

Biochemical Conversion

The department of Biochemical Conversion focuses on research for the provision of energy from biomass with the help of microorganisms. Here, the main focus lies on the technology used for biogas production and utilization.



12 L lab fermenters

To ensure the quality of the manifold research topics, the department is divided into the following work groups:

- Characterization and development of anaerobic processes
- System optimization
- Process monitoring and simulation
- Biogas technology

Additionally, the work group “Microbiology of Anaerobic Systems” (MicAS) works in the Biochemical Conversion department – in close collaboration with the Helmholtz Centre for Environmental Research (UFZ).

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Further Information

For additional information about the “Deutsches Biomasseforschungszentrum” and ongoing as well as completed projects, please refer to www.dbfz.de.

Further information about the Biochemical Conversion department and the biogas research plant can be obtained by scanning the QR code below.



Applied Research in the Department of Biochemical Conversion



Technical facilities of biogas lab and biogas research plant

Biogas research plant

Facilities

- 2 main fermenters (190 m³)
- 1 plug-flow fermenter (53 m³)
- 1 small-sized fermenter (88 m³)
- 1 secondary fermenter (215 m³)
- 1 manure storage tank (174 m³)
- 1 digestate storage tank (215 m³)
- CHP (pilot injection gas engine) with electric power of 75 kW output, equipped with a flare



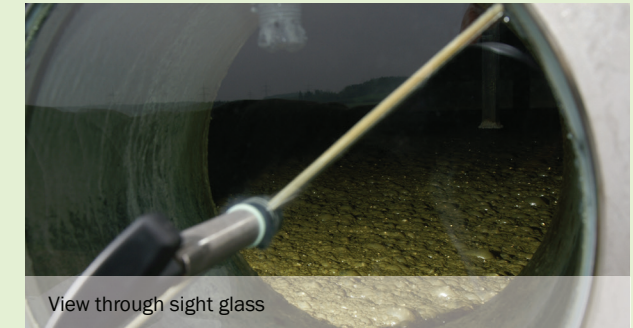
Areas of research

- Process stabilization and mass balances and efficiency increase
- Scale-up from lab to industrial scale
- Use of microbial and abiotic parameters for process monitoring and control
- Flexibilization of biogas production
- Investigation of mixing techniques & mixing properties
- New feedstocks for anaerobic digestion
- Extreme process conditions
- New applications of sensors and moduls for process monitoring and control



Technical capabilities

- Mesophilic and thermophilic operation
- Process control via a process control system
- Various programmable modes of operation
- Online measurements (e.g. pH, temperature)
- Determination of biogas quality and quantity for each fermenter
- Various options for sampling and technical modification
- Parallel operations due to the identical construction of the main fermenters
- Fittings for additional gas utilization technologies or biogas treatment



Biogas laboratory

Analytics of biogas feedstocks and digestates:

- Standard analytics (TS, VS, TKN, NH₄N, Titration of VOA, pH, etc.)
- Methane forming potential
- Composition analysis (Weender, van Soest)
- Sugar analytics
- Determination of alcohols
- Microscopy and physiological characterization

Emission measurements:

- Trace gases (CH₄, N₂O, NH₃)
- Emissions from biogas plants
- Emissions from digestate (field measurements)

Areas of research

- Improvement of the efficiency of the biogas process
- Process optimization and process development for special substrates
- Effects of additive addition (trace elements, nutrients and enzymes)
- Comparison of different technologies for biogas production
- Effects of feedstock pretreatment
- Microbiology (in cooperation with UFZ)
- Development of analysis methods
- Emission measurements

Technical facilities

Batch assays:

- 70 eudiometers, 60 AMPTS

Continuous fermentation tests:

- 46 CSTR up to 15 L
- 2 CSTR up to 35 L
- 6 CSTR up to 45 L
- 1 CSTR up to 500 L
- 1 IC reactor 23 L
- 1 plug-flow fermenter 180 L

