



Krieg & Fischer Ingenieure GmbH



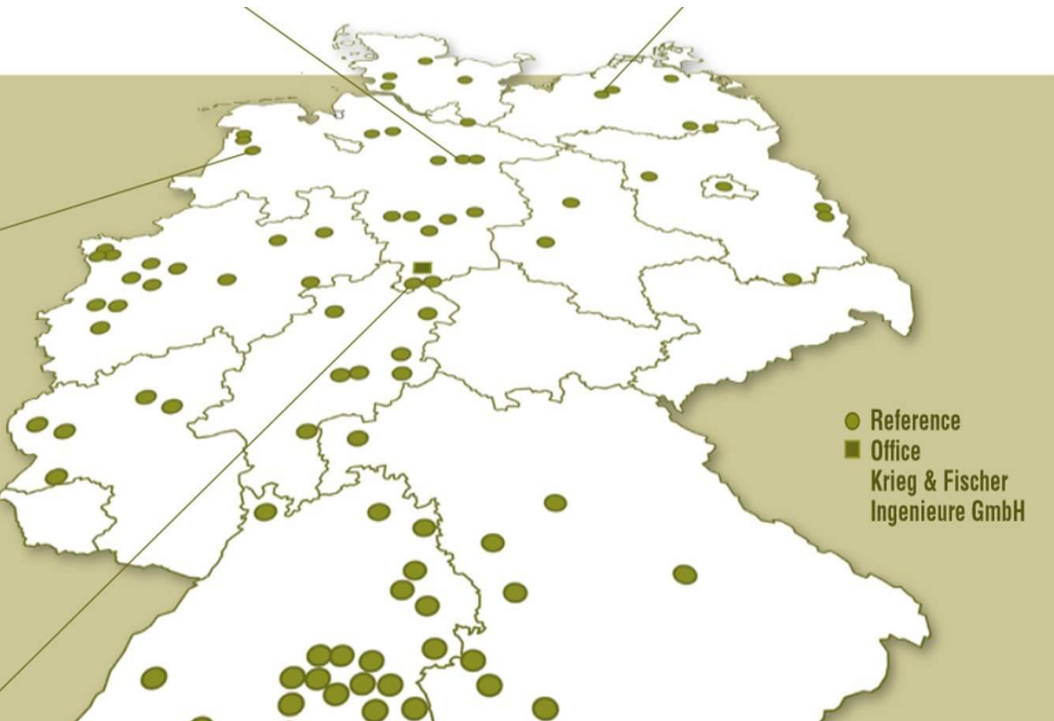
KRIEG & FISCHER INGENIEURE GMBH

## BIOGAS PLANTS



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

# COMPANY LOCATION IN THE MIDDLE OF GERMANY



Krieg & Fischer Ingenieure GmbH  
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## 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.



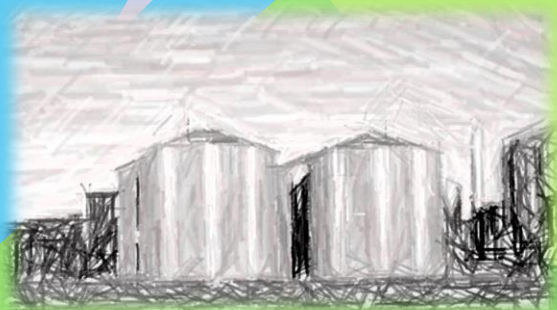
**1999**  
founded

**2003**  
Award of  
Innovation

**2009**  
Sworn  
Expert of  
Biogas

**2019**  
20 years  
company  
anniversary  
160 Biogas  
Plants  
References  
worldwide

**2020**  
World Biogas  
AWARD



## Planning und Construction BIOGAS PLANTS

# GENERAL MANAGER:



Raphael Thies

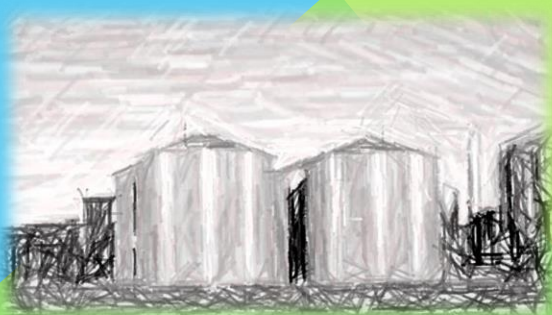
Torsten Fischer

## **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.

## **Raphael Thies**

already works for Krieg & Fischer since 2007. Starting out as an engineer in the field of planning and processing, he now also works in the field of sales. Alongside founder and shareholder Torsten Fischer, Raphael Thies will, as of 2017, take up the position of an additional Managing Director. Since 2016 Raphael Thies is sworn expert of biogas plants





**OUR TEAM**

**Krieg & Fischer  
Ingenieure GmbH**



## OUR PARTNER



**Bulgaria:** Agroecon o.o.d.

**Poland:** Biogazowuie Polski

**Spain:** Ecobiogas

**Ukraine:** Ecodevelop

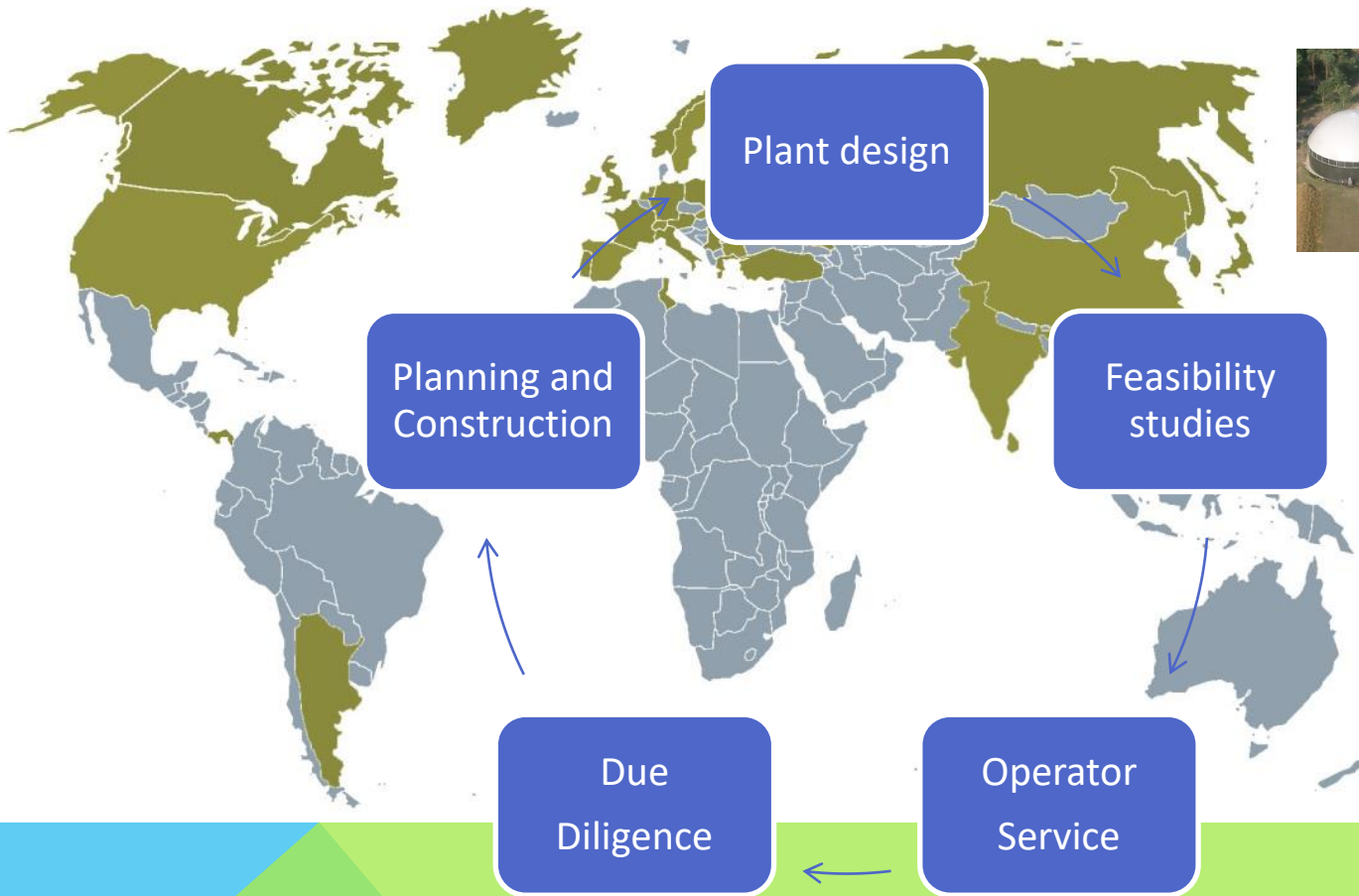
**Japan:** Eco HearT Inc.

**Canada:** Electrigan Technologie Inc

**. Italy:** Inte.C.O. engineering

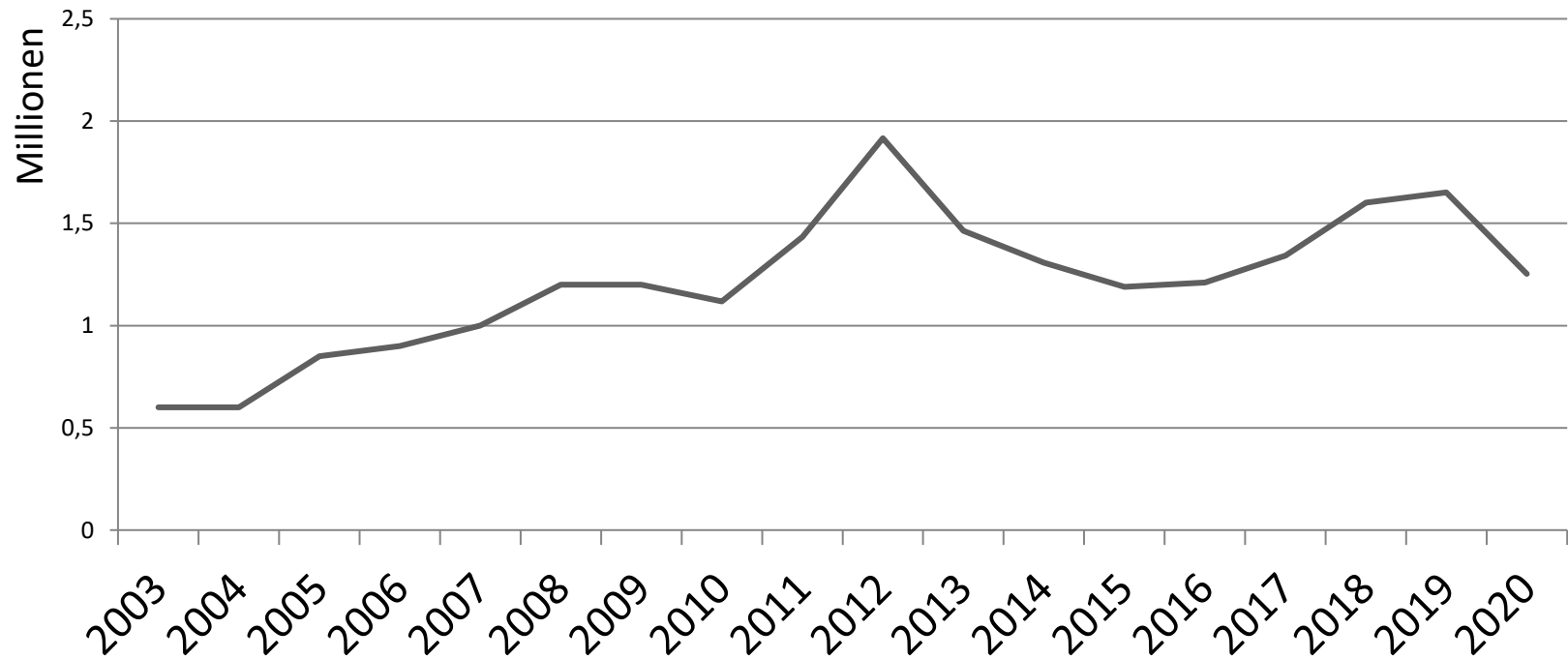
**Planning und Construction  
BIOGAS PLANTS**

# ACTIVITIES WORLD WIDE



**Planning und Construction  
BIOGAS PLANTS**

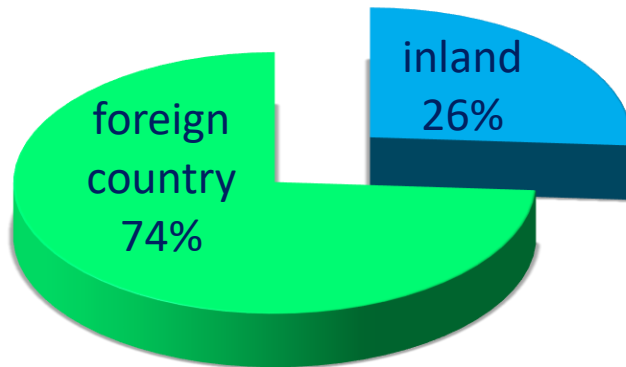
# TURNOVER 2003-2020



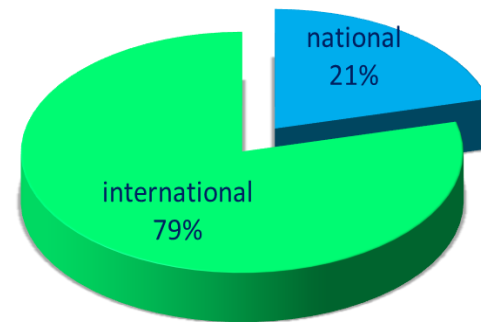


# DISTRIBUTION OF TURNOVER

## Turnover 2020



## Turnover 2019

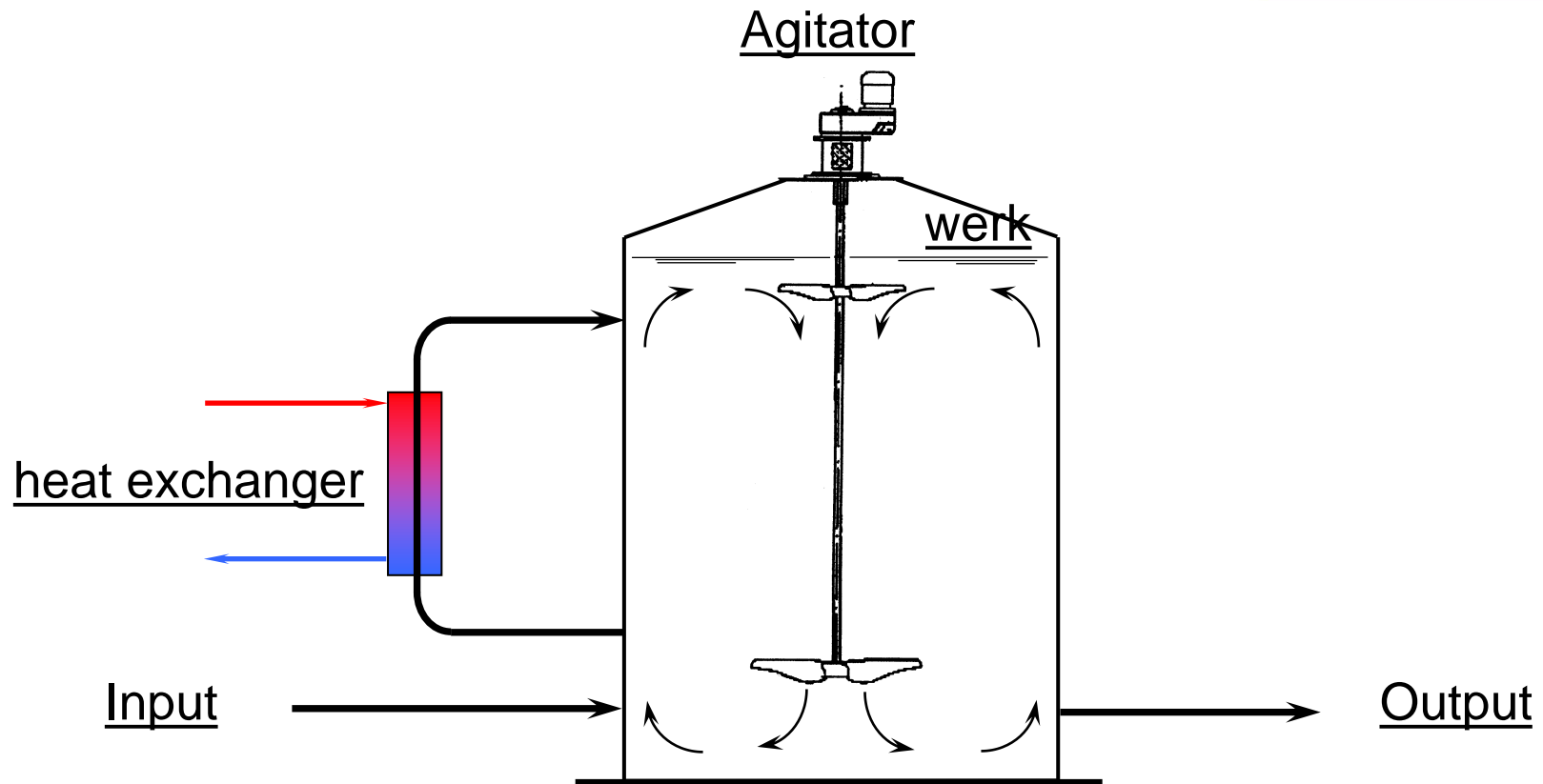


# OUR SERVICE OFFERING



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

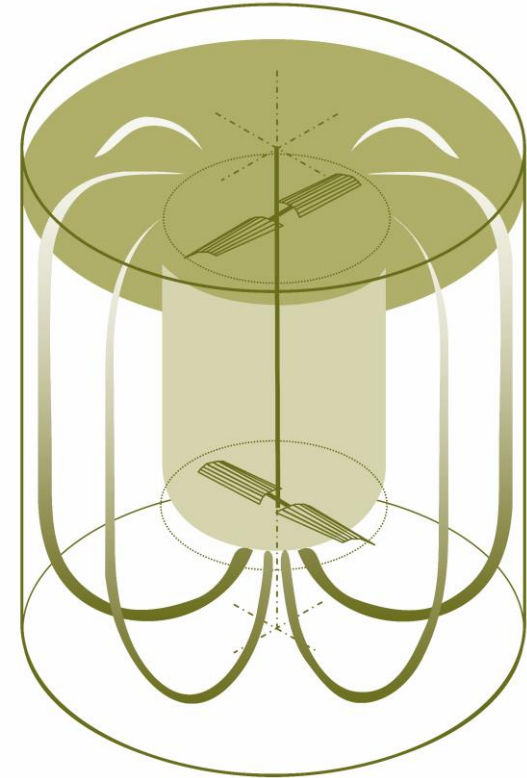
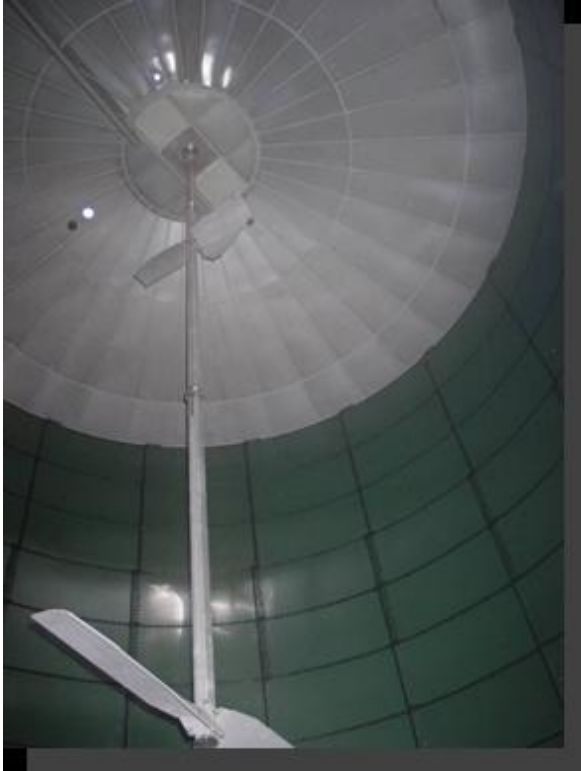
# TECHNICAL DETAILS



## High upright digester / CSTR

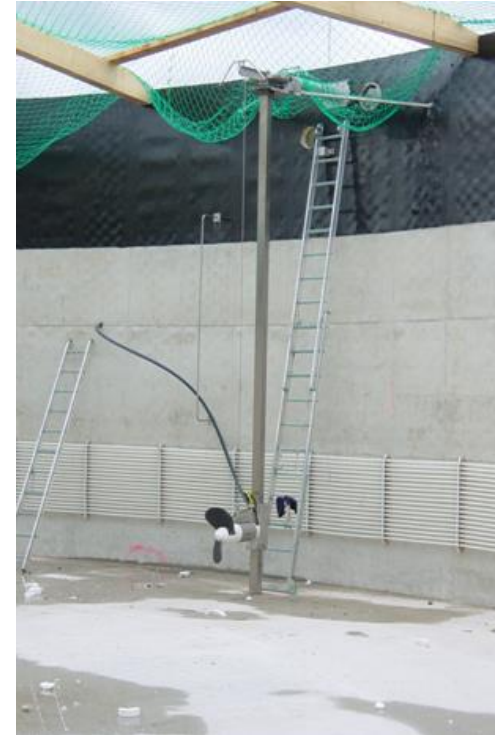
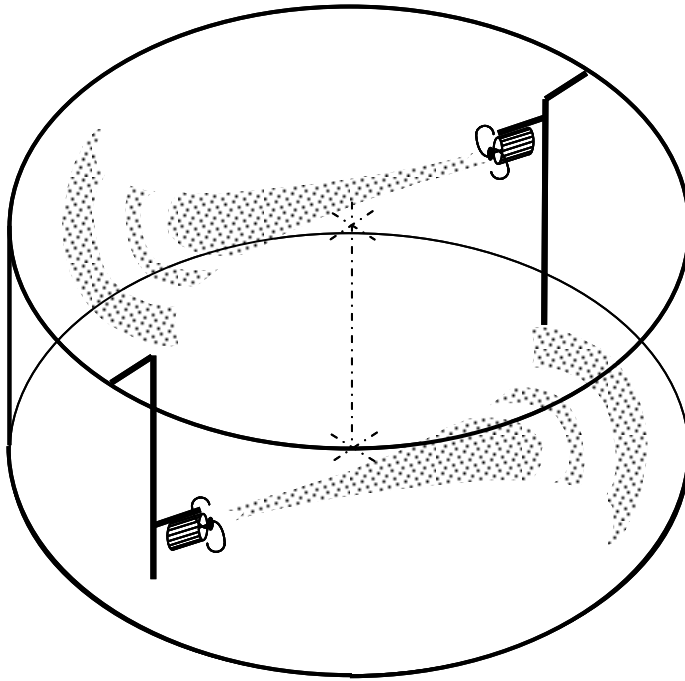
Established for large-scale plants with volumes up to 5,000 m<sup>3</sup>. Mixing is done by a top mounted mixer that is continuously operating. Material: Reinforced concrete or glass coated steel depending on the size. The digester is followed by a secondary digester with a gas holder roof • Homogeneous 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 m<sup>3</sup> • 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



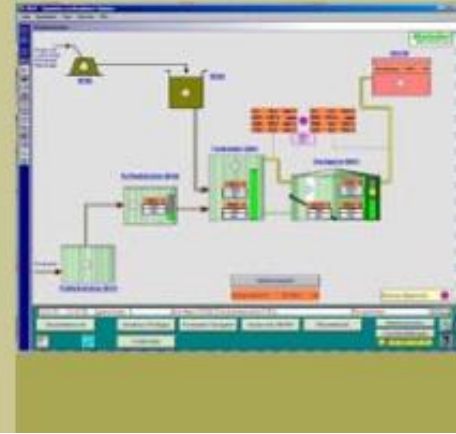
## External heat exchanger

to heat the substrate



## Overpressure-vacuum relief valve

for safety reasons



## Process control system

system control, monitoring and worldwide access to the biogas plant

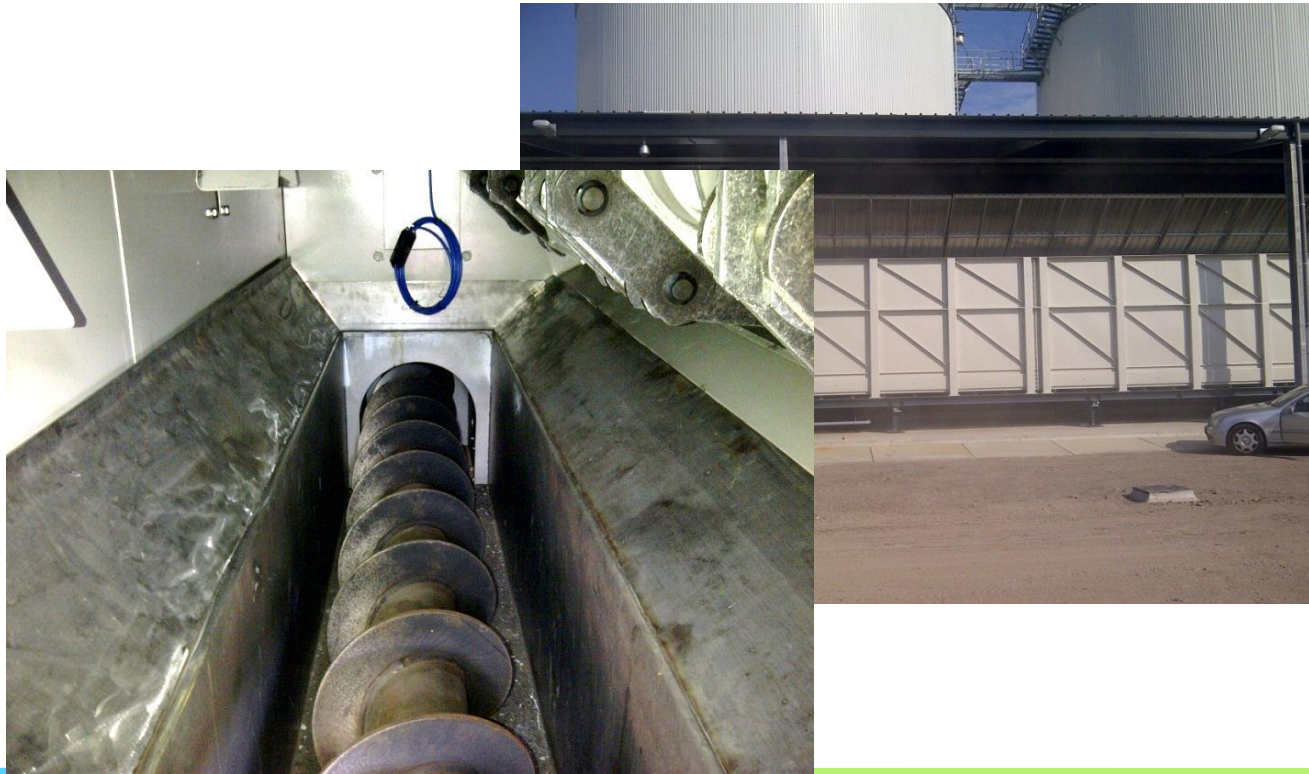
# TECHNICAL DETAILS



**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



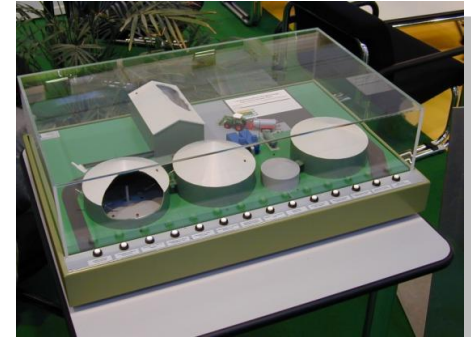
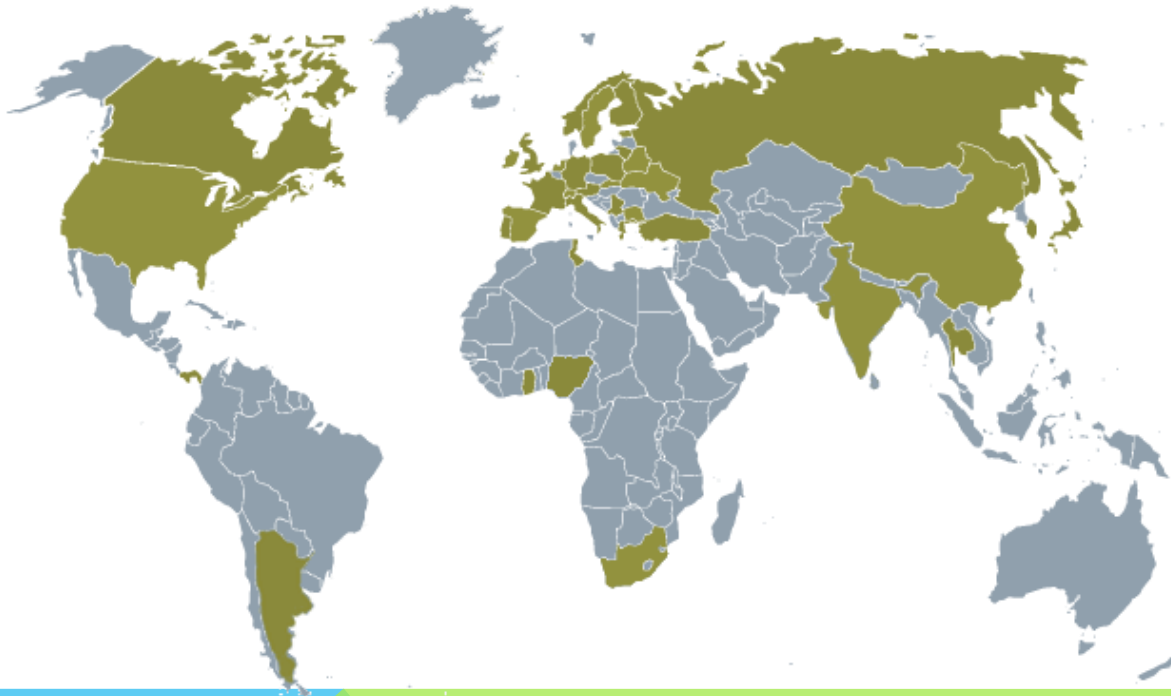
# REFERENCE OF BIOGAS PLANT

113 BIOGAS PLANTS IN GERMANY

47 BIOGAS PLANTS WORLDWIDE



Krieg & Fischer Ingenieure GmbH



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

# NETHERLANDS

## BIOGAS PLANT DINTELOORD

Location: The Netherlands  
Construction Period: 2011  
Input: Sugar beets, vegetable waste (potatoes, chicoree)  
Fermenter: Steel tank, 4 x 4,480 m<sup>3</sup>  
Co-generator: biogas upgrading, gas injection  
Further biogas plant in the Netherlands:

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

**Krieg & Fischer Ingenieure GmbH**

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



# ARGENTINIA

## BIOGAS PLANT RIO CUARTO II

Location: Argentina

Construction Period: 2017/2018

Input: Thin stillage (corn silage, vinasses), a residual material from ethanol production

Fermenter: Glass coated steel tank, 8,000 m<sup>3</sup>

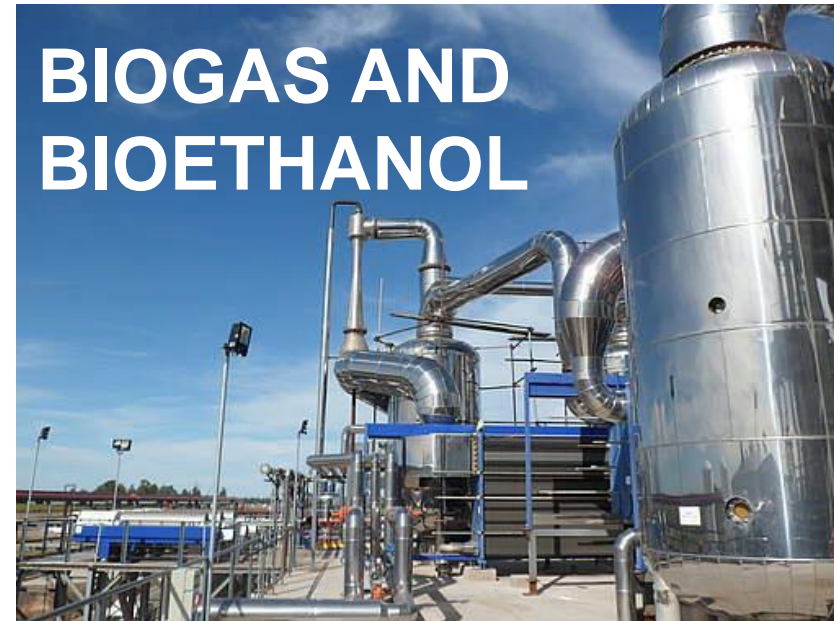
Co-generator: total: 2,927 kWel: 1,200 kWel in CHP; 1,727 kWel in a boiler for internal consumption of the bioethanol process

Further biogas plant in the Netherlands:

- Rio Cuarto I (2012)

### Krieg & Fischer Ingenieure GmbH

Basic evaluation, pre-, draft- and execution planning, tendering, participating in contract awarding process, site management/project controlling, start-up, training for operators





# JAPAN

## BIOGAS PLANT FUKUOKA

Location: Japan  
Construction Period: 2016/17  
Input: Vegetable waste, residue of shochu, sludge from WWTP, okra, gluten  
Fermenter: enameled steel tank, 2 x 5,000 m<sup>3</sup>  
Co-generator: Gas engine 2 x 1,056 kW<sub>el</sub>  
Further biogas plants in Japan:

- Fukuoka (2016/2017), Daisen (2013/2014)
- Bekai (2000/2001), Kawagoe (2019/2020)
- Tottori (1999/2000), Hamanaka, (2019/2020),
- Revacs (2019/2020)



### Krieg & Fischer Ingenieure GmbH :

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

# IRELAND HUNTSTOWN

Location: Ireland  
Construction Period: 2018/19  
Input: Hydrolysed (TPH) biowaste and kitchen waste  
Fermenter: Steel tanks, 4 x 4,900 m<sup>3</sup>  
Co-generator: Gas engine 2 x 2,4 MW<sub>el</sub>  
  
Special sand removal ,cooling of input material, 2 buffertanks, external gas storage



Further biogas plants in Ireland:

- Mc Donnell (2009)

## Krieg & Fischer Ingenieure GmbH :

Basic evaluation, pre-, draft- and execution planning, tendering, participating in contract awarding process, site management/project controlling, start-up, operator training and instruction



# USA

## BIOGAS PLANT INLAND EMPIRE

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



**Krieg & Fischer Ingenieure GmbH**

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

# GERMANY

## BIOGAS PLANT ANKLAM

Location: Germany  
Construction Period: 2012  
Input: Sugar beets, vinasse  
Fermenter: Steel tank, 4x4,480 m<sup>3</sup>  
Co-generator: Gas upgrading,  
gas injection

Further more then

- 123 biogas plant in Germany



**Krieg & Fischer Ingenieure GmbH**

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

# CHINA

## BIOGAS PLANT QINHUANGDAO

Location: China  
Construction Period: 2014  
Input: Kitchen waste  
Fermenter: Steel tank, 2 x 3,400 m<sup>3</sup>  
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

# 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<sup>3</sup>

Co-generator: Gas engine, 716 kW<sub>el</sub>

Further biogas plants in France:

- Bretagne (2007)

**Krieg & Fischer Ingenieure GmbH**

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





# GERMANY

## BIOGAS PLANT SEMD

Location: Germany

Construction Period: 2009/10

Input: Corn silage

Fermenter: Prestressed concrete, prefabricated element tank, 2,473 m<sup>3</sup>

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



# CANADA

## BIOGAS PLANT PRINZ EDWARD ISLAND

|                                  |  |
|----------------------------------|--|
| Location:                        | Canada                                   |
| Construction Period:             | 2007                                     |
| Input:                           | Potato raw materials, oil, potato sludge |
| Fermenter:                       | Steel tank, 22,000 m <sup>3</sup>        |
| Co-generator:                    | Thermal use of biogas                    |
| Further biogas plants in Canada: |  |
| •                                | Cudworth Pork 2004                       |



### Krieg & Fischer Ingenieure GmbH

Conception, Preplanning, Permitting, 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 <sup>3</sup>    |
| Co-generator:        | Gas engine, 4 x 190 kW                 |
| Costs:               | About. € 1,000,000                     |



### Krieg & Fischer Ingenieure GmbH

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,<br>2,000 m <sup>3</sup>        |
| Co-generator:        | Micro gas turbines,<br>4 x 30 kW           |
| Spezial Features:    | Gasholder above<br>secondary digester tank |



### Krieg & Fischer Ingenieure GmbH

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 <sup>3</sup>      |
| Co-generator:        | Dual fuel co-generator<br>2 x 170 kW <sub>el</sub> |



**Krieg & Fischer Ingenieure GmbH**

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,<br>4 x 2,500 m <sup>3</sup> |
| Co-generator:        | Gas engine,<br>2 x 2,1 MW <sub>el</sub> |
| Costs:               | about € 25,000,000                      |



**Krieg & Fischer Ingenieure GmbH**

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

# INTERNATIONAL TRADE FAIR

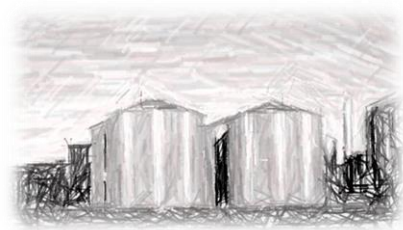


NEXPO  
Japan

IFAT  
Germany

GREENEXPO  
Ukraine

SINO-GERMAN  
China



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