

ININTERCONECTA ALEGRIA PROJECT



Algae and energy for the recovery of wastewater from the galician agri-food industry

Project Description

The Galician agri-food and fishing industries produce effluents containing high levels of organic matter and nutrients. At present, traditional technologies (generally physicochemical and aerobic treatments) are used to minimise the impact on the aquatic environment. However, they use energy to convert organic matter into CO₂ and do not recover essential nutrients such as nitrogen and phosphorous. The cost associated with industrial wastewater treatment is high and it diminishes competitiveness in the sector.

The ALEGRÍA project looks to improve competitiveness in the agri-food sector by: a) reducing wastewater treatment costs; b) generating value from subproducts, reusing valuable substances in wastewater and reusing treated water; c) cutting the carbon footprint, and d) improving the industry's energy use.

A system based on two basic stages is proposed: a stage involving the removal of organic matter using a methanogenic anaerobic digester attached to a membrane bioreactor (AnMBR); and the use of effluent produced in a subsequent treatment stage using a microalgae reactor with membranes to recover nutrients (N and P) and to generate a recoverable product (microalgae). The research is divided into 3 activities:

Activity 1: Energy recovery in wastewater treatment.

Activity 2: Nutrient recovery and microalgae growth.

Activity 3: Optimisation and validation of advanced technologies to treat wastewater from the agri-food industry.

From the results seen in the operation of different wastewater treatment units, produced in the FRINOVA plant, the following marketable products have been obtained:

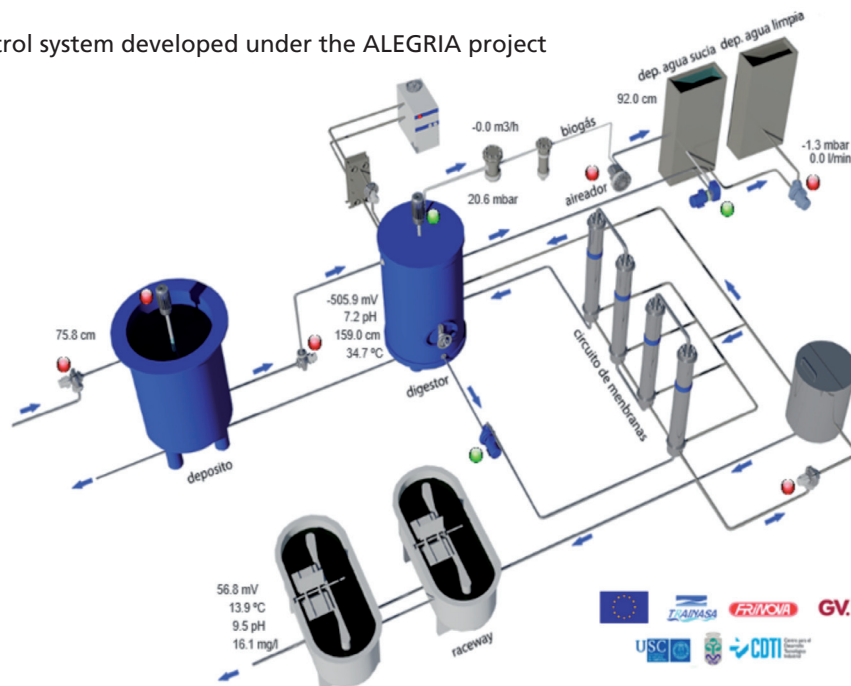


Location: FRINOVA, O Porriño (Pontevedra, Spain)

Duration: From the 1st of May 2013 to the 28th of February 2015

Total Budget in Euro: 1,600,877 € **Trainasa:** 550,234 €

PLANT TRACK control system developed under the ALEGRIA project



1. AnMBR with ceramic membranes
2. AnMBR with polymeric flat-sheet membranes
3. UASB + aerobic reactor + MBR aerobic with hollow fibre membranes
4. Open reactors to grow microalgae, attached to harvesting membrane systems
5. PLANT TRACK control system to comprehensively manage the plant

The quality of waste obtained on leaving the AnMBR is comparable to that obtained on leaving aerobic systems and easily meets the legal waste limits.

The ventilation energy requirement is much less than that seen in aerobic membrane bioreactors (energy saving). Furthermore, it is estimated that there is a considerable 70% reduction in sludge production (saving in operating costs). In addition to this, energy from biogas is used in the industrial production process, and the purification and recovery processes pave the way to energy self-sufficiency.

It has been verified that the quality of wastewater significantly improves when the microalgae system is used and that with hydraulic residence time under 10 days, it is possible to obtain good

nutrient removal efficiency. The filtration through membranes of obtained microalgae has helped the said microalgae to reach a good thickness for its subsequent recovery, whether it be energy or for other purposes (thermal peloides, etc.).

"The WWTP has gone from expense to resource thanks to energy recovery from organic matter and nutrient recovery by way of microalgae production."

PROJECT PARTICIPANTS

- Trainasa Tratamiento Industrial de Aguas S.A.
- FRINOVA
- ASM soft
- GV Soluciones



COLLABORATING PUBLIC ORGANISMS

- Universidad de Vigo
- Universidad de Santiago de Compostela



DETAILS OF FUNDING

Funding: FEDER-ININTERCONECTA Galicia 2013.

Organism: Centro de Desarrollo Tecnológico Industrial (CDTI).

Project: FEDER-ININTERCONECTA ITC-20133118.

Grant: Subsidy of 40% of budget (co-funded by the Technological Fund, European Regional Development Fund).

Funding Received
Total Budget in Euro: 758,075 €
Trainasa: 220,093 €