

# MORE BIOGAS FROM WASTE BIOMASS

## Pre-treatment from GFE and Xergi

The pre-treatment system increases biogas production from manure fibres and makes it possible to utilize a wider range of biomasses including animal byproducts. The alkaline pressure boiling results in higher methane production and removal of ammonia before introduction to the digester reactor. The verification included testing of several different biomasses in laboratory at the Danish Technological Institute.

### Verification of manure fiber pretreatment effect upon biogas potential:

- Manure fibres as substrate
- Increase in biogas production
- Faster fermentation process
- Efficient ammonia removal

Getting the best out of waste using boiling and ammonia extraction from fibres

The pre-treatment of biomass is a combination of pressure boiling and pH regulation using of calcium oxide addition. This relatively simple procedure helps breaking up the structure of the biomass and makes more nutrition accessible to the microorganisms, which results in a higher methane production. Furthermore the pre-treatment reduces ammonia in biogas reactors, which makes it possible to use biomasses with a higher content of nitrogen. As a side effect the boiler homogenises the biomass.

*"It is important that test and verification is carried out by approved and impartial institutions and we are therefore very content with the establishment of the verification centre DANETV. This ensures a high degree of certainty of the results and international recognition, which is especially important to us as the export markets are very interested in pretreatment technologies from GFE and Xergi."*

Lars Jørgen Pedersen, Director of board the Board, GFE  
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# BOOSTING BIOGAS BY IMPROVED SUBSTRATES

## The new slurry separator from SB Engineering increases the efficiency of biogas plants and reduces slurry transports

AgroTech has tested the separator from SB Engineering to verify the performance. Verification was done in full scale on a commercial farm using cattle slurry as input manure. The main objective of the test was to verify the separation efficiency with respect to total solids, total nitrogen and phosphorous and at the same time determine the biogas yield of the solid fraction. In addition the electricity consumption has been measured as part of the verification.

### The verification of the SB Engineering separator was done for an application as follows:

- Separation of cattle slurry
- Biogas yield of solid fraction
- Separation efficiency with regard to organic matter, nitrogen and phosphorous
- Capacity (tons/hour)
- Electricity consumption (kWh/tons slurry separated)

### Benefits both climate and environment

The separator divides liquid livestock manure into a solid fraction and a liquid fraction. The solid fraction is rich in organic matter and thus a useful substrate for biogas production. The liquid fraction is characterized by low concentration of organic matter and this leads to improved nutrients uptake by the crops when the liquid fraction is applied to the fields. Thus, slurry separation is a way to reduce nutrient losses to the environment.

*"Independent tests and verifications play an important role in the development and marketing of our environmental technologies in Denmark and other countries."*

Søren Brams, Director, SB Engineering

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# TOXICITY MEASURE OF WASTEWATER

## Luminescence technology from HACH-LANGE for faster laboratory and on site toxicity measurements

HACH-LANGE luminometers for toxicity test in wastewater samples, LUMISTox, for laboratory tests and the recently developed field/laboratory instrument, ECLOX, have been verified at the DHI DANETV Water Centre.

The verification was done as a joint verification with the US EPA ETV, hosted by Battelle, and ETV Canada, hosted by OCETA. The verification results will be a strong marketing tool for HACH-LANGE.

### Faster screening for toxicity

LUMISTox and ECLOX perform luminescence tests with the light emitting bacterium *Vibrio fischeri*. If bacterial metabolism is inhibited by a toxic compound less light is emitted. The inhibition is quantified by means of a luminometer.

In contrast to chemical analyses, bacteria tests can evaluate overall toxicity of a sample. The test is fast compared to other toxicity tests (e.g. daphnia, fish), with a test time of only 30 minutes. The test thus allows for fast screening for toxicity in e.g. effluents from wastewater treatment plants and gives possibility for improved traceability of sources of toxicity.

*"HACH-LANGE has a long tradition in development and as supplier of high performance water analysis equipment and systems. HACH-LANGE is convinced that a joint verification with DANETV, U.S. EPA ETV and ETV Canada is of major importance for a global market acceptance of the HACH-LANGE LUMISTox and ECLOX Luminescent Bacteria Test Systems."*

Dr. Elmar Grabert, HACH-LANGE GmbH

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# DRYING BIOMASS INCREASES ENERGY YIELD

New energy efficient steam technology from Cimbria Manufacturing A/S dries biomass fibre fractions with zero emissions

The Super Heated Steam Drier from Cimbria Manufacturing A/S was verified by DANETV. The biomass drying technology is tested on a wet manure fibre fraction and the efficiency is measured as a change in dry matter content.

The drier is based on an evaporation process using overheated steam to evaporate water from fibrous material. The steam is condensed and the energy content is recovered and reused in a district heating system.

## Verification of technology for biomass drying

The verification of the drier was done for an application as follows:

- Manure fibre fractions with high water content above 30%
- Increase in dry weight
- Energy balance

It makes a difference with the drying technology and the verification

With the new drying technology a significant increase in the dry matter content of the manure fibres is achieved. This enables new possibilities for utilization: The manure fibres are easier to handle in transportation and pelletizing. The pellets can be used either as a low cost fertilizer since the nutrients remains in the product or as medium energy content biomass fuel.

*"Cimbria Manufacturing develops machinery and equipment for biological treatment world wide. Several of these processes are extremely energy intensive. In general Cimbria Manufacturing is continuously determined towards a developing process where the primary focus is energy optimization of the different processes.*

*Consequently it is of major importance for Cimbria Manufacturing that the competence of DANETV is applied within verification for environmental technologies "*

Søren Kjær,

Manager of Development and Construction – Cimbria Manufacturing A/S

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## DANETV

The Danish Centre for Verification of Climate and Environmental Technologies, DANETV, offers independent tests of technologies and products for the reduction and monitoring of climate change and environmental impacts. DANETV has been established with financial support from the Danish Ministry of Science, Technology and Innovation.

## TECHNOLOGY AREAS

DANETV covers technologies addressing some of the most important climate change and environmental pollution issues:

- Air emissions
- Energy efficiency and alternative energy production
- Water treatment and water monitoring
- Agricultural environment

## VERIFIED ONCE – VERIFIED EVERYWHERE

DANETV works for global recognition of verifications through co-operation with other ETV schemes in the World and provides joint verifications with e.g. the US ETV scheme on an ad hoc basis.

## VERIFICATION

The process of verification includes:

- Definition of application and identification of relevant performance parameters
- Evaluation of existing data supporting the verification
- Testing to provide missing data
- Verification of performance
- Quality assurance and documentation
- Preparation of verificate

All operated according to the guidelines for environmental technology verification that are being developed as part of the establishment of the coming EU ETV scheme.



www.etv-danmark.dk  
www.etv-denmark.com



# YOUR KEY TO GREEN INNOVATION

Proof of performance promotes the use of innovative, green technologies.

Implementing smarter environmental technologies faster is in the interests of the industry, technology users and the environment.

Environmental technology verification, ETV, provides the credible and independent proof needed.