LIFE HyMemb - Tailoring hybrid membrane processes for sustainable drinking water production

LIFE12 ENV/PT/001154

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Project description:

Background

Anthropogenic pressures and climate change are responsible for severe variations in raw water availability and quality, and for the degradation of water sources by emerging contaminants that are of environmental-health concern because of their toxicity, mutagenicity and/or endocrine-disrupting behaviour. These include personal care products and pharmaceuticals; pesticides from agriculture; and cyanotoxins produced by toxic cyanobacterial (blue-green algal) blooms.

Such emerging contaminants are often dissolved organics, of intermediate-to-low molar mass, commonly present in very low concentrations (micro-contaminants). As such, conventional wastewater treatment plants and processes do little to remove them.

Objectives

The HyMemb project's general objective is to demonstrate the feasibility and sustainability of advanced membrane processes for the treatment of drinking water, in order to provide a safer, more resilient barrier against emerging contaminants, with lower environmental impacts.

Specific objectives include:

- Developing an innovative hybrid process, using a low-pressure ceramic

membrane (microfiltration - MF) and powdered activated carbon (PAC);
- Conducting a two-year field test of a PAC/MF prototype, to demonstrate its effectiveness, reliability and efficiency and to compare the advanced process with conventional treatment processes;
- Drafting recommended guidelines [for several Portuguese and European surface drinking water scenarios] on PAC/MF application for safe EU control with a reduced carbon footprint, i.e. with a 15% decrease in the consumption of chemicals of and sludge production, keeping energy consumption to a minimum;
- Carrying out a cost-benefit analysis of the process using field data gathered during the project, as well as social indicators of stakeholders' attitudes towards membrane processes. HyMemb therefore expects to identify potential opportunities for using PAC/MF technology in drinking water treatment.

Expected results: The project expects to achieve the following results: • To optimise the operating conditions of the hybrid PAC/MF for effectively removing the emerging contaminants targeted, whilst minimising membrane fouling - thus increasing the technology's productivity and lifetime. The aim is to obtain a significant decrease (15% target) in chemicals consumption and sludge production, and to keep energy consumption to a minimum in comparison with optimised conventional treatment systems; • The development of comprehensive technical guidelines for upgrading conventional drinking water treatment with PAC/MF and for its application Europe-wide; • To identify the main values, beliefs and attitudes towards membrane processes and build a SWOT analysis on the use of PAC/MF for drinking water production; • To build bridges between engineering and social dimensions for an effective technology transfer from R&D institutions to end-users; and • To quantify the environmental, economic and social impacts of each technology studied.
Results

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Environmental issues addressed:

Themes

Water - Water quality improvement

Keywords

water treatment, drinking water, pollutant elimination, water quality improvement

Natura 2000 sites

Not applicable

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Beneficiaries:

Coordinator	Laboratório Nacional de Engenharia Civil, I.P.
Type of organisation	Research institution
Description	The Laboratório Nacional de Engenharia Civil – LNEC (National Laboratory for Civil Engineering) is a state-owned research and development institution founded in 1946. Its main goals are to carry out innovative research and development and to contribute to achieving best practices in civil engineering, as well as advising the Portuguese government in technical and scientific matters of civil engineering. Its hydraulic and environment department (DHA) develops research applied to the field of water and environment.
Partners	Águas do Algarve S.A., Portugal

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Administrative data:

Project reference	LIFE12 ENV/PT/001154
Duration	01-JAN-2014 to 31-DEC -2016
Total budget	631,046.00 €
EU contribution	282,678.00 €
Project location	Lisboa e vale do Tejo,Algarve

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