

With many commercial buildings, energy efficiency is here today, gone tomorrow—because no matter how energy-efficient a building is when it's constructed, energy savings can degrade over time.

Standard building commissioning—the process by which local or state authorities, independent standards organizations, or energy service companies inspect, test, and certify building performance efficiencies—helps ensure that buildings operate as efficiently as designed. Commissioning for new and existing buildings has saved energy for decades. But, while state and local inspectors measure against state-set codes, less than 5 percent of new buildings in the United States are commissioned by independent entities, which generally test to higher standards. Fewer buildings are ever retested.

Even with robust procedures for periodic standard recommissioning, we are leaving real energy savings on the table.

Now, energy service companies are capturing that energy savings with monitoring-based building commissioning (MBCx) programs, which provide something akin to continuous, real-time building tune-ups. “You can imagine real-time commissioning in the same sense that a microprocessor is constantly tuning a modern engine,” said Energy Secretary Steven Chu at a recent lecture at the Massachusetts Institute of Technology. “It notices what the temperature of the engine is and the temperature of the air, and it's constantly tuning up.” It's like having a mechanic in your car while you are driving.

The Challenges

Energy savings degrade over time due to operator error, sensor and device failures, and failure to detect operational changes promptly. Even with today's building management systems, few facility managers can monitor all potential energy losses in their systems—from global faults to deficiencies in the operation of cooling plants, air-handling units, heating plants, and so on—during regular business hours, let alone around the clock.

To capture energy savings opportunities, MBCx programs aim to connect building operations and building automation systems to advanced diagnostic and analytical software through the communications capabilities of advanced metering technologies. Such programs ensure that building savings continue indefinitely, using data analysis, automatic detection and diagnosis of system faults as they occur, and prioritization of energy and operational improvements based on expected savings, implementation costs, and optimum efficiency.

That kind of automation poses challenges. With large facilities, some with thousands of points to be monitored in intervals as short as five minutes, data storage and computing infrastructure are major hurdles. “This is a smart grid project,” says Rick Counihan, vice president of regulatory

REAL-TIME BUILDING TUNE-UPS

By Lisa V. Wood,
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affairs for energy service provider EnerNOC, “because we're moving terabytes of data from one customer rather than gigabytes from thousands.” EnerNOC estimates that constant monitoring for all 75 billion square feet of U.S. commercial space wouldn't need a new technological discovery—just the ability to compute 20 trillion records in real time.

Historically, advanced metering technology and computing power of such magnitudes have been expensive, keeping small firms out of the market. Moreover, regulated utilities have been hesitant to act, due to regulatory uncertainty.

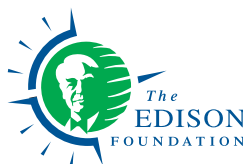
The Takeaways

But computing costs are decreasing, and advanced metering initiatives nationwide have pushed down the price of (smart) metering. As a result, innovative nonutility service providers are pioneering MBCx services. Those providers are carving a niche in the efficiency market by leveraging existing relationships with commercial customers and partnering directly with utilities and their emerging smart grid capabilities.

EnerNOC's MBCx program, for example, results in 8- to 15-percent energy savings in most commercial buildings, according to the company, which operates under a monthly fee based on savings estimated. In one case, the company's MBCx services have helped optimize building efficiency at Western Connecticut State University, which avoided more than \$322,000 in energy costs in the first two years of service. PG&E and SCE recently selected EnerNOC to administer MBCx programs for 2009-2012 and are awaiting approval from the California Public Utilities Commission, expected this fall.

Enovity calls its program monitoring-based persistence commissioning (MBPCx), emphasizing “persistence” of savings into the future. The company provides continuous monitoring but instead of shared savings offers incentives for tune-ups and control system optimization. Total incentives are \$0.083 per kilowatt-hour saved and \$0.624 per British thermal unit saved—these typically reduce the payback time on a package of recommended measures to one year. Enovity designed and implemented MBPCx services for PG&E's 2006-2008 energy efficiency resource program portfolio.

A major benefit to utilities of contracting MBCx services is their potential to secure energy savings while avoiding some risks associated with evaluation, measurement, and verification of such savings, the procedures for which are still evolving. Due to the use of real-time operational data, it's relatively straightforward to measure and verify savings from MBCx programs. ♦



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