

# BOC Bulletin

A Newsletter for BOC Graduates, Enrollees and their Employers



WINTER/SPRING 2009

## Hospitals Operating in Harder Times

After years in a relatively stable economic environment, the current financial crisis has hit everyone with tightening budgets. Hospitals and health-care facilities have a particularly tough outlook when trying to address the various pressures specific to their industry. Scientific advances have increased the number of treatment options so that many more people are availing themselves of these treatments while the ranks of the uninsured continue to grow. How many people do you know that have new knees or hips?

As the boomer generation ages, demand for this type of surgery and its recuperative aftermath will only increase and joint replacements are only a part of the overall increase in treatment options, many of which can be energy-intensive.

As demand increases, it follows that more healthcare facilities – hospitals, rehabilitation centers, clinics – will be needed. As noted in the March 2008 issue of Facilities.net, "So many hospitals and medical centers are being built that capital investing for health care construction is expected nearly to double in the next few years, from about \$18 billion in 2006 to about \$35 billion in 2010." (*Energy Efficiency Prescriptions for Health Care Facilities* by Rita Tatum)

While energy costs have been on a rollercoaster over the past several months and current prices are down, the overall trend is certainly heading higher and healthcare facilities will



Main Entrance Cedars-Sinai Medical Center in Los Angeles, CA.

have to adjust. Control of energy costs is vital to an industry in which many facilities run 24/7, have demanding HVAC and air quality requirements and, with so many more treatment options now available, are anticipating a boom in procedures over the next several years. Just the sheer increase in the number of electricity-demanding devices in patient rooms is an obvious sign of inevitable usage increases.

So what are healthcare facilities and, more particularly, hospitals, doing to offset this triple-whammy of costs increasing, reimbursement rates declining and demand for services rising?

An article in the winter 2008 edition of Green.org highlights the efforts of the Department of Energy's new program for increasing energy efficiency in healthcare facilities, EnergySmart

Hospitals, which was rolled out last summer. The article notes, "Hospitals are probably the largest consumers of energy in the health care field. According to a statement released on July 23, 2008 by the US Department of Energy (DOE), in 2007 hospitals spent more than \$5 billion on energy costs alone. Hospitals use 836 trillion BTUs of energy annually and produce more than 30 pounds of CO2 per square foot of space — an energy intensity that is more than two and a half times the consumption and CO2 emissions of commercial office buildings.

"Even within the current structure of health care, the DOE has demonstrated that it is possible for existing hospitals to lower their energy consumption by 20–30 percent. Most of the solutions for this modest (but significant) reduction are simple. In a typical hospital, lighting, heating and hot water account for more than 60 percent of total energy use." (*Reducing Energy Use in Hospitals* by Abbe Sudvarg)

And this is just what BOC participants focus on: low-cost, practical fixes to tame energy usage and contain costs. For hospitals though, the reality of 24/7 operation, more stringent codes of air quality and heavier-than-normal water usage make energy-efficiency that much more challenging. Nevertheless, as BOC participants know, there are ways to cut back.

### Search for Savings a Daily Routine

Cedars-Sinai Medical Center in Los Angeles is a complex of approximately 4.5 million square feet, with clinics, research labs, doctors' offices and the main hospital building, which is 2.3 million square feet of the total space.

Manager of Plant Operations Mark Rojas works with seven maintenance supervisors to brainstorm on ways to reduce energy needs and it is an ongoing process. Says Rojas,

(Continued on page 2.) See *Harder Times*.

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"We have some pretty sophisticated control systems, but they still have to be evaluated almost on a daily basis. Weather patterns have changed significantly in recent years and we can have temperature swings of 40-50 degrees in a single day, so it's often possible to use outside air to cool things at night rather than running the AC.

"By the same token, recent patterns of higher temperatures and humidity levels have placed greater demands on the system which, at only five years old, is very much state-of-the-art. Controls are great, but you have to be vigilant in monitoring that they are set up for the situations at hand."

For one energy savings project, the maintenance team observed that a 200-ton chiller was being used in one three story clinic building, but for a good 40 percent of the year, the need was only about 20 percent of the chiller's capacity. They are in the process of purchasing a 20-ton chiller that will give them an alternative to running the oversized chiller for a good chunk of the year, and will also be available as an "add-on" during periods where temperatures are hotter than usual for many days at a time and more cooling capacity is needed.

Lighting retrofits are always a good place to save and a couple of years ago, Rojas worked with Philips Lighting on a solution to replace all parking lot 32-watt 4-foot fluorescent lights with 25-watt ones, with the 7-watt differential saving 12,000 kilowatts per month in just one parking lot. Cedars-Sinai also received rebates for the retrofits from the Los Angeles Department of Water and Power, \$19,000 for the first lot and \$24,000 for the second. Rojas intends to do three more lots and anticipates rebates totaling approximately \$35,000.

Additionally, any building that isn't 24/7 is on timers for HVAC and lighting. Step by step, the team works to cut energy usage with the result that when the most recent budget report came out, it showed that Cedars-Sinai was paying less in energy costs this year than last, despite rising energy costs and a larger client service base.

As the largest medical facility in the area, and currently one of the few with a stage-one trauma unit, Rojas says that Cedars-Sinai "has kind of set the bar for energy efficiency in medical complexes. People look to see what we are doing." With electrical costs for the facility at about \$750,000 per month on average, the incentive to control usage is strong indeed.

## Savings Vigilance Helps Needed Growth

Providence Health & Services, which operates across five states in the western part of the country from Alaska to California, also has a history of promoting energy efficiency in its facilities. With such a wide range of operation, solutions come in very different packages.

At the Providence St. Peter Hospital in Olympia, Washington, Director of Facility & Technology Services Geoffrey W. Glass PE, CHFM has been working steadily with the facilities plant operators – all of whom are BOC level I certified – to increase energy and operating efficiency at the site.

"Providence is taking a conservative course, suspending construction activity for six months or so in the face of the current economic conditions," Glass notes. Tighter financial constraints make conservation measures even more necessary.

Glass has worked with the local utilities to support a variety of conservation projects. The local water utility, LOTT Alliance, is underwriting almost 75 percent of the funding for installation of low-flow toilets and shower heads. "Utilities are getting more proactive about energy efficiency and policies are changing so that rebates and co-funding options are much more available. The technologies are becoming more and more proven and are designed so well that you can't even tell the difference in efficiency," he observes.

From local utility Puget Sound Energy, the hospital can expect a grant of \$20,000 to help fund a position for a resource conservation manager (RCM), once requisite milestones have been fulfilled. "The first thing we will have the new person do is to perform walk-throughs to see how usage varies at different times of the day and night. Typically, they would see about a 5 percent improvement in energy conservation when this position is in place, but it will likely be more like 3 percent in our case, since we have already instituted a number of good practices," says Glass. The 900,000 square foot campus has earned Energy Star labeling since 2003, starting at 75 and improving to a 90 rating in 2007

Lori Moen, the PSE's supervising engineer working with Providence St. Peter on grants

and rebates, notes, "I have met with Keith Edgerton, St. Peter's new RCM, and was impressed by his knowledge and enthusiasm... he is a good choice for this challenge and I have confidence that he will be able to identify opportunities for increased energy savings. I am anxious to see where Providence can take this program."

Like Cedars-Sinai's Mark Rojas, Glass also worked with Philips to replace old fluorescent lighting with the newer 25-watt version where appropriate throughout the facility. Occupancy



Main lobby at Providence St. Peter Hospital in Olympia, WA.

sensors are currently used in about 35 percent of the facility and the 480 exit lights are all LED. The hospital is also moving towards using more LED lighting as the technology becomes cost-competitive with compact fluorescent lighting. LED is also more beneficial for lighting color rendition requirements, with ratings in the low 90's versus fluorescents which come in at the high-70-low-80's level. The lights can also now be dimmed and do not strobe the way fluorescent lights have been prone to do.

"We need to grow at 2.5 percent to keep up with our community's need for health services," says Glass, "Energy conservation is cost conservation and that contributes to our ability to meet the needs of our growing community for patient care services."

The Energy Star site on healthcare estimates that, "Every dollar a non-profit healthcare organization saves on energy is equivalent to generating new revenues of \$20 for hospitals or \$10 for medical offices." The cost savings translate to more being spent on care and that is what healthcare facilities are about – in good economic times and bad. [BOC](#)

# Scheduling Data Analysis

by Eliot Crowe & Dave Moser

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Please note that charts and footnotes associated with this article can be found when the reader accesses the article in its entirety on the web with a link to the online version of this BOC Bulletin on the home page at [www.theBOC.info](http://www.theBOC.info).

## *Using building trends to uncover deeper problems is an integral part of any retrocommissioning investigation.*

Equipment scheduling is the most common and cost-effective area for finding energy savings in a building. Relatively easy to find, normally inexpensive to rectify, they should be one of the first areas to explore in any energy audit or retrocommissioning investigation.

A common finding is lighting or HVAC equipment operating during unoccupied hours. The root cause may be that there is no central control for equipment, or perhaps the equipment was on a schedule but was overridden one time and never switched back to auto operation. The identification method can be simple — have somebody perform a walk-through during unoccupied hours and see what is switched on. Rectifying this problem typically costs nothing, and can annually save tens of thousands of dollars in a large commercial building.

Finding problems is not always that simple, however — data analysis can be used to uncover deeper problems, and this is a key part of any retrocommissioning investigation.

There are two approaches to data analysis when looking for energy-saving opportunities, the first of which is analysis of whole-building energy usage. Many electric utilities can provide whole-building power usage data readings at 15-minute intervals ("interval data"). Analyzing a year or more of this data can give clues to problems, such as:

- Why is the Sunday power usage similar to Saturday, when the building should be 100 percent unoccupied?
- Why is there a 200kW spike every day at 10 a.m.?
- Why does the usage start to increase at 4 a.m., when the office opens at 8 a.m.?
- Why isn't the usage pattern more consistent, when everything is on a central controller?

The second data analysis approach is to dig beyond the meter to obtain data on the individual systems operating within the building, such as temperature, humidity, pressure, current, power, waterflow, airflow, etc. There are two ways to collect such data [1]:

- The building's Energy Management Control System (EMCS) will be connected to many sensors throughout the system (also known as points), and can provide data on operating conditions.
- Individual data logging devices can be installed throughout the system, to collect data independent of the EMCS, or perhaps in addition to the points in the EMCS.

Data points will be stored at intervals of one minute to one hour, over a period of one to four weeks. For a retrocommissioning project on a large commercial building there might be between 100 and 1,000 data points for which this data is collected.

This approach is considerably more valuable in pinpointing problems than an investigation using whole-building usage data, but is more time-consuming (hence costly), and presents greater challenges. Installing (and subsequently removing) a hundred data loggers requires time, and then there is the additional effort of getting the data from the loggers and organizing it within a spreadsheet for analysis. An EMCS, on the other hand, can eliminate all that effort, but in most buildings they are configured only to view data points, not necessarily store them for analysis purposes.

In some cases, a controls contractor will have to visit the site to program the EMCS to store the trend data for a specific list of points.

***Data points will be stored at intervals of one minute to one hour, over a period of one to four weeks. For a retrocommissioning project on a large commercial building there might be between 100 and 1,000 data points for which this data is collected.***

Some EMCS systems are very limited in how much data they can store, and coupled with the fact that a lot of building mechanical systems evolve over time rather than being installed as a single integrated system, the results of the data collection exercise can sometimes be corrupted, requiring more than one attempt to get the required data. Another caution with using the EMCS is that sensors may be out of calibration, or perhaps located where they will not give a true reading of system conditions.

## **Identifying and Fixing Scheduling Problems**

The Allied Plaza office building in La Mesa, Calif., is a good example of how building trends can be used to identify and fix scheduling problems [2]. Built in 1983, the Allied Plaza building is a seven-story, 125,000-square-foot building, with primary heating and cooling being supplied by a water-source heat pump system. The building was retrocommissioned by Portland Energy Conservation, Inc. (PECI) in 2002, and one of the improvement measures saved \$17,120, for an investment of only \$240.

The building's heat pump HVAC system includes 175 water source heat pumps, two water loop circulating pumps, and two fluid coolers, all controlled from a central EMCS manufactured by CSI.



**You can complete your reading of this article in the online version of this BOC Bulletin at [www.theBOC.info](http://www.theBOC.info).**

# BOC Grads Making a Difference

## Getting Back into the Black with Energy Savings

Several years ago, the Unit Five school district in Normal, Illinois, a district of twenty schools with just under 12,750 students, was running what seemed to be an irreversible deficit in its operations and management (O&M) fund. After attempts at behavioral "please-turn-off-the-lights" changes proved unsuccessful, it became apparent that a more focused effort was needed. In 2005, the Board of Education



*Fairview Elementary, converted to geothermal in 2007.*

made two critical decisions: **Supervisor of Maintenance Jeff Monahan** was enrolled in a BOC training program, and the board signed a contract with an energy efficiency consulting firm, Energy Education, Inc. of Dallas, Texas. The combination proved to be a fruitful one.

Shortly thereafter, another piece fell into place when **Bruce Boswell** was hired as an **energy manager** for the district to concentrate specifically on energy savings. Boswell, too, enrolled in the BOC training program and worked with Energy Education consultants to implement the much-needed changes.

With Monahan at the supervising helm, several energy cost-saving initiatives were begun. The two most notable successes were: 1) obtaining lighting retrofit grants for several buildings from Clean Energy Illinois and 2) changing some older schools from gas fired boiler heat to geothermal heating. For lighting, T-12 fixtures at several sites were replaced with T-8s, resulting in both energy savings and increased light levels – a true 'win-win' situation. One junior high school reported a reduction in annual consumption of 8.5%, translating to over 144,000 kWh due to the change. The second initiative, however, was much more involved.

Several older buildings in the district had aging heating systems in dire need of replacement. Monahan began exploring replacement possibilities including, at the behest of Assistant Superintendent John Pye, geother-

mal. Initial prospects for geothermal over convention heating systems looked promising but while still studying possibilities, local architectural firm Middleton and Associates became involved. The firm had already completed geothermal renovations in other school districts and through this association, Monahan was connected to Kirk Mescher, an engineer specializing in geothermal applications (C M Engineering).

In the summer of 2006, elementary schools Glenn and Oakdale – each over 50 years old – were converted from boiler heating to geothermal. Work was completed during summer and the buildings were ready for use the first day of school. An added benefit of the new systems was that air conditioning was also available. To date, six buildings have been converted to geothermal and two more are scheduled for the summer of 2009. Also, three new schools beginning construction this spring will also be geothermal saving more energy and money.

"Savings during the first winter were absolutely phenomenal compared to previous years. In January 2007, savings were over 70% at each site compared to the same month in the base year of 2005," states a very satisfied Jeff Monahan. Also, each site received ENERGY STAR® recognition with scores of 89 for Glenn and 87 for Oakdale. Eight other sites have also been rewarded with ENERGY STAR® status for energy-efficiency initiatives.

From 2005 through 2008, the Unit Five school district netted \$2.9 million in energy cost savings due to the energy efficiency measures put in place. Square footage utility cost (electricity, gas and water) was reduced to \$1.595 in FY 2008 from a base year cost (FY 2005) for all sites of \$1.798. This measure is from 27 sites total, including warehouses. The figure for most schools costs is about \$2.

To curb energy costs, the district employed saving techniques learned through BOC training and Energy Education. As BOC training espouses, detailed data has been kept to clearly demonstrate the results of techniques used and to track improvements going forward. **New Maintenance Supervisor Doug Johnson** has begun the current BOC training locally, with the goal of continuing the improvement process, and this growing district is looking forward to further positive results in energy and cost savings.

## Energy Savings Build Step by Step

While planning an overall "face lift" of the maintenance operation center in Redmond, Washington, BOC graduate and Redmond's **Lead Maintenance Technician Carolyn Swanson** decided to include a lighting upgrade as an energy savings component of the project. Lighting projects in general are a great place to start saving energy costs, with options constantly improving, from both a technical and a price perspective.

After obtaining ready support from her supervisor, Swanson determined that the project would be quite straightforward. Sensor switches were installed where appropriate. T12 lamps and magnetic ballasts were changed to T8 lamps and electronic ballasts. In the mechanics' bay, eight metal halide fixtures were removed and replaced with bay fluorescent fixtures, providing not only savings, but a huge improvement in the lighting quality. Under their grant program, local utility provider Puget Sound Energy (PSE) reimbursed 50% of project costs, including materials and in-house labor.

For this initial area improvement, Swanson anticipates energy savings of 16,036 kWh which corresponds to an annual cost savings of almost \$1,000 per year at current rates. This savings will soon be multiplied. Similar lighting projects in the Redmond Community Center building-wide, as well as in the police department parking garage and the projected savings for these two projects is over 151,000 kWh, or more than \$9,000.

Says Swanson, "We've also just taken over maintenance of the six Redmond fire stations and I know we'll be doing similar energy-savings projects there. This year, we'll also be starting to look at ways to save energy with our HVAC systems, installing frequency drives and updating control systems.

"My BOC training was a big help! I learned a lot in the classes about the energy upgrades and where to look for financial assistance."

There are plenty of projects out there and it's just a matter of chipping away at them to achieve some great energy – and by extension financial – savings.



Michael Bergeron

### Steadily Moving Towards Sustainability

While to some, the goal of "sustainability" is a relatively new concept, the efforts at Wentworth Institute of Technology in Boston, Massachusetts have been meticulously planned and implemented over the last ten years, starting with an irrigation well designed to capture and reuse storm run-off water to irrigate the quad in front of administration building, Wentworth Hall. Other earlier initiatives have included low-flow shower heads throughout the institute's buildings, a rigorous recycling program, and designated VIP parking for those who carpool.

BOC graduate and WIT's Assistant Director/ Energy Management Michael Bergeron has been a pivotal part of the institute's ongoing efforts to reduce its carbon footprint. Bergeron has been in facilities management at the institute for 23 years and has had his BOC certification for almost a decade. Some of the projects he has spearheaded have included lighting upgrades in all buildings and the installation of motion detectors where applicable. The boiler systems have also been updated to natural gas systems, with long-needed insulation fitted on pipes.

Another major project was the replacement of an old cogeneration unit with a 595 kW natural gas engine at the institute's power plant. Positioning of this unit, which went on line in January, makes it possible for the power plant to supply both steam heat and 200 tons of cooling, making it a year-round asset. It also supplies close to two thirds of the power needs of the main campus. Estimated energy cost savings of \$140,000 annually and a rebate from National Grid of \$100,000 give this project a seven-and-a-half year payback.

Bergeron reports, "We've worked with National Grid (the local utility) on a number of money-saving options, rebates for installation of energy-efficient equipment, the NSTAR Demand Response Program among several others." He indicates that over a seven-year period, they have received rebates totaling \$158,000 for co-gen units, autoflame combustion controls, and a heat recovery rooftop unit.

Bergeron's National Grid account manager, Yvonne Flanagan, lauds his efforts in working with the utility to improve energy efficiency at Wentworth. "Mike Bergeron has taken a leadership role among National Grid's Key

Accounts in energy efficiency via his many pursuits with emerging technologies. He's a pleasure to work with and sets a terrific example for his peers in maximizing green and innovative technologies in facilities management," states Flanagan.

Additionally, as a participant in the Demand Response Program, Wentworth receives financial incentives for its ability to reduce usage on request at peak demand times. "We are required to respond and have emergency generation equipment up and running within half an hour's time. We have just over 1000 kW of emergency generation and have committed 900kW to any one event. We also shed as much load as possible with the use of our energy management systems during these events. Just last August, Wentworth received a check for \$8,200 for participating in the program and responding to an event," Bergeron explains.

Many of the changes to date have been in the realm of facilities management, requiring little understanding by building occupants since there was no direct effect. But encouraging energy-efficiency consciousness also requires pattern changes. To that end, in January of 2008, a "sustainability committee" was formed, on which Bergeron serves, to provide continuous input from all segments of the school: faculty, students, representatives from facilities management, accounting, planning and construction, IT and student housing. Getting everyone involved encourages an exchange of ideas and raises awareness for recycling and energy conservation efforts so that all those affected can buy into the changes.

For 2009, things on the energy efficiency front look promising as well. With the purchase of an FLIR infrared camera, Bergeron (who was certified as a level one thermographer) hopes to do both facility troubleshooting and predictive maintenance as well as checking for heat losses around doors and windows for even more energy efficiency savings.



Dino Gonzales

### Patience, Tenacity and Innovative Thinking

BOC graduate Dino Gonzales is the lead facilities engineer for Philips Healthcare at the global company's Bothell, Washington campus, a facility of 630,000 square feet dedicated

to manufacturing, research, education, data housing and testing for Philips ultrasound

machines. His enthusiasm and dedication to energy conservation projects prompted the local utility contact, energy engineer Alan Budman, at Snohomish PUD, to nominate him for the Better Bricks Award for Facility Manager/ Operator of 2008. Based on Budman's summation of his impressive body of project work, Gonzales did indeed win the award.

Over the last eight years he has collaborated with Snohomish PUD in the development of a dozen innovative efficiency projects, producing significant energy savings at the Philips Bothell Campus. Gonzales has initiated a variety of projects, among them: installation of lighting controls; replacement of older roof-top AC units with new energy-efficient units using variable-frequency-drives (VFD's); and replacement of inefficient air compressors with a smaller air compressor, a cycling air dryer and more air storage capacity. Overall, the savings achieved amount to over 2,227,000 kWh per year, or over \$153,000 at current rates.

Gonzales is most enthusiastic about his two latest projects, which account for close to a quarter of the total kWh savings: the installation of air-side economizers on Liebert computer room A/C units and the installation of Turbocor oil-less centrifugals on the first stage of two existing Mammoth A/C units.

The Turbocor project was quite a challenge for Snohomish P.U.D Energy Engineer Patrice Lundquist, who was responsible for extrapolating the potential savings of the project. After countless hours of calculations using meter data, she was able to produce an estimate of annual cost savings based on a significant improvement in part load performance with this technology. With SNOPUD picking up almost 50% of the project cost, the simple payback was 2.5 years.

The computer room was another issue. Keeping the room at acceptable temperature and humidity levels was costly. Since the computer room was on the second story of a two story building, Gonzales saw an opportunity to add air-side economizers to the existing computer room A/C units. The cooler climate in the Pacific Northwest allows for outside air "free cooling" most of the year. But it was expensive to install a system that would work effectively with the humidity limitations of computer room applications. After review of several proposals, Integrated Systems was the only firm with the advanced control strategy necessary to assure both temperature and humidity control based on outside air. Again P.U.D. picked up almost 50% of project costs resulting in a 2.6 year payback.

(Continued on page 6.) See **MAKING A DIFFERENCE**.

## MAKING A DIFFERENCE (Continued from page 5)

From idea to fruition, the project took two years, but that did not discourage Gonzales. "There are always problems, some financial, some logistical, some just trying to convince people it can be done. You just have to evaluate, find solutions – or people that can find solutions for you and your situation – and keep moving forward to your goal," says Gonzales. And he does keep moving towards his energy efficiency goals.

Not only is Gonzales a BOC level I graduate, but he was in the very first BOC level II class – the first group to become level II certified. As Budman noted when nominating Gonzales for the Better Bricks Award, "Dino has developed a great working relationship with building occupants in all areas of the facility, from offices to production, R&D and IT. Through his thirteen years on site, he has earned a high degree of trust and credibility within his organization which allows him to gain management support for his ideas. He partners with vendors to develop innovative projects and gains occupant, management and utility support prior to implementing projects.

"Dino is a great spokesperson and example for the emerging role of the facilities engineer in energy efficiency project development."



Angelo Vescio

### Learning about What You Thought You Knew

Angelo Vescio is the maintenance supervisor for Fulton, New York's seven schools. Originally in construction, he was also working part time for the school district as a bus driver and maintenance worker

when, in the late eighties, he was offered a full time position with the schools' maintenance department. His promotion to maintenance supervisor in 2001 coincided with the implementation of a major energy conservation project that was underway throughout the school system.

The energy performance project, which was conducted by Siemens Building Technologies in 2000 and was essentially a building retro-commissioning project, called for a variety of changes and upgrades for the city's schools: lighting retrofits throughout all schools, installation of VSD and energy-efficient motors, upgrades of kitchen equipment at selected sites, and various heating system conversions among other tasks. Projected savings over

a seven year period were put at about \$1.8 million plus and the suggestions made by the consultant firm were implemented.

As an integral part of the implementation team, Vescio helped to perform the various equipment upgrades beginning in 2001 and basically assumed that the upgrades were doing the job. In 2005 though, he was sent to the BOC level I class by Bill Price, Fulton's manager for buildings, grounds and security, and also a BOC grad. The course was a revelation for Vescio.

"You do these projects and often don't realize what you're actually accomplishing. I'm a basic maintenance guy but I can't emphasize enough how much the course shows you what a difference these changes make. When you see the savings figures, it really opens your eyes to possibilities and gets you thinking," Vescio observes. Another advantage he sees in the training is that "the courses are so informative, giving the pros and cons of so many different methods of energy generation, but emphasizing that most situations are unique and may require different solutions."

He was also impressed with the fluid exchange of ideas encouraged by the BOC training and the advantage of the networking aspect of meeting peers with similar concerns. "If I go to buy a certain type of car, I want to talk with someone else who has one. The same thing works for the newer technologies. I like to talk with someone that has had experience with them and has advice to offer and you get a lot of that give-and-take in the sessions. Plus the presenters make themselves so available for questions that they're a great resource as well."

In fact, Vescio was so pleased with the level I training that he went on to complete level II last year. His interest has also been piqued to the point where he is now an online student at Mohawk Valley Community College working towards his Facilities Management Certificate and has recently completed a course in green technologies as a part of the curriculum.

So where does this put Fulton's schools now? With the 2000 energy project initiatives completed and the final savings tally coming in at about 9% over the initial projection, Vescio has turned his eye to issues that were not addressed in the energy performance project: boiler upgrades, lighting controls where appropriate, T-5 lighting in gymnasiums, libraries and cafeterias, new heat pumps for the junior high school and an exciting new, LEED-certified addition to the high school. Automated controls for six out of the seven buildings are on a modern system so that, if needed, Vescio can manage the building remotely.

"For anything we do now, the first things we look at are what is it going to save us in energy costs and is it green?" says Vescio. "Everyone who takes the courses will bring home useful information. Even I, who have worked at this vocation for twenty years, was brought up to date with the newest concepts."

### BOC Training a Great Foundation for LEED Work

BOC graduate **Jeff Madigan**, is a **project engineer** for the University Mechanical & Engineering Contractors (UMEC, an EMCOR Company) in El Cajon, California. The company is currently involved in providing the plumbing, mechanical piping and sheet metal installation for an exciting LEED project commissioned by Palomar Pomerado Health (PPH). Installations will be in the facility's hospital and central plant. As one of the largest hospital projects in the country, as well as the first new hospital to be built in the area in almost thirty years, a great deal of anticipation surrounds the project, seen as a "hospital of the future" because of the detailed attention to design and planning.

According to PPH's mission statement, the new facility "will harmoniously blend innovative technology with our community's cultural needs and transform the healing experience. Design and construction will reflect a commitment to the hallmarks of sustainable buildings – healthy indoor air quality, a soothing and healing environment, and continual recognition of life cycle impacts of materials and methods employed."

To fulfill this vision, UMEC's part will be to oversee, at a minimum, construction waste management, refrigerant management, potable water use reduction and community containment prevention. Reflecting on these requirements, Madigan notes that, "The level of due diligence expected for all the trades from the owner is evident with the goal of recycling 75% of all construction waste. The LEED credit goal in the area of enhanced refrigerant management is to select refrigerants and HVAC&R equipment that minimize or eliminate the emission of compounds that contribute to ozone depletion and global warming.

"The project will require greater centralized coordination between the general contractor and all the trades in achieving the LEED credits. Everyone will be challenged with the current economic situation to maximize efficiency with fewer and fewer available resources. My training as a BOC graduate and

(Continued on page 7) See **MAKING A DIFFERENCE**.

**BOC Certification Renewal**

To maintain BOC certification, graduates must accumulate continuing education (CE) hours each year following a full calendar year after their graduation. Level I renewal requires five CE hours each year and Level II, ten. Hours may be earned as follows:

- **Continued employment in building operations**.....2 hours / year
- **Continuing education in building operations**.....Actual hours of classroom time
- **Energy efficiency projects completed at your facility** .....Up to 11 hours / year
- **Membership in a building operations membership association**.....1 hour / year
- **Offices held in membership associations**.....2 hours / year
- **Awards received for efficient building operations** .....2 hours / award
- **BOC Newsletter quiz (see page 11)** .....1 hour / passed quiz
- **Completion of an energy consumption benchmark for the previous 12 month period using ENERGY STAR® Portfolio Manager or alternative energy accounting tool**.....3 hours / year

You will be notified by mail when your certification is up for renewal (anniversary date appears on your wallet card). Once you have received a renewal notice, complete the application form and return it to NEEC. For 2009, the renewal fee is \$55 for Level I or Level II, or \$85 for a "combo" renewal.

*MAKING A DIFFERENCE (Continued from page 6)*

as an LEED-accredited professional has guided my efforts in organizing UMEC's policies and procedures."

Now underway and set for completion in 2011, the Palomar Medical Center West will be a 653-bed hospital in the midst of the Escondido Research and Technology Center and is creating over 700 construction jobs for the area, always a boon in harder times. "It is exciting to be able to work on a project of this magnitude that requires my training so extensively," concludes Madigan. **BOC**

**Continuing Education Opportunities for Certification Renewal Credit**

Below you will find listings for the web sites of various national organizations that offer continuing education courses that are applicable to annual BOC certification renewal. Check out the Education, Professional Development and Events Calendars at these sites.

**BOMA:**  
**Building Owners & Managers Association**  
[www.boma.org/TrainingAndEducation/BEEP/](http://www.boma.org/TrainingAndEducation/BEEP/)

**BOMI:**  
**Building Owners & Managers Institute**  
[www.bomi-edu.org](http://www.bomi-edu.org)

**ENERGY STAR®:**  
**Live web conferences, pre-recorded trainings, self-guided presentations**  
[www.energystar.gov/index.cfm?c=business.bus\\_internet\\_presentations](http://www.energystar.gov/index.cfm?c=business.bus_internet_presentations)

**FEMP:**  
**Federal Energy Management Program Workshops & Conferences**  
[www.eere.energy.gov/](http://www.eere.energy.gov/)

**GreenBuild:**  
**US Green Building Council**  
[www.usgbc.org](http://www.usgbc.org)

**HVACR Education:**  
**On-Line Learning for the HVACR Industry**  
[www.hvacrededucation.net/](http://www.hvacrededucation.net/)

**IFMA:**  
**International Facility Management Association**  
[www.ifma.org](http://www.ifma.org)

*The International Facilities Management Association has several regional chapters, all of which can be accessed from the association's main web site address above. Be sure to check out the site for the variety of learning options available both online and via seminar.*

**Utility Energy Training Centers:**  
[www.dsireu sa.org](http://www.dsireu sa.org)

Your local utilities may offer energy education events and their sites are sources for training opportunities as well. Regional industry associations also offer a number of options for further education.

In the January 2009 online issue of Buildings Magazine, an article written by Jana J. Madsen entitled Integrate Weather Data into Building Automation highlights the growing interest in harnessing highly-detailed weather data to use with building automation systems (BAS) to decrease energy and water usage – often quite significantly.

Historic, current or forecast weather data can aid in a variety of ways, from improving HVAC operational choices to calculating the performance of energy usage more accurately. Four advantages are emphasized:

- **benefits to mechanical-system performance,**
- **decision-making in the case of alternative on-site energy sources,**
- **appropriate controls of water supply during periods of rain,**
- **safety for building occupants in terms of inclement weather.**

Not all BAS systems have this capability built in, but the piece assures facilities personnel that a set up can be put in place fairly inexpensively and goes on to discuss a couple of options for monitoring: an on-site weather stations system and an XML weather feed.

You can access this article on the web at: [www.buildings.com](http://www.buildings.com) and checking out their archive issues for January 2009



# Saving Energy: A New Old Way of Getting it Done

Written by Alan Mulak, PE, with Steven Dark

Recently, we have seen energy costs go from modestly expensive to outrageously over-the-top, then back down again. If anyone believes the roller coaster ride is over, I have some discounted bank mortgages to sell you. In fact, no one has any idea of where energy costs are going. My vote is for up, up, and away. I hope I am wrong but this article is about being prepared in case I am right.

One company in southern New Hampshire, led by innovative management and strong employee support, found a way to save energy, reduce waste, and save money that worked beyond expectations while improving building operations. Plant Manager, Timothy Hines, came up with a new (old) way to get every employee involved in this opportunity for success. It was not a "top down" management edict. It did not involve alternate forms of energy, sophisticated energy management systems, or major modifications in the production schedule.

His method: ask the people working in the plant. Results: Over \$50,000 in annual savings realized from implementing employee suggestions in just six weeks!

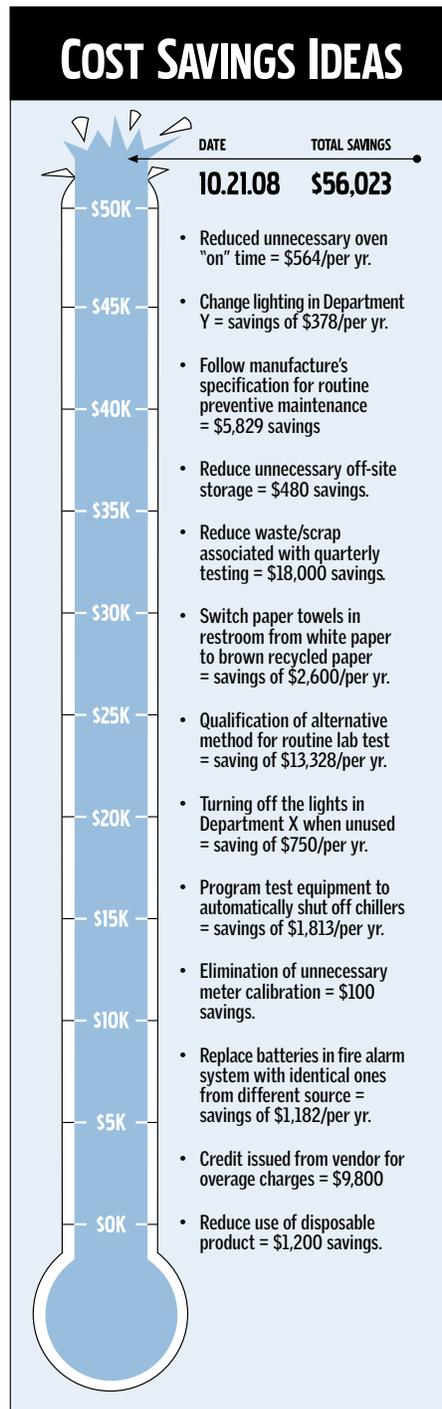
## How did the program work?

Due to the economic climate, management at Millipore realized they needed to trim operating expenses to stay competitive. Shaving waste and energy expenses would be a start, but with a new (old) approach: they turned to the 500 employees to ask for their help – sort of a virtual "suggestion box." In return (and this is very important), if the goal was achieved by the challenge date, all employees received a reward: a gift card to a local supermarket.

"Do not underestimate the value of a small reward – and the recognition," said Steven Dark, the company's environmental resource manager. "The employees now felt like they were part of the solution. Instead of shrugging their shoulders and labeling the effort yet another management ploy, they all realized they could help, if even in a small way, control their future. Plus, we all recognize it's the right thing to do. We'll be issuing a new challenge in Q1, 2009."

## What's the downside?

Management of the project required plenty of time from a team of employees. "Every day, we



had to sort through many emails suggesting a variety of ways to save energy and reduce waste. This takes time, no doubt about it," said Dark. Each email entry has to be opened, evaluated, and then quantified. In some cases, work orders had to be issued, the energy saving activity had to be scheduled, and the work had to be done. In total, the team spent

roughly an hour a day on the project. AND, every idea or suggestion brought forward was responded to, whether or not it was added to the cumulative list after its evaluation.

## What's the upside?

Millipore Corporation set the goal of reducing energy expenses by \$50,000 before Thanksgiving 2008. The goal, in form of a challenge to the employees, was set in mid-September. By incorporating some of the "suggestions," this goal was easily reached before the end of October! Reducing energy and waste costs by \$50,000 in 6 weeks is ambitious for any manufacturing company. I routinely conduct energy audits that identify 10% or 20% potential energy savings but often only a few of the savings ideas are actually implemented. This effort not only exceeded the goal but accomplished it without hiring consultants! Plus, employees felt as if they had a real part in keeping their company competitive and thus, insuring their jobs.

With no "official" entry form, most of the communication was by email or phone, some even by hallway conversations. Solutions offered were simple but effective. The sidebar "thermometer" graphic delineates the numerous suggestions implemented (two of which came in after the \$50,000 had been exceeded).

As of the date of this writing, oil is trading at about \$35 per barrel. We all know it will not stay there for long and now is the time to prepare for the next breath-taking spike. Millipore's cost-savings solution had nothing to do with high efficiency new technologies but instead, demonstrated the effectiveness of a group of concerned, motivated (and rewarded) employees working toward a common goal. The key is cooperation at all levels.

As a BOC instructor, I often hear comments like "those teachers are idiots" or "this job would be great if it weren't for those doctors," etc. We who operate buildings have a choice. We can view the occupants as the enemy who make our life miserable or, we can ask for their help. Millipore, wisely and effectively, chose the latter. [BOC](#)

## Authors:

Alan Mulak, PE, BOC instructor, Energy Engineer & Consultant

Steven Dark, Environmental Resource Manager, Millipore Corporation

# Effective Communications for Energy Efficiency Buy-in: Dear Customer

*The Fred Hutchinson Cancer Research Center in Seattle, WA has been making investments in energy efficiency strategies since 1988. The work has resulted in electricity savings of about \$1 million a year and an additional half million from water and natural gas cost savings. Facilities management for operational efficiency is a part of the culture at the Hutch. Effective communication with occupants is key in contributing to a department's success.*

Memo from Robert Cowan, Facilities Engineering Manager at the Fred Hutchinson Cancer Research Center, December 11, 2008

**Subject:** Lighting Setback for Weintraub, Hutchinson and Thomas Buildings

As an energy conservation measure, currently the lab and office lights in Weintraub, Hutchinson and Thomas buildings are being swept off at 8 PM. To save even more energy we are planning to move this up to 6:30 PM starting December 22nd. When we say "swept off" that means the building control system will blink once at 6:25 letting you know that in 5 minutes your lights will be turned off; if you are still working you can simply go to the light switch and hit the top button and this will give you two additional hours of light (this process will reoccur every two hours and you will be able to repeat the override as often as needed).

If your lab or work area is typically occupied after 6:30 PM you can call Engineering at 4245 and we will tailor the lighting schedule in your space to meet your work schedule. Also note that even when we sweep off the lights, 20% of them are on the emergency power circuit and will always remain on, and that the corridor lights are on motion sensors. Also if you come into a space and the lights are off, simply hitting the light switch will turn those lights on for two hours.

The Center has a comprehensive energy management strategy that includes delivering energy efficiently, delivering the right amount of energy and delivering energy just in time. This earlier turning off of the lights will help all three areas and will save the Center in excess of \$20,000 per year. Here's how: As many of you know labs are very energy intensive. When occupied we are doing a minimum of six air changes per hour of 100% outside air, which involves tremendous amounts of heating and cooling. We use energy efficient boilers and chillers to generate this energy and have variable speed drives on our pumps and fans to move it as efficiently as possible. When no one is in the lab we set the temperature back and the air change rate is reduced from six to three times to make sure we are delivering the right amount of energy. We base this setback occupancy on the lighting system recognizing that when someone is in the lab the lights are on. By turning off the lights at 6:30 we are better able to meet our just in time goal.



The Fred Hutchinson Cancer Research Center located in Seattle, WA.

A recent random survey found that roughly 33% of the (non-emergency) lights in the lab buildings were left on between 6:30 and 7:30 yet no one was there. The good news is that 67% of the lights were either turned off by someone before they went home or were still being used. Many of the spaces are shared though, and people are hesitant to turn those lights off. By having the computer automatically turn off these lights, the Center can save tremendous amounts of energy and help reduce our environmental impact.

If there are any questions, concerns or helpful ideas please feel free to give me a call. [BOC](mailto:BOC)

Thanks.  
Bob Cowan

## Bainbridge Island School District Receives 100% BOC Award

NEEC's BOC program is pleased to recognize and congratulate the Facilities Department of Bainbridge Island School District for certifying 100% of their operations staff in the Building Operator Certification training.

Bainbridge Island School District operators earned BOC certification following a year of training and project work. The facilities department includes Jack Evans, Bill Ackerman, Bernie Mejia, Don Burton and Dave Flieder.

"Operators who earn BOC certification demonstrate commitment to their profession and to improving the performance and comfort of their facilities," says Stan Price, NEEC's Executive Director. We applaud their dedication!

For more information about the 100% BOC Award: [www.theboc.info/maintaining](http://www.theboc.info/maintaining)

## Call for Ideas!

BOC's publication aims to highlight new technologies, relate success stories of graduates and get the word out about new ideas in the facilities management industry. We are open to suggestions. What would you, as readers, like to hear about? We welcome ideas and encourage all readers to submit thoughts on content they would like to see, technologies that spark their interest on which they'd like more information, or their own success stories as facilities personnel.

We encourage you to submit your ideas to email address: [news@theBOC.info](mailto:news@theBOC.info).

## BOC Grad to Present at NFMT's Conference

In our August 2008 newsletter, we featured Maine BOC graduate Rick Meinking, who had been working on a project dedicated to bringing an historic 19th century building up to 21st century energy-efficiency speed. We are pleased to note that Meinking has successfully submitted his presentation, "Be an Energy Bean Counter" to this year's NFMT (National Facilities Management & Technology) conference taking place in Baltimore, MD. Look for his session on March 12th, based on the theme, "You can't manage what you can't measure."

## Find A BOC Training In Your Area

There are currently over five thousand BOC graduates throughout the country and that number will continue to grow because the need for educated facilities operations & maintenance personnel is stronger than ever. BOC training is offered in 21 states and that number, too, is continuing to grow.

### BOC Level I Certification

The Level I series comprises 74 hours of training and project work in building systems maintenance. Courses include: Building Systems Overview, HVAC Systems and Controls, Facility Electrical Systems, Indoor Air Quality, Operation & Maintenance Practices for Sustainable Buildings, Efficient Lighting Fundamental and Energy Conservation Techniques.

### BOC Level II Certification

Level II has 61 hours of training and project work in equipment troubleshooting and maintenance. Courses include four core classes and two supplemental classes. The four core classes include: Preventive Maintenance & Troubleshooting Principles, Advanced Electrical Diagnostics, HVAC Troubleshooting & Maintenance, HVAC Controls and Optimization. See the website for supplemental class topics.

To find a Level I or Level II training in your area, please visit the BOC website at [www.theBOC.info](http://www.theBOC.info). On the main page, you will see "BOC® Around the USA" and just underneath that is a link to "FIND training near you." Click on the map and you will find detailed listings of course series available, with dates, locations and information on how to register.

***Training is available from  
Maine to California!***

Learn more about the program by participating in a free BOC Informational Web Cast. All you need is a desktop browser and a telephone. The presentation describes Level I and Level II course topics, schedules and certification requirements in detail. Listen in and find out who benefits by attending BOC training and how graduates are improving their facilities.

## REMINDER: 2008 BOC Grads

By **March 31, 2009**, you will need Continuing Ed credit to renew your level certification. Level I renewal requires 5 hours annually and Level 2 requires 10 hours. See page 7 in this newsletter for details.

## National Conferences & Symposiums

### *Winter/Spring 2009*

### National Facilities Management & Technology Conference/Expo

The Baltimore Convention Center  
Baltimore, MD  
March 10-12, 2009

More info: [www.nfmt.com](http://www.nfmt.com)

### National School Plant Management Association

Trump Taj Mahal Resort  
Atlantic City, NJ  
April 6-8, 2009

More info: [www.nspma.org](http://www.nspma.org)

### Total Facility Management Show

Indiana Convention Center  
Indianapolis, IN  
June 16-19, 2009

More info: [www.tfmshow.com](http://www.tfmshow.com)

### National Conference on Building Commissioning

Sheraton Seattle  
Seattle, WA  
June 3-5, 2009

More info: [www.peci.org/ncbc](http://www.peci.org/ncbc)

### Facilities Decisions Conference

Las Vegas Convention Center  
Las Vegas, NV  
September 22-23, 2009

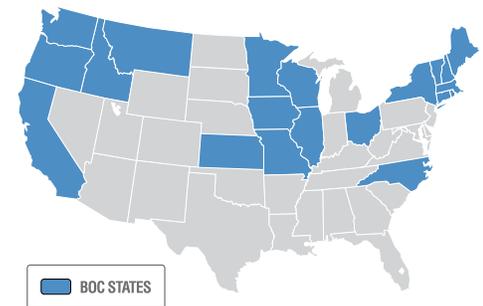
More info: [www.facilitiesdecisions.com](http://www.facilitiesdecisions.com)



## Kansas is on Board!

The Midwest Energy Efficiency Alliance (MEEA) and the Northwest Energy Efficiency Council (NEEC) are pleased to welcome the state of Kansas as the latest addition to the national BOC program as of January 2009. MEEA has partnered with Kansas utility companies Westar Energy, Kansas City Power and Light Company, and Midwest Energy to offer the program to Kansas-based operators. Kansas joins as the 21st state to recognize the BOC credential.

### Building Operator Certification States – 2009



## FREE BOC WEBCAST

The webcast allows you to conveniently view and listen to an overview of the BOC program from the comfort of your office. All you need is a desktop browser and a telephone.

*The next webcasts for 2009 are:*

### Wednesday, March 4th Tuesday, June 23rd

8:30AM - 9:30AM (PST)

9:30AM - 10:30AM (MST)

10:30AM - 11:30AM (CST)

11:30AM - 12:30PM (EST)

To sign up go to:

[www.theBOC.info](http://www.theBOC.info)



# Scheduling Data Analysis Quiz

Here is an easy way to earn one continuing education hour towards annual BOC re-certification. Read the article on *Scheduling Data Analysis* that begins on page three and take this short quiz based on that material. Mail or fax your answers to our offices, *with your certification renewal application*, as directed at the end of the quiz.



*With a passing grade, we will apply one credit hour to your record.*

**CHECK YOUR ANSWER(S) AS APPLICABLE:**

**1) Where do you get your building's power usage "interval data"?**

- a.  From monthly utility bills.
- b.  From the DOE web site.
- c.  Request it from your local utility.
- d.  Add up all utility bills for a year and divide by 365.

**2) What two types of data analysis does this article address?**

- a.  Systemic & individual.
- b.  Whole building & individual systems.
- c.  Temperature & humidity.
- d.  Air quality & water flow.

**3) What is the best (and cheapest) initial step in identifying energy-wasting practices within your facility?**

- a.  Send out an email request to building occupants for information.
- b.  Schedule an unoccupied hours walk-through.
- c.  Put all lights on timers.
- d.  Turn heat down two degrees across the board in the facility.

**4) What is "whole building" energy usage analysis?**

- a.  Looking at interval data provided by a local utility.
- b.  Using an infrared camera to see where the building envelope is weak.
- c.  Polling building occupants on their satisfaction with the building's climate.
- d.  Adding up utility bills for the year and dividing by the square footage of the building.

**5) Which of the following are methods of collecting individual system data? (Check all that apply).**

- a.  Assigning to each system a system rep who measures usage.
- b.  Installing individual data logging devices throughout the system.
- c.  Requesting the appropriate local utility for detailed usage data .
- d.  Using the building's energy management control system (EMCS) to collect data.

**6) What is a typical range of data points for retrocommissioning a good-sized commercial building?**

- a.  10 - 25.
- b.  25 - 100.
- c.  100 - 500.
- d.  100 - 1000.

**7) Of the methods of scheduling data analysis, which is usually the most costly?**

- a.  Whole building analysis.
- b.  Individual system analysis via EMCS.
- c.  Individual system analysis with installed data loggers.

**8) Taking two weeks' worth of data serves no useful purpose.**

- a.  TRUE
- b.  FALSE

**9) Programming based on load will always outweigh programming based on schedule.**

- a.  TRUE
- b.  FALSE

**10) Building retrocommissioning projects typically achieve**

- a.  5-15% energy savings with a typical payback within one-two years.
- b.  5-15% energy savings with a typical payback within two-three years.
- c.  25% energy savings with a typical payback within five years.
- d.  10% energy savings with a typical payback of six months .

**END OF QUIZ**

We include a quiz like this in each of our bi-annual newsletters. To submit your completed quiz for re-certification credit (1 credit per quiz passed), please complete the following and either fax it to 206-292-4125, or mail it to: **BOC Quiz, NEEC Office, 605 First Avenue, Suite 401, Seattle, WA 98104. Please remember to send it with your certification renewal application and NOT as a separate item.**

Your Name: \_\_\_\_\_

Title: \_\_\_\_\_

Employer: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_ Zip: \_\_\_\_\_

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