



**BIOGAS
ANLAGEN**

INVENTIVE BY NATURE **farmatic®**

FARMATIC company presentation

Purification of industrial waste water and biogas
production

New developments for the production of biogas

Bangkok – 8th June 2014

Dipl.-Ing. Helmut Muche

FARMATIC Anlagenbau GmbH – Kolberger Straße 13 – 24589 Nortorf – Germany
www.farmatic.com



FARMATIC Anlagenbau GmbH profile

- company history of almost 50 years
- annual turnover of about 16 Mio €
- 60 Employees
- headquarters in Nortorf (70 km North of Hamburg)
Subsidiary company FARMATIC Inc. in San Francisco (USA)
- ISO certified quality management
- over 100 biogas plant references
over 100 wastewater treatment plant references world-wide
almost 50 years of bolted steel tank construction experience

FARMATIC's business sectors

Biogas Plants



Tank and Storage Solutions



Wastewater Treatment



Biogas Plants for Energy Crops

Biogas Plants for Biowaste

Farm-sized Biogas Plants

Biogas Components

Digestate Dryers

Engineering Services

Biogas

Agriculture

Industry

Communal Clients

Cold Storage

Heat Storage

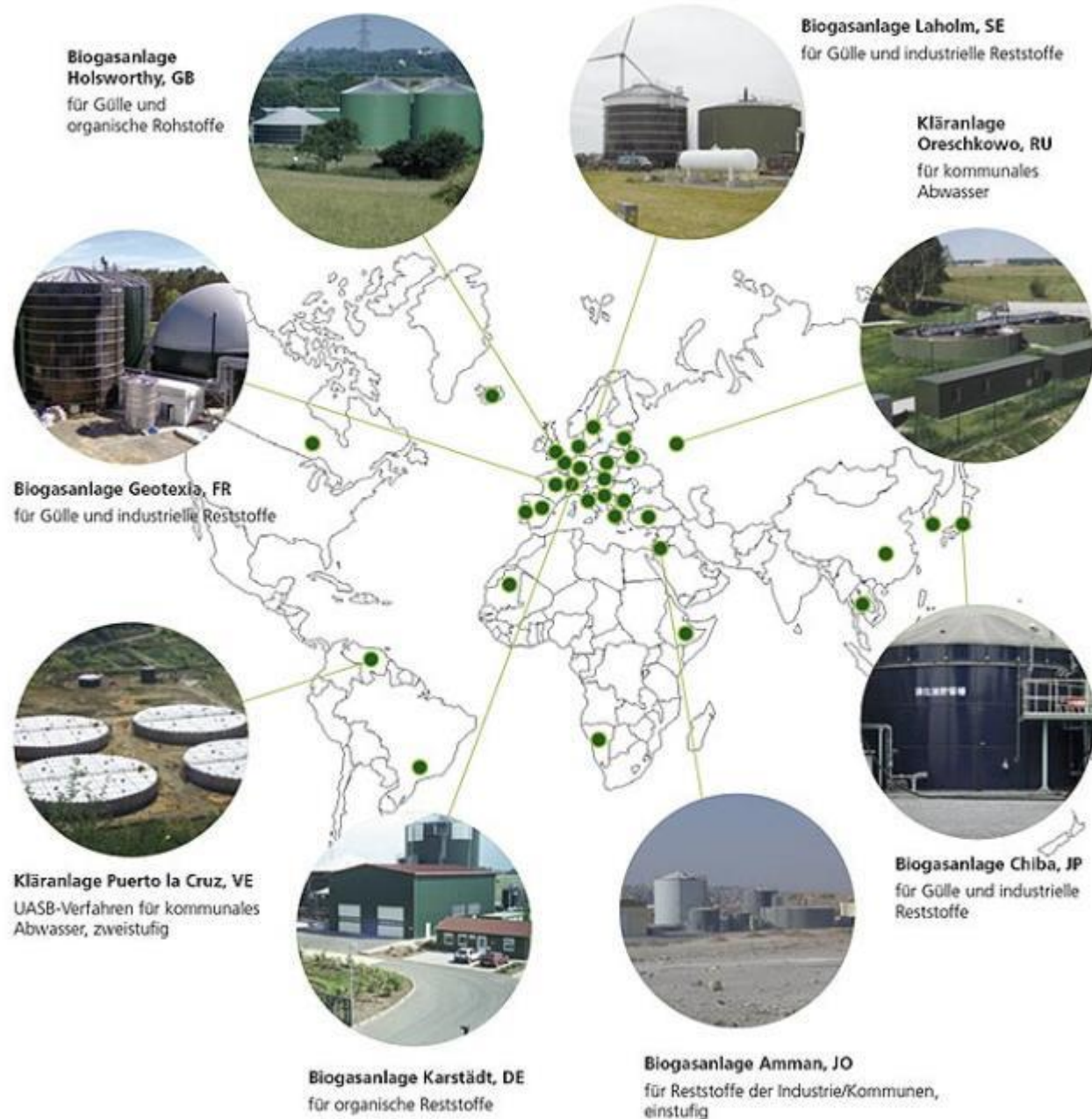
SBR-Plants

Continuous Flow Plants

Components

FARMATIC projects have been implemented world-wide

Segmented glass coated
and stainless steel
construction enables us to
build turnkey biogas plants
with guaranteed quality
and on schedule –
anywhere in the world.



Storage Solutions – FARMATIC's foundation



Tank Construction on Site



No scaffolding necessary – tanks are built on the ground and then lifted by a special jack system.

Tank Interior

Tank Exterior

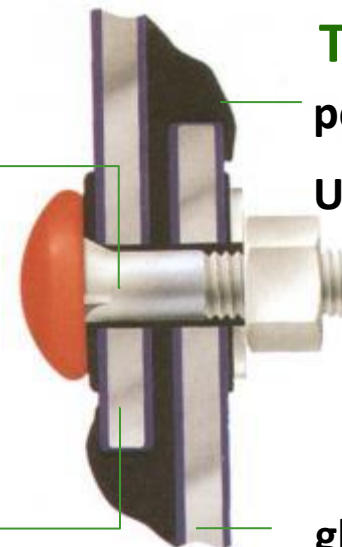
silo bolt

permanently elastic and
UV resistant sealant

PE cover

glass coated steel panel 2

glass coated steel panel 1



Our Biogas Digester Technology



We build Digesters for all Biogas Plant sizes

100 kW



500 kW



2 MW



Farmatic's signature – vertical constantly stirred digesters



Digester Material

Liquid Zone	Glass Coated Steel (GCS)
Gas Zone	Stainless Steel or GCS
Roof	Stainless Steel

Insulation and Sealant

10 – 20 cm of mineral wool
Permanently elastic sealant (Sikaflex)

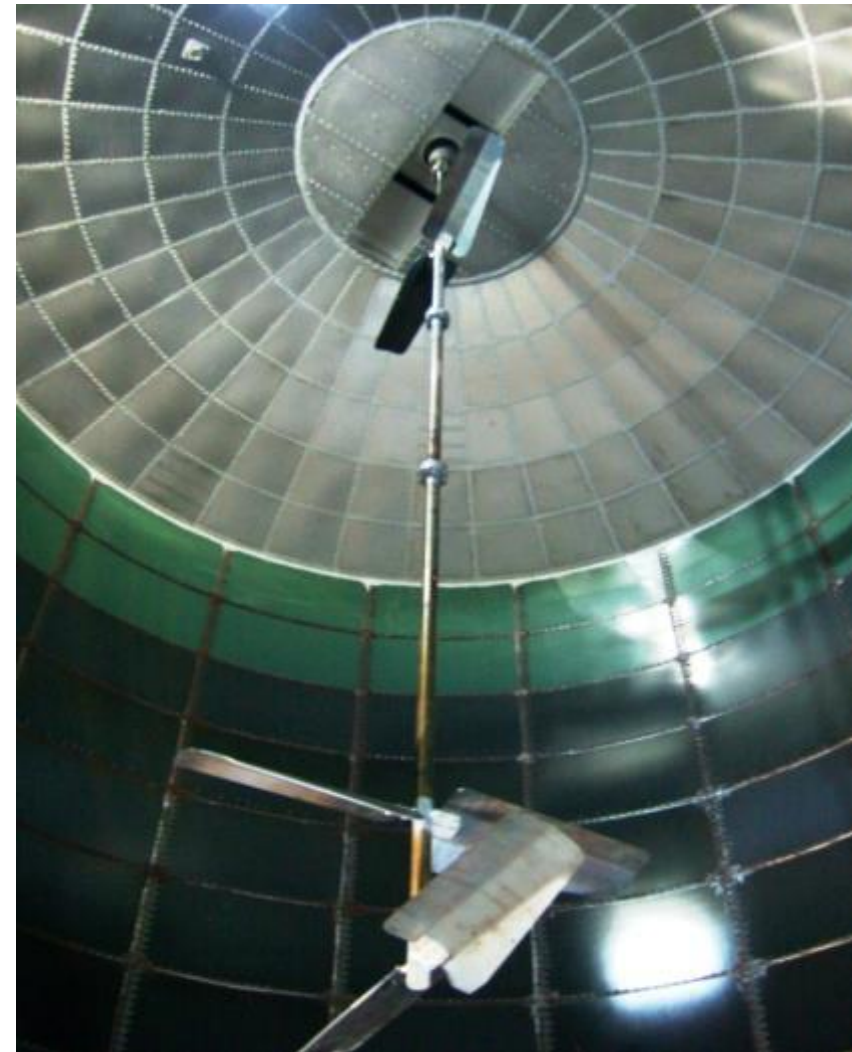
Operational Temperatures

Thermophilic	50° – 56° C
Mesophilic:	36° – 38° C

Watch the 3D animation on Youtube:

www.youtube.com/FarmaticAnlagenbau

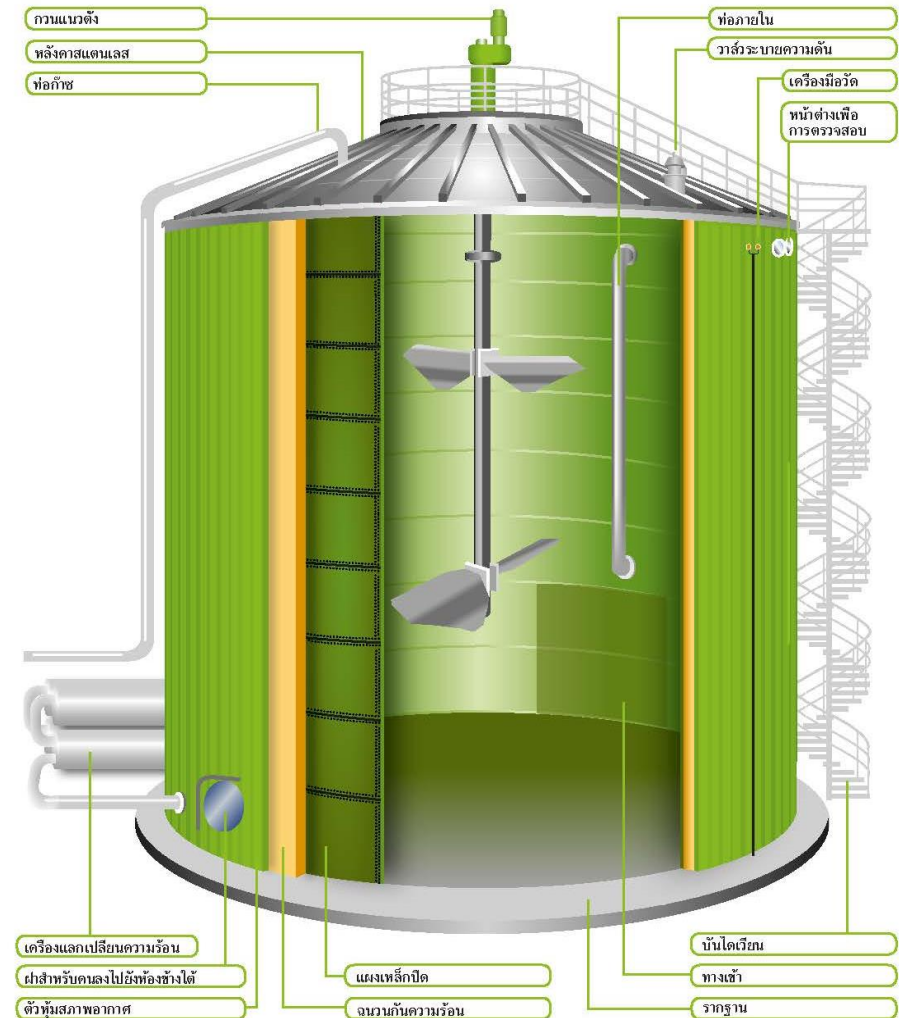
Roof-mounted agitators for the digester



No sedimentation, no floating layers - constant substrate circulation

Advantage Centrally Stirred Tall Digesters

- simple design
- high material quality
- high volumetric load possible
- high dry matter content possible
→ smaller digester volume needed
- uses highly efficient vertical mixers
- low energy consumption for mixing
- external heat exchangers, easy maintenance
- heat insulation
→ low heat loss
- danger to groundwater easily eliminated
- easy explosion protection
- easy lightning protection
- very low maintenance
- very long life span of the system
- low overall life cycle cost
- low footprint of facility



PALM OIL PRODUCTION

- Palm Oil Mill Effluent (POME) arises in the production of palm oil from the fruit of the oil palm
- The waste water is generated mainly in the sterilization of Fresh Fruit Bunch (FFB) and further treatment steps



- Therefore, the waste must be cleaned to protect the environment



PALM OIL PRODUCTION

- An effective cleaning technology is the anaerobic degradation of pollutants in a biogas plant. The anaerobic treatment of the waste water is a very effective purification technique. At least 80 % of the COD load can be removed. Further purification of the waste water is thus easier.
This produces biogas, which can be used for energy.

- Per 1,000 kg Fresh Fruit Bunch arise 550 - 800 kg POME.
The COD load is between 50 – 80 kg/m³

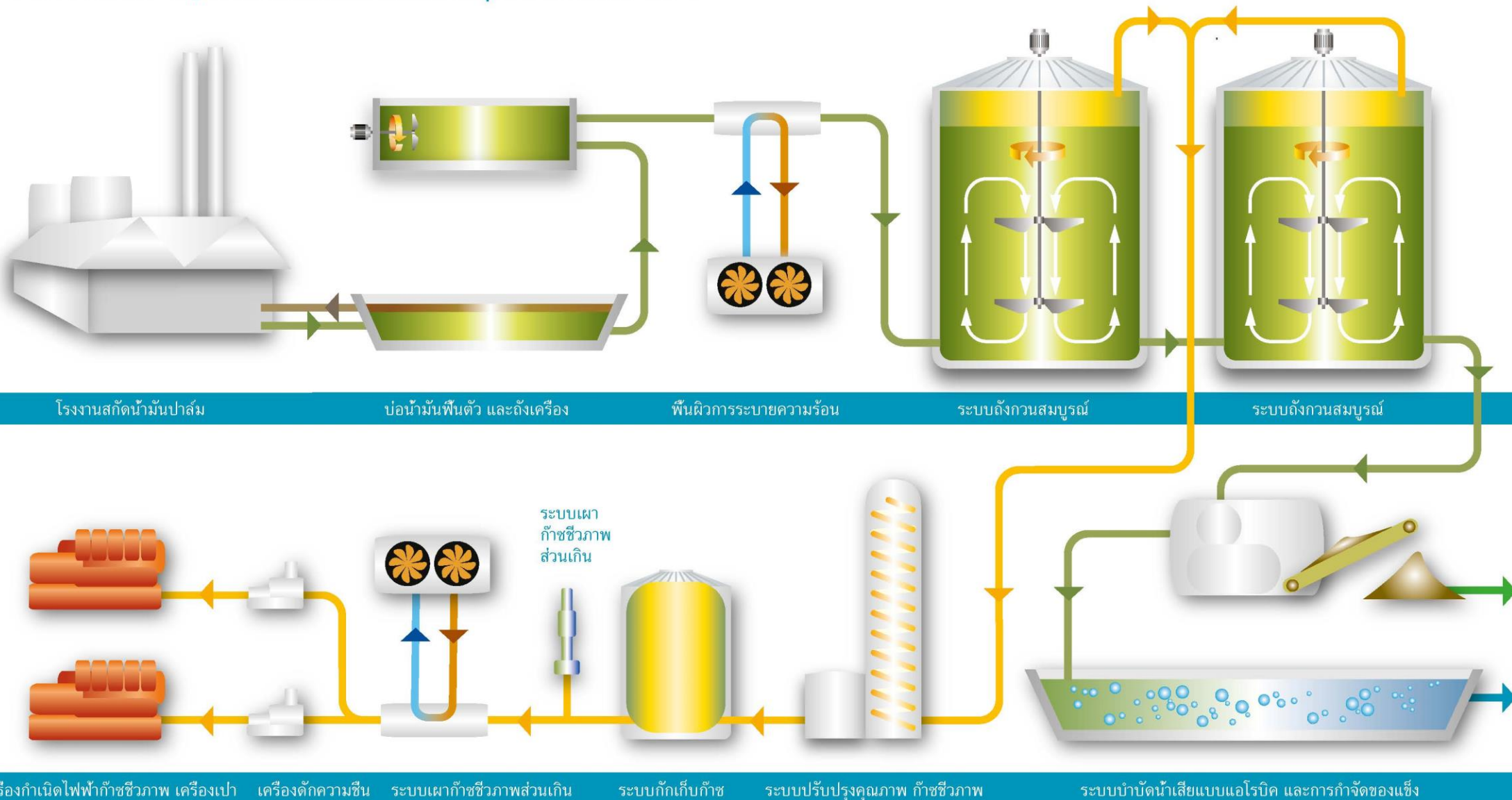
- A mill for 60 tons FFB / h produces between 600 - 900 m³/day POME with 40,000 – 50,000 kg COD/day.
From the COD arise 20,000 – 25,000 m³ of biogas per day.

Enough for a power generation of
2.5 MW electricity



Key components of a biogas plant for POME

ส่วนประกอบที่สำคัญของโรงงานผลิตก๊าซชีวภาพในอุตสาหกรรมน้ำมันปาล์ม



Biogas yield of Napier grass

Napier grass			
Dry matter	DM	%	20.2
Organic dry matter	ODM	%	18.2
Methane content	CH ₄	%	58
Gas yield, specific	l/kg ODM		570
Gas yield	m ³ /1000 kg FM		104



- The Napier grass has a low content of dry matter
- A storage as silage is therefore not possible
- The Napier grass must therefore fresh, be directly used by the field
- The drying (hay) is also possible to store the Napier grass
- The Napier grass has to be crushed at harvest on a small cutting length
- The Napier grass may then be processed well in the biogas plant

For comparison

Plant type	DM content in %	Max. cut length in mm
Maize	32 – 36	6 – 8
Whole crop silage	30 – 35	6 – 8
Grass	30 – 35	8 - 12
Straw	70 – 90	20 - 35



Key components of a biogas plant for POME



Biogas Plant Gnutz



Client:

Biomassekraftwerk Gnutz GmbH & Co.KG
Heinkenborsteler Weg 25

D-24622 Gnutz

Year of commissioning:	2011
Installed power:	800 kW
Volume digester:	3,200 m ³
Volume post-digester:	3,000 m ³
Volume digestate storage:	5,600 m ³
Substrates:	
Cattle manure	7,300 m ³ /a
Maize silage	10,300 t/a

Special features

- Digestate drying with a FARMATIC drying unit Contitroc 800
- Located 3 km from FARMATIC headquarters

Biogas Plant Skövde, Sweden



Client:

Göteborg Energi AB

Box 53

SWE-401 20 Göteborg

Year of commissioning	2011
Gas Yield	800 Nm ³ /h
Digester volume	5,500 m ³
Post digester volume	2,400 m ³

Substrates

Whey	73,000 t/a
Slaughterhouse waste	8,000 t/a
Spoiled milk	3,000 t/a
Overdue food	10,000 t/a
Waste water	7,000 t/a

Special Features

- Gas upgrading unit
- Thermophilic process (55 °C) as hygienisation method
- sophisticated heat management through heat storage and recovery
- Very few pumps, plant operates 80 % through hydrostatic pressure

Biogas Plant Irvine, United Kingdom



Client:
Large pharmaceutical company

UK-Irvine, Ayrshire, Scotland

Year of commissioning:	2013
Gas yield:	400 Nm ³ /h
Digester volume:	3 x 3,000 m ³
Post-digester volume:	1 x 1,000 m ³
Substrates:	
Organic sludge	200 m ³ /d

Special features

- Anaerobic digestion of organic sludge and industrial wastewater from the pharmaceutical industry
- AD system is integrated into a complex wastewater treatment concept
- Project was implemented while production was ongoing

Research Biogas Plant Leipzig (DBFZ)



Client:
Deutsches Biomasseforschungszentrum DBFZ
 Torgauer Str. 116
 D-04347 Leipzig

Year of commissioning:	2012
Installed power:	75 kW
Volume tall digester:	2 x 188 m ³
Volume flat digester :	1 x 216 m ³
Volume plug flow digester:	1 x 75 m ³
Volume Hydrolysis unit:	1 x 95 m ³
Volume slurry storage:	1 x 183 m ³
Volume digestate storage:	1 x 187 m ³
Substrates:	various

Special features

- Research plant for various digestion cycles for Germany's leading biogas research centre
- Mix of various digester designs for comparative testing of different feedstock

Biogas Plant Sønderjysk



Client:
E.ON Danmark
under construction

Substrates:

Organic sludge, manure : 485,000 to/year
Energy crops : 55,000 to/year

Gas yield : 21 Mio. m³/year biomethane

Thank you!



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Our partner in Thailand

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