

# Meeting Goals with Renewable Energy

*U.S. school districts can save billions of dollars a year that could be reinvested in school programs instead of energy bills.*

By Vincent J. Canino



**T**oday's business administrators must certainly go into sticker shock when they see their school's monthly utility bills. America's K–12 and postsecondary schools collectively spend more than \$20 billion a year on energy, according to the U.S. Environmental Protection Agency and its Energy Star program. As much as 30% of that energy is wasted by school buildings that simply are not as energy efficient as they could be. That inefficiency amounts to almost \$6 billion a year that could be reinvested in existing and new school programs instead of energy bills.

Energy inefficiency consumes scarce resources that school districts and higher-education institutions need

to address other imperatives and to create a better environment for students to learn and instructors to teach. Reducing energy waste—and lowering those utility bills—would free up funds that administrators could apply to building quality programs and curricula, to recruiting and retaining the best teachers, and to creating a more comfortable, healthy, and productive indoor environment that helps them achieve their primary educational missions.

The good news is that today's high-performance building technologies and operating practices can improve building performance, reduce energy consumption, and shrink the institution's environmental footprint. From a financial perspective, these technologies pay for themselves many times over a school building's decades-long occupied life. They are made even more affordable thanks to federal and state energy credits and innovative energy performance contracts that pay for technology investments with future energy savings.

Most school districts, colleges, and universities have sustainability objectives. A high-performance building solution that includes a renewable-energy component is a powerful symbol of sustainability that can improve the school's reputation, support recruitment and retention goals, and deliver significant financial benefits, all at the same time.

## The Role of Renewables

The high-performance-building approach is nothing new to the education community. In fact, K–12 schools in the United States pioneered the high-performance-schools concept beginning in the late 1990s, and colleges and universities have been among the leaders in adopting energy-efficiency and sustainability strategies, including the use of renewable energy.

The U.S. Environmental Protection Agency defines a high-performance school building as one that improves the learning environment while boosting energy efficiency, reducing operating costs, and improving environmental performance. In addition to the obvious financial benefits, research shows that high-performance school

buildings deliver a wide range of nonfinancial benefits, including better test-score performance, lower student absenteeism, and greater instructor satisfaction and retention.

School districts looking to improve energy efficiency often include renewable energy as a component of their high-performance-schools strategy. Solar energy and wind energy are used most frequently, but other proven technologies are worth consideration as part of a total energy solution. They include cogeneration (also known as combined heat and power), waste-to-energy conversion, and biomass, geothermal, and—new to the mix—thermal and electrical energy storage.

When considering renewable energy as part of a broader energy-efficiency initiative, many school districts choose to work with an energy services company (ESCO) that has extensive experience in the kind of project they are considering.

The ESCO typically conducts an energy audit to determine how the school is using energy and how much that energy costs, and compares energy patterns with similar and best-in-class facilities. Once the ESCO has painted an overall energy picture, it will identify potential energy-efficiency measures to lower the school's energy consumption profile and evaluate renewable-energy approaches to reduce the school's overall cost of electricity or to create some amount of energy independence.

### Financial Benefits of Energy Efficiency

ESCOs use a variety of state-of-the-art energy modeling software programs to project the effect of applying various energy-efficiency measures over a building's total life cycle and to calculate savings using free cash flow and net present value formulas. With a performance contract, energy savings are guaranteed by the ESCO and can be leveraged to finance building infrastructure improvements.

The ESCO also helps administrators determine whether renewable-energy installations should be included in the infrastructure improvements. A variety of factors go into determining the practicality of any renewable-energy project, including technical, financial, and commercial considerations.

With all this information at their disposal, school administrators can choose the best combination of energy-efficiency and generation measures, set priorities, and work with the ESCO or another third party to implement improvements.

Renewable energy can contribute to the success of a high-performance-schools project implementation. For example, a university in Missouri replaced its outdated power plant and boiler system with a geothermal heat pump system that uses 150 geothermal wells to provide highly efficient heating and cooling for three campus buildings. The geothermal project is just one element of

a comprehensive heating, ventilation, and air-conditioning (HVAC) retrofit that is saving the campus an estimated \$735,000 each year in energy and operating costs.

A community college in Oklahoma implemented an HVAC retrofit program that is reducing energy consumption by an estimated 35% per square foot. The project included implementation of a thermal energy storage system. Controlled by a state-of-the-art building automation system, the thermal storage system saves energy by making ice at night when utility rates are favorable and using it to cool campus buildings during the heat of the day when electricity rates are at their highest.

As part of a \$3.2 million performance contract that included HVAC, controls, lighting, and water upgrades, a northern California school district requested the inclusion of a 295-kilowatt photovoltaic system in the contract. The district has been able to demonstrate its commitment to sustainability, energy conservation, and energy independence with a measure that reduces its carbon footprint and greenhouse gas emissions. The district expects to save an estimated \$160,000 or more per year with this integrated renewable performance contract.

### Educational Opportunities Add Value

Schools choose to implement renewable-energy programs for a variety of reasons. As part of a broader high-performance-building effort, the opportunity to reduce costs, energy consumption, and environmental impact is substantial. Some schools have to meet sustainability goals or regulatory requirements. Still others are looking to build a "green" reputation that will bolster their image in the community and help them attract supporters, donors, faculty, and students.

Renewable-energy projects also provide a wide range of educational opportunities as secondary and postsecondary schools look to strengthen programs and curricula to help students qualify for the anticipated growth in green employment opportunities. Working closely with educators to develop programs and curricula in critical industry growth areas such as renewables will help the United States develop a more competitive workforce. Renewable projects can also play a role in connecting concept to implementation. Some schools even involve students in the development, design, construction, and operating phases of renewable projects, which gives their students the benefit of a holistic picture and real-life project experience.

The combination of educational, financial, and sustainability benefits makes a powerful case for considering renewable-energy systems as part of any educational institutions energy-efficiency agenda.

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