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FAIR OAKS DAIRY DIGESTER – FAIR OAKS, IN

DAIRY FARM IN INDIANA – CNG POWERING FARM TRANSPORTATION

SYSTEM DESIGN

Fair Oaks Dairy is located in Fair Oaks, Indiana, and has two anaerobic digesters onsite: a large DVO two-stage mixed-plug flow™ and a smaller vertical-plug flow. The dairy has approximately 12,000 lactating cows producing manure that feed the anaerobic digesters. Currently, no codigestion is conducted, but in the past ethanol syrups collected from regional ethanol plants were codigested and typically amounted to five percent of the feedstock.

The vertical-plug flow digester began operating in 2003. It receives manure from approximately 3,000 dairy cows each day and is equipped with two 350 kW gensets. This system produces electricity for on-farm use, and any excess electricity produced is used at the dairy visitor center. Waste heat from the genset is recovered and used to heat the digester.

The DVO two-stage mixed-plug flow™ began operating in 2008 and receives manure from approximately 9,000 dairy cows each day. Biogas is used for on-farm electricity generation, waste heat to heat the digester, and CNG for use as transportation fuel in vehicles. Any excess electricity after the on-farm electricity needs are met is sold to the local utility. This system is also equipped with a gas cleaning system that cleans and scrubs contaminants from the biogas to meet purity levels for use as a renewable transportation fuel.

SYSTEM FINANCING

The total capital cost for the larger digester is \$12 million, and the equipment is estimated to have a project lifetime of 20 years. The farm financed approximately 99 percent of the up-front capital cost of the anaerobic digester using industrial revenue bonds, with a loan period of 15 to 20 years. Annual operating and maintenance (O&M) costs for the two-stage mixed-plug flow™ are estimated to be approximately \$600,000 per year, and \$100,000 per year for the smaller vertical-plug flow system.

PROJECT BENEFITS

- Compressed Natural Gas (CNG) for transportation fuel and sale
- On-farm use of the generated electricity allows the farm to purchase less electricity
- Recovery of waste heat from the engine/genset to heat the digester allows the farm to avoid purchase of heating fuel for the digester

Biogas is being used to produce CNG for use as a transportation fuel to power CNG tractor trailers that deliver milk to processing plants in three Midwestern states (replacing diesel fuel-powered vehicles). The farm received a grant under a separate program for the extra CNG tanks to extend the range of these trucks powered by CNG. The farm has reduced its use (and cost) of diesel fuel by 1.5 million gallons per year. The surplus clean biogas will be piped and sold to a CNG fueling station. It is estimated that after installation of the gas cleaning system in 2011 and the beginning of CNG sales to the fueling station, the simple payback period for the gas cleaning system project will be approximately three years. (See [Biocycle article](#) for details.)

Digester Type: DVO Two-Stage Mixed Plug Flow™

- **Population Feeding Digester:** 9,000+ Dairy
- **Baseline System:** Storage Tank or Pond or Pit
- **System Designer:** DVO, Inc.
- **Biogas Use:** Cogeneration; CNG
- **Generating Capacity:** 1,060 kW
- **Receiving Utility:** Jasper County REMC

Digester Type: Vertical Plug Flow

- **Population Feeding Digester:** 3,000 Dairy
- **Baseline System:** Storage Tank or Pond or Pit
- **System Designer:** Dennis Burke, Environmental Energy Corporation
- **Biogas Use:** Electricity
- **Generating Capacity:** 700 kW