



# INNOVA INNPACTAR and INNOVA E3N PROJECTS



## Membrane Aerated Biofilm Reactors for energy-efficient removal of nitrogen from wastewater

### Project Description

This project, entitled “Research into the Energy-Efficient Process to Remove Nitrogen in Waste Water” is being developed around new concepts arising from research into advanced biological treatment of sewage water.

The project in hand presents a process for treating wastewater that attempts to overcome the limitations and disadvantages faced by today’s conventional processes for removing organic matter and nitrogen. Environmental conditions and the carbon/nitrogen ratios often present in urban wastewater and some industrial waters mean that the most widely used treatment in nitrogen removal is a combination of biological nitrification and de-nitrification processes, particularly in places like Cantabria, where COD/N ratios are not high, using extended aeration in oxidation ditches.

In this project, a line of treatment consisting of a high-biomass concentration anoxic reactor and an aerobic reactor and a membrane-aerated biofilm reactor (known as MABR) will be researched.

Furthermore, it also contemplates a study of a preceding physical-chemical process to remove solid organic matter (which can subsequently be used for energy production) and a COD control system that only allows organic matter required for de-nitrification to be used.

By separating the two biomasses that perform nitrogen removal, the process involves a low ratio COD/N ratio plus an optimal use of oxygen, which is supplied with high efficiency because the membranes distribute it directly onto the biofilm, thus improving the hitherto low efficiency rates associated with bubble aeration systems. The thorough control of



Innova Pilot Plant

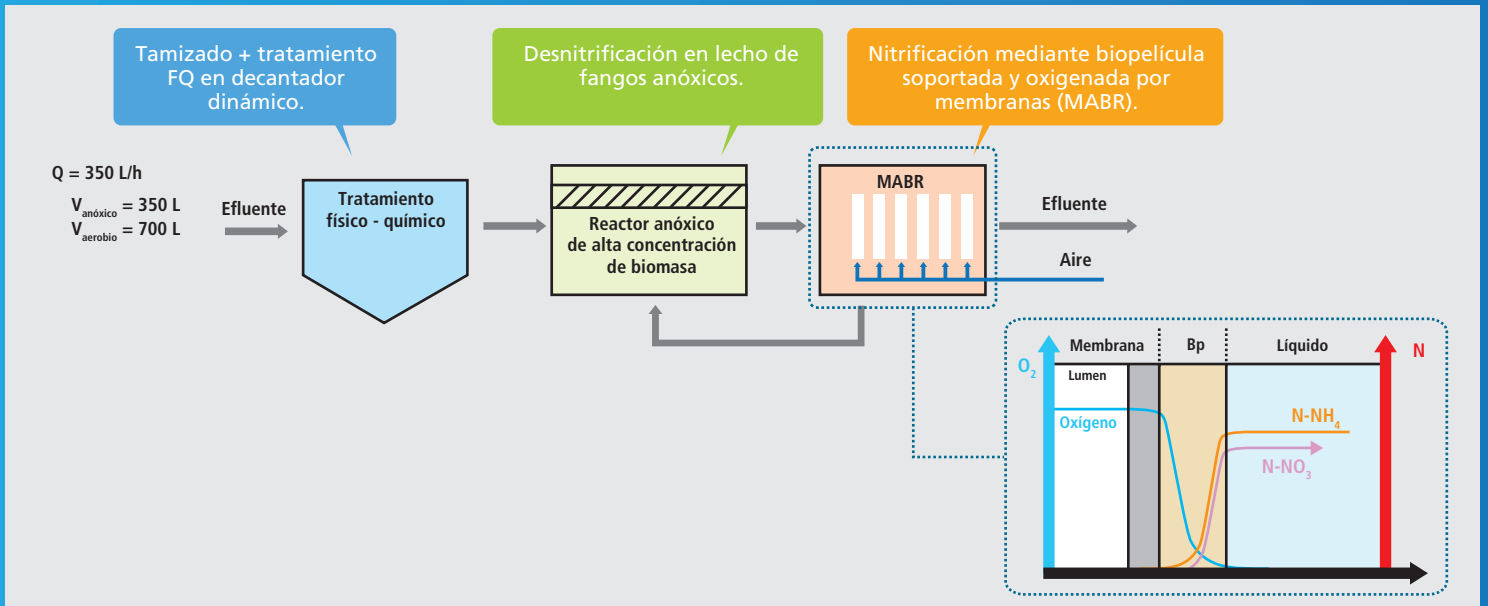


**Location:** Santander (Estación de Bombeo de Aguas Residuales “Las Llamas”)

**Duration Innpactar Project:** From the 25<sup>th</sup> of June 2012 to the 25<sup>th</sup> of June 2015

**E3N Project:** From the 15<sup>th</sup> of April 2015 to the 31<sup>st</sup> of March 2017

**Total budget in euro Innpactar Project:** 285,100 € **E3N:** 179,572.60 €



oxygen performed by the MABR reactor will also enable research into other alternatives, such as nitrogen removal through nitrite.

The project aims to establish itself as a competitive solution for both large sewage treatment plants, where energy self-sufficiency would be achieved, and in small treatment plants, where it would provide a compact and sustainable solution. Preliminary results indicate that this MABR system could achieve up to 75% energy savings in sewage treatment plants.

#### PROJECT PARTICIPANTS MAIN COLLABORATORS

- FCC Aqualia, S.A. (Leader)
- Grupo de Ingeniería Ambiental (GIA) de la Universidad de Cantabria (UC)



#### DETAILS OF FUNDING

**Funding:** Programa INNPULSA, Línea de Subvenciones INNOVA.

**Organism:** Gobierno de Cantabria.

**Project: Innpectar:** 2012/INN/045 - **E3N:** 2015/INN/029.

**Grant:** Non-refundable subsidy.

#### Funding Received

FCC Aqualia Innpectar: 52,018.50 €

FCC Aqualia E3N: 41,438.73 €