

What Would Mr. Edison Say?

Intelligent wireless sensors, united in a smarter infrastructure, can help transform how we consume energy and reduce our carbon footprint.

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When Edison first publically demonstrated his incandescent light bulb, he told the crowd, "We will make electricity so cheap that only the rich will burn candles." Indeed, electricity became so cheap that, rich or not, we now take electricity for granted. Today, many worry that our growing reliance on electricity might disrupt our economic, social, and environmental equilibrium. A 21st century Edison might say, "We must make electricity so 'green' and cheap that only the rich will burn carbon." Affordable, mainstream energy solutions are critical if such a 21st century assertion will ever become a reality.

Given today's information and communication infrastructure, the short time and low cost involved in deploying consumer-side energy monitoring and control systems is making the 21st century vision possible. Wireless Sensor Network (WSN) technology has come of age and is ready to dramatically increase energy efficiency, reduce energy waste, and optimize to meet peak demand and other constraints. WSN is the natural extension of a well-established and familiar line of information and related technologies already accepted by consumers. It leverages and augments mainstream and familiar devices like thermostats and internet appliances, which allows the network to blend in unnoticed and readily adapt to consumer needs. Deployments of consumer-side energy monitoring and control systems can proceed in advance of and be congruent with the Smart Grid development. WSN offers immediate benefits through conservation and efficiency while forming a basis for future expansion and integration with the Smart Grid.

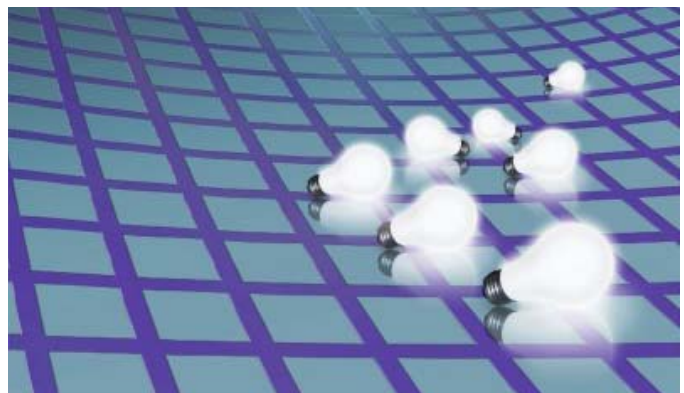
Systems that employ wireless sensor networks open a new dimension when they measure, communicate, and process information. These new systems enable information to flow bi-directionally from sensors and controllers to data

systems and energy management software. They can provide secure access at the office, home, or mobile phone. With Wireless Sensor Networks, consumers are empowered to make smarter decisions and trade-offs on energy consumption and cost.

There are various ways to optimize WSN technology performance to fit desired applications and environments. For example, manufacturing, military, agriculture, and medical applications can require different tradeoffs. The new ZigBee Pro standard, although still early in its deployment, appears to be positioned more for the home area network within AMI, much like Z-wave. Other WSNs target commercial and industrial applications. For example, Millennial Net's wireless sensor network devices are well-suited for retrofitting commercial and industrial buildings.

Wireless networks avoid the time, cost, and complexity involved with hard-wiring. However, to retrofit existing buildings, devices and integrated systems should also be designed for affordable, rapid deployment and robust operation in long-term use. Commercial and industrial applications particularly need a reliable and scalable WSN to adapt to different building configurations and unique building dynamics.

Highly responsive self-forming and self-healing networks allow for wireless sensors to be installed easily and put into service with minimal cost and disruption. To facilitate retrofit installations,



devices in these networks work with legacy HVAC systems, lighting, and appliances. Thus, consumers see immediate and significant energy savings yet the necessity of mandatory upgrades to legacy equipment is eliminated. Additionally, low-power operation is key; devices are powered from existing equipment or operate on battery for years in order to avoid additional costs.

Today, government- and utility-driven policies and incentives should encourage a more widespread use of readily available and inexpensive WSNs, internet communications, information technology, and infrastructure. Such systems will empower consumers, businesses, policy makers, and utilities to wisely invest in new infrastructure and will help consumers and utilities intelligently

manage supply and demand. Wireless Sensor Network systems will foster energy conservation and reveal opportunities for continuous improvement.

Edison's carbon-filament light bulb replaced candles and gas lights with electric lights, making electricity practical, safe, and affordable. Now we need to follow Edison's spirit of innovation and make better use of the available energy. The tools exist today to use our energy more efficiently through a better understanding of usage and conservation measures. Yet we must use these tools in order for them to be effective. To quote Edison, "The value of an idea lies in the using of it." It is time for us to take up Edison's call.

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