Biogas Project Profile

Monogram Clean Energy Plant

Martinsville, VA

Owner: Monogram Snacks
Developer: CHA Companies / H&V Consulting LLC
Contact: James D. Howard, Jr., 602-759-5308, tkrebbs@dudleyventures.com
Date Construction Started: 6/1/2016
Date Tank Started Being Filled: 3/1/2017
Date Project was Fully Operational: 6/1/2017

Project Summary:

Monogram Foods operates a production plant in Martinsville, Virginia, that produces beef jerky and other meat snacks. In 2016, to support the expansion of its production plant and address waste treatment needs, Monogram initiated construction on a new Clean Energy Plant (CEP) that principally uses an Anaerobic Digester (AD) to to treat its wastes. The CEP was completed in June 2017. It was conceived by Monogram staff, its engineers, and its financial representatives to address waste and wastewater treatment needs in a sustainable fashion. The biogas is used to produce both heat and power for plant operations. The CEP is a model for financial ingenuity, energy efficiency, and sustainable waste treatment.

What makes this project special?

- The CEP uses a 1.5 million gallon anaerobic contact process with recuperative thickening of the digester effluent in a dissolved air flotation unit to capture and return the biosolids to the digester and thereby separate the solids residence time from the hydraulic residence time. This allows the AD to operate with a high waste conversion efficiency, treat wastes with a wide range of solids content, and significantly lowers the required reactor volume.
- Production plant inedibles are ground in a JWC 4-shred unit and blended with water to form a 15% slurry that can be pumped into the AD for additional biogas production. This reduces the amount of Monogram Snacks production wastes requiring off-site disposal.
- The CEP uses Caterpillar's latest and best-in-class biogas engine-generator technology, with an electric energy conversion efficiency of 41.2% and a thermal energy recovery efficiency of 40.8%.
- The CEP facility is entirely energy self-sufficient and generates up to 2,024,000 kWH of energy for sale to the Monogram Snacks production plant.
- Creative financing allowed the project to leverage and utilize New Market Tax Credits, as well as Investment Tax Credits. Structured agreements between the CEP and the production plant allow longer term savings and RECs are monetized and sold to produce additional income.
- The CEP is environmentally friendly. It serves an important need for waste treatment, 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, and the residuals are applied to land to reclaim their nutrient content.

Organizations involved:

LEGAL/FINANCE/ACCOUNTING: Greenberg Traurig, P.A., Novogradac & Company LLP, Dudley Ventures LLC, Valley National Bank, US Bank.*
ENGINEERING: H&V Consulting LLC, CHA Consulting Inc..
CONSTRUCTION MANAGEMENT: CHA Tech Services, LLC
CONTRACTORS: Frith Construction, Steve Martin Trenching, Inc., Waco, Inc., Light Electric Company, Inc.,Givens-Kingree Automation, Inc.
MAJOR EQUIPMENT PROVIDERS: Permastore, Biodome, Carolina CAT, FRC, DropBox, BioProcess H2O

**ABC Member*

Inputs and Outputs

Source of Biogas:	
Feedstocks:	Process Wastewater – 75,000 gallons per day Grease – 3,000 gallons per week Inedible Solid Wastes from Production (35% solids) – 19,000 pounds per week Imported Wastes from Milk Processor (5% solids) – 6,000 gallons per week
Products Created:	The engine-generator is equipped with both jacket and exhaust gas heat recovery systems and recovers 1.4 MMBTU/hr (409 KWT) of hot water heat energy, which is used to heat the digester via an external spiral heat exchanger. Approximately 90% of this heat is used in the digester (largely to heat the incoming process wastewater), and the residual is lost to the atmosphere.
Digestate Management:	The digestate (solid fraction) is trucked off site and applied to agricultural lands in the Shenandoah Valley to reclaim its nutrient value. The CEP has entered into an agreement with a land application firm to transport supplemental waste into the plant and residuals out of the plant in the same tanker, which minimizes fossil fuel consumption and saves Monogram an estimated $100,000/year in residual management costs. The liquid effluent is polished by aerobic treatment and discharged to the Henry County Public Service Authority sewer system in full compliance with the applicable discharge limits. The conversion of the carbon in the wastes to methane via AD saves Monogram Snacks approximately $300,000 in annual sewer surcharges.
Biogas Generation:	After startup, the Monogram production plant was not yet operating at full capacity and producing enough waste to fully utilize the CEP. As a result, the CEP has contracted to accept and treat wastes from a milk processor, which will enable it to produce 105 SCFM of biogas containing 68% methane and allow the engine-generator to operate continuously at its full-rated capacity of 400 KW. Based upon 8,000 hours of operation a year, the generator will produce a total of 3,200,000 kWh of electric for utilization by the CEP and Monogram Snacks (see below).

Finances, Beneficiaries, and Expansion

Project Financing:	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 Investments. The unique structure of the deal creates long-term income opportunities and depreciation through corporate structuring and feedstock agreements, and a power purchase agreement. Renewable Energy Credits (RECs) are sold on the open market to augment revenues.
Customer(s):	The energy produced by the 400 kW engine-generator is first used to fully satisfy 100% of the parasitic electric loads associated with biogas synthesis and energy conversion (approximately 147 kW or 1,176,000 kWh annually) for both the digester and digestate treatment and gas compression – making the CEP entirely energy self-sufficient. The balance of the electric (253 kW or 2,024,000 kWh annually) is transformed up to 34.5 KV and then sold under the terms of a Power Purchase Agreement to the Monogram Snacks production plant where it is used to offset the power required to produce meat snacks. The RECs are monetized and sold on the open market through PJM-GATS. There is no export of electric to the utility grid (AEP). The engine-generator is equipped with both jacket and exhaust gas heat recovery systems and generates 1.4 MMBTU/hr (409 KWT) of heat energy, which is used to heat the digester.
Environmental and Economic Beneficiary:	Beneficiaries are Monogram Clean Energy Plant, LLC and Monogram Snacks.
Long-Term/ Expansion Plans?	Monogram Foods' long-term plans include the expansion of production at the Martinsville site into a 100,000-square-foot building located on property adjacent and is now used by Monogram for warehousing. The expansion would require the addition of a second digester and engine-generator and provisions for the addition of these facilities were included in the project design. At full design potential, the CEP will be able to self-generate over 1 MW of electrical energy and an equivalent amount of thermal energy from the wastes produced by the Monogram Snacks production plant. An estimated 300 jobs would be created by the plant expansion.

Photographs

Monogram Clean Energy Plant

Combined Heat & Power Energy Recovery System