



CHP
TECHNICAL ASSISTANCE
PARTNERSHIPS

Knouse Foods Co-Op

1.25 MW CHP System

Site Description

Knouse Foods Cooperative, Inc. is an established grower-owned co-op with a 70-year history of providing the best fruit products. The co-op includes about 125 growers. Knouse Foods Co-Op specializes in products such as pie fillings and applesauce. The headquarters plant is in Peach Glen, Pennsylvania, where workers process apple products most of the year, as well as peaches and cherries for the Musselmann's and Lucky Leaf brands.



Knouse Foods
SOURCE: KNOUSE FOODS

A new wastewater treatment system has been installed to address food processing byproducts of manufacturing operations. The system includes a combination of technologies to generate a high-quality final effluent, allowing Knouse Foods to meet discharge limits to release to the local Bermudian Creek.

Quick Facts

LOCATION: Peach Glen, Pennsylvania

MARKET SECTOR: Food processing

FACILITY PEAK LOAD: 3 megawatts (MW)

EQUIPMENT: 1.25 MW reciprocating engine CHP system providing process steam and hot water

FUEL: Digester gas and natural gas blend

USE OF THERMAL ENERGY: Hot water and steam for building and process heat

CHP SYSTEM COST: \$2,028,717

CHP ANNUAL TOTAL EFFICIENCY: 67%

ENVIRONMENTAL BENEFITS: Reduces CO₂ by > 1,600 tons of per year

YEARLY ENERGY SAVINGS:

\$270,000 annual operating savings

PAYBACK PERIOD: 3.8 years after \$1,000,000 PEDA matching Grant

CHP IN OPERATION SINCE: 2018

Reasons for CHP

The company needed a solution to responsibly manage organic food waste and wastewater from its fruit processing. It did not just want to dispose of the waste but wanted to turn something that would usually be wasted into something valuable. By investing in onsite anaerobic digestion and a CHP system, Knouse Foods could utilize the biogas to power the CHP system, thereby helping the environment—and the fruit processor's bottom line. The 1.25 MW CHP system was installed to reduce dependency on the grid and help Knouse Foods drive energy savings and reduce environmental impacts, including the following benefits from the CHP plant project:

- Electricity offset of 65% of its annual consumption
- Thermal offset of about 23% of its annual natural gas, consumption including boiler efficiency loss
- Annual GHG of reduction of 1,600 tons CO₂
- Increased reliability
- Pennsylvania Energy Development Authority Grant (PEDA) of \$1,000,000 for installation of biogas CHP system

Anerobic Digester and Fuel Gas Treatment



Digester System
SOURCE: ADI SYSTEMS

The treatment system consists of a 2.35 million-gallon anaerobic pretreatment and a membrane reactor for aerobic polishing. Biogas generated from anaerobic digestion is first scrubbed in a biological scrubbing system to reduce the hydrogen sulfide concentration in the biogas. Scrubbed biogas is cooled to reduce the moisture content then transmitted to fuel the reciprocating engines as part of the 1.25 MW dual-fuel packaged CHP system. The natural gas is blended with the treated biogas to maintain a target electrical power output.

CHP Equipment and Configuration



1.25 MW Packaged CHP System
SOURCE: PA ENERGY DEVELOPMENT AUTHORITY

The MEG-S1250 packaged CHP system, provided by Martin Energy Group, comes with a long design pedigree of providing energy solutions using digester gas. This includes digester gas cleanup before entering the gas engine and prepackaging and testing of all essential systems. This particular application uses an exhaust gas heat recovery steam generator to deliver steam for use in the fruit processing part of the plant. A plate heat exchanger recovers jacket water, oil cooler, and first stage turbocharger heat and delivers this thermal energy for process and space heating.

The packaged CHP approach allows for simplified installation requiring only fuel, power, steam, and hot water external connections.

“Knouse Foods is committed to sustainability and supporting green initiatives and proud to continue being good stewards of the environment with the installation of this CHP project. When changes were required in the treatment of facility wastewaters, alternatives in treatment processes were explored that resulted in the selection of a treatment process that included anaerobic digestion. Knouse Foods could utilize the methane biogas produced by the digestion process to provide power to the facility while positively reducing its carbon footprint. Knouse Foods was able to install a 1.25 MW CHP system with the aid of the PEDDA grant to utilize this methane biogas. Along with a previously installed 3 MW solar voltaic array, approximately 90% of the facility electrical requirements are produced onsite.”

Robert Woerner, Director of Engineering & Development, Knouse Foods Cooperative, Inc.

For More Information

U.S. DOE MID-ATLANTIC CHP
TECHNICAL ASSISTANCE
PARTNERSHIP (CHP TAP)
www.machptap.org

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