

# Systems Approach to Studying and Demonstrating Anaerobic Digestion

## Morrisville State College

### **Objectives:**

The overall objective of the project is to design and construct an anaerobic digester to treat dairy manure (generated at the free-stall dairy complex) and other organic waste produced on the campus of Morrisville State College (MSC) and to use the generated biogas to run a combined heat and power generation system. Other objectives include the collection of data on the various components of the system; the analysis of the collected data and the reporting of results; the utilization of the project for demonstration purposes; and the use of the facility within any pertinent educational program offered by MSC.

### **Description of System:**

Anaerobic digestion can minimize odor, generate biogas, and allow more effective nutrient use by crops. To realize the potential energy, environmental, and cost saving benefits of anaerobic digestion, farmers need information to evaluate the energy, labor, land, and equipment costs. The anaerobic digester project at Morrisville State College involves the design and construction of a heated, hardtop plug-flow anaerobic digester. The digester will biologically treat dairy manure and other organic waste generated on campus to produce a stable effluent with improved physical, chemical, and biological characteristics. In the system, biogas (about 60% methane) will be produced, captured, and combusted to generate heat and power using a 50kW engine generator set. A boiler that runs on either biogas or propane will also be used to heat water during the startup phase of the system and anytime the engine generator set is not running. The methane digester system is sized to treat manure from over 350 milking cows and generate about 300,000 kWh per year from the recovered biogas.

The project is being funded by NYSERDA and the New York State Department of Agriculture and Markets, with additional support through U.S. Representative John McHugh, and from the U.S. Department of Energy's Office in Golden, CO. Construction on the project started in August 2005 and was completed in late 2006. The combined heat and power generation system was started on February 27, 2007.

### **Expected Outcomes:**

The project will generate data on the effectiveness of an internal combustion engine for converting biogas to energy; will track and evaluate project data, costs, and benefits; and will use the digester system in Morrisville State College's academic programs to transfer information to others considering anaerobic digestion systems.