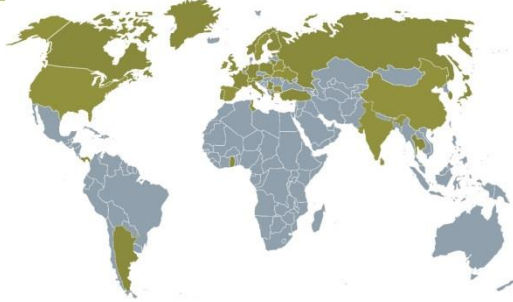


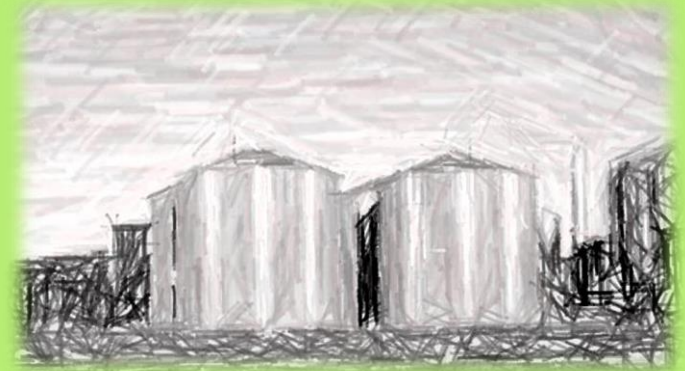


Krieg & Fischer Ingenieure GmbH



KRIEG & FISCHER INGENIEURE GMBH

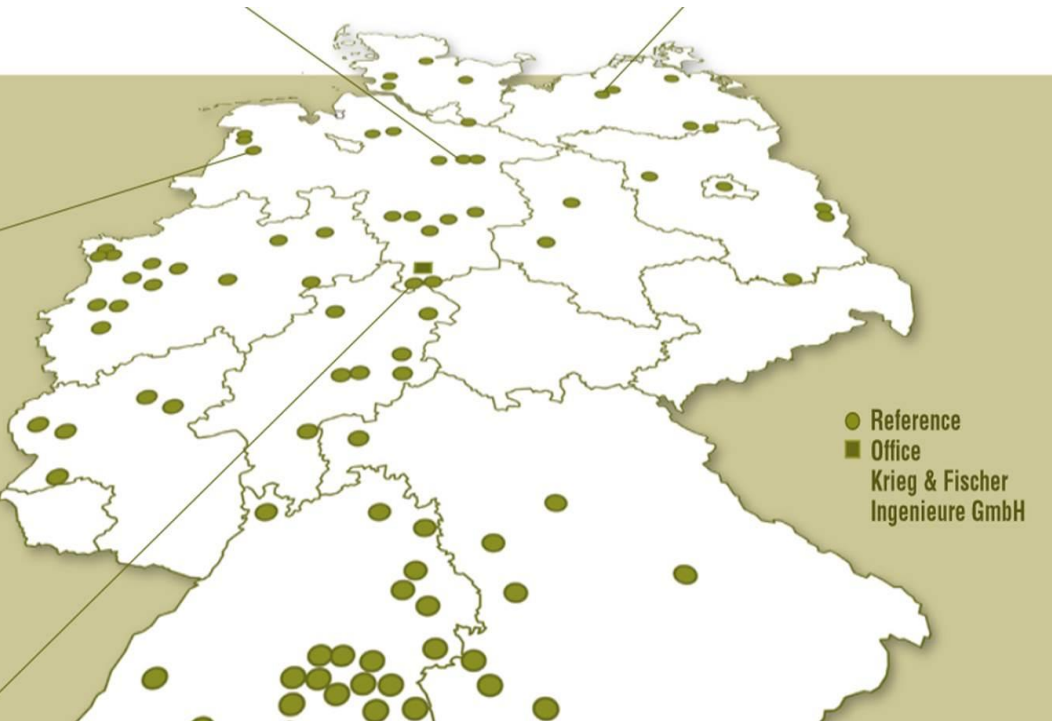
BIOGAS PLANTS



- *Planning & Construction*
- *Worldwide*
- *25 years of experience*
- *160 references*
- *Made in Germany*

Date: July 2017

COMPANY LOCATION



Krieg & Fischer Ingenieure GmbH
Bertha-von-Suttner-Str.9
D-37085 Göttingen
Germany

phone: +49 551 900363 - 0,
fax: +49 551 900363 - 29,
@: Contact@KriegFischer.de,
home: www.KriegFischer.de



Planning und Construction BIOGAS PLANTS

OUR OFFICE

Our range of services comprises provision of all types of service in the field of digestion of anaerobic process technologies and biogas technologies.



1999

...founded

2003

Adward of Innovation

2009

Sworn Expert of Biogas

2016

160 Biogas Plants References worldwide

**Planning und Construction
BIOGAS PLANTS**

GENERAL MANAGER:



Torsten Fischer

has been active in the field of biogas since 1993.

In this period he worked for two plant construction companies.

The main aspects of his work were biogas plants for industrial bio-waste digestion and large-scale co-fermentation biogas plants.

Since 2009 Torsten Fischer is sworn expert of biogas plants

SECOND MANAGING DIRECTOR:



Alongside founder and shareholder Torsten Fischer, Raphael Thies will, as of now, take up the position of an additional Managing Director

OUR TEAM



**Krieg & Fischer
Ingenieure GmbH**

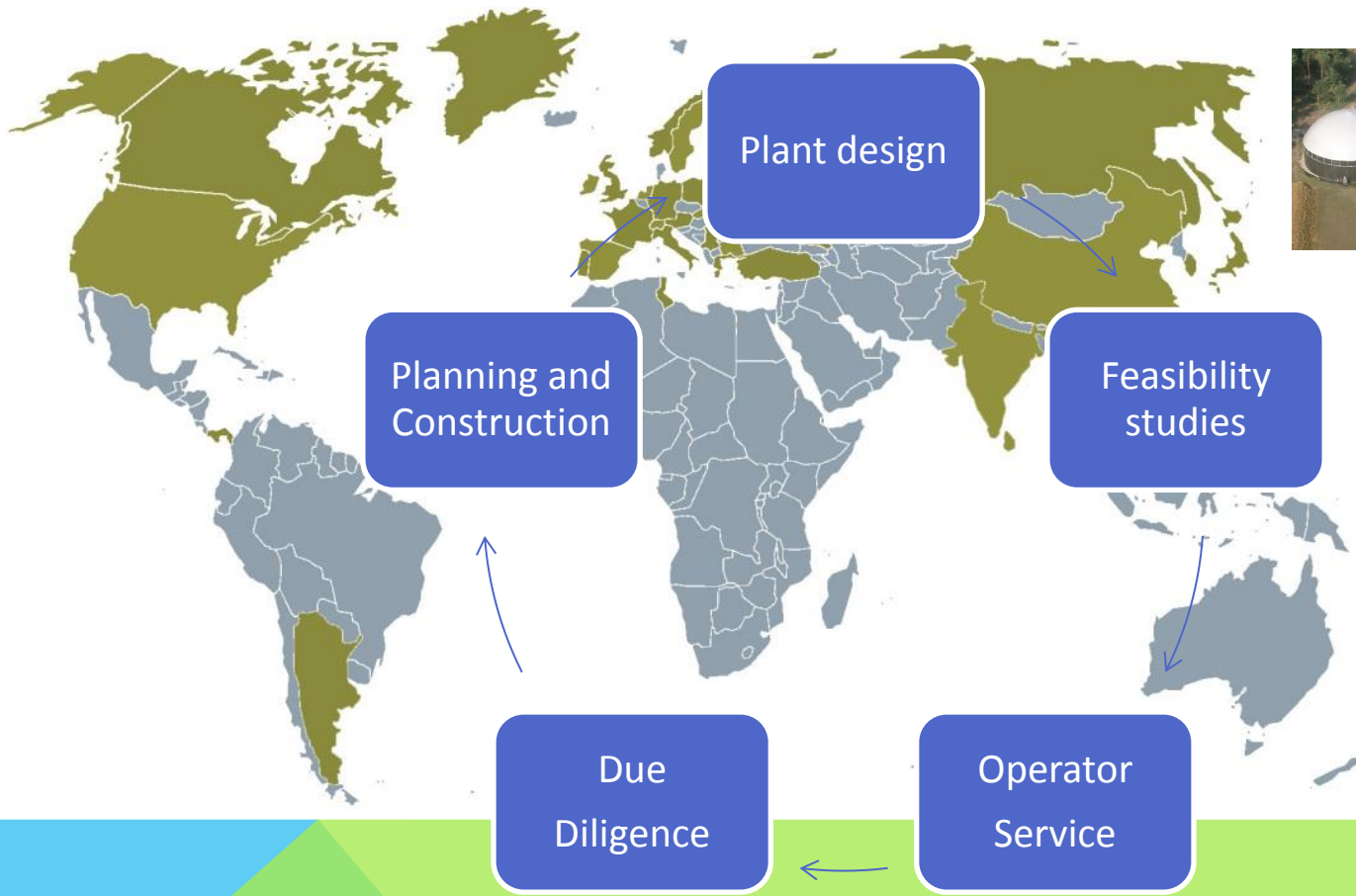
OUR PARTNER



- Japan:** Eco HearT Inc.
- Canada:** Electrigaz Technologie Inc.
- France:** Fertigaz
- Bulgaria:** Agroecon o.o.d.
- Poland:** Biogazowuie Polski
- Italy:** Inte.C.O. engineering
- Greece:** Agroenergy S.A.
- Spain:** Ecobiogas
- Serbia:** Imes Biogas

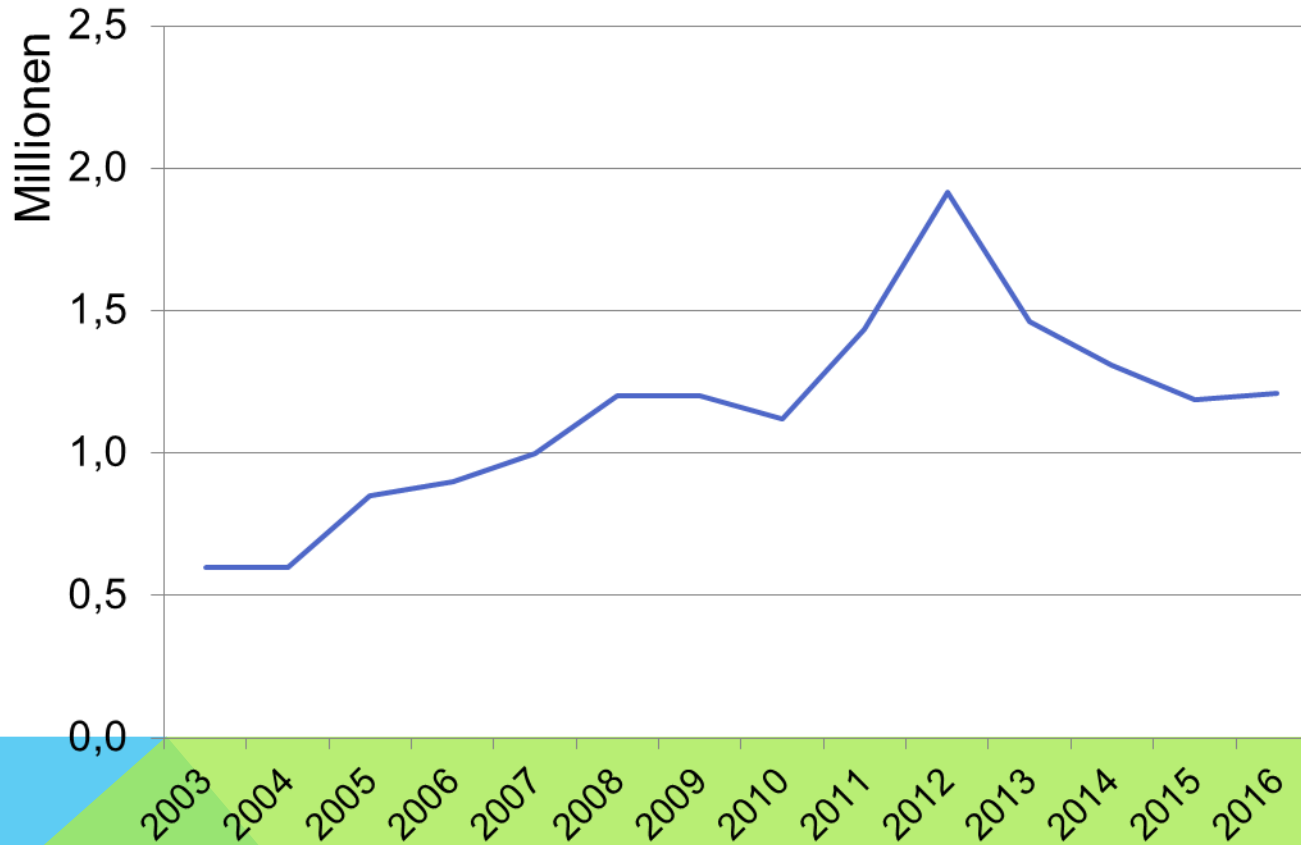
**Planning und Construction
BIOGAS PLANTS**

ACTIVITIES WORLD WIDE



**Planning und Construction
BIOGAS PLANTS**

TURNOVER 2003-2016

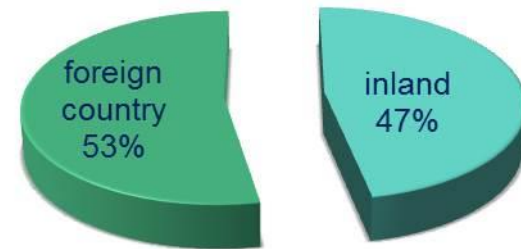


DISTRIBUTION OF TURNOVER

Turnover 2016



Turnover 2015

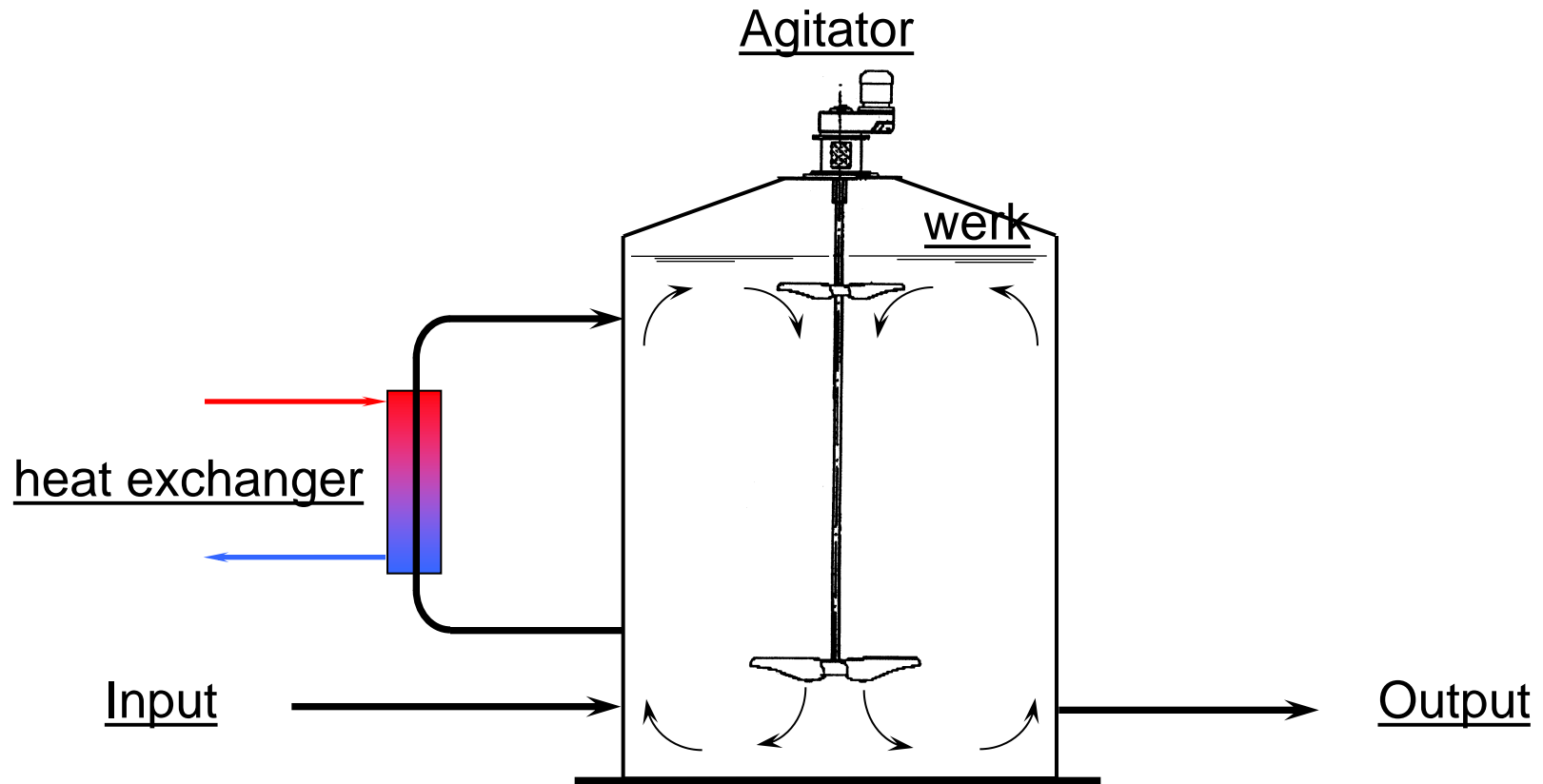


OUR SERVICE OFFERING



Studies * Concept development * Process technology * Cost determination/
Calculation Permission * Planning * Construction management * Start-up *
Optimisation * Due diligence * Expert Opinion * Operator Service new 2014

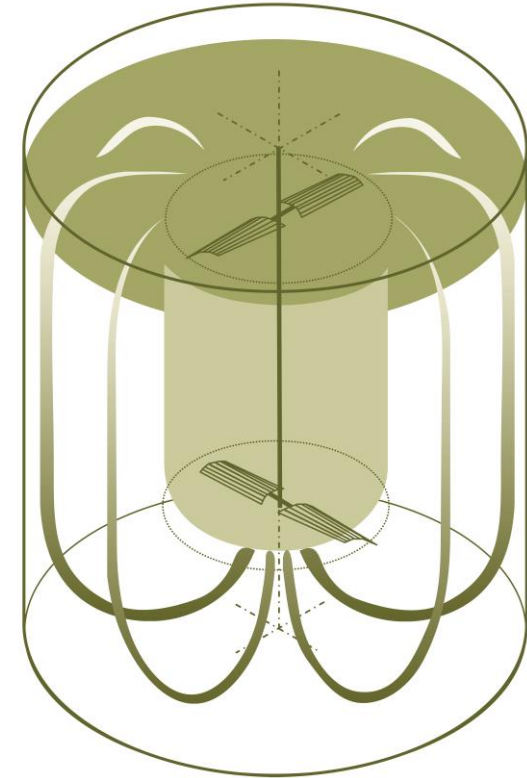
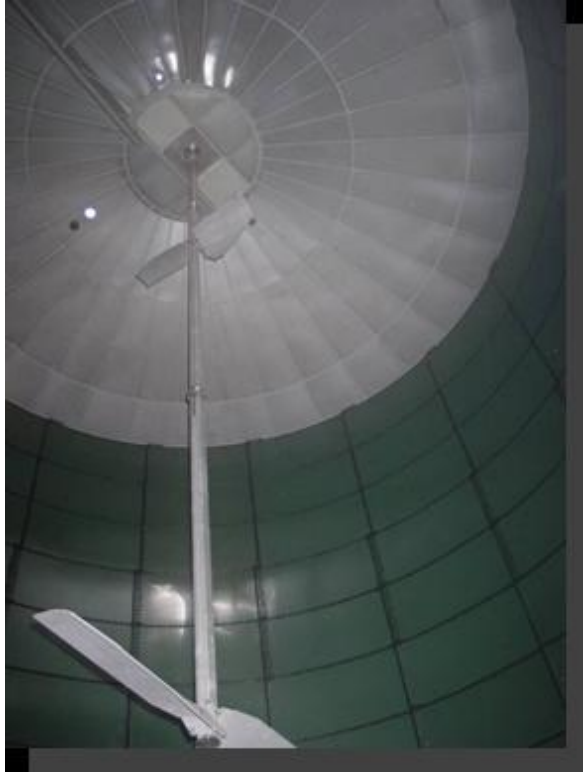
TECHNICAL DETAILS



High upright digester / CSTR

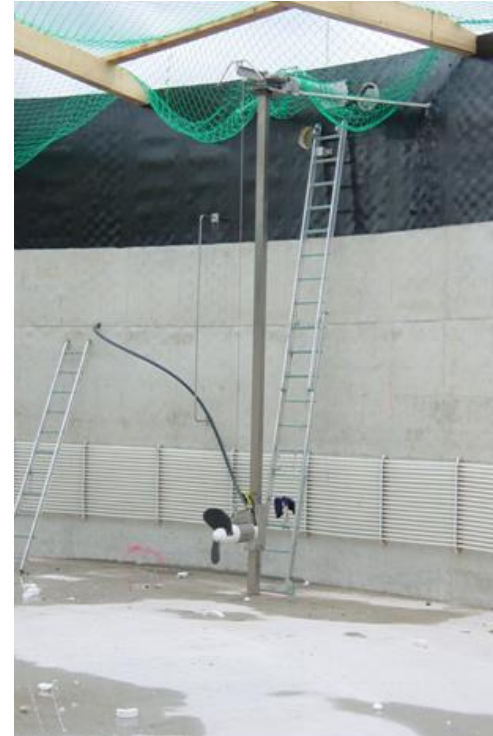
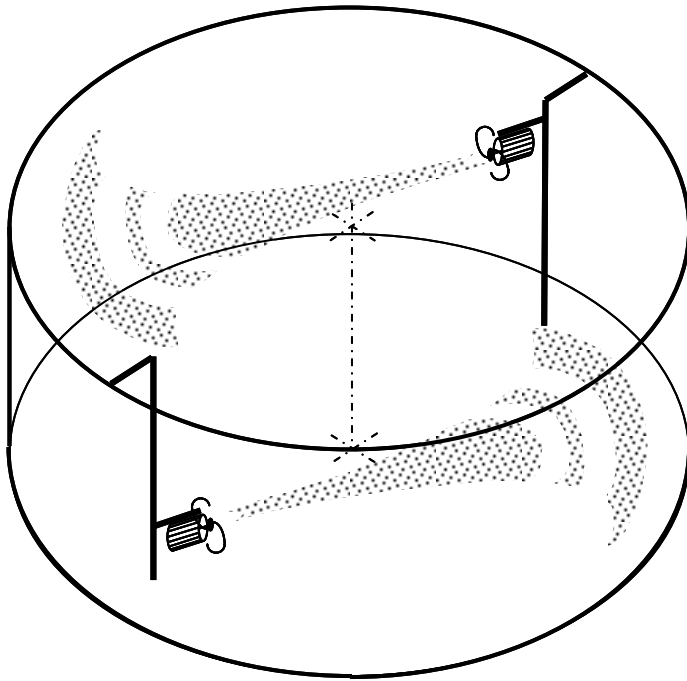
Established for large-scale plants with volumes up to 5,000 m³. Mixing is done by a top mounted mixer that is continuously operating. Material: Reinforced concrete or glass coated steel depending on the size. The digester is followed by a secondary digester with a gas holder roof • Homogeneous mixing • Constant gas production • Low heat loss

TECHNICAL DETAILS



Agitator in the digester tank and its effect

TECHNICAL DETAILS



Flat digester•

Best suited for small to medium sized biogas plants with substrates with low dry matter content that is easy to mix • Height up to 6 m • Volumes up to 2,000 m³ • Integrated gas storage in gas holder roof • Cost saving digester tank design • Simple mixing and heating conditions

TECHNICAL DETAILS



Wood construction in the secondary digester tank

Gas holder on top of secondary digester tank

TECHNICAL DETAILS



Pumping room

Pumps, valves and pipes specific to the plant substrate



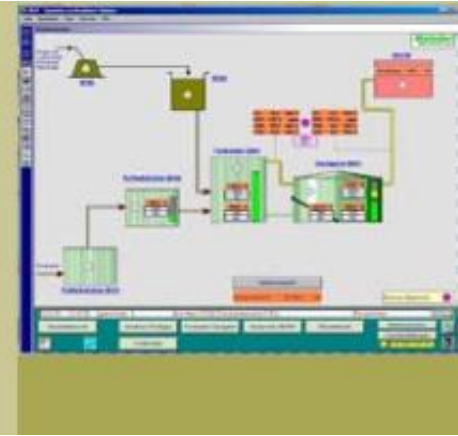
External heat exchanger

to heat the substrate



Overpressure- vacuum relief valve

for safety reasons



Process control system

system control,
monitoring and
worldwide access to
the biogas plant

TECHNICAL DETAILS



Input device for solid substrates

TECHNICAL DETAILS



Solid input device with liquid input device and storage capacity

TECHNICAL DETAILS



Biogas upgrading and injection of bio-methane
into the natural gas grid

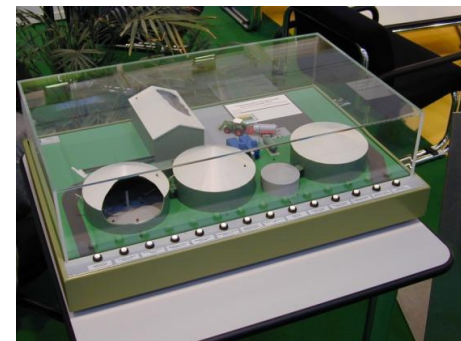
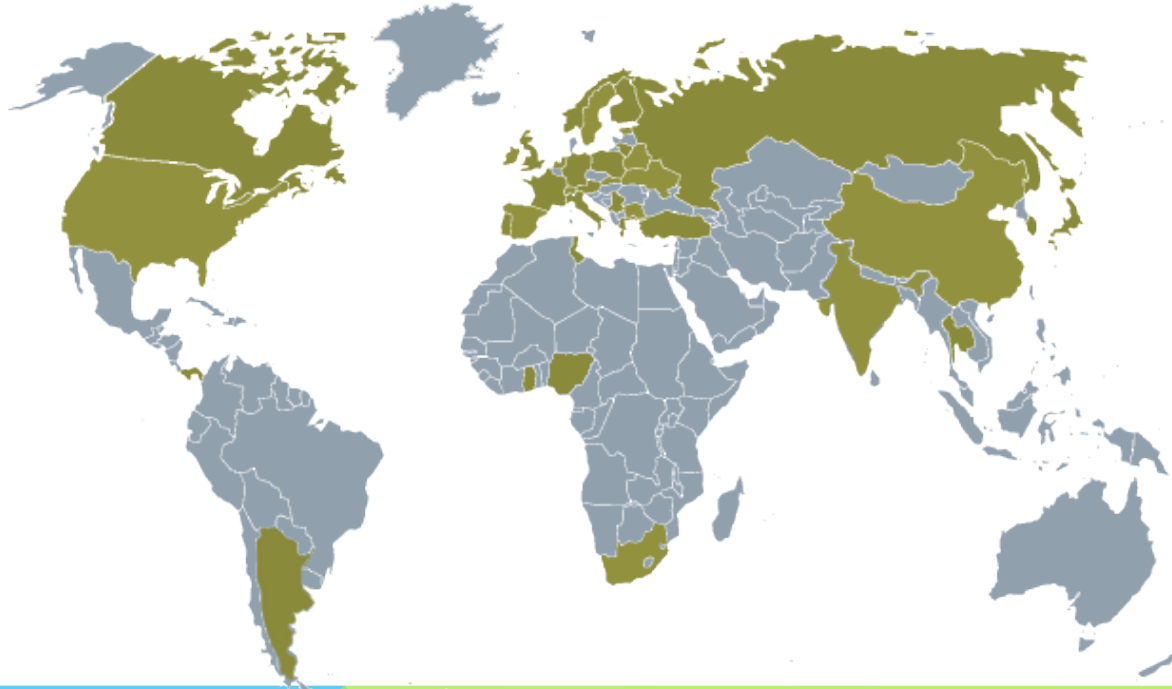


Krieg & Fischer Ingenieure GmbH

REFERENCE OF BIOGAS PLANT

153 BIOGAS PLANTS IN GERMANY

40 BIOGAS PLANTS WORLDWIDE



Austria, Argentina, Canada,
China, Finland, France,
Germany, Italy, Japan,
Lithuania, the Netherlands,
Poland, Slowacai, Spain,
Swiss , Russia, USA

CHINA

BIOGAS PLANT QINHUANGDAO

Location: China
Construction Period: 2014
Input: Kitchen waste
Fermenter: Steel tank, 2 x 3,400 m³
Co-generator: Biogas upgrading
Further biogas plant in China:

- Deqingyan II (2012),
- Jiaozuo (2016/17),
- Wuhu (2016/17)



Krieg & Fischer Ingenieure GmbH :

Conception, preplanning, permission detailed and final construction plans, supervision of construction, start-up

JAPAN

BIOGAS PLANT DAISEN

- Location: Japan
- Construction Period: 2013/14
- Input: Pig manure, fats, sewage sludge, industrial kitchen waste
- Fermenter: Glass coated steel tank, 5,000 m³
- Co-generator: Gas engine 3 x 370 kW_{el}
- Further biogas plants in Japan:
- Fukuoka (2016/2017)
 - Bekai (2000/2001)
 - Tottori (1999/2000)



Krieg & Fischer Ingenieure GmbH :

Conception, preplanning, permission detailed and final construction plans, supervision of construction, start-up

GERMANY BIOGAS PLANT ANKLAM

Location: Germany
Construction Period: 2012
Input: Sugar beets, vinasse
Fermenter: Steel tank, 4x4,480 m³
Co-generator: Gas upgrading,
gas injection

Further more then

- 150 biogas plant in Germany



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and final construction plans, supervision of
construction, start-up

NETHERLANDS BIOGAS PLANT DINTELOORD

Location: The Netherlands
Construction Period: 2011
Input: Sugar beets, vegetable waste (potatoes, chicoree)
Fermenter: Steel tank, 4 x 4,480 m³
Co-generator: biogas upgrading, gas injection
Further biogas plant in the Netherlands:

- Volverlaten (2012)
- Dinteloord (2011)
- Nij Bosma Zahte (2000)



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Conception, detailed and final construction plans, supervision of construction, start-up

GERMANY BIOGAS PLANT SEMD

Location: Germany
Construction Period: 2009/10
Input: Corn silage
Fermenter: Prestressed concrete, prefabricated element tank, 2,473 m³
Co-generator: Biogas upgrading and injection into the gas grid



Krieg & Fischer Ingenieure GmbH

functional tender, award and supervision of construction, project management, final acceptance

FRANCE

BIOGAS PLANT NOYON

Location:	France
Construction Period:	2007
Input:	Sewage sludge, fats, food residuals, co-substrates, process water
Fermenter:	Steel tank, 3,000 m ³
Co-generator:	Gas engine, 716 kW _{el}
Further biogas plants in France:	
	<ul style="list-style-type: none">• Bretagne (2007)



Krieg & Fischer Ingenieure GmbH

Conception, Preplanning, Permitting, Detailed and Final Engineering, Construction Supervision, Start-up

CANADA

BIOGAS PLANT PRINZ EDWARD ISLAND

- Location: Canada
- Construction Period: 2007
- Input: Potato raw materials, oil, potato sludge
- Fermenter: Steel tank, 22,000 m³
- Co-generator: Thermal use of biogas
- Further biogas plants in Canada:
- Cudworth Pork 2004



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and Final Engineering, Construction
Supervision, Start-up

USA BIOGAS PLANT INLAND EMPIRE

Location:	USA
Construction Period:	2006
Input:	Manure, waste
Fermenter:	Two steel tanks, 4,500 m ³
Co-generator:	Feeding into the gas distribution systems



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Conception, Preplanning, Permission,
Detailed and Final Engineering, Construction
Supervision, Start-up

GERMANY BIOGAS PLANT IM BRAHM

Location:	Germany
Construction Period:	2005
Input:	Pig manure, kitchen waste, fats, grain
Fermenter:	Concrete Tank, 1,205 m ³
Co-generator:	Gas engine, 4 x 190 kW
Costs:	About. € 1,000,000



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Conception, Preplanning, Permitting, Detailed and Final Engineering, Construction Supervision, Start-up and several enlargements

CANADA BIOGAS PLANT CUDWORTH PORK

Location:	Canada
Construction Period:	2003
Input:	Pig Manure
Fermenter:	Steel Tank, 2,000 m ³
Co-generator:	Micro gas turbines, 4 x 30 kW
Spezial Features:	Gasholder above secondary digester tank



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Conception, Preplanning, Permission,
Detailed and Final Engineering, Construction
Supervision, Start-up

GERMANY BIOGAS PLANT BÖCKERMANN

Location:	Germany
Construction Period:	2002
Input:	Manure, other organic waste
Fermenter:	Glass coated steel tank, 2,500 m ³
Co-generator:	Dual fuel co-generator 2 x 170 kW _{el}



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Conception, Preplanning, Permitting, Detailed and Final Engineering, Construction Supervision, Start-up

GERMANY

BIOGAS PLANT WIETZENDORF

Location:	Germany
Construction Period:	2001/2002
Input:	Potato pulp
Fermenter:	Steel Tank, 4 x 2,500 m ³
Co-generator:	Gas engine, 2 x 2,1 MW _{el}
Costs:	about € 25,000,000



Krieg & Fischer Ingenieure GmbH

Conception, Preplanning, Permitting, Detailed and Final Engineering, Construction Supervision, Start-up

INTERNATIONAL TRADE FAIR

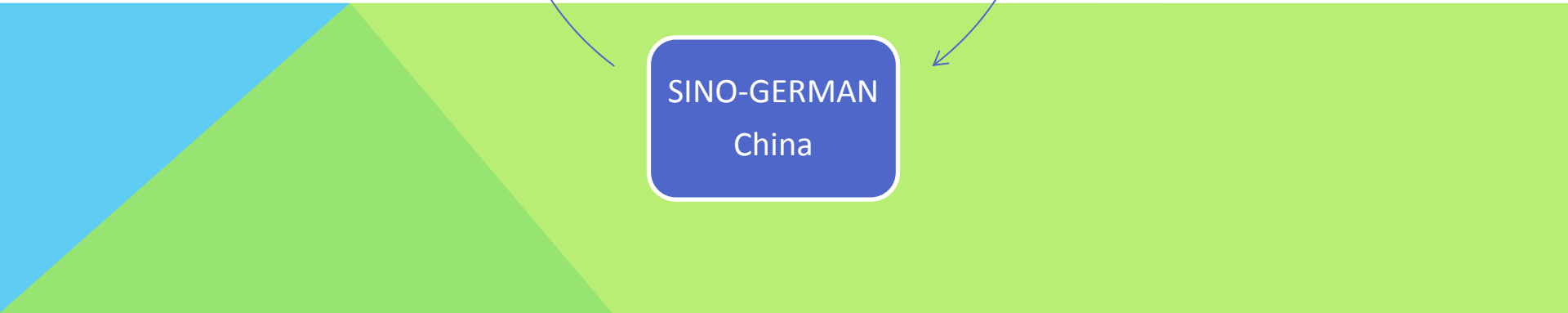


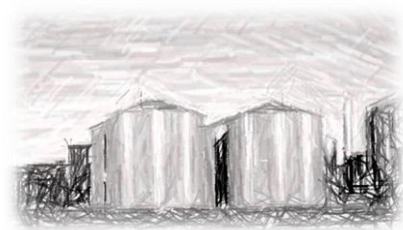
IFAT
Germany

NEXPO
Japan

GREENEXPO
Ukraine

SINO-GERMAN
China





Krieg & Fischer Ingenieure GmbH

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