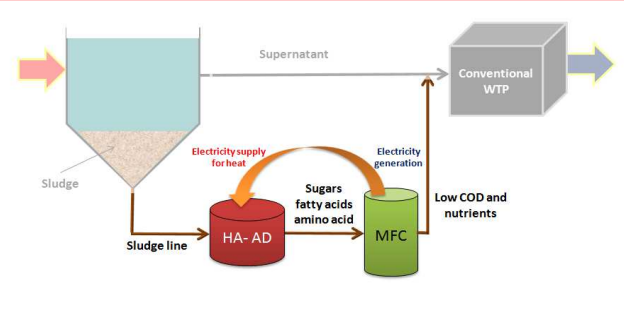

MFC4Sludge

Microbial fuel cell technologies for combined wastewater sludge treatment and energy production

Abstract

MFC4Sludge is an industrial research EU funded project that involves European SMEs and first class RTDs.

This project aim is to provide an innovative solution consisting of a Microbial Fuel Cell (MFC) coupled to a hydrolytic-acidogenic Anaerobic Digestion process (HA-AD) in order to develop a new strategy for sewage sludge from wastewater treatment plants (WWTPs) valorisation.

FP7 – Capacities programme

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CAPACITIES

PROJECT COORDINATOR: ECO trend s.r.o.

admin@mfc4sludge.eu

Project Participants

FEDERACION ANDALUZA DE EMPRESAS COOPERATIVAS AGRARIAS

KTH VETENSKAP OCH KONST

helbio

idener

POWERCELL

LEITAT managing your technologies

ingenostrum

marches biogas anaerobic digestion engineering

Contributions to technical progress

- Wastewater sludge pre-treatment using HA-AD;
- MFC system development aimed at improving system efficiency and cost-effectiveness;
- MFC control strategies design in order to reach an optimal performance;
- Integration of the different elements which compose the final solution.
- Demonstration of techno-economical and environmental feasibility of developed technologies for their implementation in wastewater treatment plants.
- Promotion of proposed solution application for distributed power production.
- Testing of the technological competitiveness as renewable and integrated technological solution. By valorising sewage sludge the wastewater treatment process can become more sustainable

Objectives

▪Adapt HA-AD so it can be used as a pre-treatment of sludge for MFC, reduce the residence time of sludge to 7 days, keep the operating temperature below 30°C and asvoid CH4 production while maximising concentrations of volatile fatty acids (VFA) and other suitable substrates for the MFC

▪Research and document the microbial community to be selected as for an optimal partial HA-AD and MFC processes combination and produce start-up cultures for the partial HA-AD processes to be developed herein

▪MFC development and performance: obtain power output ratings of at least 250W/m3, reduce MFC carbon impact in electricity generation to 0.3 kg CO2/kWh by an optimized design and usage of materials, develop novel stack configurations and increase the ratio of surface area of electrodes to volume by around 20%

▪MFC control and integration: development of a non-linear, grey-box mathematical model aimed to HA-AD-MFC process description (electrical performance, microbiology, mass and heat transfer, etc), develop a distributed control system (DCS) and implement a MPC controller.

▪Prototype: research and document the scaling-up process of the HA-AD-MFC process for sludge treatment, construct a prototype with a 10L-volume MFC, achieve at least 90% of COD degradation, reduce sludge volumes at least 75% and generate a higher electricity output than required by the HA-AD. Initial estimations foresee a net energy generation of 140 W/m3 or more