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## Colorado Springs School District 11 – Achieving Healthy Indoor Learning Environments Through Energy Efficiency Upgrades

Colorado Springs School District (SD) 11 provides an outstanding example of how integrated energy and indoor air quality (IAQ) management programs can improve learning environments for students. District 11's energy management program—built on the commitment of the superintendent, board of education, and a full-time coordinator—has resulted in an estimated annual energy savings of more than \$928,000 and significant IAQ improvements.

District 11 has used energy savings to fund an initiative to ensure that all of the district's schools meet or exceed current IAQ requirements with no burden to the taxpayer. The district's energy management team, led by Thomas Fernandez, Director of Energy, recognized that energy efficiency and good indoor air quality go hand and hand. IAQ goals have been accomplished through energy-efficient design, proper maintenance and commissioning of HVAC equipment, and the use of performance-based contracting.

### Designing For IAQ and Energy Efficiency

Colorado Springs SD 11 has committed to constructing and maintaining high performance K-12 schools and incorporating energy efficiency and IAQ considerations into the design of new schools and the retrofit of existing ones. In the case of existing schools, District 11 has used an energy performance contract developed with the help of Rebuild Colorado, a program of the Colorado Governor's Office of Energy Management and Conservation. As part of this performance contract, the district also has worked with energy engineers to revise the design guidelines to include high performance, or sustainable, design practices. District 11 includes commissioning as early as possible in the design process to ensure that the district's needs are understood and met. The design process is meant to focus on solutions that will produce energy-efficient, comfortable buildings that perform well.

### Improvements in IAQ and Energy Efficiency in Existing Buildings

District 11 realized that it did not have to wait for funding to improve the quality of its school buildings. By using performance contracting, energy improvements have paid for themselves. The district's goals for existing buildings include maintenance of acceptable temperature and relative humidity, control of airborne contaminants, and distribution of adequate ventilation air. While some measures have been quick fixes that yielded immediate return on investment, such as installing pool covers and maximizing the use of natural daylight, other measures such as replacing out-of-date equipment with new boilers, implementing demand control ventilation via CO<sub>2</sub> sensors, installing heat recovery units, and lighting retrofits have longer term paybacks. As a result of improved energy efficiency, District 11 has been able to meet its IAQ goal of 700 ppm CO<sub>2</sub> or less during occupied hours.

### Raising the Bar for New Construction

Energy managers in Colorado Springs recognized that design goals that incorporate energy efficiency from the outset of a project are paramount to determining the appropriate mechanical and electrical systems necessary for achieving targeted levels of energy performance, daylighting, and healthy IAQ. Therefore, Colorado Springs SD 11 set high standards for integrated design, acoustic quality, materials selection, and aggressive energy and water use targets for its new schools. Using EPA's Target Finder, the district set an energy target of 25 kBtu/sf/year for its new schools, which is dramatically more efficient than the 70 kBtu/sf/year average energy use of existing schools.

*"Even though we've been able to save millions so far, we know we can do much more. Replacing aging lighting, heating, cooling and controls with energy-efficient alternatives can generate big savings, but we lack the capital funds to do those projects. Energy performance contracting provides us a way to make those improvements now with money we'd otherwise be spending on high utility bills. And it allows us to improve our facilities without any additional burden for taxpayers."*

**- Thomas Fernandez, Energy Manager**

Through careful selection of materials, designers in District 11 avoid introducing potential pollutant sources to the indoor environment. Because reliable ventilation systems supply fresh air to occupants, the district ensures that air passageways are protected during construction and mechanical systems are balanced and commissioned before operation. In one of its most recent new construction projects, District 11 clearly conveyed expectations for energy and indoor air performance by specifying the following targets as key parameters:

- Total energy use: 25 kBtu/sf/year or less
- Water use – building: 2.4 gallons per building sf/year or less
- Water use – irrigation: 4.5 gallons per turf sf/year or less
- Total building power factor: not less than 0.95 lagging at the utility meter
- Indoor air quality: 700 ppm CO<sub>2</sub> or less during occupied hours (which contributes to meeting the stringent total energy use goal)
- Artificial lighting: 0.70 watts/sf or less
- Lighting levels: 40 footcandles in classrooms

Geoexchange systems will provide low-cost heating and cooling year round. The district received a high performance design grant from Rebuild Colorado, allowing design assistance and additional research to ensure the design included cost-effective, efficient, and environmentally responsible features. These included, but were not limited to, demand controlled ventilation, heat recovery systems, and natural daylighting.

### **Creative Solutions – Using Incentives to Improve Performance**

In 1999, Colorado Springs SD 11 developed a Resource Conservation Management program to alter its approach to energy management and actively work to reduce costs. The program represented a major shift in thinking and required a creative approach for meaningful participation. Each year, the district awards cash incentives to schools in the amount of \$500,000, totaling \$3.5 million over the life of the 7 year program, based on the school's student population and measured energy savings. Building managers have embraced the program and rely on the incentive awards for a substantial portion of their annual budget. The schools developed educational programs such as the "Lights Out Campaign" to raise awareness among teachers, students, and staff about conserving energy.

### **The Value of Partnership**

Through partnerships with ENERGY STAR, Rebuild Colorado, and energy service and product providers, District 11 tapped into a wealth of resources to support its energy performance improvement efforts. Colorado Springs SD 11 uses EPA's rating system to assess the energy performance of more than 90 percent of its schools. The district also partners with Save More Resources, an ENERGY STAR partner that provides energy tracking software to end-users. As a result of these partnerships, Colorado Springs SD 11 successfully integrated automated benchmarking into its energy management program.

### **Recognition**

Colorado Springs SD 11 was named ENERGY STAR Partner of the Year in 2005. It is one of six school districts to have earned the ENERGY STAR Leaders distinction. Further, in 2006, the Governor of Colorado recognized District 11 for being one of the most efficient school districts in the state.