

CIRCUIT LEVEL SUBMETERS PLUS CLOUD-BASED ENERGY ANALYTICS SOFTWARE

NOW WE'RE TALKING SMART

By Jeffrey Kistner

Smart meters, by definition, record total electricity consumption hour by hour and send that information to the utility. Smart is no longer an accurate term. In reality, they're as smart as any ten-year-old technology and rather expensive compared with groundbreaking electrical submetering that is now hitting the market.

Utility 'smart meters' measure total consumption. Advanced electrical submetering, on the other hand, can break down total consumption into its individual components, meaning that it can produce useful, detailed information about when, and how much energy is being used, and by which equipment, rooms, or building sections. The 'gold' is in the details.

Energy management "behind the meter" is beginning to be recognized as a major area of opportunity across commercial, industrial and high density residential sectors. The magnitude of wasted energy has been estimated to be as high as 30%. As energy costs continue to rise, the cost of this waste is becoming more and more significant. In fact, in 2016, estimates for Canada and the United States combined place the value of this waste in excess of \$80 billion per year.

According to an open letter sent to the federal government in August 2016, a collaboration of 11 groups including the Pembina Institute, the Canadian Energy Efficiency Alliance and the Toronto Atmospheric Fund, one quarter of Canada's emissions come from energy consumption in buildings. This makes the building sector a significant source of carbon dioxide.

Historically, standard practice was to install a utility meter that captured the total electrical consumption for the entire building. Some of the more advanced and aggressive operators would also make limited use of submeters to measure the major pieces of equipment in their facility. A more comprehensive submetering

strategy was employed in high value manufacturing and industrial facilities, where the high cost of submetering solutions could be justified due to the substantial value of reliability and the cost of equipment maintenance and replacement.

Recently, major advances in submeter technology have been made, and significantly lower cost, more sophisticated submeters are now available. Advanced submetering companies are providing continuous circuit level metering and collection of granular electrical data in real time at a fraction of the cost of industry standard sub-meters. This new technology includes integrated cloud communications and Big Data software analytics. With this integrated submetering technology, companies can monitor their energy on a per circuit basis, enabling them to more effectively pinpoint problem areas. With high powered, energy analytics software that encompasses real time communications, this new technology can precisely analyze energy usage and identify the location and the timing of wasted energy. Submetering, therefore, can now provide value by isolating specific equipment that requires troubleshooting at a reasonable cost and ensure accountability on a divisional or managerial basis with respect to energy use and cost. Additionally, these new submeters can identify the exact time of peak demand and relative contribution of each piece of equipment, leading to more cost effective demand management strategies.

The granular reporting that can be generated through circuit level real time metering, can be used to increase awareness of energy use. This, in turn, can drive down consumption and create synergies within departments through competition to reduce energy or associated reward systems.

Energy savings can be expected if facility managers are held accountable for knowing and controlling energy costs. Metering data provides transparency in the shared savings process by providing quantifiable data that can be used to justify energy

saving capital projects. Monitoring, controlling and reducing energy consumption is of growing importance to today's facility managers. Submetering at the circuit level can yield key data for operational baselines, project development and savings validation. It can also provide ongoing information with respect to the sustainability and financial return of specific projects.

Typical electricity submeters monitor electricity usage every 15 minutes. This usage information can be sent to energy management software for analysis. Using the analytic capability of the software and proprietary energy use models, external consultants, vendors, on-staff personnel, or some combination, can identify energy savings opportunities, but it is not an easy or efficient process and is, therefore, not widespread.


With real time, circuit level submetering and continuous communication to the cloud, a completely new level of insight into the exact areas of energy waste can be generated. Savings can be achieved through simple no-cost, behavior changes such as turning off unneeded equipment and correcting improperly set or programmed control systems. Granular submetering with easy to use software can highlight the fact that some systems and equipment are running when it is not necessary, and once identified, the software can notify the operator if the condition occurs again.

While unnecessary power consumption represents one aspect of wasted energy, inefficient use represents the other. Equipment that is operating with a low power factor, or with higher energy consumption than benchmarked, can be identified and flagged for maintenance or replacement. With this level of energy analytics, significant cost savings can be achieved by reducing operating costs, and greatly enhance the potential that comes from traditional upgrades of lighting, motors, chillers and other systems.

This overall analytical capability is sometimes referred to as "continuous energy audit". The term captures the concept that advanced submeter technology with real time communications can identify energy drift "where it happens, when it happens", and minimize the degree to which building efficiency declines with time from initial commissioning. These losses in efficiency can be as much as 20% over the first two years. Some of the causes of this degradation can include:

- Temperature and time overrides by occupants or operators
- Improper control system programming
- Seasonal changes that disrupt mechanical equipment operation
- Failures of temperature sensors, relays, filters or controls

The energy management service industry can play a major role in managing facility energy usage by using this advanced technology to identify areas in which they can schedule corrective action. As a data-gathering tool for a facility's energy-using systems, submeters can



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“AS MORE AND MORE COMPANIES FIND ENERGY SAVINGS OPPORTUNITIES BASED ON REAL TIME ENERGY MANAGEMENT, INTEREST IN SUBMETERING TECHNOLOGY WILL CONTINUE TO GROW.”

improve an organization's bottom line by placing greater visibility on its overall energy footprint. By introducing energy profiling down to the individual piece of equipment, organizations can begin to understand the importance of changes in their operational strategies.

As an example, every piece of electrical equipment is affected by Power Quality (PQ) within all facilities and should be of concern to the facility manager and operator. However, in the majority of cases, PQ information is either measured only at the incoming utility supply or not at all. An important oversight about power quality is that poor PQ can be caused by the connected loads within a facility and not solely from the utility supply.

Today, sub-metering technology has advanced to provide PQ data down to the circuit level. Affordability, combined with powerful analytic software, enables every facility manager to access the information in understandable terms. By providing user friendly menus, real time and historical data, and most importantly, threshold notifications, every facility can have the energy data available to identify PQ tendencies before these anomalies result in expensive equipment replacement. Sub-metering provides performance benchmarking, efficiency status and the consumption rate of all circuits. Advanced submetering technology provides energy analytics at the circuit level for variables such as power factor, voltage (RMS), real, reactive and apparent power, and a host of other energy characteristics vital to the efficiency of a facility and the protection of its assets.

Many facilities experience a poor power factor and are assessed high penalties from the utility for readings outside the acceptable range. Typically penalties are applied for a power factor below 90% and these somewhat hidden charges could add up to thousands of dollars a month or more, depending on the size of the facility. Property managers and operators generally do not understand the cause, given its complexity, or the factors that contribute to the situation.

The installation of a circuit level sub-metering system can identify equipment operating with a low power factor. For large facilities, the cost of implementation of a circuit level metering system could potentially equal a few months' power factor penalty charged by the utility.

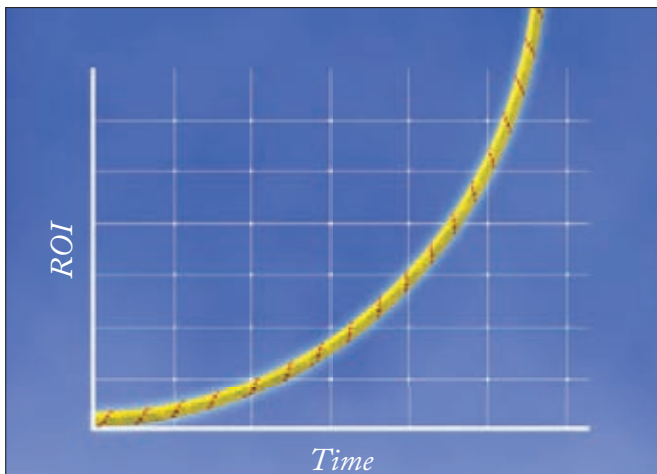
As more and more companies find energy savings opportunities based on real time energy management, interest in submetering technology will continue to grow. Circuit level metering with powerful real time energy analytics is an intelligent yet cost effective solution for improving energy efficiency, reducing consumption and improving the bottom line. A system that can slice and dice detailed energy data across an entire portfolio or pinpoint electrical data at a single circuit...defines a level for the term "smart".

FURTHER INFORMATION

CircuitMeter Inc., provide cost-effective, cloud-based energy metering solutions that help companies better understand their energy profiles and reduce their energy consumption. www.circuitmeter.com

ABOUT THE AUTHOR

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