

# QUICK Facts

## Grantee

Butler Farms

## Location

Lillington  
(Harnett County)

## Project

Purchase and install engine-generator set to convert biogas from swine manure into electricity for the power grid

## Grant

\$373,780

## Total Energy Project Cost

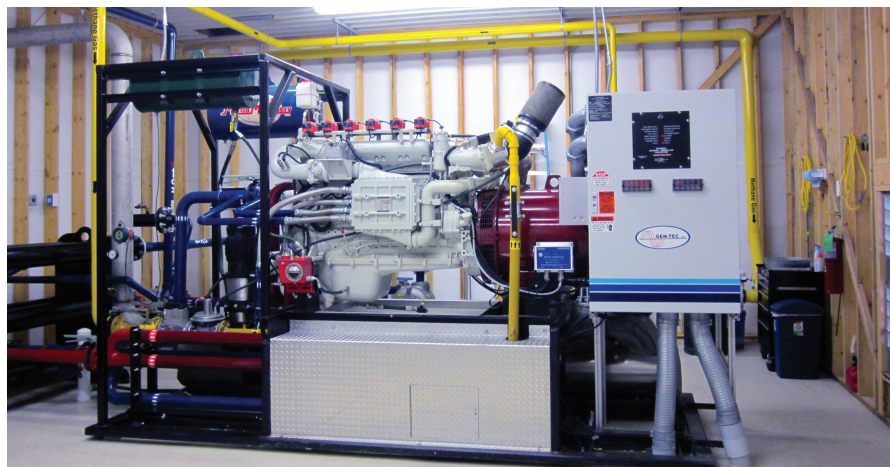
\$670,000

## Funding Source

N.C. Green Business Fund Grant from N.C. Department of Commerce's N.C. Energy Office using federal American Recovery and Reinvestment Act funds distributed through U.S. Department of Energy's State Energy Program

## Highlight

The hog-fining operation uses the biogas, mainly methane, produced from swine manure to power an engine that runs a generator that sends electricity to the local grid. The waste lagoons that produce the biogas are tightly covered, greatly reducing the rank odors associated with hog operations.



## Pig power: Swine manure becomes electricity at Butler Farms

*By Teri Boggess*

*North Carolina Energy Office Communications Staff*

October 2012

Butler Farms knows about changing with the times. It wasn't so long ago that king tobacco started its decline and hogs emerged as a cash crop. Now, Butler Farms is changing again, cultivating new methods, new attitudes and a new product.

Tom Butler, born and raised on the farm near Lillington, considers electricity produced from hog manure to be an important part of the future for his Harnett County farm and similar swine operations. Butler is succeeding in pig power. He also has knowledge to share. He wants other farmers to learn how to generate new income and help protect the environment and the land vital to their financial success. With approximately 4,400 open lagoons holding hog manure in North Carolina, Butler sees a source of a potent greenhouse gas waiting to be transformed to beneficial use.

"The way I look at it is we've already got this methane, so let's use it," he said.

Butler Farms' methane fuels a 185-kilowatt engine-generator set thundering in an insulated, metal-clad building behind 10 hog-filled barns. The methane is produced a few yards away in two tightly covered ambient lagoons that cover about 4.5 acres and hold about 11.5 million gallons of manure and water. Bacteria feast on feces in the lagoons' anaerobic (without oxygen) environment.

The engine-generator package, called a "genset" in the industry, was purchased using a \$373,800 North Carolina Green Business Fund grant from the N.C. Department of Commerce's Energy Office. The federal American Recovery and Reinvestment Act money was distributed to states by the U.S. Department of Energy's State Energy Program. The \$670,000 project is capable of generating enough electricity to power 30 to 50 homes for a year, Butler said.

North Carolina Energy Division [energync.net](http://energync.net)

# ENERGY





"We have installed a system; it's up and running. We have had a lot of glitches and technical issues to deal with, but we expect that in research and development and new systems," said Butler, whose project with contractor Environmental Fabrics Inc. of Gaston, S.C., still must reduce moisture to achieve consistent quality in the biogas, about 60 percent methane, so the genset operates at maximum efficiency. The goal is operating 95 percent of the time, with 5 percent downtime for maintenance.

The genset begins with a high-quality, industrial-grade MAN Engines product that is imported from Nuremberg, Germany, and packaged in Latham, Mo., by Marcus Martin and his Martin Machinery Inc. crew. "We do substantial transformation. We add American controls, American piping, all that to make the product. These are built in Missouri. Wisconsin builds the plumbing. We have engineers on staff. We weld the pipes," Martin said before pointing out an unusual attribute of the workers. "Ninety percent of the equipment is produced by people who ride bicycles."

Those cyclists are Mennonites, he said, who have a 250-year history of being good stewards of the land. Martin's company, which also has a facility in Ephrata, Pa., has been in operation since 1983. His cousins in Lititz, Pa., were early adopters of anaerobic digestion and energy generation, installing a heated digester system in the mid 1980s at their Oregon Dairy Farm in Lancaster County. Besides producing biogas for electricity or heat, anaerobic digestion reduces the acid level of the manure to make it a better fertilizer and protect water quality, Martin said. "It's a slam-dunk, win-win if you can afford it," he said. Capturing the biogas also helps manage H<sub>2</sub>S, or hydrogen sulfide, a corrosive and potentially toxic gas that smells like rotten eggs.

As of September 2012, 192 anaerobic digesters operated at commercial livestock farms in the United States, according to the U.S. Environmental Protection Agency's AgSTAR Program, which promotes the recovery and use of methane from manure. Though sometimes flared (burned off), the biogas was used in 178 projects to produce electricity or heat or both – electricity to sell or to use on the farms, and heat for workspaces or digester tanks. Dairy farms accounted for 158 digester projects, none in North Carolina. Four projects used poultry manure, two used beef cattle manure and five were mixed projects with multiple species. There were 23 swine farm digester projects in operation.

Among North Carolina's approximately 2,500 swine farms, Butler and five other farms have digester systems in operation or under construction. Five of those systems produce or will produce electricity. One of those belongs to Butler's cousin and neighbor, L.D. Black, owner of Black Farms in nearby Bunnlevel, where a 60kW genset was installed with a \$295,130 Green Business Fund grant. Black Farms' two ambient lagoons produce biogas about six to seven months of the year.

As a biogas pioneer in his state, Butler takes a role that is fitting for a former East Carolina University biology major who "always wanted to be what they called a scientist or a researcher of some sort." Butler's family – "just general row-crop farmers," he said – raised tobacco, cotton and corn. After attending ECU because his father wanted him to



leave the hard life, Butler eventually returned to the land with younger brother Robert. In 1995, Butler Farms switched to contract swine, raising, or “finishing,” about 7,500 hogs every 20 weeks for Prestage Farms of Clinton, N.C. Farm manager Dave Hull oversees hog care. Butler and his son, Will, also operate a specialty contracting business installing doors and hardware on projects as large as a hospital to “support my farm habit,” Tom Butler said.

New income, though sporadic in ranging from a few dollars to a few thousand per month, comes from the electricity. The power offsets the electricity used by the farm, and any leftover electricity is sold to South River Electric Membership Corporation for the power grid. North Carolina, the only state with such a decree, has mandated that electric power companies generate some of their electricity from swine waste starting in 2012. The N.C. Renewable Energy and Energy Efficiency Portfolio Standard requires that investor-owned utilities meet up to 12.5 percent of their energy needs through renewable resources or energy efficiency measures.

Those renewable resources specifically include hog manure. Bill Holman, the director of state policy at Duke University’s Nicholas Institute for Environmental Policy Solutions in Durham, achieved the hog manure specification when he was the secretary of the state Department of Environment and Natural Resources. He is glad to see the Recovery Act funding, and he credits risk-takers – from producers to electric cooperatives that engineer ways to connect small operations to the grid – for working to find out which systems are most cost-effective. “It was money well spent,” Holman said. “We need some more experimentation around the state so we can eventually get this technology at scale.”

The work also benefits “all kinds of other sectors that are beginning to take a look at this anaerobic digestion technology,” Holman said, citing municipal wastewater treatment plants, poultry producers and food processors.

Food processor waste already is on Butler’s mind. Butler eventually intends to add 6,000-gallon tankerloads of potato peelings to his farm’s hog manure because of a high-carbohydrate mix’s potential to increase methane production three to 10 times, he said. His farm’s third lagoon will be a mesophilic digester, which is stocked with heat-loving bacteria, to generate methane all year. And he won’t stop there.

“We’re hoping to get into solar. We’re hoping to expand in food waste. We don’t think there’s any place to stop. You just go on and on and on,” said Butler, whose biogas project was featured in The Travel Channel’s “Off Limits” program in 2012. Butler urges the rest of his industry, from the N.C. Pork Council to corporations and individual farmers, to embrace biogas and other green energy projects. “Renewable energy is not a tree-hugger thing,” he said. “It’s just a sensible thing to do with your waste.”

### Learn More

<http://www.youtube.com/watch?v=HnNVB61soAU>

<http://www.youtube.com/watch?v=irL2Ewjoev0&feature=related>

[environmentalfabrics.com](http://environmentalfabrics.com)

[man-engines.com](http://man-engines.com)

[www.sremc.com](http://www.sremc.com)

[www.epa.gov/agstar](http://www.epa.gov/agstar)

[nicholasinstitute.duke.edu](http://nicholasinstitute.duke.edu)

