

Policy Brief

Accelerating water smartness by successfully implementing the EU Water Reuse Regulation (2020/741)



Abstract

Water is fundamentally connected to essential areas like health, agriculture, and energy, acting as a vital resource that supports life, sustains ecosystems, and drives economic development. However, freshwater resources worldwide are increasingly under pressure. To safeguard these resources, enhance resilience, and ensure an adequate and high-quality water supply for all stakeholders, a transition to water-smart societies and economies is imperative. In response to the growing pressure on freshwater resources across the EU, the European Commission adopted the [EU Regulation on Minimum Requirements for Water Reuse](#). This regulation, which has been in effect in Member States since June 2023, aims to foster the safe use of treated wastewater for agricultural irrigation across the European Union.

This policy brief highlights challenges and enablers for the national implementation of water reuse in Portugal, examining both the national legal framework and selected success practices for water reuse. It offers recommendations to address these challenges and promote enablers, targeting EU Member States to assist in their national implementation and the EU Commission to continue fostering and reinforcing an enabling environment for water reuse. These recommendations are informed by insights gathered from the Living Labs of the Horizon 2020 project B-WaterSmart (located in Lisbon, Portugal; Alicante, Spain; East Frisia, Germany; Flanders, Belgium; Venice, Italy; and Bodø, Norway) and from the WATER-MINING project. One of the Living Labs is specifically highlighted in this policy brief, detailing the associated success practices, enablers, and challenges. B-WaterSmart and [WATER-MINING](#) have developed innovative technological and data application solutions to enhance circularity in the water cycle.



Key messages

Essential role of water reuse: Water reuse is a crucial solution to tackle water scarcity by providing a secure and reliable water source, while enhancing EU climate change adaptation capacity and alleviating pressure on freshwater resources across the EU. Yet it remains underutilized, with only 2.4% of treated water being reused. Successful examples from Mediterranean countries highlight its potential, and recent droughts expanding to Northern Europe underscore the growing need for broader adoption of water reuse practices across the continent. The EU Water Reuse Regulation (2020/741) promotes the safe use of treated wastewater, primarily for agricultural irrigation, making its sound implementation across EU Member States important in addressing growing water scarcity, stabilize food supplies, protect ecosystems, and reduce reliance on overexploited freshwater resources.

Challenges in implementation: National implementation of the EU regulation faces several challenges, including complex approval processes, and regulatory and financial barriers. Overcoming these challenges is essential for effective water reuse practices.

Successes and innovations from the Horizon 2020 project

B-WaterSmart: The Lisbon Living Lab of B-WaterSmart demonstrates successful water reuse practices and the tools developed to facilitate them, such as unrestricted irrigation of urban parks (tools for smart water allocation, risk assessment and risk management) and direct potable reuse for beer production (protocol for reclamation and monitoring).

Policy recommendations at EU level

- Extend the scope of the EU Water Reuse Regulation to urban, industrial, and environmental uses;
- Develop a strategic agenda on water reuse, mandating the integration of water reuse into EU water resources management strategies, providing guidelines for prioritizing the use of fresh and reclaimed water and on how to account for indirect water reuse, and promoting research on direct potable reuse;
- Foster public engagement, raise awareness, and enhance communication on reclaimed water safety.

Policy recommendations at Member States level

- Facilitate efficient permitting by promoting the use of appropriate tools for risk assessment and risk management (e.g., from B-WaterSmart);
- Develop robust business models, funding mechanisms, and pricing strategies.

Background

The rising necessity of water reuse in the EU

A key measure in alleviating pressure on freshwater resources is recycling and reusing water for various beneficial uses. However, water reuse in the EU remains significantly below its potential. In the entire EU, only 2.4 % of the total treated water is reused, with significant differences among Member States¹. Positive examples include Cyprus, where reclaimed water has been used in the cement industry and for agricultural irrigation for many years. Similarly, Spain and France utilize reclaimed water for various purposes such as agricultural irrigation, urban uses, and golf course irrigation, while Portugal also uses it for golf course irrigation². While most of these examples are predominantly found in the Mediterranean regions, where water scarcity has long been a concern, recent droughts and increasing water demand in Northern Europe have highlighted the need for alternative water management practices continent-wide.

Policy context - EU Water Reuse Regulation (2020/741)

The need for a systematic approach to water reuse in Europe was underlined by the European Green Deal, which brought forward a new EU Circular Economy Action Plan (CEAP) in 2020. This plan includes the review and implementation of various directives related to water, wastewater, and nutrients to facilitate enhanced water reuse and efficiency. Notably, the **EU Regulation on Minimum Requirements for Water Reuse** establishes binding requirements for water quality, monitoring, risk assessment, and public information concerning the use of reclaimed water for agricultural irrigation. The implementation of these binding legal measures varies among EU Member States. For instance, some countries impose additional water quality parameters (e.g., France, Italy and Greece)³ or expand the scope beyond agricultural irrigation (e.g., Portugal). The regulation also allows Member States to opt out of water reuse, subject to justification to the Commission.

¹ EC 2023.

² Lazarova et al. 2013.

³ McLennan 2024.

The Water Reuse Regulation (EU) 2020/741 sets out

- Harmonised minimum water quality requirements for the safe reuse of treated urban wastewaters in agricultural irrigation: requirements increase progressively based on the degree of human contact with the water (does not address other applications, Member States may use reclaimed water for other uses, provided its compliance with other relevant EU laws).
- Harmonised minimum monitoring requirements for facility operators, depending on water quality classes.
- The draft of a risk management plan to assess and address potential additional health risks and possible environmental risks along the entire water reuse system. In case of modifications to the number of control parameters, they have to be explained in the risk.
- Permitting requirements for production or supply of reclaimed water by national authorities.
- Provisions on transparency, whereby Member States provide key information on every water reuse project and develop awareness-raising campaigns.

The implementation of successful and safe water reuse across all member states requires practical guidelines and good practice examples to demonstrate their safety and build social trust.



Insights from B-WaterSmart

The Lisbon Living Lab of the EU Horizon 2020 project B-WaterSmart offers valuable insights for improved implementation of the EU water reuse regulation at member state level.

Success practices, enablers, and challenges identified in the B-WaterSmart Living Lab in Lisbon

In Lisbon, Portugal, economic growth, population increase, and the need to expand green areas and increase irrigation—driven by climate change—are intensifying the demand for freshwater. Coupled with more frequent and severe droughts, this has placed significant pressure on freshwater resources. Consequently, water reuse is gaining attention as an effective measure to alleviate this pressure, while contributing to climate change adaptation. As a Southern European country with a long history of water scarcity, Portugal developed advanced national legislation well before the EU regulation came into force in 2023. Initial water reuse efforts began in the Algarve region, particularly on golf courses, while Lisbon initiated its first pilots in the late 2000s⁴. Since then, the city has been consolidating and extending its reuse practices, including pioneering the use of reclaimed water for public park irrigation⁵.



Legal enablers

Portugal preceded the European legislation by introducing legislation that regulates the production of water for non-potable reuse, integrating developments and best practices at European level as well as by the International Organization for Standardization (ISO). The Portuguese legislation (Decree Laws 119/2019, 16/2021, 11/2023) governs the production of reclaimed water from urban, domestic, and industrial wastewater, as well as surplus water from agricultural irrigation. Allowed applications in the legislation include agricultural irrigation, industrial uses, and urban uses such as irrigation, toilet flushing, street cleaning, vehicle washing, firefighting, cooling water make-up and recreational uses (landscaping). This comprehensive approach surpasses the EU Water Reuse Regulation, setting a benchmark for both the production and use of reclaimed water.

Additionally, Portugal's Strategic Plan for Water Supply, Wastewater, and Stormwater Management (PENSAARP 2030) offers a thorough and comprehensive strategy for water management. It addresses "non-potable uses" across urban, agricultural, forestry, industrial, and landscape applications, whereas the EU regulation is limited to agricultural uses.

⁴ Franco 2009.

⁵ Viegas et al. 2015, 2020; Begonha 2022; Cordeiro et al. 2023.



Technical enablers and success practices

In Lisbon and its surrounding areas, several examples of water reuse for urban non-potable uses exist. These include a pilot for direct water reuse in the cooling systems of a large commercial building and the irrigation of the urban park Parque das Nações.



Figure 1. Second licensed water reuse for the irrigation of a big urban park (unrestricted urban irrigation)

The B-WaterSmart Living Lab in Lisbon (2020-2024) has successfully demonstrated the potential for non-potable water reuse through a new pilot near Parque Tejo. This project involves creating 38-hectare green park on a decommissioned landfill, irrigated with reclaimed water to promote lawn growth (Figure 1). This park offers citizens a scenic space along the Tagus River, suitable for hosting large events. It was inaugurated during the biggest 2023 World Youth Day ceremony attended by over 1 million pilgrims during the Pope's visit to Lisbon in August 2023, and also hosted the Rock in Rio 2024 music festival.

In this context, the Lisbon Living Lab developed a smart water allocation toolset designed to optimize water supply and demand, while managing water volume, cost, energy, nutrients and risk. This suite of four digital tools includes

- The Water-Energy-Phosphorus balance planning tool⁶ (Figure 2)
- The Risk Assessment tool for Urban Water Reuse⁷
- The Water Quality Modelling tool for reclaimed water distribution networks⁸
- The Environment for Decision Support and Selection of Alternative Courses of Action⁹

⁶Water-energy-phosphorous balance planning module: mp.uwmh.eu/d/Product/55

⁷Risk Assessment for urban water reuse module: mp.uwmh.eu/d/Product/67

⁸Reclaimed water quality model in the distribution network: mp.uwmh.eu/d/Product/51

⁹Environment for decision support and alternative course selection: mp.uwmh.eu/d/Product/66/

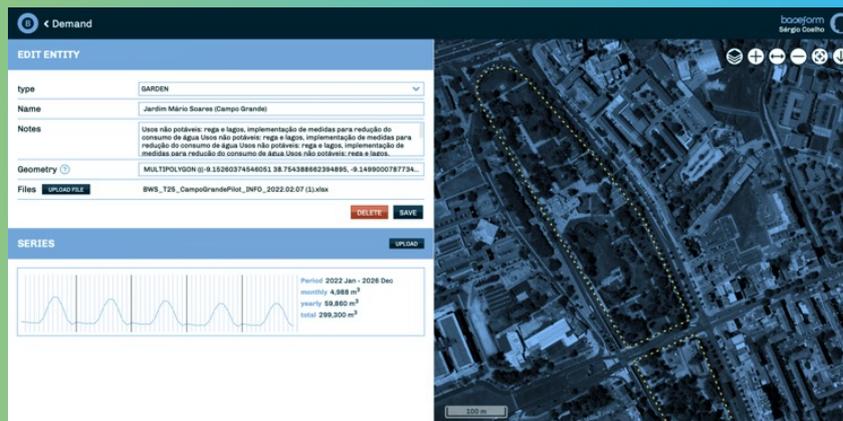


Figure 2. Water-energy-phosphorus balance planning module developed by Baseform and LNEC in B-WaterSmart

These tools aim to enhance water and related energy and phosphorus efficiency, promote water-smart allocation (fit-for-purpose quality), support circular economy practices, and ensure safe non-potable urban water reuse.

Beyond non-potable applications, the potential of water reuse extends to producing food-grade water. Based on pilot demonstration results, the Lisbon Living Lab has developed a protocol for producing craft beer-grade water from treated wastewater that complies with EU and Portuguese drinking water standards, e.g. 32 out of the 54 pharmaceutical compounds analysed below the limit of quantification (LOQ) and the remaining below 0.1 or 0.3 ug/L; 10 PFAS below LOQ and 10 PFAS below 0.3, 1 or 2 ng/L, far below the drinking water quality standard of 100 ng/L for PFAS-total; the ozonation by-product NDMA below the international guidelines. This process involves ultrafiltration, ozone treatment, activated carbon filtration, and reverse osmosis (Figure 3). With this pilot, Lisbon demonstrated the safety of reclaimed water to pave the way for future potable water reuse.



Figure 3. Lisbon Living Lab pilot (Águas do Tejo Atlântico, S.A. and LNEC) providing safe and clean water for beer production



Challenges and opportunities

Although Portugal's national strategy and legislation are generally supportive of water reuse, the Lisbon LL has encountered several local challenges that hinder the widespread adoption of reclaimed water.

A major constraint is the national legislation prohibiting licensed users of reclaimed water from transferring it to third parties, either through sale or free distribution, due to risk management concerns. The creation and regulation/licensing of a reclaimed water supply service could overcome this bottleneck through a producer-distributor-user(s) model, each party with an adequate risk management. Multiple users likely offer a steadier consumption with the inherent technical and financial advantages resulting from a decreased variation in demand throughout the year and among years, by a wider and more diverse number of interested parties.

Where water reuse is to replace drinking water consumption, as currently in the Lisbon LL for non-potable uses, the financial viability of water reuse is not an issue (with reasonable return on investment) provided the investment capacity exists. However, when it is to replace freshwater abstraction, as in many regions in Portugal, the EU's cost-recovery principle coupled with Portugal's user-pays-principle undermine the cost-effectiveness of reclaimed water compared to almost free freshwater abstraction, which is only subject to minimal water abstraction charges regulated under Decree-Law No. 97/2008. In this case, as found in stakeholder interviews and discussions within the CoPs, the willingness to pay for reclaimed water remains a significant concern. The cost of new infrastructure and potential tariff increases could hinder expansion unless future business models ensure a fair distribution of costs and benefits among all users.



Despite these challenges, there are several opportunities for advancing water reuse in Lisbon. Social acceptance of water-smart solutions has been a central focus of the B-WaterSmart approach, with the Lisbon LL evaluating public perceptions through interviews, surveys, and engagement with Communities of Practice (CoPs). Recent surveys demonstrate a wide acceptance of reclaimed water in Portugal for non-potable uses, provided there is trust in water authorities, transparent information, and sound risk management¹⁰.

Enhancing public awareness about water scarcity was therefore vital in Lisbon. Broader stakeholder involvement across the value chain improved shared problem ownership and investment opportunities. The CoPs served as platforms to promote regional best practices. In Lisbon, the CoP has engaged municipalities and water utilities, as possible replicators of water-smart solutions. These regional networks allowed them to reflect on the diverse circumstances of the municipalities involved, at the environmental, social and economic level, encouraging governance frameworks that help manage trade-offs across water users, rural and urban areas. Tools like the observatory developed by the Lisbon LL will play a vital role in raising awareness by sharing transparent, up-to-date information about water consumption in the future. Public engagement through events—targeting different groups, including students—has been key to promoting a circular culture of reuse. Long-term communication efforts, supported by CoPs, will be needed to foster water literacy and increase awareness of water scarcity in Lisbon. Furthermore, national legislation in Portugal will need to evolve to align with broader EU policies, particularly those concerning the recast of the Urban Wastewater Treatment Directive. The updated legislation should consider water reuse for purposes like surface water augmentation and managed aquifer recharge, and should more explicitly integrate water reuse into local and regional water balances, prioritising its uses.

¹⁰Gomes et al., 2023.

Policy Recommendations

Creating an enabling environment for water reuse requires joint efforts of the EU Commission and Member States. At the EU level, comprehensive legislation and clear guidance are essential for establishing compatible practices across the EU. While water reuse is a global trend, its success relies on implementing local solutions tailored to local specifications including climate challenges, infrastructure, plant size, and the water-energy-food nexus.

At EU level

Extend the scope of the EU Water Reuse Regulation to urban, industrial, and environmental uses

To enhance water resilience and secure freshwater for more demanding uses, the EU Water Reuse Regulation should be extended to include urban, industrial, and environmental applications, in addition to agricultural irrigation. Limiting water reuse to agricultural irrigation leads to underutilization of treatment capacity and incurs unnecessary operational costs throughout the year. Furthermore, water reuse is most effective and viable when reclaimed water is used near the reclamation facilities.

Moreover, Member States should be provided with guidelines to broaden the use of reclaimed water for both potable and non-potable purposes. As far as direct potable reuse is concerned, the B-WaterSmart Living Labs Lisbon (Figure 5), East Frisia, and Flanders could showcase the successful and safe potable reuse of treated process water or urban wastewater in the food industry (beverage and dairy sectors), and for drinking water supply, respectively.

#1 Water reclamation protocol for potable water reuse in beverage industry (D2.8)

- Pilot (24/7) testing in Beirolas WRRF (Lisbon LL)
- All treatment schemes produce water with an adequate quality to be reused in the beverage industry, complying with the EU and the Portuguese drinking water quality standards - no pathogen indicators: PEAS disinfection by-products, NDMA, and pharmaceutical compounds below the quantification limits (PFAS <0.3 ng/L, THMs < 2pg/L, HAAs <2pg/L bromate <3ng/L, NDMA <3ng/L, PhCs < 100ng/L)
- The operational monitoring results showed higher normalized permeate flowrates for the treatment scheme comprising only ultrafiltration and reverse osmosis



Figure 5. B-WaterSmart protocol for potable water reuse

Develop a strategic agenda on water reuse that covers all uses for reclaimed water

Establish a strategic agenda on water reuse (and related resources, e.g., energy and nutrients) that ensures coherence across EU, national, regional, and local levels. This agenda should cover all uses of reclaimed water, including non-potable and potable applications. It should aim to promote a circular water paradigm. Additionally, promote a cross-sectoral integration between water reuse policies and other relevant EU directives and initiatives, such as the Circular Economy Action Plan, Climate Adaptation Strategy, and Biodiversity Strategy, to maximize synergies, minimize trade-offs, and promote holistic water resource management.

As part of B-WaterSmart, each Living Lab has developed a strategic agenda as a pathway for implementing their vision and goals¹¹ which can support the development of the EU agenda. The EU should encourage or mandate water organizations across Europe, including water utilities, municipalities, regulators and other stakeholders, to develop their own strategic plans on water smartness. These plans should outline short-, medium- and long-term strategies and actions, while estimating the necessary human, technological, and financial resources required for implementation. The strategic plan should be supported by a quantitative and objective-driven assessment framework similar to that developed in B-WaterSmart¹².

Mandate the integration of water reuse into EU water resources management strategies and provide guidelines for prioritizing the use of fresh and reclaimed water

The EU should establish regulations that integrate water reuse into its broader water resource management plans and strategies. This approach will optimize the use of available water sources, enhance water resilience, and promote sustainable water use practices.

To support this integration, the EU should provide guidelines that help Member States incorporate water reuse into their local and regional water balances. These guidelines should assist in defining context-specific priorities for reclaimed water and freshwater uses. Prioritization should be based on local environmental, technical, economic, and social factors to ensure that water reuse is applied where most beneficial and that investments are directed to areas where they will be most effective and efficient in securing water supply continuity.

¹¹ Glotzbach et al., 2023.

¹² Silva et al., 2023.

At EU level

Define how to account for indirect water reuse

Establishing an EU-wide position on how to account for indirect water reuse is essential for a more holistic, safe, and transparent water management. During periods of droughts, treated wastewater can constitute a significant portion of streamflow, making the accounting of indirect water reuse critical for effective risk management, treatment requirements, and permit processes. In addition, other water environmental uses (e.g., ecosystems support) and storage, including managed aquifer recharge, should be considered and regulated.

Foster public engagement, raise awareness, and enhance communication on reclaimed water safety

Awareness measures and enhanced communication to build trust in society on the safety of water reuse should be promoted. The focus should be on water quality and not on its origin, and the semantics should ban 'wastewater' and focus on 'water'.

Promote research and pilot studies on direct potable water reuse

Expanding the application of reclaimed water through direct potable reuse can significantly increase water resilience by providing a locally sourced water supply. To support this, further research on direct potable water reuse is needed to facilitate the development of guidelines on water treatment processes and water quality. This entails conducting pilot studies to showcase the safety and feasibility of potable water reuse to the public. The B-WaterSmart pilot for potable water reuse in artisanal beer production in the Lisbon Living Lab marked a significant milestone, fostering trust in the utilization of reclaimed water.



At Member State level

Promote sustainable business models, funding mechanisms, and pricing strategies

Regions that have relied primarily on freshwater (groundwater or surface water) and (too) low water abstraction charges may find that the costs associated with managing and establishing water reuse infrastructure that meets the new minimum water quality standards are higher than their current expenses. To enhance the affordability and willingness to pay of treated water, robust sustainable circular business models for water reuse are required, leveraging Public-Private Partnerships (PPPs) and blended finance.

The B-WaterSmart project's 'Guidelines to Improve New Business Models at Living Labs' assist stakeholders in creating adaptable Circular Business Models (CBMs) tailored to regulated environments, the water sector's needs and the specific contexts of the LLs¹³. These guidelines integrate both economic and financial tools, addressing various stakeholders such as municipal bodies and water treatment utilities.

Below selected recommendations will help create a sustainable and economically viable framework for water reuse in various contexts:

Recommended economic and financial tools: Financing strategies must centralize water reuse projects by securing diverse funding sources, including public-private partnerships, grants, and investment funds. Implementing financial incentives or subsidies for industries, municipalities, and agricultural sectors can encourage the adoption of water reuse technologies and practices. These incentives may include, but are not limited to, tax breaks, non-interest loans, and streamlined licensing processes.

Affordability and willingness to pay: Public awareness campaigns should focus on increasing willingness to pay by highlighting the environmental benefits of water reuse, such as conserving freshwater for other uses. A comprehensive pricing strategy should consider both freshwater and reclaimed water sources, ensuring a fair distribution of costs for the treatment, storage, and distribution infrastructure of reclaimed water. Additionally, adjusting charges for water abstraction or water pollution can encourage the adoption of water reuse practices.

¹³Pérez et al., 2024

EXPOSURE SCENARIO	HAZARD	EXPOSURE ROUTE	EXPOSURE SITE	POPULATION AT RISK	ACTION
Scn1	Pathogenic bacteria - Legionella	Inhalation - Direct route	Zone - Lawns	Users - Weakened immune system	Usin
Scn2	Pathogenic bacteria - Legionella	Inhalation - Direct route	Zone - Lawns	Users - Competent immune system	Usin
Scn3	Pathogenic bacteria - Legionella	Inhalation - Direct route	Zone - Lawns	Users - Weakened immune system	Usin
Scn4	Pathogenic bacteria (indicator) - ...	Ingestion - Indirect route	Zone - Flowerbeds	Workers - Competent immune system	Mair
Scn5	Pathogenic bacteria - Legionella	Inhalation - Direct route	Zone - Lawns	Workers - Competent immune system	Mair

Figure 4. Screenshot of the Risk Assessment tool for urban water reuse developed by Baseform and LNEC in B-WaterSmart

Set up adequate risk management

Future revisions of the Regulation (EU) 2020/741 should provide clearer instructions on the risk assessment process. To assist risk managers in navigating the complex EU guidelines for public health and environmental risks, including Managed Aquifer Recharge processes, the B-WaterSmart project has developed a suite of user-friendly risk assessment tools.

Among these is the Risk Assessment Tool for Urban Water Reuse¹⁴, which aids the evaluation and management of risks associated with safe non-potable urban water reuse (Figure 4). This tool addresses health and environmental risks (including surface and groundwater) in line with the latest ISO standards and EU regulations. Other tools developed in B-WaterSmart offer specialised guidance on risk management in urban reclaimed water distribution¹⁵, and on risk assessment for Aquifer Storage and Recovery¹⁶.

¹⁴ Risk Assessment for urban water reuse module: mp.uwmh.eu/d/Product/67

¹⁵ Reclaimed water quality model in the distribution network water quality model: mp.uwmh.eu/d/Product/51

¹⁶ SuTRa - Subsurface Transport and Removal: mp.uwmh.eu/d/Product/59

Create an efficient permit process for water reuse

Permission processes in EU Member States are often lengthy and complex, involving multiple authorities and causing delays that hinder timely responses to water scarcity. To address this, the permitting process for water reuse should be streamlined to provide clear requirements and enable timely decision-making.

National implementation of the water reuse regulation should facilitate an efficient permitting process with clear guidelines, including the design of a required risk management plan, and protocols for storage, distribution, and third-party use of reclaimed water. Additionally, a clear allocation of responsibilities among the competent authorities is essential.

Improve social acceptance of Water Reuse

Generally, the closer the contact with reclaimed water, the lower the acceptance of its use. Sound risk analysis and transparent information are essential to ensure a sense of safety e.g., among users of green areas irrigated with reclaimed water. Willingness to pay is also a key factor to consider, as increased tariffs, as well as costs of new infrastructures, may hinder the expansion of water reuse, a significant concern among stakeholders in CoPs and the interviewees. The B-WaterSmart project developed a social acceptance model, which guided the analysis of this dimension in the project, resulting in a set of recommendations¹⁷:

- **Transparent governance** is key, ensuring fairness and public participation in water management decisions.
- **Clear communication** about the safety and quality of reclaimed water, particularly for non-potable uses, helps address concerns, especially where water reuse is perceived as “waste.”
- **Building trust in institutions** is crucial, particularly in water utilities and their safety procedures. Renaming wastewater treatment plants as “Water Factories” can help shape positive perceptions. Another option is to create an enabling environment for landmark products that have proven to act as a multiplier for specific population groups.
- **Socio-environmental vulnerability assessments** can help manage trade-offs between sectors with competing water needs.
- **Inclusive engagement of stakeholders**, including agriculture and industry, is necessary to balance costs and benefits. Tools like the Lisbon LL’s Urban Water Cycle Observatory and targeted campaigns are key to raising awareness and promoting a circular culture for water.
- **Innovative funding models** such as public-private partnerships can close infrastructure investment gaps. Future business models should ensure a fair distribution of costs and benefits to support broader adoption.

¹⁷ Gomes et al., 2024

Further Reading

Drivers and Barriers – Proposal for a New Governance Model
(B-WaterSmart Deliverable 5.5) (Schmidt et al. 2023)

Guidelines & recommendations for regulation and policy instruments
(B-WaterSmart Deliverable 5.6) (Cardoso et al. 2024)

A reclamation protocol for water reuse in craft beer production
(B-WaterSmart Deliverable 2.8) (Figueiredo et al. 2024)

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Imprint

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See the download section of the B-Water Smart website b-watersmart.eu for further reading.



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