

# Delivering Energy Usage Information to the Building Owner

## *Seven Simple Ways to Reduce Energy Waste and Increase Savings*

By Troy M. Hull, CEM

Commercial buildings and industrial facilities consume a tremendous share of electrical energy produced in the United States. Since there are over 5.6 million commercial buildings and nearly 350,000 industrial facilities in the U.S., it's easy to see how fast that energy usage adds up. Another astonishing fact is that approximately 30 percent of all energy consumed by these buildings and facilities is wasted.<sup>1</sup>

Consider that the utility bill for all these facilities is in the neighborhood of over \$400 billion annually.<sup>1</sup> That equates to \$120 billion in waste—a very considerable figure. Simple steps to reduce energy in these facilities typically involve little in the way of capital investment. Simple behavioral programs can reduce consumption by 5 percent with consistent and minimal effort. That's \$20 billion in savings without any capital investment.

### **Understanding How Energy is Used**

One of the biggest challenges facing building owners is understanding how energy is used in their facilities. Most owners have access to one piece of energy data—their monthly bill from the utility provider. Typically, the bill is received a full 30-45 days after the month in which the energy is used.

This data provides owners with one big picture, which, while helpful, does not provide the level of detail required to efficiently manage energy usage within their facility. That leaves owners typically guessing where their efforts and actions might make the most impact on reducing energy consumption, demand, and costs. More importantly, it provides no ability for owners to know if energy savings achieved through conservation initiatives is sustained over time.

Commercial buildings use electrical energy in many ways:

- Indoor and outdoor lighting
- Heating, ventilation and air conditioning (HVAC)
- Elevators, escalators and other moving conveyances
- Appliances and other plug load types (computers, printers, and other business equipment)
- Hot water heating
- Other process or miscellaneous loads, such as kitchen and laundry facilities

Understanding how these building systems use energy and how they interact from an energy perspective is extremely valuable information. More importantly, understanding **where** in the facility and **when** these systems use energy is critical to managing energy costs.

However, most buildings and facilities do not have equipment installed to monitor energy usage at a detailed level—they simply have one meter provided by the utility. And this is the challenge. In order to know how and where energy is being used, sub-metering equipment must be installed. This is a difficult expense to justify given the fact that it is impossible to predict a return on that investment. However, given that we know over 30 percent of energy used in commercial facilities is wasted, most buildings and facilities offer prime opportunities for energy consumption reduction and ultimately, savings for the building owner.

## Identifying Simple Opportunities to Reduce Energy Waste with Energy Data

Given the above information, what can we hope to achieve if we know more about the “when, where and how much” of energy consumption? Let’s keep it simple with a few key ideas:

**After Hours Energy Usage.** Many buildings and facilities keep lighting and HVAC loads on 24 hours a day, regardless of the occupancy of the facility. The costs associated with non-safety related lighting can be staggering over the course of a year. Add to that any plug load type appliances that are not turned off at the end of a business day or thermostats left at levels to provide occupant comfort not necessary during overnight hours. Simply knowing when to optimally turn off lights, HVAC, and other non-essential equipment or reducing it to a pre-determined after-hours energy saving setting can lead to substantial energy cost savings.

**Vacant Space Energy Consumption.** Far too often, vacant spaces use energy at an alarming rate. If there is no means to measure consumption in those spaces, the condition can go unnoticed for a long period of time incurring significant costs for building owners. During business hours, lighting, HVAC, plug loads, and other equipment operate for hours in unoccupied or underutilized spaces. Energy data can help identify these spaces and minimize or eliminate unnecessary energy waste.

**Uncovering Flaws in Building Automation Systems (BAS).** Many properties have systems that control the way HVAC and lighting systems work. At times, these systems may have been commissioned when the building was originally completed and may be executing control strategies that are not consistent with the current use or the building itself. Often times, BAS control scripts can be overridden by maintenance employees trying to satisfy a specific request at a detriment to the efficient use of energy in the facility. Energy monitoring information can pinpoint exactly when, where, and how much energy is being wasted allowing building owners to implement strategies to optimize their system processes and equipment.

**Building Equipment Efficiency and Maintenance.** Energy usage in building equipment such as pumps, motors, air-handlers, and chillers, all require maintenance and tune ups. Often times that maintenance can go neglected until energy data shows that it’s time for a check-up. Regular inspection of energy data can lead to longer service lives for equipment and help prevent the issues associated with unforeseen catastrophic failures of large building systems equipment.

**Cost Avoidance.** Often times, even after significant expenditures have been made for energy retrofits such as lighting systems, a number of scenarios exist in which building energy consumption may not be sustained, due to weather, change in building mission, or changing technology. Having detailed knowledge of the pre-retrofit energy consumption of the lighting systems will provide great insight into the **cost avoided** had the retrofit not been executed, even though total building energy usage is higher than anticipated. Energy data allows building owners to conduct an analysis to verify energy savings and evaluate opportunities for implementing similar energy saving strategies in other areas of operation.

**Demand Side Management.** Knowing the “when” energy is used is critical to cost management. Since many facilities are billed on Time of Use (TOU) rates, knowing **how much** power is drawn and **when** is a key component to driving costs down. For example, energy data can expose a

strategic energy saving opportunity by identifying high draw equipment that can be operated primarily during hours when TOU rates are at its lowest presenting considerable energy savings.

***Recouping Costs From Tenants and Common Use Areas.*** Building owners typically have no way to track or recoup costs from shared common use areas and tenants are typically charged for energy based on square footage instead of actual usage. Energy data can help reward building owners and tenants by accurately identifying and measuring energy usage. This helps building owners recoup energy costs, ensure that each user carries their fair share of the cost burden, and allow tenants to see the benefits and success of their energy conservation efforts in their energy bills.

There are numerous opportunities for energy savings to be found in the above areas. An in-depth analysis of energy data can uncover additional sophisticated opportunities to save more energy.

### **The Challenge—Building Energy Infrastructure**

Most commercial buildings, especially single tenant facilities, were not constructed with energy monitoring in mind. In a vertical building, as an example, energy sources for lighting will originate in multiple panel locations throughout, as will HVAC loads, plug loads, and other electrical loads. Most panels may have as many as 5 to 8 different originating load types and many buildings will have multiple electrical panels throughout the facility. In order to successfully monitor energy usage, an intimate knowledge of the building is required and a detailed plan must be created. Significant costs can be incurred for hardware and installation of monitoring equipment in the construction phase.

### **The Solution—Multi-point Monitoring Technology**

Sub-metering manufacturers have leveled the playing field in recent years, offering versatile, affordable, branch circuit metering technologies suited specifically for these challenging applications. Add this technology to software that can aggregate and disaggregate data and you have powerful tools for understanding how building systems use energy. These platforms allow single 20A circuits to be monitored and the data points added together to allow for “whole building lighting energy usage and demand” from an unlimited number of actual disparate circuits. This offers a flexible and scalable solution, enabling building owners to add additional energy sub-metering equipment as their budgets and operations allow.

### **Emerging Code Requirements**

State and local codes officials are beginning to understand the need for building systems energy information as a key component to sustainable building management. Codes are requiring new buildings and major retrofit projects to either install monitoring on whole building and end use loads or make significant provisions for it in the building design. While these costs might appear to drive the initial cost to build upward, they also help to reduce lifecycle costs for the building and reduce total carbon footprint and the resultant energy cost savings associated.

Washington State and the City of Seattle have very detailed requirements for monitoring and displaying detailed energy usage data. The State of California has implemented Title 24 for Commercial Building Energy Efficiency which requires, at this writing, provisions for efficient end use energy monitoring in the building design or implementation of sub-metering to meet the intent. Interestingly, the costs to

implement sub-metering to meet the code intent has proven much more cost effective in some cases than modifying traditional building designs.

### **Using Energy Information Strategically**

Energy information and management is the key to smart energy usage and cost control. Building owners can benefit significantly from a seamless solution that enables smart metering, meets code compliance, and simplifies the complexities of allocating energy costs and billing tenants. Energy metering data gives decision makers the tools to implement smart, informed strategies to achieve their unique energy goals, reduce energy waste, optimize operating costs, and increase their bottom line.

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For more information on Leviton Energy Monitoring and Sub-metering products and solutions, please visit [www.Leviton/VerifEye.com](http://www.Leviton/VerifEye.com).

<sup>1</sup> Source: <https://www.energystar.gov/buildings/about-us/facts-and-stats>