CSTR Digestion of Manure and Food Wastes

Co-Digestion of Manure and Food Wastes at Inland Empire California

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Milwaukee, Marquette University, September 19, 2008

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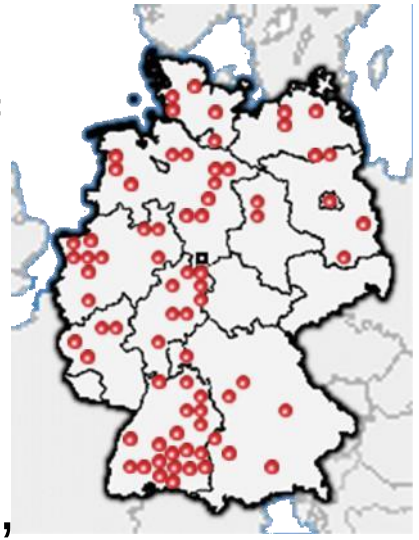

Engineering Office: Planning and Construction of Biogas Plants

Founded: 1999 (experience > 20 years)

Team: 18

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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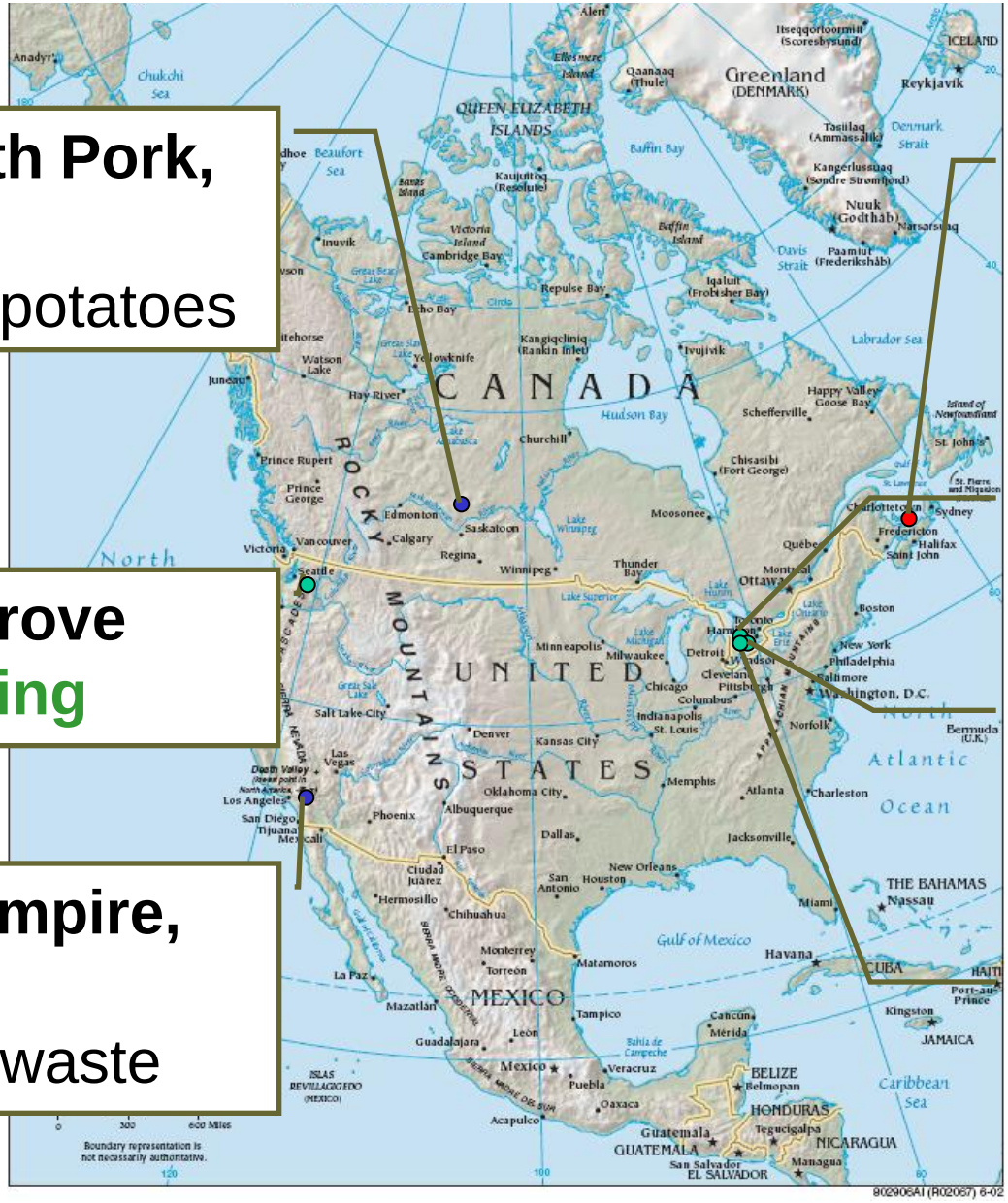
Cudworth Pork, 2003
manure, potatoes

Cedar Grove
In Planning

Inland Empire, 2006
manure, waste



SF Drayton
In Planning

SF Port Colborne
In Planning

SF London
In Planning

Large Plant Experience

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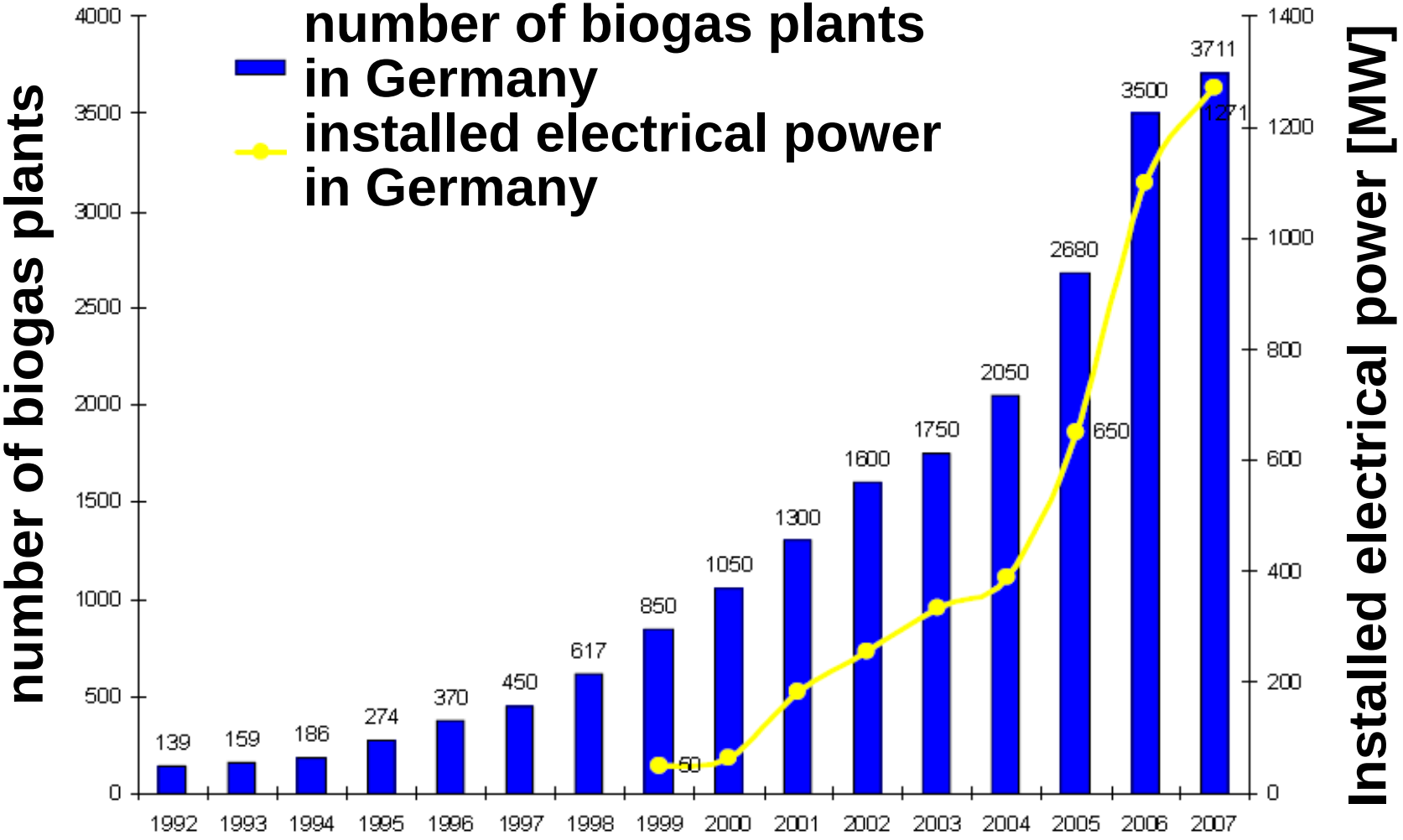

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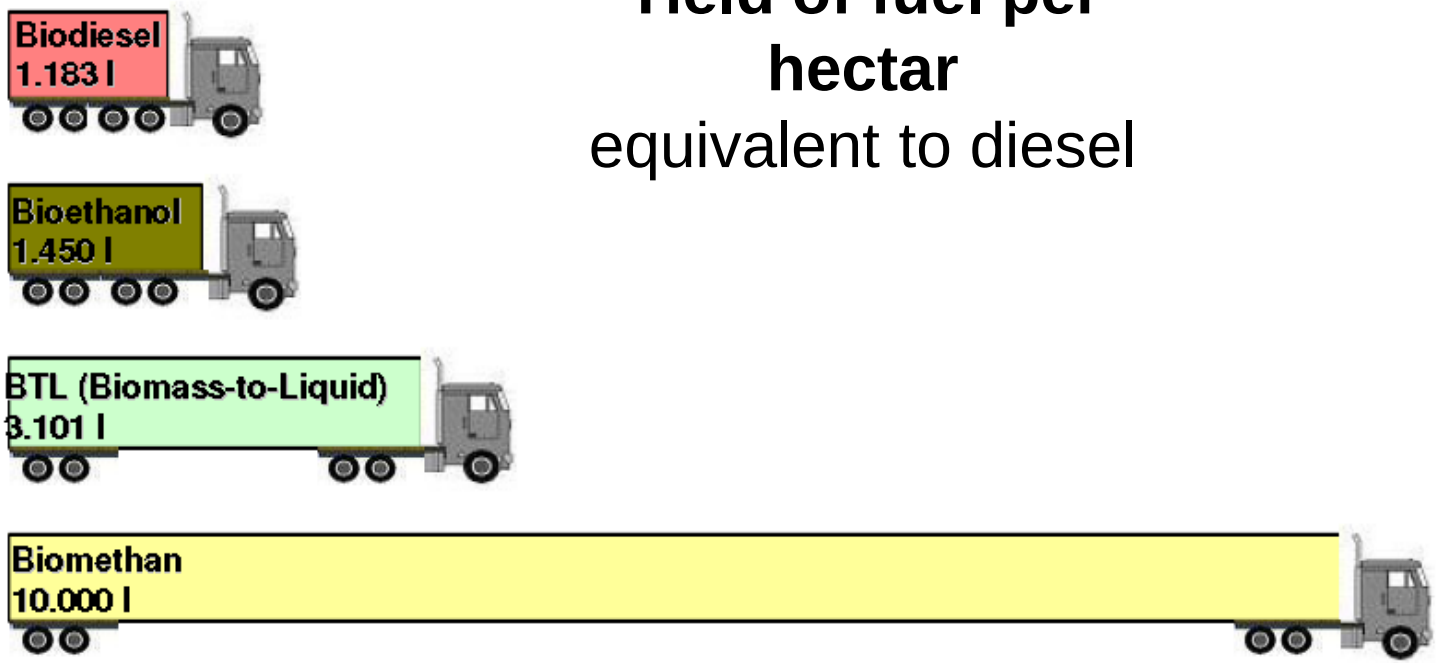
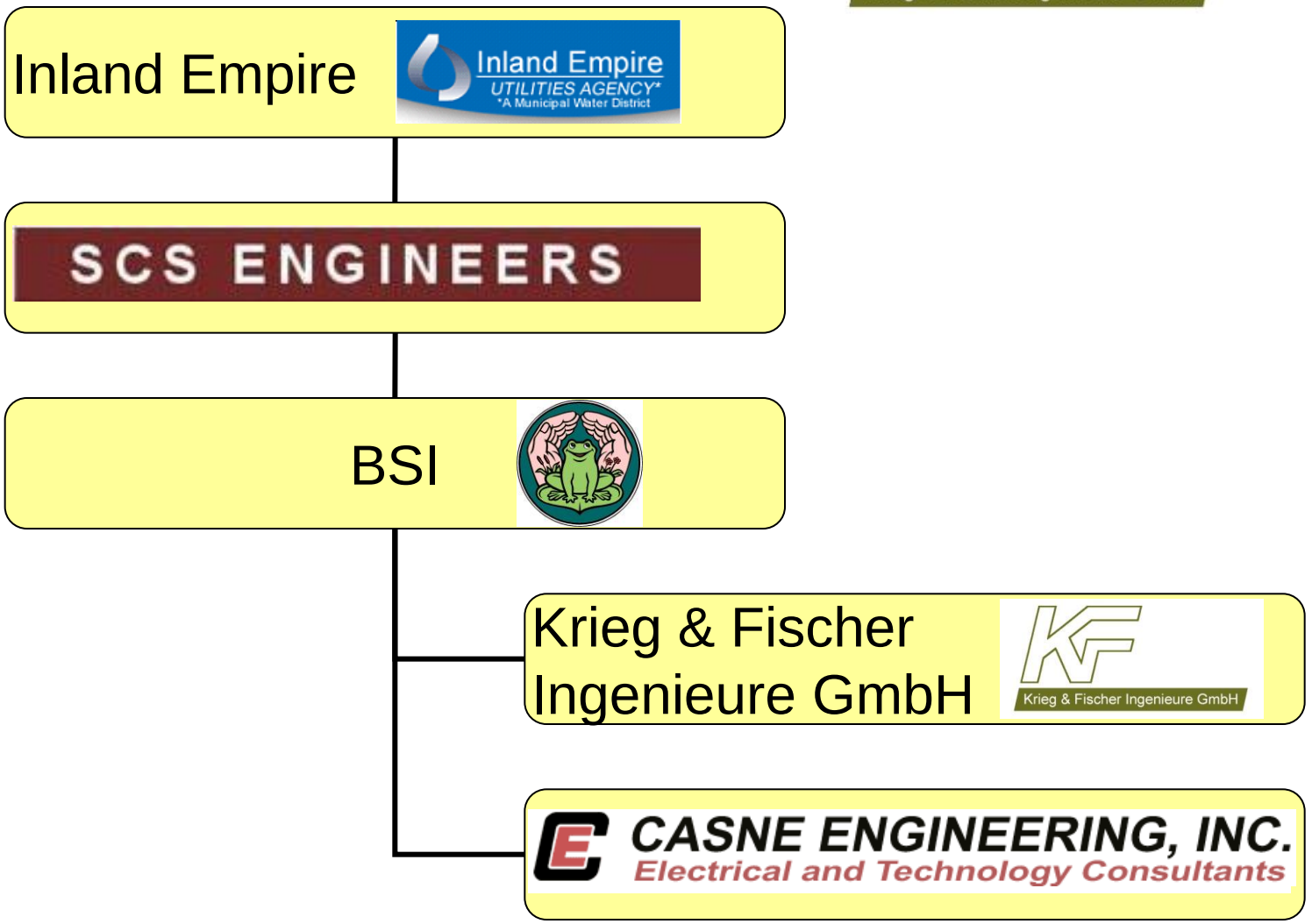
Yield of fuel per hectar

equivalent to diesel



Order Structure



Case Study
Inland Empire Utility Agency

Krieg & Fischer Ingenieure GmbH

Construction Cost $ 4.97 Million

Project:
1.5 MW dairy and food waste digester

European Suppliers

North American Suppliers

PROJECT CRITERIA

- Dairy manure treatment capacity:
  300 wet tons (270 mt)
- Manure solids concentration: 12%
- Additional food waste treatment capacity:
  90 wet tons (83 mt)
- Expected volatile solids reduction : 50%
- Expected gas production:
  699,700 cu.ft. per day (18,813 cubic meter per day)
- European Technology
- Expected power generation capacity: 1,500 kW

FINAL PROJECT DESIGN INFORMATION

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- Number of digesters: 2
- Digester diameter: 62 ft. (18.8 m)
- Digester height: 55.5 ft. (16.9 m)
- Volume of each tank: 1,200,000 gallons / 4,500 m^3
- Detention time: 25 days
- Top mounted agitator: One per tank
- Digester temperature: 98-100^{o}F /37°-39° C

Reception area

Feed Pumps

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Double-pipe heat exchangers

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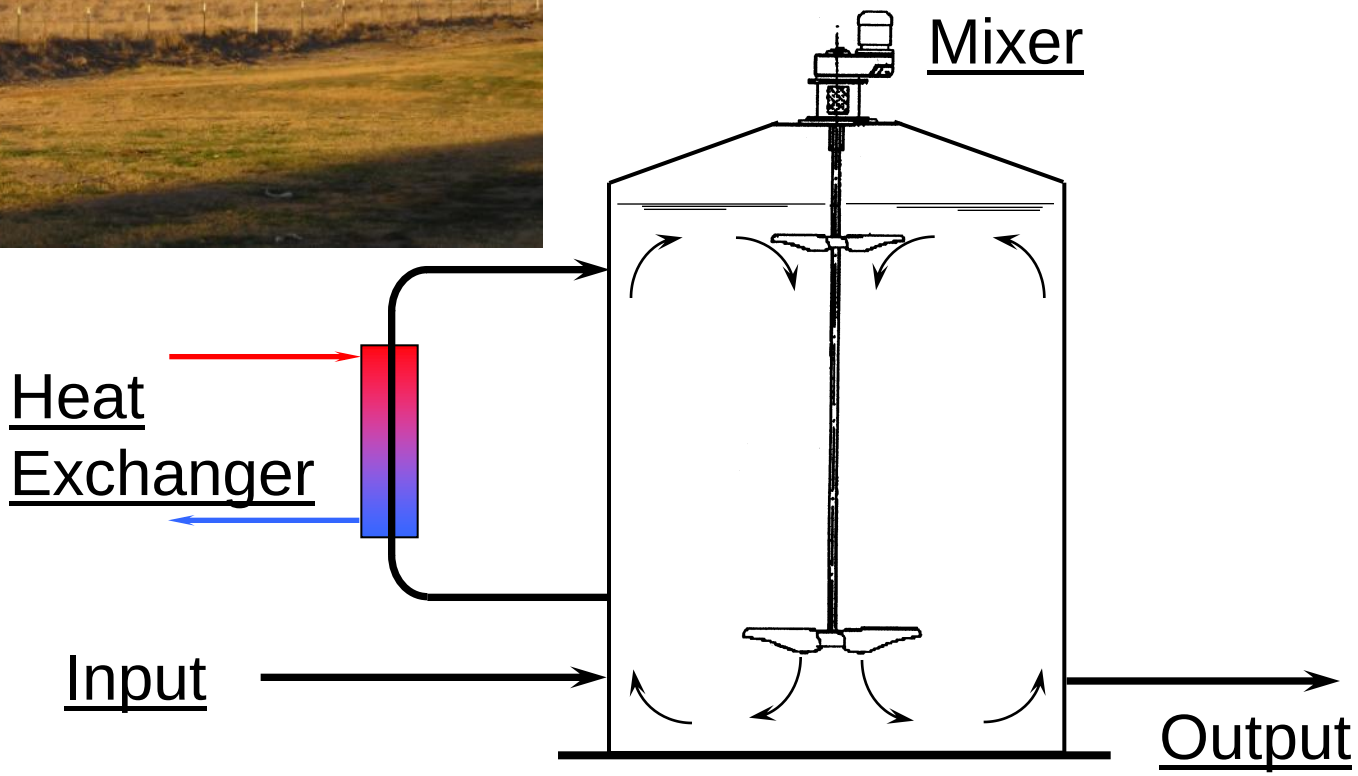
2 Upright Large Digester

(4.500 m³ volume each)



Top mounted Agitator for complete digester mixing

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Gas System

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Gas Blowers

Local biogas grid

- Pretreatment
  Desulphurication
  1. biological desulphurication with oxygen
  2. iron sponge sulfur removal devices
  Drying
  Compression to 200 psi / 1,4 MPa

- Local biogas grid
  gas flow
  diameter

- Distribution of biogas to five different companies for internal power production


4
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METHANE
GAS
2007 . 04 . 29

Statements

No biogas plant is economically feasible with manure as input substrate only. We need organic waste for two reasons:
a) Tipping Fee (Gate Fee)
b) Extra Biogas Production

There is nothing more stupid than saving money at the wrong place.
a) biogas is aggressive. All biogas exposed materials have to be in high quality (PE, PVC, SS 316)
b) the money is earned by the electricity production. Who is responsible for maintenance service for the gas engine?
c) a biological process has to be controlled on a regular basis. What laboratory can do these investigations?

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