

Project Profile: Ruckman Farm



Aerial view of covered manure lagoons
Photo Credit: [Roeslein Alternative Energy, LLC](#)



Benefits



Learn how this project advances sustainability in many ways.

Highlights

- Nation's first project that converts biogas derived from hog manure into pipeline-quality renewable natural gas (RNG)
- Largest manure-to-energy project of its kind
- Restores native prairie grasses that are harvested to double biogas production

Injecting Biogas from Hog Manure into a Natural Gas Pipeline

Smithfields Foods, Inc., one of the nation's largest hog producers, has partnered with Roeslein Alternative Energy (RAE) to undertake the nation's largest manure-to-energy project to convert biogas produced from hog manure into pipeline-quality renewable natural gas (RNG).

Ruckman Farm is the first of nine Smithfield Foods hog production facilities in Missouri where manure lagoons have been updated to capture biogas that is cleaned, compressed, and upgraded to RNG.

Phase one of the project, completed in 2016 at Ruckman Farm, culminated in injection of pipeline-quality RNG into a national natural gas network. The overall project, which is expected to cost \$120 million, includes updating the remaining farms with the same technology. In total, 88 lagoons are expected to be covered with systems to collect biogas. This project provides a model that could be replicated at other facilities with manure lagoons.

The technology we've developed is ready to be deployed commercially in a project that makes both economic sense and environmental sense. This is not just about converting the manure from almost two million pigs into renewable energy. It's about taking environmental sustainability to a new level.

- Rudi Roeslein, founder and President, Roeslein Alternative Energy



Restoring Native Prairie Grasses to Increase Biogas Production

During the next phase of the project, a prairie grass mixture will be planted on nearby idle lands that are considered unsuitable for crops. Periodic harvesting of the prairie grasses will produce biomass that will be added to the hog manure feedstock, which is expected to double the production of biogas. Restoration of the native prairie lands provides additional environmental benefits — for example, creating wildlife habitat for local species, improving water infiltration, and enhancing the quality of the soil.

This project will show how farmers can do more than produce food. We can make energy, we can reduce waste, and we can be good stewards for our most important resources – land and water.

- Blake Boxley, Director of Environmental Health and Safety, Smithfield Hog Production

Smithfield.
Good food. Responsibly.®



Prairie grasses, harvested and combined with manure, increase the production of biogas. Photo credit: Roeslein Alternative Energy, LLC

Benefits

Ruckman Farm advances sustainability in the following ways:

PEOPLE



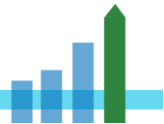
- Provides \$120 million of investment into the local economy, resulting in numerous employment opportunities for the community
- Reduces odor from hog manure previously contained in open lagoons
- Protects human health by reducing pathogens in manure through the anaerobic digestion process

PLANET



- Using pipeline-quality renewable natural gas offsets the use of fossil fuel derived natural gas
- Returning the nutrients from the digested swine manure to the soil reduces the use of petrochemical fertilizers
- Planting native grasses improves soil quality and creates wildlife habitat
- Expected to reduce the equivalent of greenhouse gas emissions from more than 25,900 passenger vehicles

PROFIT



- Diversifies farm revenue by entering into multiple industries (crops, energy)
- Reduces operating costs by producing renewable energy and using it on site
- Generates 11.727 D3 RINs (cellulosic biofuel) per one million British Thermal Units (MMBtu), trading at \$2.50 per RIN
- Produces natural fertilizer that is used on the farm, saving costs
- Water captured on covered lagoons provides drinking source for hogs

About the Digesters

The Smithfield Hog Production project is made up of impermeable covers and flare systems on 88 manure lagoons at nine hog finishing farms. Currently, impermeable covers and flare systems have been installed at half of the 88 manure lagoons.

At Ruckman Farm, one of the nine hog finishing farms, manure is collected by scraper systems from buildings that house the hogs and is sent to the farm's nine covered lagoons for anaerobic digestion. The farm's lagoons are covered with 80-mil high-density polyethylene and low-density polyethylene impermeable synthetic covers. Rain that falls on the lagoons is captured and processed as storm water. Each lagoon is equipped with a flare system for emergency backup.



Biogas collection. Photo Credit: Roeslein Alternative Energy, LLC

Annually, the Ruckman Farm project produces a volume of biogas that is equivalent to approximately 1.9 million gallons of diesel. Biogas captured within the anaerobic digester system is piped underground to an integrated 1,350 standard cubic feet per minute pressure swing adsorption facility that refines the biogas to pipeline-quality RNG. The RNG is then injected into the American Natural Resources natural gas transmission system through an interconnection that crosses the farm.

element MARKETS RNG produced from the project is sold to Element Markets, a marketer of biogas and introduced into the California vehicle fuel market.



Biogas is transported through underground piping to a processing facility that removes impurities. Photo credit: Roeslein Alternative Energy, LLC

When the project is completed, the Smithfield Hog Production project is expected to produce more than 2.2 billion cubic feet of pipeline-quality RNG per year or the equivalent of 17 million gallons of diesel fuel annually.

SYSTEM DESIGN PROPERTIES	
Feedstock Processed	Swine Manure; Prairie Grasses
Throughput	115,000 tons per year of swine manure
Digester type	Covered Lagoons
Population Feeding Digester	Design is 28,000 swine; each weighing more than 55 pounds
Baseline System	Pond or Pit
System Designer and Developer	Roeslein Alternative Energy
Biogas Generation	1.9 million diesel gallon equivalents
Receiving Utility	Element Markets
Biogas Uses	Pipeline Quality Renewable Natural Gas

System Financing

The total cost for the Smithfield Hog Production project is \$120 million. The Ruckman Farm portion of the project was financed via private equity from Mr. Rudi Roeslein, CEO of Roeslein & Associates and founder of Roeslein Alternative Energy, LLC, which provided funding for the lagoon covers and equipment in exchange for the rights to sell the biogas.

Recognition

The Ruckman Farm project has received awards and recognition:

- “[Friend of ABC Award](#)” from the American Biogas Council in 2016 to Roeslein Alternative Energy for its contributions to the growth of the biogas industry.
- “[2016 Groundbreaker of the Year](#)” award from BBI International. RAE was recognized for advancing the bioenergy industry by “breaking ground and making meaningful headway on a commercial scale biomass-to-energy project.”

Want to learn more?

Review an article published by [The Furrow, A John Deere Publication](#) about the Smithfield Hog Production project.

For more information about Roeslein Alternative Energy, LLC, visit the website at <http://roesleinalternativeenergy.com/>.

Read the American Biogas Council’s Biogas [Project Profile](#) for the Ruckman Farm project.

View the videos below, and explore more videos about the project at <http://roesleinalternativeenergy.com/videos/>.



[Roeslein Alternative Energy Overview](#)



[SciTech Now Episode 221 Roeslein Alternative Energy](#)