

POWER PROFILE

Customer: Monogram Snacks

Location:

Martinsville, Virginia, USA

Customer Business Issue:

Renewable power generation using an anaerobic digester

Solution:

Cat® CG132-08 gas generator set

Cat® Dealer:

CHA Tech Services
Carolina Cat Power Systems



Monogram Snacks is a leading manufacturer and marketer of value-added meat products, snacks and appetizers.

POWER NEED

As a byproduct of producing beef jerky and other pickled products, Monogram Snacks has leftover oils and fats that need to be disposed of. In the past, that liquid waste stream was sent to the local wastewater treatment plant in Martinsville, Virginia.

But with increased production, the food processing plant started incurring high monthly surcharges from the Henry County Public Service Authority for processing Monogram's wastewater, which exceeded levels of total suspended solids (TSS) and biological oxygen demand (BOD).

That dilemma drove the need to develop a less costly solution for the long term.

SOLUTION

With the help of two consulting engineering firms, Monogram elected to start construction of an in-house wastewater pre-treatment facility in May 2016.

When it began operating in June, Monogram started funneling the waste stream downhill to an anaerobic digester.

A day's worth of production water (75,000 gallons) from Monogram is run through the waste treatment system. The digester also breaks down 3,000 gallons per week of grease and another 19,000 pounds per week of inedible solid waste.

The waste is broken down in the digester and converted to methane gas, which is used to fuel a Cat CG132-08 gas generator set that is capable of producing 400 kW of electric power.

The Cat CG132-08 generator set engine was built in Mannheim, Germany, and delivered to Monogram as a complete package, with the generator and switchgear installed inside the enclosure.

The CG132-08 is designed to run on biogas, which tends to have a lower methane number, said David Morel, gas engine business development manager for Carolina Cat Power Systems. Equipped with both jacket water

and exhaust gas heat recovery systems, the generator set produces 1.4 MMBTU/hr. (409 KWT) of heat energy, which is used to heat the digester.

Because of built-in gas mixer technology and the Cat Total Electronic Management System, the engine can still run effectively on a lower concentration of methane.

"Caterpillar's engine division in Germany has developed this over many years of practice in Europe, and it's just a great engine for this application – it's a very heavy-duty engine," Morel added.

The consulting engineering firm, CHA Tech Services, elected to use Carolina Cat Power Systems as the equipment vendor on the Monogram clean energy plant due to its planning and expertise on multiple biogas projects across the U.S.

"We know how to project manage something like this, which can tend to be a little bit complicated," Morel explained. "One of the biggest challenges for a project like this is making sure that you get the right equipment designed for the right flow rate and the right kW and also that the heat exchangers are designed for the flow rate of the heat that they need for this project. So that all has to be designed up front and that takes time and technical expertise to get it done correctly."

During the startup and commissioning phase, Carolina Cat provided a classroom training session for Monogram. Product support rep Tom Wommack conducted a review of the operation and maintenance manual of the generator set and the switchgear.

"After the classroom setting, I take the staff out to the generator set and walk them through the day-to-day functions, pointing out what they need to pay attention to," Wommack said. "Then we'll actually put the generator set online and put it in basic day-to-day operation for them."

Trained technicians from Carolina Cat Power Systems are also available to support Monogram at any time.

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RESULTS

Currently, the generator set is running at half its designated power rating and producing 200 kW of electric power that is used to power the waste treatment facility.

“With the addition of our bioenergy production capacity, Monogram now has the ability to capture and convert that methane gas into a renewable form of electrical energy,” noted Brian Neal, manager of environmental health and safety for Monogram Snacks.

The treated water is returned to the Henry County facility for further treatment.

“The last time that we tested our BOD, it was running at about 155 mg/L, so we’ve really come down a lot with the BOD level,” said Jerry LaPrade, Monogram’s maintenance wastewater operator. “Before, the suspended solids level was 1,000 mg/L and I believe my last solids count was 110 mg/L, so you can see where we’re at now compared to where we were before. Now we are well under our surcharge limits.”

Beyond serving an important need for waste treatment, Monogram’s clean energy plant reduces net carbon emissions by 2,687 metric tons a year by reducing the use of fossil-fuel derived electric and natural gas for heating. The environmentally safe digestate from the pre-treatment process is trucked off site and applied to agricultural lands in the Shenandoah Valley to fortify the nutrient content.

“We knew we had to treat the wastewater, and it would produce methane. Either we had to just burn it in a flare – but you can’t release methane into the atmosphere – or get a Cat generator set and run it on methane. So now we’re producing heat and electricity, and it’s a win-win for everyone,” added LaPrade, who operates the clean energy plant on a daily basis.

Because of its success, the Martinsville plant was named as the “Biogas Project of the Year” in 2017 by the American Biogas Council. The honor recognizes Monogram’s clean energy plant as a model for financial ingenuity, energy efficiency and sustainable waste treatment.

The total project cost of approximately \$12 million was financed through a combination of bank loans, \$1 million in sponsor capital, new markets tax credits and investment tax credits.

While plans call for expanded production at Monogram, until then, the snack maker is looking for outside sources of waste to produce more methane and increase the output of electric power.

“The Cat unit runs extremely well,” LaPrade said. “We’re learning as we go, but whenever I’ve picked up the phone to Carolina Cat Power, I’ve been able to reach someone, and they get back to me in a relatively short period of time. They’ve been good.”

For more information, please visit cat.com/powergeneration



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