Power Up, Pollution Down

Three-year environmental improvement will deliver safe, clean, and reliable energy

Balancing the cost of emissions control against the benefit to air quality is more than an exercise in environmental economics for Ameren Corporation, a St. Louis-based energy company that serves 2.4 million electric customers and nearly 1 million gas customers in a 64,000-square-mile area of Illinois and Missouri.

The company reinforced its commitment to safe, clean, and reliable power in July 2007 when it launched its "Power On" initiative, which will invest more than $1 billion in reliability and environmental improvements over the next three years. The largest of the four program components is well under way at Ameren's 993 megawatt Sioux Power Plant, located about 28 miles northeast of downtown St. Louis. The 40-year-old plant is being retrofitted with $500 million in pollution control equipment that will reduce sulphur dioxide and mercury emissions years ahead of the federally mandated deadline.

The U.S. Environmental Protection Agency issued final regulations for the Clean Air Interstate Rule (CAIR) and Clean Air Mercury Rule (CAMR) in May 2005, calling for phased reduction of SO2, NOx, and mercury emissions from coal-fired plants beginning in 2009. By 2015, CAIR aims to reduce SO2 emissions by 75 percent and NOx emissions by 30 percent from current levels in 28 states and the District of Columbia.

To meet these targets in Illinois and Missouri, Ameren formed a long-term technology alliance with Hitachi Power Systems America Ltd. (HPSA), a wholly owned subsidiary of Hitachi America and a leading supplier of equipment and services for the power generation market. HPSA is a Global Center of Excellence for the emissions market, with expertise in wet flue gas desulphurization (WFGD). Based in Basking Ridge, N.J., the company is supplying WFGD systems for five of Ameren's power generation units, including two at the Sioux Power Plant.

The scrubbers will be capable of removing about 95 percent of the SO2 from boiler flue gas when the units are burning either low-sulphur or high-sulphur coals. This will give Ameren the flexibility to use the lowest cost fuel for each plant. Inside the scrubbers, the limestone slurry used to cool the flue gas will convert the SO2 into a calcium sulfate solution. This by-product will be de-watered to produce dry gypsum, which can be recycled as drywall, cement, or fill.

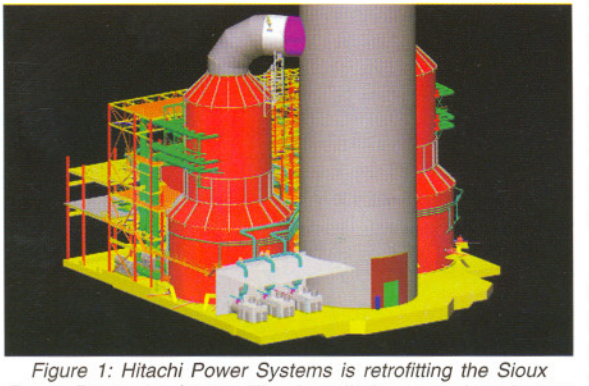

Figure 1: Hitachi Power Systems is retrofitting the Sioux Power Plant with $500 million in pollution control equipment

The Hitachi alliance not only gives Ameren access to proven emission control technology but also taps the company's research and development to meet future environmental requirements. For Hitachi, the retrofit contract represents a milestone in the development of the technology center. Formed in December 2005, the new business unit serves the expanding power market in North America, where the stable price and ample supply of coal is creating demand for new plant construction and the more stringent environmental standards are stimulating demand for plant retrofits — one of HPSA's core competencies.

The Sioux Power Plant retrofit was the first major project awarded to HPSA after its formation. Detailed design began in April 2006 and was completed within one year. "The use of Bentley software along with in-house developed custom software allowed the HPSA design team to deliver exceptional efficiencies and superior quality control during the design stage," said Bhadresh Nanavati, HPSA CAD manager. "The lessons learned during the new implementation of Bentley software products will provide future direction for development and automation to achieve greater efficiency and work process improvement."

Ramping up design

HPSA implemented Bentley software products to meet Ameren's design standards. The project required submission of 2D CAD drawings and 3D models using MicroStation and PlantSpace to produce DGN files. Bentley's software training and support services eased the design team's transition from AutoCAD to Bentley-based software.

In addition to equipment, piping, and ductwork for two WFGD systems, the project included the following for each unit: SO2 absorber module system including high alloy gas inlet section;

flue gas emergency quench section and outlet hood; integral recirculation tank; agitators; absorber recycle pumps; bleed slurry pumps; mist eliminators; oxidation air compressors and lances; and associated support steel for piping, valves, and instruments.

From conceptual design to final design, Bentley solutions impacted the entire workflow. The 3D modeling resulted in considerable time savings, thanks to the automatic generation of 2D drawings and piping isometrics with accurate material take-offs. Interference checking in Bentley Navigator reduced the amount of clashes early in the design stage, and avoided the future cost of field changes and fabrication.

Even in the early stages of implementation, ProjectWise enabled the team of about 80 engineers, designers, and draftspersons to access the latest versions of project documents in a companywide document management system. Access control, check-in and check-out features, version control and redlining capabilities enabled designers to share their work in progress.

Overall, the improved workflows and collaborative work environment resulted in greater efficiencies among team members. More importantly, the improved communications among the project team, client, and vendors helped reduce late-stage design changes, thereby lowering risk and associated costs.

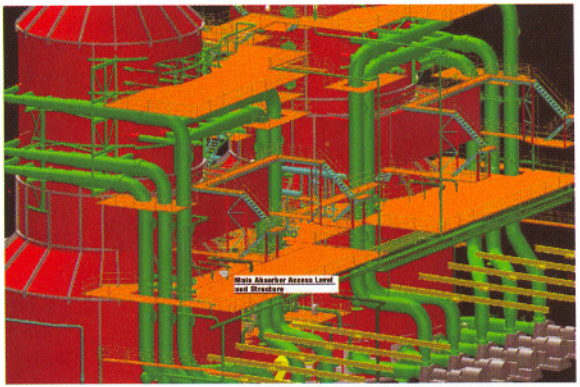

Figure 2: Interference checking reduced the number of clashes early in the design stage

"Bentley's commitment to developing the latest software and tools necessary to meet various industry standards and collaborative working environment helps HPSA to better serve its customers," Nanavati said. "And we can always depend on Bentley's well-trained support staff."

Fabrication and construction of the new WFGD units are scheduled for completion in mid-2008, with the Unit 1 plant tie-in outage scheduled for September and the Unit 2 tie-in scheduled for October 2008. When the Sioux plant scrubbers go online in 2009, the plant will meet or exceed the 2015 SO2 emissions reduction goals while keeping up with growing demand for power in the region.

Project Overview: Ameren Services WFGD Retrofit – Sioux Power Plant; **Organization:** Hitachi Power Systems America, Ltd., **BE Awards Category:** Plant Rookie of the Year; **Project Objective:** Commission a $32.7 million flue gas desulphurization system with lowest cost of ownership while maintaining and/or improving unit reliability ❑