



(Above) The Buehler Building, along with the DGLS Annex, not pictured, are two of the most energy-efficient buildings operated by Missouri state government. (Below) Double-pane, solar Low-E windows help increase energy efficiency. The building's overhang, part of its 1963 design, shades the windows in the summer and allows natural light into the building during winter months.



The Missouri Department of Natural Resources' Division of Geology and Land Survey, headquartered in Rolla, now occupies two of the most energy-efficient office buildings operated by Missouri state government.

The division is housed in the Buehler and Annex buildings on Fairgrounds Road. In recent years, these buildings have seen as much as a 40 percent reduction in energy use and at the same time, an increase in both usable space and occupant comfort.

"These two buildings were not always the high performers they are today," said Joe Gillman, DGLS director and state geologist. "The setting in 2004 was certainly not one of energy efficiency."

The Buehler Building, faced with Carthage Marble, was built in 1963 on land donated by the Rolla Chamber of Commerce. The facility's heating system was supplied by the original boiler that was converted from oil to natural gas at some point during its 40-plus years of operation. Two centrifugal chillers that had persistent problems during summer months supplied cooling. To make matters worse, the pneumatic control system that controlled valves and dampers throughout the building had constant leaks that greatly limited its effectiveness. Other issues included lighting that comprised more than 10 different light-fix-

ture scenarios and single-pane windows that produced chilling drafts in the winter.

The Annex Building, built in 1968, served as office and warehouse space in which drill core and other rock samples taken from around the state were stored and cataloged. When the McCracken Core Library and Research Center was built with private donations in 1989, core samples were relocated there and the warehouse needs of the Annex Building were significantly reduced.

"With all these issues, the need to develop and implement a capital improvement project became a high priority, not only for the division but also for the department and the state's Division of Facilities Management Design and Construction," said Frank Cunningham, a former energy engineer with the department's Energy Center. The original concept was to replace the heating and cooling systems in both buildings with similar systems – assumedly the simplest and quickest solution.

However, the cost to do this far exceeded appropriated funds. Department management and staff believed all along that improving the energy efficiency of the building was important and should be a high priority. They persisted with the idea of installing a ground source heat pump (GSHP) system. The department's Wellhead Protec-

tion office is also in the building and regulates ground source wells.

“During the design process, staff also pushed to have an energy study performed, comparing the economic impact of a conventional system to that of a GSHP system,” said Cunningham. Kirk Mescher of CM Engineering, Columbia, was hired to do the energy study. The firm has extensive experience with GSHP systems. “The results were astounding and prompted the state’s facilities management and design construction staff and the department to proceed with a GSHP system,” Cunningham added.

Partnering with architects Simon Oswald Associates, also of Columbia, CM Engineering was then selected to design and manage the replacement of the Buehler Building’s heating, ventilation and air conditioning systems. During the initial design phases, it was determined that the original amount budgeted for the HVAC replacement was more than required. This afforded the opportunity to upgrade the Annex Building’s HVAC system, as well as address other energy-efficiency measures that had been identified for the building.

As a result, both buildings received new HVAC systems, new occupancy lighting sensors, efficient fluorescent lighting, new double-pane windows, and wall insulation that also helped reduce the size and cost of the heating and cooling systems.

The consultants also designated the warehouse space as new office space that would be completed as the first phase of construction. This space served as a temporary area for staff displaced during the renovation of existing space in the Buehler Building. This not only helped save staff time but it also saved money that would have been used to lease temporary office space. Once completed, this new office space also provided a conference room to accommodate all staff.

“Our ground source option truly showcases the benefits of ground source technology, and these energy-efficient measures could be employed by businesses, schools and citizens,” said Gillman. “The 40 percent reduction in costs ... benefits both taxpayers and Missouri’s environment.”

These improvements in state facilities may soon become more common since Gov. Jay Nixon signed Executive Order 09-18 during the Missouri Energy Summit held at the University of Missouri in April 2009.



The order directed state agencies to reduce building energy use by two percent annually for the next 10 years. Nixon said conservation measures would include weatherization of buildings, replacement of inefficient light fixtures with energy-efficient ones and implementation of more efficient means of heating and cooling state government buildings, among other measures.

(Above) More efficient fluorescent lighting has replaced old fixtures and sensors turn lights on or off when people enter or leave the room.

(Left) Joe Gillman, director of the Division of Geology and Land Survey, stands near one of two wells that are part of the ground source heat pump system installed in 2003 to heat and cool the Buehler Building. The wells are 900 feet deep and water is circulated between them. The system is reversed to meet seasonal needs.



To learn about energy-efficiency measures you can take and funding opportunities through the department’s Energy Center, visit [dnr.mo.gov/energy]. You are welcome to visit the Geology and Land Survey division at 111 Fairgrounds Road in Rolla, or online at [dnr.mo.gov/geology]. ☀️

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