



ERA-NET Bioenergy Project: SE.Biomethane

Scope of work and results
of ventury work packages





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Work packages of ventury

1 *Pre-treatment of lignin- and cellulose-rich substrates using the Pressure Swing Conditioning*

- *Disintegration of barley straw, cattle and chicken manure*
- *Evaluation of results of the fermentation tests*

2 *High organic loading plug-flow digestion system (HPF-system)*

- *Digester design in low-cost silo-type*
- *Design of testing digester in laboratory size*
- *Evaluation of process design*



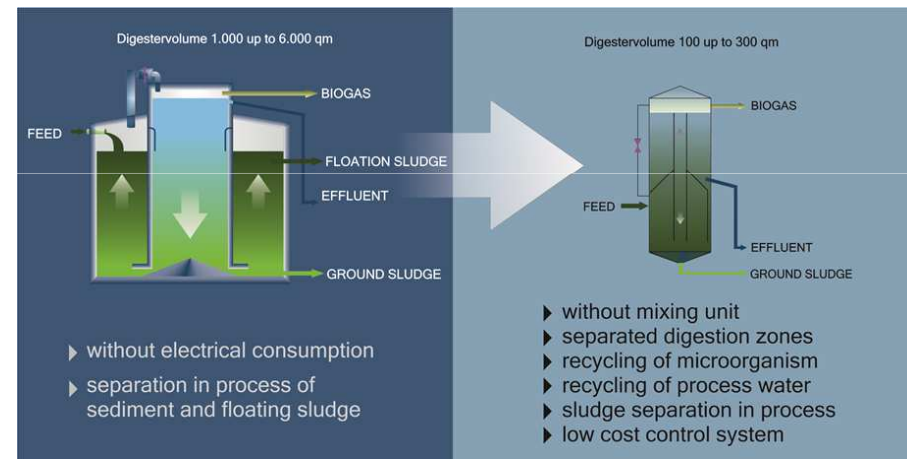
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2. High organic loading plug flow digestion system

Objectives of development

Main Objectives:

- Scale down of the conventional hydraulic mixed digester
- Keeping the advantages
- Adding new advantages:
 - Silo type construction
 - High Transportability
 - Modular design
 - Reduction of construction costs



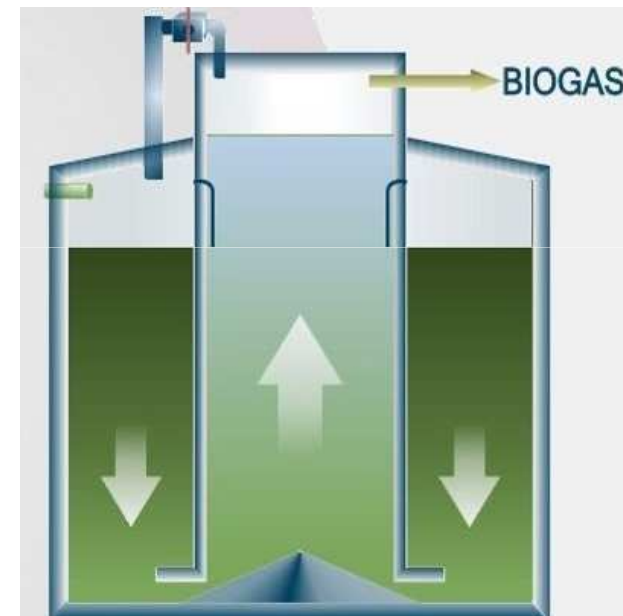


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2. High organic loading plug flow digestion system

Conventional fermenter type

- Biogas production in enclosed outer cylinder generates hydraulical gradient
 - Level lowering in outer cylinder
 - Level lifting in inner cylinder
- Feeding in outer cylinder when max. level is reached



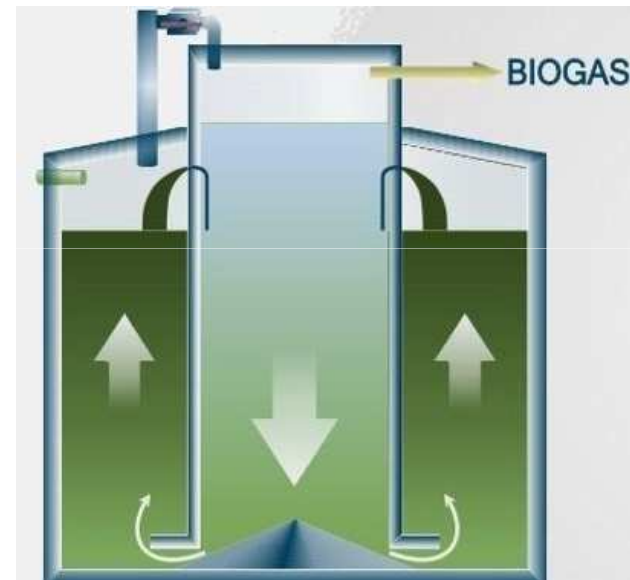


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2. High organic loading plug flow digestion system

Conventional fermenter type

- Opening of valve in connecting pipe between both cylinders for level compensation of both cylinders
- Hydraulic mixing process of the feeding material with substrate in outer cylinder
- bacteria vaccination of fresh material with substrate of the inner cylinder
- Mixing on the ground by mixing/swirl chambers





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2. High organic loading plug flow digestion system

Pros of plug flow digester

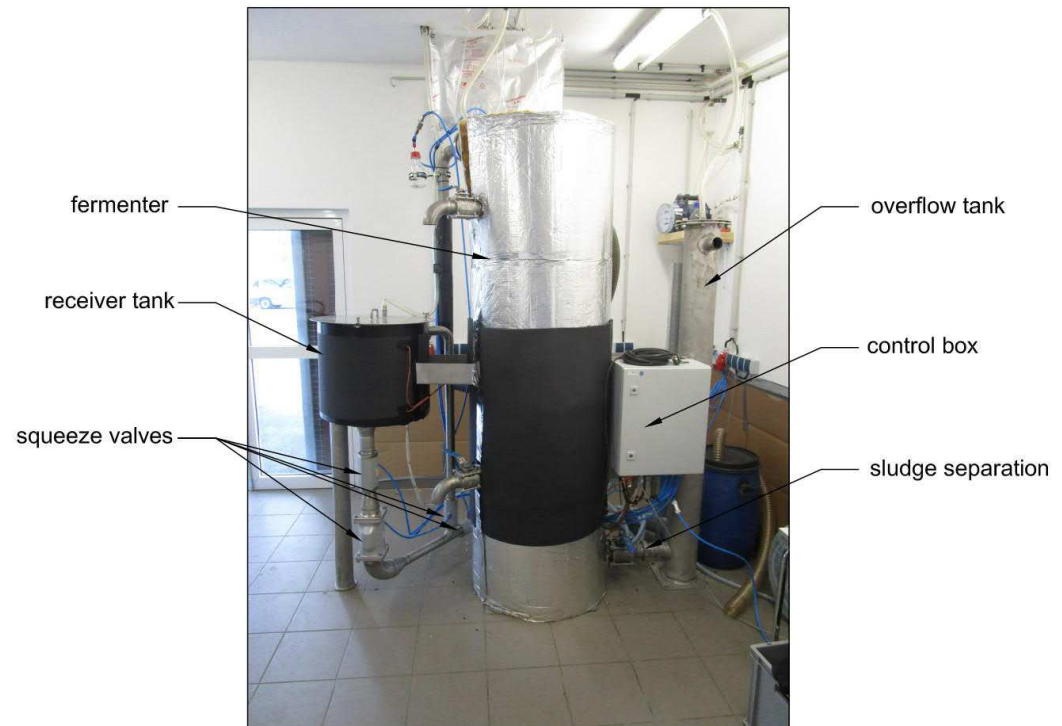
- Plug flow prevents discharge of fresh feed material
 - efficient use of biogas production capacity
- Renunciation of mechanical agitators
 - Low electricity consumption
 - Low maintenance costs
 - Low downtime caused by maintenance
- Effective destruction of scum and sinking layers
 - (external gas blower as backup for creating height level)
- No downtime caused by sediment deposit
 - Sludge separation during process



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2. High organic loading plug flow digestion system pilot plant

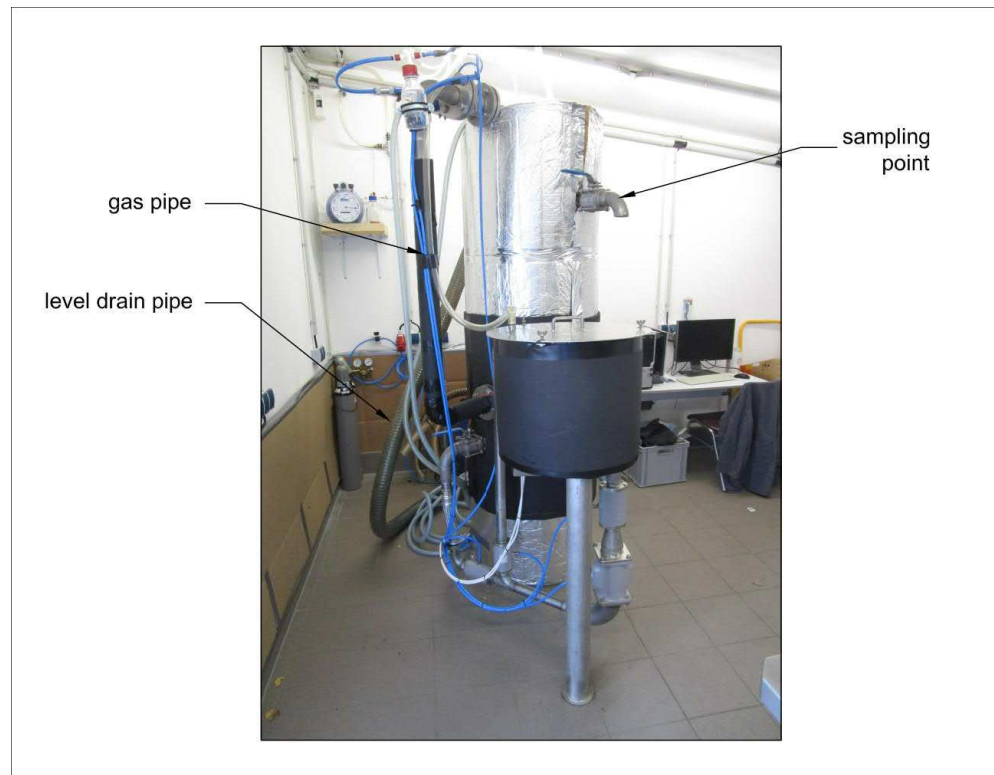
- Cooled/heated receiver tank (60l)
- Feeding with serial connected squeeze valves
- Fermenter volume: 400l
- Effluent drain in overflow tank
- Sludge separation in overflow tank





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2. High organic loading plug flow digestion system pilot plant

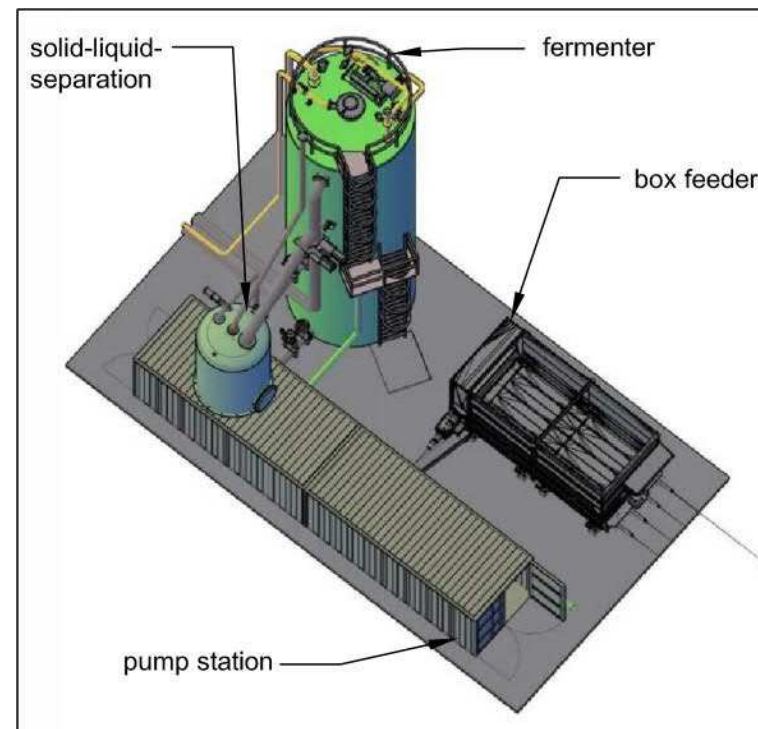




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2. High organic loading plug flow digestion system site concept

- Box feeder carries substrate to pump station
- Re-mixing of water from solid-liquid separation
- Feeding of fermenter by pumps
- Ground sludge separation and effluent drain in receiver tank for solid-liquid separation

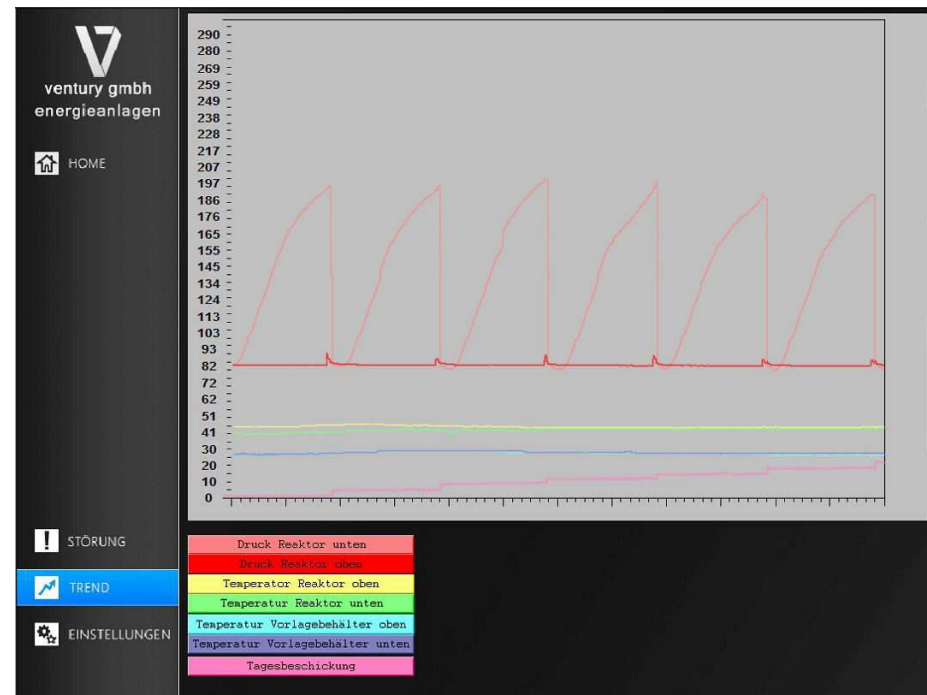




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2. High organic loading plug flow digestion system pilot plant PLC

- Gas pressure in bottom cylinder is forming typical sawtooth curve
- Degressive pressure rise
- Subsequent feeding and mixing causes pressure balancing





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2. High organic loading plug flow digestion system conclusion

HPF-system advantages:

- fiber- and lignin-rich substrates can be used
- high efficiency of substrate utilisation (plug-flow system)

- Low (no) energy consumption
- low maintenance requirement
- Constant operation time
- cost-efficient and compact design



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Thank you
for your attention!