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Cow power: Michigan farmers turn manure into energy

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By Tina Lam

FENVILLE -- The round metal building with its green dome looks only slightly out of place next to barns full of mooing cows. It takes up about a third of an acre, inconspicuous on the sprawling Scenic View Dairy farm, surrounded by dirt roads and acres of tasseled corn.



ANDRE J. JACKSON/DFP

Norma McDonald, owner of Phase 3 Renewables, shows off biofiber – a soft, dark pile that looks like mulch and smells only faintly of its manure origins. It is used as bedding for the cows.

Inside, stinky manure from 3,500 cows and 9,400 pigs is being fermented and turned into electricity. What's left afterward is a rich, dark pile of soft biofiber that looks like mulch and smells only faintly of its origins. It goes back into the barns as bedding for the cows. Liquid that is leftover is sprayed as fertilizer onto nearby corn, soy, alfalfa and wheat crops.

Welcome to the miracle of anaerobic digestion, a natural bacterial process the farm is harnessing to produce alternative energy. Scenic View's anaerobic digesters have been operating for nearly two years -- the first in the country to produce not only electricity but also natural gas for sale.



ANDRE J. JACKSON/DFP

A cow passes by to be milked at Scenic View Dairy in Fennville on Sept. 30. Manure from the cows is used for energy.

The manure is pumped into large insulated tanks, where it's heated to the ideal temperature for tiny bacteria in it to work on producing methane gas.

The gas is pumped to a building, where half of it is used to power two generators that create electricity for the farm and for sale, and the other half is purified, compressed and put into the state's natural gas pipeline.

Across Michigan, half a dozen digesters are operating or planned on large farms. Michigan State University plans to spend \$3 million in grant and foundation money to help small and midsize farms put in methane digesters, some shared among farms.



ANDRE J. JACKSON/DFP

McDonald reviews the amount of energy processed at the farm. "This is just the starting point," she said of turning farm waste into energy.

"If we can turn a waste product into alternative energy, that's an exciting idea to explore," said Bob McCann, spokesman for the Michigan Department of Environmental Quality, which regulates the largest farms.

As the number of megafarms in Michigan has grown, so have complaints from neighbors about the stench and water contamination they produce. Thousands of animals can create as much waste as a small city, according to the Sierra Club.



ANDRE J. JACKSON/DFP

Norma McDonald looks over an electric generator at Scenic View Dairy in Fennville on Sept. 30. "There is so much potential," she said.

More than 3,000 digesters already are operating on farms in Europe, and there are more than 100 in the United States. Last year, the Environmental Protection Agency estimated that digesters could be installed at another 6,900 American farms.

Digesters aren't cheap.

Scenic View's digester and related equipment cost about \$3 million. But as energy prices rise, driving up farm costs, farmers are more willing to consider digesters to create their own energy and

sell the excess, getting payback for the investment within four or five years.

Alternative energy push

In Michigan, farmers have been in the forefront of alternative energy, growing corn for ethanol, leasing their land for windmill turbines and experimenting with fuel made from crops like soybeans and beet mash.

Now, they're trying to make cow power work.

"This is just the starting point," said Norma McDonald of Phase 3 Renewables, a company she started to help farmers turn their most undesirable byproduct into electricity. "There is so much potential."

McDonald, a former executive at Proctor & Gamble, gave up city life to move back to the farm world about the same time her brother, Scenic View owner Michael Geerlings, decided he wanted to try a digester. She agreed to help him find and install the best technology. From there, her business grew.

Farmer Velmer Green of Green Meadows Farms in Elsie has a 3,000-cow operation that produces about 60,000 gallons of manure daily.

His digester, part of ongoing MSU research, has been running an 800-kilowatt generator since spring, with the electricity going to Consumers Energy.

"We thought this would be viable for the farm," he said. "It's not cheap, but we think we'll eventually get paid back."

Ready for a new first

Harley Sietsema is pursuing a slightly different plan. Sietsema Farms, which raises 1.3 million turkeys each year in 40 barns around west Michigan, says he hopes next month to start the nation's first farm gasification plant, which will turn turkey litter and wood shavings into synthetic gas.

The gas will run a 475-kilowatt generator that will power his feed mill 18 hours a day. He'll sell the rest to a utility.

Until now, the farm had disposed of the manure by spreading it on nearby land, he said.

The turkey litter will be baked, leaving a nutrient-rich ash that can be spread on fields as fertilizer, he said.

"We're trying to be as environmentally friendly as we can," he said.

He plans to spend about \$3.5 million on his turkey-powered plant. He figures he'll see payback within about six years.

Gayle Miller, legislative director of the Sierra Club in Michigan, said most digesters are partly paid for by government grants or subsidies.

While the club would like to see a digester at every large-scale farm, taxpayers shouldn't have to pay for them, she said.

"They should have to treat their waste properly as part of doing business," she said.

Digesters are not new, even in Michigan, where there were half a dozen in the 1980s, said Steve Safferman, an agricultural engineering professor at MSU. Most failed because farmers didn't know how to fix them, found them too expensive to operate or didn't have the time to run them.

With higher energy prices, better technology and the push for more environmentally friendly farms, there's renewed interest, Safferman said.

Whether digesters spread to more farms depends partly on whether utilities are willing to buy the electricity at a fair price, Sietsema said.

Michigan's new alternative energy law requires utilities to get 10% of their electricity from renewable sources by 2015, but it doesn't require them to pay what farmers consider to be fair rates.

Matt Smego, a lobbyist for the Michigan Farm Bureau, said various groups are working to improve the law so it benefits renewable energy producers.

"There's lots of interest around the country in what we're doing," said farmer Sietsema. "I believe the future of this is bright."

HELP FOR FARMERS

Besides creating renewable energy, digesters resolve two dilemmas for farmers:

- They create renewable energy and help get rid of farm waste that makes neighbors cry foul.

A small, 200-cow farm produces 1.2 million pounds of manure a year, according to the Environmental Protection Agency.

Farmers spread that manure on fields. But with the explosion of megafarms, that becomes difficult because there's too much manure and not enough land available to spread it on.

A General Accounting Office report in September said the number of large U.S. dairy farms quintupled between 1982 and 2002, while the number of large hog farms grew tenfold. Michigan numbers were not available.

- Digesters sharply cut odors and can kill 98%-99% of the harmful organisms in manure, which at most farms isn't treated at all.

But they don't eliminate all harmful bacteria, which still can get into local waterways.

To get rid of 100% of the organisms, farms would need a full-service wastewater treatment plant like cities have. That usually is not practical.

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