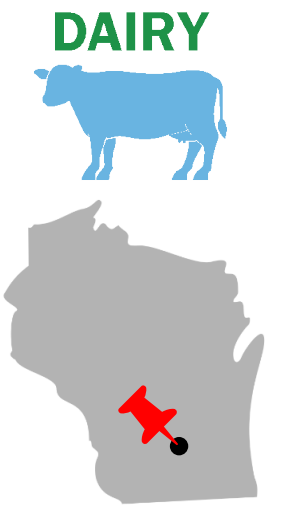
Project Profile: Dane County Digester – Vienna, WI

Clean Fuel Partners installed a new roof on digester tank #2 in November 2015.
Photo Credit: Clean Fuel Partners



Vienna, Wisconsin

Key Features

COMPLETE MIX | CO-DIGEST | RNG | NUTRIENTS | FERTILIZER | BEDDING

Highlights

- First centralized digester in Wisconsin accepting manure from multiple farms.
- First digester in Wisconsin built primarily for water quality reasons.
- Benefits include removal of phosphorus from the watershed and reduced odor from the farms.

Dane County led the development of two community manure digester facilities—the first in Vienna, Wisconsin, and the second in the town of Springfield. The Vienna site, now part of Brightmark's Demeter renewable natural gas (RNG) project, was built in partnership with the county, the state, and three nearby dairy farms: Ripp's Dairy Valley, Richard Endres Farm, and White Gold Dairy. The project is unique in that it is the first centralized or "community" digester in Wisconsin that accepted manure from multiple farms. In addition, it was the first anaerobic digestion (AD) system in Wisconsin built primarily for water quality reasons to remove phosphorous from the watershed.

Overview

The original AD project grew out of a manure management feasibility study commissioned by Dane County looking at ways to improve water quality in the county's four major lakes. Based on the study, the committee suggested eliminating phosphorous runoff from surrounding farm fields using a manure digester with advanced technology to substantially remove phosphorous. Project developer Clear Horizons, LLC began construction of the AD system in August 2010, and the facility began operating in early 2011.

Initially, electricity was generated from biogas onsite and sold under an advanced renewable tariff to Alliant Energy, a utility operating in Wisconsin. For the first several years of operation, the system faced challenges due to extreme cold and design parameters that did not match actual waste intake. Clean Fuel Partners purchased the facility from Clear Horizons in 2015, financing a series of improvements to the system. The facility's power purchase agreement with Alliant was set to expire in 2020. In order to maintain the financial sustainability of this project, the facility required an alternative revenue stream and an investor willing to make additional improvements.

In 2019, Clean Fuel Partners sold the digester to Brightmark but continued operating the system. Brightmark completed construction of a multi-million-dollar biogas upgrade system in 2020 to produce RNG. Now, Brightmark upgrades and transports the biogas from the digester to a pipeline injection point at the Dane County Landfill rather than combusting it to generate electricity. The AD system is estimated to produce enough RNG to replace at least 50,000 MMBtu of conventional natural gas each year.

About the Digestion System

The AD system accepts approximately 90,000 gallons of manure per day via pipeline from Ripp's Dairy Valley, Richard Endres Farm, and White Gold Dairy. The facility has also accepted restaurant waste to co-digest with the manure. The AD system processes the influent in three 1.25 million-gallon tanks. Brightmark's biogas upgrade system converts captured biogas to an estimated 50,000 MMBtus of RNG per year—enough energy to fuel a compressed natural gas (CNG) bus for over 1.2 million miles.

> "This agreement will help local farms continue to be environmentally friendly to our community and help us to stay in compliance with environmental regulations. We have always taken pride in being excellent stewards of land conservation and ensuring our land is a safe environment for our neighbors."
>
> – Chuck Ripp, Ripp's Dairy Valley LLC

The system routes digestate through a high-performance centrifuge to provide advanced phosphorus removal. This process isolates approximately 60 percent of the phosphorous in the solid digestate. Captured heat from one genset is used exclusively to dry separated solids, killing much of the bacteria and making a better bedding product than undried digestate. Farms outside the watershed use the solid digestate as a peat moss substitute or for bedding. Brightmark pipes the liquid digestate back to partner farms to use for land application. The phosphorous removal process has limited the amount of phosphorous entering Dane County's lakes and streams from the liquid effluent.

Challenges

The project overcame several challenges to achieve its current success.

First, the AD system had manure leaks resulting primarily from an unusually cold winter that caused above-ground joints to break. Over the course of three years, there were three manure spills, an inadvertent recirculation of liquid digestate, and an incident that destroyed one of the digester's nylon inflatable covers. Additionally, influent volume and characteristics were different from the digester design criteria, which yielded phosphorus removal measurements that were initially below expectations.

Inside an anaerobic digester at Dane County's Vienna facility.
Photo Credit: Brightmark

With a thorough accounting of the current operational needs of the project, developers have implemented solutions to these challenges. Once the recirculation problem was addressed, the digester operated within its design parameters. When Clean Fuel Partners purchased the project in 2015, they implemented a series of upgrades to improve safety and operational standards, including installation of H_2S monitors, a new roofs and equipment, and new pressure valves for two of the three digesters. Clean Fuel Partners resolved many of the issues the project had faced prior to their ownership, and the facility has experienced no other major incidents to date.

Benefits

Dane County Community Digester advances sustainability in the following ways:

- Improves quality of life in the community by reducing odor on local farms
- Reduces the presence of pathogens through anaerobic digestion of manure

- Offsets the use of fossil fuels
- Removes significant amounts of phosphorus from the watershed, reducing phosphorus runoff alone by 60%
- Reduces methane emissions from livestock manure and offsets carbon dioxide emissions from fossil fuel combustion

- Delivers maximum revenue from the sale of RNG
- Saves cost through use of liquid effluent for fertilizer
- Generates revenue from sale of solid digestate for bedding or soil amendment

SYSTEM DESIGN PROPERTIES	
Feedstock Processed	Dairy cow manure
Throughput	90,000 gallons per day
Digester type	Complete mix
Population Feeding Digester	2,500 dairy cows
Baseline System	Storage lagoon
System Designer and Developer	Clear Horizons, LLC; Clean Fuel Partners; Brightmark
Biogas Generation	50,000 MMBtu per year
Biogas Uses	RNG for vehicle fuel
Digestate Use	Fertilizer and bedding

For more information about Brightmark, visit their website at https://www.brightmark.com/. Information on Clean Fuel Partners can be found at http://www.cleanfuelpartners.com/.

To learn more about Dane County's Vienna Digester, review Brightmark's page on the Demeter Project.

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