

How to organize a biogas project in Thailand

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Bangkok, Thailand
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Krieg & Fischer Ingenieure GmbH

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Engineering Office, specialized in Design and Engineering of Biogas Plants

Foundation: 1999

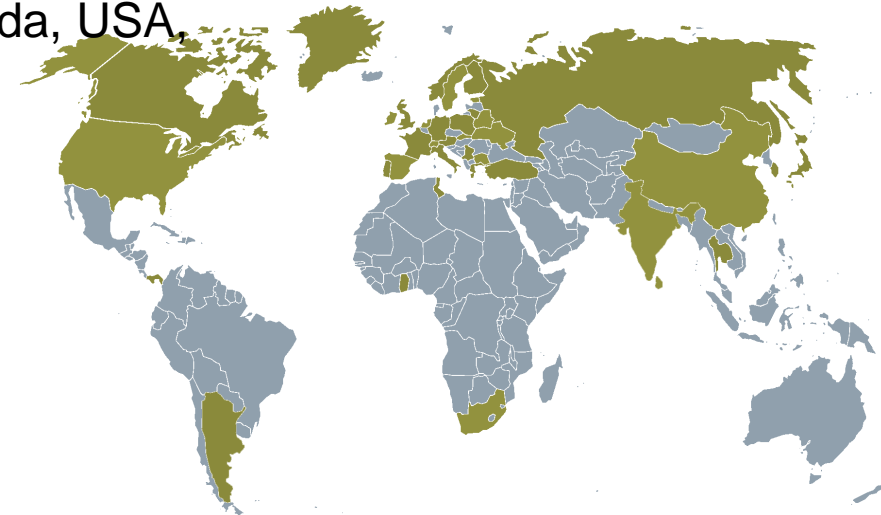
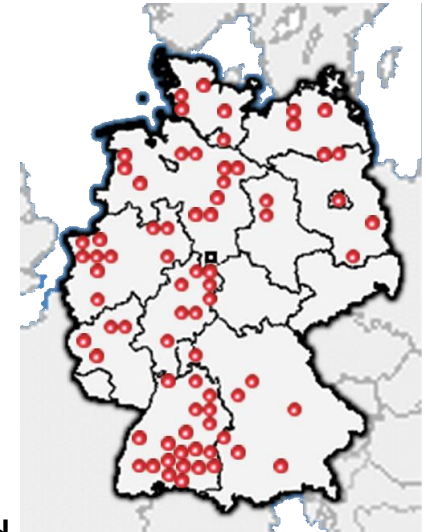
Team: 20

Experience: > 25 Years

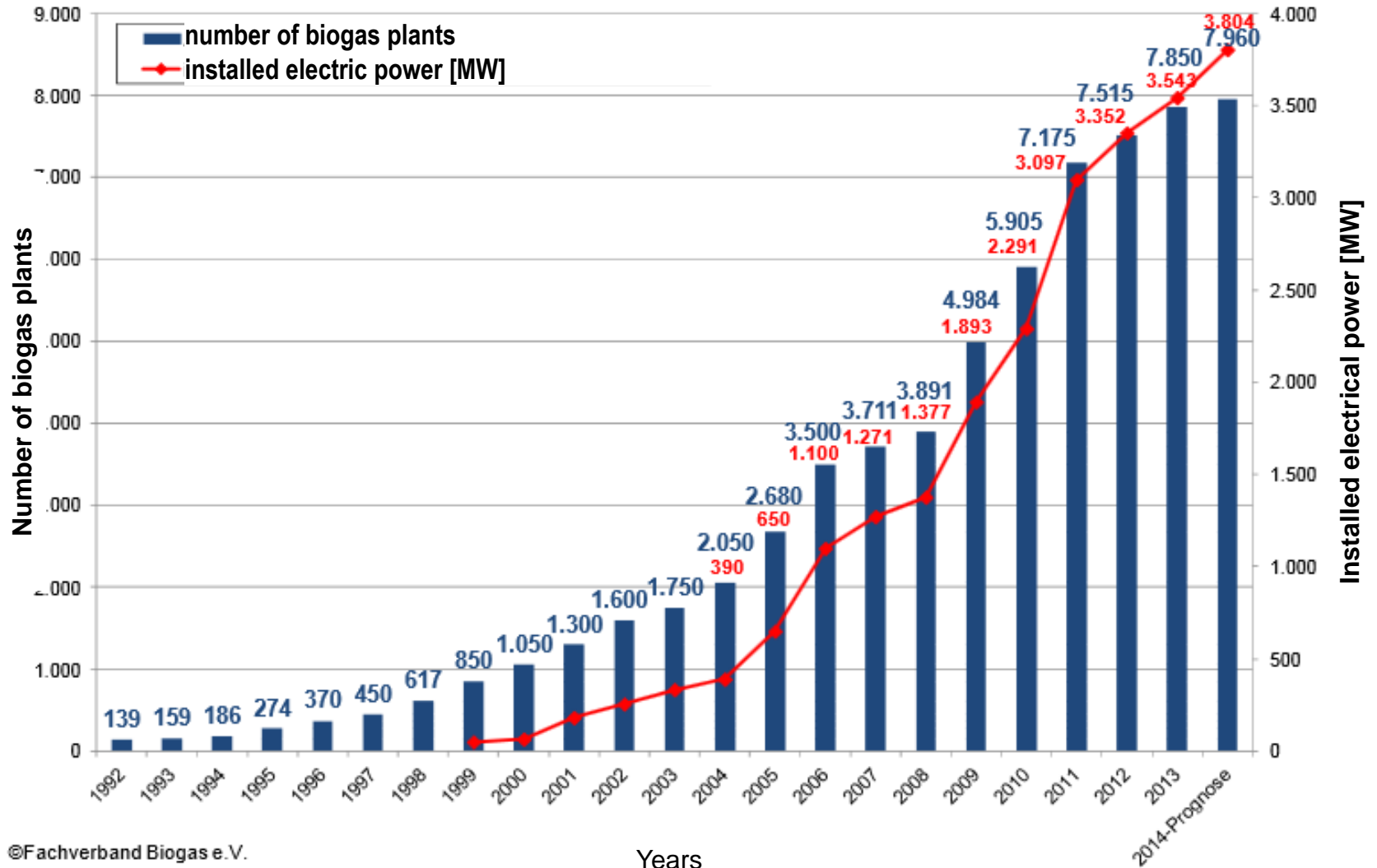
References: ca. 150 Biogas Plants

in: Germany, Japan, Netherlands, Austria, Switzerland, Lithuania, Italy, Slovakia, Canada, USA, Spain, France, Ireland, Russia, India, China and Argentina

Partner in: Japan, Korea, Canada, Bulgaria, France, Poland, Italy, Spain, Serbia, Greece and China



Development of Biogas in Germany



©Fachverband Biogas e.V.

References worldwide



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Cudworth Pork



Prince Edward Island



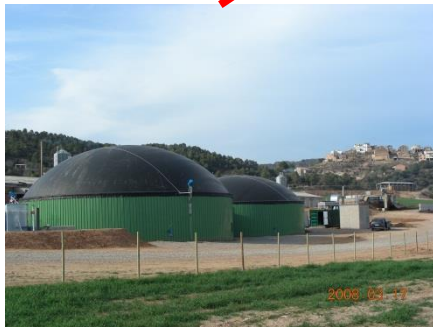
Bekkai



Inland Empire



Fairyland



Montargull



Noyon



Prato



Krieg & Fischer Ingenieure GmbH

Projects in China



Qinhuangdao, China



Built: 2013/2014

Input: kitchen waste

Hydrolyses tank 530 m³

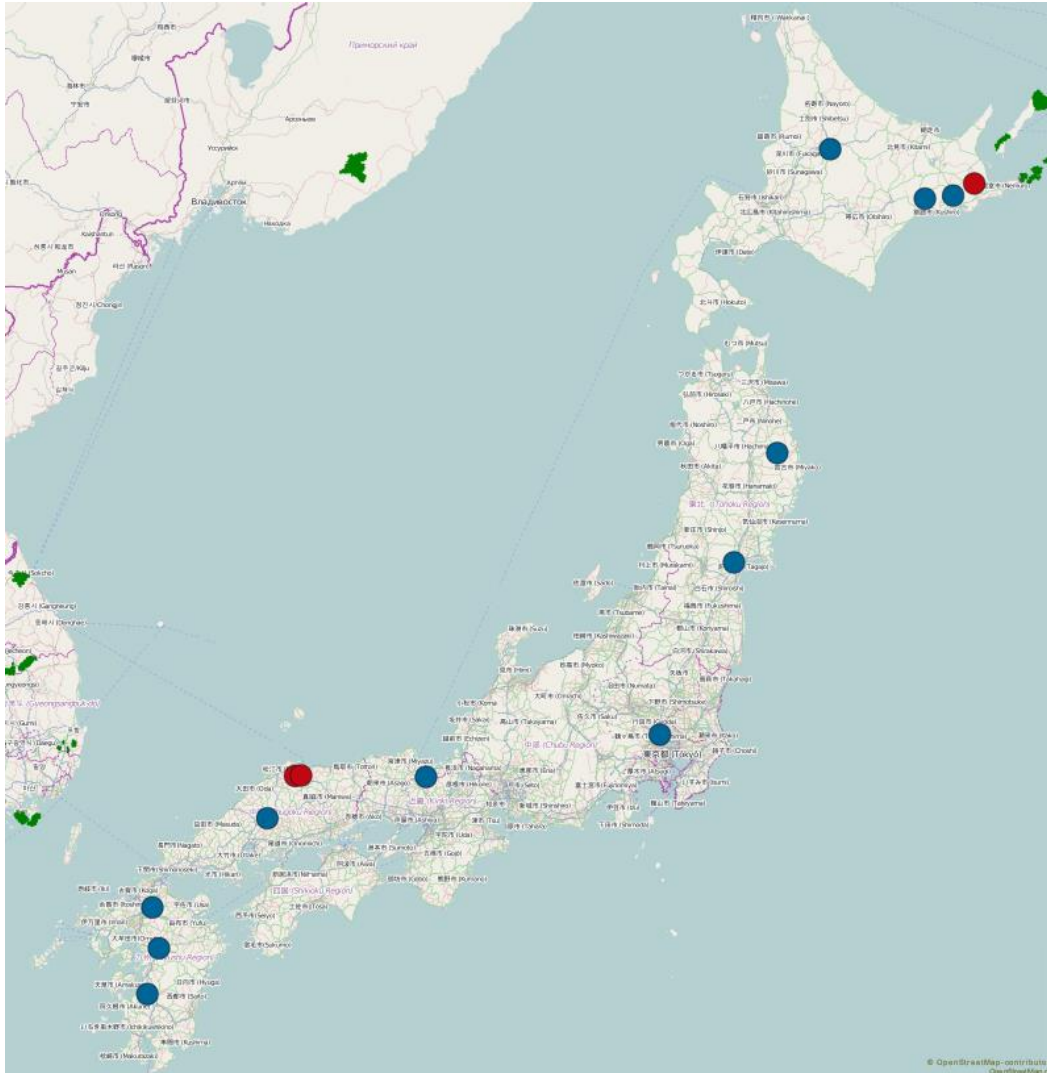
Digester: 2 x 3,400 m³
carbon steel tank

Upgrading of biogas

External gasholder

Pretreatment (hammer
mill, hydro-cyclone,
hydrolysis)

Projects in Japan



- Biogas plants K&F
バイオガスプラント K&F
- Activities
(studies, optimization,
detail-engineering)
技術サービス (調査、設計、
プラント改善・最適化)

Sansui-en 2, Japan

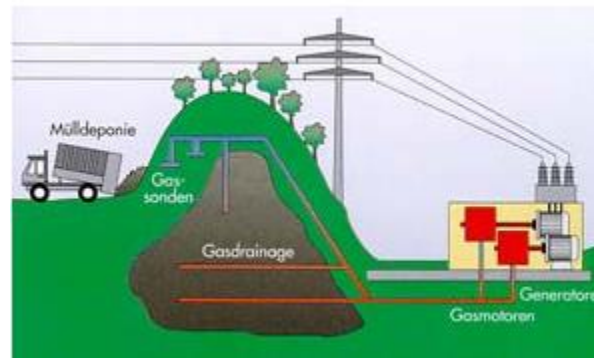


- Build: 2013/14
- Substrate: pig manure, FOG, sewage sludge, industrial food waste
- Digester: 5,000 m³ glass coated steel tank
- CHP: 2 x 370 kW_{el}
- digester, secondary digester, mesophilic operation
- Extension and integration of an existing biogas plant

~~Sewage gas~~

~~Landfill gas~~

Biogas



Examples of possible substrates

Agricultural substrates



Agricultural wastes as straw, green cut, crop residues, food remains...

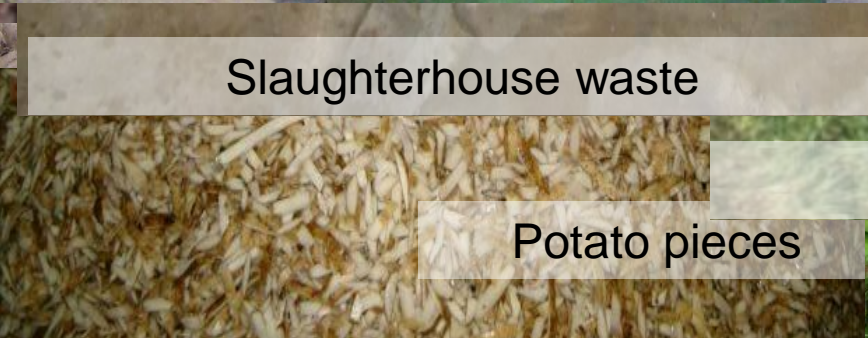


Energy crops as corn, whole plant silage, or grass



Municipal organic waste

Old bread

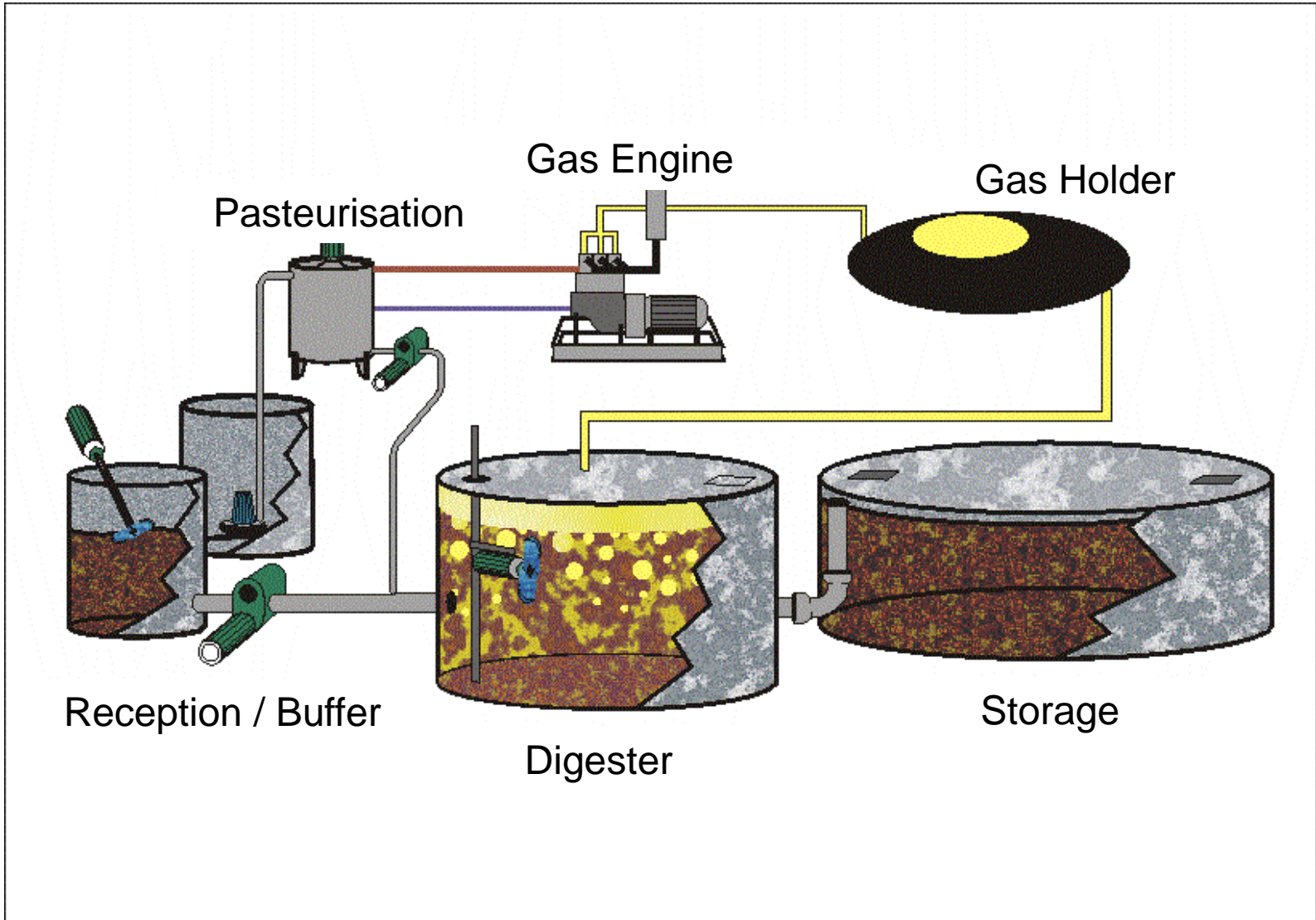


Slaughterhouse waste

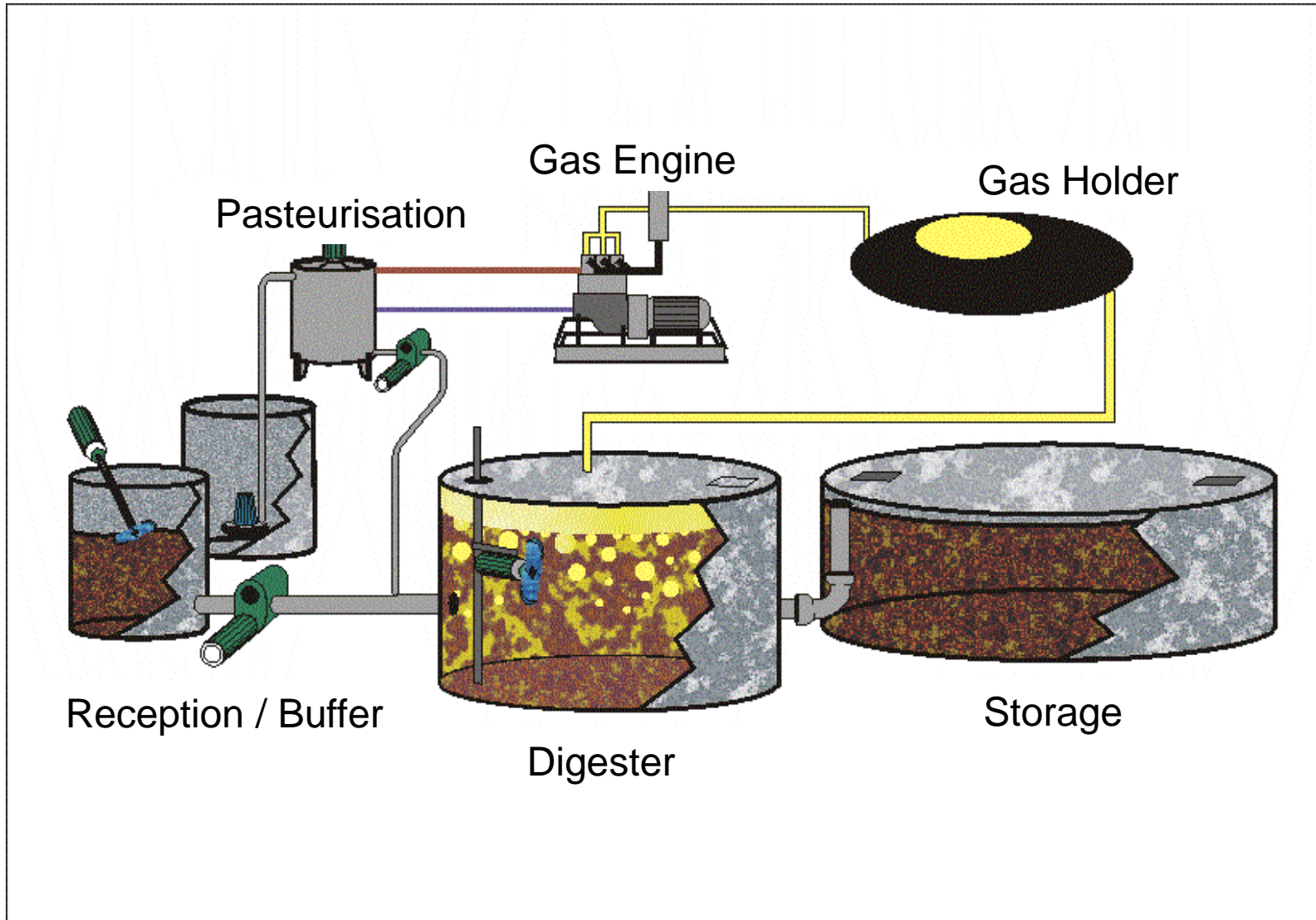
Potato pieces



Waste french fries







Components of a biogas plant

- Tanks (digester, secondary digester, storage tanks)
- Gas holder
- Stirrer
- Pumps
- Shredder
- Pretreatment
- Solis input device
- Heat exchanger
- Measurement devices
- Safety components
- Desulphurization
- CHP
- Biogas upgrading system

EPC - Contractor (turn-key) Engineering-Procurement-Construction

- Provides all contract work sections
 - Provides all construction services
- Fixed price
- Organization and Responsibility of the entire project

Fixed price includes EPC-surcharge of minimum 50%, abroad often more

Dream of every client, worldwide

One single, technically competent company

Taking full responsibility

Low price

No interfaces

That is not the way the world works!



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Piece-meal approach

- Ordering of contract work sections independently
- Less expensive (No surcharges between purchasing and sales)
- Cooperation of European and Thai company: Joint engineering team
- Coordination of battery limits between different suppliers

Local Thai company

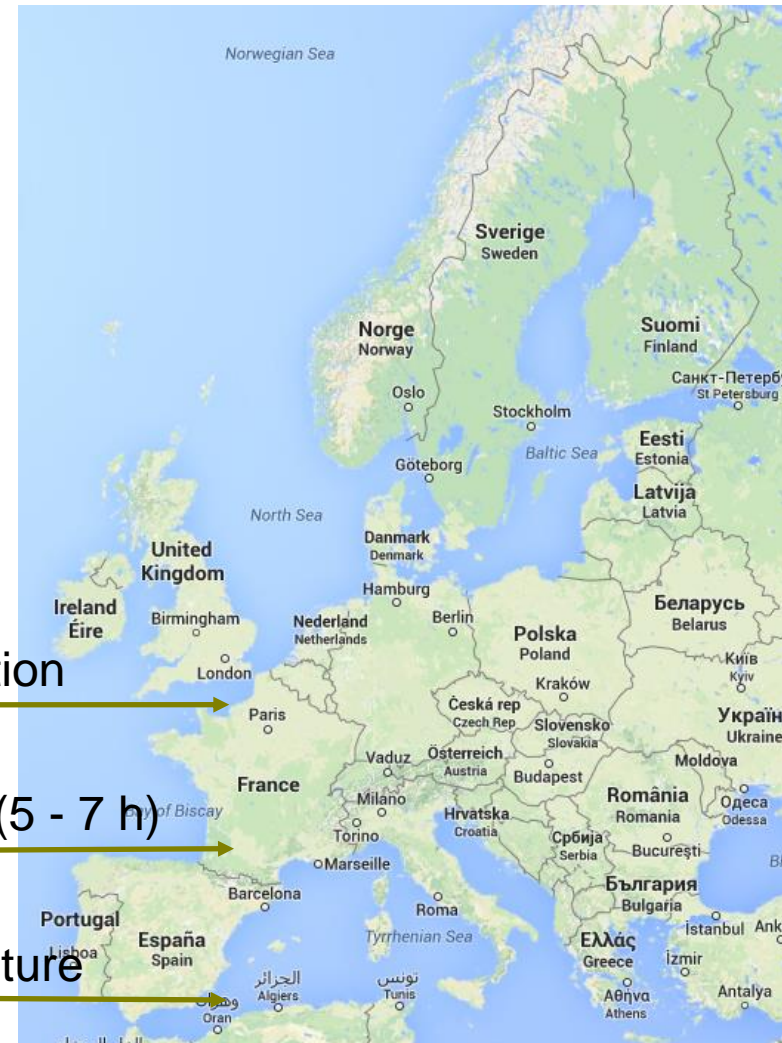
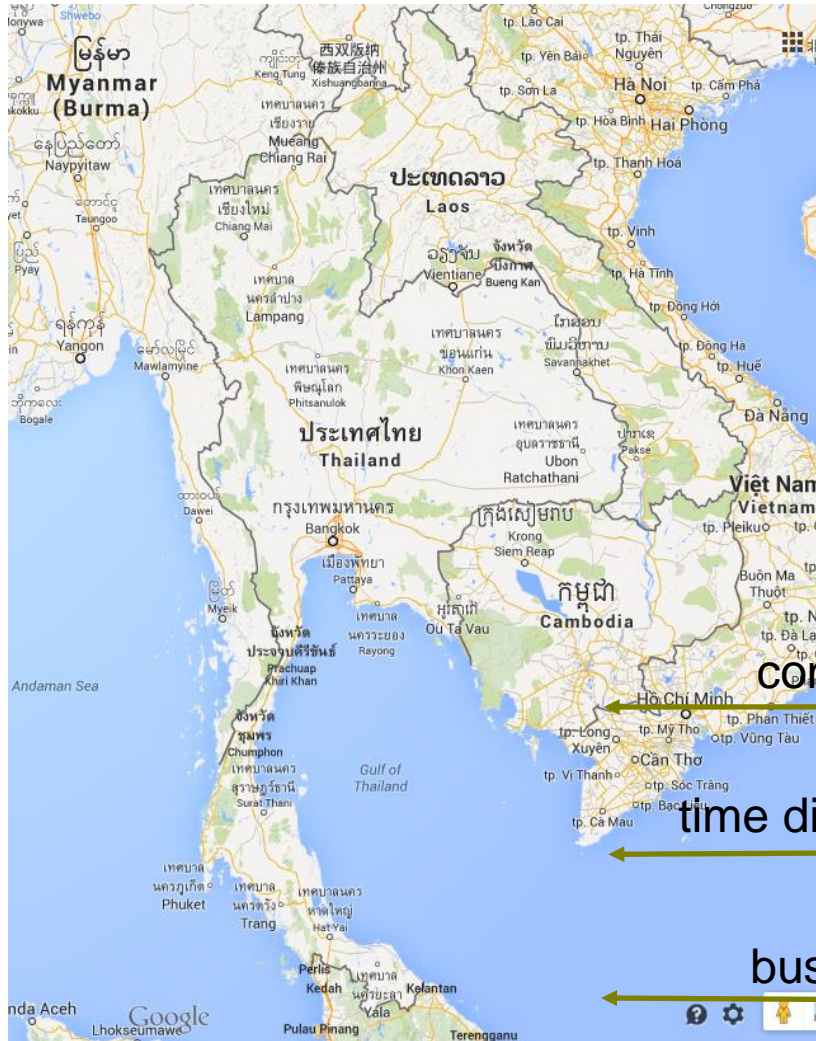
- Knows about Thai regulations and laws
- Speaks local language
- Can prepare documents for administrative approval
- Knows the local suppliers
- Knows specialist companies (subsoil reports, safety aspects as hazard assessment, surveying or environment impact report...)

- Less expensive

What is missing in Thailand

- Engineering know-how for a biogas plant in accordance with the state of the art
- Certain equipment as
 - certain stirrers
 - CHP
 - biogas upgrading system
 - desulphurization
 - solid input device
 - heat exchanger
 - pumps
 - certain safety components

Organisation of a biogas plant in Thailand



communication

time difference (5 - 7 h)

business culture

Contract work sections

- Earthwork
- Civil engineering operations
- Construction of digester and other tanks
- Construction of halls (reception, pretreatment)
- Installation of pumps
- Electrical operations
- Pipeline and mains connection work
- ...

Central issue: installation of large tanks



Concrete tanks
Europe

Welded
steel tanks
China



Glass coated steel tanks
Europe and Japan

Experience of K&F in North America

Organization and Supplier



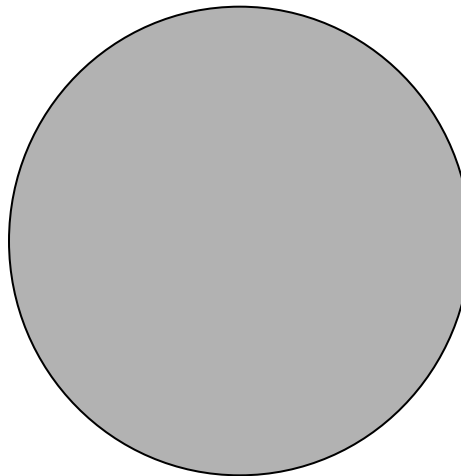
	Saskatoon	Chino	Kensington	London
construction period	2003	2005	2008	2009/2010
organisation	Piecemeal (directly K&F)	(Piecemeal/Assembly) (‘Americanising’)	Piecemeal (‘Canadianising’)	Piecemeal Approach (‘Canadianising’)
digester tanks	Steel Tank Europe	Steel Tanks North America	Steel Tanks Europe	Steel Tanks North American
top mounted mixer	North America	Europe	Europe	Europe
heat exchanger	Europe	Europe	North America	North America
CHP / gas user	Gas Turbine North America	Biogas Grid	Gas Burner North America	CHP North America
other tanks	Concrete Tank North America	(-)	Steel Tanks Europe	Steel Tanks North America
gas holder	Europe	(-)	Europe	Europe

Supplier:

At the beginning the origin of the supplier is uncertain



25%



50%



25%

Contract work sections

Import Germany/ Europe

- Engineering of the biogas plant
- Certain stirrers
- Heat exchanger
- Special pumps
- Safety components
- CHP
- ...

Unknown

- Civil engineering operations
- Construction of digester and other tanks
- Installation of pumps
- Electrical operations
- ...

Thai company

- Earthwork
- Subsoil reports
- Hazard assessment
- Surveying or environmental impact reports
- Civil engineering operations
- Construction of halls (reception, pretreatment)
- Installation of pumps
- Electrical operations
- Pipeline and mains connection work
- ...

Local, national or regional products

- Generally less expensive from Thailand
- Organization of spare parts is easier
- Documentation in national language
- Less problems with warranty

As many deliveries by local manufacturers as possible

- Earthwork
- Subsoil reports
- Hazard assessment
- Surveying or environmental impact reports
- Civil engineering operations
- Construction of halls (reception, pretreatment)
- Installation of pumps
- Electrical operations
- Pipeline and mains connection work

Imported products

- Imported from „biogas countries“: Denmark, Germany, Austria and Switzerland
- All projects around the world are supplied from there
- For example:
 - Special pumps and valves
 - Central stirrer
 - Heat exchanger for highly viscous substrates
 - Special measuring equipment
 - Special safety equipment

Piece-meal

- simple to organize different suppliers from Thailand and Europe
- interfaces management
- responsibility
- different business 'cultures'
- different legal backgrounds
- National building Code
- 'Thailandianising' of European equipment

Conclusions / Summary

- German EPC-contractors construct standardized biogas plants
 - This does not work in Thailand:
 - Local regulations must be considered
 - Local suppliers must provide many of the components
- Thai EPC-contractors do not yet have sufficient experience

**Cooperation
between a Thai and a German company
and individual (piece-meal) awarding**

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