

**CODE:** LIFE12 ENV/ES/000332 NECOVERY **PROJECT DURATION: July 2013 – December 2016 BUDGET: 1,813 k€** 



# Nutrient and Energy ReCOVERY in wastewater treatment plants by pre-concentration and adsorption processes www.life-necovery.eu

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CONTEXT



The main objective of the project is to demonstrate, by means of a prototype, the technical, economic and environmental feasibility of an innovative WWTP flowsheet based on an pre-concentration step at the inlet of the WWTP and focused on the recovery of nutrients and energy.

LIFE NECOVERY project deals with the issues of changing the current concept of WWTPs from being energy consumers to resource recovery sites. This is the new concept of WWTP of the future which consists in extracting resources (energy, nutrients) from wastewater.

Currently, the flowsheets implemented in WWTPs are mainly based on energy-consuming pollution removal and they are not adapted to a future water treatment fit. In fact, it is estimated that in Western Europe, only 20-35% of consumed energy in WTTPs can be recovered by means of the anaerobic digestion. Regarding the nutrients, most of the WWTPs are mainly focused in removing them than in recovering. Thus a thorough flowsheet re-design is required to focus on resources recovery and within stringent surface requirements.

## METHODOLOGY

- On –site demonstration trials by means of a prototype (1 m<sup>3</sup>/h) composed by 3 units: pre-concentration unit, anaerobic digestion unit, nutrient recovery unit.
- Comparison with the conventional process of the WWTP.
- Technical, economic and environmental evaluation of the innovative flowsheet.

The demonstration plant is based on the principle of high concentration ("preconcentration" at the beginning of the flowsheet) to:

Recover much more primary sludge than conventional primary settling to maximize energy production.

 $\rightarrow$  By means of **biosorption process** which takes profit of the ability of activated sludge to rapidly adsorb organic matter, leading to the separation of solid and colloidal COD from the main stream, to be further pre-concentrated by sludge settling and thickening until being suitable for anaerobic digestion.

Recover nutrients from the pre-concentration effluent which contains only dissolved pollution, and also from the supernatant of the anaerobic digestion.  $\rightarrow$ Adsorption process based on zeolites have been selected for N recovery in the main line and centrates due to its high cation exchange capacity for ammonium ions and their versatility to be regenerated to obtain a fertilizer solution.

 $\rightarrow$ Struvite recovery process have been selected for P and N recovery in centrates in order to obtain a valuable product to be used as fertilizer.

## **NECOVERY TREATMENT VERSUS CONVENTIONAL TREATMENT**



### Selected WWTP

Vilanova WWTP is located 40 km away from Barcelona and it is operated by AQUALOGY Medio Ambiente, S.A. (Agbar Group). The WWTP has a conventional activated sludge treatment and a global nominal capacity is 25,500 m<sup>3</sup>/day (130,050 PE) and treats a flow of around 14,000 m<sup>3</sup>/day of urban and industrial wastewater.

Vilanova i la Geltrú WWTP Pretreatment O Primary settler Biological reactor Secondary settler 5 Thickener 6 Anaerobic digestion Ø Centrifuge

#### NECOVERY CONCEPT



C Solid separation O Anaerobic digestion O Dewatering system

