Increasing biogas recovery by solids recycle and biological pretreatment

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Background

Limited energy resources
➢ Less biomass available for biogas plants

Residual methane potential in digestate after anaerobic digestion
➢ Need to be recovered to increase CH_4 production

A **part of the biomass is recalcitrant**
➢ Need to be treated to enhance its biodegradability

Overall goal

Develop an improved bioenergy system by treating the digestate (or a fraction of it containing the recalcitrant biomass) and recirculating it into the anearobic digester using advanced biological pre-treatment.

Objectives

- **Evaluate recovery of active biomass**

What? Solids obtained by separation of digestate
How? Batch tests

- **Quantify rate and extent of degradation:**
  - during anaerobic digestion
  - during the treatment (TAD*?)

W? Manure and sewage sludge: raw substrate, digestate and solids
H? Batch and CSTR

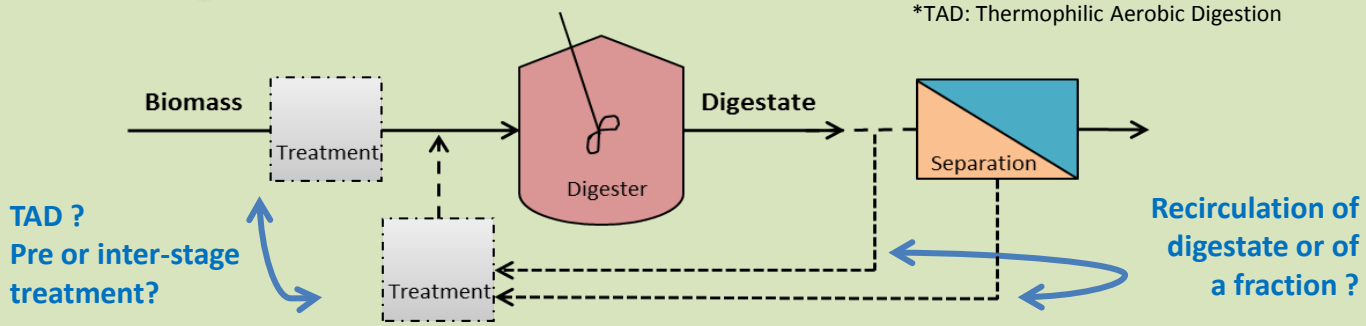
- **Simulate and predict the effect on VS conversion and CH_4 production** of
  - solids separation and recycling
  - pre-treatment

H? Model development, R

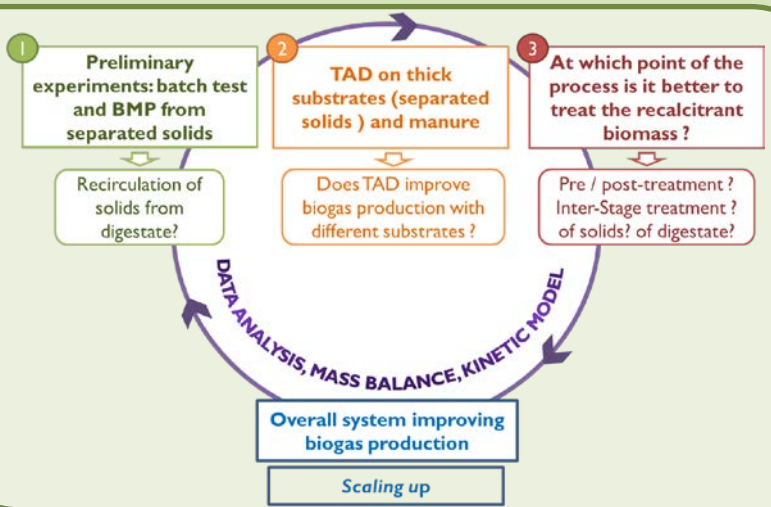
- **Evaluate the whole system combining solids recycle and pretreatment**

H? Lab-scale CSTR reactors

*TAD: Thermophilic Aerobic Digestion



Research Plan



BioCap

This PhD is part of the BioCap Project, a collaboration between Danish and Korean research groups and industrial partners