

Swineline Farm

After installing a 65-kilowatt Capstone MicroTurbine®, Swineline Farm in Cullinan, South Africa, transformed methane biogas produced by its commercial pig farm into renewable energy. Reducing costs, lowering emissions, and providing power to the 1,000-sow operation, the Capstone CR65 microturbine allowed the farm to address its environmental odor issues and reap immense benefits by using the biogas to generate onsite renewable power. The Capstone Renewable (CR) microturbine line is designed to operate on the facility's biogas.

Swineline owner James Jenkinson, an agricultural engineer, recognized the value of incorporating the Capstone microturbine into the operation. "The technology is top notch," Jenkinson said. "I was sold immediately the day I saw how it connects to the grid, how easily (it connects), and how little maintenance there is on the whole plant."

In addition to being clean burning and efficient, Capstone microturbines are known for their reliability since they have only one moving part and the patented air-bearing technology does not require lubricants or coolants. The CR65 uses a Dual Mode Controller to facilitate protection of critical loads. Acting like an automatic transfer switch, the Dual Mode Controller monitors incoming power and directs the Capstone microturbines to switch to stand alone operation when the grid fails. Protected loads see less than 10 seconds of outage while the microturbines transition from grid-parallel to stand alone operation.

At Swineline, odor control was the most significant environmental concern. "We are producing roughly 2.2 to 2.5-metric-tons (4,850 to 5,500 pounds) of effluent per day," Jenkinson said. The development of a covered anaerobic lagoon to capture a methane rich biogas and installation of the Capstone CR65 microturbine provided a new, environmentally friendly approach to the traditional treatment of the farm's animal waste.



At a glance

Location

Cullinan, South Africa

Commissioned

December 2011

Fuel

Biogas derived from the treatment of wastewater.

Technologies

- CR65 Capstone microturbine.
- Capstone Dual Mode Controller.

Results

- System reduces the farm's electricity use by at least 30% annually.
- Reduces odor into surrounding community by more than 75%.
- Using the Dual Mode Controller, loads see less than 10 seconds of outage while the microturbines transition from grid-parallel to stand alone operation.
- Capstone Renewable microturbine line uses the site's biogas to generate onsite renewable power.
- Provides most economical total cost of ownership available in the market.
- The power produced is fed back to the facility; heating it, pumping water and running the ventilation system.
- Farm is recognized as industry leader in South Africa thanks in part to the benefits of the microturbine system.





A digester gas-fueled Capstone CR65 microturbine provides power to Swineline Farm in South Africa.

“In swine farms in South Africa today the normal process for addressing waste and waste management is the use of open anaerobic lagoons that emit significant amounts of methane-rich biogas heavily laden in hydrogen sulfides,” explained Matthew Hayden, CEO of Acrona South Africa LTD, Capstone’s South African distributor.

“The installation and operation of an anaerobic waste treatment plant at a farm like Swineline reduces odor to the surrounding communities by as much as 80 percent,” he added.

In addition to the foul smell, methane biogas is harmful to the environment since it has a greenhouse gas impact on the atmosphere 21 times that of carbon dioxide.

The swine industry widely uses flushing systems to keep piggeries clean. Each standard pig creates an average of 2.5 to 3 kilograms (6 to 7 pounds) of animal waste each day. With 1,000 pigs at Jenkinson’s farm, pig waste management was a round-the-clock-task.

“The piggery is built on a flush toilet system,” Jenkinson explained. The pigs stand on gridded floors that collect the waste. “We flush that out with a volume of water that will then enter into the bioreactor via the channels.” The nearby bioreactor – or anaerobic digester – is a covered lagoon near the piggery.

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— Matthew Hayden, CEO
Acrona South Africa LTD

He continued, “In the bioreactor, with a microbiology process, the waste will be converted into biogas. We have a blower extracting the gas from the reactor into the gas treatment plant. The gas treatment plant basically prepares the gas as a fuel for the microturbine by taking out the condensate and also compressing the gas to a pressure that is acceptable for the turbine to operate.”

“All the power we generate gets fed back into the piggery,” he added. The Capstone microturbine provides Swineline an environmentally sound, economical source of electricity to heat the facility, pump water, and run the ventilation system.

As one of South Africa’s only 300 commercial pig farms, Swineline continues to be recognized as an industry leader thanks in part to the numerous benefits of the clean-and-green Capstone microturbine installation. In addition to a dramatic reduction in odor and greenhouse gas emissions, and development of a new power source, the single-unit installation has cut the farm’s use of utility electricity by about a third.

“Installation of this turbine has reduced my electricity usage by a good 30 to 35 percent,” Jenkinson said. “The farm is a very small farm when you are looking at effluent production. We have only got one turbine installed but by getting the process more effective it could get to the point that I can reduce my electricity usage by even more.”

“By offering these solutions we are offering the South African farmer a sustainable, appropriate technology for introducing reliable, renewable energy solutions,” Hayden added. “The cost of ownership to the farmer for the operation of the Capstone solution is best in market. This makes the solution financially viable.” ■