Performance Contracting: Taking School Technology Green

By Dane Taival

Energy efficiency makes fiscal and environmental sense, and so does energy savings performance contracting.

Because an energy savings performance contract can create a self-funding package of products and services that reduce energy and operating costs, over time, school districts' sometimes-large initial investment in emerging technologies saves money in as few as three or four years.

Energy savings performance contracting creates sustainable schools that improve student and teacher health, increase attendance, and decrease energy and operating costs.

How Performance Contracting Works

An energy savings performance contract allows school officials to undertake energy-related projects for their facilities without up-front capital costs. The school district partners with an energy services company (ESCO), which conducts an investment-grade audit and identifies facility improvements that could save energy. At this time, school personnel can identify green technologies to be incorporated into the plan.

The ESCO designs the improvement project and, as part of the performance contract, guarantees that the savings identified will meet or exceed project costs. As part of the performance-contracting process, selected technologies will not exceed the maximum costs identified in the contract.

The length of time over which the project can be financed—which is determined by state statutes—can drive decisions about the technologies selected. Most states stipulate a financing time frame of 10 to 20 years. Shorter financing terms may limit the use of some technologies. For example, solar energy typically has a payback that is longer than 10 years.

The availability and key parameters for grants or rebates that the technologies may qualify for should also be considered, as they have the potential to dramatically improve the financial return of a particular technology.

Green Technologies

Administrators interested in using green technologies should communicate their preferences before committing to an ESCO. In selecting a partner, ask for experience working with specific technologies. Potential partners should be able to clearly identify the payback from their other projects and provide references.

Then, depending on the district's needs, renewable-energy technologies selected during the investment-grade audit may include some of the following:

- **Solar/photovoltaic** technology is especially useful in warmer regions of the country. Solar panels convert the sun's energy into electricity.
- **Ground-source heat pump systems** are effective where there is enough land for the well field. During the winter, heat from the ground travels through a heat exchanger into the building. In the summer, heat from the building is moved back to the cooler ground. Ground-source heat pumps met the needs of Shelby County Schools in Alabama, where they were installed as part of a performance-contracting process. With other high-efficiency systems and building improvements, the project is generating more than $517,000 a year in savings.
- **Daylighting** uses natural light to illuminate building spaces to reduce reliance on electric lighting during daylight hours.
- **Cogeneration** (also called combined heat and power) involves simultaneous generation of two energy forms—electricity and heat—from one source. Combined heat and power capture the heat generated by electricity production. The heat, usually vented away as a nuisance, is redirected for the buildings' heating needs. This resource is most effective in large districts.
- **Thermal ice storage** improves the reliability and cost-effectiveness of the infrastructure by shifting peak cooling loads to off-peak hours. Ice produced overnight is used to cool the building during the day. Because there is greater reliance on the most efficient power plants during off-peak hours, off-peak electricity is less expensive. This gives the school substantial cost savings as well as environmental benefits. Administrators at William Mason High School in Mason, Ohio, are using a thermal ice storage solution as part of a $30 million high school expansion project. This and other energy-efficient, environmentally responsible infrastructure improvements will save the district more than $55,000 in annual energy costs and will pay them back in fewer than five years.
- **Advanced automation controls,** including but not limited to demand ventilation, control outside air introduction into the building based on building load. Ventilation is a key part of a high-performance classroom and is the most expensive component in heating and cooling a building.

Identifying Payback

When selecting emerging energy-saving technologies, administrators can work with their ESCO to identify systems that fit their building and locale. Once those systems are identified, school officials should weigh the proposed infrastructure investment against a conservative estimate of future energy costs compared with historical costs. To derive the identified payback, it's important to diligently follow the plan through the entire project.

The administrators' work doesn't stop when construction is complete. Monitoring utility costs goes a long way toward confirming the value of the project. Regular communication with the ESCO is also important to ensure that the ESCO remains involved. Most contracts hold the ESCO responsible for results that are below what was promised.

Sustaining Building Performance

A building requires ongoing assessment to ensure continued energy efficiency. Emerging technologies can be useful at this stage as well. They identify preventive maintenance needs to remedy potential problems before they strike and to gather trend data. The following technologies, which are now readily available, meet the increasing demands for environmental certification:

- **Infrared thermography** creates "maps" of a building that show temperature variations. Priority can be given to areas identified as outside the preferred temperature range. Heat loss or inefficient airflow (e.g., too much or too little conditioned air) is often an inexpensive repair.
- **Ultrasonic analysis** focuses on heating, ventilating, and air-conditioning hardware. It identifies problems related to component wear, steam trap failures, and fluid and vacuum leaks. Ultrasonic analysis is simple and inexpensive.
- **Vibration transducers** detect how smoothly a machine is running. This analysis can help technicians diagnose problems, such as misalignment, rotor rub, and mechanical instability, which shorten the useful life of equipment.

Analysis by Greening America's Schools found that green schools cost about $3 more per square foot to build, but the total financial benefits are 20 times greater than initial costs. High-performance schools also use an average of 33% less energy than conventionally designed schools. More importantly, Greening America's Schools also found that 70% of districts with green schools increased student attendance. Those are results that can take any school to the head of the class.

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