

Description and Comparison of Technical Details of Biogas Plants

Technical Details of Tanks

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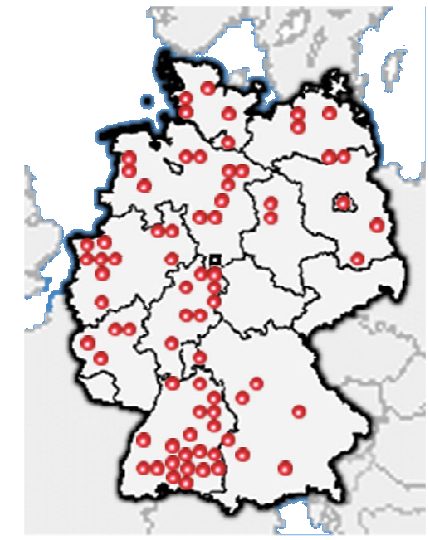
Growing the Margins, London, Ontario, April 03, 2008

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Engineering Office, Planning and Construction of Biogas Plants

Founded: 1999
Team: 18
Experience: > 20 years
References: ca. 120 biogas plants
in: Germany, Japan, Netherlands, Austria, Switzerland, Lithuania, Italy, Slovakia, Canada, USA, Spain, France
Partners: Japan, Korea, USA, Canada, Bulgaria, France, Hungary, Turkey, Poland, Spain, Ireland



Activities of Krieg & Fischer in North America



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Cudworth Pork, 2003
 manure, potatoes
 1 x 2,000 m³ steel tank
 micro gas turbine,
 4 x 30 kWe

Cedar Grove
 In Planning

Inland Empire, 2006
 manure, waste
 2 x 4,500 m³ steel tanks
 gas distribution in a biogas
 grid

Irving Equipment, 2007
 potato residues, oil, potato
 starch
 4 x 5,500 m³ steel tanks
Under Construction

SF Drayton
 In Planning

SF Port Colborne
 In Planning

SF London
 In Planning

Biogas concept with a flat digester



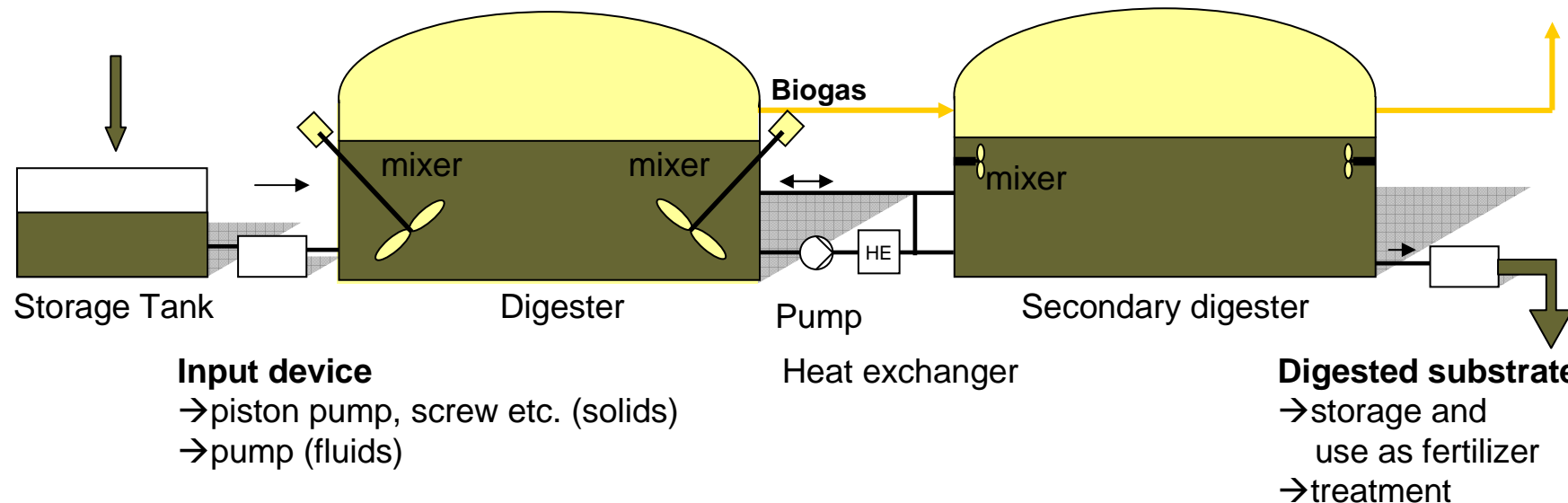
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Substrate

manure
organic waste
energy crops

Gas utilization

→CHP (power, heat)
→direct use (heating, cooking, light)
→upgrading (gas grid fuel, fuel cell)



BGA Porta, Spain

Built: 2006

Digester: 1,360 m³, concrete tank

CHP: 191 kWe dual fuel engine

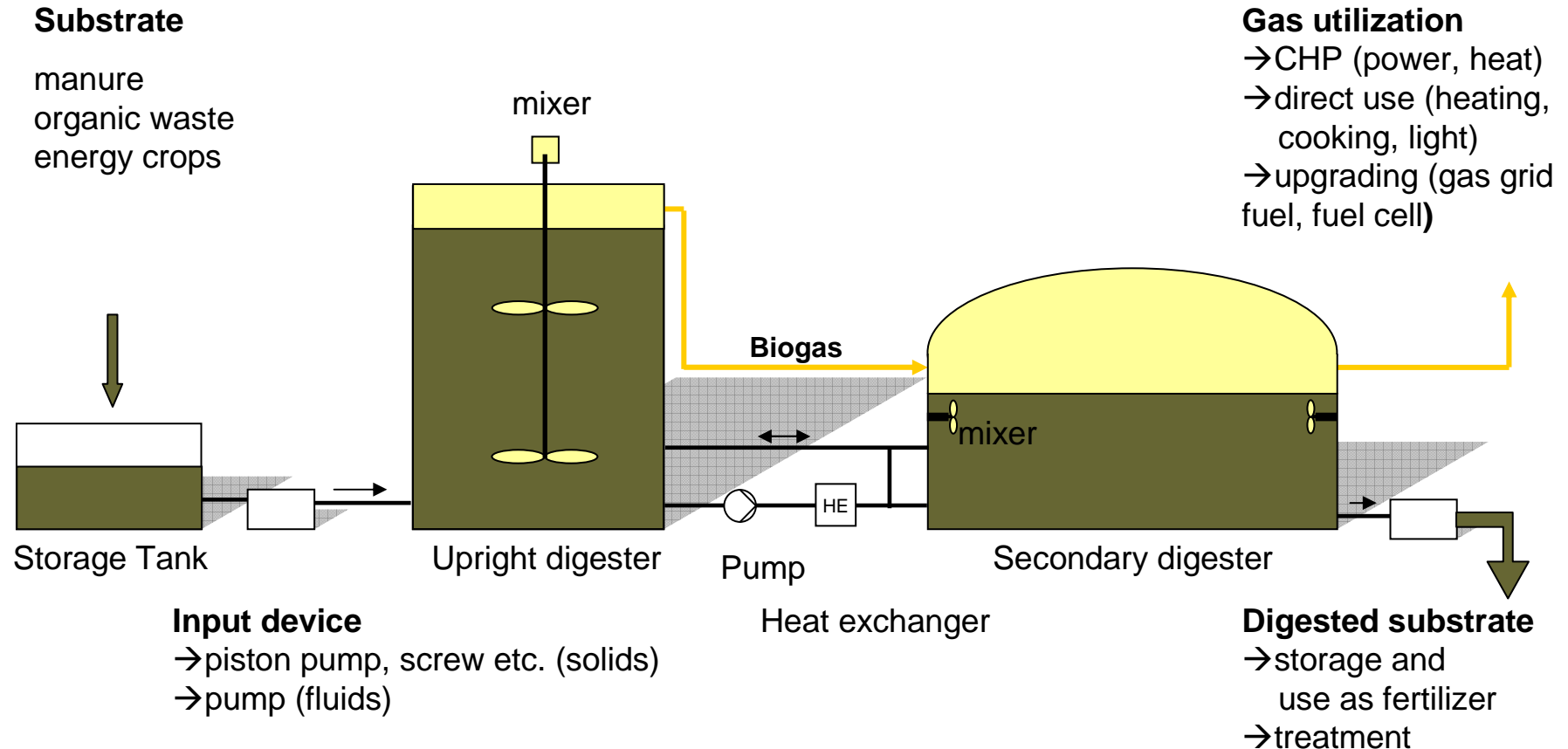
Substrate: pig manure, waste



Biogas concept with upright digester



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BGA Cudworth Pork, Saskatoon, Canada

Built: 2003

Digester: 2,000 m³, steel tank

CHP: 4 x 30 kWe Microgasturbines

Substrate: potato, manure

BGA Wietzendorf, Germany

Built: 2000-2002

Digester: 4 x 2,500 m³, steel tanks

CHP: 4 x 2.1 MWe gas engines

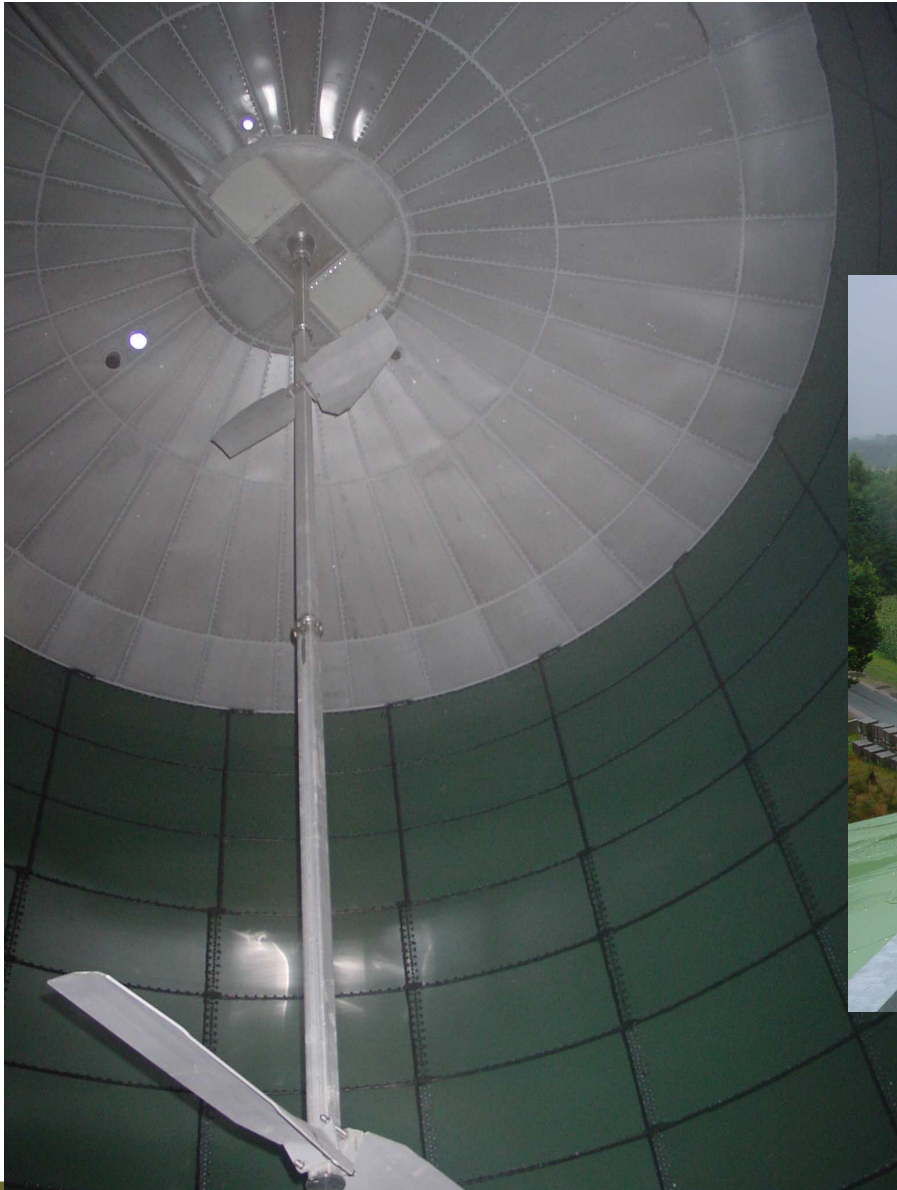
Substrate: potato waste



Top mounted mixer



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Tanks made of concrete



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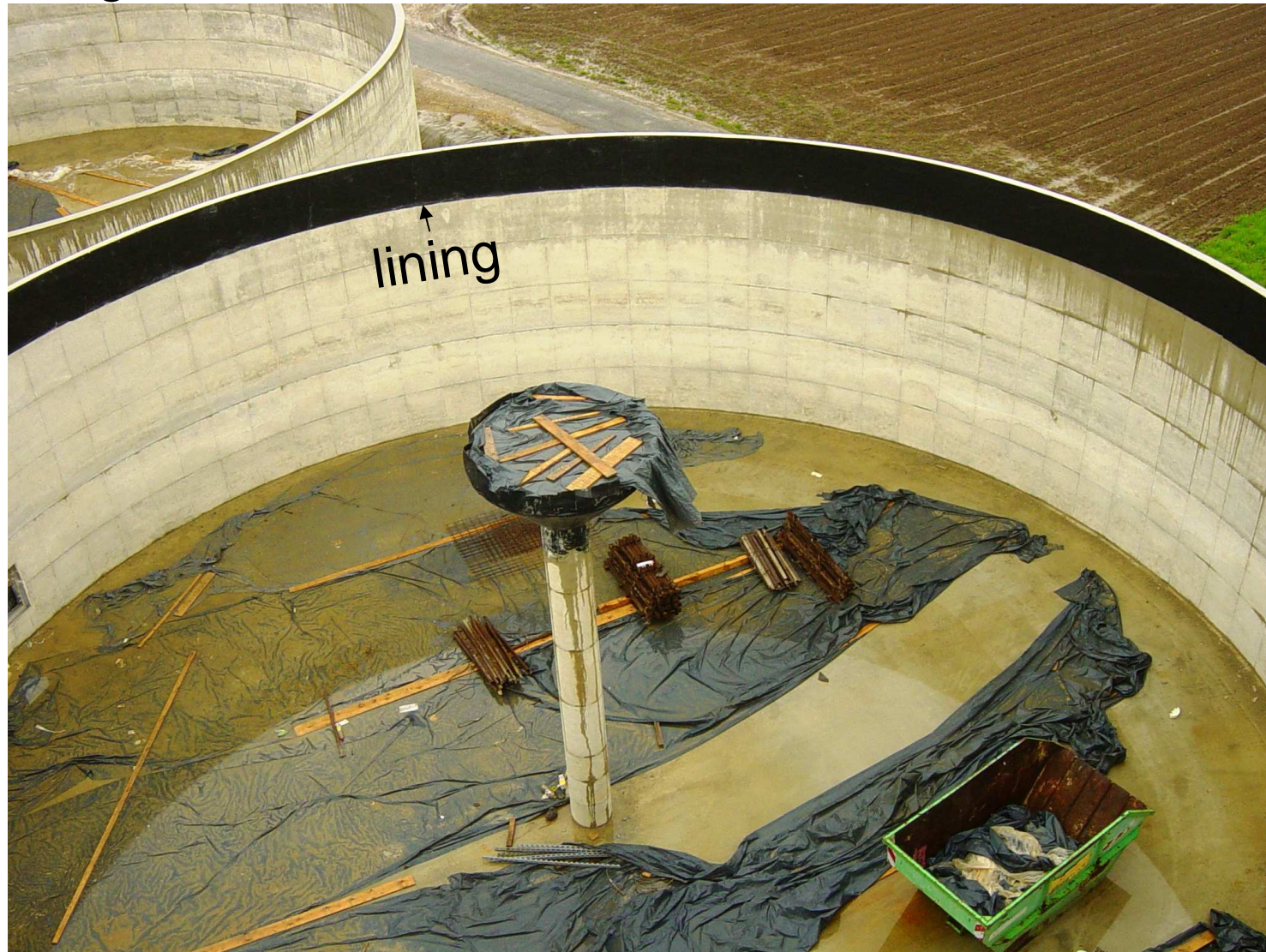
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Concrete protection by anti-corrosion lining



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concrete
digester

finished
concrete
construction

Watertest with complete filling



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After 28 to 56 days, depending on the type of concrete, the density of the tank may be tested by filling with water for 48 h



Insulation and Steel Cladding



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Growing Steel Tanks



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Mounted Winch System



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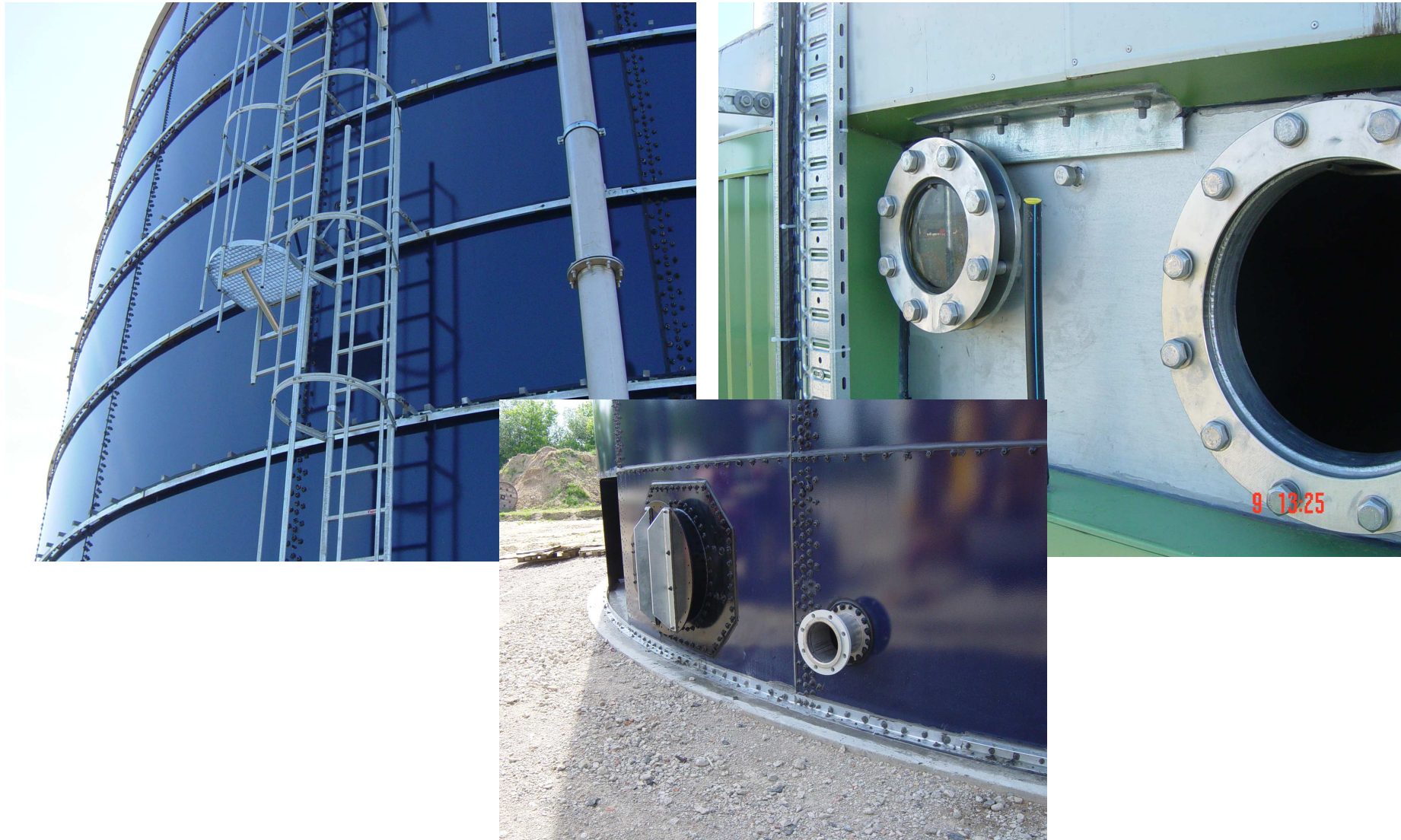
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High Upright digester
made of glass coated
steel

Equipment: ladders, inspection glass, flanges



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Comparison



Digester made of concrete

- construction on site by local companies
- concrete has to be protected at least in the gas phase
- cheaper < 2,500 m³ volume (in Germany)
- tightness has to be tested after 28-56 days
- renaturation difficult

Digester made of glass coated steel

- preproduction in the factory (only 3 - 4 companies worldwide)
- corrosion protection by enameling
- cheaper > 2,500 m³ volume
- tightness can be tested directly; leakiness very few and easy to correct
- recycable

Delivery Contents



Digester made of concrete

- Construction of reinforcement
- Concrete
- Crane
- Concrete protection in the gas phase
- Manhole and other openings (for viewing glass, pipes, measuring devices etc.)

Digester made of glass coated steel

- Prefabrication of the tank of single glass coated plates
- Construction of the tank
- Crane
- Pressure safety device
- viewing glass
- Flanges in required sizes for pipes, safety devices
- Flange top mounted mixer
- Manhole
- Fixing device for insulation and cladding
- Insulation
- Ladders and platforms

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