

QUASAR ENERGY GROUP – WOOSTER, OH

SYSTEM DESIGN

The quasar energy group’s Wooster facility features a complete-mix digester that is located on The Ohio State University’s (OSU’s) Ohio Agricultural Research and Development Center (OARDC) campus in Wooster, Ohio. The complete-mix digester relies primarily on biosolids, food waste, fats, oils, and grease collected from the surrounding area as its feedstock. However, on occasion, dairy manure is codigested with the food waste. The food waste feedstock includes food, FOG, beverage waste, and other wastes. The dairy farm on the OSU campus intermittently sends its animal manure as a codigested waste to the anaerobic digester.

The complete-mix digester has a working capacity of approximately 650,000 gallons and receives a daily volume of 80 to 100 wet tons of feedstock. It operates at a temperature between 98°F and 102°F and has a hydraulic retention time of 20 to 25 days. The biogas produced from the complete-mix digester is estimated to have a methane (CH₄) content of 60 percent. On average, the Wooster digester is generating 250,000 ft³ of biogas per day. Biogas from the digester is used to generate electricity and heat.

The complete-mix digester is equipped with a 600 kW rated genset that is used to generate electricity. The electricity generated is used onsite and sold locally through an agreement with OARDC. Approximately 13 mWh of electricity are generated daily, and approximately 4,500 mWh are produced per year. Additionally, waste heat from the genset is captured, recovered, and used to provide heat to the digester to promote maximum biogas production. Waste heat is used intermittently to heat the digester, typically in the winter and when feeding a new or large load of feedstock to the digester.



Photo: Quasar Digester

“quasar energy group’s ability to design, build, operate and maintain anaerobic digestion systems has grown from the success of the early Wooster facility. Most recently, a swine farm in Ashley, OH has incorporated quasar’s AD system to help lower operating costs and fuel their fleet of CNG vehicles.”

—Mel Kurtz
President, quasar energy group

- **Baseline System:** Storage Tank
- **Digester Type:** Complete Mix
- **Codigestion:** Biosolids, manure, food wastes
- **System Designer:** quasar energy group
- **Biogas Generation:** 250,000 ft³/day
- **Biogas Use:** Electricity
- **Generating Capacity:** 600 kW



The total turnkey cost of the complete-mix digester and genset was \$6 million, with the up-front capital cost being funded initially by equity financing. Quasar Energy Group has been awarded several grants, which ultimately reduced the total capital cost of the digester to the operator. The grants that Quasar Energy Group received include the following:

- a \$500,000 grant from the United States Department of Agriculture's (USDA) Rural Energy for America Program (REAP),
- a \$1,500,000 grant from American Recovery and Reinvestment Act (ARRA) Section 1603 Program, and
- a \$500,000 grant from the Ohio Biomass Waste to Energy Program.

Annualized operations and maintenance cost of the anaerobic digester and genset are estimated to be approximately 3 to 5 percent (\$180,000 to \$300,000) of the total capital cost of the system. The digester was designed to operate for at least 20 years. The estimated simple payback period is 4 to 6 years. The liquid byproduct (effluent) that leaves the anaerobic digester is used for land application as an agricultural fertilizer on a local farm near the digester.

