



What's Up with Smart Meters?

Understanding the Impact of Metering

What's up with meters?

Smart Meters are all the rage. Based on what's in the press and certain sales presentations, it would seem that simply installing a meter will reduce energy consumption. While savings won't appear magically the day after the meter data starts to flow, a well designed energy monitoring solution delivers important information needed to optimize the performance of a building.

The Smart Meters that are getting all the press are heralded as enabling two-way, real-time communication between the utility company and the consumer. These meters will allow utility companies to reduce the cost for reading meters and preparing bills. Backers promise that energy consumers will use meter data to control energy consumption, and utilities will encourage them to further savings with time-of-use pricing enabled by the advanced meters. Time will tell how well markets adapt to this concept. There are several pilots underway around the country.

That's the vision for the residence of the future, but most commercial operators can already enjoy the benefits of smart metering . Advanced metering solutions are available for commercial and industrial buildings that deliver valuable information to building operators today.

Understanding the Impact of Metering

Mine-all-mine

Privately owned meters and sub-meters for utilities including electricity are becoming more widely available. End users want to learn whether installing real-time sub-meters (“AMR” or “AMI”)¹ will contribute to their energy-savings and sustainability programs. The ability to monitor usage in real time can help a building operator to better understand energy usage and to manage that usage to optimize a building’s overall performance. At the very least, gathering meaningful and accurate energy consumption information is the right place to start an energy efficiency effort.

Several trends over the last several years have combined to make AMR affordable and effective:

Technology - As with all computer technology, the cost of the components needed to deliver a metering solution has fallen dramatically over the last 10 years. Affordable hardware and software tools are now available that enable web connections to legacy control systems that once operated in “island” mode. Advances in graphical analytical software tools now make energy consumption data easy to display, understand and control.

Energy Costs - Cost for energy fluctuates by season and economic cycle. Utility rates vary widely. However, over the long-term, energy costs are trending upward. Whether due to supply limitations, increased regulation, or increased global consumption, building owners see a larger portion of their expenses spent on energy.

Sustainability - In order to retain tenants and / or attract customers, companies now strive to demonstrate their “green” credentials. Programs such as Energy Star® or LEED® drive building operator to monitor consumption to reduce usage and demonstrate their commitment to sustainability initiatives.

New and improved

Utility companies pioneered real time meters to reduce their cost for preparing monthly bills. Also, they found that they could better manage supply by gathering information about how and when their largest customers used electricity. Customers found that they could use meter data as well. Astute building operators realized they could reduce their building’s energy usage by identifying usage patterns, adjusting systems, and changing supply contracts.

Early adopters (way back in the 1990’s!) installed metering systems to better understand and manage their building systems. Unfortunately, many costly installations failed to deliver a return on investment. Often the data was presented at a macroscopic, main meter view which made it difficult to pinpoint energy waste. Also, the early reporting tools provided rudimentary graphical displays, and required skill and time to be able to normalize data, create comparison reports, and identify opportunities.

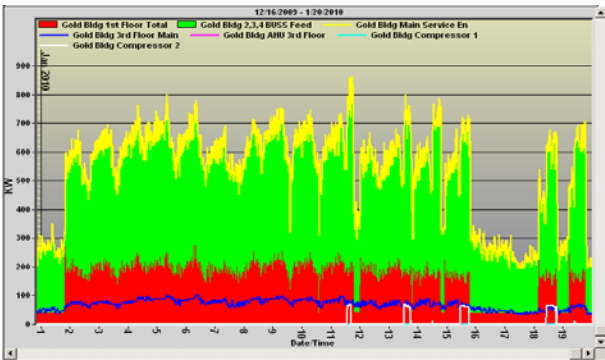
Today’s systems deliver ease of use and intuitive reports. Costs for the hardware and software have been reduced significantly. Installation costs remain, but advances in wireless technology promise to reduce labor in the near future.

1 AMI -- Advanced Metering Infrastructure
AMR -- Automated Meter Reading

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New and improved some more

A well designed metering solution coupled with advanced reporting can empower managers to reduce consumption, find billing errors, allocate costs to specific usages, and identify power quality issues. Several analytical techniques assist energy engineers to deliver saving. One of the most common is graphical data. Information gained by analyzing when and how energy is used can shorten the time needed to identify problems and implement solutions.

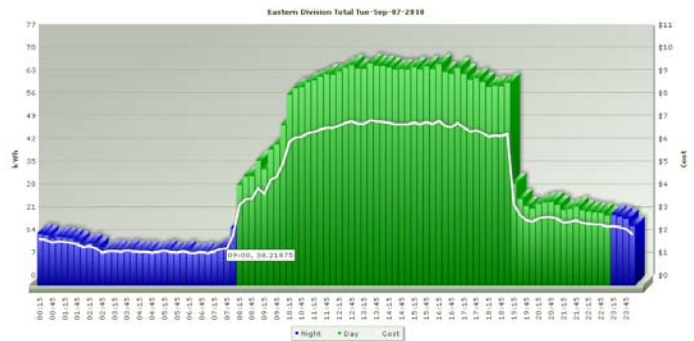


Office Building Control Failure

Several common problems are easy to find once metering is available. One of the easiest and best is after-hours usage. Control systems are often incorrectly set to operate building systems in the middle of the night. We identified a control system anomaly at our own corporate headquarters that caused our chiller to run for 15 minutes in the middle of the night.

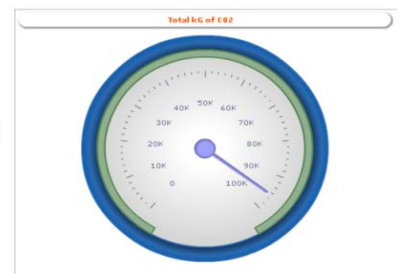
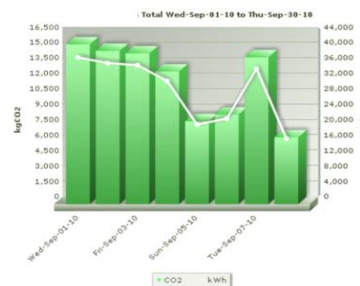
Wasteful practices of building occupants can be identified through a metering system. For example, one end user saw a spike in gas usage at 3 am, which they were able to track to an overnight cleaning crew that cleaned kitchen equipment by burning off debris.

Analysis of usage patterns can point out other cost savings opportunities. Early morning spikes in usage may indicate systems that should be started in stages to avoid setting usage peaks. High baseline usage may point to opportunities to improve lighting efficiency and / or controls.



A well commissioned retail load curve

Sustainability programs also benefit from visibility into energy usage. For companies that wish to match emissions with specific products or activities, sub-metering coupled with advanced reporting tools can provide insights into which building areas or processes are responsible for green house gas (“GHG”) emissions. Advanced systems convert any fuel into its carbon equivalent for reporting purposes.



Measuring combined greenhouse gas emissions with AMR

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Power quality can impact the longevity of capital equipment. A voltage difference of only 3% between phases will cause motors to run inefficiently and fail prematurely. A building's power factor is a measure of how it uses electricity. Many utilities charge a premium for a low power factor, and a metering solution can help identify which components contribute to this problem. A well designed solution will highlight power quality issues and allow them to be addressed before equipment fails or costs spike.

How do I do this?

One of the most important success factors needed to achieve value from any metering solution is skilled analysis. Any modern meter software packages display cool lines and eye-popping graphics. Unfortunately, these flashy displays cannot tell an unskilled operator exactly what's driving usage. The key to unlocking AMR's potential is having someone that has the capability to understand the data and to benchmark usage against the building's own baseline and against other similar buildings. An experienced analyst can use regression analysis can help to identify anomalies as well identify the correlation to critical variables such as temperature or production volume.

This isn't a skill that one develops overnight. Experienced analysts spend years looking at usage patterns to learn what they mean. By comparing these patterns with subsequent field observations, patterns are matched to problems. Solutions can be recommended, and savings achieved. Unfortunately, many well designed metering systems fail to deliver results because operators either don't look at the data on a regular basis or don't have the experience to interpret the data they see.

It's critical to make sure that unusual usage triggers alarms, and that these alarms are monitored by someone with the experience to understand the data and the authority to act upon it. The combination of technology and technique allow AMR to deliver a strong ROI for buildings.

AMR's goal shouldn't be to watch energy usage; it should save energy and money. The best implementations involve both automated systems and skilled human resources. When these are paired together to create an AMR solution, they can provide a clear path to increasing a building's profitability.

About the Author

Mr. J. Andrew Abrams has been with the Company for more than 25 years. He started as an assistant superintendent and subsequently worked as a project manager before focusing his efforts on commercial real estate development. In the 1990's, Mr. Abrams managed the company's former manufacturing division in downtown Atlanta and Douglasville. Since 2002, he has focused on strategic management of the company's technical offerings. He is currently the Company's Executive Vice President and CTO. Mr. Abrams received a BA in English and a BS in Electrical Engineering from the University of Notre Dame in 1983 and an MBA, with honors, from Emory University in 2005.

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