



## TECHNOLOGY

# Swine Waste-to-energy Project Takes Off

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North Carolina farms raise more than 10 million hogs per year, making hog production one of the state's top agricultural products.

The production comes with a cost, as the waste produced by that many animals is stored in large open pools, called lagoons, before being sprayed onto agricultural fields. Hog lagoons have become a point of contention for the industry, especially when the contents spill into waterways.

Technology developed by Cavanaugh & Associates, an engineering firm with offices in Wilmington, Winston-Salem and Asheville, along with Duke University, Duke Energy and Google, has shown promise to reduce the greenhouse gases released from hog waste and convert it into renewable energy.

The project, called the Loyd Ray Farms Swine Waste-to-Energy Offsets Project in Yadkin County, generates electricity by burning the methane produced by hog waste while reducing the amount of greenhouse gases released by the waste.

On the project, Cavanaugh helped with the concept, detailed design and permitting, assisted with construction management and was retained to operate and oversee the system, said Gus Simmons, vice president and director of engineering at Cavanaugh.

“The anaerobic digestion process converts organic carbonaceous compounds to methane, which combusts in the microturbine to generate electricity,” according to Cavanaugh’s website about the project ([www.pigpower.net](http://www.pigpower.net)). “The electricity generation from the microturbine generates over 0.5 Megawatts of power per year.”

Cavanaugh’s website explained that methane is a 21-times more potent greenhouse gas (GHG) than carbon dioxide.

“When the methane is combusted in the microturbine, it is converted to carbon dioxide,” it stated. “Thus, for each ton of methane previously emitted from the farm’s lagoon, there is now a 21-fold reduction in GHG potency.”

Simmons said Cavanaugh has been involved with agricultural waste projects since its founding in the mid-1990s.

“A portion of my work has always been in the realm of food production and food waste,” said Simmons, who works in the firm’s Wilmington office. “This one has been a great project. It is quite unique, especially having those sponsoring partners.”

In addition to Duke University and Duke Power, the project received funding from Google Green, the search giant’s renewable energy and environmental efficiency program, which will be purchasing the carbon offset credits produced by the project and the USDA.

Simmons said the project had specific goals.

“Whatever we did had to be good for the farmer, not just for satisfying the regulation. We had to be market feasible from an economic standpoint,” he said. “We also wanted to try to address other concerns in history with pig farms, such as the emission of ammonia and odors. The goals constrained the wide range of things we could do. Duke Energy, Duke University and Google partnered to get this off the ground. I think the economics are really the tough part. Taking something that is a waste product and converting it to something useful is hard.”

The project recently garnered national attention when Cavanaugh received the American Council of Engineering Companies (ACEC) Honor Award for Excellence in Engineering Design at an award ceremony in April.

Converting hog waste into fuel is not a new concept.

In fact, it even appeared in the 1985 post-apocalyptic film “Mad Max Beyond Thunderdome,” starring Mel Gibson and Tina Turner.

Simmons said, however, this was the first project to generate renewable energy credits that can be used by a utility.

The credits are used by Duke Energy as part of its requirement to comply with the state’s Renewable Energy and Energy Efficiency Portfolio Standard.

In 2007, North Carolina became the 25th state to require electric power providers to generate a portion of its electricity needs through renewable energy resources.

The standard increases the percentage of renewable energy use required by utilities over time, eventually requiring that 12.5 percent of power to be produced with renewable sources by 2021.

The reduction in greenhouse gases released also creates carbon offset credits, which are purchased by Google as part of its program to reduce the company’s carbon footprint.

Critics of the standard, including the conservative, Raleigh-based John Locke Foundation, point to the increased cost of electricity when utilities are required to invest in renewable technology.

A 2009 study, "The Economic Impact of North Carolina's Renewable Energy and Energy Efficiency Portfolio Standard," co-sponsored by the John Locke Foundation and the Beacon Hill Institute, predicted that the law would cost consumers more than the stated \$12 per year in 2012 and \$34 per year in 2015. According to the study, industrial users would see costs increases more than the \$1,000 per year cap on rates.

Those findings were contracted, however, in another study from RTI International and La Capra Associates that stated consumers could save \$173 million between 2007 and 2026 due to the state's clean energy policies, even after the cost of recovery fees. The report also concluded that the total economic benefit of clean energy development in the state during 2007-12 would be an estimated \$1.7 billion.

The issue of renewable energy standards has been debated this year at the General Assembly.

"There were a couple of bills that were introduced in this legislative session that would have significantly changed or eliminated the renewable energy portfolio standard," Simmons said. "With the elimination of the standard, it would remove any economic incentive [to invest in renewable energy]. The standard put in place requirements to invest in the development of renewable energy sources."

House Bill 298, the Affordable and Reliable Energy Act, would have frozen North Carolina's renewable power mandate at the current rate of 3 percent. The bill struggled to get enough votes to make it out of committee.

But Rep. Mike Hager, R-Rutherford, a primary sponsor of the bill, recently said in an interview with the Carolina Journal that he expects the discussions to continue through a study commission, which he said could start up before the end of the legislative session.