University executes mission through sound energy management

Missouri State University’s identity is distinguished by its statewide mission in public affairs, which seeks to develop citizens of enhanced character that are more sensitive to the needs of the community, and more competent and committed in their ability to contribute to society. In a testament to this mission, the University engaged Johnson Controls in two performance contracts aimed at energy management and conservation. The University is expected to save $23.5 million in energy costs over the life of the contracts and has set an example of good stewardship of public resources for its students as a result.

Missouri State is a comprehensive statewide university system serving more than 20,000 students. The University has grown and continues to grow to meet the needs of the fastest growing region of Missouri. In doing so, University officials are committed to minimizing the University’s environmental impact, and are mindful of their duty to be good stewards of the taxpayers’ dollars. In fact, Bob Eckels, Director of Facility Management along with University administration, set a goal to reduce the amount of energy consumed by the University.
Eckels researched performance contracting, which included a visit to a neighboring university who had contracted with Johnson Controls. Eckels then contacted Johnson Controls to learn more. “Confident they could save us money, Johnson Controls offered to do a feasibility study for us. They determined we had more than $60,000 in energy losses each month, which made it very clear we could make some improvements” states Eckels. Armed with this information, the University conducted an in-depth selection process, ultimately awarding the first of two consecutive performance contracts to Johnson Controls for energy saving improvements.

Addressing energy inefficiencies

The feasibility study revealed that the University had inefficient lighting, no means to manage high-energy use and no centralized control of occupied buildings, resulting in $60,000 to $80,000 of energy waste each month. In 1996, the University entered a 10-year performance contract with Johnson Controls for $5.5 million in energy improvements including 15,000 lighting retrofits, electrical sub-metering for all major facilities, installation of variable speed drive motors and a Metasys® building management system in 36 buildings across campus.

Missouri State was guaranteed energy savings of $10 million over the term of the contract. Johnson Controls was responsible for maintenance of the Metasys system under a service agreement. In addition, a Johnson Controls building environment specialist (BES) was hired by the University to help the physical plant staff maximize savings by making the best use of the systems and equipment put in place. Regular meetings are held to immediately address any new concerns and to discuss additional savings and improvement opportunities.

“The process and results of the first performance contract and the experience of the BES shed light on a number of things from an operations perspective, and incited us to conduct electric and natural gas utility studies,” says Eckels. This led to an upgrade of the University’s underground electrical distribution system, which paved the way for the second performance contract involving $10.8 million in energy improvements in 2004.

Upon review of the natural gas study, Johnson Controls recommended phasing out 16 inefficient building-dedicated absorption chillers and installing a chilled water loop that would be charged by five larger, more efficient chillers. Johnson Controls conducted a feasibility study for implementing the project through a performance contract and was later awarded the contract. The chilled water loop serves 20 major buildings on campus and is designed to save Missouri State more than $900,000 annually over the contract’s 15-year term. Under a service agreement, Johnson Controls maintains the equipment installed under the contract and the Metasys system, which now monitors and controls systems and equipment in 40 buildings on campus.

“The improvements implemented with Johnson Controls assist us with our facilities management mission to provide a quality-learning environment.”

Bob Eckels
Director of Facility Management
Missouri State University

“The construction for the project took place during our centennial year...
when we had a number of ceremonies happening on campus,” notes Eckels. “As project manager, Johnson Controls worked well with our preferred mechanical engineer throughout the construction process. There was boring and trenching going on all over campus, yet it was handled very smoothly and with little disruption to our centennial events.”

The improvements done in the first performance contract paid for themselves in just over seven years and the remaining savings were used to conduct a boiler plant modernization. Eckels expects a 13-year payback on the second performance contract and has earmarked the future savings for additional improvements.

Benefits beyond savings

Providing a quality-learning environment through effective facilities planning, service, maintenance, repair and construction is the Facility Management Department’s mission, according to Eckels. “The improvements we’ve initiated with Johnson Controls assist with that mission through better lighting, more effective heating and cooling, and better overall control of the learning environment. Because of the sophistication of the Metasys system, we often know of problems before the students and staff do. And, improved operations and longer equipment life allow us to focus on other issues which are also important to making the academic environment better,” he says.

Students were also challenged to be a part of the University’s initiatives. With the help of the Johnson Controls BES, theater students prepared a video of tips and did–you–know scenarios that outlined the impact of things like leaving lights and computers on, and not adjusting thermostats in dorms and classrooms when they are not in use. The video was shared with all students and staff, and is part of new student and staff orientation. A second video, detailing the improvements completed in the first performance contract, was also prepared by the Johnson Controls BES. The video played a key role in educating students and staff on what was taking place across campus, and in obtaining the approval of University administration to install the chilled water loop.

“The initial performance contract with Johnson Controls served as a catalyst, opening our eyes to new energy opportunities; this included campus-wide paradigm changes, facilitated by utility master planning,” states Eckels. Now, the monthly meetings of physical plant personnel and the Johnson Controls BES are a medium for discussion of new initiatives. “Successful performance contracting requires a partnership in which both parties develop a long term commitment to the energy efficiency of the University,” adds Eckels.

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`Bob Eckels
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A green future

Since completion of the first performance contract, Missouri State has reduced CO\textsubscript{2} emissions by more than 153,000 tons, Nitrous Oxide by 668 tons and Sulfur Dioxide by 327 tons.

With its public affairs mission in mind, Missouri State is committed to continuing these efforts. In fact, sustainability is the theme of the University’s 2009 Public Affairs Week. Future energy savings have been earmarked for alternative energy projects and a sustainability committee has been established. With the help of Johnson Controls, utility study findings are being used to determine which alternative energy opportunities make the most sense for the University. Opportunities already being considered include solar energy for hot water needs and producing electricity, ground source heat pumps for heating and cooling, and free-cooling during winter months.

"The results of the initial performance and the studies done along the way were a catalyst for the efforts that followed, and opened our eyes to the need for a utility master plan."

**Bob Eckels**
**Director of Facility Management**
**Missouri State University**