NIMTOFTE BIOGAS

BIOGAS CASE STORY

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Self-sufficient biogas plant supplies the grid 24/7
With 650 sows, 20,000 slaughter pigs per year, a total reactor size of 11,500 m^3, and a top-notch gas engine controller with anti-knocking regulator, Nimtofte Biogas has hit the success formula. By fueling the gas engine with biogas extracted from the piggery's dung, the plant produces 3 GWh yearly for the grid corresponding to 600 households – and utilises the surplus heat to warm the pigsty and other buildings.*

In 2015, Nimtofte Biogas decided to upgrade the plant's 15 year old and worn-out engine and an outdated power management system. The owner, Kristian Thorsen, therefore began searching the market for new solutions.

"Due to the varying quality of biogas, we prioritised the possibility of continuous fine-tuning when selecting the new solution. It is our experience that fine-tuning is essential to obtain optimum utilisation of the biomass", Thorsen explains and continues.

"Fine-tuning also minimises consequential losses because it enables us to intervene and make adjustments rather quickly".

Ultimately, Kristian Thorsen ended up choosing the power management solution from DEIF because of its flexibility and almost endless possibilities to fine-tune.

"It has become quite a sport to us to optimise the plant in order to secure the largest contribution margin. Obviously, this hunt for the last marginal demands both ability and willingness to acquaint oneself with the technical side of the system – but don't forget… The last marginal holds the key to optimise your profit", says Kristian Thorsen.

* Average household, 4 persons, according to DONG ENERGY

»With the old system, we had a 34% efficiency ratio. The new system has elevated this to just below 39%. For a period, we have even been constantly above 40%.«

Steffen Thorsen
Chief engineer
Nimtofte Biogas

EASIER DAILY OPERATION

Almost a year after commissioning, Thorsen takes stock of Nimtofte Biogas' experiences and achievements with the new solution.

"I am very satisfied with DEIF's power management system and how it integrates with the rest of the biogas plant. The DM 400 is virtually self-optimising, which has made the daily operation much easier and unproblematic. Additionally, if anything goes wrong, I am notified via SMS. That allows me to focus on other things", he says.

Anti-knocking for protection and optimum utilisation

Initially, Nimtofte Biogas invested in the power management solution only. Shortly after that, they decided to look further into adding an engine anti-knocking module to it. Again, this stemmed from a desire to further optimise the engine running conditions and – in the end – the output performance.

"By adding glycerine, you can raise the octane rating, thereby improving the combustion process. However, operating close to the upper limit of the engine also increases the risk of engine knocking."

"Adding DEIF's anti-knocking module to our control solution has already prevented two gas engine breakdowns. Because of biogas impurities, the air intake valve was stuck – this was detected by the AKR which stopped the engine immediately to prevent damage."

"The regulator constantly monitors and adjusts if necessary", Steffen Thorsen, chief engineer of Nimtofte Biogas, explains.

POWER EFFICIENCY

Efficiency improvement cuts payback time
The installation of the new and contemporary solution not only brings easier operation. Nimtofte Biogas has also registered a considerable efficiency improvement.

“With the old system, we had a 34% efficiency ratio. The new system has elevated this to just below 39%. For a period, we have even been constantly above 40%”, Steffen Thorsen states.

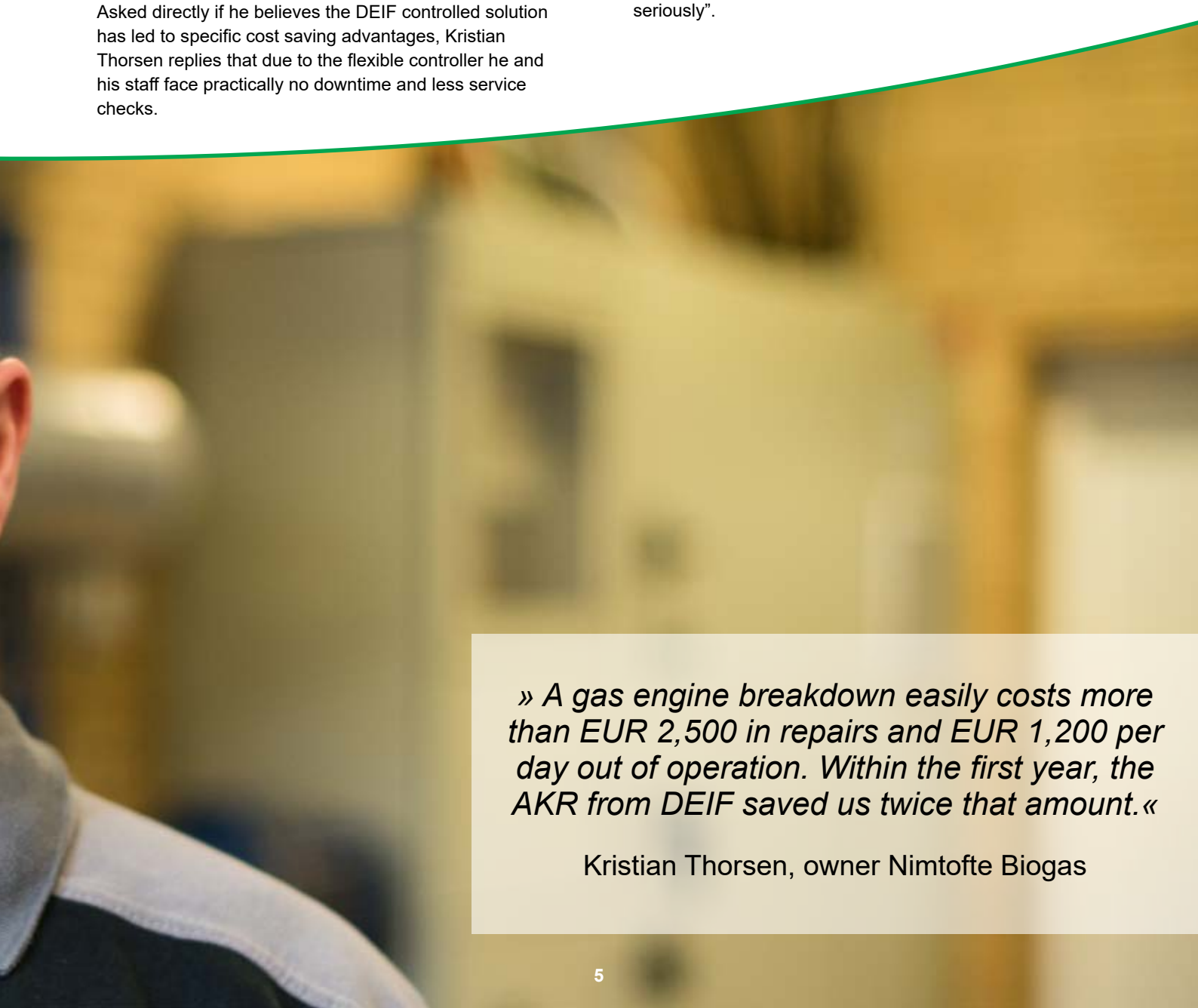
Kristian Thorsen attributes the main part of the progress to the new RMG gas mixer and the power management system from DEIF. Due to the optimised efficiency of the entire plant, he estimates a return on investment equal to approximately one year.

Asked directly if he believes the DEIF controlled solution has led to specific cost saving advantages, Kristian Thorsen replies that due to the flexible controller he and his staff face practically no downtime and less service checks.

As a day of downtime costs around 1,800 Euros in total, it is absolutely crucial that the system remains in operation all the time.

High commitment and constructive dialogue
Kristian Thorsen describes the commissioning period of the anti-knocking system as a bit challenging because it was a new solution and a first in terms of combining Nimtofte Biogas’ specific engine type with DEIF’s regulator.

“On the other hand, that gave me the opportunity to experience the high level of engagement of DEIF’s project team. Really dedicated and focused on finding the right solution. Our dialogue has been and remains very positive. I feel our input is appreciated and taken seriously”.

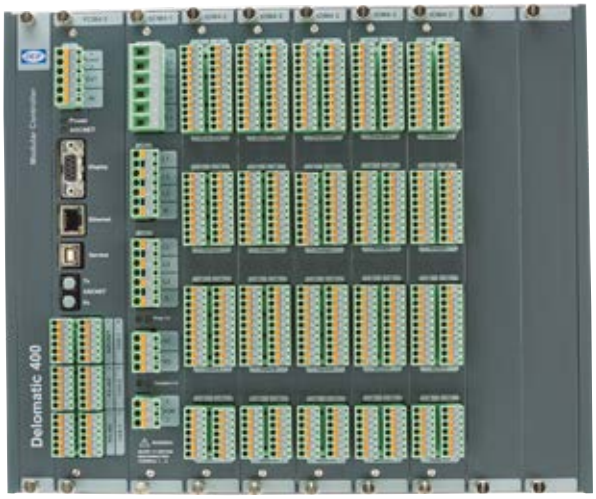


» A gas engine breakdown easily costs more than EUR 2,500 in repairs and EUR 1,200 per day out of operation. Within the first year, the AKR from DEIF saved us twice that amount.«

Kristian Thorsen, owner Nimtofte Biogas

Facts

Nimtofte Biogas' DEIF solution



Delomatic 400 Gas: Gas engine controller

- Gas engine and generator control, protection, synchronising and load sharing for both active and reactive power
- Mains protection including loss of mains detection
- Control of aux systems: gas mixture and gas circuit, air circuits/exhaust gas, cooling circuits/ emergency coolers, heating circuits etc
- Emission control and communication to ignition system (Altronic CD200, Heinzmann Phlox 2 and others)
- PC touch interface including animated flow diagrams, log books and so on for easy supervision of the entire CHP (locally and remotely)

DBC-1: Battery charger

- Automatic and electronic protection features
- Automatic restart after fault condition
- Alarm relay
- Automatic output power derating for high ambient temperatures
- LED indication of faults, boost charging and normal operation
- Boost mode
- Adjustable output voltage
- No moving parts – no maintenance

GPU-3 Gas: Generator protection unit

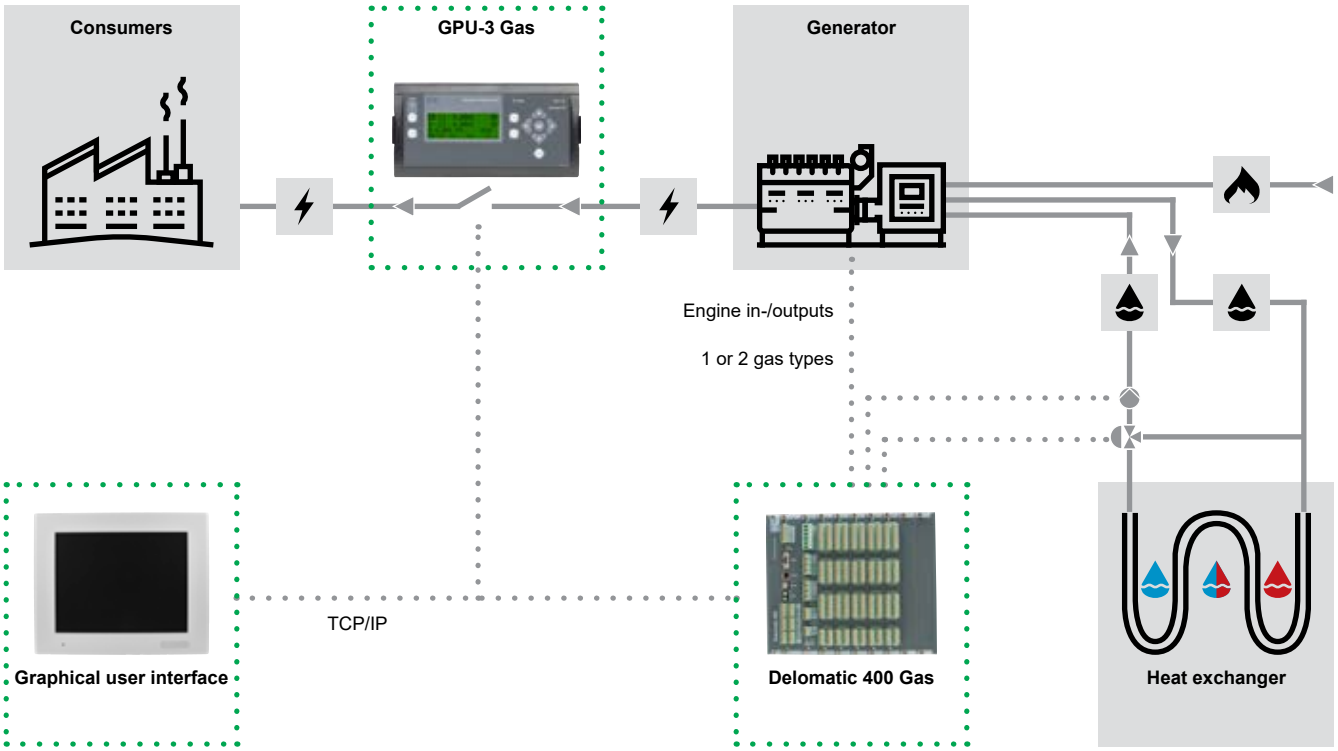
- Generator/mains protection incl loss of mains protection
- Synchronisation
- Multiple display units and operator panels possible

AKR 3: Anti-knocking regulator

- Individual cylinder-knocking monitoring for up to 24 cylinders
- J1939 communication to controller
- Digital alarm outputs

Diagram and technical description

Nimtofte Biogas' DEIF solution



Facts about Nimtofte Biogas' engine and generator

Engine make	MAN
Engine type	E2842LE302/12 cylinders
Alternator make	STAMFORD
Alternator Power output	360kW

Facts about Nimtofte Biogas' heat production

The waste heat from the engine is used for building and biogas plant heating. The heat is taken from the cooling water and an exhaust heat exchanger.

At 100% engine load:

Heat production:	450kW
Heat loss (exhaust and radiation):	90kW

DEIF's power management solution fits gas engines from for instance the following manufacturers:

- MAN
- JENBACHER
- MWM
- CATERPILLAR
- GUASCOR

If your gas engine is from another manufacturer please contact us at info@deif.com

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LEARN MORE AT WWW.DEIF.COM/GAS