

Research Stays 2019

Environmental, economic and modelling approach of energy recovery in wastewater treatment plants implementing innovative technologies

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Objectives

The objective of this research stay was to model conventional and innovative wastewater treatment technologies and processes in order to integrate model parameters with environmental and economic indicators. Innovative schemes include technologies such as rotating belt filter (RBF) or high rate activated sludge (HRAS) for primary treatment and a partial nitrification-Anammox process (IFAS technology) for secondary treatment (Fig.1).

Methodology

Two real wastewater treatment plants (WWTPS), located in different European countries, were simulated with real data through MATLAB software. The main objective of the modelling of these conventional plants was to replace conventional schemes with more innovative configurations focused on energy recovery and minimization of sludge production. In addition, the integration of modelling results with environmental and economic indicators is fundamental to show whether the new schemes are sustainable (Fig.1).

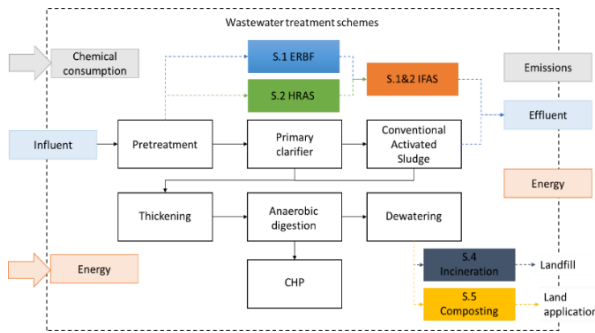


Fig.1. Different wastewater schemes considered

Results

The modeling results showed that innovative schemes improve environmental and economic indicators because there is more biogas production and a reduction in grid electricity consumption. In addition, although two plant sizes were evaluated, these schemes can be extrapolated to a wider range of plant size (Fig. 2).

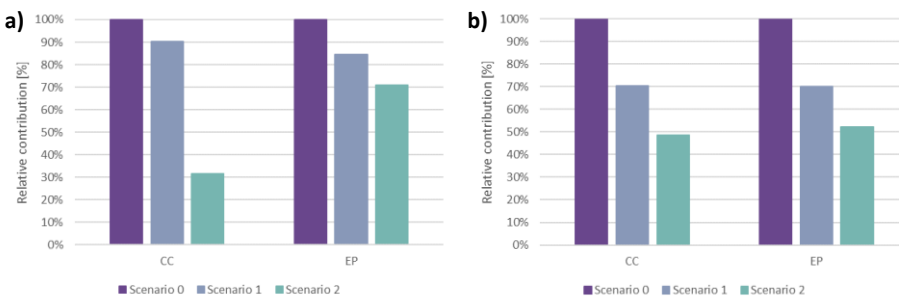


Fig.2. Comparison between the different scenarios considered for each plant size (a) Avedøre (b) Valladolid

Highlights

The model allows the integration of innovative technologies in real WWTPs. In this way, economic and environmental indicators can be calculated and validate their level of eco-efficiency.

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