOD OF OPERATORS REPORTS

Finally, we seek to overview that is the periodicity of reporting, in terms of the period of operators` reports. Like the previous chapters, we present aggregated information as well as some individual information by the members.

In almost all cases reported (18) regulated entities are required to present annual report to the regulator. In some cases, besides annual report the WSOs are also required to present 6-month report (3 cases), 3-month report (4 cases) and monthly reports (3 cases).
2 regulators require all the above-mentioned reports from regulated entities. More information is provided for WAREG members in the sections bellow.

a. General information in table view for WAREG Members

Information provided by 20 WAREG Members participating in the survey is aggregated as follows:

PERIOD OF OPERATORS` REPORTS	Yes	No
Annual report	**18**	**2**
6-months report	**3**	**10**
3-months report	**4**	**11**
Monthly report	**3**	**10**
If WS operators provide several reports during the year, are they required to provide annual report as well	**7**	**2**

Table II.4-1: Period of operators` reports – aggregated data

Information for WAREG Members is presented in next table:

PERIOD OF OPERATORS` REPORTS	Annual report	6-months report	3-months report	Monthly report	If WS operators provide several reports during the year, are they required to provide annual report as well
Albania	Yes	Yes	No	No	Yes
Armenia	Yes	Yes	Yes	Yes	Yes
Azores	Yes	No	No	Yes	Yes
Belgium / Brussels	Yes	No	No	No	
Belgium / Flanders	Yes	No	No	No	
Bulgaria	Yes				
Estonia	No	No	No	No	No
Georgia	No	No	No	No	No
Greece	Yes				
Hungary	Yes	No	No	No	
Ireland	Yes	No	No	No	
Italy	Yes	No	No	No	
Kosovo	Yes		Yes		Yes
Latvia	Yes				
Lithuania	Yes	No	No	No	Yes
Malta	Yes	No	No	No	N/A
Montenegro	Yes	Yes	Yes	Yes	Yes
North Macedonia	Yes				
Portugal	Yes				
Romania	Yes		Yes		Yes

Table II.4-2: Period of operators` reports – data by WAREG Members

b. Detailed information for WAREG Members

Albania: Under the "Cost Plus" & "Price Cap" methodology, utilities are required to submit an annual report to the Water Regulatory Authority (WRA) as per the provided template. Additionally, the submission of the Water Balance Annual report is compulsory. Utilities must also provide a six-month intermediary report. The WRA reserves the right to request further reports from utilities on specific issues when deemed necessary..

Azores: WSOs must submit to ERSARA a yearly program on water quality control, setting the parameters to be analysed and its frequency, for approval. The results of the implementation of these programs must also be submitted every year to ERSARA. Every non-compliance to the parameters set on the legislation must be reported to ERSARA up to 1 day after the result. Every costumers' complaint must also be reported on a 10 days' period.
WSOs are also requested to submit data to support the KPIs and financial data every year.
Every month WSOs must submit information on billing in order to set the tax due to ERSARA.

Belgium (Brussels): Operators provide annual reports between March and July every year.

Belgium (Flanders): annually each water company reports an update of the past year (actuals) in the tariff plan template.

Bulgaria: WSOs provide to the Regulator annual report in April next year, including report on the implementation of the approved business plan and report on regulatory accounting rules. Both reports are integrated into one detailed excel model, followed with text explanations. Additional information is provided by the service providers on request during the annual inspections.

Greece: On an annual basis, the agency composes a National Report assessing the state of realization of water services management policy. In this report, both financial and technical data are utilized in order to gain valuable insights regarding the effect of pricing policies on water consumption, on the level of cost recovery per sector, on the effect on the quantitative and qualitative situation of water bodies. When needed, this report also proposes specific incentives for the reduction of water consumption including special pricing policies.

Hungary: WSOs have to report their balance sheets until the end of May and we have access to these documents.

Italy: The report EGA has to attach to technical data collection contains: the description of the territory and of the relevant infrastructures, highlighting any change (e.g. the one resulting from aggregation with other operators); technical prerequisites situation (e.g. volumes metering, absence of infringement procedures, reliability of data), specifying, in case the operator has not reached them, the period within which it will be compliant and the necessary measures; the starting value of each macro-indicator, the related class, the objectives to be achieved and the necessary measures (investments or operating activities); possible requests for being excluded by the incentive mechanism for some quality objectives; any other relevant information;

Kosovo: RWCs report the data for the KPIs on quarterly basis. Based on these quarterly reports WSRA is preparing the Half Yearly Reports and analysis the trends of the KPIs, and gets into contact with the RWCs to take appropriate actions. Final operational and financial data are reported on annual basis for the purpose of the annual monitoring plan.

Latvia: Most service providers shall submit report till 15th of June, larger service providers shall submit it till 15th of August. These dates are set 2 weeks after the deadline for submission of the Annual Report to the State Revenue Service.

Lithuania: Annual regulatory performance report package consists of 11 excel forms covering financial data, costs, earnings, volumes, real estate, employee numbers accounted to each service.

Malta: Both License Monitoring Report (excel file) and Report (word document) are provided by the WS operator on a yearly basis which include various information such as financial, technical, losses, customer service, and water quality.

Montenegro: REGAGEN has created Benchmarking excel model, which operators fulfil and send back to REGAGEN.

North Macedonia: WSOs provide annual report only.

Portugal: Managing entities provide annual report only, but validation of information is made based on other evidence collected throughout the year.

Romania: The quarterly reports contain less data and information to be reported by all operators of the water supply and sewerage service, and the annual report is a more complete report and is completed by regional operators and large municipal operators for their entire area of operation. They serve 90% of the total population served by water supply and sewerage.

III. KPIs MONITORING PROCESS

This chapter seeks to analyse and overview how WAREG members actually apply monitoring of companies` performance and efficiency through performance indicators. In this perspective we first seek to understand how indicators are legalized and what are the powers of the regulators to amend or change them, even during ongoing regulatory periods.

Then we tried to overview how regulators set targets of the KPIs used, how do they monitor performance of the companies (actual results achieved on the KPIs levels), the consideration of data quality within the reporting framework, and what actions can the regulators undertake in case of target non-implementation by the service providers.

Finally, for the need of full understanding of the KPIs process, we also inquired whether additional authorities oversee KPIs within the water and sanitation sector and, if so, how their monitoring regimes correlate with those implemented by WAREG members.

III.1. KPIs DEFINITIONS

A summary of the information collected during this survey in the area of indicators legalized is presented in this chapter, including a summary of data reported, as well as additional information presented by the members that participated in the survey.

Data provided shows that majority of WAREG Members that participated in the survey (18) perform monitoring through KPIs on the activities performed by the regulated entities. exceptions are the regulatory authorities in Armenia and Estonia, although the Estonian regulator evaluates KPIs as part of the tariff-setting process..
In the majority of cases, KPIs used for monitoring are defined in legislation (10 cases) and in regulator guidance (15 cases).
In almost half of the cases the regulator has the powers to make changes during the regulatory period related to indicators in use (9 cases) and/or methodologies and definitions in use (8 cases). More information is provided for WAREG members in the sections bellow.

a. General information in table view for WAREG Members

Information provided by 20 WAREG Members participating in the survey is aggregated as follows:

KPIs MONITORING	Yes	No
Do you perform KPIs monitoring	**18**	**2**
How are KPIs defined:		
In legislation	**10**	**8**
In Regulator guidance	**15**	**2**
Others	**2**	**0**
Can the Regulator make changes during the regulatory period		
Change the KPIs	**9**	**10**
Change the methodology/definitions	**8**	**10**

Table III.1-1: KPIs definitions – aggregated data

Information for WAREG Members is presented in next table:

KPIs MONITORING	DO YOU PERFORM KPIS MONITORING	HOW ARE KPIs DEFINED:			CAN THE REGULATOR MAKE CHANGES DURING THE REGULATORY PERIOD	
		In Legislation	In Regulator Guidance	Others	Change The KPIs	Change The Methodology / Definitions
Albania	Yes	No	Yes	Yes	No	No
Armenia	No				No	No
Azores	Yes	No	Yes		No	No
Belgium / Brussels	Yes	No	Yes		Yes	Yes
Belgium / Flanders	Yes	No	Yes		Yes	Yes
Bulgaria	Yes	Yes	Yes		No	No
Estonia	No	No	No	Yes		
Georgia	Yes	Yes	Yes		Yes	Yes
Greece	Yes	Yes	yes		No	no
Hungary	Yes	Yes	Yes		Yes	Yes
Ireland	Yes	No	Yes		Yes	
Italy	Yes	Yes	Yes		No	No
Kosovo	Yes	Yes	Yes		No	No
Latvia	Yes	No	No		Yes	Yes
Lithuania	Yes	Yes	Yes		No	Yes
Malta	Yes	Yes	Yes		No	No
Montenegro	Yes	No	Yes		Yes	Yes
North Macedonia	Yes	Yes			No	No
Portugal	Yes		Yes		Yes	Yes
Romania	Yes	Yes			Yes	No

Table III.1-2: KPIs definitions – data by WAREG Members

b. Detailed information for WAREG Members

Albania: WRA has defined 10 KPIs for monitoring the performance of the utilities.
WRA has the right to revise and to change them when finds it necessary, but not during the regulatory period of the utility.

Azores: 30 KPIs were set by ERSARA in 2017, with reference to the KPIs used by IWA and at national level by ERSAR, and also after a consultation of the parties.
KPIs or methodologies may be changed, when necessary, by ERSARA, in advance of each regulatory period.

Belgium (Brussels): The KPIs are mentioned in the tariff approval methodology (official document). The fact sheets of the KPI's (definition, description, etc.) and the reporting canvas has been published in January 2023. However, the KPIs come into force gradually (up to 2025) and some could still be subject to adaptations in order to stick to the availability of the data.

Belgium (Flanders): The water management companies have committed themselves to annually comparing at least one aspect of their business operations by means of a benchmark. The purpose of the benchmarks is twofold. On the one hand, the benchmark contributes to increased transparency for the water companies and the wider public with regard to the process. On the other hand, the implementation of the benchmarks creates a knowledge exchange platform between the water companies that encourages the exchange of good practices and the improvement of efficiency. AquaFlanders takes care of the coordination, financing and

reporting. The Water Regulator monitors the performance of the benchmarks. The implementation of the benchmarks themselves is entrusted to the water companies. After all, the water companies have the most knowledge to analyse their business operations. In addition, it makes them more aware of their responsibilities.

Bulgaria: 15 major KPIs are defined in the Act on Regulation of Water and Sanitation Services, further extended to 30 KPIs in the Ordinance on Regulation of Quality of Water and Sanitation Services under the Law. The Ordinance includes detailed requirements for variables definitions and formulas for calculation.
EWRC provide guidance prior to each regulatory period, where some additional requirements and definitions may be provided in order to clarify information in the legislation.
EWRC cannot change the KPIs and/or their definitions during the regulatory period.

Estonia: KPIs monitoring lies on local governments but regulator might use some KPI indicators to estimate prices in price approval process. Regulator assess KPIs in price approval process to the scope of necessity in certain case. KPI-s are used in practice rather to compare similar water company's activities and effectiveness.

Georgia: GNERC approves 11 indicators, which are defined in accordance with the "investment appraisal rule". GNERC can make relevant changes, both in the approved indicators and in the "investment appraisal rule".

Greece: KPIs monitoring is done through the online platform. The agency provides guidance to authorized personnel of WS operators that have access to the online platform in order to provide the adequate data.

Hungary: There are 3 KPIs defined by a Government Decree that the regulator has to monitor constantly: capital strength ratio, liquidity rate, debt ratio. Beyond these indicators the regulator is free to set any type of indicator and there is no limitation in using them in the tariff setting process. It is also possible to revise them anytime and there are no rules on the publication of these KPIs.

Ireland: The CRU annually monitors performance against metrics set as part of the Performance Assessment Framework. The CRU also annually monitors performance against the Capital Investment Plan outputs and outcomes set as part of the Revenue Control
The KPIs are ideally set for the duration of a revenue control. On occasion as an exception, certain KPIs may need to be adjusted if circumstances change that are outside the control of the utility

Italy: Technical quality regulation (RQTI) is based on three kind of standards/indicators:
- Macro-indicators, representing general conditions to be ensured on 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);
- Prerequisites (necessary to be admitted to incentive mechanism), which identify broad criticalities to overcome: data availability and reliability, in general, and on water consumption, in particular; minimum conditions required by existing legislation on drinking water quality,

identified by national law, and on environmental impact, certified by the absence of infringement procedures;
- specific standards, representing conditions/performances to be ensured to each user (e.g. the maximum duration of service interruptions).

Kosovo: The 15 KPIs are defined based on Annual Monitoring Plan. There is a guidance published in the WSRA website (publicly available), which lists the KPIs and other performance indicators, with the exact definition. However, there are about 100 other performance indicators that are used for different analysis.

Latvia: KPIs are set by PUC and used internally in tariff evaluation process, to compare changes by year and between service providers. KPIs calculated based on annual report data are published annually, thus providing an opportunity to compare them both for service providers, end users and shareholders.

Lithuania: All the KPIs defined in the questionnaire are set and monitored by NERC. We are in power to set, change or revise KPIs.

Malta: Section 1 'Operational Outputs' includes KPIs such as total potable water supplied, percentage population served, operational cost, and total potable water billed.
Section 2 'Performance Indicators' includes KPIs on Operational Efficiency such as estimated leakage and pipe bursts per 1,000km.
The Water Service Provider license is set for a period of five years, after which the KPIs can be amended before the award of the new license.

Montenegro: KPIs are defined by REGAGEN's bylaw, Benchmarking Rules. In these rules, every data is defined and there is formula for calculation of each indicator and index.
These rules can be the subject of change whenever it is necessary. As KPIs are not connected to tariff calculation, they can be changed also during regulatory period.

North Macedonia: Each year ERC keeps evidence of the information provided by the WSOs about the KPIs on national level after approving the business plan. When analysing the reports, we are able to evaluate the data quality and transparency. There is an additional option which serves as easy access in the online platform for the WSOs to give better results by just filling the sections required that are appropriate and relevant to water services they offer. These indicators depend on their number of consumers and incomes on national level.

Portugal: The service quality assessment system was transposed into a technical guide (https://ersar.pt/pt/publicacoes/publicacoes-tecnicas/guias#BookID=6453) and includes a set of indicators on:
• Adequacy of the service to the user, to be evaluated based on accessibility services (physical and economic quality of service to users).
•Sustainability of service management, to be evaluated based on the economic sustainability of the service, sustainability and physical productivity of human resources.
•Sustainability and assessment according to environmental efficiency, circular of efficiency in environmental use, and efficiency in preserving environmental sustainability, useful resources.
The indicators are reviewed at an approximate frequency of 5 to 7 years.

Romania: The performance indicators are established as an annex to the regulation of the water supply and sewerage service, elaborated by the local public administration authority or by the

inter-community development associations, based on the provisions of the Framework Regulation approved by the Order of the President of ANRSC no. 88/2007. The regulation approved by LPA / ADI is part of the documentation for awarding the delegation contract and the indicators are monitored by LPA / ADI. ANRSC does not have a methodology for establishing performance indicators but analyses a number of indicators resulting from data reported annually by regional operators and large municipal operators and prepares an annual report together with the professional association.

III.2. KPIs TARGET SETTING

A summary of the information collected during this survey on how WAREG members set targets for monitored KPIs is presented in this chapter, including a summary of data reported, as well as additional information presented by the members that participated in the survey.

Data reported shows that half of the members that participated in the survey (10) set targets of KPIs levels to the regulated entities. This is not a surprise as we see in Chapter I, that less than half of WAREG members are involved in licensing companies, business plan approval, and/or usage of KPIs in the tariff calculation process. Without performing these tasks, regulators are hampered to establish targets for KPIs, as not integrated regulatory approach is introduced.
In some of the other cases targets are established by law, policy strategies and best practices; or by local authorities. Nevertheless, regulators are monitoring achieved results by the regulated entities, analysing and benchmarking their performance, and using KPIs levels in the tariff-setting process.
More details of WAREG Members practices are provided in the sections bellow. Additional data on some country-cases on KPIs target setting and monitoring performance is provided in **ANNEX I**.

a. General information in table view for WAREG Members

Information for WAREG Members is presented in next table:

KPIS MONITORING	DO YOU SET TARGETS FOR KPIS TO THE WS OPERATORS
Albania	**Yes**
Armenia	No
Azores	**Yes**
Belgium / Brussels	No
Belgium / Flanders	No
Bulgaria	**Yes**
Estonia	**Yes**
Georgia	**Yes**
Greece	No
Hungary	No
Ireland	**Yes**
Italy	**Yes**
Kosovo	**Yes**
Latvia	No
Lithuania	**Yes**
Malta	No
Montenegro	No

North Macedonia	No
Portugal	**Yes**
Romania	No

Table III.2-2: KPIs target setting – data by WAREG Members

b. Detailed information for WAREG Members

Albania: WRA sets annually targets (objectives) for KPIs for each Utility when they apply for tariffs, based on the current and predicted variables analysed in the technical-economic reports or in the business plans submitted by the utility estimating the space or margin for improvement. The most important targeted KPIs used for improvement the financial sustainability and the quality of the services are: Non-Revenue Water, OPEX Cost Coverage, Current Collection Rate, and the Continuity of Water Supply.

Azores: KPIs targets were set having regard to what is established by law, policy strategies and best practices.

Belgium (Brussels): There are no objectives for the KPIs monitored during this first regulatory period in Brussels (2022-26).

Belgium (Flanders): At the end of each process benchmark, each water company must draw up an action plan with objectives. In this action plan, a number of KPIs are mandatory and objectives are monitored by each water company. The Water Regulator monitors the progress of the action plans annually.

Bulgaria: EWRC issues a decision prior to each regulatory period in which WSOs are split into categories (large, medium, small and micro) and individual targets for each KPI are set for each WSO to be achieved in the end of the regulatory period. Individual targets are set in such way that the overall sector to achieve long-term goals for the indicators, leading to achievement of the sector strategy goals.
The operators after that can provide different targets in their business plans, but need to justify these levels in compliance with the investments and operational programs, and levels of tariff increase. EWRC can accept these targets or can require that the WSO should revise the business plan.

Estonia: Targets of KPIs are not set on standard basis, but occasionally for cost effectiveness.

Georgia: Target points are approved only for 3 KPI's: 1. Infrastructure leakage index; 2. Pipe burst per 100 km; 3. Staff productivity index (SPI);

Greece: No targets of KPIs are set. However, average values of all operators on a district level are used for comparative analysis.

Hungary: We don't set KPI targets (yet).

Ireland: The CRU annually monitors performance against metrics set as part of the Performance Assessment Framework. The CRU also annually monitors performance against the Capital Investment Plan outputs and outcomes, set as part of the Revenue Control.
The KPIs are ideally set for the duration of a revenue control. On occasion as an exception, certain KPIs may need to be adjusted if circumstances change that are outside the control of the utility

Italy: 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, the best performing class being Class A. For each 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).

Kosovo: Usually, the WSRA defines the KPIs and the targets to be achieved before the tariff setting process. Targets are set for each individual RWC and achievements are monitored on yearly basis. In case the RWCs propose more challenging targets, WSRA is approving them. WSRA intends to have unified KPIs and targets in all documents that are prepared by RWCs.

Lithuania: KPI targets are set during price setting for the next three-year procedure and revised during the price setting for the following period.

Malta: REWS monitors the KPIs of the current year with respect to preceding years and asks for clarifications when a negative trend is observed.

Montenegro: REGAGEN does not set any KPIs targets. At this moment, REGAGEN only comment results of KPIs in Benchmarking reports.

North Macedonia: ERC does not set targets for KPIs to the WSOs. We just monitor the indicators provided by the WSOs, assessment and general incomes of the population.

Portugal: In all indicators of the service quality assessment system, reference values are used for annual classification (good, median or unsatisfactory). The national objectives to be achieved, using these or other indicators, are foreseen in the strategic plans issued by the Government.

Romania: The targets are set by the LPA / IDA and in relation to the targets assumed by Romania through the EU accession treaty.

III.3. KPIs MONITORING PERFORMANCE

A summary of the information collected during this survey on how WAREG members monitor companies` performance is presented in this chapter, including a summary of the data reported, as well as additional information presented by the members that participated in the survey.

Data reported shows that more than half of the members that participated in the survey (13) monitor performance and achieved targets of KPIs levels to the regulated entities. In some of the other cases monitoring is done by local authorities.
More details of WAREG Members practices are provided in the sections bellow.

a. General information in table view for WAREG Members

Information for WAREG Members is presented in next table:

KPIs MONITORING	DO YOU MONITOR (CONTROL) KPIs TARGET IMPLEMENTATION
Albania	**Yes**

Armenia	No
Azores	**Yes**
Belgium / Brussels	No
Belgium / Flanders	**Yes**
Bulgaria	**Yes**
Estonia	**Yes**
Georgia	**Yes**
Greece	**Yes**
Hungary	No
Ireland	**Yes**
Italy	**Yes**
Kosovo	**Yes**
Latvia	No
Lithuania	**Yes**
Malta	No
Montenegro	No
North Macedonia	**Yes**
Portugal	**Yes**
Romania	No

Table III.3-1: KPIs monitoring – data by WAREG Members

b. Detailed information for WAREG Members

Albania: The approved KPIs are monitored every year through the annual report, which compares the planned and achieved variables and updates the tariffs based on the achievements foreseen in the methodology for "Price Cap" case set up in the 5 Years Business Plan. WRA keep monitoring on annual basis the KPIs for the utilities, applying the tariffs set up by "Cost Plus" methodology.

Azores: Every year, the WSOs submit their data until the end of march, with reference to the previous year.
The data is then validated and processed by ERSARA and a report with the assessment of the KPIs is published until November.

Belgium (Brussels): As said here-above, there are no objectives for the KPIs monitored during this first regulatory period. However, BRUGEL follows the evolution of operators` performance in the time and in comparison, with other operators. This information helps BRUGEL to control the costs of the operators and to revise/validate the "terms of services" contract.

Bulgaria: WSOs provide annual report on business plan implementation, including reported levels of KPIs achieved, and their assessment on the quality of information.
EWRC analyses the reports through data control and on-site inspections and prepares formal assessment on the quality of information (4 grades - good, medium, bad and lack of data).
Reported results for KPIs with lowest quality of information are not considered.
Formal assessment is then prepared on the level of KPIs annual target implementation (4 grades - good, medium, bad and full incompliance) considering the approved and the actual reported steps.
In case certain KPI is assessed with lowest grade of data quality, it is assessed with lowest level of target implementation, regardless of reported data.

Estonia: Targets of KPIs are not set on standard basis, but occasionally for cost effectiveness.

Georgia: Achievement of the target points are monitored yearly bases, according to WS companies provided data, only for KPI's which are taking account during tariff calculation.

Greece: In case special actions are needed for an operator, our agency approves an action plan in order to improve service provision and cost recovery levels by this operator. Through this action plan, specific targets and actions are set out and our agency monitors their implementation.

Hungary: We don't monitor target implementation.

Ireland: The CRU annually monitors performance against metrics set as part of the Performance Assessment Framework. The CRU also annually monitors performance against the Capital Investment Plan outputs and outcomes, set as part of the Revenue Control.
The KPIs are ideally set for the duration of a revenue control. On occasion as an exception, certain KPIs may need to be adjusted if circumstances change that are outside the control of the utility

Italy: Targets calculation is defined in Technical Quality Regulation (RQTI) and Contractual Quality Regulation (RQSII) and it's monitored by Authority through data collections

Kosovo: WSRA is monitoring permanently the achievement of targets for KPIs, particularly those KPIs for which the targets are linked with the tariff process. WSRA receives the KPIs on quarterly bases; analysis them and observes the trend for achieving the targets. WSRA drafts Half Yearly Performance Reports and communicates with the RWCs and other stakeholders about the achievement of targets. These HYR are used as 'early warning' to take appropriate actions.

Lithuania: During the price setting procedure KPI analysis is being done. If targets are not reached, WSO is penalized in terms of allowed cost reduction. No licenses are revoked or other legal prosecutions are taken.

North Macedonia: WSOs provide information about KPIs through the annual report by describing the main ones which they evaluate as the most important when analysing the quality of the services they provide. EWSRC controls the accuracy of the information provided and the main thing to do is avoiding any omissions regarding the levels of KPIs achieved. We are working on creating a level of assessment to these operators in order to encourage them to give better and accurate results.

Portugal: ERSAR monitors the implementation of KPI which are then published through several mechanisms: ERSAR's Website (https://www.ersar.pt), a mobile App ("App ERSAR"), the Annual Report on Water and Waste Services in Portugal – RASARP (https://ersar.pt/pt/site-publicacoes/Paginas/edicoes-anuais-do-RASARP.aspx), among others. Annually, small adjustments can be made to the data that feed the indicators. Monitoring reports on the targets contained in the strategic plans for the sector are also produced.

Romania: APL / ADI may sanction the operator in case of non-compliance with the performance indicators, including the termination of the delegation contract.

III.4. REFLECTION OF DATA QUALITY IN MONITORING PROCESS

A summary of the information collected during this survey of how WAREG members consider reported data quality is presented in this chapter, including a summary of data reported, as well as additional information presented by the members that participated in the survey.

Data reported shows that less than half of the members that participated in the survey (8) assess quality and reliability of the information and data reported by the regulated entities. Only in few cases however data quality is assessed by the regulators (cases of Albania, Bulgaria, Kosovo, Portugal). In other cases, data quality is not formally assessed, but regulators do not review reported data (Georgia) or do not apply incentive mechanism (Italy) in case of data issues.
More details of WAREG Members practices are provided in the sections bellow.

a. General information in table view for WAREG Members

Information for WAREG Members is presented in next table:

KPIs MONITORING	DO YOU REFLECT DATA QUALITY IN THE TARGET IMPLEMENTATION ANALYSIS
Albania	**Yes**
Armenia	No
Azores	**Yes**
Belgium / Brussels	No
Belgium / Flanders	No
Bulgaria	**Yes**
Estonia	No
Georgia	**Yes**
Greece	No
Hungary	No
Ireland	No
Italy	**Yes**
Kosovo	**Yes**
Latvia	No
Lithuania	**Yes**
Malta	No
Montenegro	No
North Macedonia	No
Portugal	**Yes**
Romania	No

Table III.4-1: Reflection of data quality during monitoring – data by WAREG Members

b. Detailed information for WAREG Members

Albania: Data quality is estimated at 3 levels based on the fulfilment of WRA requirements for information system. The quality of information and the achievements of KPIs, are used to update tariffs every year during the regulatory period.

Azores: According to the targets set for each KPI the result may be rated, using a traffic-light system, respectively as good, average or unsatisfactory quality service, and also lack of data.

Bulgaria: Assessment on the quality of information (4 grades - good, medium, bad and lack of data) is done on the basis of the level of integration of internal data registers and data bases as required (including assessment of general requirements for all systems, and specific requirements for each register/data base), as well as an assessment on reported data reliability (based on data cross-check).
In case data quality is assessed with the lowest grade, then the regulator does not accept reported level of the corresponding KPI and assess its implementation with the lowest grade (full incompliance).

Georgia: Confidence of the data are approved at the same time of approving KPI's. if change is in range of data accuracy, we aren't accepting this;

Italy: Data quality and reliability is one of the prerequisites according to which operators can be admissible to the incentive mechanism.

Kosovo: The quality of data is reflected during the assessment of targets implementation. The WSRA guidance sets 3 levels for data quality: 100% of scores for the highest quality of data, 50% of scores when the data are of medium quality and 0% of scores when no data is available.

Lithuania: WSO provides excel forms with the price calculation data. These forms are inspected and cross-checked with annual regulatory performance reports.

Portugal: All data are audited annually by ERSAR and the reliability of data and also KPI result is always presented together with the reliability, in a transparent way. The reliability is reported for each data with 3 level scale that depends on information source and methodologies.

III.5. ACTIONS IN CASES OF NON-IMPLEMENTATION

A summary of the information collected during this survey on how WAREG members can act in case of KPIs target non-implementation is presented in this chapter, including a summary of the data reported, as well as additional information presented by the members that participated in the survey.

Data shows that in 6 cases achieved KPIs levels are reflected in the tariff setting process, and in 5 cases regulators can impose sanctions on the regulated entities, although WAREG members indicate that they do not use powers to penalize often, as at the end the price will be paid by the customers anyway. More details of WAREG Members practices are provided in the section bellow. Additional data on some country-cases on reflection of KPIs targets into tariffs is provided in **ANNEX I**.
In fact, one of the most used options by the regulators is "name and shame" procedure, where achieved results are publicly announced. More details of the data publicity are provided in section IV of the report.

a. General information in table view for WAREG Members

Information for WAREG Members is presented in next table:

KPIs MONITORING	WHAT ACTIONS ARE TAKEN IN CASE OF KPIS TARGET NON-IMPLEMENTATION		
	Penalties to the WS operator	Reflection in the tariffs	Others
Albania	No	Yes	No
Armenia	No	No	

Azores	No	No	
Belgium / Brussels	No	No	
Belgium / Flanders	No	No	
Bulgaria	Yes	Yes	
Estonia	No	Yes	
Georgia	Yes	Yes	
Greece			
Hungary	No	No	
Ireland	Yes	No	
Italy	Yes	Yes	
Kosovo	Yes	No	
Latvia	No	No	
Lithuania	No	Yes	
Malta			
Montenegro	No	No	
North Macedonia	No	No	
Portugal	No	No	Yes
Romania		No	Yes

Table III.5-1: KPIs target non-implementation activities – aggregated data

b. Detailed information for WAREG Members

Albania: In case the KPIs are not achieved, the WRA provides a financial correction in the tariff update, as described in the tariff setting methodology, respectively, for utilities that do not cover 100% operational costs (used "Cost Plus" method) the tariffs are updated in the next regulatory period, and for utilities covering more than 100% operational costs (used "Price Cap" method), the tariff is updated at the end of each year through the "K" index (KPI achievement index).

Azores: The results are published in a public report developing a benchmarking framework to support performance-based sunshine regulation in the sectors. It's the effect of "name and shaming", improving the effect of the competition between operators stimulating the progressive increase on the performance of the operators.

Bulgaria: EWRC selects 5 out of 30 KPIs and link their target implementation in the tariff update procedure, based on the following standard:

- for KPIs assessed with good implementation: +0,5%;
- for medium implementation: 0%;
- for bad implementation: -0,5%;
- and for full incompliance: -1%.

The final result is sum of all bonuses/corrections for the 5 KPIs.
Apart from that, "name and shame" practice is applied: annual report is prepared with information for planned and actually achieved levels of KPIs for each WSO with approved business plan.
Easy access to reported KPIs levels is allowed in the E-portal by selecting respective operator and year from drop-down list.
The regulator can also apply penalties in case of non-target implementation.

Georgia: Financial sanctions (penalties, tariff correction and so on).

Ireland: The CRU only recently introduced incentives to a limited number of KPIs (Billing and Leakage) for the current Revenue Control period.

Italy: Operators are incentivized to reach technical quality objectives by a stick and carrot mechanism (in addition to reputational effects), with rewards and penalties economically quantified according to different assessment stages and rankings (globally for all macro-indicators and separately for each one). Penalties size depends, for the first level of evaluation (Stage I and II), on the extent of non-implementation of the target by each operator and on the number of operators which have not reach the target and, concerning the advanced evaluation level (Stage III and IV), on the ranking of the operator. Penalties amount is capped mainly to the level of regulated revenues recognized by tariff to each operator. Depending on the level of evaluation, operators have to store penalties in a specific fund or to cut it from their level of regulated revenues.

Kosovo: The Law regulating the water services does not foresee penalties for not achieving the targets, because it is believed that the customer will pay the price at the end. Therefore, the practice is to present publicly the Annual Performance Report, in presence of all RWCs and other stakeholders; during the presentation of Performance Report the best and worst performing RWCs are identified. Starting from 2022 the Government of Kosovo will monitor achievement of targets for 6 KPIs and will hold accountable the managers and the board of directors of RWC for not achieving the targets.

Lithuania: WSO is penalized on the allowed cost levels.

Portugal: Access to national funding by utilities is limited by full report of KPI and compliance with a minimum value on selected economical KPI. Every year, ERSAR awards the WS operators with the best performance on the KPI. The main goal of this initiative is to identify, reward and publicly disclose the operators that excelled in the services provided. If the WS operator does not report all data for KPI is excluded for this award.

III.6. OTHER KPIs MONITORING REGIMES

A summary of the information collected during this survey about *the availability of other than regulatory monitoring of performance indicators* is presented in this chapter, including a summary of the data reported, as well as additional information presented by the members that participated in the survey.

Information shows that there is some practice of other KPIs regimes apart from the national regulator, where KPIs are set by the WS assets owner (5 cases), WS operator`s owner (4 cases) and by other authorities, usually ministries (5 cases).
Some cases involve KPIs established in delegation contracts (Romania, Bulgaria), lease agreements (Armenia), WSS development plans (Estonia), national strategic plan (Portugal) and others. However, data received shows that in not all cases national regulators are involved in this process (where such exists).
More details of WAREG Members practices are provided in the section bellow.

a. General information in table view for WAREG Members

Information for WAREG Members is presented in next table:

KPIs MONITORING	DOES ANY OTHER AUTHORITY SET KPIS TARGETS TO THE WS OPERATORS				IF YES, ARE YOU INVOLVED IN THIS PROCESS
	WS asset owner	WS operator owner	Other authority	Others	
Albania	Yes	Yes	No		No
Armenia	Yes	Yes			No
Azores	No	No			
Belgium / Brussels	No	No	No		
Belgium / Flanders			N/A		
Bulgaria	Yes				No
Estonia	No	No	Yes		No
Georgia	No	No	No		
Greece	No	No	Yes	No	No
Hungary	No	No	No		No
Ireland	No	No	Yes		No
Italy	No	No	Yes		No
Kosovo	Yes				No
Latvia		Yes			No
Lithuania	No	No	No		
Malta					
Montenegro	No	No			
North Macedonia		Yes			No
Portugal	No	No	No	Yes	Yes
Romania	Yes	No	Yes		No

Table III.6-1: Other KPIs regimes – data by WAREG members

b. Detailed information for WAREG Members

Albania: The municipalities are the owners of the assets and the utilities providing the water and wastewater services in their administrative area. They can set up target for some KPIs in order to monitor the performance of the management staff and the utility.
The National Agency of Water Supply, Wastewater and Solid Waste (depending from the Ministry of Infrastructure and Energy) every year has to draft and sign a Performance Contract with the respective Municipalities (owner of the utilities) with target KPIs that should be achieved every year by the utility. The aim of this contract is the improvement of the utilities performance by the incentives as grants (subsidies) for covering the O&M costs) and investments in the water supply and wastewater systems in the service area. WRA is not included on this process.

Armenia: The KPIs are defined in the Lease Agreement and the property owner, the Water Committee, is a party to the agreement.

Belgium (Brussels): Some KPIs are defined in the contract of service between the regional operator and the regional Government. However, there are no targets set for these KPIs.

Bulgaria: WS asset owners conclude delegation contracts with selected WSOs, and they impose contractual KPIs and targets in the contracts. EWRC is not included in this process**.**

Estonia: Local governments set KPIs in the WSS development plans.

Greece: Ministry of Health for drinking water quality, Ministry of Interior for municipal companies regarding fiscal reasons and not water provision activities.

Italy: Relationships between Authority and Local Authorities (EGA) concerns data collection, validation and monitoring. Local Authorities can set additional KPIS than technical ones or set more strictly targets than those defined by national regulator.

Kosovo: There was a practice that the Board of Directors of RWCs has set its own KPIs and targets. Starting from this year, it has been agreed that all institutions have unified KPIs and targets. So, the KPIs and targets that are set by WSRA are used by other institutions to monitor the performance of the RWCs.

Latvia: In some cases, municipality that is owner of WSO sets KPIs targets.

Lithuania: Only NERC sets KPIs and monitor them.

North Macedonia: We are not involved in this process.

Portugal: ERSAR participates in the elaboration of the national strategic plan and in the monitoring of the KPI implementation.

Romania: ANRSC analyses whether the award of the delegation contract was made in compliance with the legal framework and whether there are indicators on compliance targets.

IV. DATA PUBLICITY

One of the most important aspects of having national regulation of certain aspect is provision of information and data publicity. This is of particular importance for the water and sanitation sector, where usually services are provided by public companies (owned by the local municipalities or the state), which are not listed on stock exchanges, and therefore are usually not motivated to provide much information to the public apart from what is legally required.

Regulators analyze performance of each individual service provider, but also analyze sector`s performance on the basis of monitored performance indicators, trends for efficiency growth or regress, and are usually required to perform and publish annual reports. Therefore, in this analysis we seek to identify what information is provided by the WAREG members for the KPIs monitoring regimes applied and what are the tools and channels used by the regulators to provide public information. Like in the previous chapters, aggregated data is presented as well as individual information and links to public reports available by the WAREG members.

Data provided shows that the majority of WAREG members that participated in the survey provide public data for KPIs (17 cases) by publishing annual report in native language on their websites (in text format).
Other options available are less used by national regulators – such as data in table or other formats (4 cases) or direct information in drop-down menu (5 cases), as well as other forms – thematic power-bi reports.
The practice of publishing annual reports in English language are less spread, as only 7 members have reported positive answers.
More details about WAREG Members practices are provided in the section below, together with links to their webpages for the annual reports in native languages, as well as information in drop-down menus and English reports (where such are available).

a. General information in table view for WAREG Members

Information provided by 20 WAREG Members participating in the survey is aggregated as follows:

DATA PUBLICITY	YES	NO
Do you provide public data for KPIs	**17**	**3**
If yes, how do you provide public data		
Annual reports in Word/PDF	**16**	**2**
Annual data in excel or other type	**4**	**9**
direct information in the drop-down menu	**5**	**11**
Others (please define)	**1**	
Do you provide public data in English language		
Annual reports in Word/PDF	**7**	**8**
Annual data in excel or other type	**0**	**12**
direct information in the drop-down menu	**2**	**11**
Others	**0**	**1**

Table IV-1: Data publicity – aggregated data

Information for WAREG Members is presented in next table:

DATA PUBLICITY	IS PUBLIC DATA FOR KPIS PROVIDED	HOW PUBLIC DATA IS PROVIDED			
		Annual reports in Word/PDF	Annual data in excel or other type	direct information in the drop-down menu	Others
Albania	**Yes**	**Yes**	No	No	
Armenia	**Yes**	**Yes**	**Yes**	No	
Azores	**Yes**	**Yes**	No	No	
Belgium / Brussels	**Yes**	No	No	No	**Yes**
Belgium / Flanders	No				
Bulgaria	**Yes**	**Yes**		**Yes**	
Estonia	No				
Georgia	**Yes**	**Yes**	No	No	
Greece	**Yes**	**Yes**			
Hungary	**Yes**	**Yes**	No	No	
Ireland	**Yes**	**Yes**	No	No	
Italy	**Yes**	**Yes**	**Yes**	No	
Kosovo	**Yes**	**Yes**	No	No	
Latvia	**Yes**	**Yes**		**Yes**	
Lithuania	**Yes**	**Yes**	No	No	
Malta	**Yes**	**Yes**			
Montenegro	**Yes**	**Yes**	No	**Yes**	
North Macedonia	No	No		No	
Portugal	**Yes**	**Yes**	**Yes**	**Yes**	
Romania	**Yes**	**Yes**	**Yes**	**Yes**	

Table IV-2: Data publicity – data by WAREG Members

b. Detailed information for WAREG Members

Information for annual reports for KPIs and links to reports in native languages:

Albania: WRA draft every year the Performance Report of the water supply and sewerage sector where 10 KPIs, for the whole sector in general and individually for each utility, are analysed. This report is aiming to inform and give transparency to public and all stakeholders at the central and local level involved in the water sector in Albania.
Link to report: https://www.erru.al/doc/Raporti_Performances_2020.pdf

Armenia: Technical and economic indicators-water balance, product output, payments, recalculation. Service quality indicators regarding received applications-complaints and questions, interruptions in the supply of drinking water to consumers and regarding fines paid to consumers for violating the requirements of the service provision rules.
Link to report: https://psrc.am/contents/fields/water/water_reports

Azores: The report published every year includes recommendations for each WSO to improve their performance.
The results of the KPIs are also an important tool for the Regulator to set strategic priorities, namely in what concerns training or co-funding.
Link to report: http://www.azores.gov.pt/NR/rdonlyres/A1E1EFC1-3DF2-4262-B95D-C76ED695F9B8/1127335/RAAQSARA2021.pdf

Belgium (Brussels): BRUGEL will publish some KPI's results this year. The Power-Bi report will be published on the BRUGEL's website: https://www.brugel.brussels/

Belgium (Flanders): Since 2015 each process benchmark is completed with a final report made available to the public. The further development of the KPIs is not reported as such. These are used in reports and advice. As an example, below is a link to a report on leakage loss in which we used the KPIs.
https://www.vmm.be/wetgeving/adviezen-waterregulator/waterregulator_advies_omvang_waterverlies_tw.pdf/view
Link to report: https://www.aquaflanders.be/standpunten-en-publicaties/raadpleeg-hier-de-volledige-rapporten

Bulgaria: Each year EWRC provides annual report with information for integrated data for KPIs levels on national level (together with information for OPEX, CAPEX, Assets and others) and individual sections for each WSO with approved business plan - information for level of introduction of registers and data bases, assessments of data quality and KPIs target implementation. We also provide easy access to KPIs levels on the basis of drop-down list of operators.
Link to report: https://www.dker.bg/bg/vik/pokazateli-za-kachestvo.html

Georgia: GNERC submits an annual report which is available on the website to any person. The Annual report also includes approved KPI's.
Link to report: https://gnerc.org/ge/commission/commission-reports/tsliuri-angarishebi

Greece: Through the annual national report on the implementation of the management policy of water services.
Link to report: https://ypen.gov.gr/

Hungary: We only publish the annual report of the regulator where we list the 3 KPIs we are legally obliged to calculate. Currently, we are working on a public document which we wish to publish this summer and it's going to contain 28 KPIs for the last 3 years for every service provider.
Link to report: http://www.mekh.hu/download/5/fc/f0000/orszaggyulesi_beszamolo_2020.pdf

Ireland: The CRU publish its yearly reports monitoring both the Performance Assessment Framework and Investment Plan Monitoring reports as set as part of the revenue control cycle. and the CRU uses text and tables to show the public how Uisce Éireann is progressing against its targets.
Link to report:
Uisce Éireann Capital Investment Plan 2020-2024 Monitoring Report No. 2
Uisce Éireann Performance Assessment Framework 2021 Annual Report

Italy: The regulatory framework for technical quality, within the context of applying incentive mechanisms, also mandates the disclosure of certain macro-indicators. To date, select technical data have been presented in a consolidated manner within the Annual Report of the Authority. Meanwhile, information pertaining to contractual quality performance is already available on the Authority's website. Link to the report:
https://www.arera.it/it/dati/QSII.htm#prima
https://www.arera.it/it/dati/RQSII.htm
https://www.arera.it/it/dati/QTSII.htm

Kosovo: WSRA makes public presentation of Annual Performance Report for the water service providers. Additionally, the Annual Performance Report, the methodology for performance assessment, including the list of KPIs and list of other performance indicators with the definitions, is published in the web-site of the WSRA.
Link to report:
https://www.arru-rks.org/
https://www.arru-rks.org/monitorimi/374/raportet-vjetore-te-performances/374
https://www.arru-rks.org/monitorimi/372/metodologjia-e-vleresimit-te-performances/372

Latvia: PUC publishes an overview of the regulation of the water management sector and the results of the economic activity of the WSOs in the previous reporting year (infogramm). Since year 2018 PUC publish KPIs of WSOs for the previous years (data from year 2016). Report is in Power BI data visualization format that allows to compare different indicators between service providers and to follow up the changes that occurred in previous years.
Link to report: https://www.sprk.gov.lv/content/nozares-raditaji-0

Lithuania: Annual average KPIs for each WSO group (set according volumes sold) are calculated and published.
Link to report:
https://www.vert.lt/SiteAssets/vanduo/Lyginam%c5%b3j%c5%b3_nutarimas_2020%20m.pdf

Malta: REWS publishes its annual report on the website which is accessible to the general public. A part of the annual report is dedicated to the Water Unit within the Regulator, in which the main KPIs are included.
Link to report: https://rews.org.mt/#/en/rewsfa/26

Montenegro: REGAGEN's Annual Benchmarking reports are published on REGAGEN's website and sent to all stakeholders. Some of the KPIs are also published on REGAGEN's website - data portal.
Link to report: https://regagen.co.me/komunalne-djelatnosti/benchmarking-komunalne-djelatnosti/izvjestaji/

North Macedonia: ERC keeps evidence of data in Excel only for its needs and analysis. We collect the information given in the approved business plans and annual reports of WSOs about KPIs and divide them by regions. We do not provide public data for KPIs yet but we are working on it.

Portugal: ERSAR annually publishes a report on the water and waste sector (RASARP), consisting of two volumes.
In Volume 1 - Characterization of the water and waste sector, information is published on the levels of KPIs at national level and by management entity, as well as some general information, including economic and financial sectors.
Volume 2 publishes information on the Quality Control of water for human consumption.
Information is also available in excel, on ERSAR's website, with all the data and KPIs by management entity.
Information is available in an interactive way on ERSAR App, a mobile app available on App Stores.
Link to report: https://www.ersar.pt/pt/site-publicacoes/Paginas/edicoes-anuais-do-RASARP.aspx

Romania: Annually, a report on the activity of ANRSC is elaborated and it is published on the institution's website. Based on the annual reports of the regional and municipal operators, a

Report on the status of water supply and sewerage services is prepared together with the professional association and it is presented at the meetings in the field.
Link to report: www.anrsc.ro/anport-anual-de-activitate/

Information for easy access to KPIs levels selected by drop-down list:
Armenia: Link to report: https://psrc.am/contents/fields/water/water_service_quality_indicators

Bulgaria: Respective WSOs and year are selected from drop-down list (information is available since 2015). Reported levels of KPIs are marked with:

- Green color (where WSOs results are better or equal to sector average for the respective year);
- Yellow color (where WSOs results are worse up to 20% from sector average for the respective year);
- Red color (where WSOs results are worse more than 20% from sector average for the respective year);

Link to report: https://portal.dker.bg/vik/otcheti

Latvia: Power BI data visualization format.
Link to report: https://www.sprk.gov.lv/content/nozares-raditaji-0

Montenegro: Some of the KPIs are also published on REGAGEN's website - data portal.
Link to report: https://dataportal.regagen.co.me/

Portugal: Information available on ERSAR`s website on a dropdown menu per operator: https://ersar.pt/pt/consumidor/qualidade-dos-servicos/pesquisa-por-entidade.

Information for reports in English language:
Malta: Link to report: https://rews.org.mt/#/en/rewsfa/26

Italy: Link to report:
https://www.arera.it/allegati/relaz_ann/21/Summary2021.pdf
https://www.arera.it/it/inglese/annual_report/relaz_annuale.htm

V. KPIs METHODOLOGY AND DEFINITIONS

Information was received from 19 WAREG Members for 425 KPIs, as follows:

MEMBER	NUMBER OF KPIs
Albania	15
Azores	30
Brussels	33
Bulgaria	30
Estonia	5
Flanders	24
Georgia	11
Greece	10
Hungary	26
Ireland	51
Italy	13
Kosovo	15
Latvia	27
Lithuania	30
Malta	11
Montenegro	17
North Macedonia	10
Portugal	44
Romania	23
TOTAL	**425**

Table V-1: WAREG members KPIs

Data provided shows the following:

- 3 members use more than 30 indicators: Ireland (51), Portugal (41) and Brussels (33);
- 3 members use 30 indicators: Azores, Bulgaria and Lithuania;
- 4 members use between 20 and 30 indicators: Latvia (27), Hungary (26), Flanders (24), Romania (23);
- 8 members use between 10 and 20 indicators: Montenegro (17), Albania and Kosovo (15), Italy (13), Malta and Georgia (11), Greece and North Macedonia (10);
- 1 member uses less than 10 indicators: Estonia (5).

Considering that these indicators cover different organizational, technical and economic scope of WS activities, they were structured and analyzed in the following 5 categories:

KPIs CATEGORY	NUMBER OF KPIs	SHARE
Service coverage	49	11,5%
Service quality	99	23,3%
Environment	33	7,8%
Asset efficiency	118	27.8%
Economic efficiency	126	29,6%
TOTAL	**425**	100,0%

Table V-2: KPIs categories

Data provided shows that Economic efficiency is the most used KPIs category, followed by Asset efficiency and Service quality. Less indicators are used in Service coverage and Environment categories.

The KPIs in these 5 categories were then structured in 23 sub-categories for the needs of this analysis, as follows:

KPIs CATEGORY	KPIs SUB-CATEGORY	NUMBER OF KPIs	SHARE
Service coverage	Water coverage	19	4,5%
	Sewer coverage	17	4.0%
	WW treatment coverage	6	1,4%
	New connections	7	1,6%
Service quality	Water quality	23	5,4%
	Water continuity and bursts	29	6,8%
	Water pressure	2	0,5%
	Sewerage flooding and bursts	20	4,7%
	Complaints and communication	25	5,9%
Environment	WW quality	21	4.9%
	WW discharge	4	0.9%
	Sludge	8	1,9%
Asset efficiency	Asset Management	33	7,8%
	Asset capacity	24	5,6%
	Electricity	31	7,3%
	Non-Revenue Water	30	7,1%
Economic efficiency	Meters and reading	12	2,8%
	Billing and consumption	9	2,1%
	Debt collection	11	2,6%
	Affordability	4	0.9%
	Cost unit/coverage/efficiency	45	10,6%
	Personnel	39	9,2%
	Revenue and profit	6	1,4%
TOTAL		**425**	**100,0%**

Table V-2: KPIs categories and subcategories

KPIs categorization is based on WG Chair expertize, and does not follows any Benchmarking methodology. Detailed information for all categories of KPIs, methodologies and approaches used by WAREG members are provided in the next sections of the report.

The 1st category covers indicators related to coverage of services – water supply, sewerage (wastewater collection) and wastewater treatment, where available. These indicators are important for state and local authorities, regulatory bodies, asset owners and asset operators in order to assess the resources and efforts needed to provide water and sanitation services to the entire population in the respective countries / regions in order to achieve Sustainable Development Goal 6 Clean water and sanitation – to ensure availability and sustainable management of water and sanitation for all by 2030[16]. With this respect, indicators for new connections to existing water and sanitation networks are also included in the service coverage category. Indicators associated with service coverage are 11,5% of all analyzed indicators.

2nd category includes different indicators associated with the customers` perception for quality and reliability of services delivered. The most important aspect of service provision is the quality of the water supplied for drinking, hygiene and other needs, followed by reliability of water supply – monitored by indicators for water continuity, bursts and failures on water network leading to water supply interruptions, but also to blocking traffic due to road excavations, as well as pressure of the water supplied. Flooding from sewerage network, as well as burst (blockages, collapses) of sewerage network are also directly related to the perception of customers for quality of service. Finally, indicators that monitor how operators communicate with their customers and the process of treating / analysing / answering customer complaints complete the list of indicators in this category. Around 23% of all indicators have been associated with service quality.

[16] https://www.globalgoals.org/goals/6-clean-water-and-sanitation/

The process of wastewater treatment is not directly associated by the customers with the quality of service, but it has enormous effect on the environment. Thus indicators related to the quality of wastewater (or how wastewater is treated before its discharge in nature), as well as indicators monitoring discharge of wastewater without treatment, and how sludge generated in the process of wastewater treatment (around 8% of all) are included in the **3rd category Environment**.

4th category summarizes various and different indicators, related to the technical side of water and sanitation services provision, and more precisely with the management of the assets used for service provision. Some of the indicators related to monitor energy efficiency and levels of non-revenue water/water loss are more or less standardly applied by regulatory authorities, while the other sub-categories include heterogeneous indicators related to asset management (including indicators monitoring network rehabilitation and renewal, asset inspection and age, investments in assets and others) and asset capacity (including indicators for capacity and number of tanks and treatment plants, network data and water volumes. 28% of all indicators analysed fall inside this category.

Almost 30% of all indicators reported by WAREG members are associated with analysis and monitoring the **economic efficiency of the regulated entities. The 5th category** covers miscellaneous indicators related to the meters and meter reading, billing and monitoring customer`s consumption, debt collection, economic affordability, various ways of monitoring companies` costs (cost unit / cost coverage / cost efficiency), analysing number of staff used by the operators, and their revenue and profit.

Information for KPIs names, units, descriptions and definitions of indicators and variables used as numerators and denominators in their calculation, as provided by the WAREG members in the questionnaires, is provided in **ANNEX II** of the report.

Most commonly used sub-categories in terms of **number of KPIs** are for:

- *Cost unit/coverage/efficiency* (45), *Personnel* (39), *Asset management* (33), *Electricity* (31) and *Non-revenue water* (30);
- followed by *Water continuity and bursts* (29), *Complaints and communication* (25), *Asset capacity* (24), *Water quality* (23) and *Wastewater quality* (21).
- In the middle section are the sub-categories of *Water coverage* (19), *Sewer flooding and bursts* (20), *Sewer coverage* (17), *Meters and reading* (12) and *Debt collection* (11).
- Lowest number of KPIs are used in the sub-categories of *Billing and consumption* (9), *Sludge* (8), *New connections* (7), *Revenue and profit* (6), Was*tewater treatment coverage* (6), *Wastewater discharge* (4), *Affordability* (4) and *Water pressure* (2).

Most commonly used sub-categories in terms of **number of regulators** are, as follows:

- 18 regulators use Non-*revenue water / water loss* indicators;
- 16 regulators use *Water continuity and bursts* indicators;
- 15 regulators use *Cost unit/coverage/efficiency* indicators;
- 12 different regulators use indicators from *Personnel* and *Water coverage* sub-categories;
- 11 different regulators use indicators from *Sewer flooding and bursts*, *Complaints and communication*, and *Electricity* sub-categories;
- 10 different regulators use indicators from *Sewer coverage*, *Water quality*, *Wastewater quality*, *Asset management*, *Asset capacity* and *Debt collection* sub-categories;
- 8 different regulators use *Meters and reading* indicators;
- 7 regulators use *Billing and consumption* sub-categories;
- 6 regulators use *Sludge* indicators;
- 4 different regulators use indicators from Wastewater treatment coverage, and *Revenue and profit* sub-categories;
- 3 regulators use *Wastewater discharge* indicators;
- 2 different regulators use indicators from *New connections*, *Water pressure* and *Affordability* sub-categories.

V.1. SERVICE COVERAGE KPIs

a. WATER SERVICE COVERAGE KPIs

Total of 19 KPIs are presented in the sub-category of Water service coverage, used by 12 WAREG members (Albania, Azores, Bulgaria, Georgia, Greece, Hungary, Kosovo, Malta, Montenegro, North Macedonia, Portugal and Romania), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Albania	9,1	Service Coverage for water	%
Azores	1	Physical accessibility of the water service	%
Azores	12	Connection to the service	%
Bulgaria	1	PK1: Level of coverage with water service	%
Georgia	3	Level of coverage with water service	%
Greece	2	Population Coverage by Water Supply Network	%
Hungary	1	Service coverage (water)	%
Kosovo	4	Water service coverage	%
Malta	2	Percentage Populated served - water connection	%
Montenegro	3	Water Supply Coverage	%
North Macedonia	1	Level of coverage with water service	%
Portugal	1	AA01 - Service coverage	%
Portugal	8	AA07 - Connection to the service	%
Romania	1	Degree of access to water supply services at national level	%
Romania	2	Market share of regional and municipal operators for water supply service	%
Romania	3	Degree of coverage with water supply services at the level of the operating area	%
Romania	4	The population served by the water supply service per Km of the water network at national level	loc / Km
Romania	5	Population served by the water supply service per Km of the water network, by regional and municipal operators	loc / Km
Romania	6	Population served by the water supply service per km of the water distribution network by regional and municipal operators	loc / Km

Table V.1-1: Water service coverage KPIs

Types of indicators in usage:

WAREG members monitor share of population that receives public water supply service, in terms of physical accessibility (connected) to existing water networks.

Most commonly used approach is to monitor number of population that receives water service vs total number of population in the service area – Albania, Bulgaria, Georgia, Greece, Hungary, Kosovo, Malta, Montenegro, North Macedonia, Romania.

Azores and Portugal monitor number of households (not population), and keep attention of households that receive effective service (connected to network) as well as households that are with service available, but not physically connected to network. Portugal monitors service coverage separately in bulk systems.

Romania monitors share of service coverage on national level and within WSO service area, as well as connection density (population connected per km of total and distribution network length).

Requirements for source of information:

In most of the cases information for total number of population is required by National statistics, while information for population served comes from WSO billing system (Azores, Bulgaria, Kosovo, North Macedonia, Romania).
In Greece all data comes from National statistics.

KPIs used in tariff regulation:
Portugal uses Connection to service KPI in tariff setting.

b. SEWER SERVICE COVERAGE KPIs

Total of 17 KPIs are presented in the sub-category of Sewerage service coverage, used by 10 WAREG members (Albania, Azores, Bulgaria, Georgia, Greece, Hungary, Kosovo, Montenegro, Portugal and Romania), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Albania	9,2	Service Coverage for sewerage	%
Azores	19	Physical accessibility of public and decentralized drainage services	%
Bulgaria	10	PK7a: Level of coverage with sewer service	%
Georgia	4	Level of coverage with sewer service	%
Greece	3	Population Coverage by Sewerage Network	%
Hungary	2	Service coverage (wastewater)	%
Kosovo	9	Coverage with wastewater services	%
Montenegro	7	Sewerage Coverage	%
Portugal	21	AR01a – Service coverage (Bulk systems)	%
Portugal	22	AR02b - Service coverage through network and septic tanks (Retail systems)	%
Portugal	28	AR07 - Connection to the service (Bulk systems)	%
Portugal	29	AR08 - Connection to the service through network (Retail systems)	%
Romania	10	Degree of connection to sewerage services at national level	%
Romania	11	Market share of regional and municipal operators for sewerage service	%
Romania	12	Degree of coverage with sewerage services at the level of the operating area	%
Romania	13	Population connected per Km by the sewerage network at national level	inhabitants / Km
Romania	14	Population connected per Km by the sewerage network at the level of regional and municipal operators	inhabitants/ Km

Table V.1-2: Sewer service coverage KPIs

Types of indicators in usage:
WAREG members monitor share of population that receives public sewerage (wastewater collection) service, in terms of physical accessibility (connected) to existing water networks.

Most commonly used approach is to monitor number of population that receives sewerage service vs total number of population in the service area – Albania, Bulgaria, Georgia, Greece, Hungary, Kosovo, Montenegro, North Macedonia, Romania.

Azores and Portugal monitor number of households (not population), and keep attention of households that receive effective service (connected to network) as well as households that are with service available, but not physically connected to network, as well as households that use individual systems (like septic tanks) in those cases when WSO collects the sludge. Portugal monitors service coverage separately in bulk systems.

Romania monitors share of service coverage on national level and within WSO service area, as well as connection density (population connected per km of sewer network length).

Requirements for source of information:

In most of the cases information for total number of population is required by National statistics, while information for population served comes from WSO billing system (Azores, Bulgaria, Kosovo, Romania). Kosovo also requires data from GIS systems.
In Greece all data comes from National statistics.

KPIs used in tariff regulation:

Portugal uses Connection to service KPI in tariff setting.

c. WASTEWATER TREATMENT SERVICE COVERAGE KPIs

Total of 6 KPIs are presented in the sub-category of Wastewater treatment service coverage, used by 5 WAREG members (Albania, Bulgaria, Kosovo, Montenegro and Portugal), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Albania	9,3	Service Coverage for wastewater treatment	%
Bulgaria	11	PK7b: Level of coverage with wastewater treatment service	%
Kosovo	10	Coverage with waste water treatment plants	%
Montenegro	8	Sewage Connection to Waste Water Treatment	%
Montenegro	13	Urban Wastewater Treatment Coverage	%
Portugal	43	PAR05ab – Treatment service coverage	%

Table V.1-3: Wastewater treatment service coverage KPIs

Types of indicators in usage:

Albania, Bulgaria, Kosovo, Montenegro and Portugal monitor with separate indicators the share of population that receives sewerage service and the share of population that receives wastewater treatment service due to the fact that not all existing sewerage networks are connected to wastewater treatment plants.
Therefore, the regulators can understand also the share of population that is connected to sewerage network but not connected to wastewater treatment plants.
Montenegro also monitors share of wastewater volumes that have been treated in WWTP.

Requirements for source of information:

Bulgaria and Kosovo use the same approach as above-mentioned.

KPIs used in tariff regulation:

No WAREG member uses sewerage coverage KPIs for tariff setting.

d. NEW CONNECTIONS KPIs

Total of 7 KPIs are presented in the sub-category of new connections, used by 2 WAREG members (Bulgaria and Flanders), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Bulgaria	27	PK14a: Connection to water network	%
Bulgaria	28	PK14b: Connection to sewerage network	%
Flanders	9	Lead time to complete request for new branch	median # days
Flanders	10	Lead time for quotation (offer) new branch	median # days
Flanders	11	Lead time for the implementation of new branch works	median # days
Flanders	12	Lead time for time for road repair	median # days
Flanders	13	Cost of a standard branch	€

Table V.1-4: New connections KPIs

Types of indicators in usage:

Bulgaria monitors share of properties who have concluded contract for new connection to water and sewerage network (in separate) and have fulfilled all contractual requirements, that have

been connected to WS networks by the WSO vs all properties that have concluded contract for new connection to WS services.
Flanders monitors the process of new connection to WS networks in separate for different stages – time to provide offer to customer after application, time to construct new connection, time to repair road, total time for completion of new connection and cost of standard connection.

Requirements for source of information:
Bulgaria has specific requirements for sources of reported information (internal WSOs information systems) - Connection contracts data base.

KPIs used in tariff regulation:
No WAREG member uses sewerage coverage KPIs for tariff setting.

V.2. SERVICE QUALITY KPIs

a. WATER QUALITY KPIs

Total of 23 KPIs are presented in the sub-category of Water quality, used by 10 WAREG members (Azores, Brussels, Bulgaria, Flanders, Georgia, Ireland, Italy, Kosovo, Montenegro and Portugal), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Azores	4	Safe Water	%
Azores	8	Disclosure of water quality data	number
Azores	10	Implementation of protection perimeters	%
Azores	18	Fulfilment of the water intake licensing	%
Brussels	1	DW-Qual01: Drinking-water quality	%
Bulgaria	2	PK2a: Drinking water quality in large water zones	%
Bulgaria	3	PK2b: Drinking water quality in small water zones	%
Bulgaria	4	PK2c: Monitoring of drinking water quality	%
Flanders	20	Lead time between identifying a new potential risk (water quality) and determining the appropriate action(s)	days
Georgia	1	Drinking water quality	%
Ireland	10	Security of Water Supply	
Ireland	13	Drinking Water Quality	
Ireland	14	Boil Water Notices and Drinking Water Restriction Notices	
Ireland	38	Number of Treatment Plants with Ortho-Phosphate Dosing	No.
Ireland	39	Number of Water Supplies removed from the EPAs RAL	No.
Ireland	40	Reduction in the number of properties with risk of Microbiological Non Compliance	No.
Ireland	41	Reduction in the number of properties with risk of THM Non Compliance	No.
Italy	4	Incidence of non-drinkability orders (M3a)	%
Italy	5	Non-compliant sample ratio (M3b)	%
Italy	6	Non-compliant parameters ratio (M3c)	%
Kosovo	1	Drinking water quality	%
Montenegro	2	Water Quality	%
Portugal	5	AA04 - Safe water	%

Table V.2-1: Water quality KPIs

Data provided shows that these KPIs cover the following areas of water quality:

- **Analysis of parameters in compliance/non-compliance:** 11 KPIs (Azores, Brussels, Bulgaria, Ireland, Kosovo, Montenegro, Italy, Georgia, Portugal);
- **Other KPIs related to water sources:** 2 KPIs (Azores);
- **Other KPIs related to monitoring of quality**: 1 KPI (Bulgaria);
- **Other KPIs related to water zones:** 2 KPIs (Ireland);
- **Other KPIs related to treatment plants/suppliers:** 2 KPIs (Ireland);
- **Other KPIs related to reduction of risk:** 2 KPIs (Ireland);
- **Other KPIs related to customers in non-drinkability orders:** 1 KPI (Ireland);
- **Other KPIs related to time for action:** 1 KPI (Flanders);

Types of indicators in usage:

11 KPIs measure number of tests/analysis compliant to legal requirements vs all test/analysis:

- ✓ In the case of Bulgaria, there are separate KPIs for large and small water zones.
- ✓ In the case of Italy, there are separate KPIs for not compliant samples and parameters.

12 KPIs measure other factors:

- ✓ Disclosure of water quality data (Azores);

- ✓ Water catchment protection areas / water catchments in compliance with legal requirements (Azores);
- ✓ Level of fulfilment of drinking water quality monitoring (Bulgaria);
- ✓ Security of supply index (water zones in deficit) (Ireland);
- ✓ Drinking water restriction notices greater than 30 days (Ireland);
- ✓ Number of Treatment Plants with Ortho-Phosphate Dosing / Number of Water Supplies removed from the EPAs RAL (Ireland);
- ✓ Reduction of number of properties with risk of Microbiological / THM non-compliance (Ireland);
- ✓ Incidence of non-drinkability orders (number of users affected) (Italy);
- ✓ lead time between identifying a new potential risk (water quality) and determining the appropriate action(s) (Flanders).

Requirements for source of information:

The following members have specified requirements for sources of reported information (internal WSOs information systems):

- ✓ Azores: Drinking water quality control, GIS, licenses register;
- ✓ Bulgaria: Drinking water quality register;
- ✓ Kosovo: NIPH data registry.

KPIs used in tariff regulation:

- ✓ Bulgaria uses KPIs for drinking water quality in large water zones (and for those WSOs who don't operate large zones, the KPI for small water zones is applied);
- ✓ Italy uses all 3 KPIs for water quality - Incidence of non-drinkability orders (M3a); Non-compliant sample ratio (M3b); Non-compliant parameters ratio (M3c).

Water quality KPIs used as controlling authority:

The only WAREG member that acts not only as economic regulator, but also as controlling authority of the quality of drinking water is ERSAR in Portugal (usually this role is played by the relevant regional authorities under the Ministry of Health).

In this aspect, ERSAR uses other indicators to monitor and control compliance with the legal requirements concerning the quality of drinking water, as follows:

KPI NAME	KPI UNIT	KPI CALCULATION FORMULA	GENERAL DESCRIPTION OF THE KPI
AA04 - Safe water	%	AA04b = (dAA44b / dAA46b) x (dAA47b / dAA45b) x 100	Percentage compliance of the sampling frequency multiplied by the percentage compliance with the parametric values established in the legislation on parameters subject to routine control 1, routine control 2 and inspection control, as defined in the Water Quality Control Plans approved by ERSAR, pursuant to the legal regime in force.
Compliance with the sampling frequency	%	AA04b' = (dAA44b / dAA46b) x 100	Percentage compliance of the sampling frequency established in the legislation on parameters subject to routine control 1, routine control 2 and inspection control, as defined in the Water Quality Control Plans approved by ERSAR, pursuant to the legal regime in force.
Compliance with the parametric values	%	AA04b'' = (dAA47b / dAA45b) x 100	Percentage compliance with the parametric values established in the legislation on parameters subject to routine control 1, routine control 2 and inspection

KPI NAME	KPI UNIT	KPI CALCULATION FORMULA	GENERAL DESCRIPTION OF THE KPI
			control, as defined in the Water Quality Control Plans approved by ERSAR, pursuant to the legal regime in force.
Safe water by parameter	%	AA04bi = (dAA44bi / dAA46bi) x (dAA47bi / dAA45bi) x 100	Percentage compliance of the sampling frequency multiplied by the percentage compliance with the parametric values by parameter as defined in the Water Quality Control Plans approved by ERSAR, pursuant to the legal regime in force.
Safe water by routine control 1, routine control 2 and inspection control as defined in the Water Quality Control Plans approved by ERSAR	%	AA04bii = (dAA44bii / dAA46bii) x (dAA47bii / dAA45bii) x 100	Percentage compliance of the sampling frequency multiplied by the percentage compliance with the parametric values by routine control 1, routine control 2 and inspection control as defined in the Water Quality Control Plans approved by ERSAR

Table V.2-2: Additional water quality KPIs in Portugal

b. WATER CONTINUITY AND BURSTS KPIs

Total of 29 KPIs are presented in the sub-category of Water continuity and bursts, used by 16 WAREG members (Albania, Azores, Brussels, Bulgaria, Flanders, Georgia, Greece, Hungary, Ireland, Italy, Kosovo, Latvia, Malta, Montenegro, North Macedonia and Portugal), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Albania	7	Hours of supply	(hours/day)
Azores	3	Water service interruptions	number/(1000 household connections*year)
Azores	17	Mains failures	number/(100km*year)
Brussels	2	CS-Sup02: Disruptions of drinking-water supply by number of connections	# /1000 connections
Brussels	3	CS-Sup04: Restoration delays of drinking-water supply (after a leak)	min:sec
Brussels	4	DW-Fail03: Incidents by mains length	#/100km
Brussels	10	CS-Compl09: Satisfaction level of customers about drinking-water work-sites	%
Bulgaria	5	Continuity of water supply	ratio
Bulgaria	8	PK5: Bursts in water networks	nr/100km/y
Flanders	15	Number of repairs of spontaneous leaks/breaks in pipes compared to the total number of meters of pipe	#/kilometre
Georgia	5	24/7 Water supply	Hour
Georgia	7	Bursts in water networks	nr/100 km
Georgia	11	Flexibility of water supply network	ratio
Greece	9	Percentage (%) of days with restrictions in drinking water provision due to network damages	%
Hungary	3	Bursts (water)	unit/km
Ireland	12	Interruptions to Supply	0
Italy	3	Service interruptions (M2)	hours
Italy	12	Starting and ending of contractual relations (MC1)	%
Kosovo	3	Continuity of water supply	%
Latvia	7	Number of accidents within the water management engineering networks	accidents / km /year
Malta	10	Pipes bursts per 1,000 km (inclusive of all bursts on water mains and services detected through active leakage control)	No/000km
Malta	11	Pipes bursts per 1,000 km (excluding of all bursts on mains and services detected through active leakage control)	No/000km
Montenegro	1	Continuity in Drinking Water Supply	%
Montenegro	6	Breakdowns per km of Water Supply Network	number/km

COUNTRY	№	KPI NAME	KPI UNIT
North Macedonia	2	Continuity of water supply	ratio
North Macedonia	9	Bursts in water networks	nr/100km/y
Portugal	3	AA03 – Service interruptions (Bulk systems)	No./(delivery point.year)
Portugal	4	AA03 - Service interruptions	No./ (1000 service connections. year)
Portugal	11	AA10 - Mains failures	No./ (100 km. year)

Table V.2-3: Water continuity and bursts KPIs

Data provided shows that these KPIs cover the following areas of water continuity and bursts:

- **Water supply continuity and interruptions:** 13 KPIs (Albania, Brussels, Bulgaria, Georgia, Greece, Ireland, Italy, Kosovo, Montenegro, North Macedonia, Portugal);
- **Water bursts (number per 100km per year)**: 6 KPIs (Azores, Brussels, Bulgaria, Georgia, North Macedonia, Portugal);
- **Water bursts (number per 1000km per year):** 2 KPIs (Malta): +/- active leakage;
- **Water bursts (number per km per year):** 3 KPIs (Latvia, Montenegro, Hungary);
- **Water bursts (number per 1000 connections per year)**: 1 KPI (Azores);
- **Others**: 4 KPIs (Brussels, Flanders, Italy, Portugal)

Types of indicators in usage:

Water continuity data used:

- ✓ Water supply hours in each zone * population (Albania)
- ✓ Each water stops duration * affected population (Bulgaria, Italy)
- ✓ Number of properties >23h/d (Kosovo)
- ✓ Number of consumer hours: in optimum operation – lost due failures (Montenegro)
- ✓ Water supply hours per day (N. Macedonia)
- ✓ Supply hours * customers (Georgia)
- ✓ Number of days with restriction in water supply (Greece)
- ✓ Number of customers / connections affected by each interruption (Georgia / Portugal)
- ✓ Number of disruptions of drinking-water supply by the total number of connections (Brussels);
- ✓ Total interruption time of drinking-water supply (calculated on the closing and reopening of mains or connections) divided by the number of disruptions; after a leak is detected and repaired, for 90% of cases (Brussels).

Water bursts data used:

- ✓ Excluding service connections (Bulgaria, N. Macedonia) /
- ✓ Including service connections (Malta).
- ✓ Works related to leakage control and 3rd parties are not included (Azores) /
- ✓ Separate indicators including and excluding leakage control (Malta).

Indicators for water bursts are mostly considered per 100km of water network, but other dimensions are also available – per 1000km or by km, also by 1000 service connections.

Other indicators:

- ✓ Satisfaction level of customers about drinking-water work-sites (Brussels);
- ✓ Number of bursts per type of material (Flanders);
- ✓ Starting and ending of contractual relations (MC1) - represents an aggregated evaluation of contractual KP's whose performances are related to estimates and

execution of water connections and other works and to the activation and turn off of water supply (Italy).

Requirements for source of information:

Information for specified requirements for sources of reported information (internal WSOs information systems) has been provided from:

- ✓ Azores, Bulgaria: GIS/Repair works register;
- ✓ Kosovo: Customer complaints/site inspections;
- ✓ N. Macedonia: Staff data base.

KPIs used in tariff regulation:

- ✓ Italy (service interruptions / contractual relations KPIs);
- ✓ Georgia (Bursts in water network KPI).

c. WATER PRESSURE KPIs

Total of 2 KPIs are presented in the sub-category of Water pressure, used by 2 WAREG members (Bulgaria and Kosovo), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Bulgaria	9	PK6: Pressure in water networks	%
Kosovo	2	Pressure in the service area	%

Table V.2-4: Water pressure KPIs

Types of indicators in usage:

- ✓ Level of number of district metering areas (DMAs) with constant flow/pressure measurement on DMA inlet and outlet and measurements in DMA critical point against all DMAs (Bulgaria);
- ✓ Average number of served properties (population) over the reporting period situated in zones that regularly experience pressure below minimum pressure levels. Does not include short term intermittent periods of low pressure (Kosovo).

Requirements for source of information:

Bulgaria has specified requirements for sources of reported information (internal WSOs information systems): GIS / Asset register, Network meter and data logger data base.
Kosovo receives information during site inspections.

KPIs used in tariff regulation:

Bulgaria uses pressure (DMA establishment) KPI during tariff setting.

d. SEWERAGE FLOODING AND BURSTS KPIs

Total of 20 KPIs are presented in the sub-category of Sewerage flooding and bursts, used by 11 WAREG members (Azores, Brussels, Bulgaria, Georgia, Hungary, Ireland, Italy, Kosovo, Latvia, Montenegro and Portugal), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Azores	25	Sewer collapses	number/(100km*year)
Brussels	11	UWW-Fail02: Incidents in the sewerage networks	# / day
Bulgaria	13	PK9: Bursts in sewerage networks	nr/100km/y
Bulgaria	14	PK10: Flooding in private properties from sewerage	nr/10000 consumers
Georgia	8	Bursts in sewerage networks	nr/100 km
Hungary	4	Bursts (wastewater)	unit/km
Ireland	15	Internal Sewer Incidents (Overload)	
Ireland	16	Internal Sewer Incidents (Other Causes)	
Ireland	17	Internal Sewer Incidents (Properties at Risk)	
Ireland	18	External Sewer Incidents (Overload)	

COUNTRY	№	KPI NAME	KPI UNIT
Ireland	19	External Sewer Incidents (Other Causes)	
Ireland	20	External Sewer Incidents (Properties at Risk)	
Ireland	21	Incidents Relating to Wastewater	
Italy	7	Frequency of sewerage flooding/spill (M4a)	n/100 km
Kosovo	8	Reliability of sewage system	No.
Latvia	8	Number of accidents within the sewerage engineering networks	accidents / km /year
Montenegro	10	Number of Blockages per kilometre of Sewerage Network	number/km
Portugal	24	AR04a - Flooding occurrences (Bulk systems)	No./100 km of sewers.year
Portugal	25	AR04b - Flooding occurrences (Retail systems)	No./ (1000 service connections. year)
Portugal	31	AR10 - Sewer collapses	No./ (100 km. year)

Table V.2-5: Sewerage flooding and bursts KPIs

Data provided shows that these KPIs cover the following areas of Sewerage flooding and bursts:

- **Bursts in sewers (number per 100km per year)**: 4 KPIs (Azores, Bulgaria, Georgia, Portugal);
- **Bursts in sewers (number per km per year)**: 3 KPIs (Latvia, Montenegro, Hungary);
- **Incidents in sewers (number per day)**: 1 KPI (Brussels);
- **Bursts in sewers – no unit** – 2 KPIs (Ireland);
- **Incidents related to wastewater** – 1 KPI (Ireland);
- **Flooding from sewer**: 9 KPIs (Bulgaria, Ireland, Kosovo, Italy, Portugal).

Types of indicators in usage:

Bursts in sewers indicators are monitored as number of incidents per length of network (mostly per 100km, but also per km), in rare cases is considered per day.

The following data for number of incidents is used:

- ✓ Azores: structural breakdowns in sewers;
- ✓ Bulgaria: structural breakdowns and blockages in sewers + blockages in connections;
- ✓ Georgia / Montenegro: blockages in sewers;
- ✓ Portugal: structural collapses in sewers.

Flooding from sewers indicators are monitored in different units – per number of customers, per number of service connections, as well as per length of network. For example, Portugal monitors this indicator with separate units for bulk (length of network) and retail (number of connections).

The following data for number of flooding is used:

- ✓ Bulgaria: Number of customer complaints for flooding;
- ✓ Italy: Number of flooding registered by the operators.

Requirements for source of information:

Information for specified requirements for sources of reported information (internal WSOs information systems) has been provided from Azores and Bulgaria: GIS / Asset register / Repair work register.

KPIs used in tariff regulation:

Italy uses Frequency of sewerage flooding/spill (M4a) KPI in tariff setting.

e. COMPLAINTS AND COMMUNICATION KPIs

Total of 25 KPIs are presented in the sub-category of Customer complaints and customer communication, used by 11 WAREG members (Albania, Azores, Brussels, Bulgaria, Flanders, Hungary, Ireland, Italy, Kosovo, Montenegro and Portugal), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Albania	10,1	Customer Complaints	%
Albania	10,2	Answered Customer Complaints	%
Albania	10,3	Resolved Customer Complaints	%
Azores	5	Reply to written complaints and suggestions	%
Azores	21	Reply to written complaints and suggestions (wastewater service)	%
Brussels	21	CS-Info01: Waiting time to reach the operator by phone call	min: sec
Brussels	23	CS-Bil06: Time to process relocation cases	days
Bulgaria	26	PK13: Customer complaints answers	%
Flanders	5	Number of first-line complaints per year per 1,000 customers	# complaints
Flanders	6	Average number of days between the date of receipt of the complaint and the date of notification of the attitude and measures	# days
Flanders	7	Average number of days between receipt and closing of the complaint	# days
Flanders	8	Percentage of complaints handled within the legal term	%
Hungary	26	Customer complaints	%
Ireland	1	Ease of telephone contact: Speed of telephone response	
Ireland	2	Ease of telephone contact: Call abandonment rate	
Ireland	3	Ease of telephone contact: First call resolution	
Ireland	6	Response to complaints	
Ireland	7	Unresolved complaints upheld by the CRU CCT	
Ireland	8	Customer Satisfaction Survey	
Ireland	9	Stakeholder Engagement	
Italy	13	Managing contractual relations and service access (MC2)	%
Kosovo	12	Customer complaints	%
Montenegro	17	Number of Complaints per 1,000 Consumers	number
Portugal	6	AA05 - Response to complaints, suggestions and information requests	%
Portugal	26	AR05 - Response to complaints, suggestions and information requests	%

Table V.2-6: Complaints and communication KPIs

Data provided shows that these KPIs cover the following areas of Customer complaints and communications:

- ❑ **Number of complaints: 3 KPIs – Albania, Montenegro, Flanders;**
- ❑ **Answered complaints: 8 KPIs – Albania, Azores, Bulgaria, Hungary, Portugal, Ireland;**
- ❑ **Solved complaints: 4 KPIs – Albania, Kosovo, Flanders, Ireland;**
- ❑ **Period (number of days): 3 KPIs – Brussels, Flanders;**
- ❑ **Phone calls monitoring: 4 KPIs – Brussels, Ireland;**
- ❑ **Other – customer satisfaction survey and stakeholder engagement – Ireland**
- ❑ **Other – managing of contractual relations and service access - Italy**

Types of indicators in usage:

3 KPIs monitor number of complaints vs number of customers: Albania, Montenegro, Flanders;

8 KPIs monitor number of answered complaints vs total complaints:

Some of the members have provided information for the required deadlines for WSO to answer to customer:

- ✓ Azores: 22 working days;
- ✓ Bulgaria: 14 days;

- ✓ Hungary: 20 days;
- ✓ Portugal: 15 working days if presented in the complaints' book, 22 working days if presented by other means (ERSAR monitors written and phone call complaints, written and phone call suggestions in water and wastewater).

4 KPIs monitor solved complaints, and different approaches are applied:

- ✓ Albania: Number of applicants that filed more than one complaint vs all applicants that filed complaint;
- ✓ Kosovo: Customer complaints solved on time vs Total number of complaints received by RWCs;
- ✓ Flanders: Total number of 1st line complaints registered by the operator vs Total number of 1st line admissible complaints;
- ✓ Ireland: number of unsolved complaints.

Other KPIs:

- ✓ Flanders monitors with 2 KPIs average number of days between receipt and notification, and between receipt and closing. Brussels also monitors number of days for process relocation cases, following a user demand;
- ✓ Ireland monitors with 3 KPIs speed of telephone response / call abandon rate / first call resolution. Brussels also monitors waiting time to reach the operator by phone call;
- ✓ Ireland monitors Customer satisfaction survey (conducted by an independent research company engaged by Uisce Éireann) and stakeholder engagement (Uisce Éireann engagement with its stakeholders through a stakeholder panel);
- ✓ Italy monitors Managing of contractual relations and service access: It represents an aggregated evaluation of contractual KPI's whose performances are related to dates, billing and payment rules, check of meters and pressure levels, answers to written requests by user and service desk.

Requirements for source of information:

Information for specified requirements for sources of reported information (internal WSOs information systems) has been provided from Azores, Bulgaria (complaints register), Kosovo (Committee for Solving Customer Complaints).

KPIs used in tariff regulation:

Italy uses KPIs for Managing of contractual relations and service access (MC2) in the tariff setting.

V.3. ENVIRONMENT KPIs

a. WASTEWATER QUALITY KPIs

Total of 21 KPIs are presented in the sub-category of Wastewater quality, used by 10 WAREG members (Azores, Brussels, Bulgaria, Georgia, Hungary, Ireland, Italy, Kosovo, Montenegro and Portugal), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Azores	27	Wastewater analysis	%
Azores	28	Compliance with discharge parameters (wastewater service)	%
Brussels	12	UWW-Treatm01: Sanitation quality	# days
Brussels	13	UWW-Treatm04: Control of sanitation effectiveness	%
Brussels	14	UWW-Treatm03: Degree of Tertiary Treatment of Urban Wastewater	%
Bulgaria	12	PK8: Wastewater quality	%
Georgia	2	Wastewater quality	%
Hungary	17	Level of treated wastewater discharged to the environment	%
Ireland	22	Wastewater agglomerations meeting Treatment Requirements: Agglomerations with no Wastewater Treatment	0
Ireland	23	Compliance with the Emission Limit Values for Urban Wastewater Licences	0
Ireland	24	Compliance with the treatment requirements of Urban Waste Water Treatment Directive.	0
Ireland	45	Number of agglomerations removed from EPA's Priority Urban Area Action List	No.
Ireland	46	Wastewater treatment works compliant with the Urban Waste Water Treatment Directive	PE
Ireland	49	Number of Agglomerations in the ECJ Urban Waste Water Treatment Directives	No.
Ireland	50	Additional Wastewater Treatment Capacity	PE
Ireland	51	Number of Wastewater Treatment Plants compliant - EPA discharge increase ELVs	No.
Italy	11	Exceeding limits wastewater samples ratio (M6)	%
Kosovo	7	The quality of discharged wastewater	%
Montenegro	11	Effluent Quality Compliance	%
Montenegro	12	Degree of Secondary Treatment of Urban Wastewater	%
Portugal	42	AR21 - Compliance with discharge permit	%

Table V.3-1: Wastewater quality KPIs

Data provided shows that these KPIs cover the following areas of Wastewater quality:

- **WW quality analysis:** 7 KPIs (Azores, Brussels, Bulgaria, Georgia, Italy, Kosovo, Montenegro);
- **Population served by wastewater treatment plants in compliance:** 2 KPIs (Azores, Portugal);
- **Level of treated wastewater discharged:** 1 KPI (Hungary);
- **Level of coverage with secondary / tertiary wastewater treatment:** 2 KPIs (Montenegro, Brussels);
- **Other KPIs:** 9 (Brussels, Ireland)

Types of indicators in usage:

7 KPIs monitoring compliance of tests or analysis in % Azores, Brussels, Bulgaria, Georgia, Italy, Kosovo, Montenegro;

2 KPIs monitoring percentage of the population equivalent served by Wastewater Treatment Plants in compliance with the discharge licensing in % - Azores, Portugal

3 KPIs monitoring volumes of treated WW:

- ✓ Degree of Secondary Treatment of Urban Wastewater - ratio of the quantity of WW treated in the process of secondary treatment and the total quantity of WW taken for treatment (Montenegro);
- ✓ Urban waste water volume treated with process dedicated to the removal of nutrients (and/or pathogens);
- ✓ The total volume of collected wastewater compared to the total amount of wastewater discharged to the environment (Hungary).

Other KPIs (Ireland):

- ✓ Compliance with the Emission Limit Values for Urban Wastewater Licenses;
- ✓ Compliance with treatment requirements of Urban Waste Water Treatment Directive;
- ✓ Number of agglomerations removed from EPA's Priority Urban Area Action List;
- ✓ Wastewater treatment works compliant with Urban Waste Water Treatment Directive;
- ✓ Number of Agglomerations in the ECJ Urban Waste Water Treatment Directives;
- ✓ Additional Wastewater Treatment Capacity;
- ✓ Number of Wastewater Treatment Plants compliant - EPA discharge increase ELVs.

Other KPI (Brussels):

- ✓ Total number of days for which the treated water doesn't conform to the sanitation requirements minus the non-conform days but occurring under exceptional conditions (recognized by European legislation).

Requirements for source of information:

The following members have specified requirements for sources of reported information (internal WSOs information systems):

- ✓ Azores: Wastewater analytical control register, Licenses register;
- ✓ Bulgaria: Wastewater quality register;
- ✓ Kosovo: WWTP data registry.

KPIs used in tariff regulation:

Italy uses all KPI for Exceeding limits wastewater samples ratio (M6) in tariff setting.

b. WASTEWATER DISCHARGE KPIs

Total of 4 KPIs are presented in the sub-category of Wastewater discharge, used by 3 WAREG members (Azores, Italy and Portugal), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Azores	26	Emergency control discharges	%
Italy	8	Adequacy to the law of storm-overflow sewage (M4b)	%
Italy	9	Control of storm-overflow sewage (M4c)	%
Portugal	41	AR20 - Emergency and storm water discharges control	%

Table V.3-2: Wastewater discharge KPIs

Types of indicators in usage:

2 KPIs monitoring emergency discharges in % - Azores, Portugal

- ✓ Portugal: number of Unmonitored emergency dischargers + Emergency dischargers with unsatisfactory operation + Storm-water dischargers with unsatisfactory operation vs all emergency and storm-water discharges;

- ✓ Azores: number of discharges at elevating units and WWTP with and without daily monitoring of discharges vs all emergency discharges.

2 KPIs monitoring storm overflow discharges in % - Italy

- ✓ Non-compliant storm-overflow discharges vs all storm-overflow discharges;
- ✓ Non-controlled storm-overflow discharges vs all storm-overflow discharges.

Requirements for source of information:

Azores has specified requirements for sources of reported information (internal WSOs information systems): GIS and monitoring register.

KPIs used in tariff regulation:

Italy uses both KPIs for Adequacy to law and Control of storm-overflow sewage in tariff setting.

c. SLUDGE FROM WASTEWATER TREATMENT KPIs

Total of 8 KPIs are presented in the sub-category of Wastewater discharge, used by 6 WAREG members (Azores, Bulgaria, Hungary, Ireland, Italy and Portugal), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Azores	29	Sludge disposal from public systems (wastewater service)	%
Azores	30	Sludge disposal from individual systems (wastewater service)	%
Bulgaria	17	PK11c: WWTP sludge utilization	%
Hungary	18	Sludge utilization	%
Ireland	25	Sludge Reuse and Disposal.	
Italy	10	Landfill sludge disposal (M5)	%
Portugal	19	AA17 - Treatment sludge production	kg/m3
Portugal	38	AR17 - Treatment sludge production	kg/m3

Table V.3-3: Sludge from WWTP KPIs

Types of indicators in usage:

- ✓ Azores monitors sludge with appropriate destination from public and individual systems (2 KPIs);
- ✓ Portugal monitors sludge produced at drinking and wastewater treatment plants (2 KPIs);
- ✓ Bulgaria and Hungary monitor share of utilized sludge vs total sludge produced;
- ✓ Italy monitors share of disposed sludge vs total sludge produced;
- ✓ Ireland monitors both sludge disposed and re-used.

Requirements for source of information:

Azores and Bulgaria have specified requirements for sources of reported information (internal WSOs information systems): Weighing register / Sludge register.

KPIs used in tariff regulation:

Italy uses Landfill sludge disposal (M5) KPI in tariff setting.

V.4. ASSET EFFICIENCY KPIs

a. ASSET MANAGEMENT KPIs

Total of 33 KPIs are presented in the sub-category of Asset Management, used by 10 WAREG members (Azores, Brussels, Bulgaria, Flanders, Hungary, Ireland, Kosovo, Latvia, Montenegro and Portugal), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Azores	14	Water infrastructure asset management	number
Azores	15	Mains rehabilitation	%/year
Azores	23	Wastewater infrastructure asset management	number
Azores	24	Sewer rehabilitation	%/year
Brussels	25	DW-Transp05: Renewing rate of the drinking-water transport networks	%
Brussels	26	DW-Dis02: Replacement rate of the drinking-water distribution network	%
Brussels	27	DW-Dis01: Age index (NAX) of the distribution network	#
Brussels	28	DW-Connect01: Replacement rate of the drinking-water connections	%
Brussels	30	UWW-Sew03: Renewing rate of the sewerage networks	%
Bulgaria	18	PK11d: Water network rehabilitation	%
Bulgaria	19	PK11e: Active leakage control	%
Flanders	14	Average age of the pipeline in relation to the total number of meters of pipeline	years
Flanders	16	Percentage of pipe replacements compared to the total number of meters of pipe	%
Flanders	17	% of the existing network that is older than the technical lifespan	%
Flanders	19	Standardized Average Age Index (SNAX)	factor
Hungary	7	Replacement rate (water)	%
Hungary	8	Replacement rate (wastewater)	%
Hungary	9	Renewal rate (water)	%
Hungary	10	Renewal rate (wastewater)	%
Ireland	33	New Water-mains	km
Ireland	34	Rehabilitated or lined mains	km
Ireland	36	New Sewers	km
Ireland	37	Rehabilitated sewers	km
Ireland	42	Number of Lead Services replaced	No.
Kosovo	13	Quality of data/ reliability of data	%
Latvia	11	Proportion of new water supply pipelines	%
Latvia	12	Proportion of new sewerage system pipelines	%
Latvia	13	Investments in water supply system	EUR/m3
Latvia	14	Investments in sewerage system	EUR/m3
Montenegro	9	Length of Inspected Sewerage Network	%
Portugal	10	AA09 - Mains rehabilitation	%/year
Portugal	30	AR09 - Sewer rehabilitation	%/year
Portugal	32	AR11 - Sewer pipes condition monitoring	%

Table V.4-1: Asset efficiency KPIs

Data provided shows that these KPIs cover the following areas of Asset management:

- **Pipe rehabilitation / replacement / renewal**: 17 KPIs (Azores, Brussels, Bulgaria, Hungary, Flanders, Ireland, Portugal);
- **New asset**: 4 KPIs (Ireland, Latvia);
- **Asset inspection / monitoring**: 3 KPIs (Bulgaria, Kosovo, Portugal)
- **Asset age**: 4 KPIs (Brussels, Flanders)
- **Investment in pipes**: 2 KPIs (Latvia)
- **Infrastructure asset management**: 2 KPIs (Azores)

- **Data quality**: 1 KPI (Kosovo)

Types of indicators in usage:

As seen from the above, most of the KPIs (17) are related to monitoring and analysis of the water-mains and sewers **annual rate of rehabilitation**, assessed by length of pipe replacement vs total length of the network served (%).
Many of the Members have introduced similar KPIs to monitor rehabilitation or replacement of both water and sewer pipelines (Azores, Ireland, Portugal).
In the case of Hungary, replacement and renewal rates of water-mains and sewers are considered in separate. Similar approach is introduced in Brussels, where replacement of water-mains and water connections are considered in separate of renewal rate of water-mains and sewers. Ireland also has a target for replacement of lead water connections.
In the case of Portugal, the indicator monitors the rehabilitation rate of WS pipes with certain age (more than 10 years old) in certain period (last five years).

Two WAREG members monitor not only pipe rehabilitation, but also **new pipe construction** (network extension). In the case of Latvia, the indicator monitors accumulation of length of WS pipes installed and renewed since 2000.
Latvia also monitors **investments** in water and sewer networks in terms of EUR per m^3 water supplied to / collected from customers.

Three WAREG members monitor **WS networks inspection** (%). In the case of Bulgaria, it is length of the water network inspected with equipment for active leakage control, while in the cases of Montenegro and Portugal it is the length of inspected sewer network.

Flanders has introduced 3 indicators related to the **age of the WS network** in operation, including accumulative Standardized Average Age Index (SNAX) tries to determine how old/new the pipeline network is on average. The technical life of each type of material is standardized for all drinking water companies. For this, use is made of the standardized technical ages of the European Benchmark Exercise. The SNAX produces a number between 0 and 1, with a SNAX of less than 0.4 for an 'average new network' and a SNAX greater than 0.6 for an 'average old network'. Similar indicator has been introduced by Brussels – Age index (NAX) of the distribution network. This indicator uses a technical lifetime which is not standardized but proposed by the operators, based on their experience and the local environmental context. However the operators are requested to motivate when the technical lifetime is different from the one used for the SNAX.

Azores has introduced 2 indicators related to **Infrastructure and asset management knowledge index** (for water and wastewater) with three levels: Level A = Map of the system; Level B = Registered information on the elements that integrate the system; Level C = Registered information on works made in the system.

Kosovo has introduced indicator related to **data quality** that presents the reliability and accuracy of the data determined by the audit process

Requirements for source of information:

Azores and Bulgaria has specified requirements for sources of reported information (internal WSOs information systems) – GIS, asset register, repair work register.

KPIs used in tariff regulation:

Bulgaria uses KPI for annual water network rehabilitation rate as indicator in the tariff update procedures.

b. ASSET CAPACITY KPIs

Total of 24 KPIs are presented in the sub-category of Asset Capacity, used by 10 WAREG members (Azores, Brussels, Georgia, Greece, Hungary, Ireland, Latvia, Malta, Portugal and Romania), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Azores	16	Total potable water storage capacity	days
Brussels	15	UWW-Sani02: Volume of treated urban waste-water	m3
Brussels	16	UWW-Sani03 : Volume of treated UWW by population equivalent	m3 / PE
Georgia	6	Coverage index of fire hydrants	%
Greece	1	Total Network Length	km
Hungary	15	Wastewater treatment plant capacity	%
Hungary	16	Wastewater treatment rate	%
Ireland	28	Number of new Treatment Plants (water and wastewater)	No.
Ireland	29	Number of existing Treatment Plants Upgraded	No.
Ireland	30	Water Treatment Plant Capacity (i.e. total capacity from new/existing plants which have added capacity during RC3)	Ml/day
Ireland	31	Wastewater Treatment Plant Capacity	PE
Ireland	32	Number of Reservoirs upgraded	No.
Ireland	44	Additional Water Supply Capacity (i.e. additional capacity added during RC3)	ML/day
Ireland	47	Number of Wastewater Treatment Plants overloaded serving >2000 population	No.
Ireland	48	Number of Wastewater Treatment Plants overloaded serving <2000 population	No.
Latvia	3	Amount of other wastewater drained into the centralised collecting system (infiltration)	%
Latvia	4	Amount of other wastewater drained into the centralised collecting system (infiltration)	m3/km/year
Latvia	5	Amount of water supplied	m3/ connection */year
Latvia	6	Amount of wastewater collected	m3/ connection */year
Malta	1	Total potable water supplied	m3
Portugal	12	AA11 - Adequacy of treatment capacity use	%
Portugal	33	AR12 - Adequacy of treatment capacity use	%
Portugal	39	AR18 - Reclaimed water production	%
Romania	15	Total treated wastewater collected from regional and municipal operators	%

Table V.4-2: Asset capacity KPIs

Data provided shows that these KPIs cover the following areas of Asset capacity:

- **Water/wastewater capacity (tanks / treatment plants):** 7 KPIs (Azores, Ireland, Hungary, Portugal);
- **Water / wastewater volumes (water supplied / WW collected / WW treated / infiltration / WW reuse)**: 10 KPIs (Brussels, Latvia, Malta, Romania, Hungary, Portugal);
- **Number of Treatment plants / reservoirs (new / upgraded / overloaded):** 5 KPIs (Ireland);
- **Network data (length / fire hydrants coverage):** 2 KPIs (Greece, Georgia)

Types of indicators in usage:

Four WAREG members apply indicators monitoring capacity of WS assets – reservoirs, treatment plans, in aspect of self-sufficiency of water supply, treated or not, by the water tanks in days (Azores), water treatment plans and water supply capacity in Ml per day (Ireland);

WWTP real vs license capacity in % (Hungary); or treatment capacity used in the peak production / inflow period in % (Portugal).

Six members monitor amount of drinking water supplied and wastewater collected in m^3 and in m^3 per service connection.
Brussels, Romania and Hungary monitors ratio of treated vs collected wastewater.
Latvia monitors levels of infiltration in the sewerage network (other wastewater drained into the centralized collecting system) in % and in m^3/km/year.
Portugal monitors volume of reclaimed water produced for reuse.
Brussels monitors treated WW in terms of m^3/population equivalent. The population equivalent is a measure of the biodegradable organic matter load of the WW, measured at the treatment plant.

Ireland monitors the condition of treatment plans and reservoirs with KPIs related to new / upgraded and overloaded assets.
Greece monitors total length of WS networks in operation, while Georgia monitors coverage of water network with fire hydranths.

Requirements for source of information:
Azores has specified requirements for sources of reported information (internal WSOs information systems) – Water volumes database, Billing system.

KPIs used in tariff regulation:
Portugal uses KPIs for Adequacy of treatment capacity use in the tariff setting of Bulk operators.

c. ELECTRICITY KPIs

Total of 31 KPIs are presented in the sub-category of Electricity consumption, used by 11 WAREG members (Albania, Brussels, Bulgaria, Estonia, Greece, Hungary, Ireland, Latvia, Lithuania, Portugal and Romania), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Albania	8,1	Electricity Efficiency for water	(kwh/m3)
Albania	8,2	Electricity Efficiency for wastewater treatment	(kwh/m3)
Brussels	5	DW-Monitor01: Electricity consumption for the production and the transport of drinking-water	kWh / m3
Brussels	6	DW-Monitor02: Renewable energy bought	%
Brussels	17	UWW-Monitor01: Energy consumption in urban waste-water treatment plants	kWh / m3
Brussels	18	UWW-Monitor02: On-site energy production in UWWTPs	kWh
Brussels	19	UWW-Monitor03: Energy bought for UWWTPs	kWh
Brussels	20	UWW-Monitor04: Energy consumption for the collection of UWW	kWh / m3
Bulgaria	15	PK11a: Energy efficiency in the water supply	kWh /m3
Bulgaria	16	PK11b: Energy efficiency in the wastewater treatment	kWh /m3
Estonia	2	Energy efficiency in the drinking water and/or wastewater treatment	kWh/m3
Greece	10	Energy consumption for water distribution per m3	kWh/m3
Hungary	12	Energy efficiency (water)	kWh/m³
Hungary	13	Energy efficiency (wastewater)	kWh/m³
Hungary	14	Energy production (own energy)	%
Ireland	26	Energy Consumption	
Ireland	27	Greenhouse Gas Emissions	
Latvia	9	Average electricity consumption in water supply services	kWh/m3
Latvia	10	Average electricity consumption in sewerage services	kWh/m3

COUNTRY	№	KPI NAME	KPI UNIT
Latvia	24	Electricity costs related to water supply services per unit	EUR/m3
Latvia	25	Electricity costs related to sewerage system services per unit	EUR/m3
Lithuania	1	Energy efficiency in water extraction and supply	kWh/m³/100mH2O
Lithuania	2	Energy efficiency in water preparation	kWh/m³
Lithuania	3	Energy efficiency in waste water collection	kWh/m³/100mH2O
Lithuania	4	Energy efficiency in waste water treatment	MWh/tonne
Portugal	18	AA16 - Energy efficiency of pumping facilities	kWh/ (m3. 100 m)
Portugal	20	AA18 – Self-produced energy	%
Portugal	37	AR16 - Energy efficiency of pumping facilities	kWh/ (m3. 100 m)
Portugal	40	AR19 - Self-produced energy	%
Romania	21	Energy efficiency of the water supply service	MWh / thousands cubic meters
Romania	22	Energy efficiency of the sewerage service	MWh / thousands cubic meters

Table V.4-3: Electricity consumption KPIs

Data provided shows that these KPIs cover the following areas of electricity consumption:

- **Energy efficiency in water supply in *kWh/m³ of system inlet*:** 8 KPIs (Albania, Brussels, Bulgaria, Estonia, Greece, Hungary, Latvia, Romania);
- **Other KPIs for water energy efficiency:** 4 KPIs (Lithuania and Portugal);
- **Energy efficiency in wastewater collection in *kWh/m³ of collected wastewater*:** 3 KPIs (Brussels, Lithuania and Romania);
- **Energy efficiency in wastewater treatment in *kWh/m³ of treated wastewater*:** 6 KPIs (Albania, Brussels, Bulgaria, Estonia, Hungary, Latvia, Lithuania);
- **Level of electricity produced from own sources (biogas, solar power) used for water and wastewater services in *kWh/kWh*:** 4 KPIs (Brussels, Hungary, Portugal);
- **KPIs for bought energy:** 2 KPIs (Brussels);
- **Other KPIs for energy consumption and greenhouse gas emissions:** 2 KPIs (Ireland);
- **Other KPIs for energy costs:** 2 KPIs (Latvia).

Types of indicators in usage:

Eight regulators monitor **energy consumption for water** service in terms of kWh per m^3 of water supplied in the system, with the exception of Greece where not system inlet, but authorized consumption is used as denominator in the indicator calculations.
Furthermore, Lithuania monitors energy efficiency in separate for water extraction and supply and for water preparation, while Portugal monitors standard average energy consumption of pumping facilities in separate for bulk and retail systems.

Three regulators monitor **energy consumption in sewerage** service (wastewater collection), where kWh are used as numerator, while the denominator (water volumes) is used with different scales (m^3, thousand m^3, or m^3 per 100mH2O).

Six regulators monitor **energy consumption in wastewater treatment** service in terms of kWh per m^3 of WW treated.

Three regulators monitor **own energy production** – Hungary and Portugal monitor as % of own energy produced compared to total electricity used (in the case of Portugal, it is monitored in separate in bulk and retail), while Brussels monitors kWh of energy produced in UWWTPs.

Brussels also monitors ratios of renewable energy bought, as well as energy bought for UWWTPs.

Ireland monitors Uisce Éireann's Total Primary Energy Requirement (TPER) in GWh and also Uisce Éireann's energy-related emissions in CO2 equivalent in line with its reporting to the Sustainable Energy Authority of Ireland (SEAI).
Latvia monitors costs for electricity in EUR per m^3 drinking water supplied, and wastewater collected from customers.

Requirements for source of information:
Bulgaria has specified requirements for sources of reported information (internal WSOs information systems) – Water volumes database, Electricity consumption database.

KPIs used in tariff regulation:
Estonia and Lithuania use electricity KPIs in the process of tariff setting.

d. NON-REVENUE WATER / WATER LOSS KPIs

Total of 30 KPIs are presented in the sub-category of Non-Revenue Water / Water loss, used by 18 WAREG members (Albania, Azores, Brussels, Bulgaria, Estonia, Flanders, Georgia, Greece, Hungary, Ireland, Italy, Kosovo, Latvia, Malta, Montenegro, North Macedonia, Portugal and Romania), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Albania	1	Non-Revenue Water	%
Azores	13	Non Revenue Water	%
Brussels	7	DW-Loss02: Infrastructure Leakage Index (ILI)	#
Brussels	8	DW-Loss03: Real losses by connections	l/ 1000 connect
Bulgaria	6	PK4a: Water loss	m3/km/d
Bulgaria	7	PK4b: Water loss	%
Estonia	1	Water loss	%
Flanders	3	Lost water /branch / day	Litter
Flanders	4	Infrastructure Leakage Index (ILI)	factor
Georgia	9	Infrastructure leaking index (ILI)	ratio
Greece	6	Water Losses	m3
Hungary	5	Water loss	m^3/km/day
Hungary	6	NRW	%
Ireland	11	Leakage	0
Ireland	43	Leakage Reduction	ML/day
Italy	1	Water losses per km (M1a)	mc/km/day
Italy	2	Leakage rate (M1b)	%
Kosovo	5	Non-Revenue Water	%
Latvia	1	water loss	%
Latvia	2	water loss	m3/km/year
Malta	4	Estimated Leakage	l/prop/day
Malta	5	Estimated Leakage	m3/km/day
Malta	9	Unaccounted for water (Non revenue water)	m3/km/day
Montenegro	4	Non-revenue Water	%
North Macedonia	3	Non revenue water	%
North Macedonia	4	Non revenue water	m3/km/day
Portugal	9	AA08 - Non-revenue water	%
Portugal	16	AA15ab - Real water losses (Bulk systems and retail systems with service connection density less than 20 service connections per km)	m3/ (km. day)
Portugal	17	AA15b - Real water losses (Retail systems)	l/ (service connection. day)
Romania	8	NRW	thousand mc

Table V.4-4: Non-Revenue Water / Water loss KPIs

Data provided shows that these KPIs cover the following areas of Non-Revenue Water / Water loss:

- **Non-Revenue Water measured in %:** 11 KPIs (Albania, Azores, Bulgaria, Estonia, Hungary, Italy, Kosovo, Latvia, Montenegro, North Macedonia and Portugal);
- **Non-Revenue Water measured in m^3/km/d:** 6 KPIs (Bulgaria, Hungary, Italy, Latvia, Malta and North Macedonia);
- **Non-Revenue Water measured in l/conn/d:** 2 KPIs (Flanders, Ireland);
- **Real losses measured in l/conn/d:** 3 KPIs (Brussels, Malta and Portugal);
- **Real losses measured in m^3/km/d:** 2 KPIs (Malta, Portugal);
- **Infrastructure Leakage Index:** 3 KPIs (Brussels, Flanders, Georgia);
- **Other KPIs:** (Greece, Ireland, Romania).

Types of indicators in usage:

As seen from the data, majority of WAREG members use the **NRW** component for indicators analysing water losses, and in most of the cases they monitor it as **%** (NRW compared to system inlet) – 11 cases, and as **m^3/km/d** (where NRW is compared to the length of the water network in operation) – 6 cases.
In 2 cases NRW is compared per number of water service connections, and in 1 case NRW is monitored in real volumes (not as indicator).

All of those members` monitor NRW as provided in IWA Standard Water Balance except for Italian case, which adopts a definition of Water Losses starting from NRW, but deducting the Measured Unbilled Authorized volumes. The idea is to consider as a System Output what is surely not a leakage and, when authorized volumes are measured, they are considered an output, even if unbilled, because they involve no estimates.

Level of **Water Losses** (excluding authorized consumption) is monitored only in Greece.

Ireland and Portugal monitor **Real losses** (compared per length of network and per number of service connections), and Brussels monitors Real losses (compared per number of connections).
Ireland monitors also leakage reduction as Megalitres per day.
Brussels, Flanders and Georgia monitor **Infrastructure Leakage Index** (ILI).

Requirements for source of information:

Azores and Bulgaria have specified requirements for sources of reported information (internal WSOs information systems) – Water volumes database, Billing database, GIS/Asset register.

KPIs used in tariff regulation:

Bulgaria, Estonia, Georgia, Italy, Kosovo and Portugal use electricity KPIs in the process of tariff setting.

IWA Standard Water Balance

When discussing water leakage, we need to make sure that **proper terminology** is used. Our starting point is worldwide accepted **IWA Standard Water Balance**[17]**:**

[17] https://www.leakssuitelibrary.com/iwa-water-balance/: IWA Standard Water Balance as originally published in 2000* Parts of ASEAN region use 'Commercial' instead of 'Apparent', and 'Physical' instead of 'Real'

<table>
<tr><td rowspan="8">System Input Volume</td><td rowspan="3">Authorised Consumption</td><td rowspan="2">Billed Authorised Consumption</td><td>Billed Metered Consumption (including water exported)</td><td rowspan="2">Revenue Water</td></tr>
<tr><td>Billed Unmetered Consumption</td></tr>
<tr><td rowspan="2">Unbilled Authorised Consumption</td><td>Unbilled Metered Consumption</td><td rowspan="6">Non-Revenue Water (NRW)</td></tr>
<tr><td>Unbilled Unmetered Consumption</td></tr>
<tr><td rowspan="5">Water Losses</td><td rowspan="2">Apparent* Losses</td><td>Unauthorised Consumption</td></tr>
<tr><td>Metering Inaccuracies</td></tr>
<tr><td rowspan="3">Real* Losses</td><td>Leakage on Transmission and/or Distribution Mains</td></tr>
<tr><td>Leakage and Overflows at Utility's Storage Tanks</td></tr>
<tr><td>Leakage on Service Connections up to the measurement point</td></tr>
</table>

Figure V.4-5: IWA Standard Water Balance

IWA Standard Water Balance includes the following categories:

- ✓ **System Input volume**: all water abstracted from nature and used by WS operator;
- ✓ **Billed authorized consumption** – billed water to customers by WS operator (metered and not metered);
- ✓ **Unbilled Authorized consumption** – water that is used for network operations (e.g. network flush, fire needs), and is not billed to customers (metered and not metered);
- ✓ **Apparent Losses** – water that has been consumed but not metered and/or billed,
- ✓ **Real Losses** – leakages from water network, also known as Physical losses;

As seen from the balance, there are different leakage categories:

- ✓ **Water Losses** – include Apparent and Real losses;
- ✓ **Non-Revenue Water** (NRW) – include Water Losses (Apparent and Real) and Unbilled Authorized consumption. NRW is the difference between water input and water billed to customers.

Considering the EC intentions of monitoring water efficiency, and that NRW is an indicator reflecting an overall approach to water losses (including technical, organizational and economic factors), that a possible step-by-step approach to harmonising data collection procedures and indicators would be relevant to being able to address this idea of having a common indicator that would reflect the evolution in terms of water efficiency that is comparable between countries. The first step is then to assess which data is collected to calculate the different indicators and check if common indicators could be calculated using the already collected information. The NRW indicator follows a same pattern of calculation which means that it is possible to converge in the calculation of a common NRW indicator. In order to have a water efficiency driven indicator, however, it is important to ensure an additional effort in gathering other data that can be used to calculate real and apparent water losses, including a normalisation of procedures on the estimated portions of that calculation.

Having that in mind WAREG introduced **additional internal survey** in order to assess whether Regulators receive data for IWA Standard Water Balance from the WS operators, what kind of information for balance components is reported, are there any regulatory rules for data reporting of certain balance components that are not measured, can the Regulator aggregate data reported and calculate indicators on national level, and what is the IWA Standard Water Balance component that is prefferred to be used as performance indicator. The following results are available from 17 WAREG Members:

All Regulators confirmed that receive information from WS operators for IWA Standard Water Balance. However, not all of them receive information for all components of the balance:

- ✓ All 17 Regulators confirmed that WS operators report data for System Input Volume and Billed authorized consumption (*meaning that all Regulators receive or can calculate NRW levels*);
- ✓ 14 Regulators informed that WS operators report data for Unbilled Authorized Consumption (*meaning that 14 Regulators receive or can calculate Water Losses levels*);
- ✓ 13 Regulators informted that WS operators report *Real Losses levels*.

Not all Regulators however have issued specific requirements to WS operators for reporting reliable information for IWA Water balance elements:

- ✓ 12 Regulators confirm that they have introduced requirements to WS operators how to report data for System Input Volume and Billed authorized consumption;
- ✓ 8 Regulators informed that they have introduced requirements to WS operators how to report Unbilled Authorized Consumption, Real and Apparent losses.

Only 11 out of the 17 Regulators confirmed that they are capable to aggregate data and calculate leakage performance indicators on national level.

Finally, we asked our Members which is the IWA Standard Water Balance component that is prefered for monitoring as performance indicator (regarless of the particular unit - %, or m^3/km/d or m^3/conn/d or any other unit):

- ✓ Majority of Regulators (14) suggested that *NRW* is prefered for monitoring as performance indicator;
- ✓ Half of the Regulators (8) suggested that *Water Losses* or *Real Losses* are prefered IWA Standard Water Balance component for monitoring as performance indicator;

V.5. ECONOMIC EFFICIENCY KPIs

a. METERS AND READING KPIs

Total of 12 KPIs are presented in the sub-category of Meters and reading, used by 8 WAREG members (Albania, Azores, Brussels, Bulgaria, Ireland, Montenegro, Portugal and Romania), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Albania	5	Metering ratio	%
Azores	6	Functional conformity of water meters	%
Azores	7	Frequency of water meter reading	number
Azores	9	Ways of water meters' readings	number
Brussels	22	CS-Meter05: Meters to replace	%
Brussels	29	CS-Meter06: Replacement rate of the drinking-water meters	%
Bulgaria	24	PK12e: Efficiency of putting water meters in compliance	%
Bulgaria	25	PK12f: Efficiency of water meters	%
Ireland	35	Meters installed	No.
Montenegro	5	Water Meters Coverage	%
Portugal	44	Flow measurement index	-
Romania	9	The degree of metering of consumers	%

Table V.5-1: Meters and reading KPIs

Types of indicators in usage:

Azores has introduced indicators for **meter readings** – they monitor number of actual readings performed by the WSO to the existing meters per year, as well as meters' reading index: actual, phone, email, website, application.

Albania, Montenegro and Romania monitor **coverage with meters** (in the case of Albania and Romania, metered service connections are considered against all connections, while Montenegro uses number of consumers as denominator).

Azores, Brussels and Bulgaria monitor the **condition of existing meters**. In the case of Azores and Bulgaria, the indicator is calculated by comparing meters that have valid periodic inspection against all meters (or what share of the installed meters are compliant with legal requirements), while Brussels monitors the opposite – what share of meters do not comply (and need to be replaced).

Brussels and Bulgaria also monitor the annual **rate of putting meters in compliance** (Brussels monitors replacement rate, while Bulgaria considers replacement + test rates).

Ireland monitors number of **installed meters**.

Portugal assesses whether all the points considered relevant for the optimization of operations have a flow meter, through an index ranging from 0 to 200 points. This applies both to water and sewer services.

Requirements for source of information:

Azores and Bulgaria have specified requirements for sources of reported information (internal WSOs information systems) – GIS / Asset register, Repair works register, Billing system; Meters register.

KPIs used in tariff regulation:

Bulgaria uses KPI for condition of existing meters in the tariff setting.

b. BILLING AND CONSUMPTION KPIs

Total of 9 KPIs are presented in the sub-category of Billing and consumption, used by 7 WAREG members (Brussels, Flanders, Hungary, Ireland, Malta, North Macedonia and Romania), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Brussels	9	DW-Res01: Drinking-water consumption by inhabitants	m3 / inhabitant
Flanders	21	% of issued consumption and final invoices based on effective meter reading	%
Flanders	22	Degree of linkage of the number of domiciled persons	%
Hungary	11	Consumption	l/person/day, m³/household/year
Ireland	4	Billing of metered customers	
Ireland	5	Response to billing contacts	
Malta	3	Total potable water billed	m3
North Macedonia	8	Water Consumption	litres/person/ day
Romania	7	Share of household water consumption	%

Table V.5-2: Billing KPIs

Types of indicators in usage:

Brussels, Hungary and North Macedonia monitor **water consumption** by person in different measures: Brussels in m3 per person, while Hungary and North Macedonia monitor per capita consumption – l/p/d. Hungary also monitors annual household consumption. Romania monitors the share of household (domestic) consumption vs water volumes supplied.

Malta monitors **billed drinking water volumes**, considering the amount of water deemed billed for the year which is calculated as the actual billed amount plus accrual at end of the period less accrual brought forward from previous period.

Flanders monitors the share of billed consumption based on meter readings (actual consumption, not estimated); as well as extent to which the synchronization of the internal databases for billing with external sources runs smoothly.

Ireland monitors the number of bills based on a meter read as a percentage of bills issued to metered accounts and the percentage of metered accounts billed during the year that received at least one bill based on a meter read; as well as the percentage of billing contacts answered and closed out within 5 working days.

Requirements for source of information:

North Macedonia uses information from Billing system. Romania uses national statistics data.

KPIs used in tariff regulation:

No one of the members use billing KPIs in the tariff setting.

c. DEBT COLLECTION KPIs

Total of 11 KPIs are presented in the sub-category of Debt collection, used by 10 WAREG members (Albania, Brussels, Bulgaria, Flanders, Hungary, Kosovo, Latvia, Montenegro, North Macedonia and Romania), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Albania	4,2	Current Collection Rate	%
Brussels	24	CS-Bil01: Proportion of unpaid bills	%

COUNTRY	№	KPI NAME	KPI UNIT
Bulgaria	23	PK12d: Debt collection	%
Flanders	1	Collection effectiveness index (CEI)	%
Flanders	2	Days sales outstanding (DSO)	days
Hungary	25	Debt collection rate	%
Kosovo	15	Total revenue collection	%
Latvia	21	Payment collection effectiveness	%
Montenegro	14	Collection Efficiency	%
North Macedonia	5	Payment efficiency	%
Romania	23	Degree of indebtedness	Report

Table V.5-3: Debt collection KPIs

Types of indicators in usage:

Albania and Kosovo monitors level of paid bills from customers on annual basis vs total billed level in the current year, while Brussels monitors unpaid bills vs total billed level.

Bulgaria considers total revenues from WS services and total amount of receivables from consumers and suppliers at the end of the reported and the previous years.

Flanders monitors collection effectiveness index considering outstanding amount beginning and end of the period, invoiced amount during the period and outstanding amount not due at the end of the period; as well as days sales outstanding considering outstanding amount at the end of the period and invoiced amount as number of days.

Hungary monitors total amount of debt collected from WS services vs total amount of revenues from WS services (including VAT), while Latvia considers payments received vs revenues from WS services.

North Macedonia monitors billed vs paid amounts on annual basis, while Romania monitors total debt accumulated at the end of the year vs total receivables at the end of the year.

Requirements for source of information:

Kosovo uses information from financial software of the operators, North Macedonia request data from Billing system, while Bulgaria from Accounting system for regulatory needs.

KPIs used in tariff regulation:

Kosovo uses KPIs for total revenue collections in the tariff setting.

d. AFFORDABILITY KPIs

Total of 4 KPIs are presented in the sub-category of Affordability, used by 2 WAREG members (Azores, Portugal), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Azores	2	Economic affordability of the water service	%
Azores	20	Economic affordability of the wastewater service	%
Portugal	2	AA02 - Affordability of the service	%
Portugal	23	AR03 - Affordability of the service	%

Table V.5-4: Affordability KPIs

Types of indicators in usage:

In the case of Azores, economic affordability is considered in separate for water and wastewater service. For the water service, annual consumption of 120 m^3 is considered, while 109 m^3 per year for wastewater service is considered. Both indicators consider average family income within the WSO's area as denominator.

Requirements for source of information:
Azores uses national statistics.

KPIs used in tariff regulation:
All 4 KPIs are used by Azores and Portugal in the tariff setting.

e. COSTS KPIs

Total of 45 KPIs are presented in the sub-category of Cost unit / coverage / efficiency, used by 15 WAREG members (Albania, Azores, Brussels, Bulgaria, Estonia, Flanders, Greece, Hungary, Kosovo, Latvia, Lithuania, Malta, Montenegro, North Macedonia, Portugal), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Albania	2	O&M Costs Coverage	%
Albania	3	Total Costs Coverage	%
Azores	11	Total costs coverage	(-)
Azores	22	Total costs coverage (wastewater service)	(-)
Brussels	33	UWW-Cost03:Operational costs of UWWTPs by population equivalent	h / PE
Bulgaria	20	PK12a: Cost efficiency of water supply service	ratio
Bulgaria	21	PK12b: Cost efficiency of sewerage service	ratio
Bulgaria	22	PK12c: Cost efficiency of wastewater treatment service	ratio
Estonia	3	Cost efficiency of water supply service	€/m3
Flanders	18	Total maintenance cost of the pipeline compared to the total number of meters of pipeline	€/metre
Flanders	23	Cost of one invoice	€
Flanders	24	T	€/m³
Greece	4	Unit Financial Cost of Water Supply and Sewerage Services	€/m3
Greece	7	Cost Recovery of the recorded financial cost for drinking water and sewerage services	%
Greece	8	Cost Recovery of the recorded Financial Cost for drinking water supply services	%
Hungary	23	Cost efficiency (water)	%
Hungary	24	Cost efficiency (wastewater)	%
Kosovo	6	Cost efficiency for water services	%
Kosovo	11	Cost efficiency for wastewater services	Unit cost
Latvia	15	Total costs for water supply services	EUR/m3
Latvia	16	Total costs for sewerage services	EUR/m3
Latvia	17	Operational costs for water supply services	EUR/m3
Latvia	18	Operational costs for sewerage services	EUR/m3
Latvia	19	Total water supply service cost coverage	%
Latvia	20	Total sewerage system service cost coverage	%
Latvia	26	Capital costs related to water supply services per unit	EUR/m3
Latvia	27	Capital costs related to sewerage system services per unit	EUR/m3
Lithuania	21	Maintenance and material cost of one water pump	Eur.
Lithuania	22	Maintenance and material cost of one water treatment machine	Eur.
Lithuania	23	Maintenance and material cost of 1 km drinking water pipe	Eur.
Lithuania	24	Maintenance and material cost of 1 km wastewater pipe	Eur.
Lithuania	25	Maintenance and material cost of one wastewater treatment machine	Eur.
Lithuania	26	Contracted maintenance cost of one water pump	Eur.
Lithuania	27	Contracted maintenance cost of one water treatment machine	Eur.
Lithuania	28	Contracted maintenance cost of 1 km drinking water pipe	Eur.
Lithuania	29	Contracted maintenance cost of 1 km wastewater pipe	Eur.

COUNTRY	№	KPI NAME	KPI UNIT
Lithuania	30	Contracted maintenance cost of one wastewater treatment machine	Eur.
Malta	6	Direct operational cost (excluding cost of power) per unit supplied - potable water supply and distribution	€/m3
Malta	7	Direct Operational cost (including cost of power) of water per unit billed	€/m3
Malta	8	Total (Direct & Indirect) Operational cost of water per UNIT SUPPLIED	€/m3
Montenegro	16	Operation Cost Coverage	%
North Macedonia	6	Maintenance costs	mkd/ connections
North Macedonia	7	Water service operational costs	mkd /m3 sold/year
Portugal	7	AA06 - Cost recovery	%
Portugal	27	AR06 - Cost recovery	%

Table V.5-5: Costs KPIs

Data provided shows that these KPIs cover the following areas of cost benchmarking:

- **Cost coverage (operating revenues vs costs):** 3 KPIs - Albania, Hungary;
- **Cost coverage (total revenues vs costs):** 13 KPIs - Albania, Azores, Bulgaria, Latvia, Greece, Montenegro, Portugal;
- **Cost efficiency (operating costs vs billed volumes):** 6 KPIs - Latvia, Malta, North Macedonia, Estonia;
- **Cost efficiency (capital costs vs billed volumes):** 2 KPIs – Latvia;
- **Cost efficiency (total costs vs billed volumes):** 7 KPIs – Kosovo, Latvia, Malta, Flanders, Greece * (authorized consumption);
- **Cost efficiency (total/maintenance/outsourced costs vs network elements):** 13 KPIs – North Macedonia Flanders, Lithuania;
- **Costs efficiency (operational costs of UWWTPs by population equivalent):** 1 KPI (Brussels).

Types of indicators in usage:

16 KPIs measure cost coverage (operational / total revenues vs costs.

- ✓ In the case of Albania, total cost excludes debt service payment, in Portugal total cost exclude other revenues and investment subsidies;
- ✓ In the case of Greece, both revenues and costs are divided to authorized consumption, so EUR/m3 is reviewed in both N and D.

16 KPIs measure cost efficiency (operational / capital / total costs) vs volumes.

- ✓ Malta has 2 KPIs for operational costs with/without energy costs;
- ✓ In all cases billed volumes are used as unit except Greece, who use authorized consumption;
- ✓ Brussels monitors operational costs of UWWTPs by population equivalent.

13 KPIs measure cost efficiency (total / maintenance / outsourced costs) vs network elements:

- ✓ North Macedonia measure water costs vs number of water connections;
- ✓ Flanders monitor maintenance costs vs network length and will develop KPI to monitor cost of invoice;
- ✓ Lithuania monitors internal (5 KPIs) and outsourced (5 KPIs) maintenance costs vs asset elements: water pump / water treatment station / water network (1km) / sewer network (1km) / wastewater treatment station.

Requirements for source of information:

Azores, Bulgaria, Kosovo, North Macedonia, Estonia, Greece, Flanders have specified requirements for sources of reported information (internal WSOs information systems) – Billing systems / Economic registers / Accounting system for regulatory needs.

KPIs used in tariff regulation:

Kosovo, Lithuania, Estonia, Flanders, Portugal use some of these KPIs in the tariff setting.

f. PERSONNEL KPIs

Total of 39 KPIs are presented in the sub-category of Personnel, used by 12 WAREG members (Albania, Brussels, Bulgaria, Estonia, Georgia, Hungary, Latvia, Lithuania, Montenegro, North Macedonia, Portugal and Romania), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Albania	6	Staff Efficiency	(staff/1000 population)
Brussels	31	HR-Train01: Training courses	h / FTEs
Brussels	32	HR-Safe01: Work accidents	# / FTE
Bulgaria	29	PK15a: Personnel efficiency for water service	nr/1000 connections
Bulgaria	30	PK15b: Personnel efficiency for sewerage and wastewater services	nr/1000 connections
Estonia	4	Personnel efficiency for water service	nr/m3
Estonia	5	Labour cost efficiency for water service (apart from controllable operational costs)	€/m3
Georgia	10	Staff productivity index	nr/1000 connections
Hungary	21	Personal efficiency (water)	person/1000 connections, person/m³
Hungary	22	Personal efficiency (wastewater)	person/1000 connections, person/m³
Latvia	22	Personal costs related to water supply services per unit	EUR/m3
Latvia	23	Personal costs related to sewerage system services per unit	EUR/m3
Lithuania	5	General labour efficiency	ratio
Lithuania	6	Labour efficiency in water extraction	ratio
Lithuania	7	Labour efficiency in water treatment	ratio
Lithuania	8	Labour efficiency in water supply	ratio
Lithuania	9	Labour efficiency in wastewater collection	ratio
Lithuania	10	Labour efficiency in wastewater treatment	ratio
Lithuania	11	Labour efficiency in mud treatment	ratio
Lithuania	12	Labour efficiency in sales	ratio
Lithuania	13	Value of contracts to nominal employee in water extraction	Eur.
Lithuania	14	Value of contracts to nominal employee in water treatment	Eur.
Lithuania	15	Value of contracts to nominal employee in water supply	Eur.
Lithuania	16	Value of contracts to nominal employee in waste water collection	Eur.
Lithuania	17	Value of contracts to nominal employee in waste water treatment	Eur.
Lithuania	18	Value of contracts to nominal employee in sales	Eur.
Lithuania	19	Number of nominal employees to administration employee number	num.
Lithuania	20	Average employee salary	Eur.
Montenegro	15	Personnel Intensity	number/1000 consumers
North Macedonia	10	Number of employees	nr/1000 connections
Portugal	13	AA12a - Adequacy of human resources in water adduction and treatment (Bulk systems)	No./ (106 m3. Year)

COUNTRY	№	KPI NAME	KPI UNIT
Portugal	14	AA13 - Adequacy of human resources in water treatment (Retail systems)	No./ (106 m3. Year)
Portugal	15	AA14 - Adequacy of human resources in water distribution (Retail systems)	No./1000 service connections
Portugal	34	AR13 - Adequacy of human resources in transport and treatment (Bulk systems)	No./ (106 m3. Year)
Portugal	35	AR14 - Adequacy of human resources in wastewater treatment (Retail systems)	No./ (106 m3. Year)
Portugal	36	AR15 - Adequacy of human resources in wastewater collection and drainage of wastewater (Retail systems)	No./ (100 km. year)
Romania	18	Operationalization of regional and municipal operators	%
Romania	19	Efficiency of staff for water supply service	no./1000 connections
Romania	20	Personnel efficiency for sewerage services	no./1000 connections

Table V.5-6: Personnel KPIs

Total of 39 indicators are reported by WAREG members. However, as Hungary uses different units (per 1000 service connections and by m3), their indicators are considered in separate, and therefore for the need of analysis total of 41 indicators are considered.

Data provided shows that these KPIs cover the following areas of personnel:

- **Staff efficiency (total staff vs number of population / W customers):** 2 KPIs – Albania, Montenegro;
- **Staff efficiency (W/WW/Total staff vs number of connections):** 9 KPIs – Bulgaria, North Macedonia, Romania, Georgia, Hungary, Portugal + 1 KPI vs sewer length (Portugal);
- **Staff efficiency (W/WW staff vs volumes):** 7 KPIs – Hungary, Estonia, Portugal;
- **Other staff efficiency KPIs (operational vs total staff; total vs direct employees in different stages of WS service provision):** 17 KPIs – Romania and Lithuania;
- **Staff efficiency costs (staff costs vs volumes):** 3 KPIs – Latvia, Estonia;
- **Staff training and work accidents:** 2 KPIs – Brussels.

Types of indicators in usage:

10 KPIs measure staff efficiency vs network elements:

- ✓ Water staff vs number of Water connections: Bulgaria, North Macedonia, Romania, Portugal, Hungary;
- ✓ Wastewater staff vs number of sewerage connections: Bulgaria, Romania, Hungary;
- ✓ Wastewater staff vs sewer network length: Portugal;
- ✓ Total staff vs Water + Wastewater connections: Georgia

2 KPIs measure staff efficiency vs number of customers or population – Albania, Montenegro.

7 KPIs measure staff efficiency vs volumes:

- ✓ Hungary: Water / Wastewater staff vs Water system inlet / Wastewater collected;
- ✓ Estonia: Water / Wastewater staff vs billed Water / Wastewater;
- ✓ Portugal: Water / Wastewater treatment staff vs treated Water exported / Wastewater collected.

17 KPIs measure other staff efficiency:

- ✓ Romania: Operating vs total staff;
- ✓ Lithuania: 8 KPIs that measure labor efficiency in service preparation and provision – total / Water extraction / Water treatment / Water supply / Wastewater collection / Wastewater treatment / mud treatment / Sales: **Total vs direct staff;**

- ✓ Lithuania: 7 KPIs that measure outsourced labor efficiency in service preparation and provision – Water extraction / Water treatment / Water supply / Wastewater collection / Wastewater treatment / Sales / Administration;
- ✓ Lithuania: 1 KPI for average employee salary.

3 KPIs measure staff costs (Water / Wastewater) vs billed volumes (Water / Wastewater) – Latvia, Estonia

2 KPIs monitor staff training courses and work accidents – Brussels.

Requirements for source of information:
Bulgaria, North Macedonia, Estonia, Romania have specified requirements for sources of reported information (internal WSOs information systems) – staff data base / collection of reports from operators.

KPIs used in tariff regulation:
Lithuania, Estonia, Georgia uses KPIs for personnel in the tariff setting.

g. REVENUE AND PROFIT KPIs

Total of 6 KPIs are presented in the sub-category of Revenue and profit, used by 4 WAREG members (Greece, Hungary, Kosovo and Romania), as follows:

COUNTRY	№	KPI NAME	KPI UNIT
Greece	5	Unit Revenue by the provision of drinking water	€/m3
Hungary	19	Rate of revenues	%
Hungary	20	ROS	%
Kosovo	14	Return on Capital	%
Romania	16	Financial result	Report
Romania	17	Gross profit	thousand lei

Table V.5-7: Revenue and profit KPIs

Types of indicators in usage:
In terms of revenues - Greece monitors revenues from provision of water service (authorized consumption is used as denominator), while Hungary monitors the share of revenues from domestic and non-domestic customers.

In terms of profit - Romania monitors financial result and gross profit; Hungary monitors return on sales for operational efficiency; Kosovo monitors return on investments.

Requirements for source of information:
Kosovo uses information from financial software of the operators.

KPIs used in tariff regulation:
Kosovo uses KPIs for return on capital in the tariff setting.

SUMMARY

20 WAREG members participated in this survey, 19 of whom apply monitoring through performance indicators. A summary of findings is presented here:

SCOPE OF REGULATORY COMPETENCES

An overview of the WAREG Members` regulatory functions demonstrates that the majority of the Regulatory authorities that participated in the survey collect technical and economic data from utilities (19 cases), monitor KPIs (17 cases), calculate tariffs (17 cases) and have powers for final tariff approval (18 cases).
However, less than half of the participants in the survey have powers related to licensing of utilities (9 cases) and business plan approval (8 cases). The same is related to the usage of KPIs in the tariff calculation process (9 cases) and the possibility of calculating/reporting KPIs levels on the national level (11 cases).

DATA COLLECTION

Most WAREG Members receive economic and technical information through Excel files (16). Around half of the regulators (11 cases) have developed specific online platforms for data submission with different scopes and capabilities.
Only 2 cases (Georgia and Latvia) report introducing a direct link with WSO information systems, but it is only for commercial data.
Other options include filling out a benchmarking model prepared by the regulator (Montenegro), filling out standard forms for small operators (Romania) and introducing local authorities in the process of data submission (Italy).

DATA VALIDATION

The most used tool for data validation by the regulators is the cross-check of specific data reported for reported and previous years (19 cases) as well as cross-check of similar data in the reports for the reported year (17 cases), which are used together from most of the WAREG members that participated in the survey.
Fifteen of the members request physical documents during data validation, and 13 regulators validate data during on-site inspections. Furthermore, 13 regulators have introduced or are planning to introduce regulatory requirements for the information systems used by the regulated entities for reporting data.
Almost half of the regulators (9) use all of the above-mentioned tools together for data validation and, therefore, are doing their best to ensure that data reported by WSOs is consistent and reliable and comes from trustful sources.

INTERNAL INFORMATION SYSTEMS OF OPERATORS

Data provided that regulators provide requirements for internal information systems of the regulated entities used to report data for water volumes (15 cases), electricity consumption (14 cases) and accounting information for costs and assets (14 cases).
In 13 cases, requirements are established for information sources for assets and repair works, billing data, meters and customers` complaints, as well as personnel in the WSOs. Registers for water quality are required in 11 cases.
More than half of the regulators that participated in the survey (12) have introduced requirements for all of the above-mentioned WSOs information sources.

PERIODS OF REPORTS

In almost all cases reported (18), regulated entities are required to present annual reports to the regulator. In some cases, besides annual reports, the WSOs are also required to present 6-month reports (3 cases), 3-month reports (4 cases) and monthly reports (3 cases).
Two regulators require all the above-mentioned reports from regulated entities.

LEGAL FORM OF KPIs REQUIREMENTS

Data provided shows that the majority of WAREG Members who participated in the survey (18) perform monitoring through KPIs on the activities performed by the regulated entities. Exclusion is for the regulatory authorities in Armenia and Estonia. However, the Estonian regulator also assesses KPI levels in the tariff-setting process.
In the majority of cases, KPIs used for monitoring are defined in legislation (10 cases) and regulator guidance (15 cases).
In almost half of the cases, the regulator has the power to make changes during the regulatory period related to indicators in use (9 cases) and/or methodologies and definitions in use (8 cases).

KPIs TARGET SETTING

Half of the members that participated in the survey (10) set targets of KPIs levels for the regulated entities. This is not a surprise, as we see in Chapter I, that less than half of WAREG members are involved in licensing companies, business plan approval, and/or usage of KPIs in the tariff calculation process. Without performing these tasks, regulators are hampered in establishing KPI targets as no integrated regulatory approach is introduced.
In other cases, targets are established by law, policy strategies, best practices, or local authorities. Nevertheless, regulators are monitoring achieved results by the regulated entities, analysing and benchmarking their performance, and using KPIs levels in the tariff-setting process.

KPIs MONITORING PERFORMANCE

Data reported shows that more than half of the members that participated in the survey (13) monitor performance and achieved targets of KPIs levels to the regulated entities. In some of the other cases, monitoring is done by local authorities.

REFLECTION OF DATA QUALITY IN MONITORING

Less than half of the members that participated in the survey (8) assess the quality and reliability of the information and data reported by the regulated entities. However, data quality is formally assessed only in a few cases by the regulators (cases of Albania, Bulgaria, Kosovo, Portugal). However, in case of data issues regulators do not review reported data (Georgia) or do not apply incentive mechanisms (Italy).

ACTIONS IN CASE OF NON-IMPLEMENTATION

Data shows that in 6 cases, achieved KPIs levels are reflected in the tariff-setting process, and in 5 cases, regulators can impose sanctions on the regulated entities. However, WAREG members indicate that they do not use powers to penalize often, as, in the end, the final customers will pay the price of the sanctions. In fact, one of the most used options by regulators is the “name and shame” procedure, where achieved results are publicly announced.

OTHER KPIs REGIMES

The information shows that there is some practice of other KPIs regimes apart from the national regulator, where KPIs are set by the WS assets owner (5 cases), WS operator`s owner (4 cases) and by other authorities, usually ministries (5 cases). Some cases involve KPIs established in

delegation contracts (Romania, Bulgaria), lease agreements (Armenia), WSS development plans (Estonia), national strategic plans (Portugal) and others. However, data received shows that in not all cases national regulators are involved in this process (where such exists).

DATA PUBLICITY

Data provided shows that the majority of WAREG members that participated in the survey provide public data for KPIs (17 cases), done by publishing annual reports in their native language on their websites (in text format).
Other options available are less used by national regulators – such as data in a table or other formats (4 cases) or direct information in a drop-down menu (5 cases), as well as other forms – thematic power-bi reports.
The practice of publishing annual reports in English is less spread, as only 7 members have reported positive answers.

SERVICE COVERAGE KPIs

Around half of the members (12) apply KPIs in the area of water service coverage and (10) in sewerage coverage. In most cases, indicators measure the number of connections that receive service vs the total population. Azores and Portugal pay attention to the number of households with service available, but not physically connected. Romania monitors the share of service coverage on the national level and within the WSO service area, as well as connection density. In fewer cases, WAREG members monitor separate coverage of wastewater service (5) and the connection of new properties to existing networks (2).

SERVICE QUALITY KPIs

The most commonly used indicators in this category are related to water service continuity and bursts on water networks (16 members) with various approaches for service interruptions (per zone, per properties, per individual interruptions, per days with restriction, per customer affected and others). Different approaches are applied for burst monitoring (with or without service connections and events due to leakage control), as well as different units are used.
Half of the members (10) monitor water quality with regulatory KPIs, mostly related to the number of tests/analyses compliant with legal requirements vs all tests/analyses. However, other indicators are also used to monitor water sources, treatment plants and customers.
Only 2 members (Bulgaria and Kosovo) apply water pressure-related KPIs, and the approaches are quite different, as Kosovo monitor properties experiencing lower pressure in certain zones, while Bulgaria uses this KPI to stimulate water operators to establish district metering areas (DMAs) with constant flow/pressure measurement on zones inlet and outlet and measurements in critical points.
Eleven members monitor flooding from sewer networks (different units – per number of customers, per number of service connections, as well as per the length of the network, and different sources of information are used), as well as bursts on sewerage networks. However, different approaches are applied in terms of types of incidents (with or without structural breakdowns and blockages, including or excluding service connections) and units used.
Eleven members monitor customer complaints and communicate with customers with various indicators mostly related to the ratio of answered complaints. However, KPIs are also used to monitor solved complaints, period of reaction, phone call reaction, customer satisfaction surveys and others.

ENVIRONMENT KPIs

The quality of wastewater is monitored by half of the members (10) mostly by monitoring the number of tests/analyses compliant with legal requirements vs all tests/analyses, but other

indicators are also used to monitor the population served, level of treated wastewater and of secondary/tertiary wastewater treatment and others. Only 3 members (Azores, Italy, Portugal) monitor wastewater discharge without treatment in emergency cases and/or through storm overflows. Six members use KPIs to monitor production, the share of utilization and disposal of the sludge generated during the wastewater treatment process.

ASSET EFFICIENCY KPIs

The most commonly used indicators for measuring asset efficiency (18 members) are related to monitoring water losses. In half of the cases, regulators monitor Non-Revenue water according to IWA standard water balance (either in % or as m3/km/d), but there are also regulators that monitor levels of Real losses per network length or number of service connections. Three regulators (Brussels, Flanders and Georgia) monitor the Infrastructure Leakage Index (ILI).

Energy efficiency is also often monitored by the regulators (11 cases) in different regulated services – water supply and wastewater treatment (in fewer cases in wastewater collection), mostly through energy consumption per m^3 of system input or wastewater treated. Three regulators also monitor their energy production (Hungary, Portugal and Brussels), and other indicators are available in this category.

Ten members monitor different aspects of asset management, mostly monitoring pipe rehabilitation/replacement/renewal (half of the cases), but also new assets, asset inspections, asset age, investments in assets, infrastructure index and data quality. The exact number of regulators monitors different aspects of asset capacity like treatment plants, tanks, reservoirs, data for assets (number of treatment plants or network length), as well as data for water or wastewater volumes.

ECONOMIC EFFICIENCY KPIs

WAREG members commonly apply KPIs to monitor cost coverage and efficiency (15). They monitor coverage of operating and total revenues vs respective costs, as well as cost-effectiveness of operating, capital and total costs vs billed volumes. In fewer cases, separate cost categories efficiency (like maintenance and outsourced costs) is monitored per network length or network elements.

Twelve members monitor staff efficiency mostly per number of service connections, but also per customers or volumes. Only 1 member (Brussels) has introduced KPIs to monitor staff training and work accidents.

Eight members use 12 KPIs to monitor meter readings, coverage with meters, condition of existing meters, rate of putting meters in compliance and installed meters.

The same number of members (7) monitor water consumption, billed consumption and number of bills based on meter readings.

Debt collection is monitored by 10 members with different approaches - level of paid bills, revenues vs receivables, collection effectiveness, collected debt vs revenues and others.

Four members monitor revenues as well as the profit of service providers. Only 2 members (Azores and Portugal) monitor service affordability.

CONCLUSIONS

Water utilities use several different KPIs frameworks (e.g. IWA's lists of KPIs and IBNET). However, their use remains largely voluntary, and there is no single set of standardised regulatory KPIs to measure water efficiency or other aspects of water utilities' performance to be used consistently across Europe. This makes comparison of water and sanitation services KPIs data difficult and requires extreme caution to ensure the adoption of consistency in definitions and methodology calculations.

Water regulation is introduced in different ways in Europe – at the national level by the regulator or by the ministry after supervision by a regulator, at the 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 depends on the district or agglomeration.

Various models and approaches are applied in water and sanitation services regulation among European countries. EU legislation has set only general principles for water pricing but did not introduce a legal basis for measuring service providers` performance and standardized performance indicators for the needs of economic regulation. However, a new approach has been introduced in recent years by issuing requirements for providing public information and applying performance indicators. Nevertheless, EU legislation still lacks detailed definitions and legal requirements in the area of performance indicators.

This survey demonstrated that various models and approaches are used and applied by WAREG members while performing regulatory monitoring of regulated entities` performance and efficiency through KPIs.

Most regulators use different tools and instruments to analyse and validate reported data by the service providers, usually by cross-checking information, requesting physical documents and on-site inspections. However, not all regulators perform formal assessments of data quality and reliability, and do not provide formal regulatory requirements towards the internal information systems that the companies use to aggregate and report data. Less than half of the regulators in the survey set targets of monitored KPIs and can link these targets with licensing regimes or business plan approval. Often, regulators have insufficient powers against companies` performance, with rarely used options to impose sanctions or reflect KPIs monitoring into the tariff-setting process. In fact, one of the most used options by the regulators is the "name and shame" procedure, where achieved results are publicly announced.

Various indicators are used and applied by the WAREG members. The analysed 425 indicators demonstrate differences not only in the types and categories of the indicators used, but also contrasts and distinctions in the methodologies used to calculate similar KPIs (like those for monitoring water loss and network bursts). Therefore, the concept of international benchmarking on national level is still impossible to achieve, as actual KPIs levels will not be comparable due to different methodologies used for indicators` calculation.

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

ONLINE PLATFORMS FOR DATA SUBMISSION

Water regulators play a crucial role in ensuring the provision of high-quality water services to the public. To effectively carry out their duties, they need access to reliable and up-to-date data on various aspects of water services, including quality, quantity, and cost. Online platforms have become an increasingly popular way for water regulators to collect such data efficiently, accurately, and securely. By gathering data through online procedures, water regulators can ensure that they have access to real-time data that is always up-to-date, and that they can easily analyse and monitor.

On 22 June 2022, WAREG's Working Group on KPIs held a workshop on *Provisions of reporting information from water operators (WSOs) through online platforms*, where Latvia, Lithuania, North Macedonia and Azores held presentations. More information on the online platforms used by these WAREG Members is presented as follows:

AZORES

Data collection and validation of KPIs follow a procedure that includes specification, data collection, validation by audits from ERSARA, treatment of information, a period of contradictory procedure, and a final report by ERSARA. The platform was launched in 2017.

LATVIA

The System for Input and Processing of Merchant's Information (IIAS) was launched in 2016 and is still optional. However, considering the benefits, the current platform is used by all water service providers. The total number of service providers using the platform in all regulated sectors (e.g., electronic communications, energy, postal services, waste management, water management, and deposit systems for beverage containers) is 577. The system is a safe and convenient way for service providers to submit information to the regulator (such as reports and documents following legislative requirements). The IIAS system can only be used by registered users divided into 3 groups, namely: (1) users from the regulator, (2) users from the service provider with data input rights, and (3) users from the service provider with data signatory powers. The functional modules of the IIAS system include the service provider's general information database, annual reports, tariff data, technological data database, data export, database of tariff reports and decisions, and communication tool.

LITHUANIA

The legal regulation of the data submission process includes three main legal acts related to data submission: (1) the Law on Drinking Water Supply and Waste Water Management, (2) cost allocation rules, and (3) information submission rules. The requirement to fill out and submit forms is due on May 1, and the forms are submitted using the DSAIS (data submission tool) platform. The process of data submission involves a four-step process, including downloading the package, filling it out, having it audited, and uploading the required information. The data validation process includes audit requirements and individual check and cross-check.

NORTH MACEDONIA

The web water platform, developed in 2016-2017 by the Technical Assistance to 'Reform in Water Sector on Central Level', a Project funded by the EU and implemented by a Consortium led by NIRAS IC, allows electronic submission of reports and requests on Water Service

Tariffs by Water Service Providers. The web software is divided into two parts: (1) the web portal accessible to all Water Service Providers to submit reports and requests electronically, and (2) the system for processing the submitted data by auditors/controllers at the Energy Regulatory Commission. The web platform is hosted and maintained in ERC IT premises. Water Service Providers are obliged to use the web water portal and submit requests for tariff and Annual Reports through the web portal. Each request for tariff and Annual Report is checked in detail by ERC and then approved or rejected.

TOOLS FOR DATA VALIDATION

Accurate and reliable data is essential for effective decision-making and ensuring the provision of safe and sustainable water services. As such, water regulators have a critical role in overseeing the data validation process to ensure that the data collected from various sources is accurate, complete, and consistent. A robust data validation process can help identify and correct errors and inconsistencies in data, ensuring decision-makers have access to trustworthy information to inform their actions. This process helps to increase the credibility and transparency of the data, instilling greater confidence in the water sector and regulators alike. In this context, it is essential to understand the various aspects of the data validation process, including its purpose, scope, and methodologies, to ensure that the data collected is of the highest quality and can support effective decision-making.

On 13 July 2022, WAREG's Working Group on KPIs held a workshop on *WSOs reporting information validation instruments,* where Georgia, Kosovo and Montenegro held Presentations.

On 13 September 2022, WAREG WG KPIs held a workshop on *Requirements for WSOs internal information systems,* where Portugal and Bulgaria held presentations.

More information on the WAREG Member cases is presented as follows:

GEORGIA

Before 2017, water data in Georgia was recorded in Excel and PDF files. However, from 2017 onwards, Georgia moved to an online platform for data recording. This platform has three types of forms: monthly, quarterly, and annual. The monthly forms cover produced water and billing, while quarterly forms include technical data, new connections, and investments. The annual forms, on the other hand, cover both technical and commercial aspects.

To ensure the accuracy of the recorded data, Georgia's water regulator implements a data validation process. This process involves cross-checking similar data from previous months, quarters, and years. If necessary, physical documents are also requested to verify the accuracy of the data.

To facilitate the analysis of the collected data, the Georgian regulator uses QlikView, an analytic platform that automatically takes in data and performs analyses.

KOSOVO

The Water Services Regulatory Authority (WSRA) in Kosovo takes a comprehensive approach to data monitoring and validation. The process involves multiple departments, including the Unit of Inspection, the Department of Performance, and the Department of Tariffs. The Unit of Inspection performs regular inspections in the first quarter of each year to ensure the service standards set in the license agreement are being met. The Department of Performance verifies and validates performance data quarterly and annually in coordination with the Unit of Inspection and Department of Tariffs. The Department of Tariffs, on the other hand, performs regular monitoring and verification of data in the second quarter of each year, starting in April.

WSRA defines three levels of data reliability, with Level 1 being 100% reliable and Level 3 being 0% reliable. Data validation includes the reliability factor, and WSRA considers the source of data when assigning a reliability level. For instance, data from software applications, SCADA software, archived data, or equivalent sources are considered 100% reliable. In comparison, data from simple paper format documents or no documents are deemed 0% reliable.

The Annual Performance Monitoring Plan provides guidance on the performance indicators and methodology for monitoring and comparative evaluation. The performance indicators are grouped into three main categories: (1) water supply services, (2) wastewater services, and (3) financial performance of the Regional Water Companies (RWCs). Each category has non-financial key performance indicators (technical and commercial) and financial key performance indicators.
The verification and auditing process, carried out by the Department of Tariffs in the second quarter of each year, verifies the fulfilment of targets set in the tariff process, some of which are identified as Key Performance Indicators (KPIs). The department accesses a database reference to the Tariff Methodology and analyses reports produced and published in previous years, such as the Report on the Tariff Process and Affordability Analysis and the Report on Achieving Goals from the Tariff Process.

MONTENEGRO

Montenegro has taken initial steps in benchmarking by establishing the Law on Utility Services in 2016, which regulates utility services such as water supply and urban wastewater management. For the first time, a regulatory body was introduced in the water sector, the Energy and Water Regulatory Agency. The Water Services Department was established in July 2017, and the agency's first task was to review the status of the water sector and create a regulatory framework for implementing competencies from the Law. However, some operators lacked precise basic data, such as data on the abstracted water, billed water, length of the water supply and sewerage network, failures, interruptions and customer complaints, resulting in poor availability and quality of data. Mandatory data validation was introduced to address this issue, which motivated operators to improve the quality of their data. Indicators and indices were defined, and a benchmarking by-law was prepared.

The benchmarking process involved monthly data collection and quarterly submission, with a final submission for the previous year due on April 15th. The regulator evaluated the reliability of the data and grouped it into the water supply, collection and disposal of urban wastewater, wastewater treatment, other services, and total data for all services. The process of benchmarking can be summarised in the following steps: data collection, data submission, data verification reliability, and an annual benchmarking report released in October. To evaluate the quality of the data, the regulator compared it with previous years, asked operators to clarify changes and provide proof with official documents, and checked financial data with operators' financial statements.

Starting from this year, the regulator conducts site visits to better validate data quality. During these visits, the regulator arranges meetings with the director, benchmarking coordinator, and other relevant employees, and asks to see internal documents to validate data. They also check the operators' GIS software, SCADA, and commercial software and prepare a report. The regulator informs the operators which data will not be validated if found unreliable and provides recommendations to improve internal procedures for future periods.

PORTUGAL

Portugal has implemented a quality of service regulation through the Portuguese Water Regulation model framework, which ERSAR, the Portuguese water regulator, manages. ERSAR regulates all utilities, which includes a vast size and diversity of operators with different governance models, including state-owned, municipal-owned, and private companies operating in various sectors simultaneously. In total, 355 operators serve 10 million consumers. The evolution of quality of service regulation in Portugal began with the regulation of concessions in 1997, which fell under the responsibility of ERSAR. In 2004, the first generation of indicators was published, followed by the second generation in 2011, the third in 2016, and the fourth in 2022. The Technical Guide for the Water and Waste Services Quality of Service Assessment - 4th generation applies to every operator of water and waste services, regardless of activity scope, nature, management model, or operator size. This manual establishes definitions of data and indicators required, formulas, reference ranges, database sources, as well as the reliability of the information to be reported. New KPIs are defined to address new legal and strategic challenges, and all data are addressed and reviewed/updated between generations.

There are five steps to the KPI assessment system components in Portugal: profile data, base data, KPIs, reference value, and performance levels. The profile data contextualizes results, and the operator and the system are characterised to allow utilities benchmarking using clusters. The base data comprises all data with a code, definition, and rules for the operator to classify the reliability (such as sources, registration procedures, and support – digital or manual). The KPIs selected, evaluate each aspect of quality of service, covering three major areas for water supply KPI or wastewater KPIs. The reference values use semaphore codes for more straightforward perception, with 3 quality of service grades (good, acceptable, and unsatisfactory), obtained according to ranges of values, defined by the national goals to be achieved.

There is an annual cycle for quality of service regulation in Portugal, beginning in January with the start of the cycle, followed by reporting data in March and April. ERSAR validates the data using audits in May and June, and from June to August, the data is treated and evaluated by ERSAR. In September, water utilities have the right to reply to the evaluation of ERSAR. The results are published in November, and awards to the best are given when the annual report is published.

Validation instruments of quality-of-service regulation in Portugal include audits, right of reply, and reliability assessment. Audits are performed on operators for data validation, and every three years, 100% of the reported data is validated. The right of reply is given to water utilities to respond to ERSAR's evaluation, and reliability assessment ensures that the information source is evaluated with the three quality grades.

BULGARIA

Bulgaria is an example of a country with regulatory requirements for water operators` internal data sources. Regulators rely on information provided by WSOs to perform their duties. However, most of the needed information is generated inside the operators and cannot be verified by external authorities. Water companies usually do not have integrated (ERP) systems, and information is allocated in different departments that are usually not coordinated. As a result, data is not shared between the personnel in the departments, and only a few experts inside the company are usually involved in preparing reports and data analysis (“islands of information”). This causes mistakes in the operators` reports (both unintentional and

intentional). Therefore, to ensure reliable data reporting, EWRC requires operators to introduce and integrate data registers and databases and to introduce internal official procedures and rules for data management, covering all aspects of water and sanitation service provision – assets, repair works, quality tests, customer complaints, meters on service connections, billing, regulatory accounting, water volumes, energy consumption, network meters and data loggers, calculation of unbilled authorised consumption, new connections and personnel. Water operators are separated into 4 groups: large, middle, small, and micro. Different deadlines were given for introducing these IT systems, and internal procedures for data monitoring, control and verification.

According to EWRC's requirements, the register is an electronic database that is developed according to a uniform methodology. It contains reliable information that can be confirmed with documents, is updated in a timely manner, stores the information contained in an easily accessible way, and enables the generation of reports for each entered circumstance.
Thus, in EWRC's understanding, the register is a specialised IT solution that enables user names, passwords and different access levels, contains the history of changes and does not allow for data deletion, enables options to export data in MS Office products, options to integrate with other IT products and to generate reports following predefined criteria.
EWRC has lower requirements for digital databases, which can be developed, for instance, in MS Excel.

EWRC requires that WSOs develop internal rules and procedures for data process, mechanisms for verification, control and others, in order to guarantee that data process (data entry, processing and analyses) is kept in accordance with best practices and options for mistakes are minimised. EWRC has also issued specific requirements for the data content of each register and database, and their availability is also inspected during the verification process.

The EWRC assesses the quality of the reported data on a four-grade scale: (1) Good quality, (2) Medium quality, (3) Poor quality, and (4) Missing information. The quality of information is assessed based on an assessment of the degree of implementation of registers and databases and an assessment of the reliability of the data for variables forming the quality indicators. The assessment of the degree of implementation of registries and databases includes an assessment of the availability of general characteristics and specific characteristics. It includes 4 levels: (1) Integrated, (2) In process of integration, (3) Unproven, and (4) Absent.
The assessment of the reliability of the information presented in the annual report includes checks for inconsistency of the submitted information, incorrectly specified data, technical errors, or unsubstantiated values of the variables.
Information that has been evaluated with the lowest quality grade 4 (Missing information) is not considered in the procedure for evaluation of achieved results on KPIs targets (also done with a 4-grade scale).

EWRC also issues obligatory requirements for Regulatory accounting rules, and WSOs are required to provide financial reports for regulatory rules together with independent auditor statements. Regulatory accounting rules provide detailed requirements for reporting costs and assets, including rules to report direct and non-direct (including general /overhead) costs and assets and how to allocate them between regulated services and non-regulated activities.
A regulatory chart of accounts is part of these rules, and WSOs are required to introduce separate accounting modules for regulatory accounting (not to mix with general accounting). These requirements provide detailed rules on how to properly report CAPEX – costs for materials, personnel and external services. A work card issued by the Repair Works Register

is required for each OPEC and/or CAPEX repair work. All the above requirements have introduced a connection between technical and financial departments in WSOs.

KPIs TARGET SETTING AND MONITORING PERFORMANCE

On 11 October 2022, WAREG WG KPIs held a workshop on *KPIs target setting and monitoring performance.* Italy and Bulgaria held presentations. More information on the WAREG Member cases is presented as follows:

ITALY

In the context of the WG KPIs Meeting No. 6, the focus was on the *Target Setting and implementation Monitoring process for Technical Quality Regulation*, specifically examining the approach taken by the Italian regulator in terms of incentives and sunshine regulation.
When a regulator chooses to apply the sunshine regulation approach, it must follow a strategic process that involves making an initial decision on the model of sunshine regulation to be employed, designing the process, and monitoring its implementation. Operational steps should support this strategic approach, including data collection and the public presentation of the operator's results.

In the case of the Italian regulator, the first step was to define the model of sunshine regulation. This involved comparing utilities, setting targets based on reputation, or associating incentive mechanisms. The chosen approach in the Italian experience was to set targets associated with incentive mechanisms, utilizing rewards and penalties. The core aspect of sunshine regulation lies in the design process, specifically in selecting the indicators to be used.
The Italian experience began with collecting preliminary data, supported by literature recognition, surveys, public consultation, and focus group processes. These activities aimed to determine the most suitable indicators for comparison and output-based analysis. Another crucial aspect was the monitoring process, which involved establishing the necessary conditions. The Italian regulator introduced mandatory obligations for utilities to register data for each of the 6 macro indicators. They also conducted monitoring activities to ensure the selection of appropriate indicators that enabled fair comparisons between utilities, ensuring consistent interpretation and coherent data.

Regarding the operational steps of this approach, the Italian regulator decided to collect data every 2 years using an Excel file uploaded to a dedicated portal. The collected data were then checked using an internal tool. Currently, the regulator utilizes the data collected for tariff setting and focuses on technical quality. The final step in the process is the provision of graphical instruments accessible on the ARERA regulator's website. These instruments identify different quality classes and provide evidence of the ranking for each macro indicator, among other relevant information.

By implementing this approach, the Italian regulator aims to promote transparency, accountability, and effective regulation in the water sector. Sunshine regulation, with its target setting and incentive mechanisms, allows for measuring and improving technical quality among water utilities. Ultimately, this approach ensures that operators are motivated to enhance their performance while providing consumers with better-quality services.

BULGARIA

The Act on Regulation of WS Services in Bulgaria requires the regulator to monitor and evaluate the quality of the service through performance indicators. Fifteen major KPIs are elaborated in the law, and further developed by ordinance. Initially, when the legal requirements were introduced in 2005-2006, the ordinance developed a total of 49 indicators. The law also required that long-term KPI-level objectives be established in the ordinance and reached within a 10-year period. The by-laws introduced targets for each indicator.
Experience demonstrated that these KPIs were considered too ambitious at that time, and could not be properly described in the legal documents, leading to different interpretations by the regulator and regulated entities and, therefore, differences in reporting. It was also understood that setting the same long-term targets for all operators was not effective, as they reported different levels, and therefore, different progress needed to be achieved.

Thus, in 2016, the ordinances were revised after a review of good international practices. The number of KPIs was reduced to 30, covering all regulated services (water supply, wastewater collection and wastewater treatment) and organisational aspects of service provision. The ordinances and the regulator's guidelines provided detailed definitions of indicators, calculation formulas and variables used. Changes were also introduced in the target-setting process – the ordinance established long-term goals for each KPI that needed to be achieved in a 10-year period, not by each operator, but by the entire sector. These goals were linked and aligned with the WS sector strategy, approved by the Government. The regulator had to evaluate reported levels of each company, and to set individual goals for each operator based on its starting position and its individual aspects so the entire sector could achieve the goals established in the ordinance.

Target setting

The regulator requires water operators to provide suggestions for KPI targets for the end of the period. Information provided is analysed and aggregated by the regulator, so it can understand what targets will be established for the entire WS sector based on all individual suggestions, and whether the long-term goals will be achieved.
During the 1st regulatory period, 2017-2021, EWRC divided KPIs into several large groups:

- ✓ KPIs that set mandatory requirements (such as water quality, complaints response and network connection), and therefore, each operator should reach the long-term goal regardless of its starting level;
- ✓ KPIs calculated with no reliable data (such as water supply continuity and sludge utilisation) and/or KPIs that are related to EU projects (such as service coverage for wastewater collection and treatment) where individual suggested targets were accepted; and
- ✓ KPIs for which EWRC sets individual targets (such as water loss, network bursts, water energy efficiency, water network rehabilitation/leakage control, debt collection and personnel efficiency) that are calculated in a way that the sector should achieve progress at the end of the period.

During the 2nd regulatory period, 2022-2026, EWRC followed the same approach. However, it reassessed individual suggestions for all KPIs where the sector did not reach long-term goals based on the aggregation of individual targets.

After the regulator issues a decision with KPIs targets, the operators prepare their 5-years business plans and have the ability to suggest different targets. The regulator can accept such targets if: justifications are provided, the targets comply with the technical and economic parts of the business plan, and the principle of social affordability of the suggested tariffs is followed.

Annual monitoring and performance assessment

Detailed provisions were also introduced on how the regulator should evaluate the quality of reported information (so unreliable data is not considered) and should formally evaluate operators' performance.

Every year, the operators provide annual reports for the implementation of the approved business plans and the application of regulatory accounting rules. The regulator performs inspections of the documents and on-site where needed, requires additional data where needed, and evaluates the quality of information with 4 grades. Based on this ground, performance evaluation is formally made with also 4 grades (good performance, average performance, bad performance and total default). If the information reported for any KPI is assessed as not reliable (the lowest grade), then the lowest grade of total default is provided for this indicator`s performance.

Performance assessment is based on considering the approved Annual Step (AS_n) (or the progress for this KPI based on the approved business plan) and the Real Step (RS_n) (or actual achieved progress). The range of application for Achieved Implementation (AI_n) was established in the 1st regulatory period based on the new rules (2017-2021), and then the range was slightly amended for the 2nd regulatory period (2022-2026) as follows:

Performance assessment	RP 2017-2021	RP 2022-2026
Good performance	$AI_n \geq 90\%$	$AI_n \geq 75\%$
Average performance	$AI_n \geq 60\%$, $AI_n < 90\%$	$AI_n \geq 50\%$, $AI_n < 75\%$
Bad performance	$AI_n \geq 20\%$, $AI_n < 60\%$	$AI_n \geq 25\%$, $AI_n < 75\%$
Total default	$AI_n < 20\%$	$AI_n < 25\%$

* In cases where the operators planned negative AI_n (or regress of KPI level) for the particular year, performance assessment considers the reported level in the base year and the planned target at the end of the regulatory period.

REFLECTION OF KPIs TARGETS INTO TARIFFS

On 20 October 2022, WAREG WG KPIs held a workshop on the *Reflection of KPIs targets into tariffs*. Italy, Lithuania and Bulgaria held presentations. More information on the WAREG Member cases is presented as follows:

ITALY

The KPIs related to quality regulation in the Italian regulatory framework are considered in conjunction with tariff regulation, tariff methodology, and affordability. The linkage between quality regulation and tariffs is essential because technical quality targets shape the planning process and define the targets for the next-generation programs. These targets also contribute to determining the efficient frontier for endogenous tariffs and establish the magnitude of penalties imposed.

The planning process plays a crucial role in this context, as achieving technical quality targets is necessary to calculate tariffs accurately. Business planning and tariffs are approved together in the Italian tariff-setting methodology. When applying for tariff approval, operators are required to submit various documents, including an economic and financial plan, a contract agreement with the users, and an infrastructure and management plan. In 2020, the regulator introduced an additional requirement for a strategic investment plan, where operators are expected to highlight the planned strategic investments and declare their objectives. This planning process directly influences tariff determination.

The tariff model in Italy is based on real data. Regulated revenues are derived from infrastructure costs, components supporting specific investment objectives, environmental operating costs, resource costs recovery, and cost recovery components. This model is incorporated into the tariff multiplier, where operators adjust their actual tariffs to reflect the updates.
The tariff model in Italy follows specific regulatory schemes (there are 6 schemes). Each operator positions itself based on its financial capacity to cover investment plans. When analysing capital expenditures (CAPEX), the impact of technical quality is considered in calculating depreciation based on objectives to improve macro indicators of technical contractual quality. Regarding operating expenses (OPEX), technical quality has a more significant impact. OPEX costs are divided into endogenous costs, which relate to operator efficiency (e.g., workforce) and are submitted to an econometric function to determine the tariff level and updatable costs, not completely under the operators' control, where specific incentives are introduced (e.g. energy consumption reduction incentivised by the rules to recovering energy costs).

Another important aspect of the Italian experience is the application of penalties or sanctions when operators fail to meet the planned objectives in their investment plans. According to the current methodology, the consideration of CAPEX costs occurs after the realisation of investments. Suppose operators achieve less than what was planned. In that case, the portion of the tariff allocated to cover these costs will be reduced accordingly.
The interconnection between technical quality KPIs and tariffs in the Italian experience is evident in the planning process, the tariff model based on real data, the consideration of costs related to achieving technical quality targets, and the application of penalties for non-compliance. By integrating technical quality regulation into tariff regulation, Italy aims to incentivise operators to improve their performance, invest in infrastructure, and provide high-quality services to consumers while ensuring cost-effectiveness and affordability.

LITHUANIA

The Lithuanian Water Regulator, NERC, recognises the significance of establishing fair and sustainable water prices for both consumers and water companies. To achieve this objective, NERC employs KPIs to evaluate the operational efficiency of water suppliers and determine appropriate cost levels for each individual company.
NERC follows a systematic process for setting the price of water, which involves several key steps. The initial step involves analysing data from the last accounting period, including one-time costs and expenses incurred in the final months of the year. Additionally, sales dynamics by quarters are considered to gain a comprehensive understanding of the financial situation.
Following the data analysis, NERC evaluates the fulfilment of the development plan from the previous period of price coordination. This evaluation ensures that the company is progressing towards effectively meeting its targets and objectives.
Benchmarking indicators are also taken into account by NERC to assess the operational efficiency of water companies and determine the necessary cost levels. The benchmarking methodology categorises water companies into 5 groups based on their sales volume of drinking water. Group KPIs are then calculated using a geometric average, eliminating low and high extremes. This allows for a fair comparison and evaluation of each company's performance.

Furthermore, NERC considers changes in tariffs for electricity, heating, fuel, and taxes to understand the impact of external factors on the cost of providing water services. This comprehensive analysis helps in determining the appropriate pricing structure.
The performance/operating and development plan is thoroughly analysed by NERC, including evaluating factors such as energy efficiency in water extraction and supply, water preparation, wastewater collection, wastewater treatment, as well as labour and maintenance costs. These evaluations enable the regulator to set future costs accurately.
NERC also considers the return on investment to ensure that water companies can maintain and enhance their infrastructure and services in the long term while providing a fair return to investors. This consideration is vital for sustaining the quality and reliability of water services.

In addition to the benchmarking methodology, NERC employs KPIs to regulate other costs associated with water management. For instance, electricity consumption indicators are evaluated individually, focusing on energy efficiency in various stages of water management. Labour costs are regulated by evaluating labour indicators using a top-down principle. Maintenance and materials costs, both in-house and contracted, are assessed individually by examining the costs of specific equipment and infrastructure components.
By incorporating KPIs into the regulation of water tariffs, NERC ensures that water suppliers operate efficiently and that water costs remain reasonable and sustainable. This approach guarantees that consumers have access to clean and safe water while supporting the long-term sustainability of water companies. Using KPIs to set water prices is essential for maintaining equitable and sustainable water management, benefiting both consumers and water companies alike.

BULGARIA

The reflection of KPIs targets into tariffs plays a significant role in ensuring the efficient and equitable pricing of water services in Bulgaria. By aligning tariff structures with KPI targets, EWRC ensures that tariffs accurately reflect the costs associated with service provision and promotes transparency, cost recovery, and fair pricing for both consumers and water utilities.

The establishment of KPI targets requires careful consideration of several factors. Firstly, the targets should be based on comprehensive data analysis and benchmarking. By comparing the performance of water utilities against industry standards, best practices, and previous performance, regulators can set realistic and attainable KPI targets. Additionally, the targets must align with national policies, regulatory frameworks, and the long-term objectives of the water sector.
Integrating KPIs into tariff structures involves several key components. Business plans and tariff proposals are integrated into one document, considered and approved with one decision of the regulator. Operational costs are estimated in the 5-year business plan based on suggested KPIs targets related to water losses, energy efficiency, network performance, sludge utilisation and others. Costs for personnel are planned based on staff efficiency KPIs but also reaching targets for salary increase as negotiated between the government and trade unions. At the same time, an investment programme is suggested in the business plan that would allow the operator to achieve KPIs targets, financed by depreciation costs of own and public WS assets, and appropriate return on invested capital is ensured through the RAB*WACC model.

After the business plan approval, the tariffs for each year are then updated by the regulator based on the RPI-X model, where EWRC considers the individual efficiency coefficient (E), the coefficient that reflects planned versus actual reported costs for the operation of new assets during the regulatory period (Qr), the coefficient that reflects planned versus the actual reported

investments in own and public WS assets (depreciation costs accordingly - Qi), and coefficient that considers reported performance on selected KPIs and provides financial bonus for good performance and/or financial penalty for bad performance or total default (Y). Thus, EWRC incentivises the achievement of KPI targets. This approach encourages continuous improvement, accountability, and the efficient use of resources.

Engaging stakeholders throughout the process of incorporating KPIs into tariff structures is crucial. Collaboration between regulators, water utilities, consumer representatives, and other relevant parties helps to ensure that tariffs are fair, transparent, and reflective of the community's needs and expectations. Regular consultations, public hearings, and feedback mechanisms contribute to the overall effectiveness and legitimacy of the tariff-setting process. The reflection of KPI targets into tariffs in Bulgaria demonstrates a commitment to promoting efficiency, sustainability, and affordability in the water sector. By incorporating KPIs into tariff structures, regulators align the pricing of water services with performance standards, encourage continuous improvement, and promote the responsible management of water resources. This comprehensive approach ensures that tariffs accurately reflect the costs associated with providing high-quality water services, while also fostering stakeholder engagement and maintaining public trust in the water sector. An integrated and transparent approach is vital for creating a robust and resilient water infrastructure that meets the needs of the present and future generations.

ANNEX II: COUNTRY KPIs METHODOLOGIES

The information presented in this Annex regarding the performance indicators used by WAREG members, including: names and units of the KPIs, text description of the indicators and their calculation formulas, as well as information for the variables used for KPIs calculation in numerator and denominator, including variable`s index or name, unit and definition.

KPIs from each WAREG member are provided in the sequence and numeration as they were described in the questionnaires, so the report's readers can make the connection with the indicators presented in section V of the report.

ALBANIA

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
1	Non-Revenue Water	%	HH Water Volume Billed metered + HH Water Volume Billed unmetered + PE Water Volume Billed metered + PE Water Volume Billed unmetered + IN Water Volume Billed metered + IN Water Volume Billed unmetered + the Wholesale Water Volume Billed metered / Net volume of system input.	Non-Revenue Water or NRW (%) NRW is the amount of water that the Licensee produces (or purchases from other entities) minus the amount that is sold (billed) to consumers, presented as a percentage of water produced. HH – Household, PE - Private entity, IN - Institution
2	O&M Costs Coverage	%	Total water amount bills + Total Wastewater Bills + Total wastewater treatment bills / OC water + OC wastewater +OC WWTP + DOC DWTP).	O&M Cost Coverage is the proportion of operating revenues to the operational costs. O&M costs include all the expenses but no depreciation costs, interest costs, and debt service payments. OC - Operating Costs WWTO – Wastewater Treatment Plant DWTO – Drinking Water Treatment Plan
3	Total Costs Coverage	%	Total water amount bills – Water + Total Wastewater Bills + Total wastewater treatment bills – WWTP / TOP Water + TOC Wastewater + TOC WWTP + TOC DWTP.	Total Coverage is the proportion of total revenues to the total costs. Total costs include all operating costs, including depreciation, principal costs and return to the capital costs, but no debt service payments. OC - Operating Costs WWTO – Wastewater Treatment Plant DWTO – Drinking Water Treatment Plan TOC – Total Operating Costs
4,1	General Collection Rate	%	Collected amount from invoices issued in the reported year + Collected amount from invoices issued in the past fiscal years and not collected in past years/ Total amount billed for regulated WS services in the reported year.	General collection rate represents the proportion of total revenues collected by the operator during the fiscal year in relation to the billed revenues of the year.
4,2	Current Collection Rate	%	Collected amount from invoices issued in the reported year / Total amount billed for regulated WS services in the reported year.	Current collection rate is calculated as a proportion of the collected amount from invoices issued in the reported year to the billed revenues in the same year.
5	Metering ratio	%	Metered Connections / Water service connections (including connections without a meter installed).	This indicator represents the proportion of the total quantity of the meters installed in the systems to the total number of connections recorded for all categories of customers. This indicator is important for a realistic calculation of the NRW and loss reduction.
6	Staff Efficiency	(Staff/1000 population)	Number of staff in the operator (including administrative personnel) / Total number of population registered in the service area/1000.	SE represents the proportion of the total number of operating and administrative staff of the utility to the total number of population/1000 registered in the service area. In the current tariff methodology, this KPI monitors the number of staff per 1000 people in the service area, instead of the number of water and wastewater connections.
7	Hours of supply	(hours/day)	Sum of population x hours/day water supply for each zone A1…An / total population served in the service area.	This indicator represents the average water supply hours per day in the service area.
8,1	Electricity Efficiency for water	(kWh/m3)	Electricity consumption for technical needs for water supply / Water volumes at system entry	This indicator takes into account the current pump efficiency and other hydraulic parameters of the networks, such as the average velocity of the water in the main transmission lines, the corrosion situation of the pipelines, and the power supply regime of the booster pumping stations in the systems during the day.
8,2	Electricity Efficiency for Wastewater Treatment	(kWh/m3)	Electricity consumption for technical needs for wastewater treatment / Wastewater treated in WWTP	This indicator mainly considers the current pump efficiency in the WWTP and other hydraulic parameters of their internal networks, such as the pipelines' corrosion.
9,1	Service Coverage for water	%	Population served with water service / Total number of population registered in the service area.	This indicator represents the proportion of the total population served with water services in the services area to the total number of population registered in the same area. This KPI monitors service coverage to understand and estimate the investment needs for constructing the new asset.
9,2	Service Coverage for sewerage	%	Population served with sewerage service / Total number of population registered in the service area.	This indicator represents the proportion of the total population served with wastewater services in the services area to the total number of population registered in the same area. This KPI monitors service coverage, to understand and estimate the investment needs for construction of the new asset mainly in the urban area. Usually, this indicator seems to be very low in remote rural areas where the public sewerage network is missing (individual solution).
9,3	Service Coverage for wastewater treatment	%	Population served with wastewater treatment service / Total number of population registered in the service area.	This indicator represents the proportion of the total population served with WWTP services in the services area to the total number of population

				registered in the same area. The low value of this indicator shows the need for huge investment in the construction of WWTP to comply with the environmental requirements in the country.
10,1	Customer Complaints	%	Number of customer complaints / Total number of customers	This indicator monitors customer complaints related to the total number of customers, showing the rate of the quality of the services provided by the utility.
10,2	Answered Customer Complaints	%	Customer complaints that have been answered within the required deadline / Number of customer complaints	This indicator monitors customer complaints answered related to the total number of complaints recorded. This indicator provides information that the operator may not have resolved the complaint but has provided a formal answer to the customer.
10,3	Resolved Customer Complaints	%	Number of customer complaints that have a definitive exhaustive answer for the customer from the utility side (full correspondence) / Total number of applicants that have filed complaints during the reported year	This indicator monitors customer complaints answered definitively from the utility to the total number of complaints recorded, showing the efficiency of the utility staff in resolving appropriately and exhaustively the customer complaints.

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition
1	Non-Revenue Water	%	Numerator	Water Volume Billed- metered- HH	m3		Water Volume Billed- unmetered- HH	m3		Water Volume Billed- metered- PE	m3		Water Volume Billed- unmetered- PE	m3	
			Denominator	Net volume of system input	m3										
2	O&M Costs Coverage	%	Numerator	Total water amount bills – Water	All		Total Wastewater Bills	All		Total wastewater treatment bills – WWTP	All				
			Denominator	Direct Operating Cost (DOC) – water	All		Direct operating cost (DOC) – S	All		Direct operating cost (DOC) – WWTP	All		Direct Operating Cost (DOC) – DWTP	All	
3	Total Costs Coverage	%	Numerator	Total water amount bills	All		Water Total Wastewater Bills	All		Total wastewater treatment bills – WWTP	All				
			Denominator	Total operating costs (TOP) Water	All		Total operating cost (TOC) S	All		Total operating cost (TOC) – WWTP	All		Total operating cost (TOC) – DWTP)	All	
4,1	General Collection Rate	%	Numerator	Collected amount from invoices issued in the reported year	All		Collected amount from invoices issued in the past fiscal years and not collected in past years	All							
			Denominator	Total amount billed for regulated WS services in the reported year	All										
4,2	Current Collection Rate	%	Numerator	Collected amount from invoices issued in the reported year	All										
			Denominator	Total amount billed for regulated WS services in the reported year	All										
5	Metering ratio	%	Numerator	Metered Connections	number										
			Denominator	Water service connections (including connections without meter installed	number										
6	Staff Efficiency	(Staff/1000 population)	Numerator	Number of staff in the operator (including direct and allocated administrative personnel)	number										
			Denominator	Total number of population registered in the service area/1000	number										
7	Hours of supply	(hours/day)	Numerator	Sum of population x hours/day water supply for each zone A1…An	Ratio Hours/24										
			Denominator	Population served with water service	number										
8,1	Electricity Efficiency for water	(kWh/m3)	Numerator	Electricity consumption for technical needs for water supply	kw										
			Denominator	Water volumes at system entry	m3										
8,2	Electricity Efficiency for Wastewater Treatment	(kWh/m3)	Numerator	Electricity consumption for technical needs for wastewater treatment	kw										
			Denominator	Wastewater treated in WWTP	m3										
9,1	Service Coverage for water	%	Numerator	Population served with water service	number										
			Denominator	Total number of population registered in the service area	number										
9,2		%	Numerator	Population served with sewerage service	number										

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition
	Service Coverage for sewerage		Denominator	Total number of population registered in the service area	number										
9,3	Service Coverage for wastewater treatment	%	Numerator	Population served with wastewater treatment service	number										
			Denominator	Total number of population registered in the service area	number										
10,1	Customer Complaints	%	Numerator	Number of customer complaints	number										
			Denominator	Total number of customers	number										
10,2	Answered Customer Complaints	%	Numerator	Customer complaints that have been answered within the required deadline	number										
			Denominator	Number of customer complaints	number										
10,3	Resolved Customer Complaints	%	Numerator	Number of applicants that have filed more than one complaint related to the operator`s competence during the reported year	number										
			Denominator	Total number of applicants that have filed complaints during the reported year	number										

AZORES

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
1	Physical accessibility of the water service	%	((dA02 + dA03)/dA04)*100	Percentage of total households within the operator's area for which the infrastructures of the water supply service are available.
2	Economic affordability of the water service	%	(dA43/dA44)*100	Burden of the water supply service on the average income of families in the WSO's area.
3	Water service interruptions	number/(1000 household connections*year)	(dA10/dA29)*1000	Number of failures in supply per 1000 connections.
4	Safe Water	%	((dA46/dA47) * (dA46/dA48))*100	Percentage of controlled good water quality, as the result of the percentage of compliance with the sampling frequency multiplied by the percentage of analysis in compliance with the legal parameters' values.
5	Reply to written complaints and suggestions	%	(dA06/dA05)*100	Percentage of written complaints and suggestions that were replied up to 22 working days.
6	Functional conformity of water meters	%	(dA08/dA07)*100	Percentage of meters with updated periodic inspection.
7	Frequency of water meter reading	number	(dA09/dA07)*100	Number of actual readings performed by the WSO to the existing meters, per year.
8	Disclosure of water quality data	number	dA39	Water quality notice disclosure index: website, app, newspaper, invoice.
9	Ways of water meters' readings	number	dA40	Meters' reading index: actual, phone, email, website, app.
10	Implementation of protection perimeters	%	(dA24/(dA30+dA31))*100	Percentage of water catchment protection areas in compliance with the regional law.
11	Total costs coverage	(-)	(dA41/dA42)	Ratio between total revenue and total expenditure.
12	Connection to the service	%	(dA02/(dA02+dA03))*100	Percentage of total households in the WSO's area for which the water supply infrastructures are available and have effective service.
13	Non Revenue Water	%	(dA16/dA13)*100	Percentage of water entering the system that is not billed.
14	Water infrastructure asset management	number	dA38	Infrastructure and asset management knowledge index with three levels: Level A = Map of the system; Level B = Registered

				information on the elements that integrate the system; Level C = Registered information on works made in the system.
15	Mains rehabilitation	%/year	(dA28/dA27)*(100/5)	Average annual percentage of adduction and supply pipes over ten years old that were rehabilitated in the last five years.
16	Total potable water storage capacity	days	(dA35/dA13)*365	Self-sufficiency of water supply, treated or not, by the water tanks.
17	Mains failures	number/(100km*year)	(dA11/dA26)*100	Number of breakdowns by length units.
18	Fulfilment of the water intake licensing	%	(dA25/(dA30+dA31))*100	Percentage of licensed water catchments that fulfil the operating titles.
19	Physical accessibility of public and decentralized drainage services	%	((dS02+dS03+dS04)/dS05)*100	Percentage of total households within the operator's area for which the infrastructures of the drainage service (centralized and decentralized) are available.
20	Economic affordability of the wastewater service	%	(dS43/dS44)*100	Burden of the drainage service on the average income of families in the WSO's area.
21	Reply to written complaints and suggestions (wastewater service)	%	(dS10/dS09)*100	Percentage of written complaints and suggestions that were replied up to 22 working days.
22	Total costs coverage (wastewater service)	(-)	dS41/dS42	Ratio between total revenue and total expenditure.
23	Wastewater infrastructure asset management	number	dS31	Infrastructure and asset management knowledge index with three levels: Level A = Map of the system; Level B = Registered information on the elements that integrate the system; Level C = Registered information on works made in the system.
24	Sewer rehabilitation	%/year	(dS21/dS20)*(100/5)	Average annual percentage of drainage pipes over 10 years old that were rehabilitated in the last five years.
25	Sewer collapses	number/(100km*year)	(dS13/dS19)*100	Number of breakdowns per 100km collector's length.
26	Emergency control discharges	%	[1-((dS12+dS30)/dS29)]*100	Percentage of dischargers, discharging directly to the environment, that are monitored and perform satisfactorily.
27	Wastewater analysis	%	(dS15/dS14)*100	Percentage of the total analysis, required by licensing or by law, that were made.
28	Compliance with discharge parameters (wastewater service)	%	((dS06 +dS07)/dS08)*100	Percentage of the population equivalent served by wastewater treatment plants in compliance with the discharge licensing.
29	Sludge disposal from public systems (wastewater service)	%	(dS33/(dS34+dS35+dS36-dS37))*100	Percentage of sludge from public wastewater treatment with appropriate destination.

30	Sludge disposal from individual systems (wastewater service)	%	(dS39/dS40)*100	Percentage of sludge from private wastewater treatment with appropriate destination.

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
1	Physical accessibility of the water service	%	Numerator	dA02	number	Number of households within the operator's area for which the infrastructures of the water supply service are available and connected.	dA03	number	Number of households within the operator's area for which the infrastructures of the water supply service are available but not connected.						
			Denominator	dA04	number	Total number of households within the operator's area.									
2	Economic affordability of the water service	%	Numerator	dA43	€/year	Average annual burden for a water consumption of 120 m3, within the OSO's area: dA43=12*dA45 where dA45 = approved tariff (€/10m3)									
			Denominator	dA44	€/year	Average family income within the WSO's area.									
3	Water service interruptions	number/(1000 household connections*year)	Numerator	dA10	number/year	Total number of failures in water supply during more than 6 hours.									
			Denominator	dA29	number	Total number of connections in service.									
4	Safe Water	%	Numerator	dA49	number/year	Total number of analyses made at consumers' tap, in compliance with the parametric values established by law.	dA46	number/year	Number of analyses at consumers' tap required by law that were made.						
			Denominator	dA47	number/year	Total number of analyses made at the consumers' tap.	dA48	number/year	Number of analyses at consumers' taps required by law.						
5	Reply to written complaints and suggestions	%	Numerator	dA06	number/year	Number of written replies to written complaints and suggestions sent up to 22 working days.									
			Denominator	dA05	number/year	Total number of written complaints and suggestions.									
6	Functional conformity of water meters	%	Numerator	dA08	number	Number of meters with updated periodic inspection.									
			Denominator	dA07	number	Number of existing meters.									
7	Frequency of water meter reading	number	Numerator	dA09	number	Number of actual meter readings made by the WSO during the reference period. According to the law, there should be at least 2 readings per year, no longer than 8 months between them.									
			Denominator	dA07	number	Number of existing meters.									
8	Disclosure of water quality data	number	Numerator	dA39	number	The index is calculated by adding points from level A and B, and it may vary between 0 and 100. Points from level B won't be considered if 20 points aren't achieved in level A. Level A – Water quality notice: 0 – the absence of a water quality notice; 10 – one water quality notice; 20 – four water quality notices. Level B – Disclosure of the water quality notice: +20 – WSO's website; +30 – App; +30 – Invoice and/or local newspaper.									
			Denominator												
9	Ways of water meters' readings	number	Numerator	dA40	number	The index is calculated by adding points from level A and it may vary between 0 and 100. Class A – Ways of meters' readings: +40 – Made by a WSO's worker; +20 – Phone; +20 – Email and/or website +20 – App.									
			Denominator												
10	Implementation of protection perimeters	%	Numerator	dA24	number	Number of water catchments with protection areas (immediate, intermediate and extended) in compliance with the regional law.									
			Denominator	dA30	number	Number of groundwater catchments under the WSO's responsibility.	dA31	number	Number of surface water abstractions under the responsibility of the managing entity. Examples of surface water abstraction are, for instance, abstractions from surface lakes and wells. All funding under the responsibility of the management entity that is operational must be accounted for,						

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
									regardless of whether or not they were used that year.						
11	Total costs coverage	(-)	Numerator	dA41	€/year	Total annual revenue from the water service.									
			Denominator	dA42	€/year	Total annual expenditure on the water service.									
12	Connection to the service	%	Numerator	dA02	number	Number of households within the operator's area for which the infrastructures of the water supply service are available and connected.									
			Denominator	dA02	number	Number of households within the operator's area for which the infrastructures of the water supply service are available and connected.	dA03	number	Number of households within the operator's area for which the infrastructures of the water supply service are available, but not connected.						
13	Non Revenue Water	%	Numerator	dA16	m3/year	Difference between the supplied water and the billed authorized consumption.									
			Denominator	dA13	m3/year	Volume of water, treated or not, that enters the system.									
14	Water infrastructure asset management	number	Numerator	dA38	number	The index is calculated by adding points from levels A, B and C, and may vary between 0 and 100. Points from levels B and C won't be considered if at least 10 points aren't achieved in level A. Level A – Map of the system (paper or SIG): 0 –absence of a map of the system on a scale between 1:500 and 1:2000; 10 – Map of system on a scale between 1:500 and 1:2000; 20 – Map of system on a scale between 1:500 and 1:2000, updated the previous year. Level B – Registered information on the elements that integrate the system: +10– Information on the pipes' structure (diameter and material); +10 –Information on the pipe's age; +10 – Location and description of the accessories; +10 –Location of connections on a record base. Level C – Registered information on works made in the system: +10 – Location and description of the works made; +10 –existence and implementation of a multiannual program for renovating connections; +10 – existence of a multiannual program for renovating pipes; +10 – implementation of a multiannual program for renovating pipes.									
			Denominator												
15	Mains rehabilitation	%/year	Numerator	dA28	km	Length of adduction and supply pipes over ten years old that were rehabilitated in the last five years.									
			Denominator	dA27	km	A fifth of the sum, for the last 5 years, of the length of the abduction and supply pipes over 10 years old.									
16	Total potable water storage capacity	days	Numerator	dA35	m3/year	Total capacity of adduction and supply water tanks (excluding private tanks).									
			Denominator	dA13	m3/year	Volume of water, treated or not, that enters the supply system. Includes exported treated water.									
17	Mains failures	number/(100km*year)	Numerator	dA11	number/year	Number of breakdowns during the reference period. Works related to leaks' control and breakdowns caused by third parties shall not be included.									
			Denominator	dA26	km	Total length of adduction and supply pipes.									
18	Fulfilment of the water intake licensing	%	Numerator	dA25	number	Number of licensed water catchments that fulfil the operating titles.									
			Denominator	dA30	number	Number of groundwater catchments under the WSO's responsibility.	dA31	number	Number of surface water catchments under the WSO's responsibility.						
19	Physical accessibility of public and	%	Numerator	dS02	number	Number of households within the operator's area for which the public infrastructures of wastewater drainage service are available and connected.	dS03	number	Number of households within the operator's area for which the public infrastructures of wastewater drainage service are available, but not connected.	dS04	number	Number of households within the operator's area with private infrastructures of wastewater drainage (septic tanks) for those			

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
	decentralised drainage services											the WSO provides the collection of sludge.			
			Denominator	dS05	number	Total number of households within the operator's area.									
20	Economic affordability of the wastewater service	%	Numerator	dS43	€/year	Annual burden for a water consumption 108 m3 (120 m3 x 0,9) within the WSO's area: dS43=12xdS45 where dS45 = approved tariff (€/m3).									
			Denominator	dS44	€/year	Average family income within the WSO's area.									
21	Reply to written complaints and suggestions (wastewater service)	%	Numerator	dS10	number/year	Number of written replies to written complaints and suggestions sent up to 22 working days.									
			Denominator	dS09	number/year	Total number of written complaints and suggestions.									
22	Total costs coverage (wastewater service)	(-)	Numerator	dS41	€/year	Total annual revenue from the wastewater drainage service.									
			Denominator	dS42	€/year	Total average expenditure from the wastewater drainage service.									
23	Wastewater infrastructure asset management	number	Numerator	dS31	number	The index is calculated by adding points from level A, B and C, and it may vary between 0 and 100. Points from level B and C won't be considered if at least 10 points aren't achieved in level A. Level A – Map of the system (paper or SIG): 0 –absence of a map of the system on a scale between 1:500 and 1:2000; 10 – Map of system on a scale between 1:500 and 1:2000; 20 – Map of system on a scale between 1:500 and 1:2000, updated the previous year. Level B = Registered information on the elements that integrate the system: +10 – Information related to the collectors (section, material year); +10 – information on the collectors' altimetry; +10 –location and description of accessories (lifting units, dischargers, retention basins, desanders); +10 –location of connections on a record base. Level C = Registered information on works made in the system: +10 – location and identification of works made in the system (maintenance repairs, unclogging, renovation and cleaning works); +10 – existence and implementation of a system inspection plan; +10 – existence of a multiannual plan for renovating collectors; +10 – implementation of a multiannual plan for renovating collectors.									
			Denominator												
24	Sewer rehabilitation	%/year	Numerator	dS21	km	Length of wastewater drainage pipes over ten years old that were rehabilitated in the last 5 years.									
			Denominator	dS20	km	A fifth of the sum, for the last 5 years, of the length of the wastewater drainage pipes over 10 years old.									
25	Sewer collapses	number/(100km*year)	Numerator	dS13	number/year	Number of structural breakdowns in collectors.									
			Denominator	dS19	km	Total length of wastewater drainage pipes managed by the WSO.									
26	Emergency control discharges	%	Numerator	dS12	number	Number of discharges at elevating units and wastewater treatment plants with daily monitoring of discharges.	dS30	number	Number of discharges at elevating units and wastewater treatment plants without daily monitoring of discharges.						
			Denominator	dS29	number	Number of existing emergency dischargers at elevating units and wastewater treatment plants.									
27	Wastewater analysis	%	Numerator	dS15	number/year	Total number of wastewater analyses required, by licensing or by law, that were made.									
			Denominator	dS14	number/year	Total number of wastewater analyses required, by licensing or by law.									

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
28	Compliance with discharge parameters (wastewater service)	%	Numerator	dS06	p.e.	Sum of the population equivalent served by wastewater treatment plants in compliance with the discharge license requirements.	dS07	p.e.	Sum of the population equivalent served by wastewater treatment plants with expired licenses, but in compliance with the previous license requirements, having filled a request for a new license.						
			Denominator	dS08	p.e.	Population equivalent served by wastewater treatment plants under the WSO's responsibility.									
29	Sludge disposal from public systems (wastewater service)	%	Numerator	dS33	tons/year	Total weight of sludge from the public system with an appropriate destination.									
			Denominator	dS34	tons/year	Total weight of sludge from the public system in storage by the beginning of the year.	dS35	tons/year	Total weight of sludge from the public system.	dS36	tons/year	Total weight of sludge from public systems managed by other operators.	dS37	tons/year	Total weight of sludge from the public system in storage by the end of the year.
30	Sludge disposal from individual systems (wastewater service)	%	Numerator	ds39	(t/year)	Sludge from septic tanks with an appropriate destination.									
			Denominator	dS40	(t/year)	Sludge from septic tanks collected.									

BELGIUM (BRUSSELS)

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
1	DW-Qual01: Drinking-water quality	%	DW-Qual01 = 100 x ([d2] + [d3] + [d4] + [d5]) / [d1]	Number of tests "ok" regarding the drinkability norms (for aesthetic tests [d2], micro-biological tests [d3], physicochemical tests [d4], radioactivity tests [d5]) on the total number of tests performed [d1]
2	CS-Sup02: Disruptions of drinking-water supply by number of connections	# /1000 connections	CS-Sup02 = ([d1] x 1000) / [d2]	Number of disruptions of drinking-water supply [d1] by the total number of connections [d2]
3	CS-Sup04: Restoration delays of drinking-water supply (after a leak)	min:sec	CS-Sup04 = [d1] / [d2]	Total interruption time of drinking-water supply (calculated on the closing and reopening of mains or connections) [d1] divided by the number of disruptions; after a leak is detected and repaired, for 90% of cases [d2].
4	DW-Fail03: Incidents by mains length	#/100km	DW-Fail03 = ([d1] + [d2]) x 100 / ([d3] + [d4] + [d5])	Incidents (due to a third parties [d1] and to the operator [d2]) by 100km of mains length for transport [d3], dispatching [d4] and distribution mains [d5]
5	DW-Monitor01: Electricity consumption for the production and transport of drinking water	kWh / m3	DW-Monitor01 = ([d1] + [d2]) / [d3]	Electricity consumption for the production [d1] and the transport [d2] of drinking water divided by the total drinking water volume produced [d3]
6	DW-Monitor02: Renewable energy bought	%	DW-Monitor02 = [d1] / [d2]	Energy bought from an energy supplier from a renewable source [d1] on the total energy bought [d2], for the activities of production and transport of drinking water
7	DW-Loss02: Infrastructure Leakage Index (ILI)	#	DW-Loss2 = [d1] / [d2]	Current annual real losses [d1] divided by the unavoidable real losses [d2].
8	DW-Loss03: Real losses by connections	l/ 1000connect	DW-Loss03 = ([d1] x 1000) / [d2]	Real losses in litters in one day [d1] divided by the total number of distribution connections [d2].
9	DW-Res01: Drinking-water consumption by inhabitants	m3 / inhabitant	DW-Res01 = [d2] / [d1]	Billed drinking water for domestic usage [d2] divided by the number of Brussels-Capital Region inhabitants [d1]
10	CS-Compl09: Satisfaction level of customers about drinking-water work-sites	%	CS-Compl09 = [d1]	Satisfaction level of customers answering the operator surveys about drinking-water work sites [d1]
11	UWW-Fail02: Incidents in the sewerage networks	# / day	UWW-VIV-Fail02 = [d1] / [d2]	Incidents in the sewerage networks reported ([d1] by the number of day of the reporting period [d2]
12	UWW-Treatm01: Sanitation quality	# days	UWW-Treatm01 = [d1] - [d2]	Total number of days for which the treated water doesn't conform to the sanitation requirements [d1] minus the non-conform days but occurring under exceptional conditions (recognized by European legislation) [d2]
13	UWW-Treatm04 : Control of sanitation effectiveness	%	UWW-Treatm04 = 100* [d1] / [d2]	Number of tests of sanitation quality performed divided [d1] by the required number of tests on a yearly basis [d2]
14	UWW-Treatm03: Degree of Tertiary Treatment of Urban Wastewater	%	UWW-Treatm03 = 100* [d3] / ([d1] + [d2] + [d3] + [d4])	Proportion of Urban Wastewater volume treated with processes dedicated to the removal of nutrients and/or pathogens (considered as a tertiary treatment level) [d3] in comparison with the total volume treated in the plant at a primary level only [d1], secondary [d2] or not treated [d4]
15	UWW-Sani02: Volume of treated urban waste-water	m3	UWW-Sani02 = [d1]	Volume of total urban waste-water processed by urban waste-water treatment plants [d1]
16	UWW-Sani03: Volume of treated UWW by population equivalent	m3 / PE	UWW-Sani03 = [d1] / [d2]	Volume of treated urban waste-water [d1] divided by population equivalent (calculated on BOD5) [d2]
17	UWW-Monitor01: Energy consumption in urban waste-water treatment plants	kWh / m3	UWW-Monitor01 = [d1] / [d2]	Energy consumption in urban waste-water treatment plants [d1] divided by the treated water on year basis [d2]
18	UWW-Monitor02: On-site energy production in UWWTPs	kWh	UWW-Monitor02 = [d1]	Volume of on-site energy production in urban waste-water treatment plants [d1]
19	UWW-Monitor03: Energy bought for UWWTPs	kWh	UWW-Monitor03 = [d1]	Energy bought for the treatment plants activities [d1]
20	UWW-Monitor04: Energy consumption for the collection of UWW	kWh / m3	UWW-Monitor04 = [d1] / ([d2])	Energy consumption of the sewerage network [d1] divided by the volume of urban waste-water processed by urban waste-water treatment plants [d2]
21	CS-Info01: Waiting time to reach the operator by phone call	min:sec	CS-Info01 = [d1]	Mean waiting time to reach the operator call-canter [d1].
22	CS-Meter05: Meters to replace	%	CS-Meter05 = 100 x [d1] / [d2]	Number of outdated meters [d1] divided by the total number of user meters in place [2].
23	CS-Bil06: Time to process relocation cases	days	CS-Bil06 = [d1]	Time to process relocation cases, following a user demand [d1].
24	CS-Bil01: Proportion of unpaid bills	%	CS-Bil01 = 100 x [d1] / [d2]	Amount (€) of unpaid bills [d1], divided by the total amount (€) of bills sent to the customers [d2]

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
25	DW-Transp05: Renewing rate of the drinking-water transport networks	%	DW-Tr05 = 100 x ([d1] + [d2]) / ([d3] + [d4])	Meters of the drinking-water transport [d1] and dispatching mains [d2] renewed divided by the total length of the transport [d3] and dispatching network [d4] calculated the year before
26	DW-Dis02: Replacement rate of the drinking-water distribution network	%	DW-Dis02 = ([d1] / [d2]) x 100	Length of distribution mains replaced [d1] on the total length of the distribution network the year before [d2]
27	DW-Dis01: Age index (NAX) of the distribution network	#	DWplan-Dis01 = 100 x (([length Material1] x [Real Age Material 1] / [Theoretical Age Material 1]) + ([length Material 2] x [Real Age Material 2] / [theoretical Age Material 2]) …) / ([Length Material 1] + [Length Material 2] + …)	Mean age of distribution mains in comparison with the expected technical lifetime of the network, depending on the length of the network by type of material (Asbestos Cement, Concrete, Gray cast iron, Ductile iron, PE, PVC,
28	DW-Connect01: Replacement rate of the drinking-water connections	%	DW-Connect01 = 100 x [d1] / [d2]	Number of replaced drink-water service connections [d1] divided by the total number of service connections of the network the year before [d2].
29	CS-Meter06: Replacement rate of the drinking water meters	%	CS-Meter06 = 100 x [d1] / [d2]	Number of replaced customer meters [d1] divided by the total number of meters the year before [d2].
30	UWW-Sew03: Renewing rate of the sewerage networks	%	UWW-VIV-Sew03 = 100 x ([d1]]) / [d2])	Length of renewed sewers [d1] divided by the total length of the sewerage network the year before (replacement and renovation) [d2].
31	HR-Train01: Training courses	h / FTEs	HR-Train01 = [d1] / [d2]	Hours of training [d1] per full-time equivalent [d2]
32	HR-Safe01: Work accidents	# / FTE	HR-Safe01 = [d1] / [d2]	Number of work accidents [d1] per full-time equivalent [d2]
33	UWW-Cost03: Operational costs of UWWTPs by population equivalent	€ / PE	UWW-Cost03 = [d1] / [d2]	Operational costs of UWWTPs [d1] by population equivalent[d2], calculated on BOD5.

BELGIUM (FLANDERS)

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
1	Collection effectiveness index (CEI)	%	(€ outstanding amount at beginning of period + € invoiced *amount* − € outstanding amount at the end of period) / (€ outstanding amount at beginning of period+€ invoiced amount− outstanding amount not due end of period)	The ratio compares what has been collected during the period with what could be collected.
2	Days sales outstanding (DSO)	days	[(€ *oustanding amount end of period*) / (€ *invoiced amount*)] *x* 365	The average time between the creation of the trade receivables and their collection.
3	Lost water/branch/day	litter	(# *liter non revenue water*) / (# *branches* ∗365)	The daily water loss per branch per day.
4	Infrastructure Leakage Index (ILI)	factor	(*current annual real losses (CARL)*) / (*unavoidable annual real losses (UARL)*) ((*water supplied to network−invoiced water−unbilled authorized consumption−illegal consumption−error due to inaccuracy of customer's water meters*)) / (6,57∗*km pipes* + 0,256∗ *number of branches* + 9,13∗*average length per connection*)∗*average pressure at house connection*)	IWA has established the Infrastructure Leakage Index (ILI), a performance indicator for comparisons of leakage management in water supply systems. The Infrastructure Leakage Index (ILI) is defined as the ratio of Current Annual Real Losses (CARL) to system-specific Unavoidable Annual Real Losses (UARL).
5	Number of first-line complaints per year per 1,000 customers	# complaints	(# Complaints registered at the operator) / (# *clients*∗1000)	Frequency of complaint handling First-line complaints: 2 options: - Any contact registered by the operator in its system following a 1st line customer demand, by the customer, when not satisfied with the answer to this customer question (0th line) provided by the operator, is considered closed. - Any manifest expression (explicit wish) of a customer to formulate a 'complaint' registered by the operator in its system. The ratio compares what has been collected during the period with what could be collected.
6	Average number of days between the date of receipt of the complaint and the date of notification of the attitude and measures	# days	∑ ("time of notification of operator's attitude and measures *to client − time of receipt of complaint by operator*) / (*registered complaints*)	The average time between the creation of the trade receivables and their collection.
7	Average number of days between receipt and closing of the complaint	# days	∑ (time of closing complaint in opertators´system (after measure) − time of receipt of a complaint by operator (receptive) / (#*registrered and receptive complaints received by operator*)	Average number of days between the date of receipt of an admissible complaint and the closing of the complaint in the system, after the measure has been taken
8	Percentage of complaints handled within the legal term	%	(*registered by operator complaints handled within the legal term*) / (# *registered by operator complaints*)	Percentage of complaints per drinking water company that have been treated within the legally prescribed terms.
9	Lead time to complete request for a new branch	median # days	∑ *leadtime from receipt to complete request* / (# *amount of received request*)	Median of all lead times, starting from the receipt of a request for a new branch to the time when the request is considered complete
10	Lead time for quotation (offer) new branch	median # days	∑*lead times from complete request to sending quotation* / (# *sent quotations*)	Median of all lead times, starting from the complete request for a new branch to the time when the quotation is sent,
11	Lead time for the implementation of new branch works	median # days	∑ lead time from customer confirmation to finishing work / (# *new branches*)	Median of all lead times, starting from the confirmation by the customer that the works can start (technically ready for execution) until the time when the works on a new branch have been completed (installation of the first water meter).
12	Lead time for road repair	median # days	∑*Lead time as from end of works till final road repair* / (# *new branches related to road repair*)	Median of all lead times from the moment the branch is installed on the site has been completed (placement of the first water meter) until the water company has definitively approved the road repair of the branch on the site.

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
13	Cost of a standard branch	€	∑ *Total cost of a standard branch*	
14	Average age of the pipeline in relation to the total number of meters of pipeline	years	$(\sum_{i=1}^{N}[Ai * Li]) / (\sum L)$	The average age of a pipe network of all pipe types in pipe material X weighted by length. i = all pipe types in pipe material X. N = the total number of pipe types in pipe material X. X = cement, cast iron, plastic, steel or other pipe materials.
15	Number of repairs of spontaneous leaks/breaks in pipes compared to the total number of meters of pipe	#/kilometre	*∑repaired leaks and breaks of all types of pipes* / (∑*L*)	Number of repairs of spontaneous leaks/fractures (i.e. not caused by third parties) for all pipe types per material type on an annual basis.
16	Percentage of pipe replacements compared to the total number of meters of pipe	%	*Total length of replaced pipesvan off all types* / (∑*L*)	
17	% Of the existing network that is older than the technical lifespan	%	*total length of pipes is older than the technical lifespan* / (∑*L*)	Percentage of existing pipes older than the technical lifespan (reference year see SNAX).
18	Total maintenance cost of the pipeline compared to the total number of meters of pipeline	€/metre	*total* maintenance cost of the pipelines (all types / (∑*L*)	
19	Standardized average age index (snax)	factor	$\sum_{i=1}^{N} La_i \frac{A_{act,i}}{A_{ref,i}}$	The SNAX tries to determine how old/new the pipeline network is on average. The technical life of each type of material is standardised for all drinking water companies. For this, use is made of the standardized technical ages of the European Benchmark Exercise. The SNAX produces a number between 0 and 1, with an SNAX of less than 0.4 for an 'average new network' and an SNAX greater than 0.6 for an 'average old network'. i = lead "i" N = the total number of pipes Reference year SNAX (source: European benchmark exercise): Asbestos Cement (70 years), Concrete (100 years), Gray cast iron (80 years), Ductile iron (100 years), PE (70 years), PVC (70 years), Steel (100 years) and Other (80 years).
20	Lead time between identifying a new potential risk (water quality) and determining the appropriate action(s)	days	in development	In development.
21	% Of issued consumption and final invoices based on effective meter reading	%	1 – [(*Number of original consumption and final invoices with a (precautionary) estimate*) / (*Total Number of consumption and final invoices*)]	If the meter reading is recorded and passed on by a meter reader or when the subscriber provides the meter reading to the water company itself, an invoice can be issued on the basis of the effective meter reading made. If the effective meter reading is not available, the water company can draw up the consumption or final invoice based on a (precautionary) estimate.
22	Degree of linkage of the number of domiciled persons	%	(*Number of inhabited addresses for which linking has been established*) / (*Total number of* inhabited addresses within a delivery area)	The extent to which the synchronisation of the internal databases for billing with external sources runs smoothly.
23	Cost of one invoice	€	in development	In development.

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
24	T	€/m³	[total costs drinking water activity - revenues drinking water activity received via a different channel than via the water invoice] / the estimated water consumption to be invoiced	The ratio between the total justified, reasonable resources of the drinking water activity in a year compared to the estimated water consumption to be invoiced in that year. The value of T results in a cost per m³ for the relevant year. Drinking water activity = All the activities of a water company that are necessary for the production and supply of drinking water to subscribers,

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
1	Collection Effectiveness Index (CEI)	%	Numerator	€ outstanding amount beginning of the period	€	- Total outstanding - dd 1/01/201X - TAX included - Including any additional reminder costs charged - For which the payment term has or has not expired - Independent of the invoice date	€ invoiced amount	€	- Total amount invoiced - With invoice dates from January 1 to December 31, 20XX - Including VAT - Including any additional reminder costs charged	€ outstanding amount at the end of the period	€	-Total outstanding balance - As of 31/12/20XX - Including VAT - Including any additional reminder costs charged - For which the payment term has or has not expired - Independent of the invoice date			
			Denominator	€ outstanding amount beginning of the period	€	- Total outstanding (€) - dd 1/01/201X - TAX included - Including any additional reminder costs charged - For which the payment term has or has not expired - Independent of the invoice date	€ invoiced amount	€	- Total amount invoiced - With invoice dates from January 1 to December 31, 20XX - Including VAT - Including any additional reminder costs charged	€ outstanding amount not due at the end of the period	€	- Total outstanding amount (€) - Per 31/12/20XX - TAX included - Including any additional reminder costs charged - For which the payment term has or has not expired - Independent of the invoice date			
2	Days Sales Outstanding (DSO)	days	Numerator	€ outstanding amount end of the period	€	- Total outstanding - dd 1/01/201X - TAX included - Including any additional reminder costs charged - For which the payment term has or has not expired - Independent of the invoice date									
			Denominator	€ invoiced amount	€	- Total amount invoiced - With invoice dates from January 1 to December 31, 20XX - Including VAT - Including any additional reminder costs charged									
3	Lost water/branch/ day	litter	Numerator	# litter non-revenue water	litre	Non-revenue water (NRW) is a volume of water which enters the distribution system but is lost before it reaches the customer.									
			Denominator	# branches	#										
4	Infrastructure Leakage Index (ILI)	factor	Numerator	amount of water delivered to the network	m³		Invoiced water	m³	not-invoiced legal consumption	not-invoiced legal consumption	m³	Estimation for the moment = 0,005 * NRW.	illegal consumption (estimation)	m³	= 0,002 * NRW
			Numerator	error due to inaccuracy of the water meters at the customer (estimation)	m³	Estimation for the moment = 0,02 * NRW									
			Denominator	*average pressure at house connection*	m		Length of pipes	km		amount of branches	#		average length per connection	km	the total length of the connection between the pipe and the water meter at the customer
5	Number of first-line complaints per year per 1,000 customers	# complaints	Numerator	# Complaints registered at the operator	#	- Total amount received 1st line complaints - registered in the operators' system -From 1st of January till 31st of December 201X -Before determining validity or admissibility - per type of complaint									
			Denominator	# clients	#	- Total amount of clients - Both household and non-household - registered in the operators' system - On 31st of December 201X									
6	Average number of days between the date of receipt of the complaint and the date of notification of	# days	Numerator	date of notification of the attitude and measures to the client	date	-Registered in the operator's system - Time when the notification of the attitude and measures was communicated to the customer - Both for admissible and inadmissible complaints - Both justified and unfounded complaints - For 1st line complaints registered between January 1 and December 31, 20XX - By type of complaint	time of reception complaint by the operator	date	-Time of reception of complaint by the operator - Before the determination of merit or admissibility - For 1st line complaints received between January 1 and December 31, 20XX - By type of complaint						
			Denominator	# amount registered complaints by the operator	#	- Total number of 1st line complaints received - Registered in a system with the operator - Between January 1 and December 31, 20XX - Before the determination of merit or									

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
	the attitude and measures					admissibility - By type of complaint									
7	Average number of days between receipt and closing of the complaint	# days	Numerator	time of closing of the complaint in the system by the operator after the measure has been taken	date	-Time when the complaint was registered by the operator - In the operator's system - After informing the customer and implementing the measures - Both justified and unfounded complaints - For 1st line complaints registered between January 1 and December 31, 20XX - By type of complaint	time of receipt of the complaint by the operator	date	- Time when the complaint is received by the operator - Before the determination of merit or admissibility - For 1st line complaints received between January 1 and December 31, 20XX - By type of complaint						
			Denominator	# admissible complaints registered by the operator	#	- Total number of 1st line complaints received - Registered in a system with the operator - Found to be justified (and therefore also admissible) - Between January 1 and December 31, 20XX - By type of complaint									
8	Percentage of complaints handled within the legal term	%	Numerator	*# registered by operator complaints handled within the legal term*	#	`- Total number of 1st line complaints received - Registered in a system with the operator - Between January 1 and December 31, 20XX - Before the determination of merit or admissibility - For which the time span between receipt of the complaint (registration of the complaint in the system) at the operator and - sending a notice of inadmissibility - or notification of the operator's attitude and measures to the customer was done within the legal term. - By type of complaint									
			Denominator	# admissible complaints registered by the operator	#	- Total number of 1st line complaints received - Registered in a system with the operator - Found to be justified (and therefore also admissible) - Between January 1 and December 31, 20XX - By type of complaint									
9	Lead time to complete request for a new branch	median # days	Numerator	Sum of all lead times from receipt of application to complete application	days	-Sum of all lead times from the time of receipt of the initial application for a new branch, until a request is considered complete - For all requests for a new branch made during the period from 1 January until December 31, 20XX, are considered complete - So including those for which the initial application is in 20Xx-1, provided the completion date is in 20XX									
			Denominator	Amount received and complete requests	#	- Total number of applications received - Which were considered complete - For which the date of completion of the application is in the period from 1 January until December 31, 20XX - So regardless of the time this application was initiated - Regardless of the channel through which they were received									
10	Lead time for quotation (offer) new branch	median # days	Numerator	Sum of all lead times from receipt of initial request to sending of quotation	days	- Sum of all lead times from the time an application for a new one branch is considered complete, until the moment of sending the offer to a customer - For all applications for which in the period from 1 January to 31 December 20XX, a quote was forwarded to the customer - So including those for which the initial application is in 20XX-1, provided the quote was sent in 20XX									
			Denominator	Amount of quotations sent	#	-Total number of quotes sent - During the period from January 1 to December 31, 20XX - Regardless of when the initial request for a new branch by a customer took place - Regardless of whether or not these have already been paid									
11		median # days	Numerator	Sum of all lead times from customer	days	- Sum of all lead times from confirmation by the customer that the works can start (technically ready for execution), until the installation of the									

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
	Lead time for the implementation of new branch works			confirmation till finishing branch 'works		branch on the site has been completed (placement of the first water meter) - For all new branches for which the first water meter in the period from 1 January has been posted up to and including 31 December 20XX - So including these branches that were installed in 20XX, but for which the customer confirmation already occurred in 20XX-1									
			Denominator	Total placed new branches	#	-Total number of new branches installed (includes all diameter types) - During the period from January 1 to December 31 - For which the end of work date (placement of the first water meter) is in the period from January 1 to December 31									
12	Lead time for road repair	median # days	Numerator	Sum of all lead times from termination of branch works to final road repair	days	-Sum of all lead times from the moment the branch is installed on the site has been completed (placement of the first water meter) until the road repair of the branch on the site has been finally approved by the water company - For all new branches for which a road repair was completed in the period from January 1, 20XX to December 31, 20XX - So including these branches for which the road repair was completed in 20XX, but for which the works themselves still took place in 201x-1 - Divided into the following types of road repair: (1) Pavements (asphalt, cobblestones, cobblestones) (2) Unpaved									
			Denominator	Number of new branches installed in relation to road repair	#	- Total number of new branches installed with road repair (includes all diameter groups) - During the period from January 1 to December 31, 20XX - For which the end of work date (placement of the first water meter) is in the period from January 1 to December 31 - Divided into the following types of road repair: (1) - Pavements (asphalt, cobblestones, cobblestones) (2) Unpaved									
13	Cost of a standard branch	€	Numerator	Total cost of a standard branch type 1	€/branch	- Total cost price, including cost of own personnel, overhead cost, material cost, costs contractor. - For the installation of a standard branch type 1: A. 10 meters long PE pipe Ø32 B. with 1 water meter (1Ø20) C. 1 'tap installation' D. for which road repair is required of max 2 m² of pavement (concrete paving stones) - dd 31/12/20XX - No VAT	Total cost of a standard branch type 2	€/branch	´- Total cost price, including cost of own personnel, overhead cost, material cost, costs contractor,… - For the installation of a standard branch type 2: A. 10 meters long PE pipe Ø63 B. with 8 water meters (7Ø20 and 1Ø40 as fire protection) C. 1 'tap installation' D. for which road repair is required of max 2 m² of pavement (concrete paving stones) - dd 31/12/20XX - No VAT						
			Denominator												
14	Average age of the pipeline in relation to the total number of meters of pipeline	years	Numerator	A = the age of pipe type 'Production' 'supply' or distribution' in pipe material X	years	Age per pipe segment of pipe types 'production', 'supply' and 'distribution', expressed in years, in pipe material: o cement; o Cast iron; o PE; o PVC; o Steel; o Other/Unknown; - dd 31/12/20XX	L = the length of pipe 'Production' 'supply' or distribution' in pipe material X	metre	´- Linked to the age, also the length of the relevant pipe segment of pipe types 'production', 'supply' and 'distribution' in the corresponding pipe material, expressed in meters - dd 31/12/20XX						
			Denominator	ΣL = total length of the pipe network of all pipe types in pipe material X (m)	metre	´- the total length of the relevant pipe segment of pipe types "production", "supply", and "distribution" in the corresponding pipe material expressed in meters - As of 31/12/20XX									

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
15	Number of repairs of spontaneous leaks/breaks in pipes compared to the total number of meters of pipe	#/kilometre	Numerator	# Performed repairs of spontaneous leaks and breaks on all pipe types in pipe material X	#	´- Sum of all repairs carried out of spontaneous leaks and ruptures on the pipeline type 'production', 'supply' and 'distribution': o cement; o Cast iron; o PE; o PVC; o Steel; o Other/Unknown; - During the period from January 1 to December 31, 20xx									
			Denominator	ΣL = total length of the pipe network of all pipe types in pipe material X (m)	metre	´- the total length of the relevant pipe segment of pipe types "production", "supply", and "distribution" in the corresponding pipe material expressed in meters - dd 31/12/20xx									
16	Percentage of pipe replacements compared to the total number of meters of pipe	%	Numerator	Total length of replaced pipes of all pipe types in pipe material X	metre	- Total length of replaced pipes of pipe types 'production', 'supply' and 'distribution' in pipe material: o cement; o Cast iron; o PE; o PVC; o Steel; o Other/Unknown; - Expressed in meters - During the period from January 1 to December 31, 20xx									
			Denominator	ΣL = total length of the pipe network of all pipe types in pipe material X (m)	metre	´- the total length of the relevant pipe segment of pipe types "production", "supply", and "distribution" in the corresponding pipe material expressed in meters. - As of 31/12/20xx									
17	% of the existing network that is older than the technical lifespan	%	Numerator	Total length of pipes in pipe material X older than technical lifespan	metre	- Total length of pipelines of pipeline types 'production', 'supply' and 'distribution' in pipeline material older than technical lifespan (technical lifespan = assumptions when calculating SNAX): o cement; o Cast iron; o PE; o PVC; o Steel; o Other/Unknown; - Expressed in meters - During the period from January 1 to December 31, 20xx									
			Denominator	ΣL = total length of the pipe network of all pipe types in pipe material X (m)	metre	- total length of the relevant pipe segment of pipe types "production", "supply", and "distribution" in the corresponding pipe material expressed in meters. - dd31/12/20xx.									
18	Total maintenance cost of the pipeline compared to The total number of meters of pipeline	€/metre	Numerator	Total maintenance cost of the pipelines	€	-Total maintenance cost of pipelines of pipeline type 'supply' and 'distribution'. - Maintenance costs include everything that keeps the assets in service and extends the life of the assets. - Includes preventive, corrective and periodic maintenance. - Expressed in Euro. - Exclusive of VAT. - During the period from January 1 to December 31, 201X									
			Denominator	ΣL = total length of the pipe network of all pipe types in pipe material X (m)	metre	- total length of the relevant pipe segment of pipe types "production", "supply", and "distribution" in the corresponding pipe material expressed in meters - dd31/12/20xx									
19		factor	Numerator	Aact,i	years	the current average age of pipeline "i".	Lai	%	Share of the length of pipeline group "i" in relation to the						

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
	Standardized Average Age Index (SNAX)								total length of the distribution network (%);						
			Denominator	Aref,i	years	the reference age of lead "i". It was used for this. Made from the standardised engineering ages of the European Benchmark Exercise (fibre and sidero cement – 85 years, gray and ductile iron – 90 years, PE – 70 years, PVC – 70 years and steel – 100 years).									
20	Lead time between identifying a new potential risk (water quality) and determining the appropriate action(s)	days	Numerator												
			Denominator												
21	% of issued consumption and final invoices based on effective meter reading	%	Numerator	Number of consumption and final invoices with a (precautionary) estimate	#	- The number of booked/created original consumption invoices and final invoices for which the water company invoices based on a (precautionary) estimate, excluding rectification invoices; - During the period from January 1 to December 31, 20XX									
			Denominator	Total number of original consumption invoices and final invoices	#	'- The sum of the number of booked/created original consumption invoices and final invoices, excluding rectification invoices; - During the period from January 1 to December 31, 20XX									
22	Degree of linkage of the number of domiciled persons	%	Numerator	Number of inhabited addresses for which linking has been established	#	- The number of inhabited addresses for which a link has been made with the data from the national register in the internal system (automatic + manual) - dd 31/12/20XX									
			Denominator	Total number of inhabited addresses in the delivery area	#	Total number of inhabited addresses in the delivery area - dd 31/12/20XX									
23	Cost of one invoice	€	Numerator												
			Denominator												
24	T	€/m³	Numerator	Total costs of drinking water activity	€	sum all costs (without reserve built-up)	Drinking water activity revenues that are received via a different channel than via the water bill	€							
			Denominator	Estimated water consumption to be invoiced	m³										

BULGARIA

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
1	PK1: Level of coverage with water service	%	(F1/iE5)*100	Level of number of population that receives water supply service in the WS operator service area against the total number of population in the service area
2	PK2a: Drinking water quality in large water zones	%	(iD51a/D51a)*100, where: iD51a=iD62a+iD63a+iD64a+iD65a, D51a=D62a+D63a+D64a+D65a	Level of performed analysis (indicator, microbiological, physics-chemistry and radioactive) that comply with legal standards against all performed analysis in large water supply zones
3	PK2b: Drinking water quality in small water zones	%	(iD51b/D51b)*100, where: iD51b=iD62b+iD63b+iD64b+iD65b, D51b=D62b+D63b+D64b+D65b	Level of performed analysis (indicator, microbiological, physics-chemistry and radioactive) that comply with legal standards against all performed analysis in small water supply zones
4	PK2c: Monitoring of drinking water quality	%	(iD98/iD99)*100	Level of fulfilment of drinking water quality monitoring
5	PK3: Continuity of water supply	ratio	(D35/F1*24*365)*1000, where D35n = F1n*H1n	Level of the total number of population affected by water supply stop, calculated by each stop duration (in hours) against total number of population supplied with water multiplied by 24 hours and number of days
6	PK4a: Water loss	m3/km/d	[(A3-iA10)/iC8]/365	Level of water loss (Non-revenue water) against network length
7	PK4b: Water loss	%	(iA21/A3) * 100	Level of water loss (Non-revenue water) against system inlet
8	PK5: Bursts in water networks	nr/100km/y	D28/C8*100	Level of number of bursts on water network against network length
9	PK6: Pressure in water networks	%	(iDMAm/iDMAt)*100	Level of number of district metering areas (DMAs) with constant flow/pressure measurement on DMA inlet and outlet and measurements in DMA critical point against all DMAs
10	PK7a: Level of coverage with sewer service	%	(wE4/iE5)*100	Provides the level of number of population that receives sewerage service in the WS operator service area against the total number of population in the service area
11	PK7b: Level of coverage with wastewater treatment service	%	(wE2/iE5)*100	Provides the level of number of population that receives wastewater treatment service in the WS operator service area against the total number of population in the service area
12	PK8: Wastewater quality	%	(iD97/iD98)*100	Level of number of performed samples on wastewater quality in accordance with discharge permits against number of all performed samples
13	PK9: Bursts in sewerage networks	nr/100km/y	(wD38a+wD38b+wD44)/wC1*100	Level of number of bursts on sewerage network against network length
14	PK10: Flooding in private properties from sewerage	nr/10000 consumers	wF14/E10*10000	Level of customer complaints for flooding in private properties due to sewerage network against all customers served by the WS operator
15	PK11a: Energy efficiency in the water supply	kWth/m3	zD1/A3	Level of electricity used for water supply against water at system inlet

16	PK11b: Energy efficiency in the wastewater treatment	kWth/m3	wD13/wA2	Level of electricity used for wastewater treatment against wastewater at WWTP inlet
17	PK11c: WWTP sludge utilization	%	(wA15/wA14)*100	Level of sludge from WWTPs (dry amount) that is produced in the year preceding the reported year and utilised until the end of the reported year against all sludge produced in the year preceding the reported year
18	PK11d: Water network rehabilitation	%	(D20/C8)*100	Level of rehabilitated water network against all network
19	PK11e: Active leakage control	%	(D9 / C8)*100	Level of the water network inspected with active leakage control equipment against all network
20	PK12a: Cost efficiency of water supply service	ratio	G1/G4	Level of revenues against operational costs for water supply service
21	PK12b: Cost efficiency of sewerage service	ratio	iwG1b/iwG4b	Level of revenues against operational costs for sewerage service
22	PK12c: Cost efficiency of wastewater treatment service	ratio	iwG1c/iwG4c	Level of revenues against operational costs for wastewater treatment service
23	PK12d: Debt collection	%	[iG99-(iG98-iG97)]/ (iG99+iG97)*100	Level of debt collection for WS services
24	PK12e: Efficiency of putting water meters in compliance	%	(iD45 / iE6)*100	Level of meters on water service connections that were put into compliance with legal metrological requirements during the reported year against all meters
25	PK12f: Efficiency of water meters	%	(iD44 / iE6)*100	Level of meters on water service connections that comply with legal metrological requirements until the end of the reported year against all meters
26	PK13: Customer complaints answers	%	(iF98/iF99)*100, where: iF98=F24+wF20+iF88; iF99=F23+wF12+iF89	Level of customer complaints that were answered in a 14-day period against all customer complaints in the reported year
27	PK14a: Connection to water network	%	(iE8/iE10)*100	Level of private properties connected to water network against all contracts for new connection
28	PK14b: Connection to sewerage network	%	(iwE8/iwE10)*100	Level of private properties connected to sewerage network against all contracts for new connection
29	PK15a: Personnel efficiency for water service	nr/1000 connections	B1/C24*1000	Level of equivalent full-time staff for water supply service against water service connections
30	PK15b: Personnel efficiency for sewerage and wastewater services	nr/1000 connections	wB1/C29*1000	Level of equivalent full-time staff for sewerage and wastewater treatment services against sewerage service connections

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
1	Level of coverage with water service	%	Numerator	F1	number	total number of the population according to the last census and demographic forecasts of the NSI, using water supply service in the WS operator service area									
			Denominator	iE5	number	total number of the population according to the last census and demographic forecasts of the NSI in the WS operator service area									
2	Drinking water quality in large water zones	%	Numerator	iD62a	number	total number of indicator analyses, performed by the WS operator, in compliance with legal requirements in large water supply zones	iD63a	number	total number of microbiological analyses, performed by the WS operator, in compliance with legal requirements in large water supply zones	iD64a	number	total number of physics-chemistry analyses, performed by the WS operator, in compliance with legal requirements in large water supply zones	iD65a	number	total number of radiological analyses, performed by the WS operator, in compliance with legal requirements in large water supply zones
			Denominator	D62a	number	total number of indicator analyses, performed by the WS operator in large water supply zones	D63a	number	total number of microbiological analyses, performed by the WS operator in large water supply zones	D64a	number	total number of physics-chemistry analyses performed by the WS operator in large water supply zones	D65a	number	total number of radiological analyses, performed by the WS operator in large water supply zones
3	Drinking water quality in small water zones	%	Numerator	iD62b	number	total number of indicator analyses, performed by the WS operator, in compliance with legal requirements in small water supply zones	iD63b	number	total number of microbiological analyses, performed by the WS operator, in compliance with legal requirements in small water supply zones	iD64b	number	total number of physics-chemistry analyses, performed by the WS operator, in compliance with legal requirements in small water supply zones	iD65b	number	total number of radiological analyses, performed by the WS operator, in compliance with legal requirements in small water supply zones
			Denominator	D62b	number	total number of indicator analyses, performed by the WS operator in small water supply zones	D63b	number	total number of microbiological analyses, performed by the WS operator in small water supply zones	D64b	number	total number of physics-chemistry analyses, performed by the WS operator in small water supply zones	D65b	number	total number of radiological analyses, performed by the WS operator in small water supply zones
4	Monitoring of drinking water quality	%	Numerator	iD98	number	number of water supply zones with performed monitoring by volume and frequency in compliance with legal requirements									
			Denominator	iD99	number	total number of water supply zones									
5	Continuity of water supply	ratio	Numerator	F1n	hours	duration of each water supply stop (additional requirements for repair works and duration of supply stops are provided)	F1n	number	Affected population in each water supply stop						
			Denominator	F1	number	total number of the population according to the last census and demographic forecasts of the NSI, using water supply service in the WS operator service area									
6	Water loss	m3/km/d	Numerator	A3	m3	total inlet of the water system	iA10	m3	total billed water to customers						
			Denominator	iC8	km	total length of water network (excluding length of service connections and network used to supply water to other operators)									
7	Water loss	%	Numerator	iA21	m3	non-revenue water									
			Denominator	A3	m3	total inlet of the water system									
8	Bursts in water networks	nr/100km/y	Numerator	D28	number	number of bursts on the water network, including armatures and fittings									
			Denominator	C8	km	total length of water network (excluding length of service connections)									

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
9	Pressure in water networks	%	Numerator	iDMAm	number	number of DMAs with constant flow/pressure measurement on DMA inlet and outlet and measurements in DMA critical point, with interval of data records on 15 minutes and data archive in electronic database									
			Denominator	iDMAt	number	total number of DMAs in the WS operator service area									
10	Level of coverage with sewer service	%	Numerator	wE4	number	total number of the population according to the last census and demographic forecasts of the NSI, using sewerage service in the WS operator service area									
			Denominator	iE5	number	total number of the population according to the last census and demographic forecasts of the NSI in the WS operator service area									
11	Level of coverage with wastewater treatment service	%	Numerator	F1	number	total number of the population according to the last census and demographic forecasts of the NSI, using wastewater treatment service in the WS operator service area									
			Denominator	iE5	number	total number of the population according to the last census and demographic forecasts of the NSI in the WS operator service area									
12	Wastewater quality	%	Numerator	iD97	number	number of performed samples on wastewater quality in accordance with discharge permits									
			Denominator	iD98	number	number of all performed samples required by the discharge permit									
13	Bursts in sewerage networks	nr/100km/y	Numerator	wD38a	number	number of blockages in the sewerage network	wD38b	number	number of blockages in sewerage service connections	wD44	number	number of bursts due to structural damages in the sewerage network			
			Denominator	wC1	km	total length of sewerage network									
14	Flooding in private properties from sewerage	nr/10000 consumers	Numerator	wF14	number	total number of customer complaints for flooding in private properties due to the sewerage network, registered by the WS operator									
			Denominator	E10	number	total number of customers served by the WS operator, that receive water supply service									
15	Energy efficiency in the water supply	kWth/m3	Numerator	zD1	kWth	total quantity of electricity used to abstract, treat and transport water for water supply service									
			Denominator	A3	m3	total inlet of the water system									
16	Energy efficiency in the wastewater treatment	kWth/m3	Numerator	wD13	kWth	total quantity of electricity used to treat wastewater in WWTP									
			Denominator	wA2	m3	total volume of wastewater at the WWTP inlet									
17		%	Numerator	wA15	tones dry substance	total amount of dry weight of the sludge from the WWTPs operated by the WSS operator, produced in the year preceding									

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
	WWTP sludge utilization					the reporting year and utilized by the end of the reporting year									
			Denominator	wA14	tones dry substance	total amount of dry weight of the sludge from the WWTPs operated by the WSS operator, produced in the year preceding the reporting year									
18	Water network rehabilitation	%	Numerator	D20	km	total length of rehabilitated water network									
			Denominator	C8	km	total length of water network (excluding length of service connections)									
19	Active leakage control	%	Numerator	D9	km	total length of the water network that was inspected with active leakage control equipment (including microphones, correlators and acoustic bearings), where hidden leaks are detected and repaired									
			Denominator	C8	km	total length of water network (excluding length of service connections)									
20	Cost efficiency of water supply service	ratio	Numerator	G1	BGN	total amount of revenues from water supply service according to regulatory accounting rules									
			Denominator	G4	BGN	total amount of OPEX for water supply service according to regulatory accounting rules									
21	Cost efficiency of sewerage service	ratio	Numerator	iwG1b	BGN	total amount of revenues from sewerage service according to regulatory accounting rules									
			Denominator	iwG4b	BGN	total amount of OPEX for sewerage service according to regulatory accounting rules									
22	Cost efficiency of wastewater treatment service	ratio	Numerator	iwG1c	BGN	total amount of revenues from wastewater treatment service according to regulatory accounting rules									
			Denominator	iwG4c	BGN	total amount of OPEX for wastewater treatment service according to regulatory accounting rules									
23	Debt collection	%	Numerator	iG99	BGN	total amount of revenues from WS services (including VAT)	iG98	BGN	total amount of receivables from consumers and suppliers at the end of the reported year	iG97	BGN	total amount of receivables from consumers and suppliers at the end of the previous year			
			Denominator	iG99	BGN	total amount of revenues from WS services (including VAT)	iG97	BGN	total amount of receivables from consumers and suppliers at the end of the previous year						
24	Efficiency of putting water meters in compliance	%	Numerator	iD45	number	meters on water service connections that were put in correspondence with legal metrological requirements (tested and newly installed meters) during the reported year									
			Denominator	iE6	number	all meters on water service connections									
25	Efficiency of water meters	%	Numerator			all meters on water service connections that are in compliance with legal metrological requirements until the end of the reported year									

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
			Denominator	iE6	number	all meters on water service connections									
26	Customer complaints answers	%	Numerator	F24	number	total number of answers in 14 days to customer complaints for water service	wF20	number	total number of answers in 14 days to customer complaints for sewerage and wastewater treatment services	iF88	number	total number of answers in 14 days to customer complaints for billing of WS services			
			Denominator	F23	number	total number of customer complaints for water service (including F16 - problems with pressure; iF17 - problems with water supply; F18 - problems with water quality; F19 - other	wF12	number	total number of customer complaints for sewerage and wastewater treatment services (including iwF13 - sewerage blockages; iwF14 - flooding in properties; iwF15 - problems with pollution, smell, rodents; wF16 - other	iF89	number	total number of customer complaints for billing of WS services			
27	Connection to water network	%	Numerator	iE8	number	number of private properties that have fulfilled contractual requirements and were connected to the water network									
			Denominator	iE10	number	all contracts for connection to water network that have fulfilled requirements for connection and the deadlines for connection expire until the end of the reported year									
28	Connection to sewerage network	%	Numerator	iwE8	number	number of private properties that have fulfilled contractual requirements and were connected to the sewerage network									
			Denominator	iwE10	number	all contracts for connection to sewerage network that have fulfilled requirements for connection and the deadlines for connection expire until the end of the reported year									
29	Personnel efficiency for water service	nr/1000 connections	Numerator	B1	number	total number of equivalent full-time staff for the water supply service									
			Denominator	C24	number	total number of water service connections									
30	Personnel efficiency for sewerage and wastewater services	nr/1000 connections	Numerator		number	total number of equivalent full-time staff for the sewerage and wastewater treatment services									
			Denominator		number	total number of sewerage service connections									

ESTONIA

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI	Numerator / Denominator	Variable 1		
						Index/ Name	Unit	Definition
1	Water loss	%	%	portion of water loss (non-revenue water) from derived groundwater	Numerator		m3	(Derived groundwater without water for production process - sales volume)
					Denominator		m3	Derived groundwater without water for the production process
2	Energy efficiency in the drinking water and/or wastewater treatment	kWh/m3	kWh/m3	electricity consumption divided by the derived groundwater amount and/or wastewater volume	Numerator		kWh or MWh	electricity consumption of water and wastewater treatment plants
					Denominator		m3	Derived groundwater and sales volume of wastewater treatment
3	Cost efficiency of water supply service	€/m3	€/m3	operational (controllable) costs divided by the sales volume of water service	Numerator		€	Controllable operational costs of water service
					Denominator		m3	Sales volume of drinking water and wastewater
4	Personnel efficiency for water service	nr/m3	nr/m3	stuff divided by the sales volume of water service	Numerator		person	employees of water service
					Denominator		m3	Sales volume of drinking water and wastewater
5	Labour cost efficiency for water service (apart from controllable operational costs)	€/m3	€/m3	labour costs divided by the sales volume of water service	Numerator		€	Labour costs of water service
					Denominator		m3	Sales volume of drinking water and wastewater
6	Other KPIs, when necessary in the price approval process (rarely used)				Numerator		€	
					Denominator		m3	

GEORGIA

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI	Numerator / Denominator	Variable 1		
						Index/Name	Unit	Definition
1	Drinking water quality	%	(1-(DWPCT / DWACT))*100%	Level of analyses that meet the requirements of the technical regulation of drinking water quality	Numerator	DWPCT	number	number of analyses that do not meet the requirements of the technical regulation of drinking water quality
					Denominator	DWACT	number	total number of drinking water analysis
2	Wastewater quality	%	(1-(WWPCT / WWACT))*100%	Level of analyses that meet the requirements of the technical regulation of wastewater quality	Numerator	WWPCT	number	number of analyses that do not meet the requirements of the technical regulation of wastewater quality
					Denominator	WWACT	number	total number of wastewater analyses
3	Level of coverage with water service	%	(DWC / POP) * 100%	Level of number of population that receives water supply service in the WS company service area against the total number of population in the service area	Numerator	DWC	number	number of consumers (soul) using water supply service in the WS company service area
					Denominator	POP	number	total number of population in the service area
4	Level of coverage with sewer service	%	(WWC / POP) * 100%	Level of number of population that receives sewer service in the WS company service area against the total number of population in the service area	Numerator	WWC	number	number of consumers (soul) using sewer service in the WS company service area
					Denominator	POP	number	total number of population in the service area
5	24/7 Water supply	Hour	(HCZi * hzi) / THC	average supply hours	Numerator	HCZi hzi	number	**HCZi** - number of consumers using water supply service in the certain zone of WS company service area. **hzi** - average supply hours in a certain zone of WS company service area, during the day.
					Denominator	THC	number	total number of population in the service area
6	Coverage index of fire hydrants	%	ExFH / NFH * 100%	level of number of fire hydrants in the water system	Numerator	ExFH	number	Number of existing fire hydrants
					Denominator	NFH	number	Number of necessary fire hydrants according to technical norms
7	Bursts in water networks	nr/100 km	(NBDW / DWPL) * 100	Level of number of bursts on water network against network length	Numerator	NBDW	number	number of bursts on the water network
					Denominator	DWPL	number	total length of the water network
8	Bursts in sewerage networks	nr/100 km	(NBWW / WWPL) * 100	Level of number of bursts on sewerage network against network length	Numerator	NBWW	number	number of blockages in the sewerage network
					Denominator	WWPL	number	total length of sewerage network
9	Infrastructure leaking index (ILI)	ratio	(FPW – BAC – UAC) / Uarl	Level of loss in the water supply system	Numerator	FPW BAC UAC	number	**FPW** - system input. **BAC** -billed authorised consumption. **UAC** - unbilled authorised consumption
					Denominator	UARL	number	UNAVOIDABLE ANNUAL REAL LOSSES (UARL)
10	Staff productivity index	nr/1000 connections	NS/NC * 1000	Level of staff for water supply and sewerage service against water and sewerage service connections	Numerator	NS	number	total number of staff for the water supply and sewerage service
					Denominator	NC	number	total number of water and sewerage service connections
11	Flexibility of water supply network	ratio	NAC / NI	How many consumers are not supplied with drinking water during one burst	Numerator	NAC	number	Number of consumers that don't have water at the time of burst in the water system
					Denominator	NI	number	Total number of burst

GREECE

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI	Numerator / Denominator	Variable 1			Variable 2		
						Index/ Name	Unit	Definition	Index /Name	Unit	Definition
1	Total Network Length	km	ΥΧΔ+ΛΧΔ	Sum of the water supply network length and the sewerage service network length	Numerator	ΥΧΔ	km	Length of Water Supply network	ΛΧΔ	km	Length of sewerage network
					Denominator						
2	Population Coverage by Water Supply Network	%	(YZB7/YBN9) *100	Percentage of the total population covered by WS Operators' water supply services	Numerator	YZB7	number	Total Population served by Water Supply Operators according to the last Census by the Greek statistical authority			
					Denominator	YBN9	number	Total resident population according to the last Population- Housing Census by the Greek statistical authority			
3	Population Coverage by Sewerage Network	%	(ΛZB7/ΛBN9) *100	Percentage of the total population covered by WS operators' sewerage services	Numerator	ΛZB7	number	Total Population served by WS Operators' sewerage services according to the last Census of the Greek statistical authority			
					Denominator	ΛBN9	number	Total resident population according to the last Population- Housing Census by the Greek statistical authority			
4	Unit Financial Cost of Water Supply and Sewerage Services	€/m3	(CC+OC+MC+AC)/ (Au. Con.)	Sum of the recorded capital, operational, maintenance and administrative costs (€) divided by the Authorized Water Consumption (m3)	Numerator	Total financial cost	€	Sum of the recorded capital (CC), operational OC), maintenance (MO and administrative costs AC)			
					Denominator	Authorized Consumption	m3	The volume of water used by metered and unmetered customers and the volume of water used for other purposes that is implicitly or explicitly authorised by the WS operator, including water used for flushing water mains and sewers, fire protection, street cleaning, public fountains and other municipal purposes regardless of whether the use is metered			
5	Unit Revenue by the provision of drinking water	€/m3	TR/(Au.Con.)	Total Revenue by the provision of drinking water (€) divided by the Authorized Consumption (m3)	Numerator	TR	€	Total revenue			
					Denominator	Authorized Consumption (Au.Con.)	m3	The volume of water used by metered and unmetered customers and the volume of water used for other purposes that is implicitly or explicitly authorized by the WS operator, including water used for flushing water mains and sewers, fire protection, street cleaning, public fountains and other municipal purposes regardless of whether the use is metered			
6	Water Losses	m3	SWA-Au.Con.	Quantity of Water entering the water network minus Authorised Consumption	Numerator	Supplied Water	m3	The total amount of water that enters the operators' network	Authorized Consumption	m3	The volume of water used by metered and unmetered customers and the volume of water used for other purposes that is implicitly or explicitly authorized by the WS operator, including water used for flushing water mains and sewers, fire protection, street cleaning, public fountains and other municipal purposes regardless of whether the use is metered
					Denominator	Authorized Consumption	m3	As above.			

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI	Numerator / Denominator	Variable 1			Variable 2		
						Index/ Name	Unit	Definition	Index /Name	Unit	Definition
7	Cost Recovery of the recorded financial cost for drinking water and sewerage services	%	WRU/ WFCU*100	The recorded unit revenue of drinking water supply and sewerage services (€/m3) divided by the recorded unit financial cost (€/m3) of drinking water supply and sewerage Services	Numerator	WRU	€/m3	Total Revenue of drinking water supply and sewerage services (€) divided by the authorized water consumption (m3)			
					Denominator	WFCU	€/m3	Sum of the recorded capital, operational, maintenance and administrative costs (€) divided by the Authorized Water Consumption (m3)			
8	Cost Recovery of the recorded Financial Cost for drinking water supply services	%	NRU/ NFCU*100	The recorded unit revenue of water supply services (€/m3) divided by the recorded unit Financial Cost (€/m3) for drinking water supply	Numerator	NRU	€/m3	Total Revenues of drinking water supply (€) divided by the Authorized Water Consumption (m3)			
					Denominator	NFCU	€/m3	Sum of the recorded capital, operational, maintenance and administrative costs (€) for drinking water supply divided by the Authorized Water Consumption (m3)			
9	Percentage (%) of days with restrictions in drinking water provision due to network damages	%	(ND/365)*100	The percentage with restrictions in drinking water provision due to network damages	Numerator	ND	number	Number of days with restrictions in drinking water provision due to network damages.			
					Denominator	365	number	Number of days for a typical calendar year			
10	Energy consumption for water distribution per m3	kWh/m3	YIN47/(Au.Con.)	Annual energy consumption for water distribution (kWh/yr.) divided by Authorized Consumption (m3)	Numerator	YIN47	(kWh/yr.)	Annual energy consumption for water distribution			
					Denominator	Au.Con.	m3	As above.			

HUNGARY

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
1	Service coverage (water)	%		(1) Derived data from the Central Statistical Office: the number of population connected to water services compared to the total population. (2) Own data: number of water connections compared to total connections.
2	Service coverage (wastewater)	%		(1) Derived data from the Central Statistical Office: the number of population connected to wastewater services compared to the total population. (2) Own data: number of wastewater connections compared to total connections.
3	Bursts (water)	unit/km		Number of bursts on the water network compared to the length of the network
4	Bursts (wastewater)	unit/km		Number of bursts on the wastewater network compared to the length of the network
5	Water loss	m³/km/day		Level of water loss (Non-revenue water) against network length
6	NRW	%		Level of water loss (Non-revenue water) against system inlet
7	Replacement rate (water)	%		Percentage of replaced water network compared to the total length of the network
8	Replacement rate (wastewater)	%		Percentage of replaced wastewater network compared to the total length of the network
9	Renewal rate (water)	%		Percentage of renewed water network compared to the total length of the network
10	Renewal rate (wastewater)	%		Percentage of renewed wastewater network compared to the total length of the network
11	Consumption	l/person/day, m³/household/year		Average consumption for household consumers and households
12	Energy efficiency (water)	kWh/m³		Level of electricity used for water supply compared to water inlet to the system
13	Energy efficiency (wastewater)	kWh/m³		Level of electricity used for wastewater treatment against wastewater at WWTP inlet

14	Energy production (own energy)	%		Level of electricity produced from own sources (biogas, solar power)
15	Wastewater treatment plant capacity	%		The actual capacity compared to the capacity in the wastewater treatment plant's licence
16	Wastewater treatment rate	%		The total volume of collected wastewater compared to the total amount of treated wastewater
17	Level of treated wastewater discharged to the environment	%		The total volume of collected wastewater compared to the total amount of wastewater discharged to the environment
18	Sludge utilization	%		Level of sludge from WWTPs (dry amount) and utilised compared to all sludge produced
19	Rate of revenues	%		The ratio of revenues from household consumers compared to the revenues from non-household consumers
20	ROS	%		Return on sales for operational efficiency
21	Personal efficiency (water)	person/1000 connections, person/m³		FTEs for 1000 connections and FTEs compared to the total water inlet
22	Personal efficiency (wastewater)	person/1000 connections, person/m³		FTEs for 1000 wastewater connections and FTEs compared to the total amount of collected wastewater
23	Cost efficiency (water)	%		Level of revenues compared to operational costs for water services
24	Cost efficiency (wastewater)	%		Level of revenues compared to operational costs for wastewater services
25	Debt collection rate	%		Level of debt collection for water and wastewater services
26	Customer complaints	%		Percentage of customer complaints answered in 20 days

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition
1	Service coverage (water)	%	Numerator		number	population connected to water services		number	number of connections for water services						
			Denominator		number	total population		number	total connections						
2	Service coverage (wastewater)	%	Numerator		number	population connected to wastewater services			number of connections for wastewater services						
			Denominator		number	total population			total connections						
3	Bursts (water)	unit/km	Numerator		number	number of bursts									
			Denominator		km	length of the water network									
4	Bursts (wastewater)	unit/km	Numerator		number	number of bursts									
			Denominator		km	length of wastewater network									
5	Water loss	m³/km/day	Numerator		m3	total inlet to the water system									
			Denominator		km	length of the water network									
6	NRW	%	Numerator		m3	non-revenue water									
			Denominator		m3	total inlet to the water system									
7	Replacement rate (water)	%	Numerator		km	replaced water network									
			Denominator		km	total length of the water network									
8	Replacement rate (wastewater)	%	Numerator		km	replaced wastewater network									
			Denominator		km	total length of the wastewater network									
9	Renewal rate (water)	%	Numerator		km	renewed water network									
			Denominator		km	total length of the water network									
10	Renewal rate (wastewater)	%	Numerator		km	renewed wastewater network									
			Denominator		km	total length of the wastewater network									
11	Consumption	l/person/day, m³/household/year	Numerator		litter	total household consumption		m³	total consumption						
			Denominator		person	total number of supplied consumers		household	total number of households						
12	Energy efficiency (water)	kWh/m³	Numerator		kWh	total quantity of electricity used to abstract, treat and transport water for water supply service									
			Denominator		m³	total inlet of the water system									
13	Energy efficiency (wastewater)	kWh/m³	Numerator		kWh	total quantity of electricity used to treat wastewater in WWTP									
			Denominator		m³	total volume of wastewater at the WWTP inlet									
14	Energy production (own energy)	%	Numerator		kWh	total quantity of electricity from own sources									
			Denominator		kWh	total quantity of electricity used for water and wastewater services									
15	Wastewater treatment plant capacity	%	Numerator		m³	the total amount of treated wastewater									
			Denominator		m³	the total licensed amount for wastewater treatment									
16	Wastewater treatment rate	%	Numerator		m³	total amount of collected wastewater									
			Denominator		m³	total amount of treated wastewater									
17		%	Numerator		m³	total amount of collected wastewater									

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition
	Level of treated wastewater discharged to the environment		Denominator		m^3	total amount of wastewater discharged into the environment									
18	Sludge utilization	%	Numerator		tones	total amount of dry weight of the utilized sludge from the WWTPs									
			Denominator		tones	total amount of dry weight of the sludge from the WWTPs									
19	Rate of revenues	%	Numerator		HUF	revenues from household consumers									
			Denominator		HUF	revenues from non-household consumers									
20	ROS	%	Numerator		HUF	revenues after tax									
			Denominator		HUF	total revenues									
21	Personal efficiency (water)	person/1000 connections, person/m^3	Numerator		person	total number of FTEs		person	total number of FTEs						
			Denominator		connections	1000 connections		m^3	total water inlet						
22	Personal efficiency (wastewater)	person/1000 connections, person/m^3	Numerator		person	total number of FTEs		person	total number of FTEs						
			Denominator		connections	1000 connections		m^3	total wastewater collected						
23	Cost efficiency (water)	%	Numerator		HUF	total amount of revenues from water services									
			Denominator		HUF	total amount of OPEX for water services rules									
24	Cost efficiency (wastewater)	%	Numerator		HUF	total amount of revenues from wastewater services									
			Denominator		HUF	total amount of OPEX for wastewater services									
25	Debt collection rate	%	Numerator		HUF	total amount of debts collected for WS services (including VAT)									
			Denominator		HUF	total amount of revenues from WS services (including VAT)									
26	Customer complaints	%	Numerator		number	customer complaints answered in 20 days									
			Denominator		number	total number of customer complaints									

IRELAND

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
1	Ease of telephone contact: Speed of telephone response			The CRU will monitor the percentage of calls picked up by an agent within 20 seconds
2	Ease of telephone contact: Call abandonment rate			The CRU will monitor the percentage of calls that are abandoned while a caller is waiting in the queue to speak to an agent, having been directed through the interactive Voice Recognition system.
3	Ease of telephone contact: First call resolution			The CRU will monitor the percentage of calls to Uisce Éireann that are dealt with within one phone call.
4	Billing of metered customers			The CRU will monitor (a) the number of bills based on a meter read as a percentage of bills issued to metered accounts and (b) the percentage of metered accounts billed during the year that received at least one bill based on a meter read.
5	Response to billing contacts			The CRU will monitor the percentage of billing contacts answered and closed out within 5 working days.
6	Response to complaints			The CRU will monitor the percentage of complaints: (a) responded to within 5 working days, either with a resolution or an outline plan of the proposed resolution, (b) to which a final decision is issued within 2 months.
7	Unresolved complaints upheld by the CRU CCT			The CRU will monitor the number of unresolved complaints upheld by the CRU Customer Care Team (CCT).
8	Customer Satisfaction Survey			The CRU will monitor Uisce Éireann's performance in a survey conducted by an independent research company engaged by Uisce Éireann.
9	Stakeholder Engagement			The CRU will monitor Uisce Éireann's engagement with its stakeholders through a stakeholder panel.
10	Security of Water Supply			The CRU will monitor (a) the overall Security of Supply Index and (b) the number of water resource zones in deficit and the population served by those resource zones.
11	Leakage			The CRU will monitor: (a) the amount of water lost on the public network and (b) the amount of water lost on customer supply pipes.
12	Interruptions to Supply			The CRU will monitor the minutes of lost supply from both planned and unplanned interruptions. The CRU will monitor the number of properties experiencing unplanned interruptions to their supply for more than 12 and 24 hours.
13	Drinking Water Quality			Percentage microbiological compliance, Percentage E.coli compliance, Percentage Enterococci compliance, Percentage chemical compliance, Percentage THM compliance, Percentage lead compliance.
14	Boil Water Notices and Drinking Water Restriction Notices			The CRU will monitor (a) The number of public supplies and the population served on Boil Water Notices for greater than 30 days and (b) The number of public supplies served on Drinking Water Restriction Notices for greater than 30 days.
15	Internal Sewer Incidents (Overload)			The CRU will monitor the number of properties affected by incidents where wastewater enters a building due to the overload of a sewer.

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
16	Internal Sewer Incidents (Other Causes)			The CRU will monitor the number of properties affected by an incident where wastewater enters a building caused by equipment failure in a sewer, blockage or collapse of a sewer.
17	Internal Sewer Incidents (Properties at Risk)			The CRU will monitor the number of properties considered to be at risk of having wastewater enter their premises, caused by overload (banded approach).
18	External Sewer Incidents (Overload)			The CRU will monitor the number of external flooding incidents due to the overload of a sewer.
19	External Sewer Incidents (Other Causes)			The CRU will monitor the number of external flooding incidents caused by equipment failure in a sewer, blockage or collapse of a sewer.
20	External Sewer Incidents (Properties at Risk)			The CRU will monitor the number of properties considered to be at risk of external sewer incidents, caused by overload (banded approach).
21	Incidents Relating to Wastewater			The CRU will monitor the number of incidents resulting from wastewater collection and treatment activities.
22	Wastewater agglomerations meeting Treatment Requirements: Agglomerations with no Wastewater Treatment			The CRU will monitor the number of agglomerations with no treatment or preliminary treatment only.
23	Compliance with the Emission Limit Values for Urban Wastewater Licences			Overall compliance with the emission limit values for wastewater licences. Compliance with BOD limit values for wastewater licences. Compliance with COD limit. Compliance with Suspended Solids limit. Compliance with Ortho Phosphate limit, where applicable. Compliance with Ammonia limit, where applicable.
24	Compliance with treatment requirements of the Urban Waste Water Treatment Directive.			The CRU will monitor the total number of agglomerations meeting the treatment requirements of the UWWTD.
25	Sludge Reuse and Disposal.			The CRU will monitor the percentage of drinking water and wastewater sludge that is disposed of in a satisfactory manner.
26	Energy Consumption			The CRU will monitor Uisce Éireann Total Primary Energy Requirement (TPER) in GWh.
27	Greenhouse Gas Emissions			The CRU will monitor Uisce Éireann energy-related emissions in CO2 equivalent in line with its reporting to the Sustainable Energy Authority of Ireland (SEAI)
28	Number of new Treatment Plants (water and wastewater)	No.		
29	Number of existing Treatment Plants Upgraded	No.		

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
30	Water Treatment Plant Capacity (i.e. total capacity from new/existing plants which have added capacity during RC3)	Ml/day		
31	Wastewater Treatment Plant Capacity	PE		
32	Number of Reservoirs upgraded	No.		
33	New Water mains	km		
34	Rehabilitated or lined mains	km		
35	Meters installed	No.		
36	New Sewers	km		
37	Rehabilitated sewers	km		
38	Number of Treatment Plants with Ortho-Phosphate Dosing	No.		
39	Number of Water Supplies removed from the EPAs RAL	No.		
40	Reduction in the number of properties with risk of Microbiological Non-Compliance	No.		
41	Reduction in the number of properties with a risk of THM Non-Compliance	No.		
42	Number of Lead Services replaced	No.		
43	Leakage Reduction	ML/day		
44	Additional Water Supply Capacity (i.e. additional capacity added during RC3)	ML/day		

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
45	Number of agglomerations removed from EPA's Priority Urban Area Action List	No.		
46	Wastewater treatment works compliant with the Urban Waste Water Treatment Directive	PE		
47	Number of Wastewater Treatment Plants overloaded serving >2000 population	No.		
48	Number of Wastewater Treatment Plants overloaded serving <2000 population	No.		
49	Number of Agglomerations in the ECJ Urban Waste Water Treatment Directives	No.		
50	Additional Wastewater Treatment Capacity	PE		
51	Number of Wastewater Treatment Plants compliant - EPA discharge increase ELVs	No.		

ITALY

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
1	Water losses per km (M1a)	mc/km/day	$M1a^a = WL^a_{TOT} / (365\times(Lp^a + 0{,}22*Ld^a))$	The ratio between water losses and main length in a specific year (mc/km/day) – it represents the impact of water infrastructure on losses (technical perspective)
2	Leakage rate (M1b)	%	$M1b^a = WL^a_{TOT} / \Sigma W^a_{IN}$	The ratio between water losses and water consumption in a specific year (%) – it represents the level of water conservation (environmental perspective)
3	Service interruptions (M2)	hours	$M2^a = \Sigma_I U^a_i * t^a_i / U^a_{tot,\ ACQ}$	Defined as the sum of yearly (planned and non-planned) interruption duration, multiplied by the no. of families (and other users) involved by each interruption and weighted on the families (and other users) served by operators – evaluation of interruptions impact
4	Incidence of non-drinkability orders (M3a)	%	$M3a^a = (\Sigma_I U^a_i * t^a_i / U^a_{tot,\ ACQ} * 365) * 100$	Ratio between no. of involved users and no. total users, multiplied by orders' duration
5	Non-compliant sample ratio (M3b)	%	$M3b^a = (C^a_{ACQ\text{-}cnc} / C^a_{ACQ\text{-}tot}) * 100$	Ratio between no. of non-compliant samples and no. of total analysed samples
6	Non-compliant parameters ratio (M3c)	%	$M3c^a = (P^a_{ACQ\text{-}cnc} / P^a_{ACQ\text{-}tot}) * 100$	Ratio between no. of non-compliant parameters and no. of total analysed parameters
7	Frequency of sewerage flooding/spill (M4a)	n/100 km	$M4a^a = ((All^a_m + All^a_b + Svers^a_n) / (L^a_m + L^a_b + L^a_n)) * 100$	No. of flooding and spills (depending on sewerage network type) occurred each 100 km of network (n/100 km)
8	Adequacy to the law of storm-overflow sewage (M4b)	%	$M4b^a = (Scar^a_{tot} - Scar^a_{norm}) / Scar^a_{tot}$	Ratio between no. of non-compliant storm-overflow and no. of total storm-overflow
9	Control of storm-overflow sewage (M4c)	%	$M4c^a = (Scar^a_{tot} - Scar^a_{ctrl}) / Scar^a_{tot}$	Ratio between no. of non-controlled storm-overflow and no. of total storm-overflow
10	Landfill sludge disposal (M5)	%	$M5^a = \Sigma^N_{imp=1} SS^a_{disc,imp} / \Sigma^N_{imp=1} SS^a_{out,imp}$	Ratio between landfill sludge disposal and total produced sludge , in terms of tonnes of dry substance (SS)
11	Exceeding limits wastewater samples ratio (M6)	%	$M6^a = \Sigma^{N*}_{imp=1}(C^a_{imp,DEP\text{-}cnc}) / \Sigma^{N*}_{imp=1}(C^a_{imp,DEP\text{-}tot})$	Ratio between no. of wastewater samples exceeding one **or** more emission limits and no. of total samples analysed by the operator
12	Starting and ending of contractual relations (MC1)	%	$MC1^a = \Sigma^{18}_{K=1} N^C_K / \Sigma^{18}_{K=1}(N^C_K + N^{nC}_K)$	It represents an aggregated evaluation of contractual KP's whose performances are related to estimates and execution of water connections and other works and to the activation and turn-off of water supply
13	Managing contractual relations and service access (MC2)	%	$MC2^a = \Sigma^{42}_{K=19} f_k * N^C_K / \Sigma^{42}_{K=19}[f_k * (N^C_K + N^{nC}_K)]$	It represents an aggregated evaluation of contractual KP's whose performances are related to dates, billing and payment rules, check of meters and pressure levels, answers to written requests by user and service desk

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition
1	Water losses per km (M1a)	mc/km/day	Numerator	WL^a_{TOT}	mc	Total losses volume in water provision infrastructures, defined as the difference between entering volumes (imported from other systems or abstracted from the environment) and the exit volumes (consumptions and exported volumes), included measured treatment losses and apparent losses (mc)									
			Denominator	Lp^a	km	Total main length (excluding connections) served on 31st December of year a (km)	$0,22*Ld^a$	km	It's a proxy of the total connection length served on 31st December of year a, defined as a % of distribution length (km)						
2	Leakage rate (M1b)	%	Numerator	WL^a_{TOT}	mc	See KPI n.1									
			Denominator	ΣWL^a_{IN}	mc	Entering volumes (imported from other systems or abstracted from the environment)									
3	Service interruptions (M2)	hours	Numerator	U^a_i	n.	number of families (and other users) involved by each single interruption	t^a_i	hours	duration of each single interruption						
			Denominator	$U^a_{tot,\ ACQ}$	n.	total users (as for domestic users, the number of families is counted) served by operator through water supply services									
4	Incidence of non-drinkability orders (M3a)	%	Numerator	U^a_i	n.	number of families (and other users) involved in each non-drinkability order	t^a_i	hours	duration of each single non-drinkability order						
			Denominator	$U^a_{tot,\ ACQ}$	n.	total users (as for domestic users, the number of families is counted) served by operator through water supply services									
5	Non-compliant sample ratio (M3b)	%	Numerator	$C^a_{ACQ\text{-}cnc}$	n.	total number of samples made by the operator in its distribution network (downstream of the treatment plant, where existing), resulting in not being compliant with national legislation									
			Denominator	$C^a_{ACQ\text{-}tot}$	n.	total number of samples made by the operator in its distribution network (downstream of the treatment plant, where existing)									
6	Non-compliant parameters ratio (M3c)	%	Numerator	$P^a_{ACQ\text{-}cnc}$	n.	total number of parameters analysed in the samples made by the operator in its distribution network (downstream the treatment plant, where existing), resulting in not being compliant with national legislation									
			Denominator	$P^a_{ACQ\text{-}tot}$	n.	total number of parameters analysed in the samples made by the operator in its distribution network (downstream the treatment plant, where existing)									
7	Frequency of sewerage flooding/spill (M4a)	n/100 km	Numerator	$(All^a_m+All^a_b)$	n.	number of flooding cases from mixed and white sewerage, registered by operator on 31st December of year a, which have determined inconveniences and danger versus environment and or users	$Svers^a_n$	n.	number of spill cases from black sewerage, registered by operator on 31st December of year a						
			Denominator	L^a_m	km	total length of mixed sewerage network	L^a_b	km	total length of white sewerage network	L^a_n	km	total length of black sewerage network			
8	Adequacy to the law of storm-overflow sewage (M4b)	%	Numerator	$Scar^a_{tot}$	n.	number of total storm-overflow served by operator	$Scar^a_{norm}$	n.	number of total storm-overflow served by operator and compliant with the law						
			Denominator	$Scar^a_{tot}$	n.	number of total storm-overflow served by operator									
9	Control of storm-overflow sewage (M4c)	%	Numerator	$Scar^a_{tot}$	n.	See KPI n.8	$Scar^a_{ctrl}$	n.	Number of the totally controlled storm-overflow served by operator						
			Denominator	$Scar^a_{tot}$	n.	See KPI n.8									
10		%	Numerator	$\Sigma^N_{imp=1} SS^a_{disc,imp}$	ton	sludge totally produced by all wastewater treatment plants and allocated to landfill disposal									

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition
	Landfill sludge disposal (M5)		Denominator	$\Sigma^{N}{}_{imp=1}SS^{a}{}_{out,imp}$	ton	sludge totally produced by all wastewater treatment plants									
11	Exceeding limits wastewater samples ratio (M6)	%	Numerator	$\Sigma^{N*}{}_{imp=1}C^{a}{}_{imp,DEP-cnc}$	n.	number of wastewater samples exceeding one or more emission limits									
			Denominator	$\Sigma^{N*}{}_{imp=1}C^{a}{}_{imp,DEP-tot}$	n.	number of total samples analysed by operator									
12	Starting and ending of contractual relations (MC1)	%	Numerator	$\Sigma^{18}{}_{K=1}N^{C}{}_{K}$	n.	number of total performances in the year within the expected standard (compliant performances)									
			Denominator	$\Sigma^{18}{}_{K=1}N^{nC}{}_{K}$	n.	number of total performances in the year out of the expected standard due to operator responsibility (not compliant performances)	$\Sigma^{18}{}_{K=1}N^{C}{}_{K}$	n.	number of total performances in the year within the expected standard (compliant performances)						
13	Managing contractual relations and service access (MC2)	%	Numerator	$\Sigma^{42}{}_{K=19}N^{C}{}_{K}$	n.	number of total performances in the year within the expected standard (compliant performances)	f_K	n.	scale factor, which assumes different values for each contractual index making up MC2						
			Denominator	$\Sigma^{42}{}_{K=19}N^{nC}{}_{K}$	n.	number of total performances in the year out of the expected standard due to operator responsibility (not compliant performances)	$\Sigma^{42}{}_{K=19}N^{C}{}_{K}$	n.	number of total performances in the year within the expected standard (compliant performances)	f_K	n.	scale factor, which assumes different values for each contractual index making up MC2			

KOSOVO

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
1	Drinking water quality	%	{W.1.A.01 x 0.75 + W.1.A.02 x 0.25} x 25%	Percentage of bacteriological, physical and chemical test results passing prescribed standards for bacteriological, physical and chemical quality during the reporting period
2	Pressure in the service area	%	{W.1.A.3 / number of served properties in the service area} x 5%	Average number of served properties (population) over the reporting period situated in zones that regularly experience pressure below minimum pressure levels. Does not include short-term intermittent periods of low pressure.
3	Continuity of water supply	%	Input number x 15% (if >23 hours a day); {W.1.A.07/Total properties served in the service area} x 15% (if 18-23 hours a day); {W.1.A.09/Total properties served in the service area} x 15% (if < 18 hours a day)	Average number of properties in the reporting period that enjoy continual water supply (excluding exceptional supply disruptions) for 23 or more hours per day.
4	Water service coverage	%	W.2.A.1/{(start year + end year total population in service area)/2} x 15%	Total number of population, according to the census over the reporting period, served with a piped water supply in the defined service area managed by RWCs.
5	Non-Revenue Water	%	{(Annual water production – Annual water sales) / Annual water production delivered into the system} x 25%	The total volume of NRW (water loss) divided by the total volume of water produced.
6	Cost efficiency for water services	%	If the cost per unit realized in relation to the plan is less than or equal to 90%, then RWC will receive 15%; If the cost per unit realized in relation to the plan is greater than 140%, RWC will receive 0% points; Unit costs between 90% and 140% are calculated by the formula below: {140% - (Realized cost / Planned cost) / 50%} x 15%	Total water costs (operational costs for production, distribution and business activity, including capital maintenance for these cost centres) in the reporting period divided by the volume of water sold in the same period.
7	The quality of discharged wastewater	%	{Tests passed / total no. of tests} x 20%	Percentage of wastewater treatment plant effluent quality tests passing prescribed standards for environmental quality in the reporting period.
8	Reliability of sewage system	No.	{S.1.B.01 / Length per 100 km of sewer network} x 20%	Number of reported incidents of sewer flooding reported to the RWC (or identified by RWC personnel) in the reporting period per 100 km of sewage network.
9	Coverage with wastewater services	%	{S.2.A.1 / ((start year + end year total households in service area)/2)} x 20%	Total number of population according to the census over the reporting period served with a sewer system in the defined service area managed by RWCs.
10	Coverage with wastewater treatment plants	%	{S.2.A.3 / ((start year + end year total households in service area)/2)} x 20%	Total number of population according to the census over the reporting period served with wastewater treatment plants in the defined service area managed by RWCs.
11	Cost efficiency for wastewater services	Unit cost	If the cost per unit realized in relation to the plan is less than or equal to 90%, then RWC will receive 20% of the scores; If the cost per unit realized in relation to the plan is greater than 140%, RWC will receive 0% of scores; Unit costs between 90% and 140% are calculated by the formula below: {140% - (Realized cost / Planned cost) / 50%} x 20%	Total wastewater costs (operational costs for collection and treatment, including capital maintenance for these cost centres) in the reporting period divided by the volume of wastewater sold in the same period.
12	Customer complaints	%	{Customer complaints solved on time/Total number of complaints received by RWCs} x 5%	Total number of complaints received by the RWC in relation to levels of service (poor water quality, pressure, reliability, disruption due to construction activities and other technical issues) in the reporting period + Total number of complaints received by the RWC in relation to levels of service (such as sewer overflows in the reporting period).

13	Quality of data/ reliability of data	%	If the reliability of the data determined by the audit process is 100%, the Company will receive 10% of the points. If the reliability of the data determined by the audit process is 0%, the Company will receive 0% of the points. If the reliability of the data is between 0% and 100%, the score is calculated with a simple formula as follows: {Data reliability scoring * 10%}	Presents the reliability and accuracy of the data determined by the audit process.
14	Return on Capital	%	F.2.B.01/ RoC_T If F.2.B.02 = 0%, the company gets 0% of the scores. If F.2.B.02 $\geq$ ROC_T = 10% {F.2.B.02 / ROC_T } x 10%	Return on capital is defined as a fair return on the regulatory capital value represented as annual income and capital growth from an investment expressed as a percentage of original investment divided by planned return on capital (RoC_T=4%).
15	Total revenue collection	%	If F.1.B.01 $\leq$ 60% = 0% If F.2.B.01 $\geq$ 100% = 10% If {(F.2.B.01 – 60%)/40% } x 10%	Total revenue collection efficiency is divided by the total amounts invoiced.

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
1	Drinking water quality	%	Numerator	W.1.A.01 and W.1.A.02	number	Total no. of bacteriological, physical and chemical tests performed by RWCs & NIPH in accordance with the water quality monitoring plan, which complies with the drinking water standards.		number	Number of bacteriological tests in compliance with the drinking water standards.		number	Number of physical and chemical tests in compliance with the drinking water standards.			
			Denominator		number	Total no. of bacteriological, physical and chemical tests performed by RWCs and NIPH in the service area - according to the water quality monitoring plan.		number	Total number of bacteriological tests performed by the RWCs and NIPH in the service area - according to the water quality monitoring plan.		number	Total number of physical and chemical tests performed by the RWCs and NIPH in the service area - according to the water quality monitoring plan.			
2	Pressure in the service area	%	Numerator	W.1.A.03 and W.1.A.04	number	Average number of properties/ customers having lower pressure than the minimum standard levels.									
			Denominator		number	Total number of properties/ customers connected to the network in the service area and managed by the RWCs									
3	Continuity of water supply	%	Numerator	W.1.A.05	number	Number of properties/ customers having regular water supply during the reporting period (>23 hours a day).	W.1.A.07	number	Number of properties/ customers having irregular water supply during the reporting period (18-23 hours a day).	W.1.A.09	number	Number of properties/ customers having irregular water supply during the reporting period (<18 hours a day).			
			Denominator	W.1.A.05	number	Total number of properties/customers connected to the network in the service are managed by the RWCs	W.1.A.05	number	Total number of properties/ customers connected to the network in the service are managed by the RWCs	W.1.A.05	number	Total number of properties/ customers connected to the network in the service are managed by the RWCs			
4	Water service coverage	%	Numerator	W.2.A.01 … W.2.A.04	number	Total number of population from the official census is connected to the water supply network and managed by the RWCs (licensed entities).									
			Denominator		number	Total number of population from the official census living in the service area managed by the RWCs (licensed entities).									
5	Non-Revenue Water	%	Numerator	W.1.B.01 … W.1.B.06	m3	Total volume of NRW (water loss) during the reporting period for the service area of RWCs.									
			Denominator		m3	Total volume of water produced and supplied by the RWCs to the service area.									
6	Cost efficiency for water services	%	Numerator		Euro/m3	Total water costs (operational costs for production, distribution and business activity, including capital maintenance for these cost centres)									
			Denominator		Euro/m3	Total volume of water sold in the reporting period									
7	The quality of discharged wastewater	%	Numerator	S.1.A.01	number	Total number of tests of effluent quality in compliance with the legal requirements for the reporting period.									
			Denominator		number	Total number of wastewater tests performed by RWCs for the reporting period.									
8	Reliability of sewage system	No.	Numerator	S.1.B.01	number	Total number of blockages/breaks/ incidents reported/ identified during the reporting period in the sewage network.									
			Denominator		km	Per 100 km of the length of the sewage system operated by the RWCs.									
9	Coverage with wastewater services	%	Numerator	S.2.A.02	number	Total number of population from the official census connected to the sewerage network managed by the RWCs									

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
			Denominator		number	Total number of population from the official census living in the service area of the RWCs									
10	Coverage with wastewater treatment plants	%	Numerator	S.2.A.03	number	Total number of population from the official census for which the wastewater discharges are treated in the WWTP.									
			Denominator		number	Total number of population from the official census living in the service area of the RWCs									
11	Cost efficiency for wastewater services	Unit cost	Numerator		Euro/m3	Total wastewater costs (operational costs for collection, treatment and business activity, including capital maintenance for these cost centres)									
			Denominator		Euro/m3	Total volume of wastewater sold in the reporting period									
12	Customer complaints	%	Numerator	W.2.C.01 and S.2.C.01	number	Total number of customer complaints for water supply and wastewater services that are addressed (solved) on time during the reporting period.									
			Denominator		number	Total number of customer complaints for water supply and wastewater services received during the reporting period.									
13	Quality of data/ reliability of data	%	Numerator		/	- If the reported data is fully documented and based on the company software applications (billing, finance and accounting software), and SCADA system for produced water, the reliability of data is considered 100%.			- If the reported data are kept on simpler applications, such as Excel files - the reliability of data is considered to be 50%.			- If the RWCs fail to provide any evidence -the reliability of data is considered 0%.			
			Denominator												
14	Return on Capital	%	Numerator	F.2.B.01	Euro	{(Regular Invoiced amounts other operational incomes subventions) - (operational costs +capital maintenance provisioning of bad debts)}									
			Denominator		Euro	Total value of assets regulatory base for water and wastewater									
15	Total revenue collection	%	Numerator	F.1.B.01	Euro	Total amounts of revenues collected for the reporting period									
			Denominator		Euro	Total invoiced amount for water and wastewater for the reporting period.									

LATVIA

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI	Numerator / Denominator	Variable 1		
						Index/Name	Unit	Definition
1	water loss	%	(W13/W12)*100	Volume of water lost related to emergencies, network servicing and measurement errors (non-revenue water) expressed as a percentage of water supplied into the network	Numerator	W13	m3	Volume of water lost (non-revenue water)
					Denominator	W12	m3	Volume of water supplied into the system
2	water loss	m3/km/year	W13/W2	Average volume of water lost per year related to emergencies, network servicing and measurement errors expressed per km of network	Numerator	W13	m3	Volume of water lost (non-revenue water)
					Denominator	W2	km	Length of pipeline
3	Amount of other wastewater drained into the centralised collecting system (infiltration)	%	(S13/S12)*100	Amount of the wastewater which has not been collected according to commercial meters, or the water consumption or wastewater norms used in the settlement of accounts (such as infiltration) expressed as a percentage of wastewater collected	Numerator	S13	m3	Infiltration
					Denominator	S12	m3	Total volume of wastewater treated
4	Amount of other wastewater drained into the centralised collecting system (infiltration)	m3/km/year	S13/S2	Amount of the wastewater which has not been collected according to commercial meters, or the water consumption or wastewater norms used in the settlement of accounts (such as infiltration) expressed per km of gravity sewer network	Numerator	S13	m3	Infiltration
					Denominator	S2	km	Length of gravity sewer pipeline
5	Amount of water supplied	m3/connection*/year	W9/W3	Amount of water supplied to customers per connection* per year. *PUC regulate water services until the proprietary border, which usually is a commercial meter which meters the total consumption of water and has been installed on the entry into a building. Therefore, we do not have information about the number of flat connections, only connections to buildings. Connections include both domestic and non-domestic customers	Numerator	W9	m3	Volume of water supplied to customers
					Denominator	W3	number	Number of connections
6	Amount of wastewater collected	m3/connection*/year	S6/S4	Amount of wastewater collected from customers per connection* per year. PUC regulates wastewater services until the proprietary border. Therefore, we do not have information about the number of flat connections, only connections to buildings.	Numerator	S6	m3	Wastewater collected from customers
					Denominator	S4	number	Number of connections
7	Number of accidents within the water management engineering networks	accidents/km/year	W10/W2	Total number of ruptures and other significant damages of the water supply engineering networks found in the reporting year.	Numerator	W10	number	Number of ruptures
					Denominator	W2		Length of pipeline
8	Number of accidents within the sewerage engineering networks	accidents/km/year	S10/S14	Total number of ruptures, blockages, cave-ins and other significant damages of the gravity sewerage engineering networks and sewerage pressure lines	Numerator	S10	number	Number of ruptures
					Denominator	S14	km	Length of pipeline
9	Average electricity consumption in water supply services	kWh/m3	W4/W12	Amount of electricity used for water supply services against water supplied into the system	Numerator	W4	kWh	Amount of electricity used for water supply services
					Denominator	W12	m3	Volume of water supplied into the system
10	Average electricity consumption in sewerage services	kWh/m3	S5/S12	Amount of electricity used for sewerage services against total volume of wastewater treated	Numerator	S5	kWh	Amount of electricity used for sewerage services
					Denominator	S12	m3	Total volume of wastewater treated
11	Proportion of new water supply pipelines	%	(W2.1/W2)*100	Length of water supply pipelines installed and renewed since 2000 against total length of water supply pipelines owned by WSO	Numerator	W2.1	km	Length of water supply pipelines installed and renewed since 2000
					Denominator	W2	km	Length of pipeline
12	Proportion of new sewerage system pipelines	%	(S14.1/S14)*100	Length of sewerage system pipelines installed and renewed since 2000 against the total length of sewerage system pipelines owned by WSO	Numerator	S14.1	km	Length of sewerage system pipelines installed and renewed since 2000 (gravity + pressure)
					Denominator	S14	km	Length of pipeline (gravity + pressure)
13	Investments in water supply system	EUR/m3	CW7/W9	Investments made in the reported year per m3 of water supplied to customers	Numerator	CW7	EUR	Investments made in the reported year
					Denominator	W9	m3	Water supplied to customers

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI	Numerator / Denominator	Variable 1		
						Index/Name	Unit	Definition
14	Investments in sewerage system	EUR/m3	CS7/S6	Investments made in the reported year per m3 of wastewater collected from customers	Numerator	CS7	EUR	Investments made in the reported year
					Denominator	S6	m3	Wastewater collected from customers
15	Total costs for water supply services	EUR/m3	CW2/W9	All costs, including capital costs, per m3 of water supplied to customers	Numerator	CW2	EUR	Total costs for water supply service
					Denominator	W9	m3	Water supplied to customers
16	Total costs for sewerage services	EUR/m3	CS2/S6	All costs, including capital costs, per m3 of wastewater collected from customers	Numerator	CS2	EUR	Total costs for sewerage system service
					Denominator	S6	m3	Wastewater collected from customers
17	Operational costs for water supply services	EUR/m3	(CW2-CW2.1)/W9	Operation costs (total costs minus capital costs) per m3 of water supplied to customers	Numerator	CW2-CW2.1	EUR	Operational costs for water supply service
					Denominator	W9	m3	Water supplied to customers
18	Operational costs for sewerage services	EUR/m3	(CS2-CS2.1)/S6	Operation costs (total costs minus capital costs) per m3 of wastewater collected from customers	Numerator	CS2-CS2.1	EUR	Operational costs for sewerage system service
					Denominator	S6	m3	Wastewater collected from customers
19	Total water supply service cost coverage	%	(CW1/CW2)*100	Revenue against total costs for water supply service	Numerator	CW1	EUR	Revenue from water supply service
					Denominator	CW2	EUR	Total costs for water supply service
20	Total sewerage system service cost coverage	%	(CS1/CS2)*100	Revenue against total costs for sewerage system service	Numerator	CS1	EUR	Revenue from sewerage system service
					Denominator	CS2	EUR	Total costs for sewerage system service
21	Payment collection effectiveness	%	(CWS4/(CW1+CS1))*100	Payments received within the reporting year for the provided water supply and sewerage system services against revenue	Numerator	CWS4	EUR	Payments received
					Denominator	CW1+CS1	EUR	Revenue from water supply and sewerage system service
22	Personal costs related to water supply services per unit	EUR/m3	CW2.2/W9	Personal costs per m3 of water supplied to customers	Numerator	CW2.2	EUR	Personal costs related to water supply services
					Denominator	W9	m3	Water supplied to customers
23	Personal costs related to sewerage system services per unit	EUR/m3	CS2.2/S6	Personal costs per m3 of wastewater collected from customers	Numerator	CS2.2	EUR	Personal costs related to sewerage system services
					Denominator	S6	m3	Wastewater collected from customers
24	Electricity costs related to water supply services per unit	EUR/m3	CW2.4.5/W9	Electricity costs per m3 of water supplied to customers	Numerator	CW2.4.5	EUR	Electricity costs related to water supply services
					Denominator	W9	m3	Water supplied to customers
25	Electricity costs related to sewerage system services per unit	EUR/m3	CS2.4.5/S6	Electricity costs per m3 metre of wastewater collected from customers	Numerator	CS2.4.5	EUR	Electricity costs sewerage system services
					Denominator	S6	m3	Wastewater collected from customers
26	Capital costs related to water supply services per unit	EUR/m3	CW2.1/W9	Capital costs per m3 of water supplied to customers	Numerator	CW2.1	EUR	Capital costs related to water supply services
					Denominator	W9	m3	Water supplied to customers
27	Capital costs related to sewerage system services per unit	EUR/m3	CS2.1/S6	Capital costs per m3 of wastewater collected from customers	Numerator	CS2.1	EUR	Capital costs related to sewerage system services
					Denominator	S6	m3	Wastewater collected from customers

LITHUANIA

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
1	Energy efficiency in water extraction and supply	kWh/m³/100mH2O	(((F14+F16)*100)/F40)/(F38+F39+F42)	Measures the efficiency in the preparation and provision of services in terms of electricity used
2	Energy efficiency in water preparation	kWh/m³	F21/F49	
3	Energy efficiency in wastewater collection	kWh/m³/100mH2O	(F17*100)/F47)/F45	
4	Energy efficiency in wastewater treatment	MWh/tonne	(F18*1000)/F49	
5	General labour efficiency	ratio	E210/(E108+E118+E119)	Measures the efficiency in the preparation and provision of services in terms of labour involved
6	Labour efficiency in water extraction	ratio	E215/E109	
7	Labour efficiency in water treatment	ratio	E221/E110	
8	Labour efficiency in water supply	ratio	E228/E111	
9	Labour efficiency in wastewater collection	ratio	E236/E112	
10	Labour efficiency in wastewater treatment	ratio	E256/E113	
11	Labour efficiency in mud treatment	ratio	E263/E114	
12	Labour efficiency in sales	ratio	E267/E117	
13	Value of contracts to nominal employee in water extraction	Eur.	E133/E215	Measures the level of services outsourced in each provided service
14	Value of contracts to nominal employee in water treatment	Eur.	E134/E221	

15	Value of contracts to nominal employee in water supply	Eur.	E135/E228	
16	Value of contracts to nominal employee in wastewater collection	Eur.	E137/E236	
17	Value of contracts to nominal employee in wastewater treatment	Eur.	E138/E256	
18	Value of contracts to nominal employee in sales	Eur.	E131/E267	
19	Number of nominal employees to administration employee number	num.	E210/E119	
20	Average employee salary	Eur.	none	
21	Maintenance and material cost of one water pump	Eur.	E147/E23	Measures the cost level of maintenance performed by WSO's own sources in each provided service
22	Maintenance and material cost of one water treatment machine	Eur.	E148/(E29+E39)	
23	Maintenance and material cost of 1 km drinking water pipe	Eur.	E149/(E47*(1+E207))	
24	Maintenance and material cost of 1 km wastewater pipe	Eur.	E151/(E72*(1+E208))	
25	Maintenance and material cost of one wastewater treatment machine	Eur.	E152/(E91+E92+E93)	
26	Contracted maintenance cost of one water pump	Eur.	E161/E23	Measures the cost level of maintenance performed by contractors in each provided service
27	Contracted maintenance cost of one water treatment machine	Eur.	E162/(E29+E39)	
28	Contracted maintenance cost of 1 km drinking water pipe	Eur.	E163/(E47*(1+E207))	
29	Contracted maintenance cost of 1 km wastewater pipe	Eur.	E165/(E72*(1+E208))	

30	Contracted maintenance cost of one wastewater treatment machine	Eur.	E166/(E91+E92+E93)	

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
1	Energy efficiency in water extraction and supply	kWh/m³/ 100mH2O	Numerator	F14	kWh	Amount of electricity used to pump water	F16	kWh	Amount of electricity used to supply water						
			Denominator	F40	m3	Amount of supplied water	F38	mH2O	Average weighted water lift length in water extraction	F39	mH2O	Average weighted water lift length in water treatment	F42	mH2O	Average weighted water lift length in water supply
2	Energy efficiency in water preparation	kWh/m³	Numerator	F21	kWh	Amount of electricity used to treat water									
			Denominator	F49	m3	Amount of treated water									
3	Energy efficiency in wastewater collection	kWh/m³/ 100mH2O	Numerator	F17	kWh	Amount of electricity used to collect wastewater									
			Denominator	F47	m3	Amount of wastewater collected	F45	mH2O	Average weighted water lift length in wastewater collection						
4	Energy efficiency in wastewater treatment	MWh/tonne	Numerator	F18	kWh	Amount of electricity used to treat wastewater									
			Denominator	F49	tonnes	Amount of wastewater treated									
5	General labour efficiency	ratio	Numerator	E210	num	Amount of nominal employees									
			Denominator	E108	num	Number of direct employees	E118	num	Number of indirect employees	E119	num	Number of administration employees			
6	Labour efficiency in water extraction	ratio	Numerator	E215	num	Total number of employees allocated to water extraction service									
			Denominator	E109	num	Number of direct employees allocated to water extraction service									
7	Labour efficiency in water treatment	ratio	Numerator	E221	num	Total number of employees allocated to water treatment service									
			Denominator	E110	num	Number of direct employees allocated to water treatment service									
8	Labour efficiency in water supply	ratio	Numerator	E228	num	Total number of employees allocated to water supply service									
			Denominator	E111	num	Number of direct employees allocated to water supply service									
9	Labour efficiency in wastewater collection	ratio	Numerator	E236	num	Total number of employees allocated to wastewater collection service									
			Denominator	E112	num	Number of direct employees allocated to wastewater collection service									
10	Labour efficiency in wastewater treatment	ratio	Numerator	E256	num	Total number of employees allocated to wastewater treatment service									
			Denominator	E113	num	Number of direct employees allocated to wastewater treatment service									
11	Labour efficiency in mud treatment	ratio	Numerator	E263	num	Total number of employees allocated to mud treatment service									
			Denominator	E114	num	Number of direct employees allocated to mud treatment service									
12	Labour efficiency in sales	ratio	Numerator	E267	num	Total number of employees allocated to sales service									
			Denominator	E117	num	Number of direct employees allocated to sales service									
13	Value of contracts to nominal employee in water extraction	Eur.	Numerator	E133	Eur	Value of outsourcing contracts in water extraction service									
			Denominator	E215	num	Total number of employees allocated to water extraction service									
14	Value of contracts to nominal employee in water treatment	Eur.	Numerator	E134	Eur	Value of outsourcing contracts in water treatment service									
			Denominator	E221	num	Total number of employees allocated to water treatment service									
15	Value of contracts to nominal employee in water supply	Eur.	Numerator	E135	Eur	Value of outsourcing contracts in water supply service									
			Denominator	E228	num	Total number of employees allocated to water supply service									
16	Value of contracts to nominal employee in wastewater collection	Eur.	Numerator	E137	Eur	Value of outsourcing contracts in wastewater collection service									
			Denominator	E236	num	Total number of employees allocated to wastewater collection service									

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
17	Value of contracts to nominal employee in wastewater treatment	Eur.	Numerator	E138	Eur	Value of outsourcing contracts in wastewater treatment service									
			Denominator	E256	num	Total number of employees allocated to wastewater treatment service									
18	Value of contracts to nominal employee in sales	Eur.	Numerator	E131	Eur	Value of outsourcing contracts in sales service									
			Denominator	E267	num	Total number of employees allocated to sales service									
19	Number of nominal employees to administration employee number	num.	Numerator	E210	num	Amount of nominal employees									
			Denominator	E119	num	Number of administration employees									
20	Average employee salary	Eur.	Numerator												
			Denominator												
21	Maintenance and material cost of one water pump	Eur.	Numerator	E147	Eur	Cost of maintenance and materials of pumps in drillings									
			Denominator	E23	num	Amount of pump in drillings									
22	Maintenance and material cost of one water treatment machine	Eur.	Numerator	E148	Eur	Cost of maintenance and materials of machinery in water treatment plants									
			Denominator	E29	num	Number of filters in treatment plants	E39	num	Amount of installed pumps in treatment plants						
23	Maintenance and material cost of 1 km drinking water pipe	Eur.	Numerator	E149	Eur	Cost of maintenance and materials of drinking water pipes									
			Denominator	E47	km	Length of underground pipes	E207								
24	Maintenance and material cost of 1 km wastewater pipe	Eur.	Numerator	E151	Eur	Cost of maintenance and materials of wastewater pipes									
			Denominator	E72	km	Length of wastewater pipes	E208								
25	Maintenance and material cost of one wastewater treatment machine	Eur.	Numerator	E152	Eur	Cost of maintenance and materials of machinery in wastewater treatment plants									
			Denominator	E91	num	Number of air pumps in wastewater treatment plants	E92	num	Number of pumps in wastewater treatment plants	E93	num	Number of other machines in wastewater treatment plants			
26	Contracted maintenance cost of one water pump	Eur.	Numerator	E161	Eur	Cost of purchased services of maintenance of drinking water pumps									
			Denominator	E23	num	Amount of pump in drillings									
27	Contracted maintenance cost of one water treatment machine	Eur.	Numerator	E162	Eur	Cost of purchased services of maintenance of drinking water treatment machines									
			Denominator	E29	num	Number of filters in treatment plants	E39	num	Amount of installed pumps in treatment plants						
28	Contracted maintenance cost of 1 km drinking water pipe	Eur.	Numerator	E163	Eur	Cost of purchased services of maintenance of drinking water pipes									
			Denominator	E47	km	Length of underground pipes	E207	ratio	Ratio of the average pump in drilling lift to underground drinking water pipe length						
29	Contracted maintenance cost of 1 km wastewater pipe	Eur.	Numerator	E165	Eur	Cost of purchased services of maintenance of wastewater pipes									
			Denominator	E72	km	Length of wastewater pipes	E208	ratio	Ratio of the average pump lift to underground wastewater pipe length						
30	Contracted maintenance cost of one wastewater treatment machine	Eur.	Numerator	E166	Eur	Cost of purchased services of maintenance of wastewater treatment machines									
			Denominator	E91	num	Number of air pumps in wastewater treatment plants	E92	num	Number of pumps in wastewater treatment plants	E93	num	Number of other machines in wastewater treatment plants			

MALTA

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
1	Total potable water supplied	m3	=Total sea water desalination product + Total GW production ± changes in reservoir levels from the previous year - Polishing plants reject	Total volume of water supplied to the distribution network (Total water available for use)
2	Percentage Populated served - water connection	%	=((No of registered consumers in active accounts)/(Total population as reported by NSO as at 31 December)) x 100	The population which are directly connected to the network as a percentage of the total population
3	Total potable water billed	m3	=Billed water + Accrued water not invoiced at the end of the period - Accrued water not invoiced at the end of the previous period	Total potable water billed is the amount of water deemed billed for the year, which is calculated as the actual billed amount plus accrual at the end of the period, less accrual brought forward from the previous period
4	Estimated Leakage	l/prop/day	=(((Minimum Night flow as measured by regions - (Legitimate Night Consumption x Day Factor)) + Estimated leakage from Reservoirs (from drop tests))/No of Account x No of days) x 1000	Total estimated annual real losses expressed in litres/property/day. It includes any losses between the reservoirs and/or abstraction/production sources.
5	Estimated Leakage	m3/km/day	=(((Minimum Night flow as measured by regions - (Legitimate Night Consumption x @Day Factor)) + Estimated leakage from Reservoirs (from drop tests))/No of km of networks x No of days) x 1000	Total estimated annual real losses expressed in m3/km /day. It includes any losses between the reservoirs and/or abstraction/production sources.
6	Direct operational cost (excluding cost of power) per unit supplied - potable water supply and distribution	€/m3	=(Operating costs Desalination – Energy Costs Desalination + Operating Costs Groundwater production – Energy Costs Groundwater production +Operating Costs Water distribution – Energy Costs Distribution)/(Total volume of water supplied)	This is the total direct expenditure for water supply less the expenditure for power expressed as a factor of the total volume of potable water supplied.
7	Direct Operational cost (including cost of power) of water per unit billed	€/m3	=(Operating costs Desalination + Operating Costs Groundwater production + Operating Costs Water distribution)/(Total volume of water billed)	This is the total direct expenditure for water supply, including the expenditure for power expressed as a factor of the total volume of potable water billed.
8	Total (Direct & Indirect) Operational cost of water per UNIT SUPPLIED	€/m3	= (Operating costs Desalination + Operating Costs Groundwater Production + Operating Costs Water distribution + Operating costs apportioned for water supply, i.e. Support Services, Planning and Design, Technical Support Services, Laboratory Services, Water metering and IT)/(Total volume of water supplied)	This is the total expenditure for water supply, inclusive of the expenditure for power, and expressed as a factor of the total volume of potable water supplied. Note Indirect costs are apportioned according to direct costs (water supply vs sewage services vs HPRW) – Refer to Table 5.5 OPEX.
9	Unaccounted for water (Non revenue water)	m3/km/day	=(Volume of unbilled potable water)/(km of network x no of days)	The amount of unbilled water expressed in m3/km/day.
10	Pipes bursts per 1,000 km (inclusive of all bursts on water mains and services detected through active leakage control)	No/000km	=(Total number of bursts service pipes and water distribution network/Total length of water network) x 1000	The total annual number of bursts located, including bursts on both network pipes and on service pipes and connections, expressed as a factor of 1000 km of pipework. This includes bursts detected through active leakage control. Note: Mains bursts include all physical repair work to mains from which water is lost which is attributable to pipes, fittings, or joint material failures or movement, or caused or deemed to be caused by conditions or original pipe laying or subsequent changes in ground conditions (such as changes to road formation and loading), where the costs of repair cannot be recovered from a third party.
11	Pipes bursts per 1,000 km (excluding of all bursts on mains and services detected through active leakage control)	No/000km	=(Total Number of bursts on water network and inclusive of service connections but excluding all bursts detected through active leakage control)/(Total length of water network)x1000	The annual number of bursts located, including bursts on both network pipes and on service pipes and connections, expressed as a factor of 1000 km of pipework. This indicator excludes bursts detected through active leakage control. Note: The number of pipe breaks, relative to the scale of the system, is a measure of the ability of the pipe network to provide a service to customers. The rate of water pipe breaks can also be seen as a surrogate for the general state of the network. However, it reflects operation and maintenance practices, too. Active leakage control is excluded in this indicator since intensive

				active leakage control may yield to a higher factor, giving the wrong impression of a deteriorated network compared to a network with minimal active leakage control.

MONTENEGRO

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
1	Continuity in Drinking Water Supply	%	100 * (p39v-p40v) / p39v	The Continuity in the Drinking Water Supply indicator is calculated as the ratio of the total number of user hours during which the public water supply system is in operation and the total number of user hours in the optimum operation of the system. The data on the number of hours of unplanned interruptions of service delivery includes the hours of interruptions caused by the repairing of breakdowns, disconnections and other adverse events, excluding interruptions under 30 minutes, planned disconnections notified to consumers in advance and being a part of the routine system maintenance, and temporary suspension of services due to the fault of consumers (such as non-payment of bills and unintentional consumption).
2	Water Quality	%	100 * p27v / p26v	This indicator is a ratio of the number of completed water quality analyses, the results of which are in accordance with the law, and the total number of completed analyses.
3	Water Supply Coverage	%	100* p01v / p01u	The Water Supply Coverage indicator represents the ratio of the number of inhabitants connected to the public water supply system and the total number of inhabitants on the territory of the local self-government unit. The data on the number of inhabitants in the territory of local self-government units was submitted by the utility undertakings on the basis of the data from the latest census (2011) or on the basis of an annual estimate of the population.
4	Non-revenue Water	%	100*(((p24v)-(p64v)) / p24v	Non-revenue Water is calculated as the ratio of the difference between the quantity of water produced, the amount of billed water and the total quantity of water produced. Also, it reflects the presence of technical and commercial water losses.
5	Water Meters Coverage	%	100 *(p46v) / (p55v)	This indicator represents the ratio of the number of consumers who have their individual metering devices and the total number of consumers.
6	Breakdowns per km of Water Supply Network	number/km	p35v / p13v	This indicator is calculated as the number of breakdowns that occur in the public water supply system divided by the length of the water supply network.
7	Sewerage Coverage	%	100* p01k / p01u	The Sewerage Coverage indicator is calculated as the ratio of the number of inhabitants connected to the public sewerage system and the total number of inhabitants in the territory of a local self-government unit. The utility undertakings used the data from MONSTAT to estimate the value of the data on the number of inhabitants on the territory of the LSGU.
8	Sewage Connection to Waste Water Treatment	%	100 * p14k / p38k	The Sewage Connection to Waste Water Treatment indicator is calculated as the ratio of the total amount of urban wastewater subjected to secondary or tertiary treatment and the total amount of billed wastewater collected by the public sewerage system.
9	Length of Inspected Sewerage Network	%	100* p22k / p04k	The Length of the Inspected Sewerage Network indicator is calculated as the ratio of the length of the inspected sewerage network and the total length of the sewerage network with connections.
10	Number of Blockages per kilometre of Sewerage Network	number/km	p18k / p04k	This indicator is calculated as the ratio of the total number of blockages in the sewerage network and the total length of the sewerage network with connections.
11	Effluent Quality Compliance	%	100 * p12p / p11p	The Effluent Quality Compliance indicator shows how many completed analyses of effluent quality were of satisfactory quality. The mentioned indicator is calculated as the ratio of the number of completed effluent quality analyses where the parameters are within the allowed limits and the total number of completed effluent quality analyses.
12	Degree of Secondary Treatment of Urban Wastewater	%	100* p09p / p06p	The indicator Degree of Secondary Treatment of Urban Wastewater is calculated as the ratio of the quantity of wastewater treated in the process of secondary treatment and the total quantity of wastewater taken for treatment.
13	Urban Wastewater Treatment Coverage	%	100* (p01p + p02p) / p01u	Urban Wastewater Treatment Coverage Indicator shows the share of the population from the territory of local self-government units whose urban wastewater, collected by the public sewerage system or by pumping septic tanks, is subjected to treatment.

14	Collection Efficiency	%	100 *p10u/p07u	This indicator is calculated as the ratio of collected and billed water and wastewater and directly affects the liquidity of utility undertakings.
15	Personnel Intensity	number/1000 consumers	1000 * (p02u - p01d) / (p55v)	The Personnel Intensity indicator or the indicator of the total number of staff per 1000 consumers, is defined as the ratio of the total number of employees and the total number of consumers. The resulting ratio is multiplied by 1000.
16	Operation Cost Coverage	%	100 *(p13u+p14u)/p27u	The ability to cover operation costs incurred in respect of utility activities by operating revenues is another feature of the efficiency of utility undertakings' performance. The Operation Cost Coverage indicator (excluding depreciation) is calculated as the ratio of operating revenues from water sales revenues and other operating revenues (excluding subsidies, grants and donations), and operating expenditures excluding depreciation. Given that this indicator represents financial performance, the data is obtained from the financial statements of the utility undertakings.
17	Number of Complaints per 1,000 Consumers	number	1000 * (p03z+p43v+p27k)/ p55v	The indicator of the Number of Complaints per 1,000 Consumers is calculated as the ratio of the number of complaints (related to public water supply service, the urban wastewater collection service and bills) and the total number of consumers. The resulting amount is multiplied by 1000.

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
1	Continuity in Drinking Water Supply	%	Numerator	p39v	h	Number of consumer hours in optimal system operation	p40v	h	Lost number of consumer hours due to failures, restrictions and other adverse events						
			Denominator							p39v	h	Number of consumer hours in optimal system operation			
2	Water Quality	%	Numerator	p27v	number	Number of analyses performed in accordance with the prescribed values									
			Denominator				p26v	number	Number of analyses performed						
3	Water Supply Coverage	%	Numerator	p01v	number	No. of Inhabitants in the municipality connected to the public water supply system by connections									
			Denominator				p01u	number	Total population in the municipality						
4	Non-revenue Water	%	Numerator	p24v	m³	Quantity of produced water in total	p64v	m³	Quantity of sold water, total						
			Denominator							p24v	m³	Quantity of produced water in total			
5	Water Meters Coverage	%	Numerator	p46v	number	Number of consumers measuring consumption through a meter in function									
			Denominator				p55v	number	Total number of customers (with and without water meters)						
6	Breakdowns per km of Water Supply Network	number/km	Numerator	p35v	number	Number of failures, total									
			Denominator				p13v	km	Length of water network						
7	Sewerage Coverage	%	Numerator	p01k	number	Inhabitants in the Municipality connected to the public sewage system									
			Denominator				p01u	number	Total population in the municipality						
8	Sewage Connection to Waste Water Treatment	%	Numerator	p14k	m³	The amount of wastewater transferred for treatment, total									
			Denominator				p38k	m³	Quantity of wastewater						
9	Length of Inspected Sewerage Network	%	Numerator	p22k	km	Length of sewerage network inspected									
			Denominator				p04k	km	Length of the sewage system with connections						
10	Number of Blockages per kilometre of Sewerage Network	number/km	Numerator	p18k	number	Total blockages									
			Denominator				p04k	km	Length of the sewage system with connections						
11	Effluent Quality Compliance	%	Numerator	p12p	number	Number of completed effluent analyses									
			Denominator				p11p	number	Number of prescribed effluent analyses						

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4		
				Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
12	Degree of Secondary Treatment of Urban Wastewater	%	Numerator	p09p	m³	The quantity of wastewater purified by secondary treatment									
			Denominator				p06p	m³	Total quantity of wastewater taken for treatment, total						
13	Urban Wastewater Treatment Coverage	%	Numerator	p01p	number	Inhabitants in the Municipality who have the service of scrubbing the wastewater of the sewage connection	p02p	number	Inhabitants who receive the service of purification of wastewater by discharge of septic tanks						
			Denominator							p01u	number	Total population in the municipality			
14	Collection Efficiency	%	Numerator	p10u	EUR	Collected in total									
			Denominator				p07u	EUR	Billed total						
15	Personnel Intensity	number/1000 consumers	Numerator	p02u	number	Total number of employees	p01d	number	Number of employees in other services						
			Denominator							p55v	number	Total number of customers (with and without water meters)			
16	Operation Cost Coverage	%	Numerator	p13u	EUR	Total operational revenues	p14u	EUR	Other operational income						
			Denominator							p27u	EUR	Operating expenses			
17	Number of Complaints per 1,000 Consumers	number	Numerator	p03z	number	Complains on bills	p43v	number	Total number of complaints about the water supply service	p27k	number	Total number of complaints about wastewater collection service			
			Denominator										p55v	number	Total number of customers (with and without water meters)

NORTH MACEDONIA

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI	Numerator / Denominator	Variable 1			Variable 2		
						Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
1	Level of coverage with water service	%	(N/D)*100	Level of number of population that receives water supply service in the WS operator service area against the total number of population in the service area	Numerator	N	number	Population with easy access to water services (either with a direct service connection or within reach of a public water point)			
					Denominator	D	number	total population under utility's nominal responsibility, expressed in percentage			
2	Continuity of water supply	ratio	N/D	Average hours of water supply in one day	Numerator	N	hours	hours of water supply			
					Denominator	D	day	24 hours			
3	Non-revenue water	%	(N-N1)/D	Difference between water supplied and water sold (i.e. the volume of water "lost") expressed as a percentage of net water supplied	Numerator	N1	number	System Input volume	N2	number	total water bill
					Denominator	D	number	System Input volume			
4	Non-revenue water	m3/km/day		Difference between water supplied and water sold (i.e. volume of water "lost") expressed per km of water distribution network per day	Numerator						
					Denominator						
5	Payment efficiency	%	N/D	Level of debt collection for WS services	Numerator	N	number	amount billed during the year			
					Denominator	D	number	annual payment from customers			
6	Maintenance costs	mkd/ connections		mkd/ connections	Numerator		number	Annual water service expenses			
					Denominator		number	water service connections			
7	Water service operational costs	mkd /m3 sold/year	mkd /m3 sold/year	Annual water service operational expenses	Numerator	N	number	Annual water service operational expenses			
					Denominator	D	number	Total annual volume sold			
8	Water Consumption	litres/person/ day	litres/person/ day	Amount of water sold to customers expressed in terms of litres/person/day	Numerator	N	number	Amount of water sold to customers			
					Denominator	D	number	Day			
9	Bursts in water networks	nr/100km/y	N/D/D1	Level of number of bursts on water network against network length	Numerator	N	number	number of bursts on the water network, including armatures and fittings	D1	number	year
					Denominator	D	number	total length of water network (excluding length of service connections)			
10	Number of employees	nr/1000 connections	N/D	Level of equivalent full-time staff for water supply service against water service connections	Numerator	N	number	full-time staff for water supply service			
					Denominator	D	number	water service connections			

PORTUGAL

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
1	AA01 - Service coverage	%	AA01b = (dAA19b+dAA20b)/dAA21b x 100	Percentage of the total number of housing units located in the operator's area of intervention for which water distribution service infrastructures are available.
2	AA02 - Affordability of the service	%	AA02b = dAA104b / dAA106b x 100	Weight of the annual charge related to the water supply service in the average disposable income of the households resident in the system's area of intervention.
3	AA03 - Service interruptions (Bulk systems)	No./(delivery point . year)	AA03a = dAA41a / dAA23	Weighted average number of failures, lasting more than 4 hours, per delivery point, where the weighting factor is the number of housing units with an effective bulk service that depends on each delivery point.
4	AA03 - Service interruptions (Retail systems)	No./(1000 service connections . year)	AA03b = dAA42b / dAA29b x 1000	Number of water connections affected by service interruptions, lasting more than 4 hours, per 1000 water connections.
5	AA04 - Safe water	%	AA04b = (dAA44b / dAA46b) x (dAA47b / dAA45b) x 100	Percentage compliance of the sampling frequency multiplied by the percentage compliance with the parametric values established in the legislation on parameters subject to routine control 1, routine control 2 and inspection control, as defined in the Water Quality Control Plans approved by ERSAR, pursuant to the legal regime in force.
6	AA05 - Response to complaints, suggestions and information requests	%	AA05b = [0.6 x (dAA84b + dAA86b) / (dAA83b + dAA85b) + 0.4 x (dAA88b + dAA90b) / (dAA87b + dAA89b)] x 100	Percentage of complaints, suggestions and information requests, both written and by telephone, that received a written and/or auditable answer within the indicated time limit.
7	AA06 - Cost recovery	%	AA06b = dAA100b / (dAA103b - dAA101b - dAA102b) x 100	Ratio between the tariff or equivalent revenues and total costs minus other revenues and investment subsidies.
8	AA07 - Connection to the service	%	AA07b = dAA19b / (dAA19b + dAA20b) x 100	Percentage of the total number of housing units located in the operator's area of intervention for which the water distribution service infrastructures are available with an effective service (existence of a water connection and contract, even if temporarily suspended during part of the year under review).
9	AA08 - Non-revenue water	%	AA08b = dAA60b / dAA48b x 100	Percentage of water entering the system that is not charged.
10	AA09 - Mains rehabilitation	%/year	AA09b = dAA28b / dAA27b x 100 / 5	Annual average percentage of adduction and distribution mains length aged more than ten years old that were rehabilitated in the past five years.
11	AA10 - Mains failures	No./(100 km . year)	AA10b = dAA43b / dAA26b x 100	Number of breakdowns per 100 km of mains.
12	AA11 - Adequacy of treatment capacity use	%	AA11b = dAA71b / dAA38b x 100	Percentage of the treatment capacity used in the peak production period.
13	AA12a - Adequacy of human resources in water adduction and treatment (Bulk systems)	No./(106 m3 . Year)	AA12a = (dAA13a + dAA14a) / dAA67ab x 106	BULK INDICATOR ONLY - Total number of full-time equivalent workers allocated to adduction and treatment in the water supply service per volume of exported treated water.
14	AA13 - Adequacy of human resources in water treatment (Retail systems)	No./(106 m3 . Year)	AA13b = (dAA15b + dAA16b) / dAA65b x 106	Total number of full-time equivalent workers allocated to water treatment per volume of water treated at treatment plants.
15	AA14 - Adequacy of human resources in water distribution (Retail systems)	No./1000 service connections	AA14b = (dAA17b + dAA18b) / dAA29b x 1000	Total number of full-time equivalent workers allocated to the water distribution service per 1000 service connections.
16	AA15ab - Real water losses (Bulk systems and retail systems with service connection density less than 20 service connections per km)	m3/(km . day)	AA15ab = dAA62ab / (dAA26ab x 365)	Volume of real losses per unit of mains length.
17	AA15b - Real water losses (Retail systems)	l/(service connection . day)	AA15b = (dAA62b / dAA29b) x (1000 / 365)	Volume of real loss per service connection.
18	AA16 - Energy efficiency of pumping facilities	kWh/(m3 . 100 m)	AA16b = dAA72b / dAA73b	Standard average energy consumption of pumping facilities.
19	AA17 - Treatment sludge production	kg/m3	AA17b = dAA81b / dAA65b x 1000	Sludge produced at water treatment plants per unit of volume of treated water.
20	AA18 - Self-produced energy	%	AA18b = dAA74b / dAA75b x 100	Percentage of energy produced by the operator in relation to the total energy consumed at the facilities allocated to the water supply service.
21	AR01a - Service coverage (Bulk systems)	%	AR01a = (dAR28a + dAR29a) / dAR27a x 100	BULK INDICATOR only - Percentage of the total number of housing units established in the operator's contract for which there are bulk infrastructures that are actually connected or able to be connected to the retail system.
22	AR02b - Service coverage through network and septic tanks (Retail systems)	%	AR02b = (dAR20b + dAR21b + dAR22b) / dAR26b x 100	Percentage of the total number of housing units located in the operator's intervention area for which collection and drainage service infrastructures through fixed networks are available or for which there are individual wastewater sanitation solutions controlled by the operator (with the sludge and/or sewage removal service being provided by the operator) in locations without an available fixed network.
23	AR03 - Affordability of the service	%	AR03b = dAR106b / dAR108b x 100	Weight of the annual charge related to the urban wastewater management service in the average disposable income of the households resident in the system's area of intervention.
24	AR04a - Flooding occurrences (Bulk systems)	No./100 km of sewers.year	AR04a = dAR53ab / dAR31ab x 100	Number of flooding occurrences on public roads and/or properties, originating from the public network of wastewater sewers per 100 km of sewers.
25	AR04b - Flooding occurences (Retail systems)	No./(1000 service connections . year)	AR04b = dAR53ab / dAR37b x 1000	Number of flooding occurrences on public roads and/or properties, originating from the public network of wastewater sewers, per 1000 service connections

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI
26	AR05 - Response to complaints, suggestions and information requests	%	AR05b = [0.6 x (dAR85b + dAR87b) / (dAR84b + dAR86b) + 0.4 x (dAR89b + dAR91b) / (dAR88b + dAR90b)] x 100	Percentage of complaints, suggestions and information requests, both written and by telephone, that received a written and/or auditable answer within the indicated time limit.
27	AR06 - Cost recovery	%	AR06b = dAR102b / (dAR105b - dAR103b - dAR104b) x 100	Ratio between the tariff or equivalent revenues and total costs minus other revenues and investment subsidies.
28	AR07 - Connection to the service (Bulk systems)	%	AR07a= dAR28a / (dAR28a + dAR29a) x 100	BULK INDICATOR ONLY - Percentage of the total number of housing units established in the operator's contract for which the bulk services are available and have effective service.
29	AR08 - Connection to the service through network (Retail systems)	%	AR08b = dAR20b / (dAR20b + dAR21b) x 100	Percentage of the total number of housing units located in the operator's area of intervention for which the wastewater distribution service access infrastructures are available with an effective service (existence of a service contract by fixed network, even if temporarily suspended during part of the year under review).
30	AR09 - Sewer rehabilitation	%/year	AR09b = dAR36b / dAR33b x 100 / 5	Annual average percentage of sewers aged more than ten years old that were rehabilitated in the last five years.
31	AR10 - Sewer collapses	No./(100 km . year)	AR10b = dAR54b / dAR31b x 100	Number of structural collapses occurred per 100 km of sewers.
32	AR11 - Sewer pipes condition monitoring	%	AR11b = dAR34b / dAR33b x 100	Percentage of wastewater sewers aged more than 10 years old that were inspected in the last 5 years.
33	AR12 - Adequacy of treatment capacity use	%	AR12b = dAR69b / dAR42b x 100	Percentage of the treatment capacity used in the peak inflow period.
34	AR13 - Adequacy of human resources in transport and treatment (Bulk systems)	No./(106 m3 . Year)	AR13a = [(dAR14a + dAR15a) / dAR57ab] x 106	BULK INDICATOR: Total number of full-time equivalent workers allocated to transport and treatment in the water urban wastewater management service per volume of wastewater collected.
35	AR14 - Adequacy of human resources in wastewater treatment (Retail systems)	No./(106 m3 . Year)	AR14b = [(dAR16b + dAR17b) / dAR60ab] x 106	Total number of full-time equivalent workers allocated to wastewater treatment per volume of wastewater treated at treatment plants.
36	AR15 - Adequacy of human resources in wastewater collection and drainage of wastewater (Retail systems)	No./(100 km . year)	AR15b = [(dAR18b + dAR19b) / dAR31ab] x 100	Total number of full-time equivalent workers allocated to wastewater collection and drainage per 100 km of a collector.
37	AR16 - Energy efficiency of pumping facilities	kWh/(m3 . 100 m)	AR16b = dAR72b / dAR74b	Standard average energy consumption of pumping facilities
38	AR17 - Treatment sludge production	kg/m3	AR17b = dAR82b / dAR60b x 1000	Sludge produced at wastewater treatment plants per volume of treated wastewater.
39	AR18 - Reclaimed water production	%	AR18b = (dAR63b + dAR64b) / dAR60b x 100	Volume of water produced for reuse (for own use or assigned to third parties) in relation to the volume of treated water.
40	AR19 - Self-produced energy	%	AR19b = dAR70b / dAR71b x 100	Percentage of energy produced by the operator in relation to the total energy consumed at the facilities allocated to the urban wastewater management service.
41	AR20 - Emergency and stormwater discharge control	%	AR20b = [1 - (dAR46b + dAR47b + dAR49b + dAR50b) / (dAR45b + dAR48b)] x 100	Percentage of emergency and stormwater dischargers with direct discharge into the receiving environment that are monitored and operate in a satisfactory manner.
42	AR21 - Compliance with discharge permit	%	AR21b = dAR55b / dAR56b x 100	Percentage population equivalent served by treatment facilities that ensure compliance with the discharge permit, pursuant to the conditions defined in the respective permit for use of water resources.
43	PAR05ab - Treatment service coverage	%	PAR05a = (dAR20b + dAR21b - dAR25ab) / (dAR20b + dAR21b) x 100	Percentage of the number of housing units located in the operator's area of intervention for which public drainage networks are available and connected to treatment facilities.
44	dAA11ab - Flow measurement index	(-)	*The value of this index is calculated based on the sum of the accumulated points of the different classes considered. Please check the definition of this index for further information	For the water supply service, the flow measurement index aims to assess whether all the points considered relevant for the optimisation of the management of the system's operation are endowed with a flow meter. This is determined by the sum of the grades of each class under analysis, with a predefined number of points being assigned to each question, which may vary from 0 to 200 points. The following classes are assessed: Class A – Measurements at water abstraction Class B – Measurements at water treatment plants Class B – Measurements at other water treatment facilities Class D – Measurements at Storage tanks Class E – Measurements at pumping stations Class F – Measurements at measurement and control zones or subsystems Class G – Measurements for charging purposes and at other water outfall points in the system Class H – Measurements at water inlet points in the system

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4			Information source
				Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	
1	AA01 - Service coverage	%	Numerator	dAA19b	No.	Housing units with effective service	dAA20b	No.	Housing units with service available but not connected to the public network							
			Denominator	dAA21b	No.	Housing units										
2	AA02 - Affordability of the service	%	Numerator	dAA104b	€/year	Annual tariff charges										
			Denominator	dAA106b	€/year	Average household disposable income										
3	AA03 - Service interruptions (Bulk systems)	No./ (delivery point . year)	Numerator	dAA41a	[(No. of failures · number of housing units served) / (delivery point · year)]	Water supply interruptions										
			Denominator	dAA23a	No.	Housing units with effective service established in the contract										
4	AA03 - Service interruptions (Retail systems)	No./ (1000 service connections . year)	Numerator	dAA42b	No./year	Service connections affected by interruptions										
			Denominator	dAA29b	No.	Service connections										
5	AA04 - Safe water	%	Numerator	dAA44b	No./year	Regulatory analyses conducted on water quality	dAA47b	No./year	Analyses carried out in compliance with the parametric value							
			Denominator	dAA46b	No./year	Required regulatory analyses on water quality	dAA45b	No./year	Analyses carried out on parameters with a parametric value							
6	AA05 - Response to complaints, suggestions and information requests	%	Numerator	dAA84b	No./year	Responses to written complaints	dAA86b	No./year	Responses to telephone complaints	dAA88b	No./year	Responses to written suggestions and information requests	dAA90b	No./year	Responses to telephone suggestions and information requests	
			Denominator	dAA83b	No./year	Written complaints	dAA85b	No./year	Telephone complaints	dAA87b	No./year	Written suggestions and information requests	dAA89b	No./year	Telephone suggestions and information requests	
7	AA06 - Cost recovery	%	Numerator	dAA100b	€/year	Tariff revenues										
			Denominator	dAA103b	€/year	Total expenses	dAA101b	€/year	Other revenues	dAA102b	€/year	Investment subsidies				
8	AA07 - Connection to the service	%	Numerator	dAA19b	No.	Housing units with effective service										
			Denominator	dAA19b	No.	Housing units with effective service	dAA20b	No.	Housing units with service available but not connected to the public network							
9	AA08 - Non-revenue water	%	Numerator	dAA60b	m^3/year	Non-revenue water										
			Denominator	dAA48b	m^3/year	System input volume										
10	AA09 - Mains rehabilitation	%/year	Numerator	dAA28b	km	Mains rehabilitated in the past five years										
			Denominator	dAA27b	km	Average mains length aged more than 10 years old										
11	AA10 - Mains failures	No./(100 km . year)	Numerator	dAA43b	No./year	Mains failures										
			Denominator	dAA26b	km	Total mains length										
12	AA11 - Adequacy of treatment capacity use	%	Numerator	dAA71b	m^3/year	Average daily water flow in the 30 consecutive days of highest production										
			Denominator	dAA38b	m^3/year	Total daily capacity of treatment plants										
13		No./(10^6 m^3 . Year)	Numerator	dAA13a	No.	Water supply personnel	dAA14b	No.	Water supply personnel under outsourcing							

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4			Information source
				Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	
	AA12a - Adequacy of human resources in water adduction and treatment (Bulk systems)		Denominator	dAA67ab	m^3/year	Exported treated water										
14	AA13 - Adequacy of human resources in water treatment (Retail systems)	No./(10^6 m^3 . Year)	Numerator	dAA15b	No.	Water supply treatment personnel	dAA16b	No.	Water supply treatment personnel under outsourcing							
			Denominator	dAA65b	m^3/year	Water treated at treatment plants										
15	AA14 - Adequacy of human resources in water distribution (Retail systems)	No./1000 service connections	Numerator	dAA17b	No.	Water supply distribution personnel	dAA18b	No.	Water supply distribution personnel under outsourcing							
			Denominator	dAA29b	No.	Service connections										
16	AA15ab - Real water losses (Bulk systems and retail systems with service connection density of less than 20 service connections per km)	m^3/(km . day)	Numerator	dAA62ab	m^3/year	Real losses										
			Denominator	dAA26ab	km	Total mains length										
17	AA15b - Real water losses (Retail systems)	l/(service connection . day)	Numerator	dAA62b	m^3/year	Real losses										
			Denominator	dAA29b	No.	Service connections										
18	AA16 - Energy efficiency of pumping facilities	kWh/(m3 . 100 m)	Numerator	dAA72b	kWh/year	Energy consumption for pumping										
			Denominator	dAA73b	m^3/(year.100 m)	Standardisation factor										
19	AA17 - Treatment sludge production	kg/m^3	Numerator	dAA81b	t/year	Sludge produced at treatment plants										
			Denominator	dAA65b	m^3/year	Water treated at treatment plants										
20	AA18 - Self-produced energy	%	Numerator	dAA74b	kWh/year	Self-produced energy										
			Denominator	dAA75b	kWh/year	Energy consumption										
21	AR01a - Service coverage (Bulk systems)	%	Numerator	dAR28a	No.	Housing units with effective service established in the contract	dAR29a	No.	Housing units with service available but not connected to the public network established in the contract							
			Denominator	dAR27a	No.	Housing units established in the contract										
22	AR02b - Service coverage through network and septic tanks (Retail systems)	%	Numerator	dAR20b	No.	Housing units with effective service	dAR21b	No.	Housing units with service available but not connected to the public network	dAR22b	No.	Housing units served by controlled individual wastewater sanitation solutions in locations without an available fixed network				
			Denominator	dAR26b	No.	Housing units										
		%	Numerator	dAR106b	€/year	Annual tariff charges										

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4			Information source
				Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	
23	AR03 - Affordability of the service		Denominator	dAR108b	€/year	Average household disposable income										
24	AR04a - Flooding occurences (Bulk systems)	No./100 km of sewers.year	Numerator	dAR53a	No./year	Floods										
			Denominator	dAR31a	km	Total length of sewers										
25	AR04b - Flooding occurences (Retail systems)	No./(1000 service connections . year)	Numerator	dAR53b	No./year	Floods										
			Denominator	dAR37b	No.	Service connections										
26	AR05 - Response to complaints, suggestions and information requests	%	Numerator	dAR85b	No./year	Responses to written complaints	dAR87b	No./year	Responses to telephone complaints	dAR89b	No./year	Responses to written suggestions and information requests	dAR91b	No./year	Responses to telephone suggestions and information requests	
			Denominator	dAR84b	No./year	Written complaints	dAR86b	No./year	Telephone complaints	dAR88b	No./year	Written suggestions and information requests	dAR90b	No./year	Telephone suggestions and information requests	
27	AR06 - Cost recovery	%	Numerator	dAR102b	€/year	Tariff revenues										
			Denominator	dAR105b	€/year	Total expenses	dAR103b	€/year	Other revenues	dAR104b	€/year	Investment subsidies				
28	AR07 - Connection to the service (Bulk systems)	%	Numerator	dAR28a	No.	Housing units with effective service established in the contract										
			Denominator	dAR28a	No.	Housing units with effective service established in the contract	dAR29a	No.	Housing units with service available but not connected to the public network established in the contract							
29	AR08 - Connection to the service through network (Retail systems)	%	Numerator	dAR20b	No.	Housing units with effective service										
			Denominator	dAR20b	No.	Housing units with effective service	dAR21b	No.	Housing units with service available but not connected to the public network							
30	AR09 - Sewer rehabilitation	%/year	Numerator	dAR36b	km	Sewers rehabilitated in the past five years										
			Denominator	dAR33b	km	Average sewers length aged more than 10 years old										
31	AR10 - Sewer collapses	No./(100 km . year)	Numerator	dAR54b	No./year	Structural collapses in sewers										
			Denominator	dAR31b	km	Total length of sewers										
32	AR11 - Sewer pipes condition monitoring	%	Numerator	dAR34b	km	Average inspected sewer length aged more than 10 years old										
			Denominator	dAR33b	km	Average sewer length aged more than 10 years old										
33	AR12 - Adequacy of treatment capacity use	%	Numerator	dAR69b	m^3/day	Average daily wastewater flow in the 30 consecutive days of highest inflow										
			Denominator	dAR42b	m^3/day	Total daily capacity of treatment plants										
34	AR13 - Adequacy of human resources in transport and treatment (Bulk systems)	No./(10^6 m^3 . Year)	Numerator	dAR14a	No.	Wastewater management personnel	dAR15a	No.	Wastewater management personnel under outsourcing							
			Denominator	dAR57ab	m^3/year	Collected wastewater										

№	KPI name	KPI unit	Numerator / Denominator	Variable 1			Variable 2			Variable 3			Variable 4			Information source
				Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	Index/Name	Unit	Definition	
35	AR14 - Adequacy of human resources in wastewater treatment (Retail systems)	No./(10^6 m^3 . Year)	Numerator	dAR16b	No.	Wastewater management treatment personnel	dAR17b	No.	Wastewater management treatment personnel under outsourcing							
			Denominator	dAR60ab	m^3/year	Wastewater treated at treatment plants										
36	AR15 - Adequacy of human resources in wastewater collection and drainage of wastewater (Retail systems)	No./(100 km . year)	Numerator	dAR18b	No.	Wastewater management collection and drainage personnel	dAR19b	No.	Wastewater management collection and drainage personnel under outsourcing							
			Denominator	dAR31ab	km	Total length of sewers										
37	AR16 - Energy efficiency of pumping facilities	kWh/(m^3 . 100 m)	Numerator	dAR72b	kWh/year	Energy consumption for pumping										
			Denominator	dAR74b	m^3/(year.100 m)	Standardisation factor										
38	AR17 - Treatment sludge production	kg/m3	Numerator	dAR82b	t/year	Sludge produced at treatment plants										
			Denominator	dAR60b	m^3/year	Wastewater treated at treatment plants										
39	AR18 - Reclaimed water production	%	Numerator	dAR63b	m^3/year	Water for reuse by third parties	dAR64b	m^3/year	Water for own reuse							
			Denominator	dAR60b	m^3/year	Wastewater treated at treatment plants										
40	AR19 - Self-produced energy	%	Numerator	dAR70b	kWh/year	Own energy production										
			Denominator	dAR71b	kWh/year	Energy consumption										
41	AR20 - Emergency and stormwater discharge control	%	Numerator	dAR46b	No.	Unmonitored emergency dischargers	dAR47b	No.	Emergency dischargers with unsatisfactory operation	dAR49b	No.	Unmonitored stormwater dischargers	dAR50b	No.	Stormwater dischargers with unsatisfactory operation	
			Denominator	dAR45b	No.	Emergency dischargers	dAR48b	No.	Stormwater dischargers							
42	AR21 - Compliance with discharge permit	%	Numerator	dAR55b	p.e.	Population equivalent with wastewater satisfactory treatment										
			Denominator	dAR56b	p.e.	Population equivalent served by treatment facilities										
43	PAR05ab - Treatment service coverage	%	Numerator	dAR20b	No.	Housing units with effective service	dAR21b	No.	Housing units with service available but not connected to the network	dAR25b	No.	Housing units with available drainage systems without treatment				
			Denominator	dAR20b	No.	Population equivalent served by treatment facilities	dAR21b	No.	Housing units with service available but not connected to the network							
44	dAA11ab - Flow measurement index	(-)	Numerator													
			Denominator													

ADDITIONAL KPIS USED BY ERSAR AS DRINKING WATER CONTROLLING AUTHORITY

KPI name	KPI unit	KPI calculation formula	General description of the KPI	Numerator / Denominator	Variable 1			Variable 2		
					Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
AA04 - Safe water	%	AA04b = (dAA44b / dAA46b) x (dAA47b / dAA45b) x 100	Percentage compliance of the sampling frequency multiplied by the percentage compliance with the parametric values established in the legislation on parameters subject to routine control 1, routine control 2 and inspection control, as defined in the Water Quality Control Plans approved by ERSAR, pursuant to the legal regime in force.	Numerator	dAA44b	No./year	Regulatory analyses conducted on water quality	dAA47b	No./year	Analyses carried out in compliance with the parametric value
				Denominator	dAA46b	No./year	Required regulatory analyses on water quality	dAA45b	No./year	Analyses carried out on parameters with a parametric value
Compliance with the sampling frequency	%	AA04b' = (dAA44b / dAA46b) x 100	Percentage compliance of the sampling frequency established in the legislation on parameters subject to routine control 1, routine control 2 and inspection control, as defined in the Water Quality Control Plans approved by ERSAR, pursuant to the legal regime in force.	Numerator	dAA44b	No./year	Regulatory analyses conducted on water quality			
				Denominator	dAA46b	No./year	Required regulatory analyses on water quality			
Compliance with the parametric values	%	AA04b" = (dAA47b / dAA45b) x 100	Percentage compliance with the parametric values established in the legislation on parameters subject to routine control 1, routine control 2 and inspection control, as defined in the Water Quality Control Plans approved by ERSAR, pursuant to the legal regime in force.	Numerator	dAA47b	No./year	Analyses carried out in compliance with the parametric value			
				Denominator	dAA45b	No./year	Analyses carried out on parameters with a parametric value			
Safe water by parameter	%	AA04bi = (dAA44bi / dAA46bi) x (dAA47bi / dAA45bi) x 100	Percentage compliance of the sampling frequency multiplied by the percentage compliance with the parametric values by parameter as defined in the Water Quality Control Plans approved by ERSAR, pursuant to the legal regime in force.	Numerator	dAA44bi	No./year	Regulatory analyses conducted on water quality by parameter	dAA47bi	No./year	Analyses carried out in compliance with the parametric value by parameter
				Denominator	dAA46bi	No./year	Required regulatory analyses on water quality by parameter	dAA45bi	No./year	Analyses carried out on parameters with a parametric value by parameter
Safe water by routine control 1, routine control 2 and inspection control as defined in the Water Quality Control Plans approved by ERSAR	%	AA04bii = (dAA44bii / dAA46bii) x (dAA47bii / dAA45bii) x 100	Percentage compliance of the sampling frequency multiplied by the percentage compliance with the parametric values by routine control 1, routine control 2 and inspection control as defined in the Water Quality Control Plans approved by ERSAR	Numerator	dAA44bii	No./year	Regulatory analyses conducted on water quality by routine control 1, routine control 2 and inspection control as defined in the Water Quality Control Plans approved by ERSAR	dAA47bii	No./year	Analyses carried out in compliance with the parametric value by routine control 1, routine control 2 and inspection control as defined in the Water Quality Control Plans approved by ERSAR
				Denominator	dAA46bii	No./year	Required regulatory analyses on water quality by routine control 1, routine control 2 and inspection control as defined in the Water Quality Control Plans approved by ERSAR	dAA45bii	No./year	Analyses carried out on parameters with a parametric value by routine control 1, routine control 2 and inspection control as defined in the Water Quality Control Plans approved by ERSAR

ROMANIA

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI	Numerator / Denominator	Variable 1			Variable 2		
						Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
1	Degree of access to water supply services at national level	%	Population served by water supply services / Country population * 100		Numerator		thousand inhabitants	Population with access to water supply services			
					Denominator		thousand inhabitants	Romania's resident population			
2	Market share of regional and municipal operators for water supply service	%	Population served by regional and municipal operators / Population served by water supply services * 100		Numerator		thousand inhabitants	Population served by regional and municipal operators			
					Denominator		thousand inhabitants	Population with access to water supply services			
3	Degree of coverage with water supply services at the level of the operating area	%	Population served by regional and municipal operators / Total population in the area of operation of regional and municipal operators * 100		Numerator		thousand inhabitants	Population served by regional and municipal operators			
					Denominator		thousand inhabitants	The total population in the area of operation of regional and municipal operators			
4	The population served by the water supply service per Km of the water network at national level	loc / Km	The population served by the water supply service / Network length at the national level		Numerator		thousand inhabitants	Population with access to water supply services			
					Denominator		Km	Length of water network			
5	Population served by the water supply service per Km of the water network, by regional and municipal operators	loc / Km	Population served by regional and municipal operators / Total length of the water network		Numerator		thousand inhabitants	Population served by regional and municipal operators			
					Denominator		Km	Total network length in the administration of regional and municipal operators			
6	Population served by the water supply service per km of the water distribution network by regional and municipal operators	loc / Km	Population served by regional and municipal operators / Length of water distribution network		Numerator		thousand inhabitants	Population served by regional and municipal operators			
					Denominator		Km	Distribution network length			
7	Share of household water consumption	%	Household water consumption / Distributed water volume * 100		Numerator		thousand cubic meters	Domestic water consumption			
					Denominator		thousand mc	Distributed water volume			
8	NRW	thousand mc	The difference between the amount of water produced and the amount of water billed		Numerator		thousand mc	The amount of water produced		%	NRW / amount of water produced * 100
					Denominator		thousand mc	The amount of water billed			
9	The degree of metering of consumers	%	Nr. metered connections / Nr. connections total * 100		Numerator		No.	Metered connections			
					Denominator		No.	Total connections			
10	Degree of connection to sewerage services at national level	%	Population connected to sewerage services / Country population * 100		Numerator		thousand inhabitants	Population connected to sewerage services			
					Denominator		thousand inhabitants	Romania's resident population			
11	Market share of regional and municipal operators for sewerage service	%	Population served by regional and municipal operators / Population served by sewerage services * 100		Numerator		thousand inhabitants	Population served by regional and municipal operators			
					Denominator		thousand inhabitants	Population connected to sewerage services			
12	Degree of coverage with sewerage services at the level of the operating area	%	Population served by regional and municipal operators / Total population in the area of operation of regional and municipal operators * 100		Numerator		thousand inhabitants	Population served by regional and municipal operators			
					Denominator		thousand inhabitants	The total population in the area of operation of regional and municipal operators			
13	Population connected per Km by the sewerage network at national level	inhabitants / Km	Population connected to sewerage services / Sewer network length		Numerator		thousand inhabitants	Population connected to sewerage services			
					Denominator		Km	Sewer network length			

№	KPI name	KPI unit	KPI calculation formula	General description of the KPI	Numerator / Denominator	Variable 1			Variable 2		
						Index/ Name	Unit	Definition	Index/ Name	Unit	Definition
14	Population connected per Km by the sewerage network at the level of regional and municipal operators	inhabitants/ Km			Numerator		thousand inhabitants	Population served by regional and municipal operators with sewerage services			
					Denominator		Km	Length of sewerage network in the administration of regional and municipal operators			
15	Total treated wastewater collected from regional and municipal operators	%	Amount of treated water / Amount of wastewater collected * 100		Numerator		thousand cubic meters	The amount of water treated			
					Denominator		thousand cubic meters	The amount of wastewater collected			
16	Financial result	Report	Total expenses incurred / Revenue received		Numerator		thousand lei	Total expenses incurred			
					Denominator		thousand lei	Revenue collected			
17	Gross profit	thousand lei	Revenue collected - Total expenses incurred		Numerator						
					Denominator						
18	Operationalization of regional and municipal operators	%	Operating staff in water supply and sewerage services / Total staff * 100		Numerator		No.	Operational staff of regional and municipal operators			
					Denominator		No.	Total staff operators			
19	Efficiency of staff for water supply service	no./1000 connections	Operational staff in water supply services / 1000 * Nr. connections		Numerator		No.	Operational staff in water supply services			
					Denominator		1000 * no	Number bransamente			
20	Personnel efficiency for sewerage services	no./1000 connections	Operational personnel in sewerage services / 1000 * Nr. CONNECTIONS		Numerator		No.	Operational personnel in sewerage services			
					Denominator		1000 * no	Number of connections			
21	Energy efficiency of the water supply service	MWh / thousands of cubic meters	Electricity consumption corresponding to the activity of production, transport and distribution of drinking water / total amount of water produced		Numerator		MWh	Electricity consumption			
					Denominator		thousand cubic meters	The amount of water produced			
22	Energy efficiency of the sewerage service	MWh / thousands of cubic meters	Electricity consumption corresponding to the wastewater collection activity / total amount of wastewater collected		Numerator		MWh	Electricity consumption			
					Denominator		thousand cubic meters	The amount of wastewater collected			
23	Degree of indebtedness	Report	Total debts / total receivables		Numerator		thousand lei	Total debts accumulated at the end of the year			
					Denominator		thousand lei	Total receivables at the end of the year			