SALTREC

Integrated resource recovery from saline wastewaters in a circular context

Water4All
Water security for the planet

Coordinated by Early Career Researcher

Abstract

Saline wastewaters are common in many industries, such as fish processing, agro-food, aquaculture, oil and gas, pulp and paper, chlor-alkali, and leather industries. Freshwater scarcity and industrial water recycling are expected to increase the abundance of saline wastewaters. Such wastewaters require adequate treatment to prevent environmental damage from their discharge in surface water bodies. Both physicochemical and biological treatment processes are severely hampered by the saline content of these wastewaters, which implies the need for a novel saline wastewater treatment system.

In this project, we will develop a novel value chain for integrated valorisation of water, organic matter and minerals from saline wastewaters towards the recovery of energy, clean process water and the production of high-value products in a holistic approach. Such an integrated, circular approach, in contrast to the current dissipative and limited treatment of saline wastewaters, will open novel routes towards maximal resource recovery in a circular economy.

First, we will develop a robust anaerobic digestion system that relies on salt-resistant microbial granular entities for the removal of organics and concomitant production of biogas as renewable energy source.
Next, a microbial consortium consisting of methane oxidizing bacteria and microalgae will be used for the production of high-value ectoine from the residual nutrients in the effluent from the anaerobic digestion process. Both biogas valorisation and biogas cleaning will be targeted by selectively promoting either methane oxidizing bacteria or microalgae in the methalgae consortium.
Next, a pilot desalination unit will be operated towards target-oriented and, thus, energy-efficient desalination, with specific focus towards reducing the brine discharge.
Finally, the different unit technologies will be virtually integrated into the novel value chain. The environmental and circularity impacts and societal readiness and acceptance of this value chain will be evaluated, ensuring innovations are sustainable, policy-compliant, and aligned with public interest.

Overall, this project will be an important step towards the sustainable management of saline wastewaters.

Project coordinator

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Project partners

- WAGENINGEN UNIVERSITY & RESEARCH - THE NETHERLANDS
- UNIVERSITY OF GABES - TUNISIA
- NODIBINAJUMS BALTIC STUDIES CENTRE - LATVIA

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