



Maximize Learning Environments through Performance Contracts

A classroom's indoor environment – temperature, humidity, air quality and noise level – plays a critical role in a student's ability to concentrate and learn. The U.S. Environmental Protection Agency reports that poor indoor air quality is believed to be linked to a variety of health effects and symptoms, including allergic reactions and asthma. According to the U.S. Centers for Disease Control and Prevention, asthma causes U.S. students to miss 14 million school days per year. Some of those missed days are likely attributable to poor indoor air quality in school buildings.

School administrators can enhance learning environments through improved indoor environmental quality, humidity control, acoustics and energy efficiency performance. Well-designed, high performance classrooms can enrich student and teacher performance and make education a more enjoyable and rewarding experience.

High performance classrooms maximize learning environments

Creating high performance classrooms requires an integrated approach to the design process, in order to produce efficiencies that can lead to cost savings. Building systems, such as controls, lighting, heating, ventilation and air conditioning (HVAC), electrical, plumbing, flooring and ceiling, must be considered together at the beginning of the design process.

According to the Sustainable Buildings Industry Council (SBIC), school administrators can save 30 to 40 percent on utility costs each year for new schools and 20 to 30 percent on renovated schools by applying sustainable design and construction concepts.

A critical element of high performance classrooms are energy efficient HVAC and building control systems that allow schools to maintain comfort while reducing energy consumption. Building automation systems are particularly beneficial because they can connect building systems and provide energy use patterns in multiple schools across a district. Such systems optimize critical factors needed to create high performance classrooms, including indoor air quality, acoustics and energy efficiency.

High performance classrooms and sustainable school buildings are fiscally and environmentally responsible, and significantly improve the quality and delivery of education. Properly designed, installed, and maintained energy efficient HVAC products, systems and services keep operating costs low and offer schools an environmentally responsible solution to help manage their assets.

Failure to address indoor environmental problems can have many consequences including:

- Decreased occupant comfort;
- Reduced performance of students and teachers;
- Lower student and teacher attendance;
- Deterioration of the school facility and equipment; and
- The potential that schools will have to be temporarily relocated or closed.

Performance contracts save energy and money

Flexible contracting options help school districts meet high performance goals, including responsible asset management, by financing capital improvements through energy-related savings. Schools enjoy an accelerated purchasing process, facility upgrades (modernization, infrastructure, service and maintenance), and financial and performance outcomes generally not possible through the traditional plan and spec procurement process. The standard HVAC system performance contract typically lasts 10 years.

Predictive maintenance, as part of an energy saving performance contract, improves system reliability and reduces owner cost by adding life to the equipment. An established predictive maintenance program allows school administrators to understand system performance, helps protect the school's investment and ensures that the HVAC system offers maximum energy efficiency.

In 2005, Pittsylvania County Schools in Chatham, Va. engaged in a performance contract consisting of a package of HVAC products and services customized to specific building requirements. Annual energy savings achieved through Pittsylvania Schools' performance contract total more than \$300,000 and initial operational savings totaled \$19,000.

All 20 school buildings in Pittsylvania County will benefit greatly from reduced energy and maintenance costs while improving the long-term sustainability of the school facilities. The school district's performance contract contributed to the creation of high-performance learning environments, sustainable schools, and responsible budget and asset management.

Sustainable schools, high performance classrooms

In 2004, the U.S. Department of Energy reported that schools with 1,000 students or more spend an average of \$240 per student for utility costs. Faced with intensive maintenance, inefficient infrastructure, soaring energy costs, and energy driven budget deficits, school districts turn down thermostats or send children home when HVAC equipment fails. The results are cold classrooms, difficult learning and teaching environments, and lost days.

Sustainable schools provide notable benefits, including improved attendance, healthier students and teachers, decreased operating costs, limited liability, and reduced environmental impact. School districts can save 30 to 40 percent on utility costs each year for new schools and 20 to 30 percent on renovated schools by applying sustainable, high performance design and construction concepts. "Green" building strategies can help school administrators contribute to the academic success of students, as well as to the financial and environmental performance of schools.

Energy efficiency tips for schools

We recommend the following tips for properly maintaining HVAC systems to improve energy efficiency in schools.

- Use a life-cycle cost analysis whenever comparing and selecting HVAC system solutions.
- At startup, carefully inspect the entire air distribution path for leakage and plug all air leaks. Once in operation, recheck the system for leaks annually.
- Ensure filters are installed to minimize air bypass.
- Make sure an HVAC system is thoroughly commissioned prior to occupancy to assure it operates as the designer intended.
- Check room thermostats for proper set point, operation and calibration at least twice per year.
- Properly train teachers and staff to use programmable thermostats.
- Clear any obstructions to discharge and return air openings of HVAC systems.
- Train facility maintenance personnel to operate building automation and energy maintenance systems.
- Inspect and maintain air filters as specified by the equipment manufacturer. Optimally, they should be replaced every three to six months.
- Minimize air bypass between filters and through the mounting rack.
- Periodically inspect fan blades and bearings, adjust/replace belts and check fan current draw.
- Clean, lubricate and calibrate outside air damper actuators every three to six months.
- Inspect and clean condenser and evaporator coils at least annually or more frequently if necessary.
- Ventilation is essential to maintaining a healthy, comfortable indoor environment. Codes base the amount of outdoor air that must be brought into a classroom on the number of occupants (students, teachers) that are normally in the room.
- Review classrooms' ventilation set points periodically and ensure they match the current occupancy and usage pattern of the room.



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