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Electric energy production from primary sieved solids through gasification

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Micro-sieving is a novel rotary belt filtration process, which separates suspended solids (SS) from raw wastewater. The openings of the belt filter are typically between 150-350 μm, however, the filtration is primarily based on the cake that is formed on the belt, due to the accumulation of the separated SS (which are continuously removed through a scrubbing device). SS removal yield, for municipal wastewater has been measured between 30-50%, with parallel BOD reduction of about 20-30%. The produced biosolids (Primary Sieved Solids-PSS) have solids content between 35-45% and High Heating Value (HHV) between 23.5-24.4 MJ/kg, and thus they are ideal for gasification. However, additional drying is required, prior to gasification, to achieve solids content of about 85%. A complete system is under installation at the Wastewater Treatment Plant of Re-thymno, Greece. Initially, about 5000 m3/d of raw wastewater, will be treated by micro-sieving. The produced PSS will be further dried and then will be gasified to produce syngas. The latter will be fed into a co-generation engine for the production of thermal energy (will be used for PSS drying) and electric energy. Based on mass and energy balances, the produced electric energy will be sufficient to operate the system: micro-sieving-drying-gasification, while excess electric energy is expected to be produced. An additional benefit, apart from the energy production, is the enhancement of the performance of the downstream WWTP, due to the removal of a large fraction of SS from the wastewater, prior to the aeration tank. The study is supported by the European Commission, through the LIFE program: "New concept for energy self-sustainable wastewater treatment process and biosolids management (LIFE B2E4SustWWTP)", LIFE16 ENV/GR/000298.

Speaker Biography

Petros Gikas is Associate Professor at the School of Environmental Engineering, Technical University of Crete, Greece, and Director of the "Design of Environmental Processes Laboratory". His research interests are focused on municipal, industrial and agricultural waste and wastewater management. He is specifically active in the design of novel wastewater treatment processes, with emphasis in low cost – low energy treatment processes and on water reclamation and reuse applications. He is also working on energy recovery from biosolids and municipal solid waste, utilizing thermal or biological processes. He has over 50 publications and over 100 conference participations, while he is Associate Editor for the Journal of Environmental Management.

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