

Pilot Project Biogas-powered Micro-gas-turbine

Supported by the
Hessischen Ministerium
für Wirtschaft, Verkehr
und Landesentwicklung



Speaker Details

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Project goals

Project plan

Project results

Project outlook

The goal of the project is to prove weather or not the microgasturbine technology is a working solution for biogas-plants in the agriculture sector



Here for will be a microgasturbine installed and run for the time of 2 years

The major task is the design and optimisation of the gas delivery unit and the optimisation of the interaction between gasturbine and gas delivery unit.

Why use a micro gas turbine on a biogas-plant?

- Variable gas-qualities are useable**
- Excellent behaviour of the gasturbine in part load**
- Good part load efficiency compared to reciprocal engines**
- Long maintenance interval/long live of the gasturbine in comparison to reciprocal engines**

Project Statement

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Micro Gas Turbine used:

Capstone C30

Ca. 28 kW el.

Eff. Ca. 28%



Capstone 28kW_{el}

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Project plan

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Project Start 01/2004

Definition of the location 03/2004

Design and procurement 03-09/2004

Start test runs 10/2004

Start normal operation 11/2004

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Location

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The following criteria was taken to choose the location

- Size of the plant
- Condition of the plant
- Excess of gas available
- Total of gas available
- Space available
- Characteristic for the state situation
- Manpower available
- Distance to out Institute



Design and Procurement

10/18

Possible designs for the gas delivery unit:

1. RPM-regulated compressor
2. Pressure-regulated compressor with a pressure vessel

Second Solution is our favourite, potential of 10-25% lower costs



Project Tasks

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Capstone fuel requirements

- Minimum Methane 35%
- Up to 7% H₂S
- 10° difference to dew point
- Temperature not higher then 50°C
- Minimum pressure at 4bar

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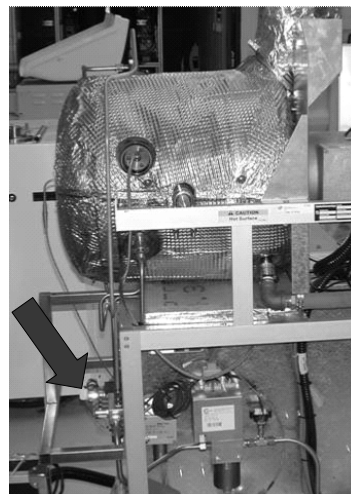


Project Tasks

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Tasks for the gas delivery unit

- Drying
- Pressurising
- Filtering
- Delivering the right quantities



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Procurement:

Compressor:

Over 70 enquiries in Europe

Offers ranging from 9.000 € to 60.000 €

Vessel:

Enquiries in Germany

Offers ranging from 7.500€ to 15.000€

Heat exchangers:

Enquiries in Germany

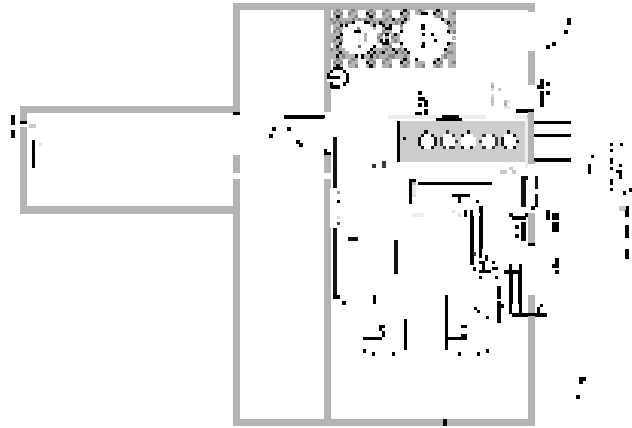
Offers ranging from 4.000€ to 12.500€

Compressor:



Heatexchanger:





Aufgabenstellung
EMM

Measurement instrumentation

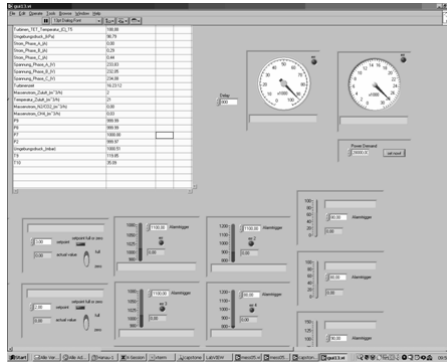
CH₄ in Biogas before and after compression
H₂S in Biogas before and after compression
Relative Humidity before and after compression

NO_x in exhaust
CO in exhaust

Pressure and temperature

Planned for not permanent: Nh₃ in Biogas

MACS Microgasturbine Advanced Control System



September 2004 CHP installation

September 2004 Gas delivery unit installation and test runs

Oktober 2004 Gas turbine Installation and Test runs

November 2004 normal operation and data collection

