Technische Universität Braunschweig

EXCELLENCE CENTER FOR DEVELOPMENT COOPERATION
SUSTAINABLE WATER MANAGEMENT

Summer School on

Energetic and Material Utilization of Biomass

- Biogas Plants and Nutrient Recovery -

September 1 – 6, 2014
Braunschweig, Germany

Quelle: Abwasserverband Braunschweig / W.Küchenthal

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Summer School on
Biogas Plants and Nutrient Recovery

Overview

Due to the growing world population and growing standards of living, the pressure on resources increases. As a consequence, resource protection and resource recovery is an urgent need.

The Summer School focuses on the resource 'biomass', containing components that could be used for energy production (carbon), as well as nutrients such as nitrogen and phosphorus. The term biomass refers to different mass flows which are rich in organic matter like organic wastes, manure or wastewater; but also energy crops explicitly grown to produce renewable energy.

There are manifold options and technologies to use and recycle this variety of substrates. With regard to scale, biogas can be produced at households, using e.g. livestock manure as substrate, but also on agricultural biogas facilities that need thousands of hectares of energy plants. Nutrient recycling can be realised by direct use of digestates, but also within elaborated, new alternative sanitation concepts basing on source separation.

As a consequence of these options, the technical portfolio shows a high variety for the different system components, both for biogas production (substrate processing and storage, plant design and operation, biogas use) and nutrient recovery (collection, transport and storage of different partial streams, technologies for treatment and recovery of the valuable compounds).

The seminar therefore intends primarily to provide an overview of the most important key factors of biogas production and nutrient recovery, regarding technical, economical as well as social aspects. An additional focus will be laid on the global aspects of resource protection and on potential conflicts such as "food vs. fuel". By the interactive form of the Summer School, a deeper understanding of the concepts and their interactions with all different levels of society shall be communicated.

Objectives

On successful completion of the seminar, each participant will be equipped with the essential state-of-the art knowledge on

- technical aspects of biogas production, biogas use and nutrient recovery at different scales
- the properties of the substrates used for biogas production; respectively the streams/sources used for nutrient recycling, and
- the most important economic and social factors, as well as (global) potentials for conflict.

Moreover, the participants will also get the opportunity to discuss/present their ***own*** experiences and projects within this context, focusing on local particularities and including the participants' backgrounds and knowledge.

Topics

- Technical aspects of biogas production; plant design and operation – from single households to industrial scale
- Characteristics, advantages and disadvantages of different substrates used for biogas production
- Interaction between biogas production and agriculture – Food vs. Fuel
- Political, legal and social aspects of biogas production and nutrient recovery
- Processes and technologies for nutrient recovery from different partial streams and sources
- Economic and social key factors, drivers and constraints
- Nutrient recovery within the context of the global demand of resources and food
- Development of integrated concepts for energy production/nutrient reuse (case studies)

Program and schedule

The summer school comprises three parts, focusing on a) biogas production, b) nutrient recovery and c) their synthesis. Each part consists of key-note lectures, contributions of the participants and interactive teamwork. The Summer School closes with an excursion to an agricultural biogas plant and a nutrient recovery site. The entire summer school spans over **one week** from the **arrival on Sunday, 31th of August 2014** until the **departure on Sunday, 7th of September 2014**.

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SCHEDULE

Day	Date	Activity
Sunday	31/08/2014	**Arrival**
Monday	1/09/2014	**Opening and Introductory session** - Key Note No. 1: Why should we think about the utilization of biomass? - Key Note No. 2:Energetic utilization of biomass - Key Note No. 3: Material utilization of biomass
		Lectures Biogas plants - Technology (Anaerobic treatment for energy recovery) - Substrates - Plant construction - Safety issues - Biogas storage, conversion and utilization - Benefits and limitations
		Presentations of the participants - Projects in biogas plants
Tuesday	2/09/2014	**Presentations of the participants** - Projects in biogas plants
		Lectures Nutrient recovery - Recycling of nutrients - Products and qualities - Pharmaceuticals and micro pollutants - Reuse options - Mass flow separation - Costs and economic aspects - Examples of nutrient recycling/recovering concepts
Wednesday	3/09/2014	**Presentations of the participants** - Projects in nutrient recovery and recycling
Thursday	4/09/2014	**Lectures Acceptance** - social aspects - food vs. fuel
		Working Groups The participants will join a workshop to study cases of energetic and material utilization of biomass facing different specific scenarios in working groups
Friday	5/09/2014	**Working Groups** - Continuation and completion of the teamwork - Presentation and discussion of the developed case studies.
Saturday	6/09/2014	**Excursion** Visit to nutrient recovery and biogas production plants

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Sunday	7/09/2014	**Departure**

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Workshop Organization

The summer school will take place in Braunschweig, Germany at University of Braunschweig. The Technische Universität Braunschweig, Institute of Sanitary and Environmental Engineering will host the summer school within the framework of Exceed project that is funded by the German Academic Exchange Services (DAAD).

Lecturers and Course Material

For each of the main related topics, leading scientists/practitioners will be invited to provide lectures. A brief summary of each lecture/exercise and of the expected learning outcomes, including a list of the supporting course material (lecture notes, related publications) will be handed to all participants.

Target Audience

The participants expected are preferably advanced master students, PhD-students, post-doctoral researchers and practitioners with sufficient engineering and scientific background (M.Sc., M.Eng.) within the field of biogas production and nutrient recovery; interested in acquiring new knowledge and competence.

Number of Participants

The number of participants is limited to 20. Candidates from the DAAD-EXCEED partner universities are to be given first priority. Practitioners, decision-makers and trainers intending to transfer the acquired knowledge and skills directly into engineering of biogas plants and nutrient recovery systems will also be given priority. Selected candidates shall be inspired to submit contributions for oral presentations in the specific field of biogas plants or nutrient recovery.

DAAD-EXCEED will cover the following costs: flight, accommodation.

Application:

Please apply online until **May 01, 2014**.

http://www.exceed.tu-braunschweig.de/apply/summerschool

Among all applicants, 20 will be selected till May 23, 2014, so that every candidate will be informed about the outcome of his/her application before End of May 2014.

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Organization TU Braunschweig:

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