

EnTech Solutions

Manure digester partnership serves multiple farms

EnTech Solutions, Town of Springfield, Wisconsin

A set of dairy manure digesters in the Town of Springfield in Dane County were switched from producing electricity to producing renewable natural gas (RNG). A large group of partners, each bringing their own expertise, worked together to make this change. The RNG is injected into a natural gas pipeline in Madison and sold as a low carbon fuel in the California market to provide clean-burning vehicle fuel.

EnTech Solutions, one of the partners, says, "Overall, the facility reduces emissions by more than 13,500 metric tons of carbon dioxide equivalent per year. This reduction is comparable to removing emissions of nearly 34 million miles driven by passenger vehicles."



Zeigler Dairy Farms across from EnTech Solutions transports manure via pipeline to the digester

Digester Facts



Manure from 4200 wet cows on 4 farms

3 million-gallon digesters

Phosphorus removal from digester liquid

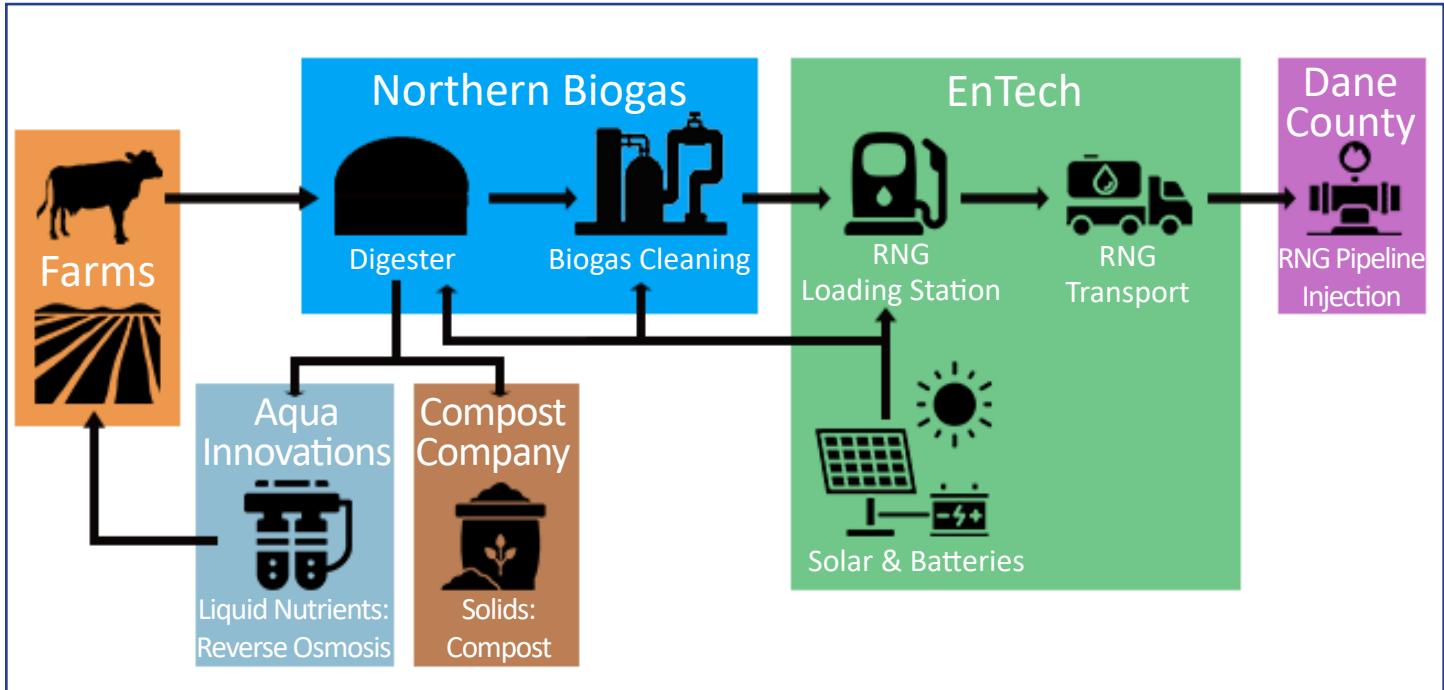
Digester solids sold to compost company

On-site biogas cleaning

RNG production proprietary

2.8 MW photovoltaic panels produce electricity for the facility and grid

RNG Production Process



RNG Production Process

1. Dairy farms supply manure

“The facility currently receives manure from four farms, and is likely to add two more later, according to Scott Romenesko, President of EnTech Solutions.” The current farms are providing manure from 4,200 milking cows. More than half of the manure comes from Zeigler Dairy Farms, located across the road from the digester. Manure from the other three dairy farms is trucked approximately 10 miles to the digesters. The farmers are paid per gallon of manure that they provide to the digester. They are not invested in the digester system.

2. Northern Biogas LLC operates digesters and biogas cleaning equipment

Northern Biogas operates and monitors the three one-million-gallon digesters that produce biogas. The digester liquids go to Step 3 for phosphorus removal and are then returned to the dairy farms. The digester solids are sold to Carbon Cycle, a compost company. Northern also operates and monitors the biogas cleaning equipment that removes contaminants from the RNG.



Liquid nutrient loading for delivery to farms



Digester solids, sold as compost

3. Aqua Innovations operates a reverse osmosis system to remove phosphorus from the digester liquids

Dane County supports phosphorus removal by Aqua Innovations to meet their goal of reducing phosphorus and algae in the Madison chain of lakes. Aqua Innovations uses a reverse osmosis system to concentrate nutrients from the digester liquids. In 2021, over 57,000 pounds of phosphorus were removed and sold to farmers outside the Yahara River watershed. One pound of phosphorus entering a lake or stream can result in up to 500 pounds of algae growth. The digester liquids with reduced phosphorus are trucked back to the dairy farms that provide manure.

4. EnTech Solutions operates microgrid with solar arrays, batteries, inverters, RNG loading station, and truck charging station

EnTech Solutions planned, installed and operates a 2.8 megawatt (MW) microgrid solar array that powers the digester system. The largest onsite solar array consists of fixed, bifacial panels. EnTech also has nearly 500 kilowatt hours (kWh) in battery storage. Extra electricity feeds into the grid. In June 2022 Scott Romenesko said “Right now we’re producing way more electricity than the facility is using with the intention of electric trucks and maybe putting an electric dryer in the solid building and then drying up the [digester] solids, bringing it back to the farmers so they can use that for their bedding.”

In August 2022, EnTech Solutions announced that they plan to partner with Peterbilt Motors and Maki Trucking to use an electric truck to haul the compressed RNG about 20 miles to a pipeline injection port. This truck will be powered by EnTech’s solar arrays.



Aqua Innovations reverse osmosis system



Battery storage with solar arrays



Future electric truck for transporting RNG to injection site

5. Dane County provides RNG injection port

Dane County provides an injection port on an interstate natural gas pipeline at their landfill. Without access to an injection port, other digesters may not have a way to sell RNG.

6. U.S. Gain purchases and markets RNG

U.S. Gain purchases the RNG and sells it on the California transportation market. California adopted a Low-Carbon Fuel Standard (LCFS) standard in 2007 to reduce their greenhouse gas emissions from transportation by 10% by 2020.

In the future EnTech plans to add manure from another dairy farm or two, add a fourth digester, haul the RNG to the injection port with an electric truck, and consider a few different options to increase use of electricity produced onsite.



EnTech Solutions Middleton digester facility, Town of Springfield, Wisconsin

The RNG Production Process has been designed using resources from Flaticon.com: “Cow icon by Freepik - Flaticon.com”; “Gas icons by AmethysDesign - Flaticon.com”; “Gas station by sonnycandra - Flaticon”; “Tanker truck icons by Chanut-is-industries - Flaticon.com”; Gas pipeline icons by Eucalyp - Flaticon.com”; Land icons by Vitoruler - Flaticon.com”; “Water filter icons by Freepik - Flaticon.com”; “Compost icons by PIXARTIST - Flaticon.com”; “Solar energy icons by Muhammad Ali - Flaticon.com”

Future electric truck for transporting RNG (page 3) and EnTech Solutions digester facility (page 4) photos provided by EnTech Solutions. All other photos taken at EnTech Solutions in the Town of Springfield, WI by Ryan Michalesko.

Prepared by Lynn Markham and Karen Blaha of the Center for Land Use Education. The Center for Land Use Education is a joint venture of the College of Natural Resources at the University of Wisconsin-Stevens Point and the University of Wisconsin-Madison Division of Extension. Copyright © 2022 by the Board of Regents of the University of Wisconsin System, d/b/a the University of Wisconsin-Madison Division of Extension.