



New York State Energy Research and Development Authority

Aurora Ridge Dairy

Biogas Fuel Engine Generator Set

DG/CHP Program

Project Profile

Combined heat and power for
Dairy Farm



Overview

Aurora Ridge Dairy is a 2000-acre family owned farm located in Cayuga County. The farm maintains a herd of more than 1,800 milking cows as well as 1,200 calves and heifers. The animals produce 84,000 gallons of manure per day that is collected and treated in a plug flow type anaerobic digester. Biogas from the digester is used to fuel a 500 kW engine-generator set. The electricity is either consumed onsite or exported to the utility grid. Waste heat is recovered from the engine and used to maintain the digester temperature. Recovered solids are dried for animal bedding. Liquid effluent is stored or immediately field spread.

Quick Facts

Location:
Aurora, NY (NYSEG)

Installation Date:
September 2009

Operating Experience:
8 months (as of June 2010)

CHP Equipment:
Guascor MGG-950

Generating Capacity:
500 kW

Heat Recovery Application:
Digester heat

Type of Fuel:
Digester gas

The Application

Farms, like all other businesses, are under pressure to adopt more environmentally conscious practices. Proper manure disposal is of paramount concern. Aurora Ridge Dairy installed a plug flow, hard top anaerobic digester to reduce farmstead odor emissions while simultaneously enhancing revenues. The digester is U-shaped and kept agitated by recirculating biogas through nozzles located under hot water pipes. These pipes help maintain the slurry at 90 to 100°F, using heat recovered from the engine. This heat and circulation keep sediments in suspension and help sustain the digester's performance.

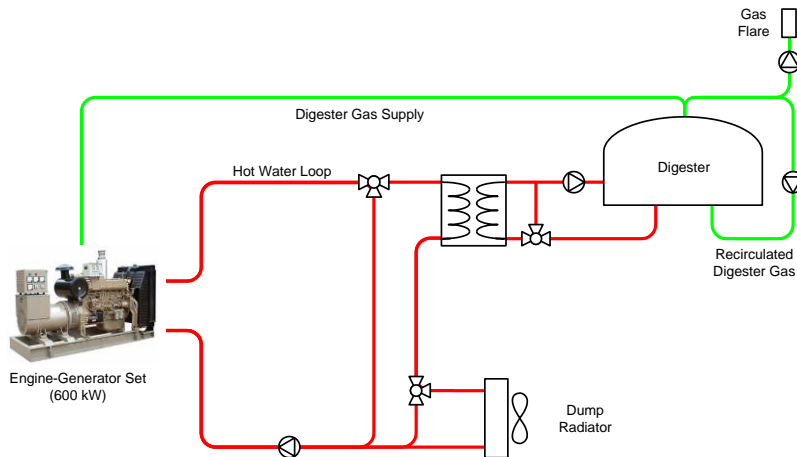
Aurora Ridge also installed a solids separation system to process the digester effluents. Solids are separated using a screw type press, and are processed for animal bedding. Liquid effluent is either sprayed on the fields as fertilizer or pumped to a long-term storage pit for subsequent distribution. Odors are substantially reduced due to the elimination of most pathogens.



Installed Engine-Generator Set

CHP System and Equipment

The CHP system at Aurora Ridge is configured on a single engine-generator set de-rated from 600 to 500 kW to operate on biogas. The farm's electric service was consolidated into a single 3-phase service to simplify the generator interconnection. The generator operates in parallel with the utility grid. Any electricity produced in excess of the site requirements is exported. The digester is hard covered and self-pressurizing. Separate blowers are used to recirculate a portion of the biogas to promote mixing or to allow excess gas to be flared. Waste heat from the engine jacket is recovered as hot water. A heat exchanger isolates the engine coolant from a second loop that heats the digester. A radiator outside the generator building is used to reject excess heat.



Economics and Environmental Benefits

Hourly data have been collected from the site since September 2009 and are available on NYSERDA's DG/CHP web site. Capital costs for the system approached \$2.3 million. Recent data indicate the CHP system has produced an average of about 300,000 kWh per month since startup. The farm consistently exports electricity to the grid offsetting utility purchases through a net metering arrangement. Additional savings should accrue with recovery of the solids; excess material can be sold for compost. Use of the digester should also reduce the dairy's environmental footprint. Digesters help reduce methane emissions and land application of untreated wastes, which can threaten local watersheds.



Manure Separator and Conveyor



Bedding Recovery Unit

Summary of Benefits

- Eliminates concerns about manure disposal
- System consistently produces 500 kW – excess electricity exported to grid
- Solids separated for animal bedding
- Liquid effluent retains nutrient value as fertilizer

“Manure isn't a waste product on a farm, it's primarily used as fertilizer for their crops, but now they're also able to capture energy from it.”

- Peter Gregg,
Director of Public
Relations, NY Farm
Bureau

Web Links and Further Information:

GDH, Inc. -
Developer/Engineer

www.ghdinc.net

Martin Machinery -
Generator Package

www.martinmachinery.com

Other
DG/CHP
Resources

chp.nyserda.org

Prepared for NYSERDA by:
CDH Energy Corp.
Cazenovia, NY 13035
315-655-1063
www.cdhenergy.com
dgchp_data@cdhenergy.com