



Industrial application of anaerobic digestion

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Industrial application of AD



- Degradation of organic compounds
 - waste water
 - Pasteous or solid products
- Energy production
 - Electricity
 - Heat/saturated steam
 - Biomethane
- Production of fertiliser
 - Feedstock
 - Legislation



Digestions systems



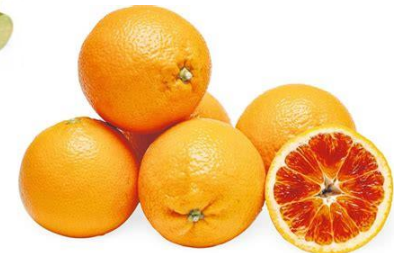
- Sludge bed systems
- CSTR
- Plug flow fermenter



Industries



- Slaughterhouse / meat processing industry
- Dairy
- Brewery
- Olive processing
- Sugar factory (sugar beet pulp)
- Distilleries (bioethanol, rum, schnapps)
- Potato processing
- Winery
- Juice factory



Potentials Europe



Country	Dominant waste streams	Total production of waste [t /year]	Methane production potential [mil. m ³ /year]
Austria	<ul style="list-style-type: none"> • Dairy Industry • Sugar Industry • Brewing Industry • Slaughterhouses 	1 095 901	76
Czech Republic	<ul style="list-style-type: none"> • Waste materials from sugar industry • Brewing Industry • Meat industry • Fruit and vegetable industry 	1 120 000	80
France	<ul style="list-style-type: none"> • Beverage industry • Meat industry • Fruit and vegetable industry • Petfood production • Beet-pulp, molasses 	11 300 000	680
Germany	<ul style="list-style-type: none"> • Meat and fish industry • Fruit and vegetable industry • Breweries and malt production • Coffee and tea processing 	13 500 000 (t DM/year)	120
Poland	<ul style="list-style-type: none"> • Fruit and vegetable processing • Dairy industry • Meat processing industry • Brewing industry 	4 023 000	185
In total		31 038 901	1 141

Dairy Berglandmilch/Austria



Feedstock

- 360 t/d
- Whey
- Waste water

Gas production

- 5,500 m³/d

Energy utilisation

- 7.900 kWh/d electricity
- 9.900 kWh/d heat

Specification

- liquid treatment



Brewery Gösser Göss/Austria



Feedstock

- Brewers spent grains 17kt/a
- Yeast
- Kieselghur

Gas production

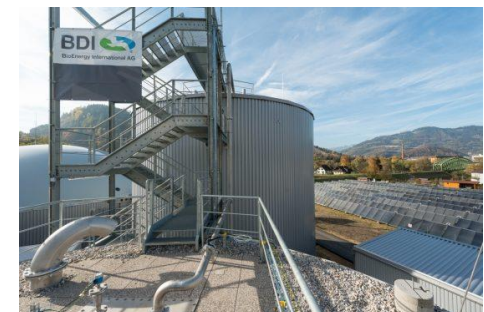
- ~2,000,000 Nm³

Energy utilisation

- Electricity production
- Gas to brewery

Specification

- Preacidification
- Digestate utilisation



Biogas potential



Substrate	Gas yield [m ³ biogas/kg FM]	Gas potential [m ³ CH ₄ /a]
Brewers spent grain	120	240.000
Malt dust	600	9.000
Residual yeast	60	13.800
Abwasser	0,35	28.000

~250.000 – 300.000 m³ biogas/a
or 1,5 – 1,8 Mio. kWh/a in a 100.000 hl brewery

Substitution of energy in a brewery



26,8 kWh/hl SB

~35%

9,9 kWh/hl SB

~70%



17,9 kWh/hl SB

Abattoir in Upper Austria/Austria



Feedstock (150-200 t/week)

- Blood
- Rumen content
- fat

Energy production

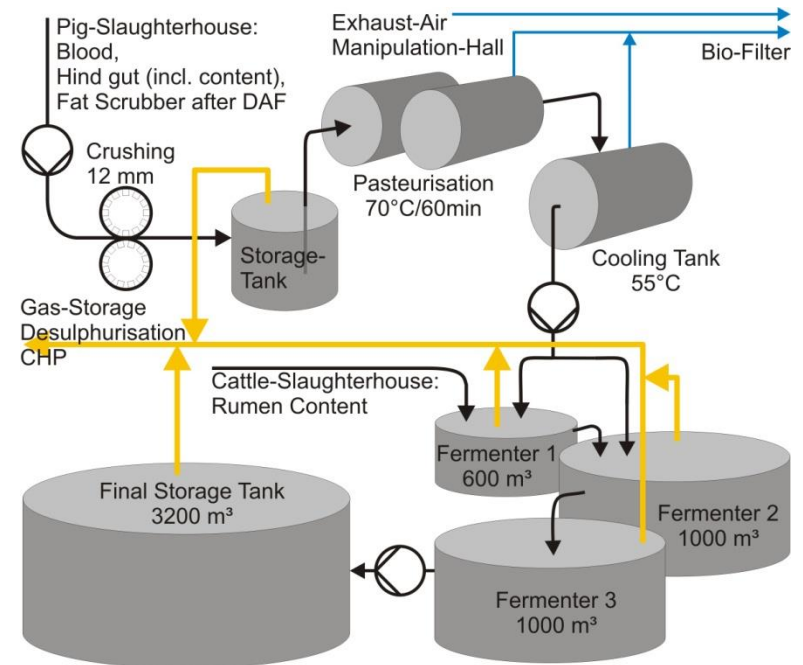
- 5 GWh electricity
- 4 GWh heat

Energy utilisation

- Electricity production
- Utilisation of thermal energy

Specification

- High nitrogen content
- Additionnally use of geothermal energy



Sugar factory Magyar Cukor Kaposvár/Hungary



Feedstock

- Sugar beet pulp
- Energy crops (seasonal)

Gas production

- 160,000 m³/d

Energy utilisation

- Biomethane
- Process energy

Specification

- Gas upgrading
- Gas injection



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Panvita Ekoteh Nemscak Murska Sobota / SLO



Feedstock

- Pig manure
- Energy crops (seasonal)
- Slaughterhouse waste
- Flotation waste

Gas production

- 17,000 m³/d

Energy utilisation

- Electricity production
- Heating stables / 50,000 pigs

Specification



Stahlbush Oregon/USA



Feedstock

- Vegetable waste
- Potatoes, pumpkins and maize waste
- Grass

Gas production

- 17,000 m³/d

Energy utilisation

- Electricity
- Heat production

Specification

- Pumpkin seeds drying
- Digester type



Jakob Bösch AG Aedelswil/CH



Feedstock

- Slaughterhouse waste
- Pig manure
- Food and market waste

Gas production

- 14,500 m³/d

Energy utilisation

- Electricity 1.0 MW
- Heat production 1.3 MW

Specification

- Heating stables
- Pretreatment



Conclusion



- Utilisation of various organic residues
- Substitution of fossil fuels
- Increasing of fuel efficiency by CHP units
- Reduction of transport costs
- Successful implementation in several industries
- Greening of industrial processes
- Specific plants and knowledge required

Questions?



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