

# Combigas

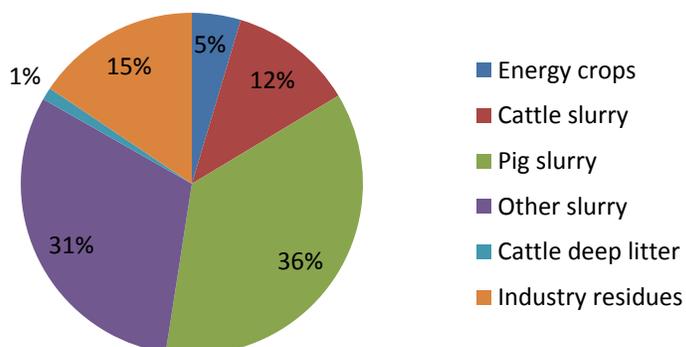


The biogas plant at Gundebølsvej, Hemmet, was built in 2012 by the Danish company Combigas that design, develop and support biogas solutions.

## Vision

The plant was built in order to demonstrate a medium size standardized decentralized farm biogas plant appropriate for realizing the municipality, Ringkøbing-Skjern's Energy plan. In the plan the municipality set high goals for the utilization of biogas from manure from its many life stock producers. In addition Combigas wanted to demonstrate the use of heat pumps for heating the digesters, a semi-automatic management software and a new biomass intake system for mixing of solid biomasses with pig slurry.

## Biomass feedstocks



**Start of operation:**  
2012

**Capacity:**  
36,500 t/year, 100 t/day

**Type of digestion:**  
Continuously stirred tank reactor (CSTR), 2 step thermophilic wet

**Retention time**  
34 days

**Drymatter content (DM)**  
12 % in average input

**Distance to suppliers of manure:**  
majority < 5 km

**Biogas Production:**  
1.5 mio. m<sup>3</sup> biogas/year  
(27 m<sup>3</sup> CH<sub>4</sub>/t)

**Utilization of gas:**  
Until 2015 power to grid produced by a 750 KWe motor and heat for local use. From 2015: upgrading to Natural Gas Grid

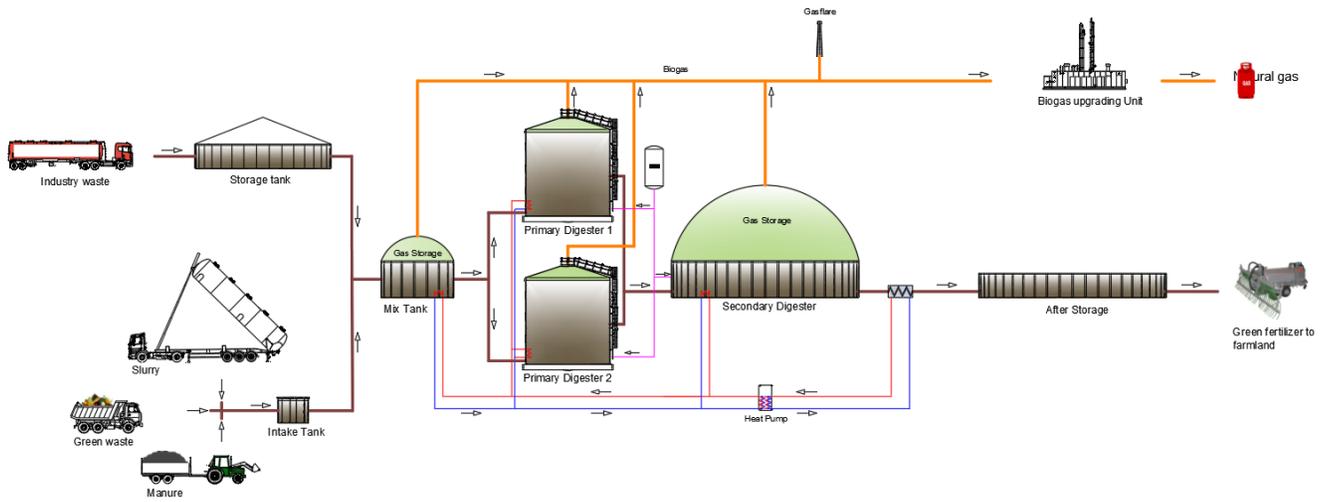
**Utilization of digestate:**  
Fertilizer on crop land

**Distance to spreading area**  
0 – 15 km

**Permanent jobs created: 3**

**Investment biogas plant:**  
USD 1.95 mio.

**O&M costs/year:**  
USD 0.27 mio. (excl. transport)



### Production and gas use

The plant uses slurry and manure from pig, cattle, mink and poultry farms. In addition it uses energy crops and agricultural and industrial residues. The majority of the slurry is pumped to the plant from farms up to 5 km away through buried pipes. In addition the plant receives trucks with biomass.

The biogas was first used for Combined Heat and Power generation in a large gas engine. The power was sold to the grid and the heat was used in local farms. In 2015 an upgrading facility was built. The facility has a capacity of 16 million m<sup>3</sup> of biogas pr. year and is currently handling gas from 3 different biogas plants all located within 6 kilometres from the upgrading station.

### Benefits

In addition to the renewable energy production the estimated benefits of the production is reduced CO<sub>2</sub> emissions from manure management and production of digestate as biofertilizer for farmers.



**Manufacturer and Operator:**

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Frank Wennerberg,  
 CEO Combigas

## Specification sheet

### 1. Sources of information:

<http://www.combigas.com>

[https://ens.dk/sites/ens.dk/files/Bioenergi/02.02.2016\\_slutrapport\\_taskforce\\_faglig\\_del.pdf](https://ens.dk/sites/ens.dk/files/Bioenergi/02.02.2016_slutrapport_taskforce_faglig_del.pdf)

[https://ens.dk/sites/ens.dk/files/Bioenergi/oekonomirapport\\_udvikling\\_og\\_effektivisering\\_final.pdf](https://ens.dk/sites/ens.dk/files/Bioenergi/oekonomirapport_udvikling_og_effektivisering_final.pdf)

<https://www.energiteknologi.dk/node/1135>

### 2. Specify investment costs, what is included?

Biogas plant as illustrated inclusive 2 tanks, 2 digesters, gas cleaning, one tank for digested biomass. CHP – plant and upgrading facility is not included. Trucks are not included as transport is outsourced.

### 3. Specify O & M costs, what is included?

	Specification	Estimated total costs <sup>2</sup> USD/year
Personnel	1,5 employees 1.9 USD/ton	65,934
Electricity (for stirring, etc)	13 kWh/ton <sup>1</sup>	71,429
Heat (power for heat pumps)	11 kWh/ton <sup>1</sup>	60,440
Administration and insurance	0.6 USD/ton	21,978
Maintenance and other operational costs	2.4 USD/ton <sup>1</sup>	82,418
Transport	Up to 80 km transport of feedstocks 11 USD/ton <sup>1</sup>	384,615

<sup>1</sup> [https://ens.dk/sites/ens.dk/files/Bioenergi/oekonomirapport\\_udvikling\\_og\\_effektivisering\\_final.pdf](https://ens.dk/sites/ens.dk/files/Bioenergi/oekonomirapport_udvikling_og_effektivisering_final.pdf)

<sup>2</sup>Totals are calculated using 35,000 tons/year based on the source above

Purchase of biomass is not included in O&M. O&M =267,000 USD excl. transport and biomass and 651,000 incl. transport.

1 USD = 6.37 DKK

### 4. Value of gas

The value of produced biogas from Danish biogas plants is highly dependent on current subsidy, gas utilisation and actual commercial agreement in each individual case. The highest value is obtained if gas is used for combined heat and electricity production, or if the gas is exported to the natural gas grid. The net value of the gas will in these cases typically be around USD 0.6 /m<sup>3</sup> methane. Net value is defined as income from energy sales minus costs of gas cleaning and conversion processes. Due to competition from other renewable energy sources, the value is expected to decrease somewhat in the future.

**5. Who has approved the data?** CEO Frank Wennerberg, Combigas

**6. Which years do the data cover?** 2014, except the composition of feedstocks which is from 2015 - 16

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