DEPARTMENT OF ENERGY TECHNOLOGY
AALBORG UNIVERSITY

PhD Public Defence

Title: Modelling of Efficiencies in Biogas Plants with Consideration of Incomplete Mass and Energy Balances based on Calorimetric Investigations and Data Sampling - Developing a new Man-Agement Tool System

Location: AAU Esbjerg Campus, Auditorium C1-117

Time: Thursday 9 January at 13.00

PhD defendant: René Casaretto

Supervisor: Associate Professor Jens Bo Holm-Nielsen

Moderator: Associate Professor Mette Hedegaard Thomsen

Opponents: Professor Lasse Rosendahl, Department of Energy Technology, Aalborg University (Chairman)
Professor Dr. Frank Scholwin, Universität Rostock, Germany
Senior Scientist Henrik Bjarne Møller, Aarhus University

All are welcome. The defence will be in English.

After the public defence there will be an informal reception in the vestibule (C2) at Esbjerg Campus.

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Abstract:

Biogas production from agricultural waste streams and energy crops provides several different value streams: production of green energy by using waste streams, reduced greenhouse gas emissions (GHG) and production of nutrient rich digestates as biofertilizer.

The focus has been the energy efficiency of these plants. Previous research has identified several different methods for determining the energy efficiency of commercial scale biogas plants. These methods are mainly based on biomethane potential tests (BMP), elementary compound analysis and historical observations.

The aim of this work is to implement a new modelling systematics for determining the energy efficiency with incomplete mass- and energy balances. For this, commercial scale biogas plants have been investigated for two years and samples from the input and output materials were taken and analyzed for the dry material (DM), organic dry material (oDM), volatile fatty acids (VFA) and the gross calorific value (GCV). For mass and energy balances the production data of each biogas plant were used, the balance borders were set around the first fermenter and the last gas tight tank of the system.

The results revealed large variations in the efficiency of Danish and German biogas plants with consistent correlations between input materials, retention time, residual energy content and gas production.