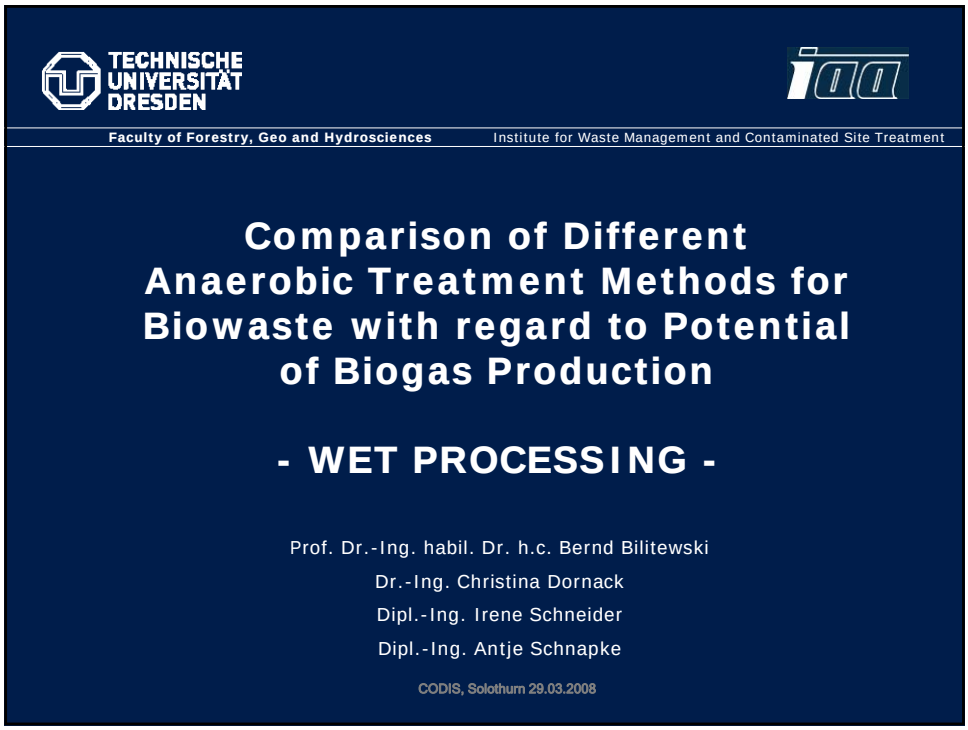
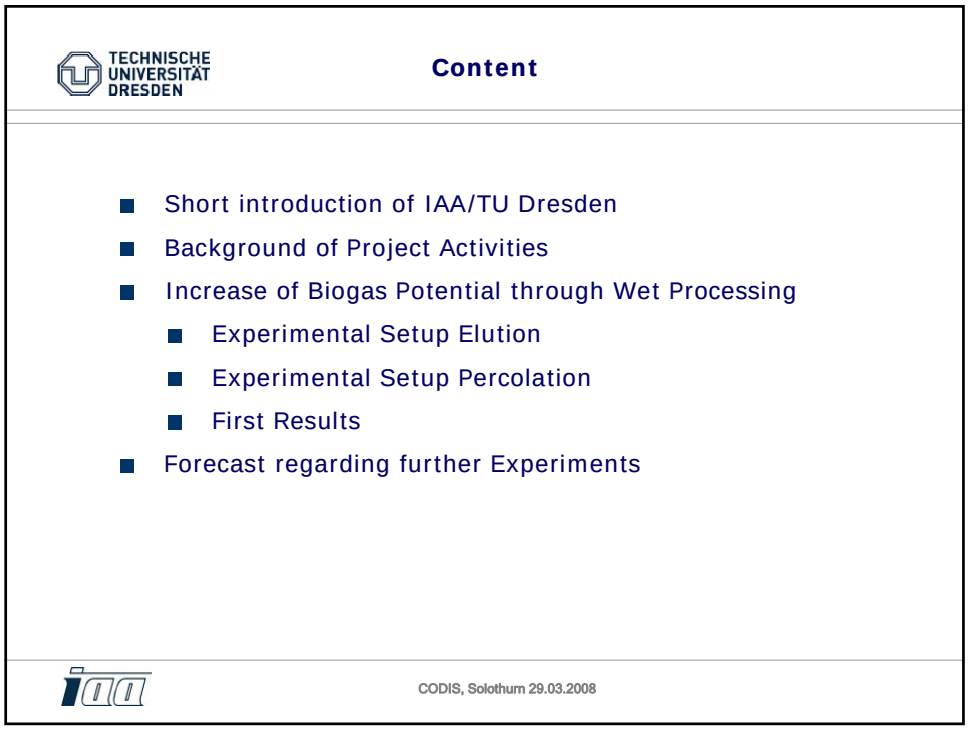

TECHNISCHE UNIVERSITÄT DRESDEN
Faculty of Forestry, Geo and Hydrosciences
Institute for Waste Management and Contaminated Site Treatment
Comparison of Different Anaerobic Treatment Methods for Biowaste with regard to Potential of Biogas Production
- WET PROCESSING -
Prof. Dr.-Ing. habil. Dr. h.c. Bernd Bilitewski
Dr.-Ing. Christina Dornack
Dipl.-Ing. Irene Schneider
Dipl.-Ing. Antje Schnapke
CODIS, Solothurn 29.03.2008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Short introduction of IAA (TU Dresden)

- Part of the Faculty of Forestry, Geo and Hydro sciences
- Founded in 1995, as cooperation of two chairs:
  - Chair of Waste Management
  - Chair of Contaminated Site Treatment
- additional areas of research:
  - Honorary Professorship of Thermal Waste Treatment
  - Honorary Professorship of Groundwater Hazardous Substances
  - System Analysis and Computer Science
- About 40 people (education and research):
  chemists, geologists, civil engineers, microbiologists and computer scientists

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Background of Project Activities

- Development of a utilization strategy for biowaste for production of biofuels through wet processing, biogas synthesis and thermal processes (funded by SMUL/LfUG Germany; 06/2007-06/2009)

A I M S

- Utilization of potential energy from separate collected biowaste for biofuel production (BtL-fuels)
- Development of alternative utilization strategy for biowaste (apart from composting, digestion)
- Focussing on wet processing for meeting requirements specification for input materials in BtL-production processes
- Wet processing: elution, percolation

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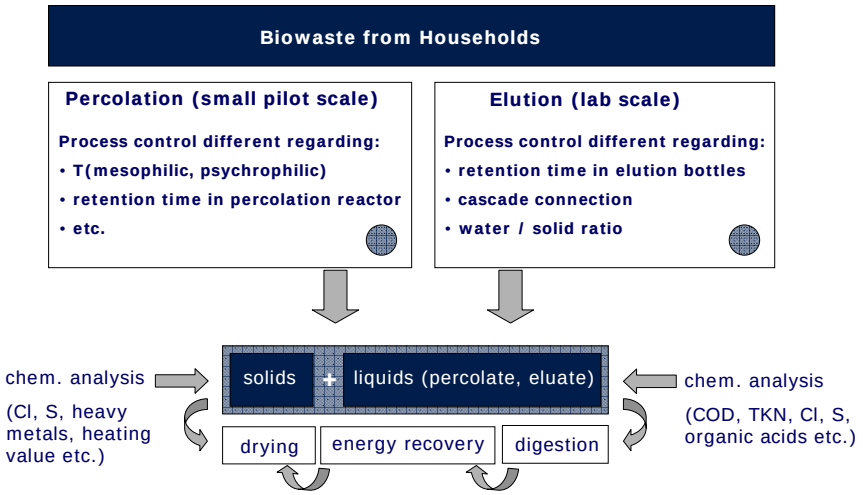
Background of Project Activities II



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Focus: Digestion of Liquids

- Percolate and eluate from wet processing is considered for digestion
- Produced biogas → energy generation for drying the solids
- Design of wet processing → increase in biogas production

Parameter $COD_{orig.}$ = indicator for biogas potential

1g $COD_{orig.}$ = 0,35 Nl CH_4

- aim of process control besides purification of solids for further processing: **increase of COD in liquids**

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PERCOLATION

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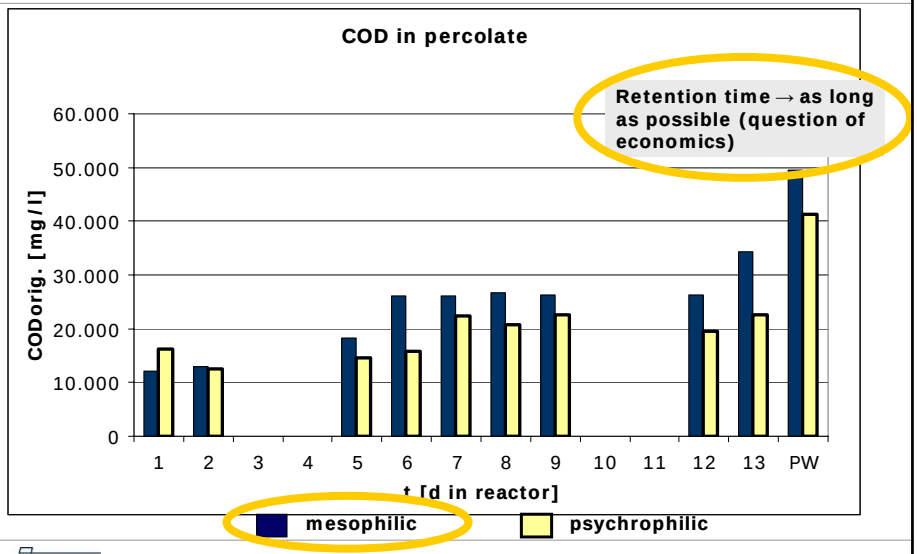
PERCOLATION
First results regarding biogas potential - COD



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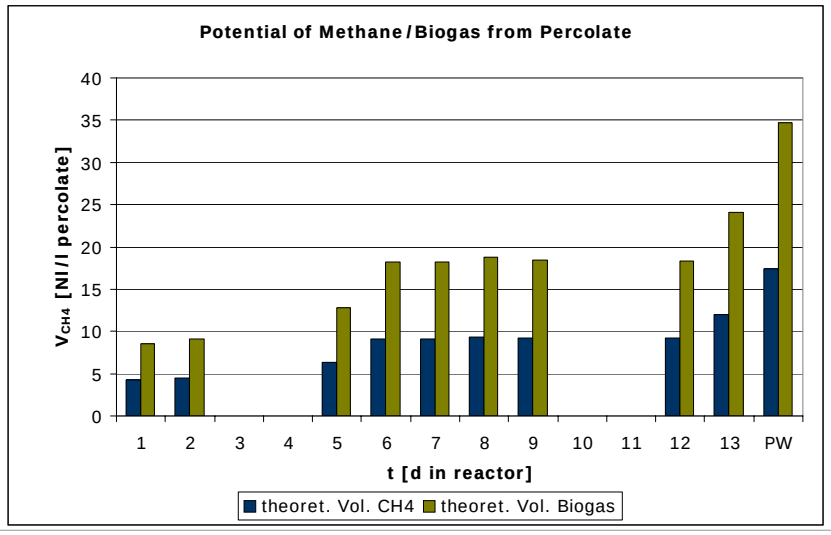
PERCOLATION (mesophilic)
calculated biogas potential from COD



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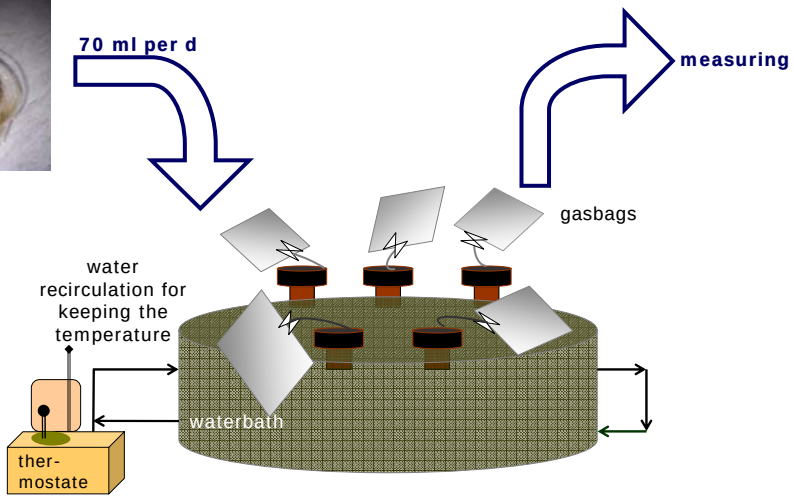
PERCOLATION (mesophilic)
Verification with Measurements (DIN 38414–S8)



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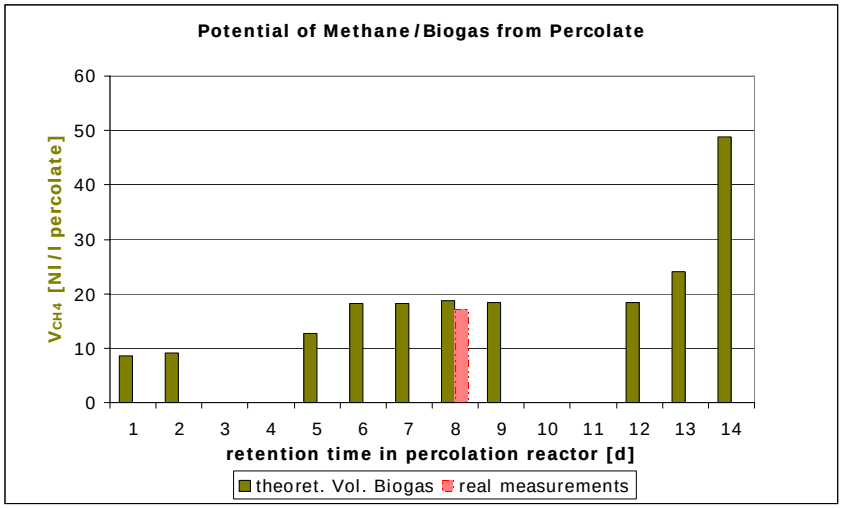

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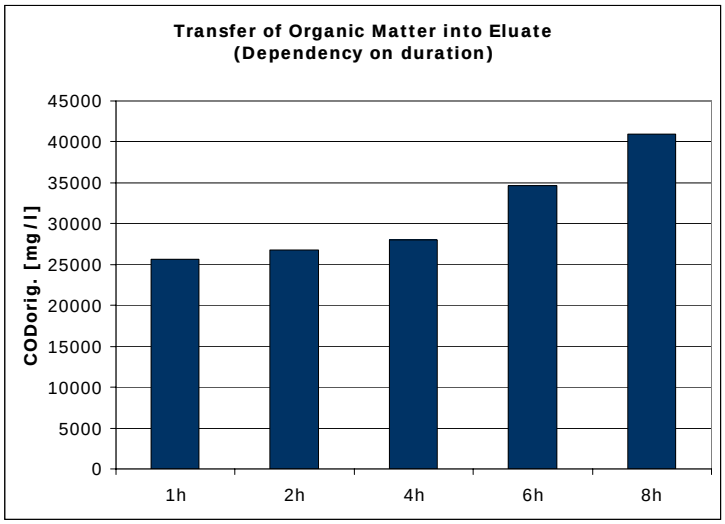
ELUTION
First results regarding biogas potential - COD



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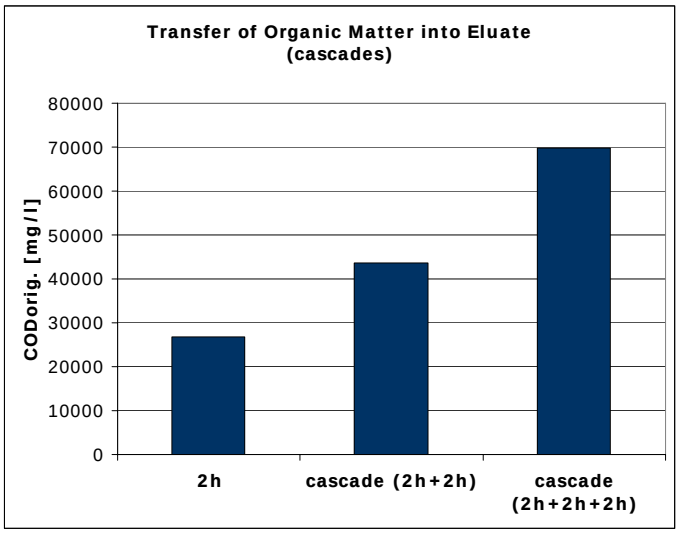
ELUTION
First results regarding biogas potential - COD



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CONCLUSIONS

- comparing COD from percolate and eluate (W/S=1:1):
  COD in **ELUATE** after 1h = 25,7 g/l = COD in **PERCOLATE** after min. 7d (and mesophilic)
- Using cascade connection seems to offer a good possibility for increasing COD in liquids and besides that for less water consumption (matter of economic efficiency)
- regarding feasibility of biogas utilization for drying - simplified calculation

Assumptions:

- triple cascade (2h+2h+2h) elution with water-biowaste ratio 1:1
- 24 Nl CH_4/l eluate from elution of 1 kg biowaste
- total solids after dewatering the solid fraction: 30% (~70% water content)
- needed energy for drying the solid fraction to 10% TS: ~**1700 kJ/kg** biowaste
- heating value methane: ~10 kWh/m³
- utilization of biogas in block heat and power plant (degree of efficiency: 90%)
- possible energy production (heat and power): **859,18 kJ**

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Forecast Regarding Further Investigations

- Focus on elution (less water consumption, better transfer of organic matter)
- Adaption of elution experiments to small pilot scale
- Investigations on dependency of separation of foils
- Investigations on dependency of size reduction of particles

Always with the background of the overall strategy to:

➡ increase purification of solid fraction (Cl, S, HM) for further processing and

➡ increase biogas potential of liquids

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Experimental Setup Percolation

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Experimental Setup Elution