



Continuous auditing: Taking energy auditing to the next level

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Imagine how healthy you would be with a team of expert physicians monitoring every joint, muscle, and tendon in your body at all times. You could be playing pickup basketball, shuffle right to guard a player and feel a twinge in your knee. You keep playing, but when you get to the bench, there's a text message from your doctor: "You sprained your knee. Put ice on it and take two aspirin." Or you're sitting at work, feeling a little light headed, and the phone rings. It's your doctor, "You have a temperature of 100.5 - go home, take some fever reducer and get some rest." With this kind of attention, you'd be healthier than you've ever been.

Now imagine how energy efficient your buildings would be if you had experts constantly monitoring every area of energy consumption in real time. When an energy spike hits your building, the energy expert knows exactly where it's coming from and calls your engineer to fix a damper, or turn off a bank of lights, or reset a thermostat. That building would be running at peak efficiency, all of the time, reducing operation costs by 15% to 30% over a 12-month period.

A once-off comprehensive energy audit is very effective at determining the most cost effective strategies for saving energy in a building, but it has limitations. For one, the walk-through audit gives the auditor an excellent snapshot of the building's operations at that time, but not the full picture of seasonal changes in operations. Another drawback is that savings calculations for energy conservation measures (ECMs) are based on assumptions for inputs such as runtimes, temperature setpoints, and use of override schedules. If these assumptions are not accurate, the savings may be under-predicted or over-predicted. To achieve the maximum amount of energy savings with the most accurate calculations, it is essential to survey the building throughout the year, with accurate before- and after data for all energy consuming systems.

The first step in continuous auditing: an auditor performs an initial building assessment and gathers data relating to all energy consuming systems. Next, the building owner installs real-time monitoring (RTM) equipment, ideally on all end-use circuits. Data is fed to a dashboard in real time, where the auditor can analyze trends and look for spikes and anomalies indicating energy waste. Over the course of 12-24 months, the auditor monitors the building in real time, identifying ECMs and areas of waste based on new data. Once ECMs are implemented, the building will operate at its peak efficiency, in all seasons.

For example, a dashboard showing real-time consumption of a sample city hall building for one day in January (Fig. 1) indicates a spike around 2:00 am. Drilling down into the detailed data, which can be seen by circuit (Fig. 2), it becomes apparent that the supply fan for one of the air handling units is spiking when it comes on. Implementing a slow-start into the existing variable speed drive will eliminate this spike and save energy.

In another example, real-time data for parking lot lights controlled by photo cell (Fig. 3) shows that 280 Watts of power is being consumed during the day, indicating a breakdown in the system. A call

to the engineer will lead to identification of specific lights not controlled by photocell, which will then be connected, saving energy and peak demand.

Return on Investment

The initial investment of a continuous auditing programâ€”installing real-time monitoring equipment and conducting an initial energy baseline assessmentâ€”is typically offset by resultant savings within two to three years. The process results in more efficient operating equipment, identification of system malfunctions before they become real problems and a better understanding of how a building operates.

Like a healthy body, your buildings will last longer and cost less to run.

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