NEWATER

Natural based and low Energy consumption unconventional solutions for the management of water sources

Water4All
Water security for the planet

Abstract

NeWater aims to develop innovative and efficient water systems for any representative EU region based on energy and cost-efficient hybrid biological, physical, and nature-based solutions and on digital technologies enabling system monitoring, control and decision support. To ensure the replication potential, the NeWater system validation will be carried out through 4 Water Labs representing different relevant areas (agricultural, rural, urban and industrial) in large-scale operational environments.

Therefore, the NeWater solutions will close the cycles of material, water, and energy at a regional level, thus reducing the current water and energy consumption. High efficiency in wastewater treatment plants (WWTP) will be attained (i.e. 90% in P recovery or 50% reduction of operation costs of WWTP)) and smart water services will be developed for the use of such recovered resources in relevant public and economic activities in the region:

- Lab 1 (UPORTO, PT): Explore the uniquely synergistic relationship between WWTPs and hydrogen production that is both positive for the environment and partially subsidise hydrogen production via electrolysis and increase its commercial viability (2€ per kg of H2; 'H2 under 2' goal): i) WWTPs supplies recycled water to hydrogen facility; ii) hydrogen facility sells oxygen to the WWTP. Oxygen will be used for ozone generation towards the advanced treatment of the ultrafiltration (UF)/reverse osmosis (RO) retentate streams generated during the production of recycled water with enough quality for PEM electrolysers.
- Lab 2 (BGU, IL): Advanced wastewater effluent desalination for ultrapure water for hydrogen production (Lab 1) and irrigation water for agriculture; activation of nanocomposite hydrochar produced from wastewater sludge for nutrient recovery from desalinated concentrate.
- Lab 3 (UNIBAS, IT): will be devoted to treat wastewater by the potentiality of natural material (e.i., clay, activated carbon, wood chips) acting as adsorbed for filtration treatment of contaminants at different operational conditions. Natural material used to purify water for agriculture water irrigation.
- Lab 4 (ICRA, ES): Decentralised NBS reclamation of greywater (kitchen and sink) for edible plant production by means of a vertical wall. Recovery of water, nutrients, energy reduction and local stakeholders' involvement (neighbourhood/citizens/city hall/questionnaires).

SAPIENZA will provide the key drivers to support the upscale and potential replicability of NeWater innovation based on E-LCA, LCC-A, CBA, s-LCA and eco-efficiency analysis; social innovation indicators will be set up with their related governance and legal frameworks to complete the market uptake strategies adapted to each of the key stakeholders' category outside the scope of the project.

The current proposal aims to develop innovative and efficient water systems for EU and no-EU regions based on energy and cost-efficient hybrid biological, physical, and nature-based solutions (NBS), interlinked technologies between partners. It also aims to develop new value chains and business models addressing new market opportunities derived from the innovative water system and related services and jobs in diverse sectors (water, agriculture, chemicals, or public services). As such, the proposal relates directly to the Call (Resilience, adaptation and mitigation to hydroclimatic extreme events) regarding Improved water availability and optimization of water quality and quantity for all uses in Europe while maintaining ecosystem needs (i.e., recovery of energy, nutrients, and reuse of wastewater for reuse and energy production).

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Project partners

- BEN GURION UNIVERSITY OF THE NEGEV - ISRAEL
- FUNDACIO INSTITUT CATALA DE RECERCA DE L'AIGUA - SPAIN
- UNIVERSITY OF PORTO - PORTUGAL
- UNIVERSITÀ DEGLI STUDI DELLA BASILICATA - ITALY

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Environmental sciences (social aspects)