Energy Efficiency's Next Frontier

END-USE MONITORING BOOSTS ENERGY SAVINGS, REDUCES MAINTENANCE COSTS AND CAN EVEN PREVENT EQUIPMENT FAILURE.

BY ARASH GUITY AND JON RABINOWITZ

Using and analyzing data to increase energy efficiency is not a new idea. For many years aggregate data about building energy use has been captured, tracked over time and compared to other facilities of a similar type to provide information for energy efficiency efforts. But use of the data hasn't been smart—a lot might have been gathered, but there hasn't been a way to turn the data into actionable insights and informed decisions.

Historically, if energy management techniques were used it was only by large facilities like factories, commercial buildings and hospitals. But as energy costs have continued to rise, the imperative to track, understand, manage and reduce energy consumption has become clear even to small- and medium-sized facilities. Today, chains of relatively small businesses including retail and food service establishments have learned they can signifi-

cantly affect their profit and loss through energy management. That's because today's technology is making circuit-level energy data available at a granular level, in real time—creating incredible opportunities for both deep energy savings and even savings on maintenance and equipment costs.

BENEFITS BEYOND ENERGY SAVINGS

End-use energy monitoring places sensors on each circuit in a building or in a series of buildings, which allows facility operators to see just how much energy is used in various areas and by different types of equipment and systems, such as HVAC, lighting or even plug-loads. In addition, new energy management technology helps control off-hours consumption using real time, device-level alerts. When a device is not turned off after a facility closes, an alert can be programmed to create notifications and locate the source of the problem. Some platforms also create monthly reports that show sites where energy performance is not optimized and where energy is being wasted.

The latest end-use energy monitoring technology includes tools for fine-tuning energy management, including remote data access and trend data available by dashboard. It gives facility operators a chance to see how energy consumption by circuit occurs and to spot abnormal patterns, which can provide an early warning system for failing equipment. Since many systems often show an abnormal energy use pattern prior to failing, this predictive maintenance allows maintenance to be performed prior to a major breakdown, forestalling the major expense of replacing that equipment. Device-level alerts also send notifications if equipment is using more or less energy than usual. By drilling down to consumption and maintenance history, one can identify breaking systems and schedule preventive maintenance.

RESEARCH AND INITIAL FINDINGS

Mazzetti has been working on pilot projects with a leading provider of energy management solutions (EMS). Together, we have installed multiple end-use energy monitoring and management systems in several locations across the U.S. over the past three years. This includes a hospital pilot project funded initially by the BIRD Foundation, which produced promising results by identifying savings opportunities capable of reducing the facility's energy consumption by up to 10 percent and saving more than $20,000 per year in maintenance costs. With the expected cost of the system, this would result in a projected discounted payback of less than two years.

Two other pilot projects are currently being conducted for the National Renewable Energy Laboratory (NREL) at military facilities located in Fort Carson, Colo., and Pearl Harbor, Hawaii. These two pilots are evaluating end-use energy consumption and examining how occupant behavior affects energy consumption at the granular, circuit level. These pilot projects are still underway, though initial results show a potential for significant savings in energy costs.

RETURN ON INVESTMENT TO SCALE

The platform Mazzetti has been implementing is by pioneering energy management provider Panoramic Power. The company's solution is geared for a wide range of companies in a variety of industries, including healthcare, multi-site retail, restaurant chains and supermarkets. Companies as diverse as The North Face and Super-Pharm

are already using Panoramic's end-use energy monitoring to meet sustainability goals, reduce costs and promote efficiency.

For The North Face, which tested Panoramic's system in four of its busiest stores in San Francisco, results included identification of equipment that needed maintenance, an early warning of equipment failure and tens of thousands of dollars in energy savings in less than six months. Super-Pharm, a global pharmacy chain that wanted to become more efficient across geographically dispersed locations, tested the system and found it was able to improve energy and operational efficiency by detecting hidden inefficiencies and waste. In both cases, the return on investment was made in months, rather than years.

ASKING THE RIGHT QUESTIONS

Any facility interested in increasing energy efficiency and improving operational processes should start by asking what the energy costs are for each location. You may also want to determine what the energy usage is at a device level in order to better drill down on energy savings opportunities. Determining what the building and systems performance is in real time can also be particularly useful for understanding where and when energy is being consumed. This can help you determine missed opportunities; for example, do you remember if/when lights or HVAC have been left on during off-hours?

Gaining an understanding of your energy usage on at the device level will help you benchmark and compare your facility to others. Once you understand your consumption patterns and how to reduce overall consumption, you can look to end-use energy monitoring technology to answer the question: Where am I consuming too much? End-use energy monitoring will provide you with valuable data about the energy use of individual systems, equipment and even occupants, which you can then use to deepen and make permanent your energy savings.

Twenty years from now, we firmly believe that that the ability to monitor energy in buildings and facilities on a circuit level will be standard practice, and cost-effective technologies, such as Panoramic Power's platform, will ensure that retail and commercial buildings can easily afford and use an EMS. With a cost-effective solution on the horizon, energy-management solutions will soon be a "must-have" instead of a "nice-to-have" solution.

As adoption of end-use energy monitoring spreads, energy costs will not be considered a fixed cost but as a strategic asset to be leveraged, and one that can be managed on a real-time rather than monthly basis. This will bring about the next generation of deep and lasting energy efficiency initiatives and more dramatic energy savings. edc

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