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John Riccio
Superintendent
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Only the Best

THE PLANT TEAM IN WAUSAU, WIS., MADE ENERGY EFFICIENCY A TOP PRIORITY WHEN SELECTING NEW EQUIPMENT FOR A \$2 MILLION UPGRADE

By Doug Day

In completing a \$2 million upgrade to the Wausau Wastewater Treatment Plant, the staff did everything possible to improve energy efficiency with the new equipment.

Planning began three years ago and the project went online in fall 2011. "The existing blower equipment was dated, inefficient and breaking down," says Ken Ligman, project manager from the Becher-Hoppe Associates engineering firm in Wausau. The 8.2 mgd (design) advanced activated sludge plant serves Wausau, the City of Schofield, and part of a neighboring township. Its average flow is 4 mgd.

The old plant had three positive displacement blowers installed in 1970. The motors and two biogas-fueled engines were from 1989. "The engines required an awful lot of maintenance, and replacement parts were getting hard to find," says Ligman. "Money had to be spent. With a little foresight, we think we spent it wisely."

CAREFUL SELECTION

The city purchased all the equipment separately, rather than as part of a turnkey package. That enabled the staff to take proposals from various suppliers to find the best combination of technology. Ghidorzi Construction Co. of Wausau is the general contractor.

"We looked at engine-driven blowers, but it was more cost-effective to go with microturbines," Ligman says. Capstone 65 kW microturbines produce electricity that is used on site. Three Turbplex 3,400 cfm blowers (Siemens Water Technologies) with variable-frequency drives (VFDs) provide aeration capacity.

"The microturbines use the gas the engines would have used to generate electricity, but they also generate hot water, which is used to heat the buildings and the anaerobic digester," says Ligman. Expected net energy savings amount to about 900,000 kWh a year and about 77,000 therms of natural gas, equating to \$130,000 a year at current utility rates.

The gas scrubbing equipment came from Unison. "The gas skid was placed in a separate building, and the existing 2-foot-high concrete bases for the blower engines were cut down to make the blowers more accessible for



Two Capstone 65 kW microturbines will help the plant avoid buying nearly 1 million kWh and 77,000 therms of natural gas from the local utility every year.



The gas treatment skid (Unison) removes contaminants like organic siloxanes from the biogas to protect the microturbines. The hydrogen sulfide removal vessel is located outdoors next to the plant.

operators," Ligman says.

The blowers are paced off the dissolved oxygen levels in the aeration tanks. The VFDs are controlled by the existing programmable logic controllers (PLCs) and SCADA systems, which were modified to account for the new machinery.

"For most of the day, a single blower runs at half capacity," says Ligman. "There are a couple of peak occurrences during the day, but not every day, when a second blower is used." When that happens, both blowers start at minimum capacity and adjust the operating speed based on dissolved oxygen.

"In summer, we'll need two blowers much more frequently," adds wastewater superintendent Dave Erickson. Other positive side effects of the project, especially for operators, are that the blower room is much quieter with the new blowers, and they don't have to spend as much time working on the blower engines.

IMPROVED AERATION

Funding was aided by grants from Wisconsin's Focus on Energy program. The aeration improvements garnered a \$100,000 grant,

What's Your Story?

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ALWAYS A GOAL

Sustainability initiatives are nothing new at the Wausau Wastewater Treatment Plant. A transition to more efficient lighting has been going on for years. The plant also applies 1,200 dry tons per year of Class B biosolids on nearly 50 farm fields to help grow feed corn, alfalfa and soybeans while keeping the material out of landfills.

Effluent is used throughout the plant for cleaning and flushing equipment, reducing demand for potable water. Perhaps the most visible sign of sustainability is a plug-in electric utility vehicle purchased in 2011. Staff members use the cart, manufactured by Columbia Parcar Corp. of Reedsburg, Wis., to move around the grounds and haul tools and equipment.

"It is ideal for short trips around the plant and has the advantage of being able to drive right to the work area inside several of the plant buildings," says wastewater superintendent Dave Erickson.

The next efficiency improvement is replacement of the plant's UV disinfection system, installed in 1991, with a TrojanUV3000Plus system that has a chemical and mechanical cleaning system. The new system will automatically adjust UV output to flows and water quality. "We'll have a lot less labor cleaning the UV lamps and won't have to handle the acid like we did when doing it by hand," says Erickson.



Turblex blowers have improved aeration at the Wausau Wastewater Treatment Plant while also reducing energy needs.

while a \$135,000 grant helped pay for the microturbines. The local utility, Wisconsin Public Service, provided a \$25,000 incentive payment while two planning grants, totaling \$9,200, were also secured for the project.

Half of the plant's aeration tanks were updated as part of the upgrade. "We replaced the existing ceramic fine-bubble diffusers in three of the six tanks with Sanitaire membrane fine-bubble diffusers (Xylem)," says Ligman. The plant only uses three tanks at a time. New dissolved oxygen sensors were also installed in those three tanks, and airflow metering was added.

The project also included several minor changes, such as replacing 30-year-old slide gate valves in the aeration tanks along with drain and mud valves, and replacing corroded concrete effluent boxes. That added to the cost but helped improve plant operations.

Erickson says the plant will be saving energy and money while getting the same high-quality wastewater treatment for which it is known. **tpm**