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Achieving Total Energy Control for Hospitals and Healthcare Facilities

Comprehensive energy management plan can create ongoing energy improvement

By Jim Parker, PE, CEM, CMVP

Those who manage hospitals and healthcare facilities have many energy-related concerns, each of which demand attention in order to help ensure that efficiencies are maintained and budget parameters are met. That can include everything from utility rate volatility to fuel cost increases to maintenance of environmental conditions, which of course requires energy and budget. In short, balancing the necessity for cost containment with a desire to provide the highest level of healthcare possible—the primary requirement of Joint Commission regulations—can make a key issue like increasing energy efficiency a challenge.

For some facility managers, quick fixes like

installing low-energy consumption devices, such as compact fluorescent lighting (CFL), seems like a logical place to start when energy costs suddenly spike. For others, an energy audit is the way to go, because it can expose areas of inefficiency and recommend changes. However, while both are valid approaches, the goal should be continuous improvement, which can only be accomplished through a comprehensive and strategic energy management plan that takes into account the healthcare industry's unique needs, along with the specific nuances of an individual facility or complex.

An energy management plan takes that crucial next step toward ongoing energy improvement, because it essentially is a road

map that inculcates continuous energy planning and accountability. One such road map comprises of four steps that will be explored in this article:

1. **Measure** energy usage.
2. **Fix** the basics.
3. **Automate** where appropriate.
4. **Monitor** and control.

It's important to note that these steps will not replace the important decisions that hospital and healthcare facility managers must make, particularly when the average facility spends up to 3 percent of its operating budget on energy. Rather, a carefully crafted and strategic energy management plan will provide greater energy usage visibility and make decisions that previously were difficult much

Achieving Total Energy Control

easier, better positioning the facility for continuous improvement. It will also be flexible enough to change when new opportunities or challenges arise, making it a living, evolving document. Plus, the energy savings that can be accrued can also reduce the payback period for new product solutions, oftentimes in two years or less.

Step 1: Measure Energy Usage

Managing an energy budget can be the most challenging aspect of a hospital or healthcare facility manager's job—especially when utility rates change by the hour, as is common in the northeastern U.S. and other areas of the country. But it wasn't always that way. Time was, utility rates were much lower, so there wasn't the need for a high level of energy usage visibility, such as understanding what areas of a facility were contributing most to energy costs. Energy bills simply arrived and were paid without question. Consequently, facility managers also paid less attention to maintenance, upgrades and improvements for building systems to stem increasing energy costs as years passed. Today, many hospitals and healthcare facilities are still operating those old, antiquated systems.

Those facility managers may not be aware of

hidden inefficiencies until there are extreme weather days during the course of a year, i.e., the coldest days of winter and the hottest days of summer. But that also doesn't mean energy isn't being wasted during the rest of the year, where an endless cycle of overcompensating heating or cooling in one area and undercompensating in another drives up energy costs.

The first step toward ending this cycle is to ascertain current energy usage. That means collecting data from major energy consumers within a facility or complex and analyzing the impact of those consumers on total energy consumption. Installing power metering and monitoring in this step is important to provide a baseline regarding utility usage and increasing energy awareness. Power meters are devices typically installed at various points within the power distribution system. The role of power meters is simply to record how much electricity is used on a circuit, which can provide a facility manager critical data about what areas within a facility need to be addressed. Power monitoring is also effective, because in addition to metering electricity usage, these devices also measure power quality.

Another popular option is an energy audit, which can provide a snapshot regarding the current state of a facility's energy usage,

including electricity. But it's important to note that unless an energy audit drives a strategic initiative, it is of little value. That's why it's key to work with a supplier that has experience in conducting audits in hospital or healthcare facilities; such firms will evaluate specific departmental functions, including everything from office space to food prep to critical care areas, and make specific recommendations about how to proceed with energy-related improvements. For instance, an audit might recommend replacing T12 lamps with more energy-efficient T8 or T5 lamps, along with installing a schedule-based lighting control system. Ideally, the firm that does the energy audit should also be able to do the work as well, which creates continuity for facility management, along with mapping out both short- and long-term goals, with annual reevaluation.

But the most important thing is to do something with the information provided by power meters or monitors or an energy audit. Simply having the information does little good; a well-thought-out plan should have clear actions in mind and reflect good decisions that can be somewhat independent of current energy prices. Those decisions begin with understanding passive and active energy efficiency measures.



Step 2: Fix the Basics

For some hospital or healthcare facility managers, fixing the basics is typically the only tactic addressed in the wake of an energy audit. This can include installing low-energy-consumption devices and improving the plant's power factor. Poor power quality, or power that's rife with voltage sags and swells, can have a negative effect on sensitive components and contribute to substandard performance. Fixing the basics also entails tactics like activating the "sleep" mode on computers or insulating boiler valves.

But while these are certainly important and can translate to as much as a 15 percent energy efficiency increase, such measures are typically a one-time improvement or a passive approach to energy efficiency. For example, a new energy-efficient transformer has a useful life cycle of two decades or more, so while the energy efficiency value is theoretically accrued over that entire time period, the cost savings impact will be felt most upon installation. The same can be said for energy-efficient lighting, such as replacing 32-watt T8 lamps with 28-watt counterparts or purchasing U.S. Environmental Protection Agency ENERGY STAR-rated appliances for waiting rooms and break rooms.

Step 3: Automate Where Appropriate

Ongoing energy efficiency improvements can be achieved by automating and regulating facility systems, which can be characterized as an active approach to energy management because they can be adjusted based on new energy-efficiency opportunities that arise in the future. For example, variable frequency drives can be installed to regulate the motors that power the pumps and fans of a facility's HVAC system so they aren't running at full speed all the time or constantly turning on and off, driving up peak demand. Not only can regulating motor speed for applications like chilled water pumps and cooling tower fans use less energy, it can also reduce maintenance expenses by creating longer periods between motor replacement.

Another good example is schedule-based lighting control and occupancy sensors, which automatically turn lights on only when they are needed and can be contoured to specific areas. Administrative offices usually have a large area with many workstations and are typically in operation during normal business hours, e.g., 8 a.m. to 5 p.m. A schedule-based lighting control system, utilizing an intelligent lighting control panelboard with an internal controller that operates motorized circuit breakers, will

turn on all lights shortly before 8 a.m. and off again at a preset time after 5 p.m. Overrides for a set period of time (e.g., two hours) provide flexibility for those working late or coming in early, but occupancy sensors can also be applied in these areas.

As part of this step, an energy management plan will also recommend a retrocommissioning process, which is akin to an automobile tune-up. Essentially, retrocommissioning puts building systems like lighting control or HVAC through their paces, to make sure they are operating correctly and configured so that the maximum amount of energy efficiency can be accrued. For example, when a medical office building was opened five years ago, the business day started at 8 a.m., but since then, the start has shifted to 9 a.m. But the schedule-based lighting control system wasn't correspondingly changed, so lights have been coming on an hour early each morning. A simple schedule change can save 365 hours of lighting per year stretched across multiple circuits, translating to hundreds of dollars of savings.

Step 4: Monitor and Control

A strategic energy management plan also helps ensure that the energy and cost savings gained through the first three steps don't erode over time. Power meter installations, monitoring services, energy-efficiency analysis, energy bill verification and particularly implementation of an enterprise energy management (EEM) system can all help achieve this end. Essentially, an EEM system collects energy-relevant data, like electricity, water, natural gas and steam values and outside air temperature. That information is then collated and presented as actionable business intelligence in a dashboard format that can be customized for a facility manager's needs.

Being able to monitor key performance indicators for an entire building, as well as departments and subdepartments within a building, allows an EEM system to trend energy usage over time and can quickly determine areas requiring the most attention. For example, a hospital complex may be receiving one electric bill each month, which of course shows both kilowatt hours and peak demand but doesn't give an indication of which of its nine buildings, or multiple departments within those buildings, are most and least energy-efficient. Energy usage data provided by an EEM system allows near-immediate addressing of challenges. A facility manager can review an electric use profile for the entire complex, or for each individual building, during the previous week and immediately spot patterns that indi-

cate changes are necessary. They can then be dealt with immediately...which is much more cost-effective than waiting years until the next energy audit. This also contributes to a quicker payback on technology investments, particularly for government-owned facilities, where budgets always seem to be tighter than at their for-profit counterparts.

Getting Started

An energy management plan can also help a hospital or healthcare facility achieve recognition for increased energy efficiency, such as the Leadership in Energy and Environmental Design (LEED) Green Building Rating System administered by the U.S. Green Building Council. Recognition such as LEED certification can create the perception that a facility is clean, healthy, modern, "green" and conducive to convalescence, which can be leveraged in the marketplace.

In order to accrue those benefits, along with cost savings and a more efficient overall operation—whether a facility manager is operating a single building or an entire complex—energy management should be a continuous process. It cannot be a program that gets under way with good intentions, then peters out after a year. An energy management plan, which should be developed in conjunction with a supplier that can provide both counsel and a comprehensive set of active and passive product solutions, can help navigate consumption during times of tumultuous energy swings. **FC**

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