

Biogas plant Kusmaul

ltd. partnership with a ltd. liability company as general partner

Before Mr. Jürgen Kußmaul built his biogas plant he attended since 2001 to various seminars of biogas getting a big knowledge on the subject. Moreover, as a farmer he works as a subcontractor for the farmers in the surroundings. As a result of that he has a very good know-how of the logistics of the substrates and the digestate. That allows him to run efficiently a big biogas plant, which needs substrates from a large area.

The co-fermentation biogas plant has 2 digesters and a substrates storage tank. It operates with a central pump station from which the substrates are managed and pumped according the fermentation necessities of each digester. That provides the possibility to pump the input substrates that can be more or less liquid and have a different fermentable energy content depending on how loaded the digesters are.



A percentage of the energy produced in the biogas plant is used for its operation and the surplus (about 90%) energy is fed in the local electricity grid. A small portion of the heat generated in the plant is used to warm the farmhouse. It is planned to build a grid which will allow the commercialization of the heat to the district.

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Biogas Regions Shining Example



key data

Operator.....	KBK Kussmaul Biokraft Gmbh & Co. KG
Location.....	Gäufelden
Start of Operation	2007
Type of corporation.....	Ltd. Company & Co KG
Amount of gas produced	2,53 Mio m³ per year
Cost	2.700.000 Euros

feedstock

Liquid manure (cattlem horse and pig).....	2.840 tons per year
Dung.....	2.050 tons per year
Maize silage.....	1.580 tons per year
Marc of apples.....	670 tons per year
Grass silage.....	415 tons per year
Corn.....	140 tons per year
Waste of potato peeling.....	230 tons per year
Fat separator.....	1.350 tons per year
Crop clearing.....	1.000 tons per year
Food rests	5.900 tons per year
Old bread.....	1.500 tons per year

production data

Available area for the output of the biogas fertilizer	450 ha
Thermal power of the gas engine	790 kW
Electric power of the engine.....	716 kW
Generated thermal energy.....	6,1 Mio kWh/a
Utilisation of heat	for sanitation,
Generated electric energy	5,8 Mio kWh/a
Heat consumption.....	1,8 Mio kWh/a

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Biogas Regions Shining Example



Power consumption (electricity)**462.000 kWh/a**
 Annual delivery of electricity to the (regional) electric grid company
5,3 Mio kWh per year
 Electric grid company.....**EnBW**
 Surplus heat: heat supply for farmhouse, district heating system planned

technical plant description

Concrete Digester with concrete cover, dimensions= 22 m x 6 m
 heating with steel pipes, 80 mm insulation.....**2.281 m³**

3 adjustable propeller mixers by Flygt 15,5/13kW; suitable for 70 °C

Secondary digester (concrete) with air inflated double membrane cover, dimensions=
 22 m x 6 m, heating with steel pipes, 80 mm insulation..... **2.281 m³**

2 adjustable propeller mixers by Flygt 15,5/13kW; explosion proof

Substrate storage tank: Ring in ring system, outer ring covered
 with concrete roof, inner ring with air inflated
 double membrane cover dimensions= 22 m x 6 m,
 heating with steel pipes, 80 mm insulation..... **2.281 m³**

Each ring equipped with; 2 adjustable propeller mixers by Flygt 15,5/13kW; explosion
 proof

Feeding Sytem for Solid substrates.....Strautmann Bio-Mix Double, **34,0 m³**

Pasteurisation.:.....**2x approx. 10m³, 2 buffer tanks**
 (pasteurised/ non pasteurised
 substrate),

Tank volume.....**approx. 30 m³ each**

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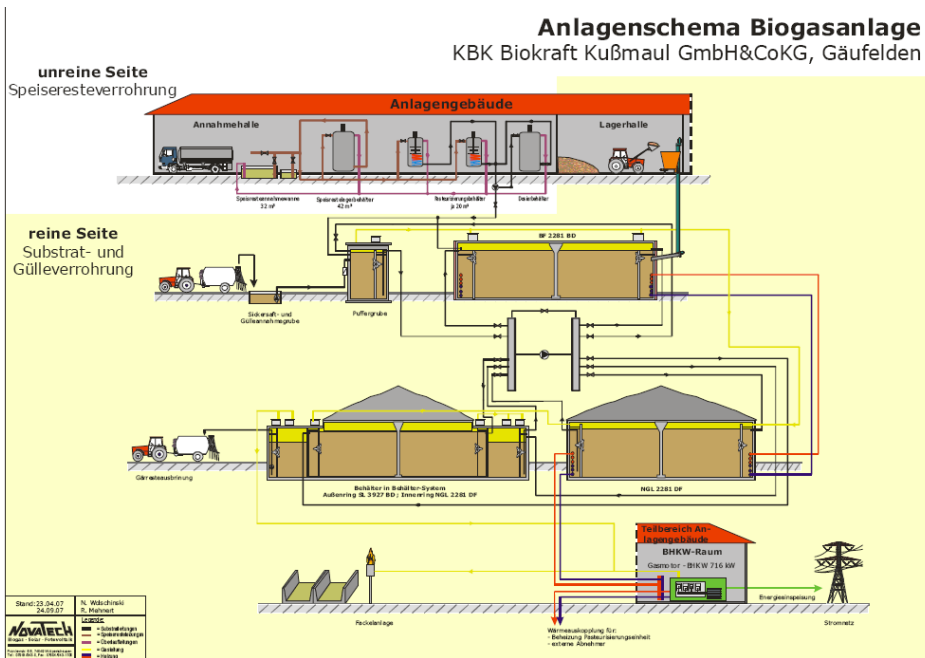
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Gas system.....Gas storage underneath air inflated double membrane covers, gas cooling system, gas analysis: analyses 4 different gases plus mass flow; emergency gas flare ... (flow stream $\leq 400 \text{ m}^3/\text{h}$) by company Haase

Operating temperature.....**51°C**

Residence time in the digester **.162 days**

Average expenditure of human labour **.3 hours per day**



Scheme of the biogas plant