

We Energies' Valley Power Plant Uses SmartProcess® Combustion Optimizer to Sustain 10% NOx Reductions

RESULTS

- 99.9% system availability
- 93.7% system utilization for over 7 years
- 10% sustained average NOx reduction since 2000
- 18% decrease in excess oxygen
- 20% reduction in desuperheater spray flow

APPLICATION

A two-unit coal-fired, combined heat and power plant configured with four boilers feeding two turbines and a total generating capacity of 280 megawatts. Valley Power Plant is one of the nation's largest cogeneration facilities that generates both electricity and steam for approximately 350 steam customers in downtown Milwaukee.

CUSTOMER

We Energies, Valley Power Plant located just outside of Milwaukee, Wisconsin

CHALLENGE

In response to evolving ground-level ozone standards in the United States, We Energies began a proactive, comprehensive strategy to prepare for new environmental regulations by reducing nitrogen oxide (NOx) emissions throughout its generation fleet. We Energies investigated solutions that evaluated NOx reduction against dollars per ton removal. Valley Power Plant was selected as the test site for the NOx reduction technology because of its close proximity to downtown Milwaukee and its challenging NOx control process. Low NOx burners were installed at the Valley Station, which provided decreased NOx emissions, but additional reductions in NOx were desired in order to ensure exceeding regulatory limits. As a cycling plant, Valley is on automatic dispatch and seldom base-loaded, so whatever technology was chosen, it needed to be reliable and robust enough to handle fast changing conditions, as well as provide We Energies with enough NOx reductions to meet environmental limits throughout the wide operating range of the plant.



“Our investment in the SmartProcess Combustion Optimizer has provided us continuous savings since it was first installed in 2000. We have seen a 99.9% availability of SmartProcess which has contributed to our sustained 10% NOx reduction.”

Mr. Tom Ventimiglia
Asset Manager
We Energies
Valley Power Plant



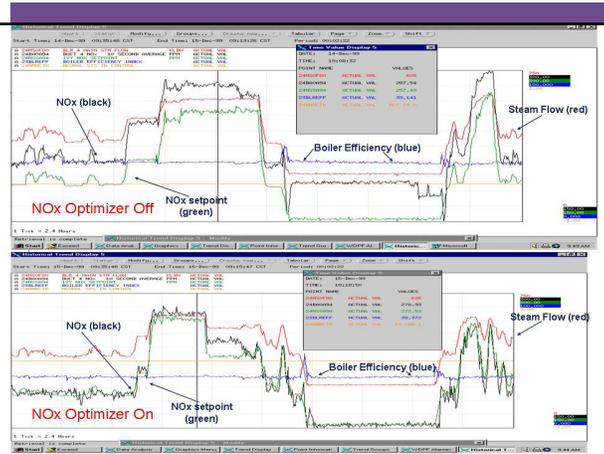
SOLUTION

We Energies assembled a talented team charged with developing an action plan to deal with increasing NOx regulations and evaluating new NOx reduction technology. After careful consideration of several vendors, the We Energies team selected Emerson’s SmartProcess® Combustion Optimizer as an economical solution for NOx control at the Valley Power Plant.

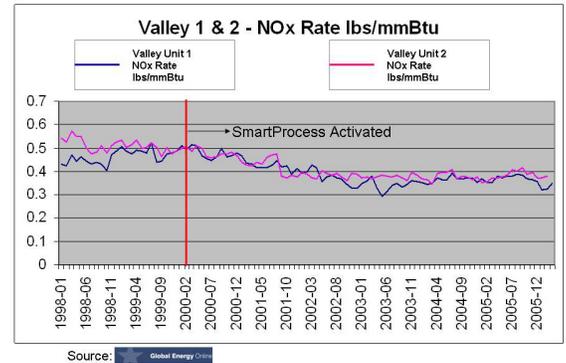
The project began on Valley Boiler 4 with modifications to the existing WDPF control system structure and logic. Changes made included the addition of software, safeguard logic, and heartbeat signals to integrate the SmartProcess optimizer and system monitors with the control system. Automated parametric testing was performed to analyze plant operations in a variety of conditions, ensuring collection of critical relationships between key variables. This data was used as the basis for creating the plant model. Once completed, the model was integrated with the boiler’s control system. The optimizer was tested and tuned in supervisory closed loop operation in order to validate its responses to dynamic changes in load demands.

Early results showed that the SmartProcess Combustion Optimizer reduced NOx emissions by 15% at Valley Boiler 4, allowing We Energies to achieve plant optimization goals while meeting EPA regulations. Other results for Boiler 4 included decreased excess O₂, reduced desuperheater spray flow, and increased boiler efficiency levels.

Since commissioning the Valley Boiler 4 SmartProcess Combustion Optimizer, We Energies has installed the optimizer on the plant’s remaining three boilers. As a “self-learning” technology-based module, the optimizer has achieved a 99.9% availability rate, with operators using the system approximately 93.7% of the operating hours for over seven years. Additionally, SmartProcess has sustained an average 10% NOx reduction across all four boilers since original installation in early 2000.



SmartProcess trending graphics show improvements in NOx levels, boiler efficiency, and steam flow when the Combustion Optimizer is activated.



The graph, above, shows a sustained average of 10% NOx reductions for 5 years since installation in early 2000 for Valley Units 1 & 2.

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