

Master thesis in collaboration with start-up company (www.hexem.com)

Wastewater Treatment to Biomethane : development and testing of new bio-electrode assemblies

This project develops and optimizes a novel wastewater treatment system that can achieve high removal efficiency, low energy consumption, and low environmental impact. It is based on bio-electro-methanation of organically charged wastewater : municipal sewage, industrial effluents, food industry, breweries, distilleries, cheeseries, liquid manure,... When passing wastewater through a flow reactor containing 2 engineered electrodes between which a voltage is applied, specific bacteria will populate the electrodes that help to oxidize the organic waste to H^+ and CO_2 (bioanode) which are then reduced to H_2 and CH_4 (biocathode). The injected electricity is but a small fraction of the CH_4 generated. The technology can produce in a single step bio CH_4 of high concentration (>95%) for direct recovery, without requiring CO_2 separation as in the case of classical anaerobic digestion (max 65% CH_4). Other advantages are the significantly lower footprint and lower volumes needed, compared to current wastewater treatment plants. The technology is relatively young and requires substantial investigation and understanding on the effect of operation parameters (T, p, V, pH,..).

Tasks:

- Conduct literature review and background research on wastewater treatment systems
- Design and perform lab experiments and pilot tests on an existing prototype
- Analyze and interpret data and results using statistical and modeling tools
- Write and present a report on the project outcomes and findings
- Collaborate and communicate with the research team and external partners

Background:

- environmental, chemical, mechanical, or civil engineering
- interest in wastewater treatment, water quality, and the environment
- skills in laboratory work, data analysis, report writing
- good oral and written communication skills in English; French is a plus
- ability and willingness to work independently and as part of a team

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