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When it comes to the United States Air Force Medical Service (AFMS), the mission always comes first. But that can be a challenge, particularly when the AFMS offers medical service to more than 2.63 million eligible beneficiaries, including active duty personnel, family members and retirees, at 62 campuses nationwide, including dozens of hospitals, medical centers and clinics.

Making sure the objectives of the AFMS mission are achieved on a daily basis requires a substantial amount of power, so patient comfort and safety aren't compromised in any way. But by early 2005, AFMS aggregate energy bills had topped out at \$39 million, which was an increase nearing \$4 million from the previous year. Couple that with federal energy efficiency mandates outlined in legislation like the Energy Policy Act of 2005 (EPAAct 2005) and the Energy Independence and Security Act of 2007 (EISA), and it was clear changes needed to be made.

Those changes are well underway, through an extensive power metering project that the AFMS commissioned with Chicago-based Kroeschell Engineering, designed to ascertain energy usage across the breadth of its facilities. The project, which utilizes more than 100 Square D® PowerLogic® ION power meters from Schneider Electric that capture information on all utility usage – including electric, water, gas, steam and chilled water – has resulted in multiple benefits for the AFMS. Energy usage information can be accessed daily by Kroeschell and AFMS engineering personnel via the Internet, providing an accurate snapshot of dozens of facets of energy usage, which can suggest areas that require attention. The project has also motivated some facility managers to pursue certification through the U.S. Environmental Protection Agency's ENERGY STAR building program. Of course, energy savings translates to cost savings, which ultimately benefits local facility budgets and programs, but the project has also fostered a competitive atmosphere. Because the Web-based system can ascertain the facilities that are most and least energy efficient, facility managers are striving hard to make sure their facilities place in the upper tier.



Taking steps to improve energy efficiency

The Air Force Medical Support Agency, located in Brooks City-Base, Texas, provides facilities engineering and sustainment support to the Air Force Surgeon General and the AFMS. The AFMS consists of approximately 40,000 officers, enlisted and civilian personnel, plus an additional 20,000 members assigned to the U.S. Air Force Reserves and the Air National Guard, all of whom serve the healthcare needs of American war-fighters, dependants and retirees around the globe. Its hospitals, medical centers and clinics are free-standing buildings on Air Force bases and range in age from 10 to 60 years. Over the years, AFMS has put forth a herculean effort to update and renovate their facilities as needed to keep them on the cutting edge of patient care, which continues today. Even with AFMS's ongoing process of improving its infrastructure systems, there are still cases where the mechanical and electrical equipment continues to operate and hasn't been updated in decades.

With energy costs increasing by the mid-2000s, and realizing energy efficiency measures were in order, the AFMS began working with the federal government's Department of Veterans' Affairs (VA) to secure a contract with a vendor to recommend and implement a comprehensive energy management solution. After reviewing proposals from multiple vendors, Kroeschell Engineering was awarded a performance-based contract in September 2006, which concluded in March 2009.

After substantial study, Kroeschell recommended an extensive power metering project to track and analyze energy usage at AFMS facilities. It would enable AFMS to identify best practices, along with areas for potential improvement, with the end goal of increasing energy efficiency and meeting federal energy efficiency mandates. For example, the Energy Independence and Security Act of 2007 requires all federal government facilities to reduce energy consumption by 3 percent per year through 2015 for a total 30 percent reduction. EPC Act 2005 requires facility managers to develop a metering plan for their building and install advanced electric meters by October 1, 2012. Further, the TRICARE Management Activity, the office that manages and implements the entire healthcare program for the U.S. Department of Defense, requires that all services move to using advanced power metering.

"The main reason for this metering project was to tie all the AFMS facilities together in order to baseline the energy usage of the facilities, and then eventually make improvements in energy efficiency," says Ken Schuette, vice president of Kroeschell Engineering. "This was strictly a metering project, a scope of work for the purpose of doing remote, on-site metering, and then remotely accessing the data for the benefit of the facility managers.

"Air Force Medical Service wanted a central clearinghouse for collection of the energy data and a consistent yardstick used to compare its facilities to similar-use facilities," he says. "For instance, electric and gas meters were read monthly, but in many cases, there were no water meters, so water billing had to be allocated. They really wanted to establish consistent, accurate and reliable water, air, gas, electric and steam, or WAGES, metering."





Ultimately, AFMS wanted access to data-rich reports such as BTUs per square foot by facility type, but it also wanted to adequately compare similar facilities, which was a challenge because some clinics were formerly hospitals. In the interest of comparison fairness, AFMS and Kroeschell created peer groups based on building type:

- Clinics
- Clinics located in older hospital chassis
- Hospitals and medical centers

Choice of power meters key

The key to generating data on the actual energy usage comparisons among the peer groups was the choice of meters. Kroeschell recommended Square D® PowerLogic® ION meters, due to its experience with them for another project in the Chicago area, along with its long-standing business partnership with Schneider Electric, Schuette says. The project includes more than 100 power meters using a combination of 65 ION7550 meters and approximately 40 ION6200 meters. The power meters capture all utility usage, including electric, water, gas, steam and chilled water.

The Square® D PowerLogic® ION7550 series meter was selected as the workhorse for gathering energy data, and was typically installed in an existing enclosure near the building's main power feed; ION6200 meters were generally installed on feeder circuits. The ION7550 meter has the ability to log data and supports a variety of industry standard communication protocol options to meet the needs of future third-party interface products. Once the data is logged, it is sent via cellular technology once each day to a Web server. This information is subsequently accessed by Kroeschell and AFMS engineering personnel by logging onto the system, querying the data of a specific facility and setting date parameters for the data being harvested. The information itself is presented in a Microsoft® Excel spreadsheet.

“We use government programs such as the U.S. Environmental Protection Agency’s ENERGY STAR to run a quick, informal evaluation using the electrical data, gas data, and others to make some assumptions for a building,” Schuette says. “This enables us to establish a baseline and assign some values to these facilities to tell which are running efficiently, and which aren’t running as efficiently. Also, we wanted to integrate the energy data to the on-site building automation system in order to make control adjustments and manage the energy usage.”

Kroeschell uses the data collected from the Square D® PowerLogic® ION meters to dig deeper and uncover what the high-performance facilities are doing right regarding energy use, and where underperforming facilities fall short. As a whole, they have found that most facilities deemed more energy efficient are equipped with some sort of building automation system, while the facility manager and building occupants have embraced the system and use it to its full capabilities to maximize energy savings. This includes taking extra steps such as setting temperature adjustments and keeping equipment well-maintained.



Conversely, those facilities identified as less energy efficient are typically found to have substandard building automation systems. This is coupled with facility managers and occupants not gaining maximum value from the system, and in turn not doing little things like setting back lighting and HVAC at night or maintaining equipment – strategies that compound energy efficiency.

“We have discovered from data analysis that there are opportunities for improvements in systems,” Schuette says. “And now AFMS is starting to look at harvesting some of the identifiable ‘low-hanging fruit’ in terms of areas for efficient improvement. For example, at one of the facilities in Georgia, through the energy analysis, AFMS was able to discover a major opportunity for improvement. After a more thorough engineering review, they realized that by interlocking the facility’s exhaust fans to the supply fans and integrate them into the building automation system, the fans would work more efficiently. They don’t need to run 24 hours a day, 7 days a week.”

To make the system more user-friendly and responsive, Kroeschell implemented Square D® PowerLogic® ION enterprise energy management (EEM) business intelligence software that greatly enhanced the capabilities of the AFMS’ metering system. The Square D® PowerLogic® ION Enterprise Energy Management (EEM) software allows for generation of instant data graphs without the extra step of generating a Microsoft® Excel file.

“We realized we wanted to use a graphic human-machine interface display system and make that available to facility managers on a regular basis,” Schuette says. “PowerLogic EEM software has the capabilities to help do that, and help us all be more efficient in our analysis and reporting capabilities.”

Next steps

According to AFMS spokespeople, the project’s next step is to make the system more responsive and to install advance metering to all of its secondary buildings (or out buildings), along with facilities located overseas. Eventually, the goal is for all AFMS sites worldwide to be metered, and to have all energy usage data delivered to a central point. This means information about global AFMS energy usage will be available with a few mouse clicks.

When asked how Kroeschell would move the effort forward, Schuette says they have already begun considering possibilities, though acknowledging Kroeschell will have to participate in a competitive bidding process much like the original project.

“For the next phase, we’ll be in touch with Schneider Electric in regards to integrating the PowerLogic ION 7550 meters into the building automation systems to enact control adjustment to equipment, as well as fine-tuning the scheduling and operation of the mechanical equipment,” Schuette says.

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