

IMPROVEMENT OF ANAEROBIC DIGESTION BY ULTRASOUND TECHNOLOGY

Bispingen FBP, Germany



I. Specification of the plant

Plant capacity	<ul style="list-style-type: none"> • 700 kW (until January 2010), 1,100 kW (since February 2010) • 2 main digesters (MD) à 1,300 m³ • 3 secondary digesters (SD): 2 à 1,300 m³, 1 à 2,300 m³ • 1 storage tank à 2,300 m³ • Hydraulic retention time of 100 days
Substrate composition (Ø 2009)	<ul style="list-style-type: none"> • 6% grain (82% VS) • 63% maize silage (32% VS) • 5% turkey manure (40% VS) • 26% cow slurry (10% VS)
Total amount of substrate	<ul style="list-style-type: none"> • 14.3 t organic dry solids/d (Ø 2007 – 2009) • 20.7 t organic dry solids/d (since 02/2010)
Biogas production	<ul style="list-style-type: none"> • 8,186 m³/d (Ø 2009) • 11,714 m³/d (Ø 2010) • 12,337 m³/d (Ø 2011)

II. Objective of the ultrasound disintegration

- Intensification of anaerobic digestion process
- Increase in specific biogas yield
- Reduction of substrate input
- Increased capacity utilization of the CHPs

III. Installation of the Ultrawaves ultrasound system

- The first Ultrawaves ultrasound system (5 kW) was installed in November 2008
- Sonication of a partial flow (36 m³/d) recirculated from secondary to main digester in an automated 24h-operation mode
- Installation of a second ultrasound system in March 2011 since the plant was extended and a 3rd CHP (300 kW) was installed in February 2010; Sonication of a partial flow (72 m³/d) (figure 1)

IV. Results of the ultrasound treatment

- Increase of the biogas production: enhanced biogas production compared to the KTBL reference value (12.3% from 2007/08 to 2009, 13,7% from 2007/08 to 2011) (figure 2)
- Reduction of substrate input by 4.6%
- Increase of the CHP's capacity utilization by 6 percentage points in average: (< 92% (Ø 2008) to 98% (Ø 2009))

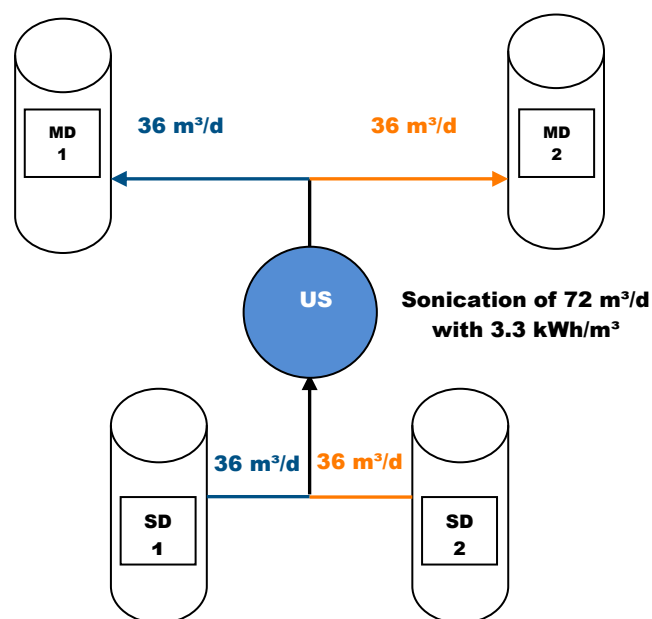


Figure 1: Integration of the ultrasound system (US) into plant

Comparison of actual biogas production and KTBL data regarding input of organic dry solids

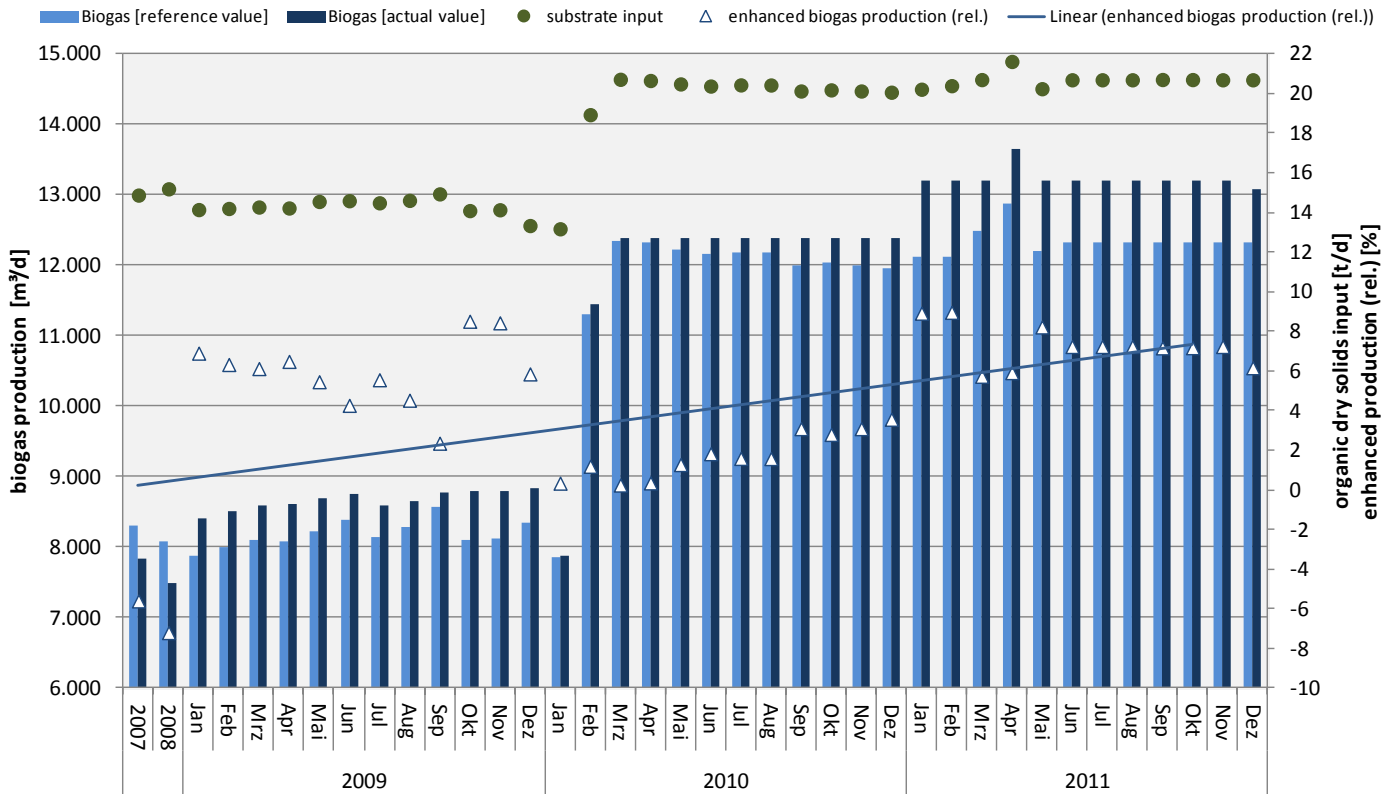


Figure 2: Comparison of biogas production considering organic dry solids input

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