

Anaerobic Digester Company Turns Waste into Energy

**LOCATION**

Cleveland, Ohio

INDUSTRY

Water & Wastewater Treatment

WEBSITEquasareg.com**CHAMPION**

Robert Luciano

Increased demand for renewable resources, coupled with rising energy costs and a global movement to reduce greenhouse gases is fueling growth in the anaerobic digestion market. Anaerobically digested waste creates biogas, a renewable energy source used to power engines and generators. Biogas can also be harnessed for vehicle fuel and has similar applications as natural gas. The market is demanding resources to protect the environment and anaerobic digestion is an effective way to do that. Captured methane is an alternative to petroleum products.

According to the World Biogas Association, anaerobic digestion has the potential to reduce global greenhouse gas emissions by upward of 13%. Additionally, the market is forecasted to reach \$15.3 billion by 2025. Since only 5% of food waste is recycled with the rest ending up in landfills, there is a tremendous opportunity for this technology.

Quasar Energy Group Cleveland, OH

Founded in 2006, Quasar Energy Group (Quasar) designs and builds anaerobic digesters—industry-scale machines that convert solid waste such as manure and food processing scraps into methane gas and carbon dioxide. Keeping organic waste out of landfills is beneficial for the environment since decaying materials release methane into the air and contribute to climate change. The company handles everything from manure generated by feedlots to biosolids produced by municipal wastewater treatment plants, and targets the agricultural and wastewater treatment sectors.

Quasar employs engineering, construction, regulatory, and research & development staff to ensure their systems remain on the cutting edge of renewable energy technology. One impetus for the company's growth has been stringent regulations on discharge quality by the Environmental Protection Agency enacted in 2013. Many treatment plants were having trouble meeting the new limits and securing funding to support necessary capital upgrades. Over the years, the company has entered into Private-Public-Partnerships with municipalities.



Receiving stations connected to an anaerobic digester at the Wooster, Ohio Buckeye Biogas facility. Approximately one megawatt of electricity is produced per hour from this digester.

Photo Credit: Pictures provided by Quasar Energy Group

Wastewater Treatment Plant Digesters

There are over 16,000 municipal wastewater treatment facilities in operation nationwide, many needing immediate help in treating the massive amounts of domestic sewage produced.

The energy hidden in wastewater is an untapped resource with the potential to offset 12% of the US electric demand. The country's aging wastewater treatment infrastructure is facing capital, technical, and regulatory challenges. Facilities are progressively required to improve pollutant loading reductions mandated by the Clean Water Act. Upgrading to high solids digesters is an effective way to address these infrastructure improvements without passing the costs on to ratepayers.

Biosolids are pumped into stirred tank reactors, where they can be co-digested with outside organic waste. As anaerobic bacteria break down the volatile solids in the digester, biogas is released and can be combusted to generate electricity. This electricity can be net metered onsite with the potential for the wastewater treatment plant to become a net-zero facility.

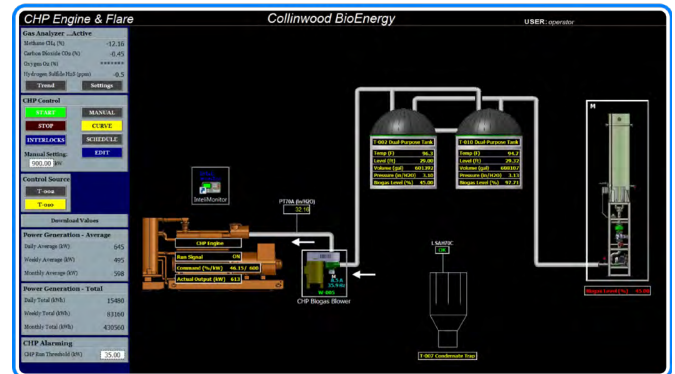


Illustration of the process: biosolids are pumped into stirred tank reactors, where they can be co-digested with outside organic waste. As anaerobic bacteria break down the volatile solids in the digester, biogas is released and can be combusted to generate electricity.

The Process

Energy is in the waste stream that goes to every wastewater treatment facility. Quasar capitalizes on the energy that is in the solids' organic fraction coming into these plants. In anaerobic digestion, complex bacteria breaks down organic matter to produce biogas or a leftover "digestate" used for fertilizer or animal bedding. Multiple organic materials can be combined in a practice known as co-digestion, ideally increasing biogas production from low-yielding or hard-to-digest waste.

The process begins with the delivery of liquid or solid organic waste. Liquid material is pumped into underground storage tanks, and solid waste streams are delivered into the hopper where they are diluted and macerated. The material is then pumped into the biomass equalization tank, where the breakdown of material begins. Incoming waste streams are mixed for three days and then pumped into digester tanks, where it is continuously mixed and broken down by anaerobic bacteria for between 18 to 30 days.

Quasar operates with just-in-time logistics, meaning that raw materials are received the moment they are needed and in the exact amount to reduce inventory cost and waste in the supply chain process. Within a water resource recovery facility, the solids receiving, digestion, cogeneration, and effluent management operate via just-in-time logistics.

Monitoring

Quasar's Ohio facilities in Cleveland, Zanesville, and Wooster are monitored around the clock by Rockwell Automation's FactoryTalk® SCADA system, which can be controlled onsite by plant operators or remotely from Quasar's central monitoring facility. Integrated with this SCADA system is SmartSights WIN-911 remote alarm notification software, to continuously monitor the alarms and provide important security updates. The software also allows operators and engineers to monitor the system from anywhere using a smartphone or tablet.

Because of the critical nature of their systems, each component is closely monitored to make sure there isn't any breakdown. Any unplanned downtime in even one of the machines would be extremely costly as well as detrimental, and the entire process would have to literally start over.

SmartSights WIN-911 remote alarm notification software monitors the pressure flows and optimal metrics for the temperatures, tank levels, volumes, pressure, and biogas levels in every piece of equipment in the anaerobic digestion process, which includes numerous roof blowers, desulfurization blowers, and pumps. Sensors in the equipment give information to the SCADA system and if there are any problems, WIN-911 will notify the plant operators via email and SMS alarms. Quasar soon will be upgrading to a more robust version of the software to ensure greater consistency.

"Because of the critical nature of the systems, we rely on WIN-911 to monitor almost every aspect of the process. To help wastewater treatment plants comply with environmental regulations we need to be notified of critical alarms right away so we can respond immediately to any issues."

Robert Luciano

Electrical Engineer,
Quasar Energy Group

A quasar is an abundant energy source, an extremely distant object with energy output several thousand times that of our galaxy. Quasar describes the potential of the anaerobic digestion industry. We are presented with an abundant opportunity to produce energy from readily available biomass resources (food waste, manure, crop residuals, and biosolids). As the population continues to grow, so does the demand for energy and the need to dispose of waste. Quasar Energy Group provides a solution to this challenge.

