No-Cost/Low-Cost Solutions at Schools:
Teaching Behavioral Patterns

In September 2009, the EPA issued a challenge to schools to improve energy efficiency in their buildings. According to the EPA press release on the challenge, annual energy costs for the country's K-12 schools is "nearly $8 billion – more than is spent on textbooks and computers combined." Reducing energy costs would obviously help to change that balance and channel the cost savings into education.

Jason Lee Middle School: *When the AC system failed, it triggered a series of changes because excessive cost of repairs necessitated a better solution. The mechanical maintenance team decided to install a new air-cooled chiller with high efficiency compressor, to replace the electric heating system boiler with high efficiency equipment and to update the kitchen walk-in cooler and freezer. The annual net savings for this project are calculated at just over $50,000.*

In the current economic climate, budgets everywhere are taking a hit. This means that the focus for energy saving techniques depends far more on no-cost/low-cost than capital expenditure options. The ability to work with a facility as it stands and have it operate at optimum functionality is a key element in tighter times. This is a guiding principle for BOC training and schools offer a great opportunity for teaching the benefits of no-cost/low-cost energy conservation techniques and for changing behavioral patterns to implement these techniques.

Let's examine two such public school systems, where both have successfully worked to save energy and to engage their communities in trying to achieve energy efficient practices.

Responding to a Pricing Crisis

A decade ago, the well-documented west coast energy crisis sparked a huge interest in energy savings. Skyrocketing prices in an area where energy costs had been traditionally cheap caused everyone to rethink energy usage and look for ways to save. It was during this energy crisis environment that, in 2001, George Bryant, who was at that time the facilities manager of the public schools system in Vancouver, Washington, was looking for a training program for his head custodians. He enlisted John Weber, assistant custodial maintenance crew leader, to investigate the BOC program, which he'd heard about through the Washington Association of Maintenance and Operations Administrators (WAMOA). They concluded it was a good fit for their situation.

Vancouver has thirty-five schools, as well as several associated activity and administration facilities. "George Bryant was a retired army person and definitely liked things to run efficiently," observes Weber. To that end, Bryant set aside money in 2001 to send the head custodians from all thirty-five schools to the training, with the goal of giving them a better understanding of all the pieces that make up building maintenance and operations. It was a shrewd move on his part.

The system is large enough that it has in-house professional staff – HVAC technicians, plumbers, electricians – which makes it possible to avoid outsourcing major projects, saving a lot of money. Weber says that by training the custodial staff to have a view of the big picture, "they are able to input work reports for the technicians that are accurate assessments of what is needed for a particular problem. This makes the technicians' jobs a lot easier." The awareness of the big picture fosters better communication and a sense of the custodial staff as a part of the O&M team.

Since efficiency measures have begun in 2001, the district has been able to save about $300,000 annually. Consumption has gone from 32 million kWh in 2001 to 26 million in 2009 – a 19% decrease. In the past, it was standard procedure for custodial staff to start the school's day by turn everything on. That view has certainly changed and a lot of Vancouver's school's initial savings came from "low hanging fruit" of common sense measures to change habits.

A great example of this low hanging fruit is phantom plug loads. Plug loads are anything plugged into a system – appliances, computers, printers, coffeemakers – the list goes on. Phantom plug loads a re sneakier. Think about what is actually powering that clock in the coffeemaker or DVD or the computer that is left on overnight when no one is around. It's estimated that phantom loads can add as much as 20% to energy bills. The team also examined lighting and equipment scheduling, as well as the how weekend operation was handled, to see where changes could be made.

Use of the EPA's Portfolio Manager software has been invaluable to the effort. Tim North of the school system's mechanical maintenance department says that, "The program is by far a superior system with which a user can judge the ongoing performance of their building.

It is a priority for us both as a tool and as a means of recognition for the buildings' staff and student efforts in utility savings."

In June of 2009, the Vancouver School Board also adopted policy regulation 3690: The Natural Resources Management and Conservation Program. The policy lays down specific guidelines and encourages involvement at all levels of the educational system. While many people were already on board with the program's suggestions, Weber says that confirming it as policy "kicked off a strong movement to involve students and district staff outside the maintenance department and establish "Green Teams" in every school, with students, teachers and administration all participating." Head custodians from each school are an integral part of each team and the program is quickly catching on at all the schools.

Paul Musco and Karen Verrengia of the Cranston School District in Rhode Island.

"I am so very proud of the contribution of our custodial maintenance people to the maintenance team as a whole," says John Weber, "especially because it is a team effort, which everyone pitching in and understanding their roles." The custodial team of the Vancouver Public School system is 100% BOC certified, with 37 BOC graduates on staff, five of which, including Weber, are level II certified.

Behavior Helps When Budgets Can't

Clear across the country in Rhode Island, Energy Manager Karen Verrengia of the Cranston Public Schools system sees things the same way: energy savings is a collaborative effort and everyone needs to participate. Cranston, too, adopted energy management guidelines and has these posted on the energy page of the school system's web site.

In late 2006 when Verrengia was hired to be the energy manager for the school system, she worked with the O&M staff in the city's 31 schools and painstakingly went through all of the buildings plans, identifying the locations and specifications of the various components of the HVAC, lighting and ventilation equipment. This was no small task with 1,755,082 square feet of building space, much of it old and most of its equipment outdated, if not antiquated. These floor plans were used as a tool to implement energy guidelines for equipment scheduling, one of the biggest energy savings measures in the "no-cost/low-cost" arsenal.

There was also the issue of knowing how to run the equipment properly, to its optimized efficiency. For example, the Westin Hills Middle School near the Cranston West High School complex had a pneumatic building control system from the 70s which was, at that time, state-of-the-art technology. Now, because of the rarity of the system, it is difficult to know how to run the pneumatic controls properly. Cranston, like Vancouver, is fortunate to have in-house professional staff and Paul Musco, the system's senior HVAC technician (and also a BOC grad) was tasked with figuring this out. He did his research, made his inquiries, and now has the controls running according to the original optimization specs. "With an old system like this, there's kind of a lost art to running it," says Musco. Verrengia agrees, "The old way, we were heating the whole neighborhood!"

Verrengia also tracked the energy use of all the system's buildings and spotted what she calls, "the $90,000 mistake" in 2007. Heating costs at one of the schools spiked during the years and she wanted to know why. Investigation revealed that the school's gas meter was actually broken and was giving errant readings. The school system eventually got a $90,000 credit.

The Cranston School District budget has not allowed for much investment in energy saving equipment so most of what has been done has had to fit into the no-to-low-cost package. While they have taken advantage of some of the rebate programs local utility National Grid has offered on lighting retrofits at a nine of the schools, there hasn't been much money for capital expenditure. So the focus has been on changing behavior. "It's a people program. You don't have control over price but you do have control over what you use and that's what we're going after," says Verrengia.

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>
> *– John Weber*

One of the associations they've been working with is the National Energy Education Development (NEED) which emphasizes educating students to teach other students. Verrengia explains, "Kids listen to other kids and we in Rhode Island are lucky to have one of the NEED people right here. Joanne Spaziano from NEED has been a real asset to our getting the message across to kids."

The savings in energy costs for the Cranston School System from December 2006 through August 2006 has been over $2 million, or about $61,000 per month. The efforts of all the O&M personnel, the students, teachers and administration were rewarded in the fall of 2009 when four of the city's schools earned the ENERGY STAR® label for four of its 31 schools – the first schools ever to be so rated in Rhode Island.

Efficiency: A Community Effort

School communities pull together to save money to better their educational system. Pulling together to reduce energy consumption means that more money is available for education and in Vancouver, Washington and Cranston, Rhode Island, as well as in many other school systems across the country, they get that.