

Dry anaerobic digestion biogas plant "Biodigester I" at the University of Wisconsin, Oshkosh

SUCCESS STORY

July 2013



Picture: BIOFerm Energy Systems

Operator:

BIOFerm GmbH/BIOFerm Energy Systems

Location of the project:

Oshkosh, WI, USA



Contact details:

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Results of the project

Biochemical

- Waste-to-energy: Digestion of organic waste material and material from landscape maintenance from the municipality and campus

Physical

- Optimized feedstock usage
- Reduced odours, noise (enclosed mixing lobby and exhaust air filtering)

Thermodynamics

- Lower electric energy process for the process
- Lower heat energy process for the process
- Higher efficiency

Economical

- Lower operation costs
- Lower maintenance costs

Socio-environmental

- Reduced pollution
- Waste reduction
- Project for the students to learn more about biogas and dry AD technology
- Raised public awareness/acceptance on biogas and renewable energies
- Renewable electricity or heat supply

Project outline

The University of Wisconsin - Oshkosh (UWO) is the first campus in its State, who adopted a comprehensive Climate Action Plans with goals for energy efficiency and renewable energy. The campus is supposed to achieve carbon neutrality by 2025 and a biogas plant was one of the first steps to reduce amount of organic waste and to increase energy independence. BIOFerm GmbH and BIOFerm Energy Systems have designed and installed a dry fermentation anaerobic digester (BD1), which was a first of its kind in the U.S.A.

Technical data

Year of plant construction: 2010-11

Plant size: Approx. 2,3 million kWh/a electric and 2.8 million kWh/a thermal output

Digester volume:

Approx. 2.900 m³ digester volume;
percolate tank: approx. 450 m³

HRT: approx. 80 days

Process temperature: Mesophilic 40°C

Type of raw material:

Material from landscape maintenance and biowaste

Utilization of biogas: Feed into the electrical grid and the local campus district heating network. Co-utilisation of gas from the local sewage treatment plant in summer.

Heat utilization: Local campus district heating network

Utilization of digestate: Further processing through local composting company

Total investment costs: \$ 3,5 Mio. (approx. € 2,7 Mio.)

Subsidy: Grant funding for the biodigester came from the state of Wisconsin (\$232.587), the U.S. Department of Energy (\$500.000) and the U.S. Treasury Section 1603 (\$1 million). The rest was paid for by the University of Wisconsin—Oshkosh Foundation. Subsidies account for 37% of the total cost.

Performed actions

Biogas plant receives its substrates from the University canteen, local grocery stores and bedding materials from some of the surrounding farms. Due to high dry matter content of the feedstock, plan designer used BIOFerm dry AD process, which is a batch process with a substrate loaded into garage-style digesters with front-end loaders. The solid material does not need to be pre-processed or turned into pumpable slurry, and the digesters have no moving parts like agitators. The advantages of such a plant are low maintenance costs and no downtime in case of contamination (e.g. plastic bags) tangled up in the mixers. Produced biogas is incinerated in a CHP unit to produce electricity, which goes into local power grid and supplies the campus with about 8% of its electrical needs.

Results of performed service

The University plant is in full operation since September 2011. Currently, BD1 acts as a “living, learning laboratory” for students in the field of renewable energies. In addition to the digester, UWO established the Environmental Research and Innovation Center (ERIC), a laboratory for students to conduct water and soil tests and where the new substrates can be tested before going into the digester.

BD1 is nationally recognized as the first dry fermentation anaerobic digester to be in operation in United States, although several have been installed since 2011. It regularly hosts tours of its operations and is frequently featured in biogas and waste management media across the country.

Prepared in collaboration with:

Schmack 

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