Schools
Case Study

Energy Management for Heating, Ventilation and Air Conditioning (HVAC)

PG&E Helps a Bakersfield School District Play it Cool

"PG&E has been great to work with on this, start to finish. Our PG&E account representative, Larry Goscinski, did a tremendous amount of legwork on our behalf. All I had to do was choose the hardware, the contractor and the installer, and Larry made everything else happen. Having that relationship with your PG&E rep is really important."

Elgie Lejeune,
Director of Facilities and Transportation,
Standard Elementary School District,
Bakersfield, CA

The Standard School District's Energy Challenge

When the Standard School District of Bakersfield, California needed to improve HVAC energy efficiency on two of its campuses, Pacific Gas and Electric Company (PG&E) stepped up to help make it happen. PG&E provided crucial financial incentives and pushed through the approval process to make sure the project was completed before a very tight deadline – the first day of school.

The Standard District is relatively small, serving 2,900 students through three elementary schools (a fourth campus is planned) and one middle school. Beyond the normal educational challenges, the district also deals with climate and energy issues. Late spring and early fall temperatures in Bakersfield frequently soar above 90 degrees Fahrenheit (90 F), impacting staff and students and requiring school buildings to be air conditioned. Students and teachers alike perform better when classroom temperature, humidity and carbon dioxide levels are properly controlled with cooling and ventilation from HVAC systems.

During summer vacation, when outside temperatures in the area approach 115 F, classrooms that are closed and not in use can reach 140 F and actual facility damage can result – the formica surfaces on cabinets and countertops will peel off because the glue has melted. The district has therefore found it necessary to keep its HVAC systems operating year-round. And, as with all school districts, Standard must keep a close eye on energy costs.

The Challenge – Cracked Thermostats and Propped Doors

Over the years, the district's efforts to manage classroom environments and energy costs had been frustrated by both human and technical factors. Individual classrooms were temperature-controlled by a ragtag assortment of thermostats from a variety of manufacturers and of widely varying technologies. The thermostats frequently ran at 69 F on a 24/7 basis, so considerable energy was wasted cooling empty rooms.

The thermostats were also regularly pried open, which defeated the lockboxes to adjust the temperature manually. This was done by either pushing pencils through the openings in the covers to reach the buttons, or by simply prying off the covers with metal implements. The maintenance staff found itself continually responding to service calls for thermostat repairs.

Further energy was wasted by the ongoing habit of propping the doors open to create cross-ventilation in the buildings. It was common to see the doors wide open to the outside heat with the air conditioner (AC) running full blast.

Simple, Ingenious Solutions - Switching to 365-day Programming

In 2009, working closely with PG&E, the Standard School District decided to replace the existing thermostats and install door sensors on all exterior doors, first at Wingland Elementary School and then at Standard Middle School and Standard Elementary School (which share a campus).

Twenty-four new Honeywell T7350 thermostats, costing $250 apiece, were installed in classrooms on the two campuses. Besides controlling the temperature, the thermostats have 365-day calendar software built in that allow them to be pre-programmed to conform to the school's schedule. Maintenance staffers visit every thermostat once a year to enter the school holidays for the upcoming 12 months (which wasn't possible with the previous thermostats). The district saves energy by ensuring the ACs operate at a reduced load when the classrooms are empty.

During school vacation periods, instead of simply shutting down the HVAC system as in previous years, the district can now program the system to maintain reasonable temperatures in the classrooms – a maximum of 95 F in the summer, and a minimum of 45 F in the winter – that keep computer systems functional and prevent the damage to facilities that can be caused by extreme temperatures.

Giving Teachers Some Control

Teachers are provided with limited control, so they don't feel completely left out. They can adjust the temperature three degrees up or down, and if they want to use an unoccupied room during system downtime to grade papers or change bulletin boards, they can turn on the AC for an hour at a time with the push of a button on the thermostat. The teacher can also shut off the AC for the day if the classroom will be empty (for a field trip or other event) so the unit isn't cooling an unoccupied area. Just this minimal amount of control has reduced teacher tampering with the thermostats and correspondingly reduced the frequency of maintenance service calls.

Closing the Door on Energy Waste

The Standard School District chose a simple, innovative solution to the door-propping problem – door switches. The District installed magnetic sensors in the door jambs, alongside the similar sensors that connect to the alarm system, to detect when the door is open. Each sensor is connected to a timer that is set to shut down the AC if the door is left open for five minutes or longer. The time delay ensures that the system will continue to run during normal door opening and closing activity. The system shuts down the AC compressor only – the fan continues to run in order to maintain healthy ventilation and keep carbon dioxide levels low.

The new door system required a somewhat lengthy learning curve, with maintenance staff demonstrating the door switch for the teachers and emphasizing the importance of keeping the doors closed. The educational campaign has paid off – teachers and students alike are helping by not propping the doors open, and teachers are making sure the doors are completely closed before calling maintenance to complain about an AC shutdown. This has reduced service calls considerably.

The Results – Straight A's

The project has been a complete success for the Standard School District. Data loggers used to monitor classroom conditions for a week at a time have found the new thermostats extremely accurate in temperature control and the new door switches functioning perfectly in turning off the system when required. Temperatures and carbon dioxide levels are remaining consistently within proper parameters, teachers and students are more comfortable, and the strain on the district's maintenance staff has eased significantly.

Projections for yearly energy savings (on which the PG&E rebate was based) are nearly 45,000 kilowatt-hours per year and more than 3,800 therms, which translate to reductions of four percent in electrical consumption and more than 12 percent of natural gas consumption for the two campuses.

The total project cost of the thermostat and door sensor retrofits at both campuses was $23,368. PG&E's Customized Retrofit program provided rebates of more than $7,800, which covered about 33.5 percent of the District's project costs.

Your Next Steps with PG&E

To learn how PG&E and its partners can help your school district or campus find innovative energy solutions, manage energy consumption and reduce costs, contact your local PG&E account manager or call our PG&E **Business Customer Service Center** at **1-800-468-4743**. More information is available at **www.pge.com/schools**.

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