Ensure an Optimized Building Environment with a BEMS Solution

By Matt Gates

The U.S. Government Accountability Office estimates that one in five children in the United States attend schools with poor indoor air quality (IAQ). Poor IAQ can mean many things: Classrooms where children have a hard time hearing the teacher due to poor acoustics, where temperatures climb above 90 degrees on hot days due to lack of air conditioning, or where poor filtration adversely affects children's focus and their health.

It is critical for educational facilities to choose heating, ventilation, and air conditioning (HVAC) solutions that help create quiet, comfortable classrooms for students and teachers. In most cases, schools want to address these issues but are faced with a variety of constraints and competing priorities that make investment decisions difficult.

Leveraging a **building energy management system (BEMS)** can help schools and universities tackle these tough investment decisions.

WHAT IS A BEMS?

A BEMS facilitates analysis, reporting, and data visualization of building system performance and energy information. Implementing a BEMS helps positively impact the bottom line of a school or campus by identifying cost reduction opportunities, areas requiring greater efficiency, and ongoing improvement needs. By taking a holistic view of a building, a BEMS helps facilities managers determine their priorities and critical areas within a school building—including key performance indicators (KPIs)—so they can develop and implement an improvement plan to fit specific needs and budgets.

There are many service providers on the market that can help when implementing a BEMS solution. Deciding to go beyond a software-only solution and leverage the expertise of a partner helps drive better outcomes and uncover more opportunities for greater improvements. This strategy can help you validate that

improvements are working as they should to impact the building environment and sustain savings.

STEPS FOR IMPROVEMENT

An experienced BEMS provider can help determine priorities and critical areas—including KPIs like IAQ, reduction in energy use, or increased student attendance—to develop and implement an improvement plan. Buildings provide many sources of valuable data that can be used to gain insight into the facility. Technology makes it easier than ever before to gather data, and a BEMS partner will help turn that data into actionable intelligence.

Whether you manage one building or an entire campus, understanding how your building(s) is supposed to perform—and how it's actually performing—is key to creating an energy baseline and prioritizing building needs. Harnessing the array of data sources in a building will help you make more targeted decisions regarding building systems. It will also support progress toward the key KPIs that were outlined in the improvement plan.

Choosing a BEMS provider that acts as an extension of your building staff helps eliminate the need for staff to "chase fires" and allows them to be more proactive in their jobs—focusing instead on the areas that impact the building environment and cost savings.

TOP 10 BEMS PROVIDERS

- Schneider Electric
- Honeywell
- Siemens
- Trane
- Johnson Controls
- BuildingIQ
- Daintree Networks
- IBM
- Powerhouse Dynamics
- Switch Automation

Source: *Navigant Research Leaderboard Report: Building Energy Management Systems,* September 2016

VALIDATE RESULTS

Determining KPIs, creating a plan for improvement, and choosing a partner to help with implementation are just the beginning. The next step is following up with an execution plan and ongoing validation of the results to help ensure continued improvements and savings.

A BEMS solution provides performance data to not only make a case for implementing the plan, but also the information to validate against KPIs to measure and demonstrate the return on investment once the project is implemented.

Validating that improvements and investments are producing the expected results is especially important for K-12 and higher education facilities that are publicly funded. In these cases, demonstrating the success of project improvements can be critical for ensuring continued ongoing financial or community support of the plan—and for gaining support for any future improvements.

The necessary follow-up and validation can be harder to execute with a software- or technology-only solution. In contrast, working through the process with a partner that can tailor the process for your building and situation offers ongoing support and analysis. It is important to balance the cost of the validation with the scale of the project.

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VALUE OF BEMS IN HIGHER EDUCATION

Higher education facilities are setting increasingly stringent climate and environmental goals to lower emissions, drive efficiency, and reduce energy costs—and schools are looking for building systems and technologies that help meet these goals.

Even though college campuses share many common elements, each campus has its own set of factors that contribute to how it uses energy. In order to improve energy performance, it is important to understand how energy is used. The more you know about how your campus uses energy, the more you can do to improve its energy efficiency.

Visibility is the first step in utilizing data to do this—you can't manage what you can't see. Working with an experienced BEMS provider can help you gain data visibility so your data can be organized into meaningful information.

Using data to run a building more efficiently—and more in line with how it's actually being used—is a low-investment option for improving operational efficiency and saving energy. This is especially important for colleges facing budget constraints that make it difficult to invest in infrastructure changes.

A BEMS provider can help universities accomplish this by identifying, selecting, and prioritizing energy-efficiency measures that have the greatest impact on energy consumption and on the organization's budget.

A REAL-WORLD EXAMPLE: BELMONT UNIVERSITY

With enrollment more than doubling in 15 years, the Belmont University campus in Nashville, Tennessee grew to a 50-building complex with 4 million sq. ft. of space, including historic buildings and new facilities. As a result of its aggressive expansion, the university was utilizing a variety of HVAC systems, including centrifugal and air-cooled chillers, chilled water with thermal storage, geothermal heat pumps, utility submetering, controls, and building automation systems (BAS). With varied suppliers, the systems lacked interconnectivity and had become difficult to operate efficiently. The university sought the help of a trusted BEMS provider to help come up with a solution to control campus energy use and operational costs.

A key component of the project was the addition of new smart submeters to monitor energy use. The metering system provides utility and energy profiles, and gives detailed data regarding the timing and location of energy use and demand. Using the data, Belmont facilities managers are able to correlate operating parameters to energy cost and focus on the major energy consumption areas on campus.

To gain an enterprise view of the campus, the submeters were integrated, along with new and previously installed controllers and third-party systems, through a building management system (BMS), allowing Belmont to manage all of its campus buildings as a single enterprise. The Web-based system gives facility managers online access and control over all of their systems from any PC or mobile device on the network, providing visibility for energy use and allowing facilities managers to proactively control costs.

Belmont uses the BMS to analyze energy and operational data as well as trending information from multiple sources. The analysis allows staff to coordinate schedules, identify issues, and make better decisions regarding building operations. The BEMS provider works hand-in-hand with Belmont, providing engineering support and training

on control-system operation. The team is also available to help analyze data, design graphics, and consult with Belmont regarding operational strategies.

There are many building energy management systems (BEMS) available that can provide software to access building data. However, some of these options may not provide the ongoing process framework, support, or expertise that it takes to know how to use the data.

A REAL-WORLD EXAMPLE: HOMESTEAD HIGH SCHOOL

Mequon, Wisconsin-based Homestead High School experienced declining student enrollment—and as a result, lower budgets. The school was challenged to reduce energy costs while still maintaining an environment conducive to learning and teaching. Homestead partnered with a BEMS provider to determine energy management strategies that would help achieve those goals.

The strategies for the nearly 500,000-sq.-ft. school included an analysis of utility consumption and ongoing reporting to help staff make informed decisions to optimize building operations. Customized energy dashboards display key information, allowing the school to gain insight into usage peaks and valleys in order to uncover hidden energy waste and identify opportunities for potential energy conservation measures.

Real-time tracking of energy use allows for comparison against planned spending to improve budgeting and forecasting. The tool also allows the facilities manager to calculate the cost of energy consumed during the school day and for after-hours community events.

Acting as a "second set of eyes," the BEMS partner works with Homestead to improve the school's business climate. KPIs identified upfront are monitored to collect performance data and analyzed to evaluate efficiency. Reports generated for Homestead allow facilities managers to view actual results versus goals and see areas for potential improvement.

With these strategies, Homestead is able to maintain an optimal learning environment and has created awareness among district administrators regarding energy usage. The ability to see the results of strategic actions provides Homestead with a great feedback mechanism for continual evaluation of energy use and ongoing development of energy management strategies.

The solutions have also resulted in energy savings of $5,000 a month—or about 15 percent—without the need to upgrade or replace equipment. And the school is able to reinvest the resulting savings back into efforts to improve the building environment.

OPTIONS TO OPTIMIZE THE ENVIRONMENT

A school's most important mission is to educate students. Providing an environment that makes it easier for students to pay attention and learn—and for teachers to teach—is critical to the goal of creating a high-performing school.

While improving building performance—and often as a result, energy efficiency—can involve technology and equipment solutions, it's also about having the information and knowledge to run a building smartly.

Incorporating a BEMS solution allows you to take a holistic view of building systems and provide performance that can help schools more efficiently manage their systems—resulting in improved classroom IAQ and equipment performance, in addition to energy cost savings. BEMS can be an important factor in ensuring that schools and universities reach their buildings' potential for comfort, reliability, and energy efficiency.

Matt Gates is the director of Intelligent Services Offers for Trane, a brand of Ingersoll Rand. He can be reached at *mgates2@trane.com*. This is his first article for *Facilities Manager*.