

Save Energy to Educate

For utilities looking to foster energy efficiency and conservation among the customers they serve, energy management solutions are a supremely effective way to introduce competence and sustainability. Combining wireless sensor technology with the internet, energy management solutions are a new and economical means to retrofit all buildings, from public locations to commercial properties. Schools are an ideal place to start.

Schools must keep their focus on educating students, yet they are often faced with the challenge of balancing the desires of administrators and taxpayers with their own needs. Additionally, schools and public buildings are frequently pressured to promote and demonstrate the effectiveness of green strategies. Thus, maintaining a cost-effective energy policy that reduces energy waste across public buildings has become a principle way to curb spiraling energy budgets and reduce carbon emissions.

It Takes Energy to Educate

Teachers and students need an environment that is conducive for learning, and this is becoming ever-more possible with the help of electronics teaching aids. But at the end of the day, we find that schools waste a substantial amount of energy at no benefit to them. Regardless of the school district size, energy expenses typically account for 2-3% of the total public education budget. Since energy costs are increasing uncontrollably, up 50 to 80% since 2000, we can expect these energy costs to double or triple. Energy is one of the few expenses that can be reduced without affecting classroom instruction. There are multiple ways to reduce energy consumption and carbon emission, but few have a significant short-term effect – many require 5 to 15 years to achieve payback. An intelligent *energy conservation program* is the key to both short and long term sustainability.

It's time to look at the opportunity communities have to reduce energy consumption across their portfolio of schools and other public buildings. School districts need a combination of approaches to balance and align short- and long-term objectives with their education and community missions.

A System of Energy Management

Communities need a strategy for energy management that encompasses schools and other buildings. A broad-based energy conservation program becomes more effective as visibility and control increase. Millennial Net's wireless Energy Efficiency Solutions are designed to leverage existing infrastructure to rapidly and cost-effectively retrofit buildings. The Millennial Net System produces savings of up to 30%



and has a typical payback period of less than 2 years.

Most school districts have no idea how much energy they consume or what to do about it. The cost of energy necessary for schools to maintain a comfortable learning environment averages to an annual rate of \$2 to \$3 per square foot – that's \$250 to \$350 per pupil! Rising costs squeeze school budgets for operation and maintenance. While new schools are built to high-performance school standards, which aim to significantly beat these statistics, the majority of existing schools operate with energy consumption that is "out of control."

Measures to reduce consumption in existing schools tend to focus on expensive and disruptive capital improvements (i.e. more efficient equipment, light fixtures, windows, insulation, or roofing). These measures may indeed save energy, but they do so passively and lack the ability to gauge whether they were cost-justified. Such measures tend to be building-centric, though some offer a web-based view into each building's system. To significantly curb energy costs, school districts should adopt an on-going energy efficiency program that will actively set policy and ensure compliance.

How Can Energy Efficiency Be Addressed at a District-Level?

Conserving energy in *one* school building is only the tip of the conservation iceberg. The majority of energy cost – and therefore the greatest opportunity for conservation – results from all buildings that make up a school district. The effort to reduce energy

consumption requires a broader view and approach. Energy policy and compliance need to be encouraged on all levels within a school district – with schools, classrooms, and equipment.

A conservation program can be enabled at the district level with an intelligent energy management system that provides sensing and control capabilities which extend from the meter to the classroom. This approach is markedly different from most energy management solutions available today, which are centered on HVAC equipment operation or lighting rather than on consistent energy policy and compliance, despite the fact that the latter method offers broader savings.

Intelligent Enterprise Energy Management

Intelligent enterprise energy management actively measures and controls energy consumption. It helps school districts and communities by enabling:

- ✓ Visible patterns of energy consumption
- ✓ Implementation of consistent energy policies
- ✓ Policy compliance
- ✓ Performance measuring for continuous improvement

The operation of HVAC and lighting represent the majority of energy consumption in school buildings. While policies may be developed to manually reduce wasteful consumption, generally, schools cannot consistently comply with those policies. Lights tend to be turned off, but controlling HVAC energy waste is more challenging. Given that most schools are occupied only 40% of the time, continuously running the HVAC system is a huge waste of energy.

School districts need a flexible and effective way to consistently provide comfortable classrooms and reduce energy consumption. Energy profiles measured and recorded over time enable users to better understand consumption patterns and improve energy conservation.

Wireless Energy Efficiency Technology from Millennial Net

Aligning energy consumption with need requires a greater sense of what is going on at the building level. Energy demand, recorded at point-of-use (classrooms,

offices, etc.), supply (HVAC equipment), and source meters (gas, electric, water), can provide valuable insight as to how buildings can better consume energy.

Millennial Net provides an energy solution that helps balance budget constraints and operational priorities. The solution is designed for rapid and affordable deployment across multiple buildings. It uses wireless devices and the internet to reduce installation costs and provide greater coverage of sensors and control points. Energy savings are achieved by improved compliance and energy policy enforcement.

Millennial Net's MeshScope® Energy Management System is an integrated framework for comprehensive remote monitoring and control of key energy sources, on both the supply and demand sides of energy use. The framework combines recent advances in technology such as wireless sensor networks, the internet, and hosted software applications.

The hosted remote monitoring and control application is available immediately and covers one or more sites via a secure website that can be accessed anywhere. This remotely managed solution quickly generates savings and minimizes the cost of ownership, upkeep, and operation. The remote access capability of the system provides greater system-wide visibility, helping your operations personnel manage buildings and equipment and allowing administrators to better manage energy policy and costs.

Retrofitting Brings Flexibility

Millennial Net's wireless sensor network devices are ideally suited for retrofitting existing buildings. They work with legacy HVAC systems, fixtures, and appliances, making it unnecessary to upgrade HVAC equipment to save energy. Wireless networking avoids the time and disruption of a hard-wired installation, so there is no need to wait for a long vacation or building shutdown to upgrade to a more efficient system.

The MeshScope wireless network is ideal for school buildings. This industrial-class wireless networking technology is a proven robust and scalable foundation for energy conservation. Its highly responsive self-forming and self-healing network allows wireless sensors to be installed easily and put into service with

minimal cost and disruption to existing facilities. Using the wireless MeshScape technology in an energy management system provides users with high-value information at a low cost. The system creates a robust flow of energy data for compliance monitoring, analysis, optimization, and reporting – all without changing existing HVAC systems.

Installing Millennial Net’s Wireless Energy Management System has essentially no impact on IT infrastructure or management. The MeshScape wireless network can coexist with yet is independent of the school’s Wi-Fi network. The web-based energy management application is a “hosted application” that Millennial Net manages via the internet. There are several secure options, commonly accepted by IT security managers, for linking the school’s wireless sensor network to the hosted application.

The web-based energy management system provides users with secure access to monitor and control the intelligent devices according to privileges granted by administrators. For example, HVAC management provides a means to monitor and control thermostats, schedule temperature set-points, and access energy management charts, tables, and reports. Authorized staff responsible for implementing energy policies input and modify temperature set-point ranges for each thermostat based on detailed room occupancy schedules – normal occupancy, vacation/holiday periods, and special events. Other policy settings governing various operating modes can permit and constrain local manipulation of energy consumption as a way to increase compliance. Certain modes may be triggered to manage demand peaks.

Historical and statistical reports, graphs, and trending charts are provided for administrators to see overall system performance. Comparisons of day-to-day, zone-to-zone, building-to-building, and time-to-time energy consumption reveal patterns of use and anomalies. These can highlight opportunities for changes in policy, behavior, and investments in infrastructure. This is great for energy audits!

Energy Savings to Educate

While energy prices and energy consumption profiles vary across regions and buildings, Millennial Net’s Wireless Energy Management System can typically

achieve savings of 10-30%. An energy efficiency opportunity assessment should be conducted to develop a savings estimate for a specific building or portfolio. Typically, energy accounts for 2% to 3% of an annual school budget; HVAC alone can account for 40% to 60% of that expense. Yet schools are only occupied 40% of the time. Unless they were built or renovated recently, most school buildings have energy management systems that cannot adequately set and enforce energy policies for an energy conservation program.

The Millennial Net Wireless Energy Management System can result in annual savings of \$15,000 to \$30,000 per school, depending on the number of classrooms. Average payback is realized within two years.

For more information, visit www.millennialnet.com/energy

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