



New York State Energy Research and Development Authority

# Patterson Farms

## Biogas-Driven Engine System

DG/CHP Program

Project Profile

Combined heat and power for  
Dairy Farm



### Overview

Patterson Farms is a dairy farm located in Auburn, NY. The farm recently installed a completely-mixed anaerobic digester to treat manure from 1,725 animals. The digester also takes in whey waste from a cream cheese factory. Biogas from the digester is used by an engine to produce electric power. The power is used on the farm or exported back to the local utility via a net metering arrangement. Waste heat from the engine is used to maintain the digester at 90°F. Separated manure solids from the digester are also used for animal bedding.

### Quick Facts

- Location:**  
Auburn, NY (NYSEG)
- Installation Date:**  
Sept 2005
- Operating Experience:**  
Commissioning Completed in March 2006
- CHP Equipment:**  
250 kW Engine (Cat G379)
- Generating Capacity:** 200 kW (on biogas)
- Heat Recovery Application:**  
Digester Heat,  
Water Heating for Parlor (planned)
- Type of Fuel:** Digester Gas

### The Application

Patterson Farms is a large dairy operation in Cayuga County. In order to control odors and provide better manure management, they decided to install an anaerobic digester. The digester is a completely-mixed, soft top design from RCM Digesters. The digester was also designed to use whey waste from a cheese factory in the region. By accepting cheese whey, the farm receives additional revenue (tipping fees) as well as significantly increased digester gas production.

Patterson Farms also installed a solids separation system (a Vincent KP-16 solid-liquid manure separator) to process the digester effluent. Solids from the process are used for animal bedding. Separated liquid effluent is pumped to a 4.5 million-gallon long-term storage pit.

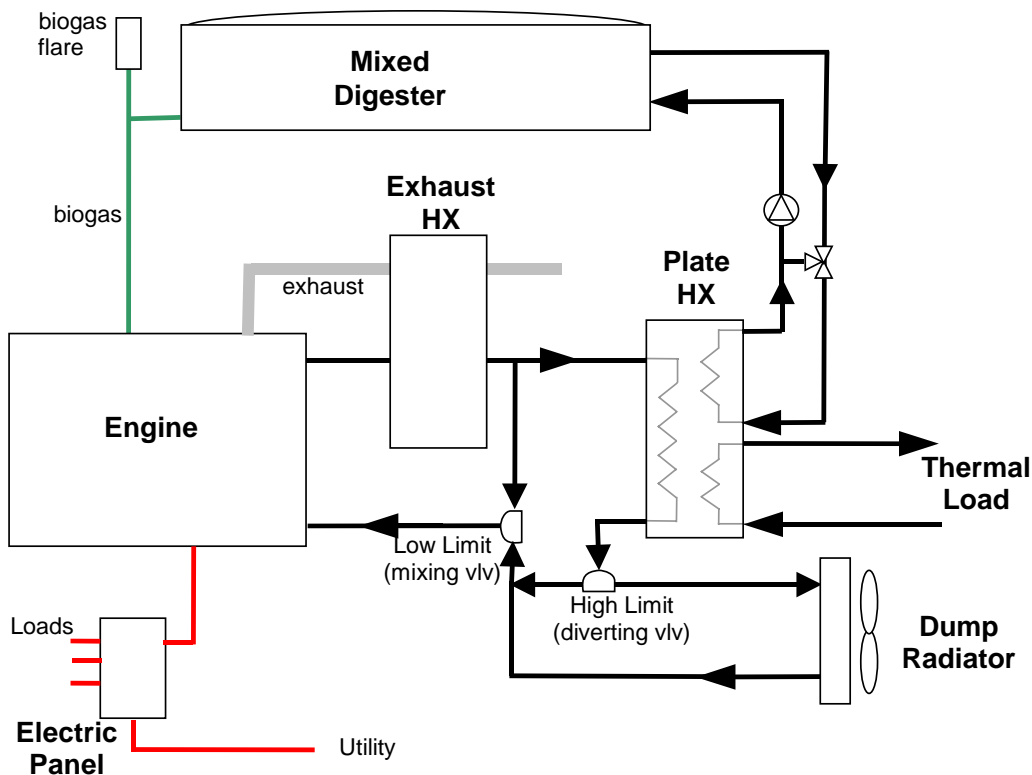


*Separated Manure Solids from the Digester are Used for Bedding*

## CHP System and Equipment

Biogas from the completely-mixed digester is used in the Caterpillar engine. Any unused gas is burned in the biogas flare. Hot water from the engine jacket and exhaust heat exchanger (HX) are sent to a plate frame heat exchanger. If the water returning to the engine is too hot, the dump radiator is activated to reject heat. Similarly a low temperature control valve bypasses the plate frame HX if the water temperature is too low. The plate frame HX can transfer heat to two separate loops. Heat is transferred to the digester loop to maintain the digester at 90°F. Provisions are also in place for a second loop that can transfer waste heat to the Milking Parlor for water heating (planned for future).

The digester is mixed by a series of agitator pumps. Raw manure is added to the digester six times a day.



*Schematic of Engine and Digester System*

## Economics and Environmental Benefits

The system currently produces more biogas than can be used in the engine. About 40% of the biogas must be flared. Biogas production is higher than anticipated with the cheese whey. The farm is currently considering ways to improve biogas utilization. The farm consistently exports electric power to the utility, offsetting their utility purchases through a net metering arrangement.

## Summary of Benefits

- Completed mixed digester uses both animal and food waste
- Solids are separated from the effluent to provide bedding
- System consistently produces 200 kW; power is exported back to the utility

“Generating electricity for my farm will help offset the cost of the digester and odor control”  
- Connie Patterson

## Web Links and Further Information:

Designer  
[www.rcmdigesters.com](http://www.rcmdigesters.com)

Engine Manufacturer  
[www.martinmachinery.com](http://www.martinmachinery.com)

Other DG/CHP Resources  
[chp.nyserda.org](http://chp.nyserda.org)  
[www.northeastchp.org](http://www.northeastchp.org)

[www.enerview.com/ny/PattersonFarms.asp](http://www.enerview.com/ny/PattersonFarms.asp)

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