

BOC Bulletin

A Newsletter for BOC Graduates, Enrollees and their Employers



SUMMER/FALL 2010

Tackling Sustainability

A quick web search on "sustainability" yields first and foremost, as one might expect, the Wikipedia listing on the topic, followed by a variety of explanations. There are a lot of opinions on sustainability. Still, some basic concepts emerge.

The EPA defines it as "the ability to achieve continuing economic prosperity while protecting the natural systems of the planet and providing a high quality of life for its people." It also emphasizes the importance of meeting "society's present needs without compromising the ability of future generations to meet their own needs." Areas of examination are: site conservation, energy and water conservation, materials conservation and recycling, and indoor environmental quality.

In the June 2010 issue of *Buildings* online magazine, regarding the issue of sustainability in facilities, Paul Hoffman states it simply:

Your objective is to create a facility that minimizes the impact on the environment, embodies social responsibility in the community, positively contributes to the bottom line, and produces a productive, healthy, and effective place for resident, staff, or customers. When you've made decisions with these benefits in mind, you can be confident that you've chosen wisely and you'll reach the right destination.

Sustainability involves conscience, pragmatism, and knowledge – just to note a few of the requisites.



Main entrance of the south addition of St. Elizabeth's Hospital, Appleton Wisconsin.

Organizational Roots a Natural for Sustainability

Wisconsin's Affinity Healthcare Systems' origins date back to the 1890s, when two religious groups established much-needed hospitals in Appleton and Oshkosh. In 1995, these two hospitals merged to form Affinity. Affiliations in subsequent years have given Affinity a network of three hospitals and numerous clinics and health centers across northeastern Wisconsin.



Like their spiritual founders, the healthcare system's emphasis is on caring for people, with a "promise to provide Personalized Care by listening, treating you with respect and putting your needs and interests first."

Vice President of Performance Excellence Gary Kusnierz saw sustainability as a natural extension of Affinity's origins and promoted the "Pursuit of Perfection" vision wheel, in which all actions revolve around this goal of personalized care. (See illustration.)

The three components generally regarded as the "pillars"

of sustainability are social, environmental and economic and the goal is to balance these optimally. Part of Affinity's interpretation of this concept is termed "Triple Bottom Line" with the components reworked as: People, Planet and Prosperity.

Their efforts so far have garnered them LEED® certification at seven facilities, including two projects within St. Elizabeth Hospital, which to date are the only two LEED® certified hospital sections in Wisconsin. Affinity's hospitals, St. Elizabeth in Appleton and Mercy Medical in Oshkosh, have also been ranked in the top 1% nationwide in terms of quality and efficiency. Affinity has also earned numerous recognitions, in both environmental and in healthcare leadership.

Planning is Paramount

As noted above, a part of the healthcare system's promise is that of listening. "We do a lot of surveys of occupants, both patients and staff," says Kusnierz. They are in the process of setting up an online "suggestion box" for occupants. The flip side to that input is a strong communications effort aimed at educating people on "green" issues, such as medical waste disposal and energy efficient practices. "There's not a lot of rocket science behind it but you're changing people's patterns and asking them to recognize the difference between good and bad practices," Kusnierz notes.

(Continued on page 2.) See *Sustainability*.

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Sustainability (Continued from page 1)

Affinity's current push toward sustainability is the implementation of an online Environment Management System (EMS) that will allow them to track each facility's performance and energy intensity measure (cost of energy per square foot) and benchmark it against like facilities. They can also set up project checklists that are tagged on the energy tracking data screens to determine results of different efficiency measure taken. The goal is to surpass ISO 14001 standards.

Implementation of this EMS is targeting for completion by the end of 2010 and to facilitate the project, a cross-functional sustainability team was assembled with representation from patients, financial staff, O&M staff, etc, so that the efforts are collaborative and no project is undertaken in a vacuum. Again, they do a lot of occupant surveys and use the feedback to, for example, design new areas or renovate existing sites. Kusnierz emphasizes that a lot of work goes into the design phase and energy modeling for best results. "If we use this method and follow the discipline, we can maximize our benefits across the board."

Putting Ideas to Work

Sustainability Team Leader (and recent BOC graduate) Iqbal Mian's original background was in supply chain and operations management, and he wanted to use his expertise in a healthcare setting. He also had an interest in sustainability but realized it entailed understanding the engineering side of operations. To this end, he attends as many building walk-throughs as possible with team members because he finds that "buildings, like people, have their own personalities. We have a very high-energy team who like to get their hands dirty. We learn a lot this way, a lot of it from occupants. Communication is so important."

St. Elizabeth's Hospital is a shining example of Affinity's process, in which they use a three-pronged approach incorporating:

- 1) evidence-based design, reflecting the exhaustive planning process,
- 2) sustainable design, reflecting the value placed on environmental stewardship,
- 3) lean principles, ensuring that time, energy and resources are all used efficiently.

Mian notes that, "Affinity is a very lean organization and runs like a business in that it is not tolerant of waste, knows that this is not always measured in hard dollars and truly recognizes that people come into the equation." A lobby at one of their centers has a huge

Benefits of Hands-on Learning

Fortune favors the prepared. In a recent BOC class on HVAC systems, BOC Instructor and Energy Consultant Greg Jourdan, made arrangements for a rooftop tour of the training facility at National University in San Diego, California. The tour provided the class access to the building rooftop units (RTUs) to reinforce key learning topics. A lucky arrangement all around, as it happened.



BOC's HVAC Class Sleuths of San Diego.

"We actually found a couple of problems for him, such as non-functioning fresh air dampers on two large units and, by using a thermal imaging camera, some very hot wires on a motor contactor," says Jourdan.

BOC training is oriented to practical project assignments that students can carry out at their own facilities. When possible, a look at the training site's building systems as an example for class topics is a great way to reinforce the lessons. Jourdan maintains that, "The benefit of hands-on learning is that students get to see related equipment to reinforce key learning objectives, such as the fact that they should understand how to identify potential problem areas while performing routine maintenance."

As part of the tour, the class inspected the air conditioning equipment on the RTU, as well as its control system. What they found was that, despite the computer panel's reading that

they were 15% open, the outside air dampers were fully closed, which would mean very high CO2 levels inside the building. The resolution to problem was to re-calibrate as needed by command opening the outside-air and return-air dampers to 100% open, and

then stroking them to 100% closed. Once done, the operator would need to verify that the damper position correlates with the computer reading. If the computer reading still did not match the actual condition of the damper position, the configuration in software of the control signal to the damper actuator should be checked to verify that the engineering units of 0 to 100% match the control signal (4-20 ma or 0 to 10 VDC) from the control panel.

As an example of a PM (Preventive Maintenance) and Predictive Maintenance procedure, Jourdan used a thermal imaging camera to check for system "hot spots." The picture indicated wires hotter than normal, which could lead to premature motor failure and/or a potential for a fire. The resolution for this issue was to repair and retighten the poor connection as needed, and then re-check with the thermal imaging camera.

There are many ways to learn but it can't be denied that one of the best, to make lessons more easily remembered, is by seeing and doing. **BOC**

fish tank, designed to sooth visiting patients in what can be stressful circumstances.

Affinity has five LEED® clinics in the surrounding local cities they service. St. Elizabeth's Hospital has two LEED® projects within the hospital: the Heart, Lung and Vascular Center and the south addition. Following the principles of the three-pronged approach, some highlights of the projects included use of recycled building materials, green plumbing fixtures that reduce water consumption by more than 30%, a vegetative roof, increased natural lighting and a host of green-thinking measures. The organization's energy team

also works closely with Wisconsin's Focus on Energy and their utility reps on energy reduction projects for their facilities.

Redefining Efficiency

We tend to think of efficiency as a cut and dried financial calculation, easily measured to dictate action. When thinking of efficiency in terms of sustainability however, it takes on new meaning. The social, economic and environmental spheres that comprise sustainability are truly interdependent. Acknowledging the idea that all three do have their own "bottom lines" is a first step in the right direction. **BOC**

Central Energy Control for Hundreds of Locations

Yankee Candle Company, headquartered in South Deerfield, MA is the leading designer, manufacturer, wholesaler and retailer of premium scented candles. The company has a vertically integrated multi-channel business model that runs the operational gamut from product development to production to distribution, ultimately with the products being sold in its own dedicated retail stores and other specialty shops through its wholesale division. Such a setup has its particular facilities management challenges, not least of which are the variety of building functions and the fine-tuning of operations that each situation requires.

Founded over forty years ago, the company just recently opened up its 500th retail store.

The Massachusetts campus, which is the corporate headquarters, consists of five main buildings. The buildings include a manufacturing facility, a distribution center, a small distribution center, the corporate office building and the 105,000 square foot Yankee Candle Flagship retail store. Manufacturing is naturally the biggest energy consumer, using roughly half of total campus consumption.

Energy conservation has been a company priority for many years now and a building automation system (BAS) has been in use for well over a decade. The BAS has been expanded and refined and currently monitors most of the buildings in the complex, and a high percentage of the retail stores across the country, as well as the sister flagship store in Williamsburg, Virginia.

Chipping Away at Projects Leads to Big Savings

Energy Manager Jeff Lubarsky and Property Guest & Services Manager Wade Bassett (a BOC graduate) have been working together



Yankee Candle's flagship store in South Deerfield, MA.

for over a decade on a variety of efficiency projects. In 2009 alone, there were over thirty projects on the main campus, from lighting to HVAC to IT power management, that reduced the electric and natural gas energy consumption by approximately 3 million kWh and 45,000 Dtm, respectively, at a cost savings of more than \$500,000 for the year.

"There is an art to correctly setting up the system to meet the needs of these facilities. In no way do we want to upset the comfort of our guests or the employees. We create very specific plans for the different types of buildings and it's a fine line to get it right."

— Wade Bassett

Due to the efficient monitoring they can perform with the BAS, the majority of the energy cost-savings measures they have taken have been no-cost/low-cost solutions. For example, they studied use of the HVAC system in the manufacturing and distribution buildings and determined that they could reduce the hours of operation and adjust the heating and cooling setpoints to achieve an estimated saving of approximately \$100,000 for the year. The same discipline was applied to other major buildings at the main complex for additional energy conservation, with almost equal savings to that of the flagship store.

Most of the campus buildings and retail stores nationwide have zones set up for lighting and HVAC. While the retail stores may have only three or so zones, the flagship stores and the other main campus buildings can have anywhere from 25-30. Certainly different zones require different levels of light and tempera-

ture control, depending on the usage. As Bassett puts it, "There is an art to correctly setting up the system to meet the needs of these facilities. In no way do we want to upset the comfort of our guests or the employees. We create very specific plans for the different types of buildings and it's a fine line to get it right."

A few years ago, almost all lighting systems were on manual switches. The lighting needs and usage trends of the various sites have since been analyzed and the information applied to the

zones to be monitored centrally by the BAS at the main campus. In many cases, they have gone to half-lighting when there are fewer occupants with no adverse effect on occupant comfort. Though campus facilities and retail stores nationwide are monitored, the systems do allow for temporary manual overrides. But it also checks that those overrides are indeed temporary and will cue Lubarsky or Bassett if there is an anomaly or a spike in usage.

Turning the Savings into More Savings

Building on their success with the no-cost/low-cost means of savings, Lubarsky and Bassett proposed other projects that save energy but require some funding. According to Lubarsky, "We have worked closely with our utility company, Western Massachusetts Electric Company, with whom we have a fantastic relationship. For the various projects we undertook last year – lighting retrofits, lighting occupancy sensors, and changes to the sequence of operation of the HVAC equipment, HVAC upgrades – we have received significant savings in rebates and incentives."

Several years ago they upgraded the incandescent lamps with ceramic metal halide fixtures/lamps in several retail and flagship stores. The ceramic metal halide lamps last about 3.5 times longer than incandescent and reduce energy by 20%. Now they are moving towards LED lighting across the board. Currently all their new retail store construction projects use LED lamps, which have a lifespan of about 50,000 hours, or about five times that of ceramic metal halide and reduce the energy consumption by approximately 50%. Even

(Continued on page 11) See Central Energy.

Strategies for Indoor Environmental Quality Assurance

This article is an adaptation of an online Q&A session with Rich Prill, BOC Instructor and Building Scientist at Washington State University.

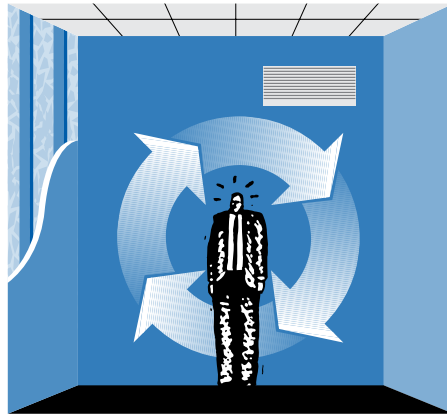
Indoor environmental quality (IEQ) is a major concern in occupied buildings because of its considerable influence on energy consumption, occupancy comfort, productivity, and safety. Facilities should be routinely checked for indoor environmental conditions and challenges before problems arise or occupants express their concerns. This involves a practical, careful and complete assessment and documentation of environmental conditions as a baseline.

Facility staff should use this initial, baseline assessment as a first step towards adopting a program of routine assessment. Routine assessments are essential to reinforce positive communication between building occupants and facilities staff. This communication raises the profile of the facilities staff and promotes an atmosphere of trust among the occupants. Occupants need to know the right people to contact if they have a building environment issue, and it is always best if they report small issues before they mushroom into large and often expensive or long-term problems.

Should an outside expert be enlisted to assess a building's environment issues? Since building conditions and operating parameters are constantly changing due to weather, occupancy, control systems, etc., it makes more sense for internal facilities staff to have a thorough knowledge of their own buildings. Before outside expertise is called in, it is wise to take the necessary time and money to understand the essentials of IEQ (and good resources are readily available) and complete a baseline assessment using basic tools and common sense, coupled with feedback from occupants. Not only will the in-house staff have a much better understanding of the building's unique challenges, but will be also be in a position to better inform and lead an outside expert should this option be needed. Let's face it, an outside expert can't know the details of a building like the in-house staff. IAQ can be a complicated issue, so facility staff may need to consult an expert to help them with situations they may not fully understand. Again, in-house knowledge and skills are your best investments – staff should know the building nuances that are impossible for outside consultants to learn quickly.

Where to Look

Of course, the US Green Building Council's LEED® guideline has some very good



resources and recommendations that cover IEQ. Inevitably though, each building has its own unique challenges and advantages. Sometime a LEED®-certified building can turn from green to gray if operations and maintenance programs are not properly monitored, supported and upgraded. There are a variety of tools you can use to prevent this efficiency loss. The EPA's Tools for Schools Action Kit, I-BEAM, and Building Air Quality Manual for example, contain a wealth of suggested IEQ elements that can help aid in keeping systems up to par.

Some Specific Issues to Consider

Ceiling Tiles

ACT (acoustical ceiling tiles), the ubiquitous fiber suspended ceiling tiles set into T-bar tracks have been implicated in IEQ problems due to exposure from irritating particles. Occupants can be exposed if areas are not cleaned up well after the tiles have been disturbed. Gravity is free but does cause problems. There are a number of considerations.

- What is above the suspended ceiling?
- Do you need ready and frequent access? Often it is the disturbance of these tiles that produces a burst of particles and complaints.
- If there is exposed fiberglass above tiles that will need to be disturbed, it should be covered or a method devised to reduce exposure to these fibers.
- There are ceiling tiles available that don't generate much in the way of particulate matter as long as they are not damaged in some way. These have sealed edges or a stronger, denser construction, but are

not as effective acoustically. Other tiles with sealed edges are often just a paint dip that binds the edges in an elastomeric paint film. This type of tile has better acoustic properties but requires more care if perforations are made. **More info:** <http://cms.h2e-online.org/ee/facilities/greenbuilding/ceilings/>

- Substitute products are available, such as plastic or "tin" tiles that meet fire spread and smoke criteria and are quite benign from an off-gassing perspective but again, will not be as effective acoustically.
- Is the plenum used for return air in lieu of a return duct system? This strategy results in a build-up of particles on the tiles and thus an increased potential for exposures when they are disturbed.

Bottom line: Prudent avoidance is vital when specifying construction and finish products.

Particle Board and Recycled Products

Most structural materials like OSB (oriented strand board – i.e. engineered or composite wood), plywood, etc., have evolved significantly in the last two decades in terms of chemical content and volatile organic compound (VOC) out-gassing. That's not to say that all products are equal. Testing of these materials is complicated. Some mills and batches can vary across product lines. Also, if these materials are improperly store or installed all bets are off, since contaminant adsorption and mold can be an issue. Care should be exercised in specifying these, and all products, to minimize potential problems. Don't ignore careful selection and installation and then simply rely on building "flush-out" or "bake-out" strategies since these strategies have a minor and very temporary impact on out-gassing. Here's some info from EPA: <http://www.epa.gov/opptintr/chemtest/formaldehyde/>.

Particle Air Filters

Air moving equipment for heating for cooling must have filters that are correctly specified, installed, maintained to function properly and efficiently. To promote IEQ/IAQ, filters should be specified and installed based on identified needs factors and a careful review of the MERV ratings (Minimum Efficiency Removal Values) and resultant pressure drop for installed filters. There are a variety of issues that need to be considered:

- What is the filter's setup? Blocking airflow can cause a myriad of equipment and comfort problems and lead to premature failure of very expensive equipment.
- What are the primary particles you are interested in capturing? The MERV guidelines define outdoor and indoor pollutant sources. MERV 1 is not worth buying, MERV 20 is hospital grade. Most buildings would need a MERV 6 to 11, depending on the equipment.
- Do the filters meet reported efficiencies? You can measure airborne particle concentrations before and after the filter bank easily with a laser particle counter. If a filter is rated for 80% efficiency of 2.5 micrometer particles, then the measured concentration for 2.5 micrometer size particles should be reduced by about 80% across the installed filters under normal operating conditions.
- Unfortunately, too many facility managers rely on filters to clean the air in their buildings. Filters cannot clean dirty buildings nor significantly reduce particle concentrations in occupied zones where particles are being produced or generated (dirty carpet, fiberglass, ACT, equipment). Proper floor cleaning that removes particles is critical for a healthy building. Testing is required.
- If a building has an HVAC system, stand-alone room HEPA air cleaners do not work well and are relatively expensive. If the building does not have an HVAC system, these are often recommended in zones where occupants may be experiencing problems, concerns or have allergies, asthma and other sensitivities. DO NOT use ozone, Ionizers, or other so-called purifiers. HEPA filters do a good job without introducing other potential problems.
- Plants are not filters. While they do remove formaldehyde and other VOCs, this removal is miniscule. Plants can have their own IEQ advantages and disadvantages. Though nice aesthetically and emotionally, they can harbor mites, molds, bacteria, and release odors and pollens. If someone is over-watering them or using the pot soil to decomposed leaf matter that falls off, they can become significant indoor sources of airborne mold spores and odors.

Testing Frequency

All buildings should be routinely monitored for performance. This does not mean specific testing is recommended. If your building is well

maintained and operated, contains very few contaminants and the occupants are satisfied, then quarterly monitoring of ventilation, controls, pressure dynamics, custodial, and other indoor environment basics is probably sufficient. If your building has combustion equipment, CO detectors should be installed and checked to alert you to problems immediately. On the other hand, a building with production equipment, chemical use, sensitive or concerned occupants, structural problems or deficiencies, poor mechanical equipment, or challenging outdoor air quality might require weekly or monthly monitoring to better understand what is happening and stay ahead of any problems. Monitoring is your first step toward specifying and implementing effective, practical and cost-efficient solutions. Knee-jerk reactions to issues are often a waste of time and money and prolong exposures.

Just start. Establish a monitoring history so that you can easily determine which parameters tend to need more attention. You can then refine your measurement/monitoring schedule to match the situations. Again, if you don't measure you don't know, which leads to "break-down" or "emergency maintenance" and contributes to many of the problems out there.

Types of Testing

Routine monitoring and documentation helps track building performance and possible contaminant exposures. Testing should routinely be done for:

- carbon monoxide
- carbon dioxide
- air flow direction ("clean to dirty" air flow patterns)
- relative humidity (*monitor surface temperatures to avoid creating moist microclimates that result from cooling the air to at or near dew point*)
- air temperature and velocity
- If there are local heat sources of the sun is shining on someone, or a wall is insulated, then it may be prudent to determine the mean radiant temperature.
- If the building has never been tested for radon then it's appropriate to test to determine the radon action level.

VOCs and particulates are often difficult to interpret, so just compare zones and building-to-building for practical comparison. Laser particle counters allow easy comparison and tracking and can also be used to ensure filters are performing as intended.

In the hands of a trained user, moisture meters help find wet materials. Thermal imagers are extremely valuable to locate moisture problems, unintentional or excessive heat loss/gain, HVAC equipment problems, electrical problems, and many other uses.

For mold sampling, it is best to thoroughly check visually for moisture and resultant molds. Mold is a process, not an event. If molds are suspected and you can't find the source, consider a tape-lift sample, which is also useful for investigating other problems. Essentially, a piece of cellophane tape is used to collect settled dust samples and these samples are thoroughly analyzed by an expert using microscopy. The results can yield evidence of exposures from potentially hundreds of possible irritants/pollutants. For example, an expert can report that the quantity of fiberglass found in a sample is "typical" or is in the range associated with problem buildings. Again, what gets measured gets controlled.

Know Thy Building

The best way to know thy building is through positive communication with building occupants, observation and measurement of building performance, and monitoring of issues that can arise to cause the building's indoor environment to deviate from its preferred norm. It is particularly important if changes are made regarding roofing systems, floor maintenance, HVAC systems and HVAC controls, and installation of new office equipment such as high-use photo copiers, printers, laminators, etc. Changes require new knowledge and adaptation.

The bottom line is that buildings have their own character. It is the role of the building operator to get to know and understand that character and to define what it takes to maintain and nurture a "happy" and healthy building. [BOC](#)

To earn one continuing education hour towards your annual BOC re-certification, read this article on *Strategies for Indoor Environmental Quality Assurance*. You can then go online and visit www.theBOC.info to take a short quiz online based on the material. Upon completion, print the confirmation of a passed quiz and submit it with the renewal application you receive in January. With a passing grade, we will apply one credit hour to your record.

BOC Grads Making a Difference

Working to Reduce Carbon Footprint



Alfred Maierle

**Tiffany & Company
– Manhattan, NY**

BOC graduate **Alfred Maierle** is **Group Director for Global Property Management Services** at Tiffany and Company. The company is committed to environmental stewardship and recently joined the

EPA's Climate Leaders Program, a voluntary program that commits its members to develop, measure and reduce its carbon footprint. Tiffany has pledged to reduce its U.S. GHG emissions by 10% per operational square foot from 2006 to 2011. Maierle is a major part of this effort and has been involved in numerous projects that have yielded great results.

Maierle is based in Manhattan but, as group director, has oversight of many of the company's facilities. He implemented projects at a couple of the New Jersey facilities in Parsippany and Whippany. The buildings are mostly storage and shipping facilities with office areas. At these facilities, they retrofitted over 4,400 lighting fixtures to more energy-efficient ones, resulting in a savings of an estimated 597,000 kWh per year. Adding to the savings, the State of New Jersey's Energy Smart Program, managed by the New Jersey Clean Energy Program, provided rebates for each installation. The rebate amount, when added to the energy savings, yields an ROI of about two years.

Another project was the installation of energy recovery ventilators (ERVs) on seventeen HVAC units at the Parsippany facility. In the fall of 2009, ERVs were installed adjacent to the existing ten-year old McQuay HVAC units, which are a mix of electric/gas and electric/electric heating and cooling. Due to the success of this project, similar units will be installed at the Whippany location. The building is already temperature and humidity controlled by means of a building management system (BMS).

As Maierle outlined the project, the development process took a year working with engineers and the Board of Public Utility for approval and installation. The goal was to achieve CO₂e (carbon dioxide equivalent) reductions and increase HVAC efficiency with the ERVs. "Conservatively, the installation is estimated to reduce total annual electri-

cal consumption by approximately 848,843 kWh and natural gas consumption by 10,723 therms," says Maierle. "In addition to reducing the costs for electricity and natural gas, the carbon emissions should be reduced by approximately 498 metric tons. In percentage terms, energy consumption for these units will be reduced by an estimated 30%."

The cost for the ERV project at Parsippany was \$940,000, including the rebate from the State of New Jersey's Clean Energy Program. Payback including the rebate amount is estimated at 2.5 years.

Maierle is working on many other energy efficiency projects that come under the umbrella of lowering carbon footprint and implementing best practices for energy efficiency. It all happens a step at a time.

Data Helps in Plotting Strategies

**Wenatchee School District –
Wenatchee, WA**



Bryan Visscher

Bryan Visscher has been in the facilities management business for ten years. He now serves as the **Director of Maintenance and Operations** for the Wenatchee school district, which has twelve schools and three administrative/operations buildings.

In 2005, he enrolled in the BOC program and was introduced to Portfolio Manager, the EPA's ENERGY STAR® online tool for energy benchmarking, now widely used by facilities managers to "rate" their building energy usage against that of similar buildings.

The Portfolio Manager program was fairly new then, and BOC was Visscher's first exposure to it. When the district received its second year of ENERGY STAR® awards, he then approached his local utility rep, Conservation Engineer Jim White of Chelan County PUD, and they worked together to track energy use trends at the various schools and administration buildings. This was also White's introduction to using the program and he quickly became a fan, encouraging its use to other non-residential customers and promoting the tool on the PUD's web site. They put in a year's worth of back-data to be able to do an apples-to-apples comparison of how the schools were faring.

Results showed that a couple of the schools were in decent shape, a little above-average nationally. For those schools it was easier to bring them closer to ENERGY STAR® status. The district already had a good energy conservation "base" focusing on the everyday types of steps they could take to promote energy efficiency, such as turning off unnecessary lights or ensuring that doors or windows weren't open when heating or cooling systems were being used.

What was far more enlightening was the information on the schools that were seriously underperforming. Much to his dismay, Visscher discovered that a couple of the schools had ratings in the single digits out of the ENERGY STAR® scale of 1 to 100. The district's M&O staff of about 60 includes in-house specialists in HVAC and electrical. At one of these underperforming schools, they worked with a contractor to review and adjust the HVAC digital control system in detail, checking operating schedules and areas of excess usage, and the savings are about \$11,000 annually. "It's not a top performer yet, but now it's an above-average building," says Visscher.

"This year, six of our fifteen primary facilities received ENERGY STAR® awards and I learned that there were only 168 award winners in all of Washington State, so I think that's pretty good. Portfolio Manager has allowed us to identify the poor performers and we are approaching those in different ways, with some good strategies," Visscher says. "The utility company has various rebate programs and I'm working with Jim on some potential lighting retrofits."

Also offered from Chelan PUD is a general energy savings plan called ResourceSmart, in which up to 70% of a project's cost can be reimbursed based on savings numbers. One of Visscher's projects is trying to get more CO₂ sensors installed to regulate outside air against actual load versus an established-hours setting. "Winter temperatures can go as low as 10 degrees or less and in summers, as high as 105, so it's important to be able to fine-tune this." The ResourceSmart program was used to fund 70% of a retro-commissioning project at one of the poor performing schools which is now showing solid progress.

\$100 million for education energy investment funding for energy efficiency projects is also coming from the state, with \$50 million from the Office of the Superintendent of Public

Instruction (OPSI) and the balance from the Department of Commerce. "Having the energy-use data on hand makes it a lot easier to apply and qualify for project funding, especially when the results would be dramatic, as they would be with the poor performers," says Visscher. With stats in hand, strategies are that much easier to fulfill.

Creative Solutions for Funding Much Needed Projects



David Bird

A.O. Fox Hospital in Oneonta, New York had a real problem. A sudden roof leak at its 130-bed nursing home had to be addressed and as quickly as possible. Tight budgets in a tough economy necessitated some creative thinking and **Director of Facilities Engineering**

David Bird, a BOC grad, decided to see what types of funding or loans might be available for the project. In his research, he came upon the Hospital Financial Services Corporation (HFSC) Smart Hospital Efficiency program. Eligible projects could receive up to 70% funding and the balance in low interest loans from HFSC. Needless to say, Bird applied.

Due to his efforts, the hospital received an HFSC grant of \$822,850 toward the project, the balance of funding to be supplied with a low interest loan. The award led him to think about possible funding for energy conservation projects. Bird applied for more funding.

Facilities departments at hospitals face particular challenges in that most of the budget priorities are geared toward patient care, physician recruitment and Medicare reimbursement. Because hospitals are a major energy consumer, with some of the facilities running high-consumption equipment 24/7, energy management is often overlooked as a means to rein in costs.

Bird started thinking about one of the "low hanging fruit" targets of energy conservation: lighting retrofits. This was the subject of his second successful grant application. For this, he ended up with 50% of the project funded and the balance, again, at a low interest loan that would dovetail with the energy savings provided by the new lighting.

"My goal," Bird notes, "was to reduce energy cost, waste and the labor and maintenance costs for re-lamping." Fox's energy consumption history was daunting 5.8 million kilowatt

hours (kWh) yearly, equivalent to \$600,000 in energy costs. Add to that \$60,000/year for bulbs and ballasts, and \$20,000/year in estimated maintenance and labor. Bird anticipates that the project will reduce energy consumption by an estimated 10%. Return on investment will be as soon as 12-16 months. The new LED bulbs are projected to last 50,000 hours (about 20 times the lifespan of an incandescent bulb), greatly reducing labor costs for change-outs. Added to the savings is the fact that they contain no harmful chemicals.

Bird has planned the project to unfold in three phases. Phase one will be the installation of 1000 4' LED lights in hallways, patient rooms and in the nursing home. Since LEDs give out more light for the same area, this will reduce the number of bulbs needed by half. Phase two will be the replacement of specialty lights in such areas as examination rooms and the emergency department. This phase will also involve re-lamping the 140,000 square-foot Fox Center, the major part of which is an open-area lobby area surrounded by offices and services. The third and final phase will address exterior lighting at the healthcare compound.

When the grant was awarded to Fox, Stephen Weidner, Compliance Officer of HFSC, pointed out the dual advantages of David Bird's proposal, noting that Fox has "exhibited a commitment to implement strategies that not only reduce energy expenditures, but also take into consideration the impact on the environment."

Due to Fox's efforts, A. O. Fox was awarded the National Energy Conservation Award from the Smart Hospital Efficiency Program, presented by HFSC.

"Any facilities person will tell you how crucial their often unrecognized and behind-the-scenes work is in running such a complicated operation," says Bird. A twenty-year veteran of healthcare administration and a Certified Healthcare Facility Manager, David Bird will also tell you that it's all in a day's work.

Transitioning Data Access to a Green Site

King County, Seattle, WA

BOC graduate and **Data Center Facilities Engineer Rick Gideon** has experience on both sides of the aisle in the IT field. He's been in facilities management for about six years now, but was previously in the IT data management field. When the data center's Seattle location lease for King County was coming up for renewal, he was an obvious choice for the transition team.



Rick Gideon

King County's data center houses the critical IT systems that not only service a plethora of government agencies, but also provides much-needed online public services and information, such as public transit schedules and licensing guidelines. As Gideon defines

it, "The data center's goal is to be available 24/7/365 to provide necessary services to the King County staff and the public."

Located in a high-rise in downtown Seattle, the former data center site was not the best place for a mission-critical facility. The lease on the space was coming due and so a relocation project seemed practical. Space limitations and at-capacity power and cooling systems at the downtown site also highlighted the need for a move to a more appropriate location. When the relocation team was put together, Gideon was appointed the data center designer.

Settling on an old warehouse building about ten miles outside of Seattle in Tukwila, preparations began. The warehouse shell was over 30,000 square feet of space, with 20-foot ceilings and was to be outfitted for multiple tenants, of which the data center space would be about 5,300 square feet, with an added 1,500 for support space and operational staff.

The team decided to build the space on a slab construction, which Gideon notes is the industry trend, versus the conventional raised-floor design. "One of the foremost reasons was the fact that, in order to deliver the amount of air needed to supply a room full of servers, the floor needs to be no less than 30 inches above the slab. Then you'd have to incorporate ramps for access and you'd just be eating up valuable space."

One of the major problems facing data centers is the enormous build up of heat generated by computers, most of which are required to run constantly. The cooling system at the new center is configured to cool mostly with outside air. Conditions in the area are good for this set up about 90% of the year. "We can also use evaporative cooling to help extend that 90% number a little," says Gideon. "So overall, we use the chiller plant on a minimal basis."

The server cabinets chosen use 3-phase 208v power as opposed to the conventional 120v.

(Continued on page 8) See Rick Gideon.

Rick Gideon (Continued from page 7)

Gideon explains that higher voltage requires less current to deliver the same amount of power, so the less current the electrical infrastructure carries, the cooler it runs and less energy is needed for cooling. This also allowed him to increase the density of the cabinets making better use of space. The cabinets also direct the hot exhaust from the servers upward, above the ceiling grid, and release it outside. "Some of the air is redirected to the air handlers to temper incoming air. This allows for a higher supply temperature since we don't have to cool a pool of hot air within the room," explains Gideon. "It also gives us the option to increase out temperature set point within the room, since we don't have to battle the hot spots in the rooms."

"Some of the air is redirected to the air handlers to temper incoming air. This allows for a higher supply temperature since we don't have to cool a pool of hot air within the room,"

– Rick Gideon

Measuring energy cost savings is difficult because the old facility wasn't set up to accurately track costs, but conceptually, it is a pretty easy argument to make. Comparing the two, Gideon observes that the savings "has to be substantial given that at the old facility we had three CRAC (computer room A/C) units running full bore 24/7/365, plus associated pumps and rooftop units. Now we're mainly paying for spinning supply and returns fans. Plus, they're connected to VFDs and can ramp up or down depending on environmental conditions within the data center."

As data center designer, Gideon worked on room layout, investigated models and makes of the infrastructure components, and reviewed various proposals and ideas for the center. "I had to vet, through experience, industry groups, or peers, to ensure that the decisions made were the correct ones for our operation. By taking the BOC courses, I was able to learn about in-depth real world equipment and scenarios. While you may learn theory in a lot of classes, I was able to come away with a better picture of a multitude of disciplines used in a building and tie them together overall."

He also participated heavily in the actual relocation. Construction was finished in May of last year and the data center was open for business in June. 

BOC Now an Approved Education Provider for USGBC

The US Green Building Council (USGBC) has approved BOC® level I classes as continuing education training for LEED® professionals seeking to maintain their credentialing requirements. This meticulous approval process, with extensive reviews from third-party experts, gives the BOC® program excellent exposure to a diverse green workforce.

LEED® Accredited Professionals and LEED® Green Associates need continuing education hours, 30 and 15 respectively, every two years to maintain their LEED® AP and LEED® GA standing. Depending on the course, BOC classes provide from 7 to 14 hours toward this requirement. We look forward to providing them additional training in this dynamic field of energy-efficient facilities operations.



Sandy Creek Central School Receives 100% Building Operator Certification Award

The Northwest Energy Efficiency Council is pleased to recognize the Facilities Department of New York's Sandy Creek Central School for certifying 100% of their operations staff in the BOC program. Companies awarded this honor are noteworthy for their effectiveness and dedication to achieving greater levels of energy efficiency in their facilities through operator training. Accepting the award for the school is Chris Ouder Kirk, Facilities Director.

The Sandy Creek Central School graduates are facilities technicians Daniel Scheppard, Andrew Ridgeway and Chris Ouder Kirk. They completed over 135 hours of classroom training and facility project assignments in electrical and HVAC systems, energy conservation, operations for sustainable buildings, and indoor air quality to earn the BOC credential.

NEEC is happy to add Sandy Creek Central School to its growing list of 100% BOC-certified employers.

BOC Program Boosted by ARRA Funding



On June 17th the Department of Energy (DOE) announced that the Northwest Energy Efficiency Council (NEEC) was awarded \$549,000

in funding from the American Recovery and Reinvestment Act to support advanced energy-efficient building technology projects. One of four national organizations to receive the funding for Training Program Development for Commercial Buildings Efficiency Experts, NEEC will partner with the Midwest Energy Efficiency Alliance, City University of New York, and the Northwest Energy Efficiency Alliance (NEEA) on the project. The New York State Energy Research and Development Authority (NYSERDA) and the NEEA will each contribute matching funds to the project.

Funding will be used to develop new curriculum to address energy efficiency knowledge gaps in the existing national Building Operator Certification (BOC®) program, and to create a blended learning approach to course delivery using classroom, online and on-site training.

This project will advance DOE's goal of net-zero energy commercial buildings by leveraging the national platform of the BOC® program to serve a national audience of building technicians. It will also advance the broader ARRA goal of job preservation by providing technicians with a means of distinguishing themselves to employers through improved job skills and a commitment to the profession.

SDG&E Recognizes Energy Efficiency Achievements

At the fifth annual San Diego Gas & Electric Energy Showcase, SDG&E honored several companies in a variety of energy efficiency categories. SDG&E, a longtime BOC proponent and sponsor, bestowed efficiency accomplish-



ment awards to many of the companies and organizations that have BOC graduates among their facilities personnel. Among those BOC-related companies that received awards were: Doubletree Hotels, General Dynamics, Grand Pacific Resorts, Irvine Corporation, Kaiser Permanente, Life Technologies, Marriott Hotels.

Congratulations to the winners on their accomplishments!

Georgia Completes First BOC Course Series

Gwinnett Technical College is pleased to recognize the 25 members of its inaugural BOC Level I class. The group completed course work on June 16th and is busy implementing cost saving and energy conservation measures at their facilities. Stay tuned for wonderful case studies and success stories from the first BOC technicians in the state of Georgia!



Georgia's inaugural BOC class.

Hawaii Comes on Board as BOC's 23rd!

The BOC is pleased to announce that Hawaii is the latest addition to the roster of states now participating in the program. In a license agreement with the University of Hawaii at



Maui College, its Sustainable Living Institute, a program at the Maui College will administer

the program directly throughout the state. The license was funded with American Recovery and Reinvestment Act (ARRA) dollars the college received to administer a training program in energy efficiency for building operators.

BOC certification is now recognized in 24 states (with the recent addition of Michigan), from Maine to California – and now across the water to Hawaii, a strong and steady expansion that attests to the value of the training and credential.

Congratulations to the first set of graduates, 16 in all, who just completed training this past June. The group included students, construction specialists and professionals whose training was funded by a grant from the Hawaii Department of Labor and Industrial Relations.

And Michigan Makes 24

The Midwest Energy Efficiency Alliance (MEEA) and the State of Michigan Department of Energy, Labor and Economic Growth have partnered to bring the BOC program to Michigan in 2010! The state holds enormous potential for training with nearly 10 million residents and significant building infrastructure. BOC is currently being piloted in closed-enrollment trainings sponsored by Michigan's two largest utilities: Consumers Energy and DTE Energy. For more information please contact Christina Pagnusat at cpagnusat@mwalliance.org.



BOC for Veterans in Washington State

Veterans residing in Washington State are now eligible to receive tuition reimbursement for attending BOC training. For more information on how to apply, contact the state's Department of Veterans Affairs at 360-725-2200. NEEC is working on obtaining approval for veterans in other states where BOC is offered. Stay tuned.



Potential Subsidized BOC Training in WA

NEEC is the recipient of a Recovery Act grant to provide job training and placement in the sectors of energy-efficient building, construction, and retrofit and energy efficiency assessment. NEEC will utilize this funding for the Sound Energy Efficiency Development (SEED) project to be implemented by a strong regional partnership of employers, labor organizations, and community and technical colleges across a five-county area. Grant funds will provide tuition scholarships for unemployed facilities professionals, veterans, incumbent workers and people with employment barriers for entry to middle-skill energy efficiency and assessment occupations, and will also help place them in new and existing jobs openings.

To learn more about the SEED grant and tuition scholarship opportunities, go to www.neec.net/seed or contact NEEC's new Green Jobs Navigator, Russell Paez, at 206-588-4984 or email at russell.paez@putnamprice.com. 

National Conferences & Symposiums 2010-2011

Labs 21 2010 Conferencement Association – 15th Annual Conference

Albuquerque Convention Center
Albuquerque, New Mexico
September 28-30, 2010

More info: www.labs21century.gov/conf

The annual three-day international conference has dozens of technical sessions highlighting new and innovative products designed to usher in the next generation of laboratories.

Facility Decisions Conference & Expo

Las Vegas Convention Center
Las Vegas, NV
October 5-6, 2010

More info: www.facilitydecisions.com

IFMA World Workplace 2010 Conference & Expo

Georgia World Congress Center
Atlanta, Georgia
October 27-29, 2010

More info: www.worldworkplace.org

Plan your attendance at World Workplace more efficiently by researching session topics online by track, knowledge level or session time.

Greenbuild International Conference & Expo

McCormick Place West
Chicago, Illinois
November 17-19, 2010

More info: www.greenbuildexpo.org

Over a hundred educational sessions are offered and are also eligible as Continuing Education Units (CEUs).

National Facilities Management & Technology Conference/Expo

The Baltimore Convention Center
Baltimore, MD
March 15-17, 2011

More info: www.nfimt.com

This event also includes the Maintenance Solutions Expo, the GreenTech Conference/Expo and the Safe Building Expo.

Call for Feedback and Projects!

Our 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?

All readers are encouraged to submit their thoughts on content they would like to see, technologies that spark their interest on which they'd like more information, or their own personnel successes as energy-efficient facilities personnel.



Please, submit your ideas to email address: news@theBOC.info. We'd love to hear from you.

FREE BOC WEBCAST

The BOC webcast allows you to conveniently view and listen to an overview of the program from the comfort of your office and ask any questions you may have about the training. 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.

Informational webcasts last approximately one hour.

2010 Webcast dates:

Sept. 9th & Oct. 26th.

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

If that date is not convenient, the site also provides a prerecorded informational webcast.



Check out BOC's Technical Webinar Series!

The BOC web site (www.theBOC.info) offers webinars, both live and prerecorded (available for viewing at your convenience). Register and receive a link, with log-in and password information. Successful completion of each webinar and its accompanying quiz earns you 1.5 hours of continuing education credit towards maintaining your BOC certification. Current prerecorded webinars available include.

- The IAQ Top Ten Fixes
- Lighting Retrofits: A Fresh Approach
- Morning Warm-up Strategies
- Boiler Tune-up
- Demand Control for Ventilation
- Using Data Loggers to Improve Building Performance
- Energy Tune Up: Addressing Problems with Sensor Error and Simultaneous Heating & Cooling
- Top Four Energy Tune Up Opportunities
- Energy Tune Up: Optimizing Outside – Air Usage & Equipment Scheduling

The first three live webinars offered in 2010 have been held and are now included in the list above (the final three). The final LIVE webinar will be held Thursday September 16th, from 10 AM to 11 AM Pacific Standard Time and covers:

- Energy Tune Up: Measurement Tools for Building Energy Diagnostics

Information on fees and registration is available at the BOC web site as above. A link to the webinar details can be accessed on the home page

A New Look at www.theBOC.info!

BOC's web site will have a brand new look with its site makeover launching this fall. The changes will make the site more navigable, with updated information on the BOC program, news releases, online opportunities for you to submit info on your project work and more resources and links for tools and continuing education.



BOC Graduate Numbers Continue to Grow!

As BOC expands across the country, the number of graduates grows as well, with over 8,000 nationwide. Graduates from this year and last hail from Idaho to Rhode Island, from Michigan to Kansas, and represent fields from education, government, manufacturing, health care and beyond – just about every sector you can name.

To see a listing of recent BOC graduates, please go to the national web site at www.theBOC.info, go to Graduate Profiles & Case Studies and click on the Recent Graduates PDF.

Find A BOC Training In Your Area

There are currently over eight-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 twenty-four states and that number continues to grow as well.

BOC Level I Certification

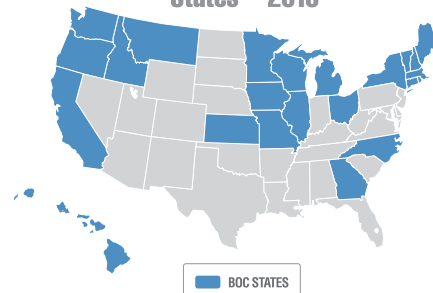
The Level I series comprises 74 hours of training and project work in building systems maintenance. Courses include: Building Systems Overview, HVAC Systems and Controls, Facility Electrical Systems, Indoor Air Quality, Operation & Maintenance Practices for Sustainable Buildings, Efficient Lighting Fundamental 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 Principle mization. See the website for supplemental class topics.

To find and register for a Level I or Level II training in your area, please visit the BOC website at www.theBOC.info. Training is available from Maine to California – and now, even Hawaii!

Building Operator Certification States – 2010



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 – based on the article on pages 10-11 of this newsletter, the quiz is available to take online at www.thBOC.info**.....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
- **Enroll in a BOC webinar and complete its quiz (see webinar announcement on page 8 for details)**1.5 hours / passed quiz

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 your program administrator as instructed. Renewal fees are established by the BOC administrator in your state and will be detailed on your renewal notice.

Certification Renewal Reminder

For those BOC graduates whose certification expires January 1, 2011, the renewal process will begin in the first week of January 2011. You will be sent an application at that time but remember, the deadline for application submissions is March 31, 2011. You will need Continuing Education credit to renew your level of certification so don't wait too long! See above for details of renewal requirements for both Levels I and II.

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

APPA:
The Association of Physical Plant Administrators
www.appa.org

BOMA:
Building Owners & Managers Association
www.boma.org/TrainingAndEducation/BEEP/

BOMI:
Building Owners & Managers Institute
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

FEMP:
Federal Energy Management Program Workshops & Conferences
www.eere.energy.gov/

GreenBuild:
US Green Building Council
www.usgbc.org

HVACR Education:
On-Line Learning for the HVACR Industry
www.hvacrededucation.net/

IFMA:
International Facility Management Association
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.dsireusa.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. The link above brings you to a database of state incentives for renewables and efficiencies.

Central Energy Control (Continued from page 3)

then, LED lights will not actually fail, but the light quality does fade.

Beyond energy savings, Lubarsky notes that LED's offer significant savings on labor. Time required for LED lighting changes represents about 1/5th of the labor needed for ceramic metal halide and 1/20th for incandescent bulbs. "Now that they are more affordable, I believe LED is one of the major energy savers of the future," Lubarsky comments.

We take ideas from everyone, meet and discuss initiatives to save energy and even have an energy newsletter. If you show results, you will get support."


– Wade Bassett

Results Garner Support

"We started a 'green team' here a couple of years ago and we've had great support from staff and from management," says Bassett. "We take ideas from everyone, meet and discuss initiatives to save energy and even have an energy newsletter. If you show results, you will get support."

Last fall, company-wide they implemented the ENERGY STAR® IT power management program, sponsored by ENERGY STAR® through their Low Carbon IT campaign. This is a free software program available at the ENERGY STAR® web site that allows them to manage all the company's computers so that they are not using excess energy. "An average home computer uses excess energy at a cost of about \$40 per year. Multiply that by the number of computers a company uses, and it was just a no-brainer," says Lubarsky. "It's probably one of the simplest things we've done."

Going Forward

Utility company Western Massachusetts Electric Company has provided a campus audit for Yankee Candle to see what other energy efficiencies they can achieve. As technologies improve, so do efficiency options so there's always something to improve. At Yankee Candle, they embrace this attitude with both a practical and an enthusiastic eye. 



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Partners in the BOC program include: Gwinnett Technical College, Midwest Energy Efficiency Alliance, New York State Energy Research & Development Authority, North Carolina Community College System, Northwest Energy Education Institute, Northwest Energy Efficiency Council, Sacramento Municipal Utility District, University of Hawaii – Maui College, Wisconsin Focus on Energy.

Thank you to these sponsors of the Building Operator Certification across the country:

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