

FACTSHEET | DEMONSTRATION PILOT SPAIN



Context of the demonstration project

The **Spanish Demonstration Project (DP) of BONEX** was implemented in Axarquía, a region in Andalusia facing severe and long-standing water scarcity. The area's semi-arid climate, combined with the expansion of subtropical irrigated crops and population growth along the coast, has led to a structural water deficit. In response, regional authorities have prioritized supply-side solutions, including investments in reclaimed water and plans for desalination. Thanks to recent Drought Decrees and upgrades to treatment infrastructure, Axarquía is expected to have access to 19.14 hm³ of reclaimed water for irrigation by 2025.

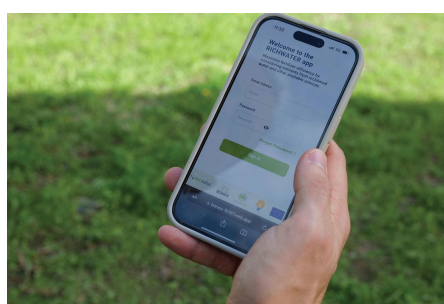
Nevertheless, the use of reclaimed water in agriculture is still relatively new in the region, and many farmers lack practical experience in its management. Reclaimed water presents both opportunities and challenges. Its high nutrient content can reduce the need for synthetic fertilizers, lowering costs and emissions. However, if not properly managed, excessive nutrient loads can lead to soil degradation and water pollution. A WEFE Nexus approach is essential to ensure that reclaimed water supports water security, environmental **sustainability**, **energy efficiency**, and **food system resilience**.

Description of the technology demonstrated in the DP

The **RICHWATER tool**, developed under the BONEX project, is a digital solution designed to support efficient fertigation strategies using reclaimed water. Its primary function is to optimise nutrient management by calculating nutrient concentrations in treated wastewater and adjusting fertilizer application according to crop-specific needs.

This approach aims to prevent nutrient overloading, reduce environmental risks such as soil degradation and water eutrophication, and align agronomic performance with environmental sustainability.

The tool contributes across all dimensions of the Water-Energy-Food-Ecosystems (WEFE) Nexus. By enhancing water use efficiency, lowering dependence on synthetic fertilizers, and promoting the circular use of nutrients, it supports more sustainable and cost-effective farming practices. Its implementation fosters collaboration between farmers and water authorities, enabling an integrated system for the treatment and reuse of urban wastewater in agriculture, with added benefits such as reduced production costs and carbon emissions.





Boosting Nexus Framework Implementation in the Mediterranean

WEFE Nexus dimensions

The BONEX Demonstration Project integrates all four dimensions of the Water-Energy-Food-Ecosystems (WEFE) Nexus through the use of reclaimed water and optimized fertigation practices.

- **Water:** The reuse of reclaimed water in agriculture reduces dependence on freshwater resources and supports more resilient water management. Its nutrient content also decreases the need for synthetic fertilizers, improving both water efficiency and resource circularity.
- **Energy:** Water reclamation is significantly more energy-efficient than alternative supply-side solutions such as desalination or inter-basin transfers. Additionally, lower fertilizer demand reduces energy use associated with production, packaging, and transport.
- **Food:** The nutrient-rich quality of reclaimed water enhances crop growth while reducing input costs. These savings support farm profitability and contribute to the viability of rural economies, particularly in regions with high water stress.
- **Ecosystem:** By managing nutrient loads and avoiding over-fertilization, BONEX helps prevent soil degradation and water eutrophication, promoting ecosystem health and land productivity.

Strengthen Water Quality Monitoring and Data Access:

Real-time, site-specific monitoring of reclaimed water is essential to guarantee agronomic safety and environmental protection. Policies should promote the deployment of automated sensors for key parameters (e.g. salinity, nutrient content, microbial load) and ensure that monitoring data is transparent and accessible to farmers, water operators, and regulators.

- **Ensure Compliance with Nitrate Regulations:** Water reuse in agriculture must align with environmental protection frameworks, particularly the EU Nitrates Directive (91/676/EEC). In designated Nitrate Vulnerable Zones, nitrogen contributions from reclaimed water must be accurately accounted for in nutrient planning to avoid over-application, reduce the risk of eutrophication, and ensure regulatory compliance. Policies should support integrated nutrient management approaches that include reclaimed water within farm nutrient balances.



Main policy recommendations

To ensure that reclaimed water contributes meaningfully to sustainable agriculture, the following policy directions emerge from the experience of the Axarquía Demonstration Project:

- **Integrate Water Reuse into Nexus-Based Planning:** Reclaimed water strategies must be embedded in holistic planning frameworks that account for energy, food, and ecosystem interlinkages. Basin-level planning should be data-informed and promote long-term resource sustainability. Nexus integration ensures that reuse complements broader water, energy, and land management goals.
- **Enhance Water Reuse Infrastructure:** Safe and effective reuse requires sustained investment in the entire reuse chain—from advanced treatment technologies to storage, pumping, and delivery systems. Modernizing infrastructure improves reliability, reduces losses, and ensures that reclaimed water reaches farms at appropriate quality standards.

Gender dimension

The Spanish Demonstration Project adopted a structured gender mainstreaming approach, ensuring strong female participation in stakeholder engagement activities and visibility across all implementation phases. Special attention was given to involving women from farming cooperatives, public institutions, research centres, and the agri-food sector.

In parallel, the DP promoted gender equity by showcasing innovation initiatives with balanced representation in decision-making and technical teams, and by encouraging women's leadership in water reuse and agri-tech. These efforts contributed to rural employment, challenged gender stereotypes, and supported broader sustainability goals—aligning with both the UN SDGs and the Water Europe Vision on the Value of Water.

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