

B-WaterSmart – Our Living Lab in Venice (Italy)

Challenges in Venice

In the Venice Living Lab the application of resource recovery and circular economy in the field of water, especially wastewater, are strategic to achieve climate change resilience. Currently, the pursuit of these goals is slowed and prevented due to several issues (technical but mainly regulatory) related to wastewater process management. The limits and slowdowns are also linked to a lack of shared and transparent knowledge on the quality and opportunities connected to water reuse and to an over-evaluation of risks, which leads to low social acceptance. Therefore, there are several goals for Venice:



Meeting at the Living Lab in Venice

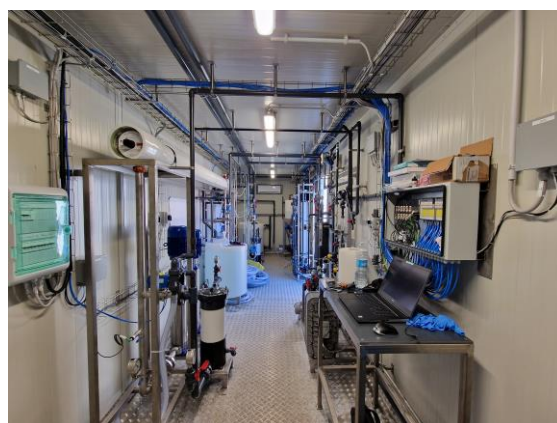
1. Resource recovery from wastewater processes for high-quality fertilizer production and carbon footprint reduction.
2. Completion of reuse goals envisaged by the Integrated Fusina Project (PIF) which, alongside other important reclamation goals for the industrial area, aims to reuse Fusina's municipal treatment plant effluent for non-potable purposes.
3. Valorisation of sludge produced by municipal wastewater treatment plants (WWTPs), often limited by inadequate knowledge and vision hindering sustainable management pathways (such

as physiological destination to the environment and the soil).

4. Promotion of effluent reuse for agriculture/urban purposes on a regional scale by analysing the state of the art to identify opportunities and conveniences.
5. Spreading of knowledge about the safety of water reuse and raising acceptance of those solutions.

Our path towards a sustainable Living Lab – the applied tools and technologies

A **combinatory pilot plant** was tested on Fusina WWTP effluent for industrial water reuse. This pilot technology (constituted by a combination of Ultrafiltration, Reverse Osmosis, and Electrodeionisation) is selected to demonstrate the opportunities for reusing effluent for industrial purposes. The rationale behind this choice is twofold: a) to showcase a concrete example of water reuse in an industrial setting, and b) to contribute to the goals of another funded project, thereby fostering collaboration and achieving mutual benefits.



Combinatory Pilot Plant in Venice

The **Nitrogen Recovery Technologies** are dedicated to nitrogen recovery from

concentrated streams of WWTPs. The selection is based on the need to explore and demonstrate the convenience and feasibility of recovering the valuable resource nitrogen. By addressing this specific aspect, the technologies contribute to sustainable nitrogen management in the wastewater sector and a possible carbon footprint reduction for the overall system.



Nitrogen Recovery Pilot Plant

The **IT platforms for water reuse** aim to foster general effluent reuse. The choice of these tools is driven by the desire to create a virtual environment that facilitates discussions and collaboration among key stakeholders in the water supply chain. This addresses the challenge of creating a stable context in terms of knowledge to permit resource valorisation and value extraction from water, minimizing risks.

The choice of **IT Tools for Sludge Management Valorisation** is driven by supporting and promoting the best practices for sewage sludge. These tools play a crucial role in creating a mediated environment for discussions among stakeholders. The aim is to minimize risks associated with sludge management and

ensure effective valorisation practices. Both IT tools have dedicated user interfaces for updating the data through simplified procedures.

How does B-WaterSmart impact society?

B-WaterSmart has a significant impact on society in Venice in various ways.

Environmental impact: Treated wastewater industrial use increases by 29% (reused water/supplied water) and globally the reuse of treated effluent increases by 32% (reused/total treated). At the nitrogen level, both, the Sludge IT tool and the ammonia stripping technology, support the recovery of nitrogen as fertilizer, under a traceable guarantee of safety. The total recovery potential is low compared to the total nitrogen applied in agriculture at the regional level (<2%) but it implies the complete exploitation of sludge potential, and it allows a significant reduction of carbon footprint linked to mineral fertilizers production and wastewater treatment plants.



Public B-WaterSmart event in Venice in 2023

Social Impact: The social impact of the Venice Living Lab encompasses increased awareness, cross-collaboration among stakeholders, expansion of the Recycling Day initiative, and local events targeting broader engagement and knowledge

sharing with external stakeholders. These contributions extended the project's influence and benefits beyond its immediate participants.

Economic Impact: An economic impact was realized through the development of two Decision Support System (DSS) platforms. These platforms reduce freshwater use, enhance water-use efficiency, increase water reuse, and quantify potential negative impacts of overexploitation. The deployment of the DSS also facilitates the identification of incentive schemes and promotes knowledge sharing. There is also a new, general potential for cost adjustments in concessions, the facilitation of governance actions through evidence-based solutions, and additional investments driven by the attention brought to the Fusina site by the B-WaterSmart project. These contributions align with the project's sustainable water use and resource management goals.



Public B-WaterSmart event in Venice in 2023

Governance and policy impact: A significant governance and policy impact has been the integration of the Living Lab Venice objectives on sludge valorisation into the update of the Regional Management Plan for Urban and Special Waste (DGR n. 988 del 09.08.2022). This is a reference point supporting the regional strategy for sludge agricultural reuse. There also have been notable

contributions to governance and policy impacts by fostering collaboration, providing feedback to public consultations, and influencing regional management plans. The project's integration into policy frameworks reflects its relevance and effectiveness in addressing local water challenges.

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Partners of the Living Lab

