

Putting Information Power in the HANds of the Smart Consumer

While building the Smart Grid will take time and strategic investment, energy efficiency and conservation programs must also forge ahead to develop the “Smart Consumer.”

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The “Smart Consumer” and the “Smart Grid” go hand in HAND. Within the Advanced Metering Infrastructure (AMI), the business-end for conservation is the HAN (Home Area Network), which will link home appliances and displays to engage residential consumers with information and financial incentives to reduce their electricity usage. A key technology enabling the HAN is the wireless-mesh sensor network (WSN). Analogous to the HAN is the need for a similar network for commercial and public-sector consumers, but these consumers have needs distinctly different from those of the residential (home) consumer.

Utility and government leaders talk frequently these days about wind power, solar power, nuclear power, etc. However, there is another vastly untapped resource we call Information Power.

Information technology is a proven way to affect a transformation in energy consumption across the enterprise. It is well understood that “if you can’t measure it, you can’t control it.” Significant advances in wireless-mesh technologies for monitoring and controlling demand-side energy management are making it possible, for the first time on a truly broad scale, to understand how energy is being consumed on an economic basis in thousands of buildings.

Energy waste is like a thief in the night. Inefficient and wasteful buildings and operations are robbing consumers and society of money, security, and sustainability, yet people remain unaware. Recognizing the problem is a first step; thus, energy policy is a top agenda for many governments, from the Federal to the local, and for many corporations, large and small.

Energy Information Gaps Hide Energy Waste

Consider this analogy...Decades ago, the retail industry recognized that they had a problem: they had no idea what their customers bought. Their only metric was the cash in the drawer each night. So, they wastefully pushed the wrong product out to the market. This poor inventory tracking cut deeply into profits. Today, the retail industry uses Point-of-Sale registers and other technologies to reduce shrinkage

and optimize their operations. In addition, they have gained a greater understanding of customer buying preferences and behavior to become more intelligent in targeting sub-markets.

Who would leave a car running in the driveway overnight? Nobody of course! We are very aware of the cost of fuel when we fill up at the pump, certainly we would not allow the mindless waste of the gas in our tanks. However, when it comes to managing building energy, we don’t supervise our spending as well.

Unfortunately, today’s consumers are blissfully unaware of how they consume and waste energy. Monthly billing data provides too little information to elevate understanding and promote changes in usage patterns. Today, both public and private sectors are feeling the squeeze between shrinking budgets and rising operating costs. Increasing energy costs and volatility are drivers for change, yet most consumers don’t know how to change or they assume that change requires major capital outlays they cannot afford. However, business investors and taxpayers



cannot afford to continue what they are doing.

The Smart Consumer in the public and private sector needs to have a point-of-use capability for energy, like the point-of-sale capability adopted for retail. Energy consumption in buildings must be measured and controlled so that consumers may become informed as to how they can operate smarter. The utility industry can actively foster the development of the Smart Consumers by raising awareness and assisting consumers in retrofitting buildings for demand-side energy management. This will advance the utility-driven effort to build essential infrastructure for the Smart Grid.

A Vision

For governments and businesses consuming energy across many facilities, key steps to reaching their goal are to establish energy policies, enable and enforce compliance, measure performance, and develop a culture of continuous improvement across the enterprise. This is a change process that many organizations currently use for quality improvements and IT governance.

Let's start with a new vision:

1. Imagine that such organizations are able to rapidly and broadly establish a consistent and sensible energy policy.
2. Imagine empowering such enterprises with secure internet access to detailed, accurate, and real-time energy consumption information from every room or major equipment in every building.
3. Imagine an enterprise dashboard to benchmark and compare buildings, even beyond organizational boundaries.
4. Imagine decision makers having the quality of information necessary to make informed decisions about energy policies in every building and guide investments for further improvements.

This is what low-cost, battery-powered sensors (as well as intelligent control) leveraging wireless mesh technology can enable. Wireless systems are ideal for retrofitting existing buildings, for installations are much faster and non-invasive. This makes it possible to rapidly and affordably deploy sensors across many

buildings. Furthermore, these systems are being successfully deployed in many cases today and can be introduced as an attractive "Shovel Ready" project for many organizations in response to emerging incentives and government stimulus programs.

Some Best in Class Examples

An international retail chain implemented a broad energy management system by deploying wireless networks in over 300 buildings in multiple countries. Its goal was to determine and eliminate energy waste in order to better respond to peak energy demand and reduce CO₂ emission by 25% in the following 5 years. A different major retail chain, one operating hundreds of supermarkets, was motivated to quickly deploy a similar system. Today, many commercial real estate owners are looking to deploy wireless systems across their portfolio as a way to reduce the total cost to tenants and increase the value and attractiveness of their properties. Regional and national banks, restaurants, and retailers operate dozens to hundreds of branches and stores that can be benchmarked and monitored on a comparative basis using an energy management system. With the help of Millennial Net, private and public schools are able to gain valuable insight into the performance of their HVAC systems and free-up money for education by reducing energy consumption.

Prior to having such energy management systems, the people paying the bills and the people managing costs relied solely on monthly consumption data, which severely limited their ability to analyze energy consumption. These retailers, schools, and other consumers use [Millennial Net's Energy Management Solutions](#) to closely monitor, control, and analyze energy use within each site and take measures to reduce energy consumption.

An Opportunity

With hundreds and thousands of commercial and public buildings, retrofitting business and government buildings with a wireless energy management system stands to save tens of millions of dollars a year. Within minutes after the installation, temperature, humidity, electrical, and many other sensors can be found online measuring and transmitting electric

consumption data and associated characteristics. Immediate benefits of the system include the ability to monitor current and historical energy consumption information in detail, aggregate, and comparison, including:

- Real-time status of each separate zone
- Historical trends of a particular period
- Comparison of consumption profiles that reveal differences in operational load and anomalies

As monitoring comes online and is trended over time, many commonly realize that they waste an exorbitant amount of energy on cooling and heating unoccupied space, leaving lights on after hours, and operating non-essential equipment. Monitoring helps achieve greater compliance with energy policies and identifies areas for improvement. Managers can quantify excess energy consumption during off days and holidays in order to minimize consumption. Historical analysis immediately shows non-compliant zones, allowing facility managers to adjust operations and create performance metrics that save thousands of dollars over multiple buildings.

From an executive perspective, continuous energy monitoring and performance metrics enable the measurement of the real benefits of capital and operational improvements. When the effects of changes are recorded, real energy consumption savings are visible and more easily quantifiable. The wireless system can gauge the direct impact of raising a temperature set point policy, of implementing a demand shedding strategy, or of introducing Green technologies. Wireless monitoring of green roofs can demonstrate the effectiveness of such building improvements. Measured results encourage energy

conservation and help to better direct future investments.

Becoming Energy Smart

The bottom line is that reducing energy-related costs can help reduce the pressure to cut other necessary programs. There is growing recognition that general wastefulness and a non-essential load during peak periods is bad for business, bad for the utility operations, bad for the general economy, and bad for the environment.

Citizens, managers, investors, and taxpayers see value in taking action to improve sustainability for both the planet and their program budgets. Therefore, saving energy is both good for politics and good for business. To realize this goal, organizations need technologies that have been proven to work, can be easily deployed, and will be rapidly absorbed. An affordable and non-invasive wireless sensor network is an attractive solution, but it must be able monitor and control as managers need while simultaneously being sufficiently scalable, robust, and reliable to operate in commercial and public building environments.

Escalating energy costs and the growing need to improve energy efficiency and self sustainability create the need to provide answers. Unfortunately, today's building systems and IT infrastructures do not offer accurate and timely data for this purpose. However, wireless sensors in a commercial-level HAN can be united with the global information and communication infrastructure of today and the Smart Grid of the future. Information Power will transform how the Smart Consumer consumes energy, enabling organizations to optimize economic tradeoffs for business performance and to reduce their carbon footprint.

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