

Project Profile: Green Valley Dairy



Above-ground complete mix digesters at Green Valley Dairy.
Photo Credit: Energy Center of Wisconsin

DAIRY



Krakow, WI

Key
Features

COMPLETE MIX



ELECTRICITY



RNG



BEDDING



Highlights

- 4,700-cow dairy farm operating digesters since 2006.
- Project currently generates 600,000 ft³ per day of renewable natural gas.
- Project generated 6,000,000 kWh of electricity annually prior to upgrade.
- On-site 1.852-MW solar panel array began operating in September 2020.

In 2006, Green Valley Dairy installed two above-ground, complete mix digesters. A third digester was added in 2009. The digesters are used to treat the 120,000 to 150,000 gallons of manure that are produced each day on the farm, along with wash water from the milking parlor. The latest upgrades at the dairy include a solar panel array and a biogas upgrading plant for production of RNG.

Digester System Design

To increase digestion, the farm uses a remote heat exchanger to preheat the manure, which is fed continuously into the digesters. The system has a hydraulic retention time of about 14 days, after which time the liquid effluent is treated and solids dewatered and recycled as animal bedding. In the project's original phase, biogas was dehumidified using a condensate trap and chiller with added oxygen and then burned to generate electricity and heat. Green Valley Dairy established a sell-all contract with We Energies, who bought the electricity produced at the farm. Recovered waste heat from the generator sets was used to maintain a digester temperature of 102°F, and additional waste heat was used for heating the calf barns, shop, and other buildings. Excess biogas was flared.

“Before we installed the anaerobic digester, we were handling manure as a waste product when what we should have been doing is handling it as a value-added product.”

– Guy Selsmeyer, Green Valley Dairy

The original digester system produced more biogas than the farm could use. In 2020, the dairy partnered with developer Outagamie Clean Energy Partners to install a biogas upgrading plant to generate RNG and claim low carbon fuel credits under California’s Low Carbon Fuel Standard. The new facility, which started receiving its first biogas loads in January 2021, scrubs the biogas of contaminants, chills it to condense out the moisture, and then compresses it for transport. The compressed RNG is injected into trucks and then offloaded at an off-site injection point for the ANR Pipeline.

In 2020, Arch Electric completed installation of a 1.852-MW solar field on land owned by Green Valley Dairy. The array is the largest privately-owned solar array in Wisconsin history and is part of a collaborative project between Arch Electric, Green Valley Dairy, and Outagamie Clean Energy Partners.

The solar energy generated by the project powers portions of the dairy, including a newly installed biogas upgrading plant, developed in partnership with Outagamie Clean Energy Partners, which will be used to upgrade the gas into pipeline-quality renewable natural gas for the transportation industry. Annually, the solar array will offset greenhouse gas emissions equivalent to more than 390 cars driven in one year.



The new 1.852 MW solar field at Green Valley Dairy was installed by Arch Electric and began operation in September 2020.
Photo Credit: Arch Electric

Benefits

Green Valley Dairy advances sustainability in the following ways:



- Protects human health by reducing pathogens in manure through the anaerobic digestion process.
- Improves quality of life in the community by reducing odor.
- Reduces methane emissions from livestock manure.
- Creates natural, pathogen-free fertilizer, and animal bedding.
- Offsets fossil fuel use in the transportation industry.
- Lowers water usage and reduces emissions from water transport through an underground piping network.
- Reduces operating costs by creating heat, bedding, and fertilizer, which can all be used on-site.
- Generates revenue through LCFS credits and the sale of RNG.

SYSTEM DESIGN PROPERTIES	
Feedstock Processed	Dairy cow manure, milking parlor wash water
Throughput	120,000 to 150,000 gallons per day
Digester type	Complete mix
Population Feeding Digester	4,700 dairy cows
Baseline System	Storage lagoon
System Designer and Developer	Biogas Direct, LLC (first two digesters), Northern Biogas, LLC (third digester), Outagamie Clean Energy Partners (biogas upgrading plant), Arch Energy (solar field)
Biogas Generation	600,000 ft ³ /day
Receiving Utility	We Energies (electricity); ANR Pipeline (RNG)
Biogas Uses	Electricity, RNG

Recognition

The Green Valley Dairy project received the 2013 U.S. Dairy award for Outstanding Achievement in Renewable Energy: https://www.usdairy.com/getmedia/aec7ad66-0387-4e51-99b9-643d45f7c5d4/greenvalleycasestudy_sust3012.pdf.pdf.aspx.

Want to learn more?

A 2022 life cycle analysis for the digester and biogas upgrade system can be found at https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/comments/tier2/b0385_report.pdf.

For more information about Outagamie Clean Energy Partners, visit <https://oceprng.com/what-we-do/>.

Read more about the farm's solar installation at <https://arhelec.com/largest-privately-owned-solar-system-in-wi-state-history/>.

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