

# Digester Turns Manure

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by Tom Shoening

**O**PERATORS OF AGRICULTURAL FACILITIES constantly look for ways to increase the value of their operations, save money and benefit the environment. One large northeastern South Dakota dairy is planning to use its manure for a list of new value-added products, including generating electricity.

Near Milbank, Midwest Dairy Institute installed a huge anaerobic digester – the first at an animal confinement operation in South Dakota. This 1,400-head dairy farm is unique – it is owned by the Milbank Community Foundation. In addition to being an economic asset to the community, this innovative dairy serves as an education center helping dairymen to develop skills for modern dairies.

“At Midwest Dairy Institute, the board decided to create a digester project that would attract positive attention for the dairy industry in South Dakota,” said Midwest Community Foundation CEO Carole Boos. “One of the side benefits of digesters is odor reduction and we hope to generate .3 kilowatt per cow.”

After several years of planning, receiving approvals and construction, Midwest’s anaerobic digester is currently being fine-tuned to maximize the production of methane.

“Our digester operates in the same process as a lagoon system,” said dairy Energy Maintenance Manager Jeff Loutsch. “Instead of letting the naturally decomposing solution vent to the atmosphere, the

biogasses are contained in the digester and we speed up the process.”

The digester is the size of three basketball courts: 85 feet wide, 163 feet long and 20 feet deep. The concrete walls, floor and roof vary between 20 to 24 inches thick. Its capacity of 1.2 million gallons of solution is designed to handle 2,400 head, to support the dairy’s future expansion plans.

Naturally occurring microorganisms breakdown the waste products and produce methane and other biogasses. The gas is used to fire a boiler and maintain a constant 96 degree temperature in the waste solution for the bacteria to work at maximum efficiency.

The boiler also provides hot water for heating the barn floors and washing facilities from a renewable resource. “We have an unlimited supply of hot water,” Loutsch said.

“Since the boiler went operational in January, all of the heating in the barns is fueled by biogas, resulting in a significant savings on propane.”

The leftover solids and liquids from the waste solution can also be used or sold. The sterilized solids make good bedding for the stalls, saving on the cost of straw. The liquids will be used as fertilizer.

Surplus methane will fuel the dairy’s 375-kilowatt generator. The Caterpillar engine, located in an auxiliary equipment building adjacent to the digester, is similar to backup diesel generators, frequently



# Into Power

installed in hospitals and emergency facilities. The generator is capable of supplying electricity for 250 average homes.

Recent tests of the generator have been successful, Loutsch said. The next step is to connect the generator to the electric grid.

The dairy is a member of Whetstone Valley Electric Cooperative. “Whetstone Valley is working with our power suppliers, Basin Electric Power Cooperative and East River Electric Power Cooperative, to receive approvals from the regional reliability council to safely connect the output of the dairy’s generator to the electric grid,” said Manager Steve Ahles. “We are assisting with electric system interconnection requirements and a power purchase contract.”

Dairy officials hope to connect to the electric grid this summer.

“This project was a significant investment and the payback is a long ways off,” Boos said. “With the rising prices of propane, this becomes a better and better investment. We should spend our dollars on developing local renewable energy projects rather than purchase imported oil from hostile areas of the world.”

The high cost of the digester, generator and related equipment makes the investment feasible for some large animal-confinement operations. However, improved technologies and new innovations are helping to stir increased interest in digesters because of the many benefits for the operator, community, electric cooperative and environment.

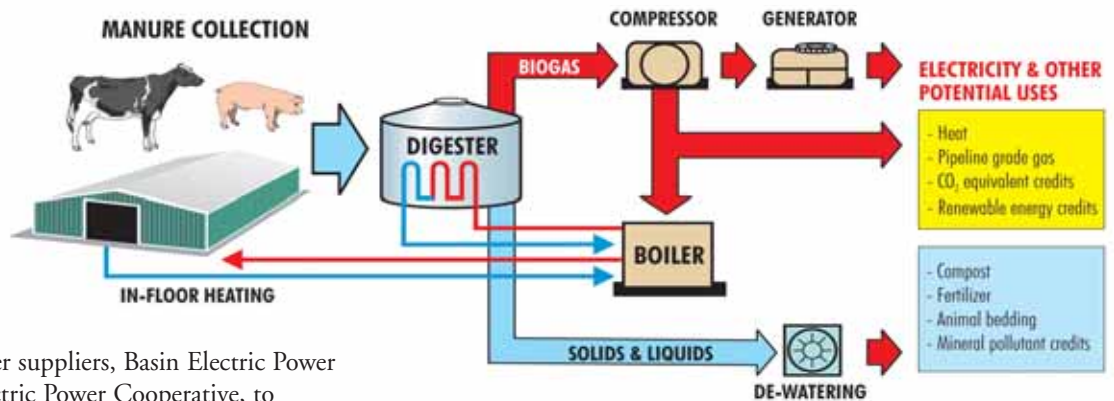
Other animal confinement operations in eastern South Dakota have expressed interest in digester projects. The U.S. Department of Agriculture has awarded grants for proposed digester projects to Turner County Dairy, in the service territory of Southeastern Electric, and Classic Farms swine operation, in the service territory of Charles Mix Electric.

While the power generation contract between the dairy and Basin remains to be signed, Boos sees a bright future for the project. “Basin Electric Power Cooperative recently increased its rate structure for purchasing this kind of renewable energy, which makes the project more financially feasible,” she said. “We plan to sell the output from the dairy generator to Basin Electric.”

The anaerobic digesters are commonly used by cities and food

**Opposite Page:** At 85-feet wide by 165-feet long and 20-feet deep, the Midwest Dairy Institute’s anaerobic digester is the size of three basketball courts. **Photo By: Tom Shoening Right:** The generator at the Midwest Dairy Institute is rated at 500 KW for natural gas and 375 KW for biogas. **Photo By: Jim Housiaux**

## BIO-MASS ELECTRIC GENERATION



industries to control odor at wastewater treatment facilities. Naturally occurring microorganisms breakdown the waste products; the trapped odiferous gases are frequently flared.



## Definitions

**Methane Gas (biogas)** – a naturally occurring gas (CH<sub>4</sub>) that can be produced using a methane gas digester; this gas burns with about two-thirds the level of BTU of natural gas.

**Methane (biogas) Digester** – a device which through biological activity produces methane gas and fertilizer from animal manures and crop residues (such as straw and leaves).