1st EUROPEAN FORUM ON REGULATION OF WATER SERVICES (EFRWS)

3 December 2019, Rome

WAREG
European Water Regulators

ARERA
Autorità di Regolazione per Energia Reti e Ambiente

AGENDA

ROMA EVENTI - CENTRO CONGRESSI FONTANA DI TREVI, PIAZZA DELLA PILOTTA 4, ROME

9.00 REGISTRATION AND WELCOME COFFEE

9.30 WELCOME ADDRESS

Stefano Besseghini, *President of the Italian Regulatory Authority for Energy, Networks and Environment (ARERA)*

Mario Turco, *Undersecretary to the Presidency of the Council of Ministers, Italy*

KEYNOTE SPEECH

Veronica Manfredi, *Director, Directorate-General for Environment – Quality of Life (ENV.C), European Commission*

Alessandro Ronzoni, *CFA, Energy and Public Sector Division European Investment Bank*

Emmanuel Thanassoulis, *Aston University Birmingham, UK*

FINDING THE RIGHT INCENTIVES TO PROMOTE SUSTAINABILITY, SECURITY OF SUPPLY AND QUALITY OF SERVICE

10.45 GENERAL INTRODUCTION

Andrea Guerrini, *ARERA Commissioner and WAREG President*

11.00 PARALLEL PANELS ON ECONOMIC REGULATION

1 WATER GOVERNANCE	2 COST ASSESSMENT MODELLING AND PROMOTING THE EFFICIENCY OF WATER UTILITIES	3 WATER REGULATION FOR INNOVATION AND ENVIRONMENTAL SUSTAINABILITY	4 SUSTAINABLE WATER TARIFFS
MODERATORS/RAPPORTEURS AND REGULATORY CO-CHAIRS			
Antonio Massarutto *(Udine University, Italy)* **Dimitar Kochkov** *(EWRC Regulator, Bulgaria)*	**Emmanuel Thanassoulis** *(Aston University, UK)* **David Saal** *(Loughborough University, UK)* **Laura Brien** *(CRU Regulator, Ireland)*	**Heather Smith** *(Cranfield University, UK)* **Szilvia Száloki** *(HEA Regulator, Hungary)*	**Riccardo Scarpa** *(Verona University, Italy)* **Ana Albuquerque** *(ERSAR Regulator, Portugal)*
DISCUSSANTS			
Maria Giovanna Montalbano *(ARERA, Italy)* Water Governance in Europe: a survey on WAREG Members	**Stjepan Gabric** *(World Bank, Croatia)* The Danube Water Program and World Bank experience with benchmarking in utility efficiency improvement	**Elena Gallo** *(ARERA, Italy)* Regulatory tools for promoting environmental sustainability: ARERA's experience	**Ivaylo Kastchiev** *(EWRC, Bulgaria)* Tariff regulatory frameworks in WAREG Member countries
Martha Baxter *(OECD, Paris, France)* The Governance of Water Regulators: Experience from the OECD's Network of Economic Regulators	**Takuya Urakami** *(Kindai University, Japan)* Understanding the Relationship between Industry Fragmentation and Wastewater Efficiency, so as to Inform Japanese Government Policy on Wide Area Cooperation and Consolidation	**Sarah Gillman** *(Scottish Water, UK, and EurEau)* Sludge Management in EU, following a circular economy approach	**Francesco Lo Passo** *(Brattle Group, Italy)* Sustainable tariffs, investments and the Concessions Directive
Sean Ennis and Bruno Liebhaberg *(CERRE, Brussels, Belgium)* Water sector governance: introducing the CERRE Water Regulatory Lab	**Francesca Mazzarella** *(Utilitatis, Italy)* Performance of the Italian Water Sector; Service Quality and Cost Efficiency	**Francesco Fatone** *(Università Politecnica delle Marche, Italy)* Regional carbon and energy footprint and audit in municipal wastewater treatment services: towards standardization?	**Gareth Davies** *(Pöyry Management Consulting, UK)* Delivering sustainable tariff regimes: insights from the GB Energy Sector
Simon Porcher *(University of Paris Sorbonne, France)* Direct versus delegated management of water services in France	**Bertel Ifversen** *(DANVA, Denmark)* Benchmarking and Sunshine Regulation in Denmark	**Peyo Stanchev** *(Brunel University London, UK)* Towards Carbon neutral and Cost-efficient Sewage Treatment	**Reinhard Perfler** *(University of Natural Resources & Life Sciences, Austria)* The landscape of water tariffs in Austria: from calculation guidelines to practical application under different organizational conditions.
Andrea Mancini *(WICS, Scotland, UK)* Retail market in the Water Sector	**Alan Horncastle** *(Oxera, UK)* Views on the cost assessment undertaken in the 2019 price control in England and Wales	**Zsuzsanna Kovàcs** *(Budapest Waterworks Ltd, HU)* Implementing innovative natural and engineered treatment systems in Budapest	**Celine Nauges** *(Toulouse School of Economics, France)* Tariff Design for Economic Efficiency, Equity, and Cost Recovery
Giulia Romano *(Pisa University, Italy)* Cooperativism and Water services	**Alan Sutherland** *(WICS, Scotland, UK)* Use of information and efficiency assessment: reflections from the Scottish regulatory experience	**Cédric Prevedello** *(Aquawal, Belgium)* Circular economy in water and wastewater: state of the art and perspectives in Wallonia (Belgium) and the effect of (lack) of regulation on it	**Rita Martins** *(University of Coimbra, Portugal)* Water affordability: assessment and policies

12.45 LUNCH

14.30 PARALLEL PANELS ON ECONOMIC REGULATION (CONTINUED):

Milo Fiasconaro *(Aqua Publica Europea, Brussels, Belgium)* The interplay of the EU water directives and their governance implications: the perspective of public operators	**David Saal** *(Loughborough University, UK)* The Implication of (Not) Appropriately Controlling for Cost Interactions, Water Scarcity and Operating Environment in Regulatory Waste and Wastewater Cost Assessment	**Hay Koppers** *(AquaMinerals, Netherlands)* AquaMinerals: a collective approach of the Dutch water sector to stimulate circular economics for their residuals from water treatment processes	**Michele Tettamanzi** *(REF Ricerche, Italy)* Sustainable Tariff: Information as a Bridge Between Regulators, Water Industries and Users
Claudia Castell Exner *(EurEau, Brussels, Belgium)* The governance of European water services: facing societal challenges in an evolving policy environment	**Fabrizio Erbetta** *(UNIUOPO, Italy)* The right benchmarking for the right incentives: the issue of water losses in distribution networks	**Montserrat Terms Rife** *(CETAqua, Spain)* Dynamic water prices for promoting a sustainable and efficient use	**Rob Sheldon** *(Accent, UK)* Participatory water tariff review: the market research perspective
Gari Villa-Landa Sokolova *(AEAS, Spain)* Governance challenges of the Spanish water services	**Peter Dane** *(European Benchmarking Cooperation, Netherlands)* The EBC programme: promoting continuous improvement of water services by learning from each other	**Luca Lo Schiavo** *(ARERA, Italy)* Regulatory tools for promoting innovation: the European experience	**Leon Fields** *(Oxera, UK)* Using water tariffs as a part of a package of water efficiency measures

15.30 COFFEE-BREAK

16.00 PLENARY SESSION

ROUNDTABLE WITH RAPPORTEURS FROM PARALLEL PANELS 1, 2, 3 AND 4.

MODERATOR: **Nadia Weekes**, *Editor in Chief, ENDS Europe, Haymarket Media Group*

17.00 CLOSING ADDRESS

WAREG SUPPORT TO REGULATORY CAPACITY BUILDING IN THE WESTERN BALKANS

Marko Bislimoski, *President of Energy and Water Issues Regulatory Commission of the Republic of North Macedonia*

Ndriçim Shani, *Chair of the National Regulatory Commission of Albania*

17.15 CONCLUSIONS

Andrea Guerrini, *ARERA Commissioner and WAREG President*

17.30 END OF THE FORUM

1st EUROPEAN FORUM
on Regulation of Water Services

3 December 2019, Rome

GOVERNANCE, COST EFFICIENCY, INNOVATION, SOCIAL AND ECONOMIC SUSTAINABILITY

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INTRODUCTION

The Covid-19 crisis has profoundly shaped our societies and economies. The pandemic's long-term effects will affect our communities for the years to come, and every part of our societies has to participate in building back and improving our economies. The current crisis has high costs for many countries but also represents an opportunity to reshape many aspects of our lives.

In this scenario, water and wastewater services' economic regulation has a crucial role, allowing each country to plan, regulate, and control their water and wastewater sector. The Regulator is emerging as a fundamental player, increasing confidence in the sector and fostering institutions' cooperation on different levels, from the national to the local. Furthermore, the Regulator is able to develop transparent, stable and harmonised frameworks crucial for the development of the sector, that can be beneficial for both water operators and consumers.

On a continental level, the European Union has pursued a similar effort to stabilise and harmonise the water and wastewater sector, in the last years. There has been a significant evolution towards the rationalisation of the sector and harmonising practices and principles, by establishing common rules for a European action to protect water resources, and promote their sustainable and efficient use.

Nonetheless, there are still significant differences between institutional frameworks and market conditions from country to country.

WAREG, the association of 30 national and regional water Regulatory Agencies (www.wareg.org), has organised the 1st European Forum on the Regulation of Water Services (EFRWS) on December the 3rd 2019, to give its contribution to the process of harmonisation and to foster the exchange of technical know-how on the water and wastewater sector between regulatory agencies and stakeholders.

The Forum, the first in its kind, was held in Rome (Italy), kindly hosted by the Italian Regulatory Authority for Energy, Networks and Environment (ARERA), which holds the Presidency of WAREG. It gathered more than 50 speakers from all over Europe, which represented regulators, national governments, European institutions, international organizations and different stakeholder associations.

One of the main purposes of Forum is to reinforce technical and institutional dialogue among institutions and stakeholders, aimed at balancing customers' needs and affordability and industrial innovation and efficient costs, without harming the environment and future generations. The Forum assessed some of the most urgent issues for the sector in Europe and worldwide, such as water governance, water utility efficiency, water regulation for innovation and environmental sustainability, and social affordability of tariffs.

This report aims at summarising the key findings of the 1st European Forum on Regulation of Water Services (EFRWS, 3 December 2019, Rome), and specifically on the following issues:

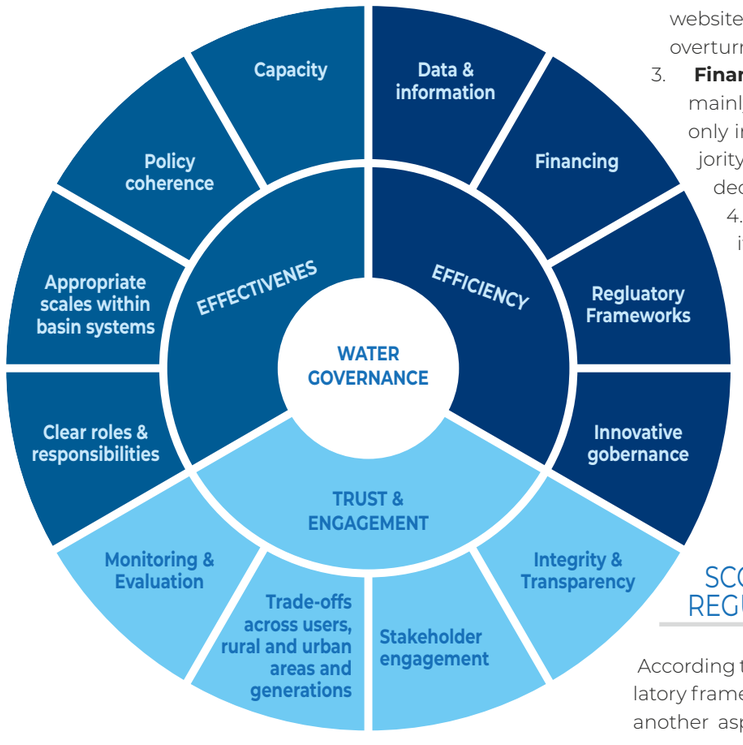
1. **Water Regulation in Europe.**
   Different models for different economic and social environments
2. **Water Sector in Europe.**
   Main features of industries and expectations concerning economic regulation
3. **Tariff Regulatory Framework in Europe.**
   A survey of WAREG members
4. **Some insights on economic regulation from European countries.**
   Innovative approaches, benchmark, econometric methodologies
5. **Tariff Structure in Europe.**
   Promoting water efficiency, environmental sustainability and assuring social affordability
6. **Customer engagement.**
   Promoting water efficiency, environmental sustainability and assuring social affordability
7. **Output based regulation.**
   Service quality and circular economy
8. **Innovation based regulation.**
   Service quality and circular economy

OVERVIEW ON WATER REGULATION AND WATER SECTOR

WATER REGULATION IN EUROPE. REQUISITES FOR REGULATORS' INDEPENDENCE

According to OECD (2015), the protection of Regulatory Authorities from undue influence can be achieved by monitoring five main dimensions:

- **Role clarity and responsibility** (clarity of role and relations in law; outreach to governmental entities; strategic foresight function);
- **Transparency and accountability** (performance reporting; transparent engagement; feedback and appeals; code of ethics);
- **Financial independence** (funding sources; identification of needs; multi-year budget; autonomous management; external and internal audit);
- **Leadership** (nomination; appointment; mandates; conflict of interest; exit process);
- **Staff behaviour** (recruitment; incentives; salary scales; employment restrictions).



A survey of WAREG - European Water Regulators (2019) among 20 water regulatory authorities and governmental agencies further analysed the five above mentioned dimensions and found out the following key points:

1. **Role clarity**. All regulators have objectives and functions set in national legislation. Law provisions guarantee independence in 15 cases;
2. **Transparency**. Public consultations are organised in 17 cases; impact assessment of regulators' decisions is carried out in 10 cases. In 14 cases decisions are published on the website. In the vast majority, decisions can be overturned by judiciary institutions;
3. **Financial independence**. Regulators are mainly financed by regulated firms while only in 5 cases by State/Region. In the majority of cases regulators have the power to decide on the allocation of expenditures;
4. **Leadership**. In 16 cases, specific qualifications are required for Board Members in their appointment procedure, and a cooling-off period is foreseen after the mandate in 11 cases;
5. **Staff behaviour.** Recruitment rules are defined autonomously by the regulator in 10 cases. The regulator makes decisions on the organisation in 15 cases.

SCOPE OF ACTION OF WATER REGULATORS

According to the 2019 WAREG report "Tariff regulatory frameworks in WAREG Member Countries" another aspect strictly related to regulators independence is the scope of action of regulators. Most important takeaways from the WAREG report are the following:

- 17 regulators have regulatory powers regarding both drinking water and wastewater;
- In all 17 cases regulators have binding power on tariff approval, though they can only issue sanctions in 10 cases;
- In 8 cases the regulator has the power to deny/revoke licence and authorisation and to impose guidance and revenue and to approve contract terms;
- Looking at the cost of operators, in most cases (12 out of 17) regulators set a specific accounting system for cost determination, hence harmonising cost recovery principles;
- In 8 cases regulators set a minimum level of quality standards;
- Looking at consumer protection levels, in most cases bodies ensure compliance, settle disputes between industry and consumers and ensure minimum quantities of water to specific customer categories.

INDEPENDENCE AND ACCOUNTABILITY OF WATER REGULATORS

In 2018 OECD published a survey on economic regulators in more than 40 countries, for 5 sectors, including water and wastewater. The report represents another useful focus on regulators' current status and is focused on the two aspects of Independence and Accountability. Main findings of the survey are the following.

INDEPENDENCE

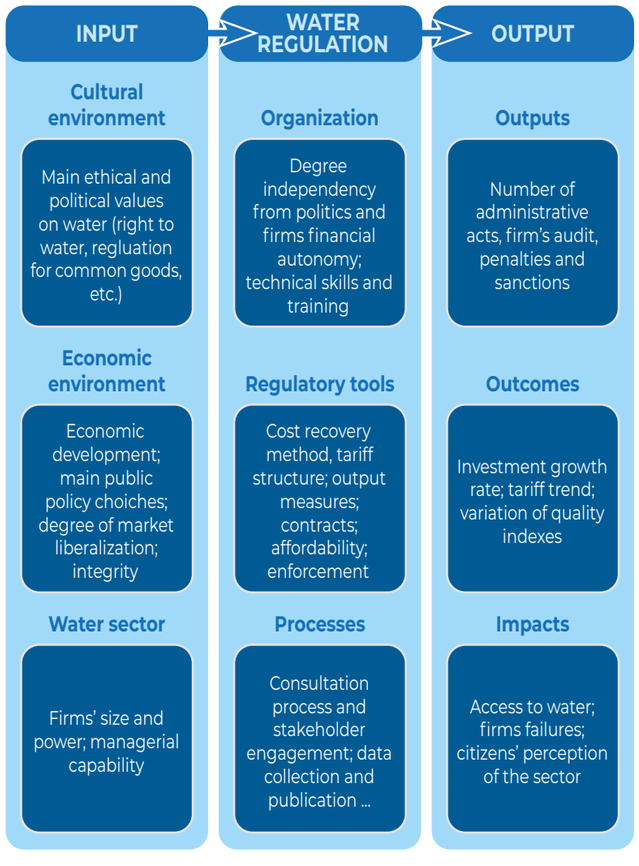
- Regulators in the water sector show a greater convergence and homogeneity in terms of degree of independence than in other sectors;
- However water regulators receive guidance from the government on long term strategy more frequently (70% of cases) than others (e.g. 39% of cases for rail sector regulators), thereby showing a high degree of policy maker attention on water resources;
- Regulators in the water sector are more dependent on state funding (50%) than in other sectors (e.g. 28% in energy sector);
- Procedures for selection of the Regulators' decision-making body is rarely public and independent;
- Most regulators apply employment restriction policies.

ACCOUNTABILITY

- In 80% of cases, water regulators are required by law to publish a report on their activities (98% for energy regulators).

CONTINGENCY APPROACH TO WATER REGULATION

Despite a growing trend in the degree of independence, financial autonomy and accountability, EU regulators remain differentiated in terms of organisational structure, regulatory tools and processes for rules approval. This shows the absence of a «one size fits all» rule and opens the door to a **contingency based approach to water regulation.**



WATER SECTOR IN EUROPE KEY PERFORMANCE INDICATORS IN SEVERAL EUROPEAN COUNTRIES

	SYSTEM COSTS	"DIRECT" AFFORDABILITY	INVESTMENT (2013)
	TOTAL COST PER CAPITA	CHARGE TO CUSTOMERS PER M^3	CAPEX PER CAPITA
ENGLAND & WALES	99.71%	99.71%	23,4%
GERMANY	99.7%	99.7%	7,13%
FRANCE	99.65%	99.65%	21,3%
ITALY	99.57%	99.57%	34,7%
SPAIN	98,89%	98,89%	18,9%
IRELAND	96.5%	96.5%	44,4%

	SYSTEM COSTS	"DIRECT" AFFORDABILITY	INVESTMENT (2013)
	TOTAL COST PER CAPITA	CHARGE TO CUSTOMERS PER M^3	CAPEX PER CAPITA
ENGLAND & WALES	€ 272,7	€ 4.14	€ 4.14
GERMANY	€ 343,3	€ 4.66	€ 4.66
FRANCE	€ 329,22	€ 3.48	€ 3.48
ITALY	€ 156,39	€ 1.50	€ 1.50
SPAIN	€ 249,72	€ 1.32	€ 1.32
IRELAND	€ 329,22	€ 0.06	€ 0.06

Key performance indicators are fundamental to evaluate and improve the water and wastewater sector, giving useful indications to regulators and ministries. Analysing the European water and wastewater sectors we can find some key aspects.

- The rate of compliance with water quality is largely over 90% in several countries in Europe;
- The wastewater treatment infrastructure is better developed in northern countries (Germany, England &Wales), while Countries in the Mediterranean area show delays in implementing the Directive on Urban Water and Wastewater Treatment (Directive 271/91/EU);
- Similarly, the rate of non-revenue water is lower in Germany, while Italy and Ireland show a high percentage of water losses due to technical leakage and unpaid invoices. However, the comparison among countries of non-revenue water data has some drawbacks, caused by different development of water measurement practices;
- Costs per capita and tariffs are partially related to investments and performance, depending on the different scope of action of utilities, which, in some countries, also carry out storm water collection services;
- Ireland is an outlier, since the high amount of cost incurred is largely covered with tax lever.

TOWARDS A PROGRESSIVE EXTENSION OF WATER UTILITIES' MISSION

The figure of the water operator is evolving from water service provider to water service promoter. Water operators' responsibilities are expanding in different directions:

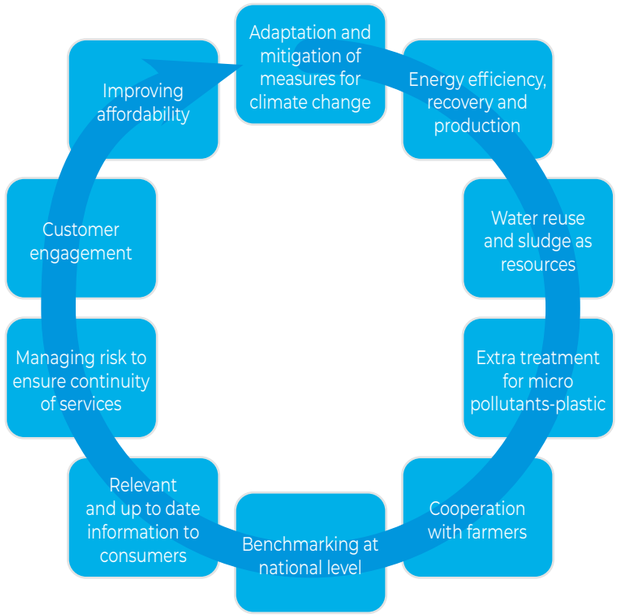
- "Upstream" with the risk management of the catchment areas and the issue of guaranteeing biodiversity
- "Downstream" with the water reuse and the issue of creating a functioning circular economy
- "Laterally" with the water-storm management and the issue of floods and natural calamities prevention

Driving Forces of this change are legislative evolution, administrative reforms, technological and organisational innovation, emerging societal challenges and finally evolving citizens' expectations. The water sector is changing towards new financing models of water resources management. The main key points about the evolution of the WSS sector are the following:

- The governance of water resources is evolving based on a sustainability compass;
- The "policy financing model" should evolve accordingly, and support the shift from a "linear" to a "circular" approach;
- Economic regulation can help: efficiency, equity, trans-sectoral and trans-scalar coordination
- Legislation (EU) remains key: clear objectives, clear responsibilities, clear economic principles

INTRODUCING THE CERRE WATER REGULATORY LAB

CERRE presented the Water Regulatory Lab, an occasion to meet the challenges of the water sector, to balance conflicting objectives assigned by society to the sector and develop robust and locally applicable regulatory solutions.
The need for an initiative like the Water Regulatory Lab is strong, even more because of the issues that the WSS sector is facing:



- **Balance of conflicting objectives** assigned to the sector; in particular tensions between massive investments needs and affordability of water in all regions.
- **Interactions with other sectors infrastructure such as waste**
- **Environmental and climate change urgency**

While the importance of independent regulator can be summoned in two aspects:

- Provides a commitment to the pursuit of particular objectives
- Support technical assessments on needed investment and prices that ensure recovery of cost

COOPERATIVISM AND WATER SERVICES SMALL-SCALE COMMUNITY WATER SUPPLIES

Small and Community-Owned Water Supplies (COWS) provide water to around 65 million people in the EU 12 - 13% of the EU population (EU Commission, 2014).
In Europe there are COWS in: **Austria** (3,400 co-operatives), in **Spain** (2,500 cooperatives), in **Denmark** (2,000 cooperatives), in **Finland** (1,400 cooperatives), In **Ireland** (5,000 group water schemes), In **Italy** (South Tyrol region, around 80 cooperatives and in **Germany** (around 150 water coops).
Strengths of the COWS are:

- The governance system, in line with European principles like subsidiarity, citizen involvement in decision processes and stakeholder engagement, (European Citizens' Initiative Right to Water);
- Governance structure is more democratic and participative guaranteeing less political influence;
- Direct control and surveillance of citizens through general meetings, informal contacts, formal audit role;

Weakness of the COWS are:

- Small dimension implies frequently scarce resources to hire professionals
- Greater vulnerability in the event of relevant crisis/problems
- Scarce turnover in managerial roles and difficult generational change
- Risks for increasing regulatory constrains implying unsustainable costs
- Need for international networks and lobbying activities at EU institutions

COOPERATIVES OF CITIZENS AT GLANCE

CORE VALUES
- No profit
- Water as a common-pool resource
- Protection of the local water resource
- Democracy in decision making – one person one vote
- Stakeholder engagement

ECONOMIC AND FINANCIAL MANAGEMENT
- Cost coverage
- Risk avoidance
- Low debt exposure
- Support of local institutions and/or banks
- Investments planned in advance
- Availability for recapitalisation by members

BUSINESS MANAGEMENT
- Cost coverage
- Risk avoidance
- Low debt exposure
- Support of local institutions and/or banks
- Investments planned in advance
- Availability for recapitalisation by members

ORGANISATIONAL MANAGEMENT
- Voluntary work of members
- Continuity in administrative roles
- Presence of a Leader, as a reference point
- Direct communication with members, even informal
- Membership checks and controls

SOCIAL MANAGEMENT
- Affordable rates
- Solidarity for members in financial difficulties
- Collaborations with municipalities, local companies, other cooperatives
- Participation in supporting and lobbying associations, where existing

INTRODUCTION OF RETAIL COMPETITION, LESSONS LEARNT FROM THE SCOTTISH EXPERIENCE

In 2008 Scotland became the first country in the world to open retail water and sewerage services to competition: all non-household customers (i.e. 150,000) can choose the supplier of their water and wastewater services.
Competitive retail includes: **billing** and **payment handling, collection** and **debt management, customer contact, customer complaints, meter reading, administering new connections**.
Benefits were **reduced** overall **industrial costs;** more **tailored services;** water efficient **residential development;** more **accurate billing; decreased levels** of water **consumption and carbon emissions.**
Lessons learnt from the opening of the retail market are the following:

1. Recognise it takes time;
2. Strong leadership but lightness of touch;
3. Take appropriate steps to support a level playing field;
4. Set appropriate margins;
5. Implement customer safeguards;
6. Protect the core business.

Key messages on customer

KEY MESSAGES ON WATER GOVERNANCE	REGULATORS	NATIONAL GOVERNMENT	EU INSTITUTIONS	UTILITIES
Regulation in the water sector is more dependent on governmental guidance on long-term strategy with high degree of attention from policy makers on water resources	✓	✓	✓	
In terms of scope of action, the majority of European regulators set rules for cost recovery and for customer protection; while only some regulators set rules for technical and commercial quality. This shows the absence of a «one size fits all» rule and opens the door to a contingency based approach to water regulation	✓	✓	✓	
Costs per capita and tariffs are partially related to investments and performance, depending on the different scope of action of utilities, which, in some countries, also carry out storm water collection services	✓	✓	✓	✓
Water utilities are progressively extending their scope of action to circular economy based activities, and adaptation and mitigation to climate change	✓	✓	✓	✓
In Europe the structure of the sector varies due to a different degree of competition among operators and of customer awareness, ranging from liberalised retail water market to direct management from municipalities	✓	✓	✓	✓

References

"The Governance of Regulators, Creating a Culture of Independence, Practical Guidance against Undue Influence", OECD (2017)

"Financing Water Supply, Sanitation and Flood Protection : Challenges in EU Member States and Policy Options", OECD (2020)

"Tariff regulatory frameworks in WAREG Member Countries", WAREG-European Water Regulators (2019)

We are grateful to the following speakers in session 1 on "Water Governance" of the 1st European Forum on Regulation of Water Services (EFRWS, 3 December 2019, Rome, http://www.wareg.org/documents.php?q=view&id=8), for allowing the publication of their presentations:

Maria Giovanna Montalbano (ARERA, Italy) *Water Governance in Europe: a survey on WAREG Members*

Martha Baxter (OECD, Paris, France) *The governance of water Regulators: experience from the OECD's Network of Economic Regulators*

Sean Ennis (CERRE, Brussels, Belgium) *Water sector governance: introducing the CERRE Water Regulatory Lab*

Simon Porcher (University of Paris Sorbonne, France) *Direct vs delegated management of water services in France*

Andrea Mancini (WICS, Scotland, UK) *Retail market in the water sector in Scotland*

Giulia Romano (Pisa University, Italy) *Cooperativism and Water services*

Milo Fiasconaro (Aqua Publica Europea, Brussels, Belgium) *The interplay of the EU Water Directives and their governance implications: the perspective of public operators*

Claudia Castell Exner (EurEau, Brussels, Belgium) *The governance of European water services: facing societal challenges in an evolving policy environment*

Gari Villa-Landa Sokolova (AEAS, Spain) *Governance challenges of the Spanish water services*

TARIFF REGULATORY FRAMEWORK IN EUROPE INSIGHT ON ECONOMIC REGULATION

TARIFF REGULATORY FRAMEWORK IN EUROPE WAREG SURVEY ON TARIFF REGULATORY FRAMEWORKS

In 2019 WAREG launched a survey aimed at understanding the different tariff regulatory frameworks applied by WAREG member Countries, and in particular the following information:

- **Regulatory system**: tariff regulation, regulatory period, existence of a business plan, possible correlation between business plan and tariff;
- **Tariff calculations**: tariff method and tariff blocks, fixed and/or volumetric charges, tariff components;
- **Operational costs** (OPEX): cost categories included in OPEX covered by tariffs (i.e. materials, external services, personnel, taxes, environmental fees, financial costs, sanctions, provisions, past obligations, asset re-evaluation costs, etc.);
- **Capital costs** (CAPEX): how investments are financed (i.e. depreciation costs, loans, etc.);
- **Regulatory Asset Base** (RAB): assets included in RAB and calculation of their value;
- **Weighted average cost of capital** (WACC): calculation by Regulator of cost of equity and debt;
- **Demand**: demand (volumes) forecast and calculation in the tariff formula.

METHODOLOGIES TO CALCULATE REGULATED REVENUES (1)

OPEX

- In all cases tariffs cover the following cost categories: materials, external services, personnel, taxes and environmental fees;
- Several countries also include financial costs for working capital, investments, or both, in the tariff; the inclusion of financial costs in operating expenditure is mainly associated with a "cost-plus" approach;
- Different approaches to ensure OPEX efficiency: political and administrative control, cost justification process, comparison of expenses and technical indicators, efficiency targets, financial stimulus, benchmarking and others.

TARIFF SETTING MODEL	COST PLUS	RATE OF RETURN	PRICE CAP	REVENUE CAP	OTHER
BULGARIA / EWRC			✔		
GEORGIA / GNERC					✔
ALBANIA / ERRU	✔				
SPAIN / MITECO					✔
MONTENEGRO / RAE	✔				
HUNGARY / HEA			✔		
ROMANIA / ANSRC	✔				
MALTA / REWS	✔				
LATVIA / PUC		✔			
LITHUANIA / VERT		✔			
ESTONIA / ECA		✔			
BELGIUM, FLANDERS / VMM		✔	✔		
BELGIUM, BRUSSEL / BRUGEL					
CROATIA / VVU	✔				
POLAND / PW	✔				
ITALY / ARERA					✔
ARMENIA / PSRC					✔
NORTH MACEDONIA / ERC				✔	
UK, SCOTLAND / WICS			✔		
UK, ENGLAND AND WALES / OFWAT				✔	
IRELAND / CRU				✔	
KOSOVO / ARRU			✔		
MOLDOVA / ANRE	✔				
TOTAL	7	4	5	4	5

CAPEX

- Depreciation costs for water infrastructure only, based on regulatory accounting policies to ensure a cost reflective approach;
- Applied only in case of adoption of advanced methods;
- Different from a simple "cost plus", with determination of the Regulatory Asset Base.

RATE OF RETURN

- In 11 cases WAREG members calculate Ce, and all of them apply the Capital Asset Pricing Model (CAPM);
- Basic concept of the CAPM (Re=Rf + ßе*ERP) is used in all cases.

WACC

- In 3 cases regulators set actual levels of equity/debt in the WACC;
- In the other cases the equity/debt ratio in the WACC is set according to regulator guidance (50%/50% in 2 cases; 40%/60% in 2 other cases).

COUNTRY	WACC
KOSOVO	4%
LITHUANIA	4,21%
HUNGARY	4,3%
LATVIA	4,47%
IRELAND	5,2%
ESTONIA	5,45%
GEORGIA	15,99%

WATER DEMAND

- In almost all cases (21) demand (volumes) is used as denominator in the tariff formula;
- In 14 cases demand is calculated in the tariff based on billed volumes only, and in 3 cases demand is calculated in the tariff based on billed volumes plus NRW levels in order to promote a reduction of water losses.

NON REVENUE WATER

- Only a few regulators set targets for Non-Revenue Water and require utilities to plan water loss reduction.

METHODOLOGIES TO DETERMINE REGULATED REVENUES (2)

SOME ISSUES FOR FURTHER DISCUSSION

- WAREG survey shows that water pricing in the water and sanitation sector is based on similar fundamental principles;
- Water pricing is regulated in different ways in Europe. At national level by an economic regulator or by the ministry after supervision by a regulator; at local and/or regional level by the municipalities with or without supervision by a regional or national authority, and in some cases the level and competent authority depends on the district or agglomeration;
- However such extreme diversity in water pricing methods across European countries (i.e. in terms of types of costs recovered, motivation for efficiency, investment stimulus and service improvement, etc.) could jeopardise long term policy objectives like economic stability and the resilience of water systems;
- One possible way to increase the long term economic stability of water systems could be to introduce additional common principles and rules for water and sanitation sector governance and regulation, through European legislation;
- Even in cases where an economic regulator is responsible for water pricing, there are different approaches (i.e. in terms of scope of services under regulation, length of the regulatory period, business planning and formal business plan approval, etc.);
- Tariffs are set based on fixed and variable charges in most of the cases analyzed in the WAREG survey, and in some cases tariff blocks are applied, yet diverse designs and approaches are applied.

SOME INSIGHTS ON ECONOMIC REGULATION IN EUROPEAN COUNTRIES UK ENERGY SECTOR RIIO* MODEL

The energy sector in the UK faces challenges such as decarbonization, changing consumption patterns and innovative technologies, so that regulation should shed light on innovation, new services and respond to new customer needs.

In the RIIO model, Revenues depends on Incentives, Innovation and Outputs:

- Incentives are based on rewards (penalties) for firms' achievements;
- Innovation is promoted through stimulus packages;
- Outputs are licensing obligations, price-controlled deliverables and Service level improvements.

The RIIO* model as an answer to future regulatory challenges.
Revenues are estimated according to the TOTEX regime, by which all cost items (CAPEX and OPEX) are treated equally in terms of rewards and penalties for over and underspending.

Efficiency targets applied to all cost items, including slow money, reduce incentives for overcapitalisation (i.e. by reducing OPEX and by increasing CAPEX) that can be generated by an excessively strong focus on operating expenditure.

*RIIO: Revenue Incentives Innovation and Output

IMPROVING CONTRACTUAL PPPS. THE FRENCH CASE

Water services are frequently agreed through contracts in several European countries like France, with a "concession" and "lease" regime that differs according to operators' power to make investments, hence depending on their "property rights" on assets.
In such contracts between an operator and a public administration, tariffs reflect operators' financial forecasts, and they might be renegotiated, hence avoiding the exceedance of a given threshold. Research shows different impacts on tariffs of contracting out water services, such as:

- economies of scope rise when concessions include water and wastewater services - Desrieux et al., 2013;
- tariff differences between direct management and contracting out depends on annual debt payments (higher for direct management) – Porcher, 2017;
- significant positive impact of private management on water quality – Porcher, 2008;
- public management is more cost efficient than private management, since the latter groups are the best and the worst performers - Le Lannier and Porcher, 2004.

A contractual redesign could be based on several interventions, such as (Porcher, 2019): transferring more risk to the private sector, in order to generate a stimulus to become more efficient; standardising contracts, avoiding the risk of undue renegotiation; including performance-based financial incentives, related to efficiency and quality targets..

EXTENDING THE LENGTH OF CONCESSIONS TO PROMOTE INVESTMENTS

In the water sector capital costs (i.e. depreciation and remuneration of capital) make up a large part of total costs, since services are provided through relevant infrastructures.
Therefore investment plans can widely influence the tariff slope and the financial needs of operators.

Financial coverage of investments through tariffs and loans also depends on the length of concession periods.
An extension of the concession period, by applying the general principle of the EU Treaty contained in the Altmark* decision of the EU Court of Justice, could guarantee the achievement of investment targets and decrease the tariff slope.
This procedure was adopted in Croatia and France for toll roads, while in Italy it was adopted for water concessions.

The shorter the concession, the higher the tariff increase required to cover investments.
Adopting the Altmark rules, a possible solution to finance the water sector at a sustainable tariff is the concession extension, avoiding over compensation.

*"Altmark" conditions on concessions:

1. public concessionaires;
2. objective parameters for calculating performance;
3. avoiding overcompensation;
4. public tender or efficient costs.

MEASURING EFFICIENCY THROUGH ECONOMETRIC METHODS

Mimicking competition could be used in natural monopolies, like the water sector, in order to promote efficiency improvements of operators.
This approach is based on an efficiency score estimation for a set of utilities, calculated through econometric methods, like Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis.
DEA identifies an efficiency score starting from INPUT and OUTPUT variables and solving optimization problems.
INPUTS include cost variables like OPEX or TOTEX, OUTPUT includes expenditure drivers, such as volume of water sold and volume of sewage treated.
DEA is widespread among regulators of different sectors for estimating efficiency savings, like in DENMARK.
In some cases, it also takes account of environmental variables which cannot be controlled by managers, but influencing efficiency scores: such as customer density, demographic features, topology, weather condition and water availability.

Some rules to design a DEA model:

- outputs should only depend on selected inputs;
- inputs should only affect the selected outputs;
- contextual factors should not be controllable cost drivers.

An evolution of DEA is the multi-cluster approach, estimating efficiency for clusters with similar output levels.

COST MODELS FOR THE WATER SECTOR A RECENT DEBATE ON PRICE REVIEW IN ENGLAND AND WALES (1)

OFWAT, the regulator of England & Wales, has been modelling operating and capital expenditure since the water price review of 2009.
In the Price Review of 2019 (PR19), OFWAT identified four main cost drivers for wholesale water and wastewater:

- Scale;
- Complexity;
- Topography;
- Density.

The work on cost modelling started in 2016, with the aim of obtaining a tool for the period 2020-2025.
OFWAT defined an econometric model to estimate cost targets for each company for the next regulatory period, based on the following rules::

- Definition of an econometric model taking account of engineering, operational and economic insights;
- Coefficient estimation and assessment of the robustness of the model;
- Verification of the risk of generating adverse incentives;
- Verification of statistical consistence;
- Estimation method based on Random Effect to reflect the panel structure of the data.

Models were used to predict costs starting from actual cost incurred in the period 2012-2017 and considering the planned value of cost drivers. Then a catch up target was applied setting a benchmark at the upper quartile.
Finally, the regulator set a frontier-shift of 1.1% over the regulatory period. In December 2019 OFWAT

published its final decisions on the PR19. Four companies out of 17 decided to appeal to CMA. **The final decision was preceded by a long debate on the robustness of the cost model, which was then partially brought to final appeals.** The main drawbacks of the econometric models can be summarised as follows (Saal, 2019):

- Water is not considered among output variables (model misspecifications). A difference between water abstraction and leakages could be used as an output in order to consider the effects of leakages on treatment and distribution costs;
- Lack of control variables to take account of changes in operating environment could over- or underestimate efficiency score (lack of control variables);
- A retrospective assessment was made on a period (2012-2017) covered by two different regulatory models and applying a time invariant random effect which does not take account of intertemporal differences;
- A basic assumption of the model is that economic and regulatory conditions have no effects on the data observed;
- The complexity indicator of water treatment is based on arbitrary weights;
- The topography and geography complexity should be measured in terms of average pumping pressure and not with booster density;
- A multi-output model could better take account of interactions between costs across the various segments of the sector.

BENCHMARKING PRACTICES IN EUROPE

Several benchmarking initiatives on the European water sector have been launched to improve accountability and disclosure towards customers, and, in some case (e.g. Denmark) to activate a regulatory mechanism based on reputation (naming and shaming approach):

- The IBNET platform provides data on a set of 12 indicators, including tariffs, for water and wastewater utilities in 178 countries;
- The Danubis platform is a cooperation network of more than 600 water and sanitation utilities in 15 countries in the Danube Region, which share data, indicators, benchmarking and reporting;
- The European Benchmarking Cooperation is a non-profit Foundation that benchmarks more than 200 water utilities in 45 Countries, over 6 main areas;
- The Danish benchmarking improves a learning process through a better understanding of inefficiency and performance.

Key messages on customer

KEY MESSAGES ON ECONOMIC REGULATION	REGULATORS	NATIONAL GOVERNMENT	EU INSTITUTIONS	UTILITIES
One possible way to better achieve common goals in national water policy at European level would be to introduce more detailed and common principles, rules and algorithms for water and sanitation sector governance and regulation, by means of European legislation	✓	✓	✓	
Energy regulators are developing innovative approaches to defining regulated revenues and promoting output quality and innovation, which could also fit the needs of water sectors in the EU	✓			
The contractual public-private partnership could be improved by adopting an incentive-based approach to setting rewards and penalties in relation to the achievement of quality and efficiency targets	✓	✓		
Economic regulation should adopt advanced statistical techniques for estimating operational and total efficiency of firms. This involves a deep learning process by regulators and utilities on econometric methodologies	✓			✓
Benchmarking improves the accountability and efficiency of the water sector and supports utilities to find best practices and to emulate top performances. It might be developed on a voluntary basis or as a compulsory practice, set by regulators or by Government. The new Drinking Water Directive seems to be leading in this direction	✓	✓	✓	✓

References

We are grateful to the following speakers in session 2 on "Cost Assessment Modelling and Promoting the Efficiency of Water Utilities" of the European Forum on Regulation of Water Services (EFRWS, 3 December 2019, Rome, http://www.wareg.org/documents.php?q=view&id=8), for allowing the publication of their presentations:

Stjepan Gabric (World Bank, Croatia) *The Danube Water Program and World Bank experience with benchmarking in utility efficiency improvement*

Takuya Urakami (Kindai University, Japan) *Understanding the relationship between industry fragmentation and wastewater efficiency, so as to inform Japanese Government policy on wide area cooperation and consolidation*

Francesca Mazzarella (Utilitatis Foundation, Italy) *The Italian water sector: insights from the Blue Book*

Bertel Ifversen (DANVA, Denmark) *Benchmarking and sunshine regulation in Denmark*

Alan Horncastle (Oxera, UK) *Views on the cost assessment undertaken in the 2019 price control in England & Wales*

Alan Sutherland (WICS, Scotland, UK) *Use of information and efficiency assessment: reflections from the Scottish regulatory experience*

David Saal (Loughborough University, UK) *The implication of (not) appropriately controlling for cost interactions, water scarcity and operating environment in regulatory waste and wastewater cost assessment*

Fabrizio Erbetta (UNIUOPO, Italy) *The right benchmarking for the right incentives: the issue of water losses in distribution networks*

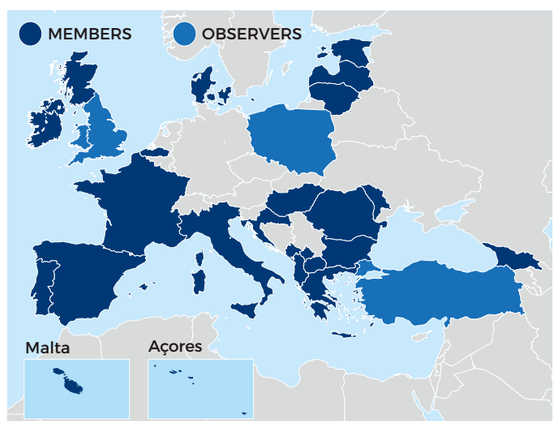
Peter Dane (European Benchmarking Cooperation Netherlands) *The EBC programme: promoting continuous improvement of water services by learning from each other*

TARIFF STRUCTURE AND CUSTOMER ENGAGEMENT. PROMOTING WATER, SUSTAINABILITY AND AFFORDABILITY

TARIFF REGULATORY FRAMEWORK IN EUROPE: 2019 WAREG SURVEY

INFORMATION ABOUT TARIFF STRUCTURE	IS TARIFF VOLUMETRIC ONLY	IS THERE FIXED CHARGE	ARE THERE TARIFF BLOCKS BASED ON VOLUMES USED	IS THE TARIFF FORMULA THE SAME FOR EACH SERVICE
Bulgaria / EWRC	YES	NO	NO	YES
Georgia / GNERC	NO	YES	NO	YES
Albania / ERRU	NO	YES	YES	YES
Spain/ MITECO	NO	YES	YES	N.R.
Montenegro/ RAE	NO	YES	NO	NO
Hungary/ HEA	NO	YES	NO	YES
Romania/ ANSRC	YES	NO	NO	YES
Malta/ REWS	NO	YES	YES	N.R.
Latvia/ PUC	YES	NO	NO	YES
Lithuania/ VERT	NO	YES	NO	YES
Estonia/ ECA	YES	YES	NO	YES
Belgium, Flanders/ VMM	NO	YES	YES	NO
Belgium, Brussel/ BRUGEL	NO	YES	YES	YES
Croatia/ VVU	NO	YES	YES	YES
Poland/ PW	NO	YES	NO	N.R.
Italy/ ARERA	NO	YES	YES	YES
Armenia/ PSRC	YES	NO	N.R.	YES
North Macedonia/ ERC	NO	YES	YES	YES
UK, Scotland / WICS	NO	YES	YES	NO
UK, England and Wales / OFWAT	NO	YES	YES	NO
Ireland /CRU	NO	YES	YES	YES
Kosovo / ARRU	NO	YES	NO	YES
Moldova / ANRE	NO	YES	YES	NO
TOTAL (YES)	5	19	11	15
TOTAL (NO)	18	4	11	6

In 2019, WAREG launched a survey aimed at understanding the different tariff structures applied for water and sanitation by all WAREG members.
A Communication of the EU Commission COM (2000) 477, states that pricing structures should include a variable element (i.e. volumetric rate, pollution rate) as an incentive for water conservation and reduction of pollution.
Typically, a tariff structure aims to allocate the costs of water services according to economic efficiency, social affordability and environmental sustainability targets.
The majority of regulators apply fixed charges with volumetric tariffs.
11 countries apply tariff blocks (between 2 to 4 blocks) to discourage overconsumption.



TARIFF STRUCTURE: A TOOL TO IMPROVE SOCIAL SUSTAINABILITY (1)

Water services in the EU are recognised as services of general economic interest and they are subject to several public goals, such as universal access and affordability (COM, 2003). The United Nations Sustainable Development Goals of Agenda 2030 include universal and equitable access to safe and affordable drinking water.
There are specific tools to tackle affordability issues for customers, such as:

- Regulatory tools: increasing block tariff, blocks free of charge, reduced VAT rate, exemptions social tariffs, forbidding disconnection for defaulting payers;
- Policy-making tools, like solidarity funds, bonuses, social discounts;
- Social tariffs – the Portuguese context (Martins, 2019).

REGULAR TARIFF SCHEME		SOCIAL TARIFF SCHEME	
FIXED CHARGE		--	
VOLUMETRIC CHARGES	1° BLOCK 0-5 m^3	VOLUMETRIC CHARGES	1° BLOCK 5-15 m^3
	2° BLOCK 5-15 m^3		2° BLOCK 15-25 m^3
	3° BLOCK 15-25 m^3		3° BLOCK >25 m^3
	4° BLOCK >25 m^3		

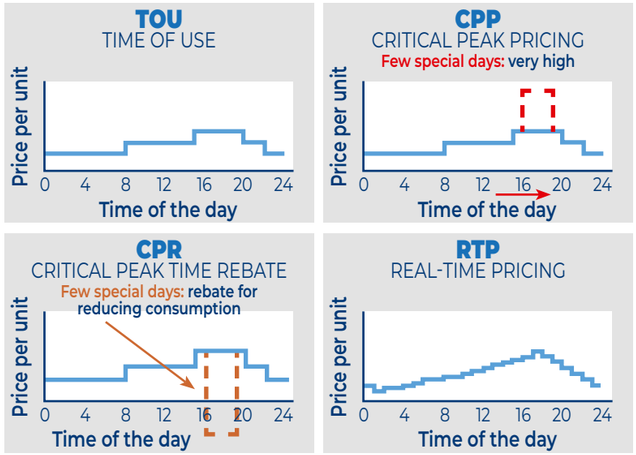
Social affordability policies should not be delivered through costs incurred by water utilities, who should not be held responsible for deciding the application of social tariffs, in order to avoid possible unfair and unequal distribution of benefits.

TARIFF STRUCTURE: A TOOL TO IMPROVE ENVIRONMENTAL SUSTAINABILITY

The Water Framework Directive requires that pricing policies create incentives for an efficient use of water resources, taking into account the social, environmental and economic effects of water consumption.
Water efficiency goals can be achieved through different tools, depending on the perspective of customers or water companies (Fields, OXERA, 2010).
Effective metering and volume-based pricing policies may discourage overconsumption.
Volume-based tariffs are:

- a combination of fixed and variable tariffs;
- Increasing (decreasing) block tariff;
- Seasonal or time of use tariff (TOU).

With a TOU tariff, daily price variations depend on water demand: in peak hours, price is higher than off-peak. This approach could change consumers' behaviour, hence promoting resource conservation through effective price signals and prompting utility cost savings. A survey of CET Acqua (Termes, 2019) shows that water consumption could be more efficient for at least 1/3 of residential users through dynamic prices.
However, TOU may also create price discrimination for different water usages, and it would require high tech smart meters.



CUSTOMER ENGAGEMENT BEYOND THE TARIFF: BEHAVIOURAL APPROACHES TO WATER EFFICIENCY

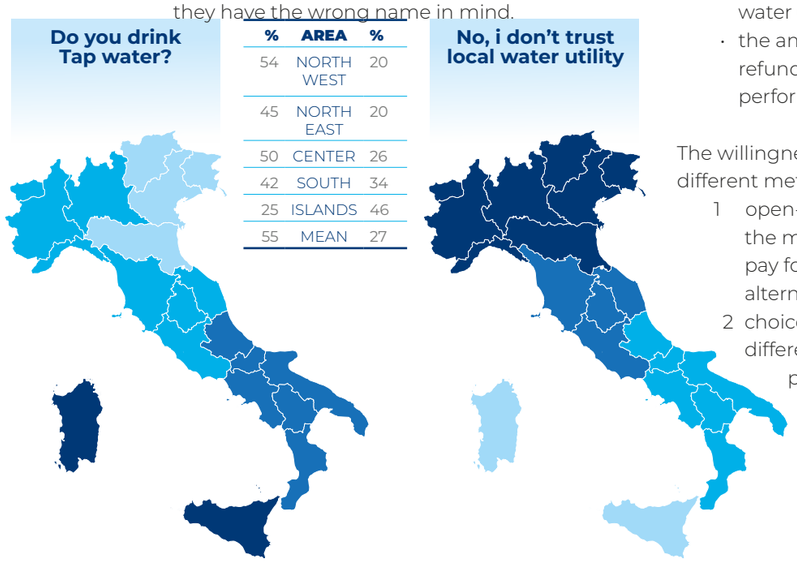
Since water demand is quite rigid to price (literature shows an elasticity between 0 and -0.5), different approaches to tariff setting can be followed, for instance based on interaction among utilities, consumers and water authorities.
Such approaches may be based on campaigns to promote the use of technologies that allow water savings in private buildings (e.g. double flush toilets); an authority may ask water utilities to inform customers periodically about their consumption, in line with the EU principle of transparency.
In England and Wales water utilities have devel-

Panel 4
Sustainable
Water Tariffs

oped social programmes to encourage consumers to save water. For the Price Review of 2019, the business plan of South West Water shows the GreenRedeem and Advizzo schemes, based on information on water consumption provided to customers and on a comparison with targeted recommendations (Fields, OXERA, 2019).

A LOW INTEREST SECTOR FOR CITIZENS

A recent survey of the Italian research centre "REF Ricerche" (2019) showed that 55% of citizens do not know the name of their service provider or they have the wrong name in mind.



%	AREA	%
54	NORTH WEST	20
45	NORTH EAST	20
50	CENTER	26
42	SOUTH	34
25	ISLANDS	46
55	MEAN	27

This is also due to the practice of sending bills addressed to the manager of a condominium rather than to the single household.
Some Italian domestic customers are not fully satisfied by the water they drink and they do not trust their local water utility, especially in Southern Italy, where the service is not well organised.
A larger exchange of information with customers could improve the dialogue between utilities and citizens, by addressing the following goals:

1. A better understanding of water services and of investments and tariff plans;
2. An increased acceptance of the water policy plan;
3. A greater trust in local water utilities and in public water authorities;

BEST PRACTICES FOR GOOD ENGAGEMENT

Engaging customers gives them the opportunity to contribute with fresh ideas and provide a different perspective on investment priorities, willingness to pay and acceptability of a business plan (Accent, 2019).
Customer engagement supports:

- the development of cost-benefit analysis, to appraise the benefits received through water services;
- the definition of performance targets for water utilities;
- the amount of reward, penalties and refunds for customers in case of poor performance of the WSS provider.

The willingness to pay can be estimated through different methods, such as:

1 open-ended method, asking customers the maximum price they are willing to pay for a given service, among given alternatives;
2 choice of alternative services differentiated in terms of quality and prices;
3 definition of alternative services with their own total prices, through a menu-based approach.

Key messages on customer

KEY MESSAGES ON CUSTOMER	REGULATORS	NATIONAL GOVERNMENT	EU INSTITUTIONS	UTILITIES
The pricing structure should include variable items, in order to comply with the polluter pays principle and to promote water savings. However, not all countries adopt a volumetric tariff	✓	✓	✓	
Increasing block tariffs are a good practice to promote water savings, which could also be used to address affordability issues, by lowering charges for the first block for the poorest people. Dynamic tariffs, based on time of use, could boost savings and reduce the rate of service collapse in peak hours, but it requires a deep development of high tech meters and IT infrastructures	✓	✓		
Water savings can also be promoted through behavioural approaches, jointly with the tariff lever, by giving a special discount to the best performing households	✓	✓	✓	✓
Effective customer engagement can reduce information asymmetries and improve the acceptability of investments and of tariff increases, hence it should be included in the process of business planning and approval	✓			✓

References

We are grateful to the following speakers in session 3 on "Water Regulation for Innovation and Environmental Sustainability" of the 1st European Forum on Regulation of Water Services (EFRWS), for allowing the publication of their presentations:

Elena Gallo (ARERA, Italy) *Regulatory tools for promoting environmental sustainability: ARERA's experience*

Sarah Gillman (Scottish Water, UK, and EurEau) *Sludge management in EU, following a circular economy approach*

Francesco Fatone (Università Politecnica delle Marche, Italy) *Regional carbon and energy footprint and audit in municipal wastewater treatment services: towards standardization?*

Peyo Stanchev (Brunel University London, UK) *Towards Carbon neutral and cost efficient Sewage Treatment*

Zsuzsanna Kovàcs (Budapest Waterworks Ltd, HU) *Implementing innovative natural and engineered treatment systems in Budapest*

Cédric Prevedello (Aquawal, Belgium) *Circular economy in water and wastewater: state of the art and perspectives in Wallonia (Belgium) and the effect of (lack) of regulation on it*

Hay Koppers (AquaMinerals, The Netherlands) *AquaMinerals: a collective approach of the Dutch water sector to stimulate circular economics for their residuals from water treatment processes*

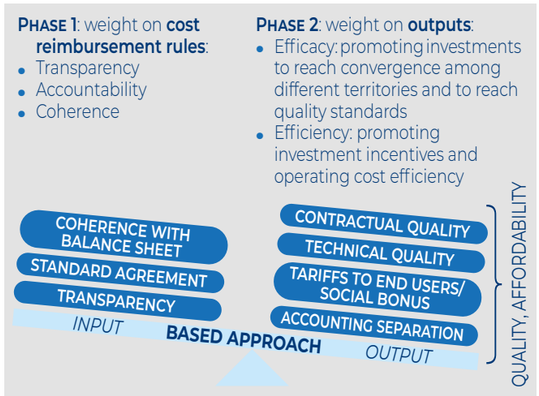
Montserrat Terms Rife (CETAqua, Spain) *Dynamic water prices for promoting a sustainable and efficient use*

Luca Lo Schiavo (ARERA, Italy)*Regulatory tools for promoting innovation: the European experience*

OUTPUT AND INNNOVATION BASED REGULATION FOR PROMOTING CIRCULAR ECONOMY AND DIGITALISATION

OUTPUT-BASED REGULATION SETTING STANDARDS FOR QUALITY: THE ITALIAN CASE

In 2012 the Italian Authority ARERA set the first rules for the water sector, starting from cost reimbursement, and following a classical input-based approach. Since 2016, output-based regulation has also been applied, by defining contractual quality standards and procedures (2016) and technical quality targets (2018).



It is too easy to react to a pushing regulatory activity on admitted costs for tariff reimbursement by reducing the quality of provided services

Quality is not free, so an opportunity judgement cannot forget the affordability issue ("who is paying for what")

COST REIMBURSMENT RULES

EU PRINCIPLES
- WATER CONSERVATION
- POLLUTER PAYS

QUALITY REGULATION

Since 2016 **QSII**

CONTRACTUAL QUALITY
- Direct impact users
- Regard ancillary services (billing, service, desk timing)

Since 2018 **RQTI**

TECHNICAL QUALITY
- Regards the core of water services (water availability and quality, environmental protection
- The focus is not "how many" investments, but the results of the investments

AFFORDABILITY

Since 2018 **TICSI-REMSI**

TARIFFS APPLIED TO END USERS
- Allocative efficiency and equity
- Reduce geographical differences
- Equitable tariff progressivity: per-capita
- «Polluter pays» principle explicitly declined for industrial users
- If everyone pays, tariffs become more sustainable

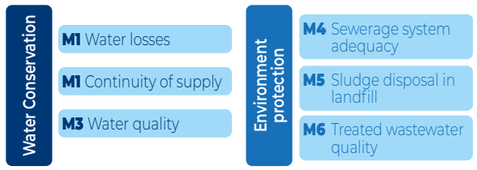
Since 2018 **TIBSI**

SOCIAL BONUS
- Water = essential service, must be available also for disadvantaged people
- 50 lt/person/day guaranteed
- Costs socialised through an equalisation component

CHANGE VS OUTPUT BASED REGULATION

REDUCING WATER LOSSES THROUGH INCENTIVE-BASED REGULATION

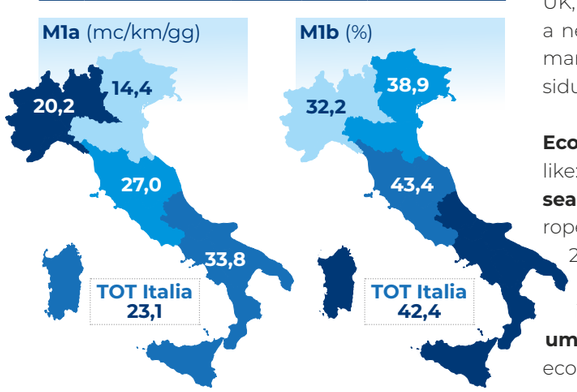
Technical Quality Regulation in Italy is based on 6 main indicators for «water conservation» and «environmental protection». Rewarding or penalizing mechanisms will be quantified starting from 2020, on the basis of utilities' performances recorded in the two previous years.
Rewards (quantified economically) are foreseen for all the assessment stages.
Penalties (foreseen for all levels except Excellence) consist of a reduction in allowable costs (starting from a performance evaluation in 2020, while for the previous evaluation period 2018-2019 penalties will be allocated to a fund), in the event of worsening quality (Stages I and III), and through the obligation of a fund in the case of negative quality variations (Stages II and IV), and are also established in relation to the operator's VRG level and certain corrective factors.
A reputational approach will also be used, by publishing the performance under assessment (sunshine regulation principles).



WATER SUPPLY

M1 - WATER LOSSES

ID	INDICATOR	TARIFF TYPE	ID CLASS	TARGETS
M1	**M1a** Water losses per km (mc/km/day) **M1b** Leakage rates (%)	RES	A	Conservation
			B	-2% M1a yearly
			C	-4% M1a yearly
			D	-5% M1a yearly
			E	-6% M1a yearly



PUBLIC INTERVENTIONS TO PROMOTE CIRCULAR ECONOMY

Public interventions to promote circular economy include: market and governance reforms; economic incentives; strict legal provisions requiring corporate conduct more oriented toward the green economy paradigm (Guerrini and Manca, 2020)

TYPE OF INTERVENTIONS		ACTORS	STRENGTH	DRAWBACKS
COMPULSORY BEHAVIOUR		Law makers (Parliaments and Governments)	Timeline	Risk of economic losses caused by the behaviour required
ECONOMIC INCENTIVES	REGULATORY TOOL	Independent authorities, ministerial agencies	Timeline; Reduced risk for companies thanks to cost recovery rules	Risk of reducing market engagement in a circular economy and increasing the tariff burden for customers
	NON-REGULATORY INTERVENTION	Public bodies and banks	Lending policies could have a higher economic efficiency than grants	Long-term horizon; Market risk borne by companies in case of borrowing.
MARKET AND GOVERNANCE		Law makers, regulators, utilities	High economic efficiency	Long-term horizon; Market risk borne by companies)

The introduction into law of compulsory behaviour with greater focus on environmental sustainability is also a tool widely adopted in the water sector: for example, the environmental limits set for effluent discharge and sludge disposal.

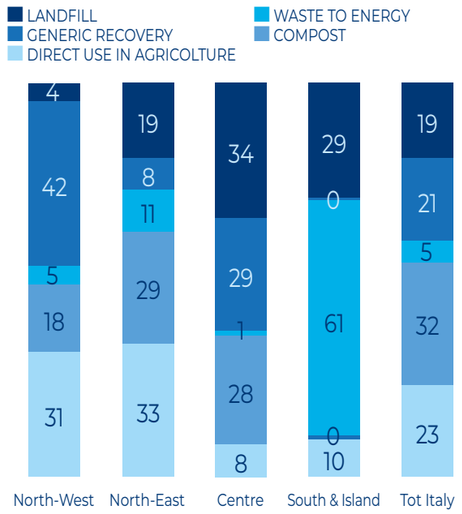
Market and governance reforms may include several interventions on different segments of the supply chain by introducing new market platform and players. e.g.: in the Netherlands a Joint Venture of water utilities was created for the recovery of materials (see next slides). In the UK, the national water regulator OFWAT created a new market platform called the "bioresources market", that matches supply and demand of residuals

Economic incentives include several measures like: **public subsidies and grants to develop research projects**, such as those issued by the European Commission through LIFE + and Horizon 2020; **subsidized loans granted by public banks**, such as the EIB, for financing "green investments"; **tariff items and extra premium** introduced by regulators to develop circular economy-based activities.

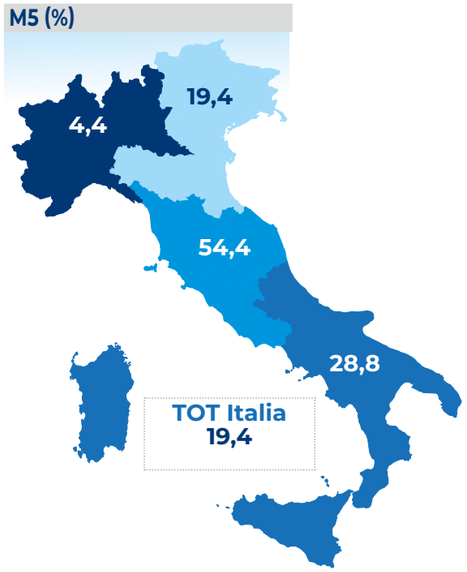
REGULATORY TOOLS (1): THE CASE OF SLUDGE DISPOSAL IN ITALY

WSS regulation in Italy for the period 2020-2023 takes into account four main pillars of the circular economy, namely energy efficiency, plastic use reduction, energy and raw material recovery and wastewater reuse.
Incentives for such activities come from the operators side, hence ensuring cost recovery and extra margin retention.
Technical quality regulation follows this approach, setting standards to minimise sludge disposal in landfill and to promote recycling.

SLUDGE RECOVERY IN 2016



M5 (%)



WASTEWATER TREATMENT

M5 - SLUDGE DISPOSAL IN LANDFILL

ID	INDICATOR	TARIFF TYPE	ID CLASS	CLASS	TARGETS
M5	Landfillsludge disposal (%)	ENV	A	M5<15%	Conservation
			B	15%≤M5<30% e %SS_{tot} ≥30% of sludge mass overall produced	-1% $MF_{ta,disc}$ yearly
			C	15%≤M5<30% e %SS_{tot} ≥30% of sludge mass overall produced	-3% MFa yearly
			D	M5>30%	-5% MFa yearly

CONSULTATION DOCUMENTS Since 2020

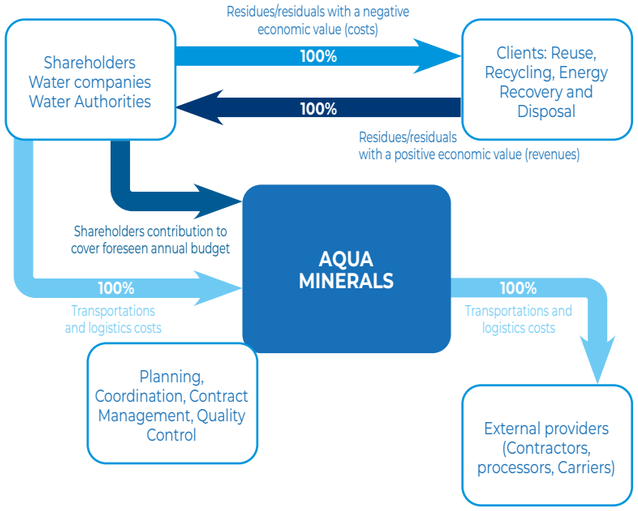
Added focus on:
3 incentives for other activities with effects on:

- **Energy efficiency** — installation of soft starters and inverters, pressure management, energy recovery devices...
- **Plastic use reduction** — installation of high quality fountains, tap water as an alternative to bottled water
- **Energy and raw material recovery** — biogas from sludge, mini hydro power plants, biopolymers/struvite/ phosporus ... from sludge
- **Wastewater reuse** — Reuse for irrigation or industrial purposes, plant internal reuse as technical water

REGULATORY TOOLS (2): THE CASE OF ENERGY SAVINGS IN ITALY

Water is an energy intensive sector, with high consumption in pumping water for abstraction and distribution and in water and wastewater treatment stages, hence it is fundamental that regulators provide proper incentives to minimise energy consumption.
Since 2020 ARERA has introduced an algorithm that ensures operators an extra margin as a share of the kWh saved, by comparing the last consumption of year «a-2» with the average consumption of a given number of years.
Saving is valued at a minimum price between the actual unit cost per kWh incurred by the operator in the year «a-2» or the average price per kWh incurred in the same year in the sector.

KOPPERS, AQUA MINERALS, 2019

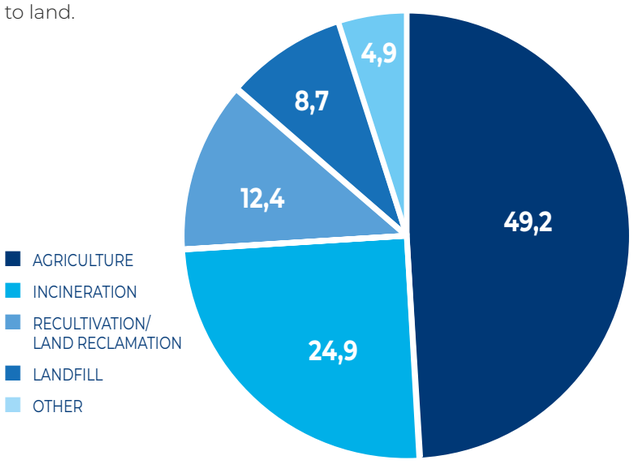


GOVERNANCE IS MORE IMPORTANT THAN TECHNOLOGY (1): THE CASE OF AQUAMINERALS IN THE NETHERLANDS

AquaMinerals was established in 1995 with the mission to provide «active services to its participants, aimed at the creation of economic and sustainable value of current and future residuals». The company is a joint venture of operators to overcome the lack of transparency of the private sector in the recycling business. It promoted initiatives to valorise residuals, organise and purchase services (such as transportation, storage and analysis), trade residuals, implement quality controls and provide information to stakeholders.
One of the most challenging issues for AquaMinerals is the reuse of alum sludge, the pelletising of iron oxides to highly effective adsorbents for Sulfur, Arsenic and Phosphorus.
Research was also carried out to find interaction between iron and phosphorus, to find P-trap.

GOVERNANCE IS MORE IMPORTANT THAN TECHNOLOGY (2): THE CASE OF SLUDGE MATERIAL RECYCLING

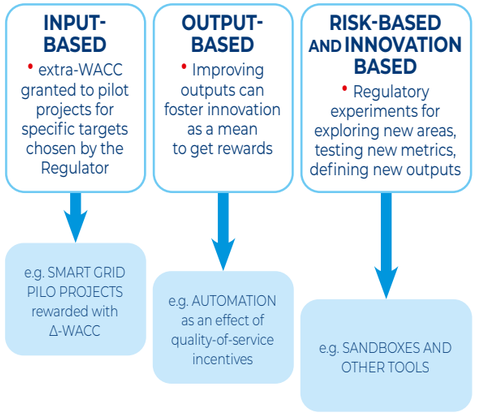
An extensive survey carried out by EurEau in 2017 shows that 4.5 M tDS/y are used in agriculture, 1.2 M tDS/y in recultivation/land reclamation, so that 5.7 M tDS/y (61.6%) of sewage sludge is returned to land.



In order to promote the reuse of sludge in agriculture it is important to combine: control at source of pollutants to maintain sewage sludge quality; technology to make treatment effective; governance choices, introducing certification of sewage sludge and involving farmers in the process.

INNOVATION BASED REGULATION ADAPTIVE REGULATION FOR PROMOTING INNOVATION

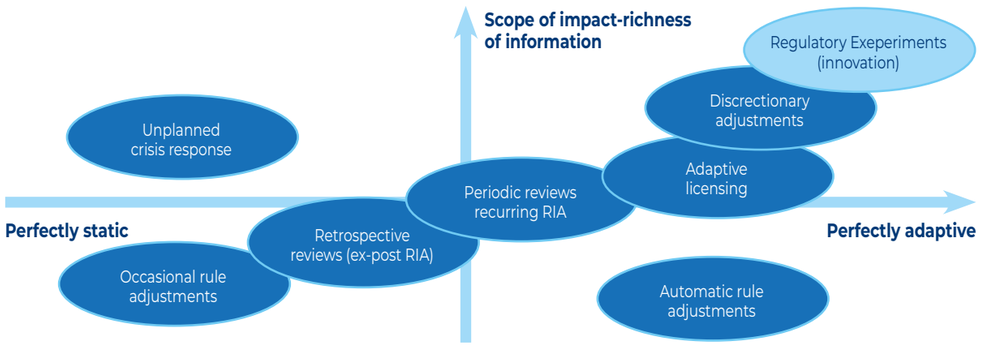
A prompt approach by regulators to accelerate a technological revolution in the water sector is key to reap potential benefits of innovation and to mitigating the risks of regulated firms.
Regulatory experiments consist of partial derogations from the ordinary set of rules, aimed at exploring new areas, metrics and outputs. While input-based regulation can promote innovation through extra remuneration of pilot projects, output-based regulation can indirectly promote innovation by raising quality standard targets, and innovation-based regulation can adopt derogations and funds to support pilot projects.
Regulation models can have different degrees of flexibility to external circumstances: under a static approach, rule adjustments are only occasional, while under a more dynamic approach rules might be automatically adapted.



The width of the scope and impact of regulation and the richness of information required varies from reduced scope and low information, associated to small intervention on rules (e.g. automatic update of rate or return with inflation rate), to a wider scope and set of information required.

Panel 2
Cost Assessment Modelling and Promoting the Efficiency of Water Utilities

ADAPTIVE REGULATION



Source: L.S. Bennear, J.B. Wiener, "adaptive Regulation: Instrument choice for Policy Learning over time", draft working paper, february 2019

Key messages on customer

KEY MESSAGES ON QUALITY, INNOVATION AND CIRCULAR ECONOMY	REGULATORS	NATIONAL GOVERNMENT	EU INSTITUTIONS	UTILITIES
Regulation of technical quality is a significant driver for investment, and it can indirectly increase innovation rates of regulated firms and their supply chain, which have to redesign their processes in order to comply with more challenging standards	✓			✓
Regulators that apply an output-based approach are deploying the rules set by EU legislation on water quality (DWD), water savings (WFD), wastewater treatment (UWWTD) in the national water sector	✓	✓	✓	
Regulators might promote circular economy practices by giving monetary incentives to those operators that are able to invest in recycling, energy saving and environmental sustainability	✓	✓	✓	✓
Governance and market reforms might be associated to economic regulation to ensure effective recycling and recovery of materials		✓	✓	✓
Regulators should adopt an innovation-based approach by derogating from rules for selected pilot projects, or by funding them with resources collected through specific tariff items	✓	✓	✓	✓

References

We are grateful to the following speakers in session 4 "Sustainable water tariffs", of the 1st European Forum on Regulation of Water Services (EFRWS, 3 December 2019, Rome, http://www.wareg.org/documents.php?q=view&id=8) for allowing the publication of their presentations:

Ivaylo Kastchiev (EWRC, Bulgaria) *Tariff regulatory frameworks in WAREG Member Countries*

Francesco Lo Passo (Brattle Group, Italy) *Sustainable tariffs, investments and the Concessions Directive*

Gareth Davies (Pöyry Management Consulting, UK) *Delivering sustainable tariff regimes: insights from the GB Energy Sector*

Reinhard Perfler (University of Natural Resources & Life Sciences, Austria) *The landscape of water tariffs in Austria: from calculation guidelines to practical application under different organizational conditions*

Celine Nauges (Toulouse School of Economics, France) *Tariff design for economic efficiency, equity, and cost recovery*

Rita Martins (University of Coimbra, Portugal) *Water affordability: assessment and policies*

Michele Tettamanzi (REF Ricerche, Italy) *Sustainable Tariff: Information as a bridge between regulators, water industries and users*

Rob Sheldon (Accent, UK) *Participatory water tariff review: the market research perspective*

Leon Fields (Oxera, UK) *Using water tariffs as a part of a package of water efficiency measures*

WATER REGULATORY TRENDS TO 2030

By **Andrea GUERRINI**
ARERA Board Member and WAREG President

The concluding remarks of the 1st European Forum on Regulation for Water Services (EFRWS[1]) shed light on the possible evolution of water regulation in the next decade. In fact, 2030 is the year targeted by the United Nations to achieve the sustainable development goals, which include clean water and sanitation, as well as affordable and clean energy[2].
Like the four Forum sessions[3] highlighted, some relevant external variables are likely to affect the work of economic regulators in the future, and specifically:

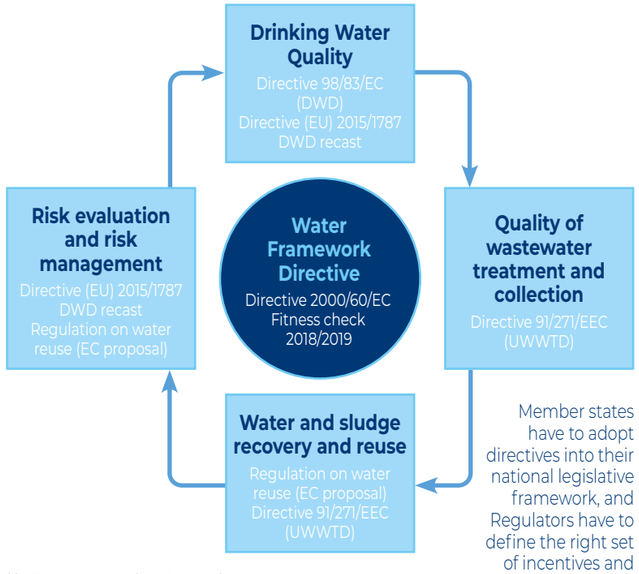
- the evolution of EU water legislation, in particular the new Drinking Water Directive[4] and the new Regulation on water reuse[5];
- the new strategic path pursued by water utilities, based on circular economy, innovation and stakeholder engagement.

The pillar of the EU water legislation framework is the Water Framework Directive (WFD)[6], which promotes efficient use of water resources, among other things, by requiring that adequate price signals are guaranteed.

This document prompted additional EU legislation, such as:

1. the new Drinking Water Directive, which sets specific quality targets for drinking water;
2. the Directive for Urban Waste Water Treatment and Disposal;
3. the regulation on water reuse, which introduced a risk-based approach to encourage the use of treated wastewater for irrigation purposes, aiming not only at alleviating stress on water usage, but also to increase citizens' confidence in reused water;
4. the Directive 1787/2015 of 6 October 2015, which introduced a risk-based approach in water management.

THE FRAMEWORK OF EU WATER LEGISLATION



(1) **Transparency** (DWD art. 14)
(2) **Measurement and risk assessment for domestic plants** (DWD art 10 + 14)
(3) **Risk based approach** (DWD – Reg. reuse)
(4) **Tariff for wastewater reuse** (Reg. reuse)

The new Drinking Water Directive (DWD) and the new Regulation on water reuse (RWR), may bring about some important changes in the tools applied by water regulators.
Firstly, article 14 of the new DWD, which was still under negotiation between the EU Parliament and the EU Council of Ministers at the time of the Forum, required that water utilities provide transparent information to customers on the price of water per cubic meter, the cost of water and water leakages.
This kind of provision, once approved, could provide an opportunity for water regulators to define a reporting scheme and to set clear computational rules on the required key performance indicators. Water utilities may have to comply with the provisions of the DWD by drafting a reporting scheme according to the specific rules set by the regulator; customers may receive clear and transparent information at least annually, and the sector may be monitored through a "name and shame approach", similarly to sunshine regulation models, where information on water services and usage is typically made public for benchmarking purposes.

TRANSPARENCY TOWARDS CUSTOMERS: the introduction of disclosure standards

THE PROPOSAL OF DWD MADE BY THE EU COMMISSION ON FEBRUARY 2018
Art.14 information to the public

2 .... **all person supplied** receive regularly and at least once a year, **and in the most appropriate form (for instance on their invoice or by smart application)**

a) information on the cost **structure of the tariff charged per cubic metre**.... Presenting at least costs related to the following elements:
- .... Pursuant to Article 8(5);
- Treatment and distribution of water intended for human consumption;
- Wastewater collection and treatment;
- Measures taken pursuant to Article 13

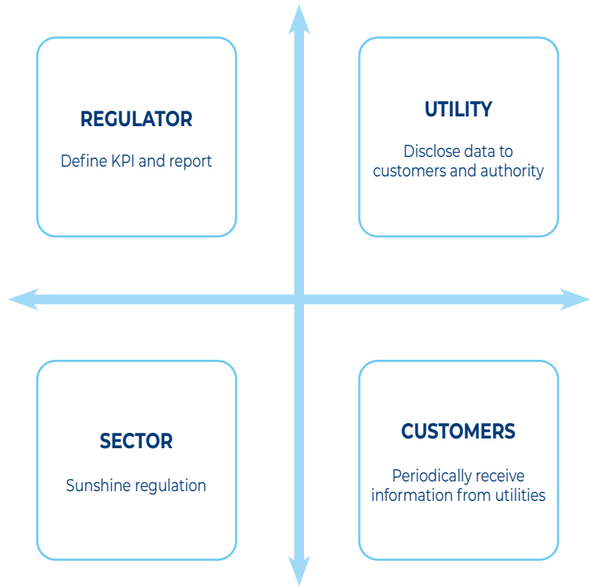
b) **The price of water** intended for human consumption supplied per litre and cubic metre;

c) **the volume consumed** by the household **at least per year or per billing period**, together with yearly trends of consumption;

d) **Comparisons of the yearly water consumption** of the households with an average consumption for a household in the same category...

KEY INFORMATION
Focus on **costs, price, consumption and water leaks**

HIGHLIGHTS
Regulators should ensure the correct balance between transparency and homogeneity of information disclosed by all water utilities



Secondly, article 14 of the new DWD also requires that water utilities provide information to all households on their actual water consumption, at least once a year, as well as a comparison with their historical consumption. This provision, once approved, may have an impact on the metering process by prompting a widespread campaign to install metering devices for domestic customers. Hence, billing procedures in Europe may be no longer based on surface (by square meter), but rather on effective consumption (by cubic meter). Additionally, in perspective, metering procedures would allow water supplies to be shut off selectively in the event that customers fail to pay their bills.
At the same time, article 10 of the new DWD introduced the task of carrying out a risk assessment of domestic plants and mains in order to mitigate the risk of contamination of water resources that flow into private plants. According to this provision, the risk assessment should be carried out in cooperation with water suppliers and, once approved, it could give water utilities the opportunity also to manage domestic plants.
At the same time, there could be room for regulators to set incentives through water tariffs to renew private plants with high contamination risks, like the approach followed by the Italian Regulatory Authority for Energy, Networks and Environment to promote the renewal of private electricity grids. Finally, plant renewal could further encourage the installation of metering devices for households.

Andrea Guerrini,
WAREG President

RISK BASED APPROACH: how the risk based approach of EU legislation can affect water regulation

THE 4 APPROACHES TO WATER REGULATION

INPUT BASED	· Efficiency measures and rate of investments · Cost recovery and capital repayment
OUTPUT BASED	· Output and quality measuremes · Reward (and penalties) for the achievement (or not) of standards provided by regulation
INNOVATION BASED	· Project measures · Derogation/pilot rules/pilot projects to incentivise steps forward in terms of input and output reports
RISK BASED	· Risk measures · Reward (and penalties) based on risk mitigation capability

MAIN ADVANTAGES OF THE «RISK REGULATION»

1) LEAD INDICATORS OF OUTPUT MEASURES (r=pr* damage)
2) IDENTIFICATION OF CRITICAL AREAS
3) BENEFITS WHEN COSTS FOR FAILED OUTPUT ACHIEVEMENT ARE HIGH

THE REGULATON OF RESILIENCE OF ELECTRIC NETWORK

- Incentive based regulation promoting the resilience of the electric network in Italy
- DSOs must publish investment plans oriented towards risk mitigation

$$\textbf{RI}\ \textit{(Risk index)} = \frac{\textbf{N. Customer at risk}\ \textit{(given design technical limits)}}{\textbf{Return time of critical event}\ \textit{(based on probability analysis)}}$$

- Incentives are paid when benefits are higher than costs planned, within 20% of the differences between benefits and costs
- Benefits = risk reduction

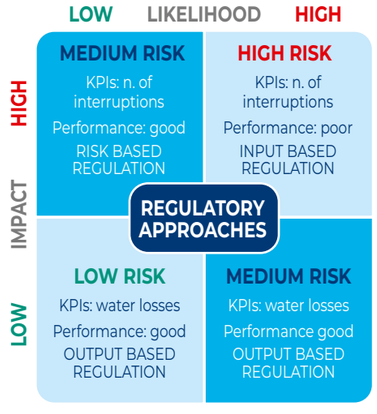
$$(RI_{pres} - RI_{post}) \times H \times V_{ens}$$

- Penalties are applied in case of late deployment of plans

The approach followed by the DWD and by the Regulation on water reuse is based on risk mitigation, hence applying the principle "prevention is better than the cure". This type of approach, already introduced by the EU Directive 1787/2015, may change water management practices by giving more importance to prevention than to control. Consequently, the main performance measures are also likely to become focused also on risk assessment than only to output achievement.

Following this hypothesis, economic regulators may not only have to apply the "classical" input-based and output-based approaches, but also a new "risk-based" approach to create additional incentives for water utilities to reduce the risk of "negative events", such as water service interruptions and non-compliance with EU drinking water quality standards.

RISK BASED APPROACH: an application for the water sector



In conditions of «**medium risk**» a target in terms of risk could be set by the regulator, since the «costs» of a failure to achieve the target could be too high for the system

- ❑ **Continuity of service provision;**
- ❑ **Water quality standards set by the law**

The risk measurements of the Water Safety Plan could be a new target set by regulators to improve the quality of water alongside more «classic» output measures.

When water services are performed well, the risk of interruption could be considered "medium", with low likelihood and high negative impacts. Under these conditions a "risk-based approach" is more reliable than an output-based approach, since it is better to measure the level of risks ex ante than only to count the number of targets missed ex post.

This approach is already adopted by some regulators in Europe, such as the Italian ARERA[7], in order to improve the resilience of the electricity grid in of the event of particularly severe weather conditions, such as unforeseen heat waves or ice.

In conclusion, some major benefits could be achieved by introducing the principles of economic regulation into EU legislation, including water reuse, in terms of a better identification of those who have to pay for reclaimed water and of cost transparency, although the current EU Regulation on water reuse does not incorporate any provisions on price charging policy. In fact, wastewater reuse is a widespread practice in Europe, including by means of pilot projects, but there is a wide variety of pricing policies, with different applications of the cost-recovery principle and with different tariff approaches ranging between wholly variable tariffs, fixed tariffs and public subsidies. Having a clearer set of rules on cost recovery for reused water would limit the risks of cross subsidisation between wastewater treatment activities (typically covered by water tariffs paid directly by citizens) and water reuse activities (typically covered by taxation policies).

Alternatively, farmers would have to pay a fair tariff to promote efficient use of water resources for irrigation.

Another possible external impact on water regulation may come from future developments in the business strategies of water utilities.

Veronica Manfredi, Director, Directorate-General for Environment Quality of Life (ENV.C.), European Commission

In fact, following the circular economy paradigm, an increasing number of water utilities have been developing new services related to water treatment, resting on energy saving and recovery of residuals from treated water.

For instance, a growing number of water companies has been installing hydropower plants in water mains to produce energy; others have applied biodigestion processes to treat sludge, in order to produce biogas and biomethane or to obtain compost and fertilisers that can be used to increase efficiency in industrial processes or sold in the market. The circular economy paradigm seems to be pushing water utilities to expand their business area and to turn from a purely water-driven company to a multi-utility company, characterised by a certain degree of investment diversification. This change of "business" poses a series of challenges to water regulators:

1. the types of capital costs to be covered by tariffs: the water tariff covers not only investments directly related to water and wastewater services (the core business), but also "non-core" investments, like photovoltaic plants, hydropower plants, etc.;
2. revenue unbundling rules for different services: in order to incentivise activities related to circular economy, water utilities' regulated revenues cover all types of cost, while revenues from non-core activities are kept apart and contribute to companies' margin;
3. however, in a second stage, a progressive growth in revenues from businesses related to circular economy could induce water regulators to use such cash inflows to (at least partially) cover the costs of the regulated activity (hybrid till – single till).

Water utilities in Europe are growing fast, not only by investing in new businesses related to circular economy, but also by developing research activities and by focusing on innovation-based solutions. The EU has financed many research projects on water management and involved water utilities as research partners.

Currently, water utilities are key players in many research projects, acting as innovation hubs by engaging their partners, such as consultants, researchers, suppliers, investors, and regulators. One of the most evident effects of this type of innovation strategy is a deep change in operations, which requires a continuous evolution of skills and capabilities to work in a water utility company. For instance, the need of plumbers has become need for drone pilots or high-tech experts, to search for leakages in water mains. What will be the role of regulators amidst such innovative strategies?

An economic regulator can indirectly stimulate innovation, through input-based and output-based tools. In Italy, for instance, the national independent regulator sets specific service quality targets by means of performance indicators that measure water leakages, number of inter-

Stefano Besseghini, President of ARERA the Italian Regulatory Authority for Energy, Networks and Environment

ruptions of water and sanitation services, quality of water, floods caused by wastewater pipes, sludge disposed in landfill and quality of treated wastewater. Following the introduction of these performance targets, many water utilities started to improve their operations by adopting more innovative solutions.
In addition to this indirect stimulus, regulators can use direct levers to promote innovation, such as allowing companies to derogate from rules if they wish to achieve certain specific targets (i.e. allowing pilot projects and regulatory experiments), or using funds generated through tariffs and available to finance eligible projects presented by water utilities to regulators. Similar regulatory incentives are also adopted in the energy sector and were also launched by water regulators in 2019 (ex. OFWAT, consultation document for innovation, July 2019; ARERA strategic plan 2019-2022).
The strategy of water utilities is, finally, more oriented towards stakeholders, with a particular attention on customers.

Some of the possible challenges for the water sector in the near future may be:

- increasing tariffs to support investments (including those in circular economy and innovation);
- a low level of infrastructures acceptance by local communities (NIMBY syndrome);
- a growing attention to the poorest household customers;
- growing needs to balance investments with different aims and in different geographical areas;
- information asymmetries.

In order to support water companies in tackling these challenges, regulators should introduce some techniques to facilitate the engagement of customers in the decisions taken by water utilities. For instance, an analysis of the "Willingness of customers to pay or to accept" may be required by water utilities before they draft their investment plans or before tariff plans are approved by regulators. In fact, while customer acceptance may lead water companies and local authorities to approve their plans, negative customer opinions may jeopardise the effective realisation of infrastructures and require the review of investment plans.
NIMBY syndrome can mostly be solved by building high quality infrastructures. Regulators need to

STAKEHOLDER ENGAGEMENT
from willingness to pay to co-decision on water investments

NEXT CHALLENGING ISSUES

- Increase water tariffs
- Low acceptance of new infrastructure (NIMBY)
- Protecting the poorest **(affordability)**
- **Balancing investments** with different aims and along different geographic areas
- **Information asymmetries**
-

NEXT CHALLENGING ISSUES

- **WTP/WTA analysis** to support tariff approval and acceptance
- Admitting a **new cost item** for improving the acceptance of infrastructures (e.g. cost for soundproofing and camouflage of infrastructures)
- Improving quality and quantity of **affordability measures**
- **Open** the investment plan decision sessions **to stakeholders**
- **Better disclosure** of companies performance to stakeholders (art. 14 DWD)

allow the recovery of specific costs programmed by companies to improve social acceptance of water infrastructure by local communities, such as soundproofing and camouflage costs.
Additionally, regulators may promote further measures to address economic affordability of water bills through specific regulatory tools to support the poorest customers.
Finally, transparency can be better achieved by asking water companies to disclose more information on prices, cost per cubic meter, leakages, and investments, and to open their decision-making process to stakeholders' delegations..

In conclusion, water regulation in the next decade may be driven by some of the following input factors:

- growing transparency claims and attention for the environment from citizens;
- increasing innovation by water utilities, with a higher orientation of business strategies towards circular economy and to the risks related to climate change, which require diversification of investments;
- increasing skills and competencies of water utility managers to understand and comply with stricter quality standards required by the EU.

Through such inputs, regulators will have to change their way of working. For instance, their internal organisation will also have to include technical and environmental skills, with specific organisational units dedicated to circular economy, high tech solutions and data management. New regulatory tools will also have to be

WATER REGULATORY TRENDS TO 2030

INPUT	WATER REGULATION	OUTPUT
Cultural environment Main ethical and political values on water (right to water, regluation for common goods, etc.)	**Organization** Degree independency from politics and firms financial autonomy; technical skills and training	**Outputs** Number of administrative acts, firm's audit, penalties and sanctions
Economic environment Economic development; main public policy choiches; degree of market liberalization; integrity	**Regulatory tools** Cost recovery method, tariff structure; output measures; contracts; affordability; enforcement	**Outcomes** Investment growth rate; tariff trend; variation of quality indexes
Water sector Firms' size and power; managerial capability	**Processes** Consultation process and stakeholder engagement; data collection and publication	**Impacts** Access to water; firms failures; citizens' perception of the sector

developed, such as: risk-based approach, innovation-based approach, sunshine regulation, recovery of NIMBY cost items, household metering, willingness to pay/accept, stakeholder engagement. Consultation of stakeholders in Regulators' decision-making processes will have to be more open, particularly to customers.
The outputs will change according to "water regulation", increasing administrative burdens for water regulators (i.e. more administrative acts, company audits, rewards, penalties and sanctions, etc.). In terms of outcomes, one of the main consequences in the short term could be an increase in tariffs to finance the growing rate of investments, accompanied by a boost in service quality for citizens. This new model of regulation may transform water utilities into a sort of "environmental sentinel"; therefore, the challenging standards set by regulators could increase the turnover of companies and managers in the water sector.
All in all, these changes could lead to a better perception of quality improvements in the water sector among customers and citizens.

NOTE

1 The 1st EFRWS was held in Rome, on 3 December 2019, co-hosted by the Italian Regulatory Authority for Energy, Networks and Environment (www.arera.it) and by WAREG the Association of European Water Regulators (www.wareg.org).

2 The 17 Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all. They address global challenges, including those related to poverty, inequality, climate change, environmental degradation, peace and justice: https://www.un.org/sustainabledevelopment/sustainable-development-goals/.

3 The 1st EFRWS was built around the following four sessions:
   1. Water governance;
   2. Cost assessment modelling: promoting the efficiency of water utilities;
   3. Water regulation for innovation and environmental sustainability;
   4. Sustainable water tariffs.

4 A political agreement on the EU Commission's proposal for a new EU Directive on the quality of water intended for human consumption (that will replace the former Directive 98/83/EC of 3 November 1998) was reached between the EU Parliament and the EU Council, in February 2020, and it should have been voted for final approval in spring, before the COVID-19 pandemic stopped the works of the EU Parliament, whose vote is expected by the end of this year.

5 The new Regulation (EU) 2020/741 of the European Parliament and of the Council of 25 May 2020 on minimum requirements for water reuse has entered into force. The new rules will apply from 26 June 2023.

6 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.

7 The Italian Regulatory Authority for Energy, Networks and Environment (www.arera.it).

CREDIT

EDITORIAL PROJECT
AND CONTENT
WAREG Secretariat

Published by WAREG in 2020.

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