ULTRAWAVES ULTRASOUND SYSTEM FOR IMPROVEMENT OF BIOGAS PRODUCTION ON FARMLAND BIOGAS PLANTS

Lindow FBP, Germany



Figure 1: Lindow FBP and installation of the ultrasound reactor

I. Specification of the plant

Plant capacity	• 500 kW • 1 main digester à 1.950 m³ • 1 secondary digester à 900 m³ • 1 storage tank • hydraulic retention time (HRT) digester: 35 days • HRT total: 64.6 days • Sludge usage as fertilizer on nearby agricultural areas

Substrate (before US application)	• feed: 21 t/d
	  ○ 50.5 % Maize silage
	  ○ 30.5 % Grass silage
	  ○ 11.9 % Turkey hen dung
	  ○ 7.1 % whole grain

Power production (before US application)	• 9,77 MWh/d generated power • 570 m³/kg VS biogas yield

II. Objective of the ultrasound test

- Intensification of anaerobic digestion process
- Reduction of substrate input
- Increase of specific biogas yield

III. Installation of the Ultrawaves ultrasound system

- One ultrasound system (5 kW) was installed in March 2008
- Sonication of a partial flow (15 t/d) recirculated from secondary to main digester in an automated 24h-operation mode (figure 2)

IV. Results of the ultrasound treatment

- Increase of the biogas production by 14.4 % (figure 4), which corresponds to substrate savings of about 12.6 %
- Increase of the CHP's capacity utilization by 12.5% points in average, which means an increase up to 19% compared to predictions of KTBL and IGEA (figure 3)
- Amortization of investment costs after 3–4 years

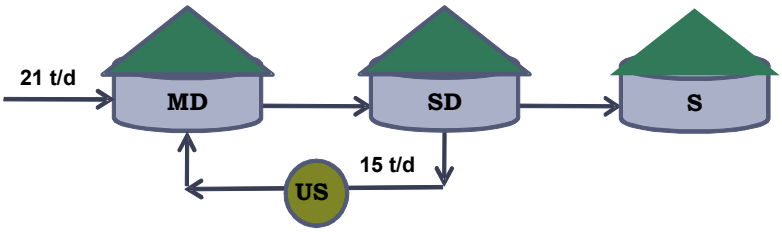


Figure 2: Flow scheme of Lindow FBP and integration of the ultrasound system (US)

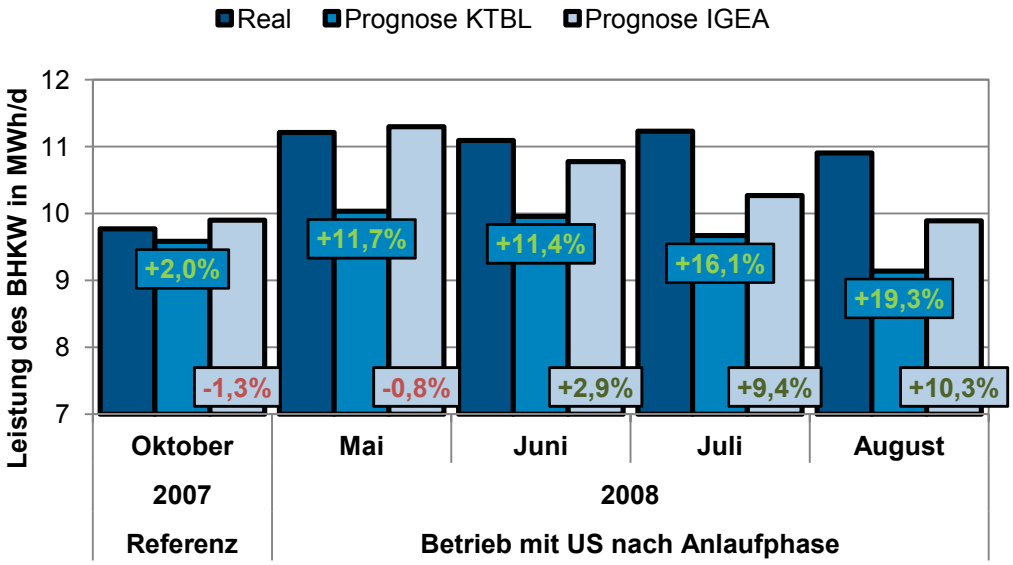


Figure 3: Power of the CHP in comparison to the predictions of KTBL und IGEA

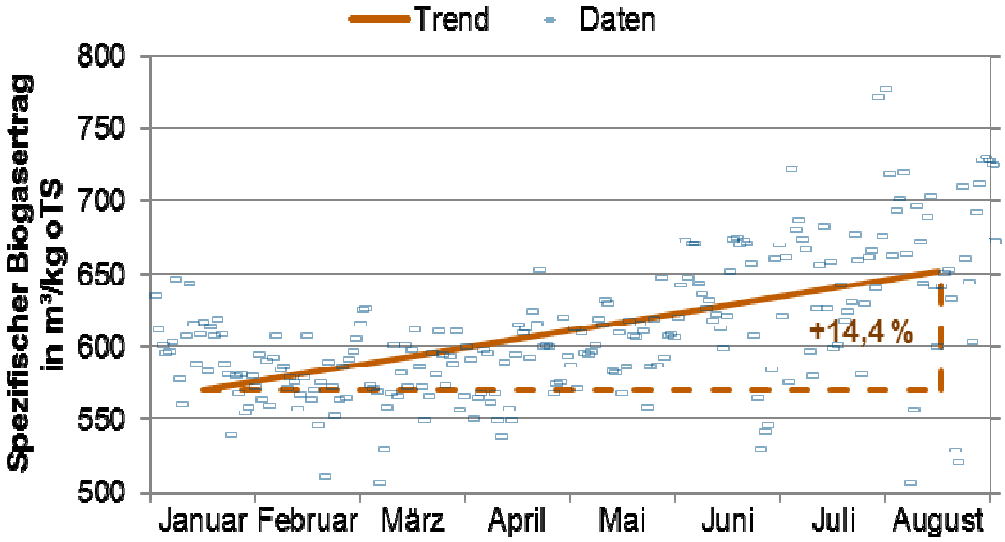


Figure 4: Specific biogas yield of the Lindow FBP

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