

Biomethane's Wild Ride – The Anaerobic Rollercoaster of Temperature Waves and Feeding Surges

Research group: [Microbial Resource Management](#)

Lead: Priv. Doz. Dr. Sabine Podmirseg

1. Introduction:

The transition to sustainable energy systems is essential to reduce fossil fuel dependence and meet growing energy demand, with bioenergy playing a key role within the circular economy and the EU Green Deal. Anaerobic digestion of organic waste enables efficient waste management through the production of biogas and biomethane, contributing to decarbonization. However, reactors often operate under variable conditions, such as temperature fluctuations and dynamic organic loading, which can affect process stability. Recently, we have shown that unconventional temperature regimes can enhance biomethane yields. This work aims to assess reactor robustness under these unconventional temperatures to better understand their limits for stable and efficient biomethane production.

2. Objectives:

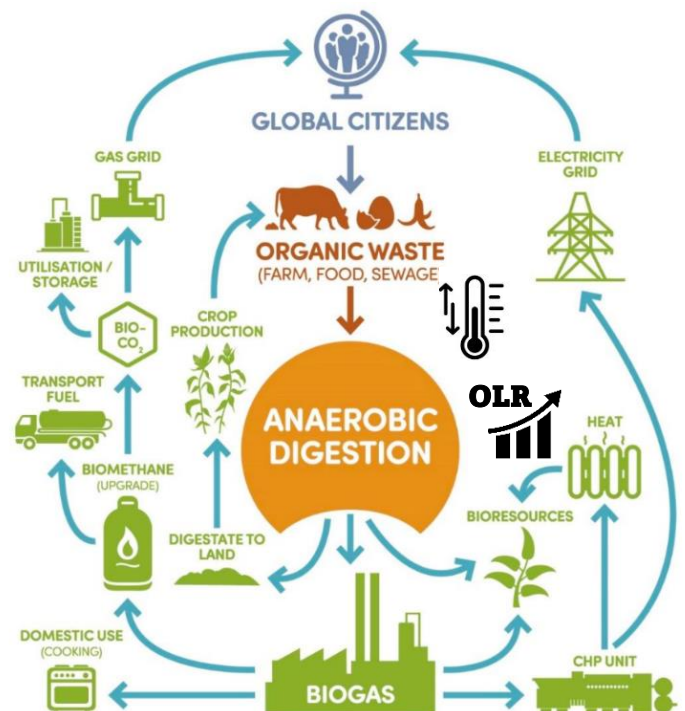
This study aims to evaluate the robustness of 60 fed-batch laboratory-scale anaerobic reactors inoculated with three different inoculants and operated under variable temperature conditions and dynamic organic loading. The work will investigate how these conditions affect process stability, microbial community dynamics, and system efficiency, with particular focus on unconventional temperatures between mesophilic and thermophilic operation (the temperature gap), previously shown to enhance biomethane yields.

3. What you will do:

- Continuous monitoring of biogas production and composition in laboratory-scale reactors.
- Monitoring of physicochemical parameters throughout the experimental period.
- Application of molecular biology techniques, including DNA and RNA extraction and quantification of target microbial groups using digital PCR (dPCR).
- Analysis of microbial biodiversity through bioinformatic approaches.

4. Requirements:

- ✓ Currently enrolled in the Master program Microbiology.
- ✓ Basic knowledge about microbiology and molecular biology techniques.
- ✓ Previous experience in microbiology lab courses is of advantage.
- ✓ Proficiency in English.



5. Other information:

Starting date: As soon as possible, preferable before the 1st of May 2026.

If interested, get in touch with the research group lead Sabine Podmirseg, [sabine.podmirseg\[at\]uibk.ac.at](mailto:sabine.podmirseg[at]uibk.ac.at)