

An Industrial-Urban Symbiosis (I-US) concept for the production of gaseous biofuels

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Abstract

The production of biofuels has increased in order to reduce the dependence on fossil fuels and mitigate climate change. However, current production practices are heavily criticized for their lack of environmental sustainability. In the coming years, biofuel production practices should improve in order to meet strict environmental sustainability policies. The Industrial and Urban Symbiosis concept focuses on long-term collaboration between local municipal and industrial actors that enables more efficient use of materials, energy, and other resources. Such collaboration and networks can increase the value of businesses, stimulate innovation, improve environmental and sustainability performance, and foster local and industrial development.

The aim of the research is to characterize waste from industry and municipality aiming at Industrial-Urban Symbiosis (I-US), to identify possible material and energy exchanges between municipalities and industries and improve the efficiency and environmental performance of biofuel production within the Horizon Europe project SYMSITES.

The main objective of SYMSITES is to implement regional industrial urban symbiosis in four European regions different in social economic, and environment aspects, from the north Denmark, through the mid Austria to the south Spain and Greece. The four EcoSites will use the same technologies for wastewater and waste treatment and energy production and integration, enabling a clean comparison of the EcoSite impacts. The four EcoSites will generate virtuous circles of energy, treated waste and wastewater streams between urban and industrial entities.

This study concerns the production of methane from three different waste streams: Olive Industry Wastewater (OIWW), Liquid Fraction of Food Waste and Municipal Wastewater (MWW). These streams are collected from the area of West Achaia in Greece.

Methane production from the three above waste streams through anaerobic fermentation under mesophilic conditions was carried out using a 40L CSTR, operated at different 40d, 30d and 20d with an organic loading of 0.5 gCOD/(Lreactor*d) and feedstock rates (91.7% MWW, 3.3% LFFW, 5% OIWW). Also TSS, VSS, tCOD, sCOD, pH, VFAs and methane were measured. The methanogenic reactor was operated for 50 days. The mean

biogas production rate was 11.6 L/d with a mean methane content of 78%.

Keywords: EcoSites, biofuels, Industrial-Urban Symbiosis (I-US)

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