



CHP  
TECHNICAL ASSISTANCE  
PARTNERSHIPS

# General Mills

## 1.6-MW Biogas CHP System

### Project Overview

General Mills, one of the world's largest suppliers of snack foods, cereals, and dairy-based products, operates a food processing complex in Murfreesboro, Tennessee. The campus has been steadily expanded since first opening in 1979 and, today, includes multiple processing and packing areas that produce Pillsbury bakery products and Yoplait yogurt.



Aerial view of the General Mill's plant in Murfreesboro, TN. Photo courtesy of General Mills

### Quick Facts

**LOCATION:** Murfreesboro, TN  
**MARKET SECTOR:** Food processing  
**PRODUCTION FACILITIES SIZE:** 1 Million sq. ft.  
**FUEL:** Biogas from on-site anaerobic digester  
**GENERATING CAPACITY:** 1.6 MW  
**IN OPERATION SINCE:** 2015  
**EQUIPMENT:** CAT 3520 - 2,000 HP recip engine  
**USE OF ELECTRIC ENERGY:** On-site  
**USE OF THERMAL ENERGY:** Clean-in-place (CIP)  
 Water Heat  
**BIOGAS + CHP SYSTEM COST:** \$5.6 million  
**NET ANNUAL OPERATING SAVINGS:** >\$500,000  
**ENVIRONMENTAL BENEFITS:** Reduces CO<sub>2</sub>e emissions by over 9,000 metric tons per year

### Reasons for CHP

As demand for, and production of, Yoplait Greek yogurt increased, the plant developed a "whey" problem; as in, they had "way" too much of it. The yogurt production process creates a byproduct of 2 gallons of acid whey for every 1 gallon of Greek yogurt produced. The acid whey byproduct was pumped to holding tanks then hauled offsite for EPA-permitted land application. An analysis showed that the cost of storage and disposal of the acid whey eventually exceeded \$2.5 million per year. To address this cost, in 2013 General Mills constructed a 6.6 MG anaerobic digester producing greater than 400 SCFM of methane gas, based on the conversion from excess whey. Initially, the biogas produced by the anaerobic digester was flared.

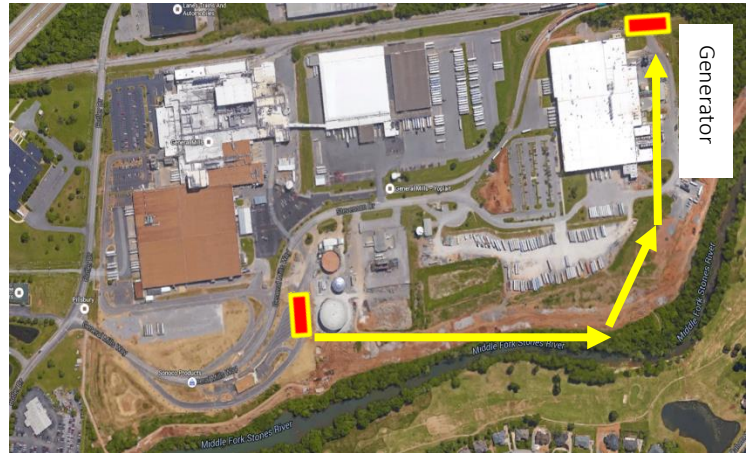
In 2014, construction began on a second phase to utilize the "free" biogas from the digester to fuel a new combined heat and power system. This application, which went online in 2015, facilitates the generation of electricity, as well as the capture of the waste heat which is funneled back into the process.

## Equipment & Configuration

The plant's 6.6 MG anaerobic digester produces in excess of 400 SCFM of biogas consisting of approximately 63 percent methane. At the plant's wastewater treatment plant the gas is scrubbed to remove siloxanes, moisture and other impurities. The gas is then compressed and piped underground from the wastewater plant to the facility where it is used to fuel the CAT 3520 reciprocating engine, the prime mover for the site's CHP system. The waste heat from the engine is recovered through a heat recovery loop and supplements the plant's hot water system helping to meet the thermal demand. This feature has also reduced the plant's dependence on natural gas.



Biogas compression skid at the Yoplait plant.



In this diagram, compressed biogas is piped underground to the CHP system.

The 1.6 MW of electricity produced by the CHP system represents approximately 20 percent of the Yoplait plant's demand and reduces power purchased from local utility Murfreesboro Electric. Additionally, the recovered heat from the system is harvested and used to heat Clean-In-Place (CIP) water used in dairy sanitation processes. Net reductions in operating and utility costs exceed \$500,000 per year.

On top of the energy cost savings realized by the CHP system, the project reduces the facility's greenhouse gas emissions by over 9,000 metric tons of CO<sub>2</sub>e per year by using power from waste-generated biogas rather than from the grid.

To read more about General Mills' Global Responsibility initiatives, please visit: <https://www.generalmills.com/en/Responsibility/Overview>

"This project is a great example of leveraging a strategic, big-picture perspective to turn a negative into a positive," says Daren Kaiser, Global Energy Strategy Leader for General Mills. "With persistence and innovative application of technology, we were able to realize positive cash flow and also improve our environmental footprint by extracting significant value out of a costly waste stream."

--Daren Kaiser, Global Energy Strategy  
General Mills

## For More Information

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Date issued: 9/2019