

Living high – and clean – off the hog

A waste-to-energy project on a farm in North Carolina aims to set a new standard.

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REPORTING FROM
YADKINVILLE, N.C.

Lloyd Bryant used to pump manure from his 8,640 hogs into a fetid lagoon, where it raised an unholy stink and released methane and ammonia into the air. The tons of manure excreted daily couldn't be used as fertilizer because of high nitrogen content.

The solution to Bryant's hog waste problem was right under his nose — in the manure itself.

A new waste-processing system — essentially a small power plant — installed on his 154-acre farm uses bacteria to digest the waste and burns methane to produce electricity. It also converts toxic ammonia into forms of nitrogen that can be used as fertilizer for more profitable crops.

Waste-to-energy systems have been around for at least 15 years. But Duke University, which helped develop and pay for Bryant's system, says this one is the cleanest in existence — and virtually the only one that tackles all of the environmental problems created by animal waste.

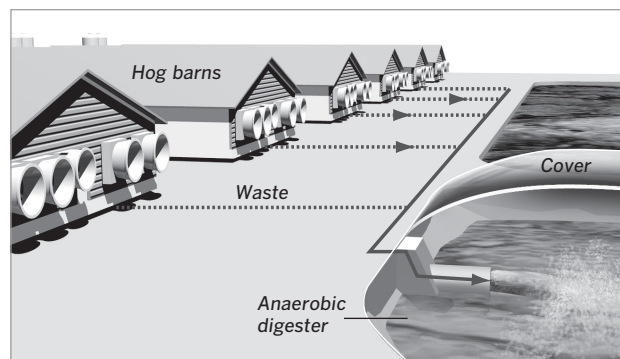
The system was built with off-the-shelf parts and simple design plans that are free for the asking. It's poised to become the standard for a cleaner waste-to-energy model that brings together farmers, utilities and private companies in an environmentally friendly effort.

"It does it in a way that is not overly complicated and stands to yield many more benefits beyond energy production and environmental protection," said Tatjana Vujic, director of Duke University's Carbon Offsets Initiative.

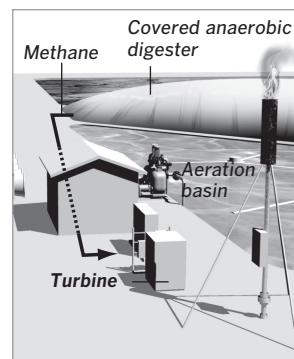
The \$1.2-million project is funded by the university, Duke Energy and Google,

Power-generating hogs

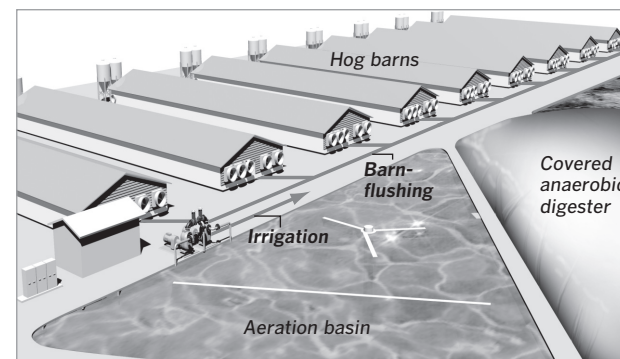
North Carolina farmer Lloyd Bryant has started using a new system to process the waste from his 8,640 hogs. Developed with Duke University, it turns manure into electricity, reduces atmospheric pollution and creates fertilizer for raising more profitable crops.



Waste is flushed from hog barns into a covered pond called an anaerobic digester, where bacteria "digest" the waste and produce methane gas.



The methane is burned to run a turbine, which produces electricity.



Liquid waste then flows into an aeration basin, which treats the water for pollutants such as ammonia. The water can then be reused for irrigation and barn-flushing.

Sources: Duke University Carbon Offsets Initiative, Times reporting

LORENA INIGUEZ ELEBEE Los Angeles Times

which operates a data center in nearby Lenoir, N.C. All three, along with Bryant, will benefit.

Bryant saves money on electricity and gets a cleaner farm. Improved air quality in his hog barns also means his pigs will have lower mortality rates and convert feed more efficiently, fattening Bryant's profits.

Duke University and Google earn carbon offset credits from the system. And Duke Energy gets renewable energy credits in a state where a new law requires utilities to produce a small percentage of electricity from renewable resources beginning next year. North Carolina is the only state that will require a portion of that "set-aside" to include electricity produced from hog waste.

Bryant, whose family has farmed the rolling Piedmont of central North Carolina for four generations, says the 65-kilowatt turbine generates enough electricity to power the system — and five of Bryant's nine hog barns, where giant fans hum day and night.

The digester captures methane equivalent to 5,000 metric tons of carbon dioxide per year and produces enough electricity to power 35 homes a year.

"It's cut my electric bill in half, and it's going to make it so I can grow corn and wheat and beans," Bryant, 71, said as he stomped across the sticky clay soil around the aeration basin.

'A new level'

The project is attracting national attention at a time when a growing number of U.S. livestock farms use various types of waste-to-energy systems to produce electricity and reduce greenhouse gases.

The Duke system is "pioneering," said Gary Gero, president of Climate Action Reserve in Los Angeles, a nonprofit group that runs the nation's largest carbon-offset registry and which developed the protocols that register and verify carbon offsets on Bryant's farm.

Gero said the project shows that digester systems can benefit farmers, the environment and corporations while solving myriad environmental problems not entirely addressed by other systems.

"They're taking it to a new level," he said.

The number of waste-to-energy systems nationally is growing every year, according to the Environmental Protection Agency. Last year, 162 digester systems on

U.S. farms produced 435 million kilowatt-hours of electricity — enough to power 25,000 homes for a year.

The systems reduced methane emissions by 51,000 metric tons and produced enough electricity to avoid 264,000 metric tons of carbon dioxide from fossil fuel power plants — comparable to removing 235,000 cars from the roads. The reduction in methane emissions last year was nearly 22 times as great as in 2000, according to the EPA.

If 8,200 eligible dairy and hog farms nationwide used the systems, the EPA estimates, they could generate enough electricity to power 980,000 homes for a year. They would create the equivalent of removing 6.7 million cars from the roads by reducing methane emissions and avoiding power plant carbon dioxide emissions.

Hog farm digester systems have special potential in North Carolina, which trails only Iowa in the number of hogs raised and where almost all farms rely on waste lagoons.

Six hog farms in North Carolina have converted to waste-to-energy systems. Wisconsin has the most livestock farms using the systems, with 26, followed by

New York and Pennsylvania with 22 each, and California and Vermont with 11 each.

Digesters will spread as scientists figure out ways to make them cheaper and more efficient, says C. Mike Williams, director of the Animal and Poultry Waste Management Center at North Carolina State University. The EPA already offers incentives and technical assistance to farmers nationwide to promote the expansion of digester systems.

Waste nothing

"Farmers like the idea of using every bit of what comes off their farms," said Vujic, of Duke University, as she walked near barns full of squealing hogs on Bryant's farm. "They can manage their waste and save money while doing it."

Digesters cost more than a lagoon, so some corporate factory farms that dominate the dairy and hog industries are reluctant to convert, the EPA acknowledges. Bryant paid nothing to install the digester system. The university, the power company and Google will cover operating costs for 10 years. After that, Bryant will own and operate the system himself.

The Duke system is a pilot project that was expensive to design and test, Vujic

said, but new versions will be cheaper. And because North Carolina farmers are no longer allowed to expand unless they convert lagoon-and-sprayfield systems to waste management systems — after Hurricane Floyd ruptured hog lagoons in North Carolina in 1999 — the new model offers a way to expand their farms and profits.

Bryant previously planted only low-value millet and fescue grass, which can better absorb high nitrogen in lagoon effluent. But because the digester system cleans wastewater and transforms nitrogen into usable forms, fields sprayed with the water are ideal for raising cash crops such as corn or wheat.

"It's a pretty good deal," Bryant said. "I'll be able to put in corn and wheat and beans, and I'll get more yield on less land."

It smells a lot better around the farm these days too. There's a faint whiff of manure, but nothing like the overwhelming and persistent stench of hog waste lagoons.

"People tell me the smell's a lot better now," Bryant said. "To tell you the truth, the smell never bothered me. I just love hogs."

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