Biogas Process and Technology Development

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Department of Thematic Studies – Environmental Change and Biogas Research Center

The main goals!

Fundamental and applied knowledge for

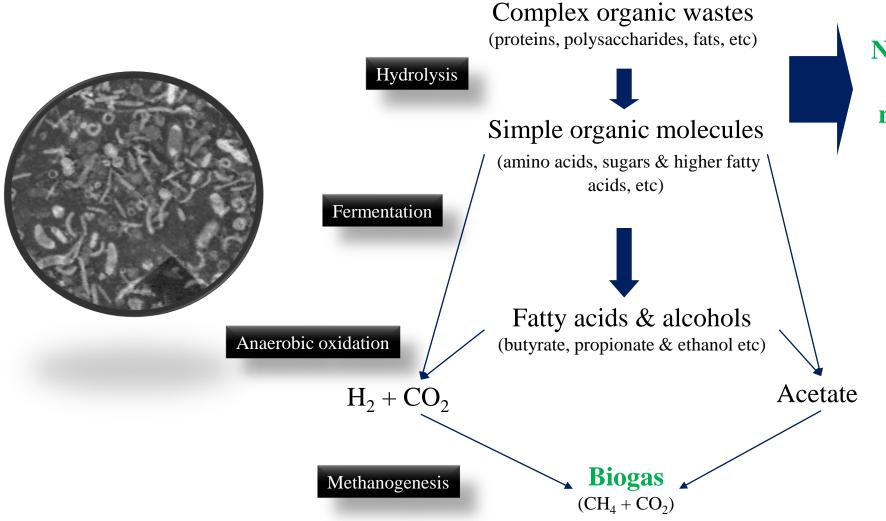
Optimization:

• To maximize stable methane production per reactor volume, time and organic wastes substrate and produce high quality digestate

Application of new substrates:

• To establish efficient and stable process for new substrates.

Engineered ecosystem



Nutrientrich residues

Integrated waste management, renewable energy production, nutrient recovery

Biogas process engineering

Pretreatment

Substrate

- Degradability
- Characteristics
- Nutrient content
- New opportunities

Reactor and process design

- Reactor configuration
- Loaidng rate
- Retention time

Microbiology

- Microbial composition
- Degradation pathways
- Nutrient availability
- Inhibition

Fluid characteristics

- <u>Viscosity</u>
- Flow movement

Chemistry

- Phosphorous
- Nitrogen
- Sulfur
- Iron
- Metals
- Organic matter

Gas product

- Methane
- Carbone dioxide
- Hydrogen Sulfide

Post-digestion

Process control/monitoring

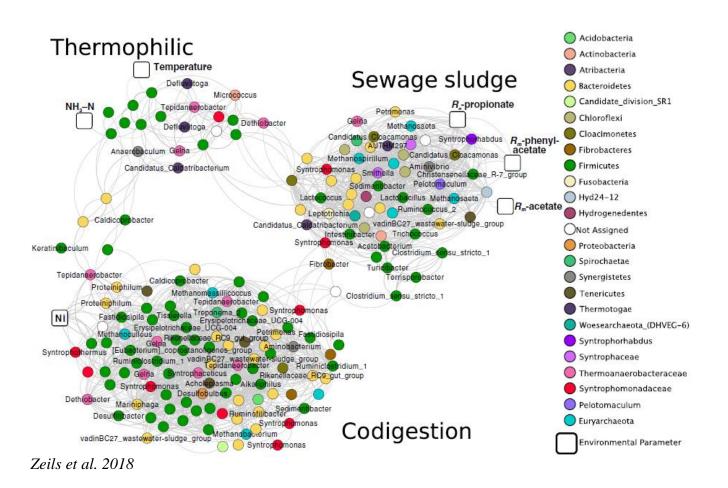
- Online measurments
- Modelling
- Standard methods

Digestate

Dewatering
Nutrient recovery
Applications

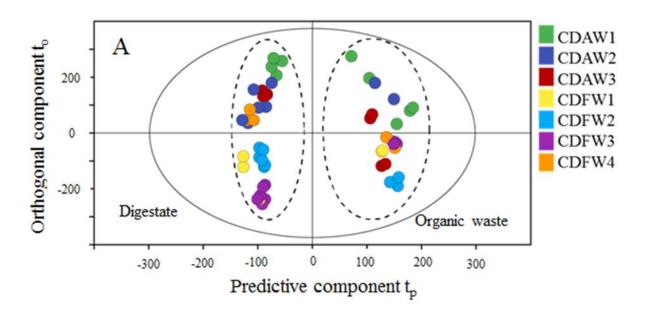
Screening!

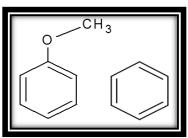
Microbial community and function!

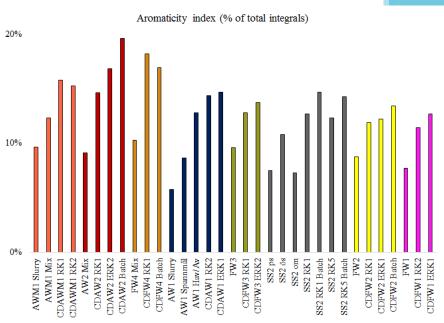


Screening!

Organic matter characteristics and degradability

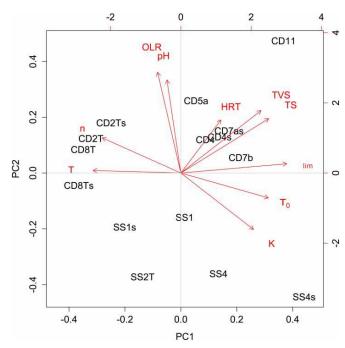




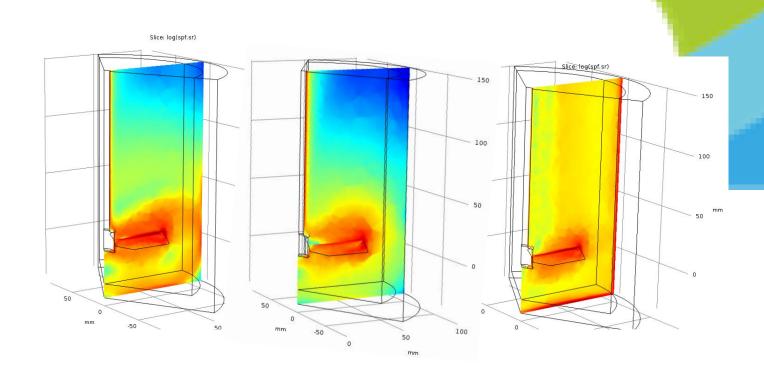


Screening!

Fluid characteristics



Björn et al. 2018



Biogas process engineering

Pretreatment

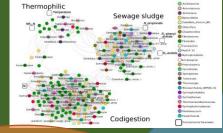
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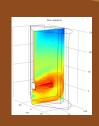
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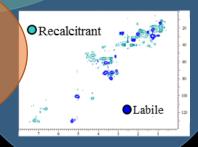
Microbiology



Fluid characteristics



Chemistry



Process control/monitoring

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- Standard methods

Gas product

- Methane
- Carbone dioxide
- Hydrogen Sulfide



Post-digestion



Digestate

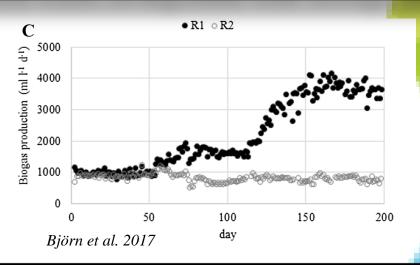
Dewatering
Nutrient recovery

<u>Applications</u>

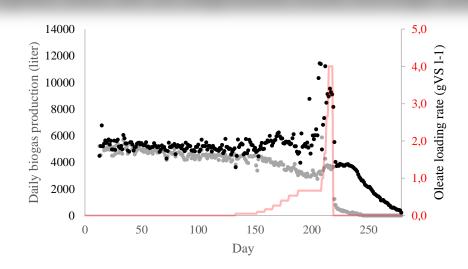
Laboratory trials!



Food waste co-digestion with Sewage sludge



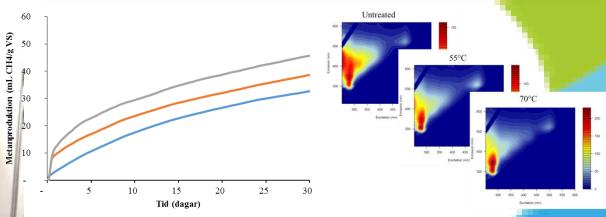
Lipids and fat co-digestion with Sewage sludge



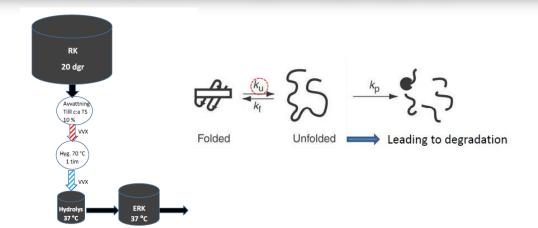
Laboratory trials!



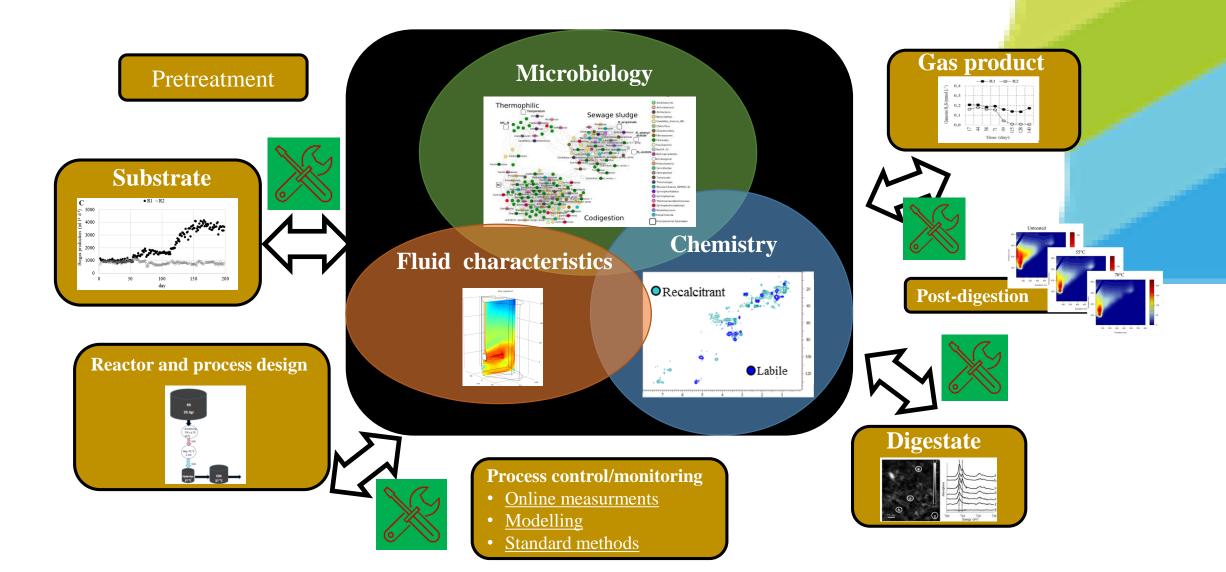
Post-treatment for improving biogas production



Application of enzymes for improving biogas production



Biogas (technical) solutions





FO6 Nationell och internationell policy

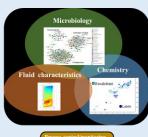
FO5 Regional och lokal utveckling

FO3 Värdekedjor FO4 Bioekonomi

FO7 Internationalisering

FO1 Rötningsprocesser FO2 Digestat













Thank you for your attention!

