



Case story

New, large scale biomass plant opts for energy efficiency

More than forty Danfoss VLT® frequency converters are used in a new Dutch the biomass plant's sophisticated process control systems. Chosen for their high efficiency in large scale operations, the drives also support the plant's green ambitions.

In a field that is developing quickly, anaerobic digestion is currently looking like an attractive proposition in sustainable energy production. Not only does it provide a solution for the treatment of all sorts of biodegradable waste; it also produces a constant supply of energy in the form of gas, which can be converted to electricity. The waste products are clean water and organic fertiliser, which can be completely reused.

One of the largest digestion plants is the Lijnco Green Energy Biomass Plant (LGE), part of Biopark Terneuzen, which is to receive

investments of EUR 0.5 billion. The biomass plant is one of the biggest sustainable energy projects in the Netherlands and will cost more than EUR 35.5 million and will produce gas which is then used to generate clean electricity. The only subsidy available for this is the Sustainable Energy Stimulus Scheme (stimuleringsregeling voor duurzame energie, SDE+).

Output constantly rising

The project is being implemented by the Schücking Energy Group from Enschede and Lijnco from Groningen and is managed by process technologist Jupp Schücking. The technology for the biomass plant is being provided by HME Engineering for the industrial automation and process control systems and Mosch Thermische Installaties (MTI) for the mechanical systems.



23,000
tonnes CO₂ emissions saved

In total, the biogas plant represents a reduction in CO₂, methane and nitrogen emissions by around 23,000 tonnes per year.



VLT® drives contribute to the clean credentials of the plant. This also applies to the high-efficiency electric motors used in the drives.

Heino Oltwater,
HME Engineering



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Part of the biomass consists of waste products from maize and wheat.



Seepex progressive cavity pumps powered by Danfoss VLT drives.

The Schücking Energy Group has already completed a number of biogas plants in the Netherlands and other countries, including the world's first mono-digester for animal waste. A key characteristic of their projects is the large scale.

"Numerous small-scale facilities are already in use in the Netherlands. Unfortunately, their capacity is much too small. You need at least 1 megawatt to make it worthwhile. We build large plants rated at 1 megawatt and above. In total, we have now installed around 50 megawatts of capacity. In four years time, we will have doubled this. In Europe, we

rank among the largest builders of biomass plants", explain Jupp Schücking.

The LGE Biogas Plant currently processes more than 300 tonnes of biomass per day, with a capacity of 135,000 tonnes per year. At the moment the plant is increasing its production to 6,000 cubic metres of gas per hour and 5 megawatts of energy.

"This should increase to 10 megawatts by the end of 2011, and we expect the output to double again sometime in the future. The electricity is sold to energy supplier Delta N.V.," says Jupp Schücking.

Scale is crucial for optimum results

Scale is extremely important in biomass plants because the fermentation process requires constant monitoring. Fermentation involves a large number of bacteria that live in a delicate balance with the various organic substances. The rate at which organic substances are digested varies considerably.

For instance, wheat is digested in 40 days, while glycerine takes only 24 hours. Maize, by contrast, takes a full 80 days. This biological process must be constantly fed, just like farm animals. If there

is too little input, the digestion process will stop, and if you overfeed, the mass will start to froth and overflow. Production downtime is highly undesirable, because it can easily take eight days of extra effort to get the process going again.

Anaerobic digestion is therefore not something that farmers can do on the side. The process requires specially trained staff to manage the processes, and this is only possible if the scale is right.



The manure digestion tanks (6,000 cubic metres per tank) hold sufficient biomass for 10 megawatt generation capacity.

Amibition to set new standards

“We want this plant to set the standard and be a model that we can reuse in subsequent projects. We drafted the functional requirements for the electrical system. Important elements in this are the forty or so Danfoss VLT® frequency converters, including a large number of 45 kW drives. These are used, for instance, to drive the many pumps and mixers that are essential in keeping the fermentation process going. There are ten 22 kW and 30 kW Seepex pumps between the large tanks,” says Heino Oltwater of HME Engineering, who continues

“This is the first time that I have used Danfoss frequency converters. Van Egmond Elektrogroothandel in Doetinchem recommended the Danfoss VLT® frequency converters because they have 2% higher efficiency. They therefore contribute to the clean credentials of the plant. This also applies to the high-efficiency electric motors used in the drives.”

The frequency converters were supplied by Van Egmond, a company that HME Engin have done business with for a long time. They are a Danfoss distribution partner and can supply all frequency converters from stock, allowing the entire construction process to proceed smoothly. Furthermore, Van Egmond Industrial Automation built the accompanying panels and developed the control and visualisation software for the plant.

Basics of biomass production

The biomass plant digests waste according to the co-digestion principle. Co-digestion means that agricultural and food wastes are digested together with animal manures. The waste comes from companies that process grain, maize, sunflower seeds and soy beans to make foods and animal feeds. This results in organic waste matter such as animal skins, which are generally unusable apart from anaerobic digestion. These materials are mixed with glycerine and animal manure, which is supplied from across the entire country.

Digestion takes place in seven tanks with a total volume of 35,000 cubic metres. The biogas produced is collected in a secondary digester which is recognisable by its bulging tarpaulin cover. Below this is the methane gas, which must be compressed and dried before it is ready for combustion in the gas turbines. The remaining biomass is purified using a membrane filtration and drying system.

What remains is clean water and organic fertiliser. The fertiliser contains nitrogen, phosphates and potash, which can readily be sold to the agricultural industry as organic, non artificial fertiliser, which is a scarce substance which production usually involves high levels of CO₂ emissions. From an environmental perspective being able to reclaim them is very important.

The biogas plant has its own water purification facility that can produce as much clean water as a sewage treatment plant for 1.5 million people. In total, the biogas plant represents a reduction in CO₂, methane and nitrogen emissions by around 23,000 tonnes per year.

Biopark Terneuzen (total investment EUR 500 million)

Lijnco Green Energy Biomass Plant:
capacity 135,000 tonnes of waste from the food industry and agriculture

Drives in Lijnco Green Energy Biomass Plant

A wide range of VLT® AutomationDrives, from 1-45kW help control the many intricate processes that lead to clean energy, supported by networking and safety options.

2x FC302 1 kW
1x FC302 1.5 kW
5x FC302 3 kW
7x FC302 4 kW
4x FC302 5 kW
3x FC302 11 kW
1x FC302 15 kW

5x FC302 22 kW
3x FC302 30 kW
2x FC302 37 kW
6x FC302 45 kW
11x Profibus modules
10x LCP2 graphical displays
10x MCB 108 Saftey PLC IF

What VLT® is all about

Danfoss VLT Drives is the world leader among dedicated drives providers – and still gaining market share.

Environmentally responsible

VLT® products are manufactured with respect for the safety and well-being of people and the environment.

All activities are planned and performed taking into account the individual employee, the work environment and the external environment. Production takes place with a minimum of noise, smoke or other pollution and environmentally safe disposal of the products is pre-prepared.

UN Global Compact

Danfoss has signed the UN Global Compact on social and environmental responsibility and our companies act responsibly towards local societies.

EU Directives

All factories are certified according to ISO 14001 standard. All products fulfil the EU Directives for General Product Safety and the Machinery directive. Danfoss VLT Drives is, in all product series, implementing the EU Directive concerning Hazardous Substances in Electrical and Electrical Equipment (RoHS) and is designing all new product series according to the EU Directive on Waste Electrical and Electronic Equipment (WEEE).

Impact on energy savings

One year's energy savings from our annual production of VLT® drives will save the energy equivalent to the energy production from a major power plant. Better process control at the same time improves product quality and reduces waste and wear on equipment.

Dedicated to drives

Dedication has been a key word since 1968, when Danfoss introduced the world's first mass produced variable speed drive for AC motors – and named it VLT®.

Twenty five hundred employees develop, manufacture, sell and service drives and soft starters in more than one hundred countries, focused only on drives and soft starters.

Intelligent and innovative

Developers at Danfoss VLT Drives have fully adopted modular principles in development as well as design, production and configuration.

Tomorrow's features are developed in parallel using dedicated technology platforms. This allows the development of all elements to take place in parallel, at the same time reducing time to market and ensuring that customers always enjoy the benefits of the latest features.

Rely on the experts

We take responsibility for every element of our products. The fact that we develop and produce our own features, hardware, software, power modules, printed circuit boards, and accessories is your guarantee of reliable products.

Local backup – globally

VLT® motor controllers are operating in applications all over the world and Danfoss VLT Drives' experts located in more than 100 countries are ready to support our customers with application advice and service wherever they may be.

Danfoss VLT Drives experts don't stop until the customer's drive challenges are solved.

