Prairie State Energy Campus is a standalone, technologically-advanced energy campus located in southern Illinois. Operated by Prairie State Generating Company (PSGC), the energy campus comprises a 1,600 MW coal-fired supercritical power plant, and an adjacent underground coal mine. Six public power entities and three rural electric generation and transmission cooperatives own Prairie State. All of Prairie State’s member-owners are community-owned or member-owned, non-profit electricity suppliers that are committed to providing clean, reliable, and affordable baseload electricity to 2.5 million customers in hundreds of communities in the Midwest and Mid-Atlantic regions across eight states. As might be expected, its unusual origins raised the stakes considerably for engineers charged with designing the new plant’s operation model.

A Complex Green Field

Fortunately, Prairie State leaders had the experience and foresight to integrate a robust solution combining the advanced analytics capabilities of Atonix Digital’s ASSET360 Monitoring & Diagnostics software with the consultative expertise of Black & Veatch’s Remote Monitoring Services into its operations. The plant’s operations leaders knew from the start that they wanted to work with this hybrid solution.

“It was a greenfield site,” recalled Lyman Sutton, Prairie State’s Assistant Operations Manager. “When the construction firm turned the plant over to us in 2012, we knew our personnel couldn’t possibly process all the alarms they had coming at them. We also knew we could talk to Black & Veatch to see what they could offer for remote support.” While the alarms are dramatically reduced today compared to 2012, advanced pattern monitoring remains a vital need to ensure reliable operation.

“...”

Lyman Sutton | Assistant Operations Manager, Prairie State Generating Company

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Maximizing the Denominator

As with most plants, Prairie State tries to heed a simple formula for operations: minimize cost per megawatt-hour produced.

As Sutton explained, “Our goal is to minimize costs for our members. One of the best ways we can do that is to make the denominator in that equation as large as possible, meaning we reduce outages and keep the plant online.”

Equipment reliability plays a major role in this formula. “We try to think strategically and stay ahead of issues before they become bigger problems that might lead to forced outages,” volunteered Derek Birch, the plant’s Engineering Supervisor.

One SaaS Solution Supports a Team of Specialists

At Prairie State, there’s an important professional development component to this. “We have many junior engineers in the engineering department,” said Birch. “It’s critical that we train them to see the issues, and to start to create solutions.”

A team of ten System Owners report to Birch, each assigned to specific groups of equipment around the plant. They are charged with developing preventive maintenance strategies and devising processes to support those strategies.

The Remote Monitoring & Diagnostics service with ASSET360 software contributes directly to this objective. “The notifications give the ability for any member of my team to evaluate discrepancies they wouldn’t normally see,” said Birch. “The issue might not be generating an alarm in the DCS, but the notifications identify deviations that might require additional attention.”

An Early-Warning Resource

Black & Veatch’s Remote Monitoring Service is also vital for identifying issues long before they trigger alarms, cause failures, or force outages.

One such issue spotted by the Remote Monitoring team ironically arose as a performance improvement: a decrease in differential pressure across a boiler feed pump strainer. Prompted by the Black & Veatch team to inspect onsite, Prairie State engineers discovered that the upstream strainer element had failed, with parts of the strainer element completely detached from its assembly. Using a borescope, they could clearly see strainer segments lodged in the boiler feed pump suction. This correlated with another alert on an increase in pump vibration, and disproved an earlier suspicion that there was a problem with the pump – whose investigation would have required a longer-duration outage and yet still might not have identified the root cause.

The list of early interventions at Prairie State includes correcting a valve misalignment and control system logic that caused water to migrate into a boiler feed pump turbine lube oil tank; discovering a failed extraction check valve that could have resulted in a turbine overspeed event; discovering a leaking main steam stop valve that caused an increase in net plant heat rate; and identifying early signs of boiler slagging.

To date, the software-and-services solution has identified problems that could otherwise have gone unnoticed, and saved Prairie State tens of millions of dollars in avoided repairs or replacements.

“The collaboration between our team and Black & Veatch is key,” summarized Sutton. “We have folks with lots of experience, but the Remote Monitoring engineers can tell us, ‘there’s something we noticed that reminds us of something we caught at this other plant.’ They bring more of a macro view to the table, and that’s just what we need.”

“"The notifications give the ability for any member of my team to evaluate discrepancies they wouldn’t normally see.”

Derek Birch | Engineering Supervisor, Prairie State Generating Company