Economical Energy Savings

By Greg Thompson

RTO technology reduces operating costs in New Jersey

The Stony Brook Regional Sewerage Authority (SBRSA) in Princeton, N.J., provides treatment and disposal services for wastewater residuals. Its River Road Wastewater Treatment Plant was constructed in 1976 and began accepting flow in 1978. The plant receives flow from Princeton Borough and Township, South Brunswick Township and West Windsor Township.

Sludge is generated as part of the wastewater treatment process. It is dewatered and then incinerated in one or two multiple-hearth incinerators. The sewage sludge incineration (SSI) process is continuous and averages approximately 6 wet tons per hour, operating six days per week and 52 weeks per year.

To control odors and carbon monoxide (CO) at SBRSA, the exhaust from the incinerator originally was conveyed to a direct-fired afterburner system before passing through a wet venturi scrubber for removal of coarse particles. The authority recognized that approximately 50% of the natural gas used in the incineration process was consumed by the direct-fired afterburner. This became the focus of the authority's initiative to reduce operating costs.

The RL RTO systems installed at Stony Brook Regional Sewerage Authority

Stony Brook Regional Sewerage Authority layout

An Economical Alternative

SBRSA consulted Chavond-Barry Eng. (CBE) of Blawenburg, N.J., a local engineering firm with years of experience with multiple-hearth incinerators and SSI. After an extensive review of the process, CBE recommended a regenerative thermal oxidizer (RTO) to obtain the greatest reduction in operating costs.

CBE recommended Dürr Systems of Plymouth, Mich., based on its successes at similar facilities in Wayne, N.J., and Fitchburg, Mass. High thermal efficiency, high destruction efficiency and a proven track record were some of the reasons used to formulate CBE's equipment and supplier recommendation.

In addition to recommending Dürr's experience in the industry, CBE specified Dürr's Ecopure RL RTO system for the added benefit of the single-rotary valve that allows for high destruction efficiency and low system maintenance, as well as the compact footprint offered by the skid-mounted design.

The skid mounting offers the advantages of prepiping and wiring of the RTO to an integral control room, thus saving cost and time during installation. A final consideration was the advantage of an online bakeout feature that allows the reduction of particulate on the heat recovery beds while continuing to operate at full production volume.

The project included the addition of a wet electrostatic precipitator (WESP) for a total system installation cost of $4.9 million. Since going online with the RTO system, SBRSA has realized an average monthly savings in natural gas usage of 49%, equating more than $2.5 million thus far in energy cost savings. The return on investment for the entire project stands at just less than 3.5 years.

"The reduction in incineration operating costs has been a significant factor in the authority's ability to keep operating costs and annual budgets stable during a time when member municipalities are under significant economic stress," said Courtney Bixby, assistant manager of engineering at the plant. "Keeping in line with the authority's vision, our carbon footprint has been reduced considerably, as well as our impact on the environment."

System Details

Risk was greatly reduced by employing an RTO technology that had been successfully used in difficult situations where odor and CO destruction were critical project objectives. The Ecopure design features a single rotary diverter valve, 12 heat recovery chambers enclosed in a single tower, and a pre-piped, pre-wired, skid-mounted package. The single-rotary valve is resistant to particulate and condensables, while having few moving parts reduces maintenance and improves system uptime.

The RL features a continuous purge that makes it particularly well suited for any performance emission reduction application. An RTO without a purge feature will "puff" untreated emissions, which can be detected locally. Rotary valve RTOs eliminate the puffing, which occurs during valve switching, a common problem with conventional regenerative thermal oxidizers.

"The Dürr RL has been very well received by the operators of the plant," Bixby said. "It has been dependable and easy to operate."

Complying with Standards

The emissions from sewage sludge incinerators are regulated in part by the U.S. Environmental Protection Agency, Section 129 of the Clean Air Act. These revised standards for both new and existing incinerators were published in 2011 and all operating sewage sludge incinerators are required to be in compliance with these standards by March 21, 2016.

"Potentially, as the upgrade bills accumulate, many sewage sludge incinerators may have to be in compliance with the considerably lower emission standards for new incinerators," said Louis T. Barry, P.E., president of CBE.

Along with the revised emission standards for existing incinerators, this regulation also requires existing incinerators to meet the stricter emissions standards of new incinerators, should their accumulated system upgrades reach 50% of the initial installation cost for the facility, adjusted to current dollars.

"The addition of the RTO and WESP has put us in a better position to meet those standards," Bixby said. WWD

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