

Impact

The NAWADES outcome will have a significant impact with several dimensions by means of developing cost-effective technologies to reduce environmental impact of RO facilities and to reduce the pressure of RO processes and maintenance requirements.

Regarding the environmental impact, NAWADES will provide:

- A more ecologically friendly method of creating clean water from sea water.
- A reduction of pressure on conventional fresh water sources (i.e. surface and ground sources) and thereby preservation of original flora and fauna.
- A reduction of the associated environmental footprint in terms of energy consumed, greenhouse gas emissions, consumable burden and chemical disposal.

NAWADES will have an industrial and economic impact due to the integration of innovative technologies to improve RO processes and maintenance requirements. The central feature of the NAWADES project is a set of techniques to extend the life time and performance of filter membranes. This will lead to:

- Significantly more sustainability in the filtration field (in terms of quantity of filter material that goes to landfills).
- Energy savings.
- Lower cost in waste disposal.

Nawades Partners



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NAnotechnological Application in WAtER DESalination



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Background

Pollution, over-exploitation of natural resources, damage to aquatic ecosystems, climate change and security aspects are challenging the sustainability of European water systems. Given global economic and population growth, the 2030 Water Resource Group reports that the worldwide water supply-to-demand gap is likely to reach approximately 40% by 2030 unless significant efficiency gains can be made. The Intergovernmental Panel on Climate Change (IPCC) predicts that by the year 2050, around 60% of the world's population could experience severe water shortages, with 33% already thought to be under stress.

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There is an urgent need to protect diminishing clean water resources and to upgrade/develop alternative water sources, promoting investments in water treatment and desalination. Membrane technologies for Reverse Osmosis (RO) applications are very well suited for use in commercial desalination plants. However desalination using RO membranes is a process that presents a number of environmental challenges generating waste streams of brine and chemical agents, and consuming considerable quantities of energy.

Brief Summary

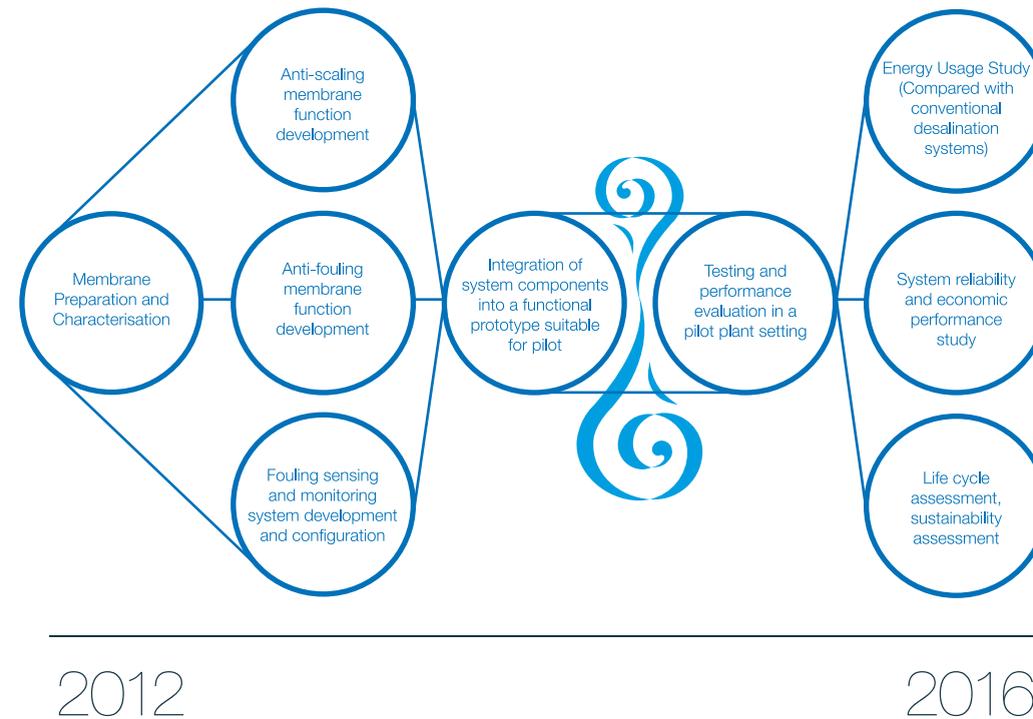
The core intention/deliverable of the project is to develop a new and cost-efficient water desalination system design, comprising ultra-filtration as a pre-cleaning step within one membrane or within separate membrane process steps.

The NAWADES project will study, design, produce, and test new water desalination filter technology from four perspectives:

- ☞ The structure of the multi-layer membrane filter, including UV light distributed inside the membrane stack.
- ☞ The materials used to build the filter, including fouling and scaling monitoring.
- ☞ The coating treatments applied to the surface of the filter using plasma and nano-TiO₂.
- ☞ The filtration process, with integrated removal of bio-fouling.

The new filter technology will provide long-life and antifouling filters to be used in Reverse Osmosis (RO) water desalination processes with a higher efficiency and life-time, less energy consumption (lower pressure), and less maintenance (lower cost).

Overview of Nawades approach



Project Targets

The new filter technology will provide long-life and non-fouling filters to be used in Sustainable Reverse Osmosis Water Desalination processes with pure and chemical-free salt harvesting, low energy consumption due to lower pressure loss, and low maintenance due to the automated anti-fouling and anti-scaling effects that will result in lower overall costs. The filters should not need flushing with aggressive and environmentally harmful chemical agents.

The qualitative and quantitative targeted results in NAWADES will be:

- ☞ Development of a sustainable RO process reaching permeate quality of 500 mg/l of total dissolved salts (TDS) from seawater feed (at 35,000 mg/l TDS).
- ☞ Increasing the operational life of the membrane filter to a minimum of 8 years.
- ☞ Quantitative harvesting of clean salt fraction, thereby solving brine disposal issues.
- ☞ Development of a filter system with minimal maintenance requirements (set-and-forget filter system).
- ☞ Reducing estimated overall cost of desalinated water by approximately 20% to below €0.30/m³.