

Plant Saves \$200,000 In NOx Credits

At Constellation Energy's Brandon Shores station, use of [Emerson](#) [1]'s SmartProcess® selective catalytic reduction (SCR) optimization technology is translating into dramatic operational, environmental and financial improvements – including improved SCR efficiency, extended SCR regeneration cycles, a 250-ton reduction in NOx and subsequent savings of \$200,000, which is achieved by eliminating the need to purchase additional NOx credits.

At 1,300 megawatts, Brandon Shores is the third largest power plant in terms of owned capacity within Constellation Energy's generation portfolio. The Brandon Shores station operates with SCR systems to reduce NOx emissions during the annual ozone season from May through September.

The systems work by injecting ammonia into the flue gas to neutralize NOx. In order for the SCR to work at its target efficiency rate of 90 percent NOx reduction, the flue gas entering the SCR must be greater than 585°F. When the flue gas falls below 585°F, the ammonia flow rate drops, resulting in less efficient NOx reduction. If the flue gas falls below 555°F, SCR operation stops completely.

Flue gas temperature is greatly affected by plant load. Since Brandon Shores participates in the PJM Interconnection market for regulation and is required to closely follow fluctuating load demand, the flue gas temperature frequently dropped below 585°F and occasionally dropped below 555°F. The original SCR control schemes were not able to optimize the flue gas temperature and struggled to maintain the minimum SCR inlet temperature.

Constellation needed an optimization solution that controlled the SCR inlet temperature more tightly in order to meet the SCR efficiency target of 90 percent NOx reduction. Doing so would help the plant achieve the operational flexibility required to participate in the PJM Interconnection market.

Emerson's solution included revising the original OEM-supplied design philosophy with advanced Ovation expert control strategies and installing SmartProcess SCR optimization technology. Ovation is used to control the plant's boiler, burner management, data acquisition and flue gas desulfurization processes.

Emerson studied the original boiler and SCR designs, as well as associated operational philosophies, and developed recommendations for improvement. Several modifications were implemented in a new Ovation strategy that provided tighter management of the economizer remix temperature throughout the entire load range by revising the control aspects of the economizer bypass and outlet dampers. This resulted in more consistent control of the SCR inlet and remix temperatures.

The SmartProcess SCR optimization technology was installed to work in conjunction

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with the recently modified Ovation controls to further optimize the SCR inlet temperature. SCR optimization uses fuzzy logic, advanced analytics and model predictive control to closely monitor the system and related data to predict the optimum ammonia usage and current flue gas composition, and based on this information, recommend the ideal SCR performance settings. SmartProcess also automatically calculates optimal bias settings for O₂, fans and dampers to provide tighter control of the inlet temperature.

Since its installation in 2006, the new Ovation advanced control strategies and SmartProcess optimization technology have tightened control of the economizer remix and SCR inlet temperatures at higher loads, and increased the SCR inlet temperature at lower loads. The improvement in SCR efficiency has resulted in a reduction in NO_x generation, NO_x credit purchases and ammonia usage, as well as extended SCR regeneration cycles.

Prior to implementing Emerson's solutions, the Brandon Shores SCR that was tested operated below its targeted 90 percent NO_x reduction efficiency rate for approximately 190 hours during the ozone season, emitting roughly 650 tons of NO_x during that time. After installing new Ovation logic and SmartProcess technology, test results show that the SCR operates below the 90 percent target for only 70 hours, emitting 400 tons of NO_x in this time frame. By eliminating 120 hours of operation below optimal efficiency, Constellation was able to reduce the amount of NO_x generated by 250 tons. At a rate of \$800 per ton, Constellation saved \$200,000 in NO_x credits.

"By automatically controlling the SCR inlet temperature, the SmartProcess solution makes it possible for the plant to quickly and efficiently respond to constantly changing load demand, which is critical to our participation in the PJM Interconnection market," explains Harry Brocato, engineering projects general supervisor at Brandon Shores. "Emerson's technology has enabled us to dramatically increase the amount of time we operate within the optimal parameters, which in turn, results in a significant decrease in NO_x, as well as a significant cost savings."

"Today, utilities operate in a challenging operational, environmental and financial environment," says Bob Yeager, president of the Power & Water Solutions division of Emerson. "The key takeaway for power generators, based on Constellation's experience at Brandon Shores, is that Emerson's control system and optimization technology can work hand-in-hand for the benefit of the environment and the bottom line."

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[1] <http://www.emersonprocess.com>

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