BOC Bulletin

A Newsletter for BOC Graduates, Enrollees and their Employers

WINTER/SPRING 2016

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OCCUPANT ENGAGEMENT:
Communication a Key to Achieving Building Efficiency

Last year's BOC webinars included a four-part Skill Building series on "Communicating" for facilities personnel. The series targeted communication with 1) your boss, 2) your boss' boss, 3) the organization at large in regards to your energy performance, and 4) with building occupants. This last is the topic of discussion here.

BOC classes concentrate on how to measure performance changes and improvements in order to evaluate progress. This, in turn, gives facilities personnel the information they need to make the cases – financial, practical, environmental – for changes regarding the continued efficient operation of a building. The final piece though is engaging building occupants. If there is one theme that runs through the various experiences about successfully operating an energy efficient and/or sustainable building, it's that you need to have cooperation at all levels: It's a team effort.

To do this, facility managers need to communicate, certainly, but more importantly, they need to engage. In a Facilitiesnet.com article about the top five occupant engagement myths (see link below), the second myth is that "Communication alone is tenant engagement," further explaining that "True engagement is not passive, (but requires) proactive and collaborative involvement of occupants."

That said, one of the other myths is that a one-size-fits-all approach is effective. BOC graduates come from all types of facilities. You don't engage students and teachers the way you would tenants; moreover, building occupants can be employees but they can also be customers. The relationships change and therefore the approach needs to fit the situation.

Physical Plant Manager Richard Laws seeks to entertain and inform in order to engage at United Radio in Syracuse, New York.

In order to get people on board, they have to have a positive feeling about any changes that will occur. FMLink.com also has a piece on occupant engagement (see link below) that puts this relationship in perspective when it states, "Think about a change you've experienced – did it feel like it was done to you or with you?"

What follows are two examples of successful approaches used in different facility situations.

What is Facilities Management?

Richard Laws is the physical plant manager at United Radio in Syracuse, New York, and a BOC graduate. The manufacturing and repair company deals with automotive, communications, and consumer electronics, with a building dedicated to each division. Operations are very energy-intensive. The three buildings together are about 275,000 square feet. Profiled in a previous BOC newsletter, Laws outlined several no-cost/low-cost projects he had undertaken at United Radio, most geared to analysis, troubleshooting, and repairs to optimize existing equipment. He had many successes (these are detailed in the Summer/Fall 2014 issue of the *BOC Bulletin*).

Laws built off these early successes to launch a new "Lunch and Learn" presentation to promote energy efficiency among building occupants. Lunch and Learns are volunteer information sessions/trainings where employees can enhance skills and knowledge in a less-structured setting than a classroom. United Radio has been providing these sessions for a number of years in topics from company updates to professional development to community matters. Laws felt that it would be an excellent forum for teaching employees about energy efficiency and what their facilities maintenance department was doing towards this end.

> *"One of the biggest obstacles for a facilities manager to overcome is to achieve the respect and cooperation of the fellow employees that occupy the building you service."*
>
> – *Richard Laws*

"One of the biggest obstacles for a facilities manager to overcome is to achieve the respect and cooperation of the fellow employees that occupy the building you service," says Laws. Prior to the Lunch and Learn sessions, Laws had been reaching out to employees via the company's monthly newsletter in a section called "From the Maintenance Desk." This column, which he still writes, gives people energy efficiency tips that can be used at work and at home. He believes that by making the information personal and encouraging people to be energy-conscious at home, they will transfer these behaviors to the workplace. Laws always ends his column with the same message: It does not take much energy to save energy.

Branching out from the newsletter, the Lunch and Learn sessions he has done for the last three years put a face on FM and promote the respect and cooperation he wants for his department. His first presentation was a basic instructional PowerPoint but in the last couple of years, he has used his phone to take pictures and videos of the various

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maintenance projects and issues that are part of what makes the facility run. He edits these into an "intro" to his talk, likening it to a preview at a movie. Visuals make a difference.

"It really opened up communications," says Laws. "I start with opening credits of the physical plant with pictures of different aspects of the department. For instance this year, I start out with the credits and introduce what the presentation topics will be. I then show video of testing different equipment they use in their work. Next, I show the actual kWh, amps, and power factor that these pieces of equipment use, especially when sitting idle for periods of time."

Laws cites various examples of wasted usage, such as a soldering iron that is on constantly but may only be used five times a day – even when it only takes 34 seconds to reach the temperature needed. Finishing with a photomontage of the year's various projects and repair work, he opens the floor up for questions.

"The best is at the end when we have a Q&A to address questions or concerns people might have. Everyone gets to walk away feeling that they are a part of bettering our work areas and at the same time helping in saving and making a difference in our company's energy conservation. And they know what "facilities management" is!"

The Lunch and Learn, together with the monthly newsletter posts, puts a face on facilities management and people are more likely to come to Laws with suggestions or concerns – a win for occupant engagement.

Recognizing What Works

Heidi Burkart is the operations coordinator and resource conservation manager (RCM) for the Camas School District (CSD) in Washington. She was also a panelist on the BOC's "Communicating to Building Occupants" webinar. Camas encourages its schools to participate in the Washington Green Schools program, which helps schools in the state build Green Teams to reduce waste and conserve energy while building environmental awareness. Once schools go through the six-step process of certification and have set up their structure to address environmental issues at their locations, they develop plans for the six WGS categories: Energy, Healthy School Buildings, School Grounds & Gardens, Transportation, Waste & Recycling, and Water. Different levels are reached as each category is addressed: bronze (1), silver (2), gold (3-5), and platinum (all six) so that there is the element of competition and achievement.

Burkart is always looking at new ways to save energy and looks for inspiration from other successful programs. Several years back when she was working on implementing efficiency measures at CSD, her research led her to the success Dave Cone was having at the Gresham-Barlow School District in Oregon (A BOC grad, Cone's work at Gresham-Barlow was highlighted in the Winter/Spring 2006 issue). She tracked him down and found that he had taken a position as RCM, virtually around the corner from Camas, at Evergreen Public Schools. Evergreen has been an ENERGY STAR Award in Energy Management winner over the past few years. Over lunch, she picked his brain and ended up modeling her district's efficiency programs after his, adapting it as needed.

With the support of Clark County Environmental Services, the students and teachers of Camas High School's Green Team recently visited the local recycling transfer station in Vancouver, WA, a field trip that resulted from a discussion at one of the team's regular meetings.

Both their programs use the EPA's Seven Steps guide for ENERGY STAR as a starting point. Cone refined that framework to his situations and passed on his experiences to Burkart. It can be tough to deal with naysayers when starting the process and she says that, "Dave has been a great resource and his mentoring has encouraged me to strive for the best, even when dealing with difficult situations. Having someone that you can call on to bounce things off of and help lead the way when things get difficult makes all the difference." Burkart says she would like to do the same for someone else, passing on experience as well as encouragement.

One of the critical things to building a successful program and team is getting people at all levels – students, teachers, administrative staff, and custodial and maintenance staff – to be enthusiastic about energy conservation and sustainability. Obviously Burkart chose well: All Camas schools have earned EPA's ENERGY STAR certification. All have recycling and composting efforts to minimize landfill and the rising costs associated with that. The district also entered the Energy Department's Better Buildings Challenge in 2013 with a baseline year of their 2009 benchmarking efforts, committing to reduce energy use by 20 percent by 2020. Not only did they reach the goal five years early in 2015, they bested it with a reduction of 28 percent.

While many times FM staff do their jobs behind the scenes, the success of a facility's efficiency and sustainability efforts relies on being visible. Laws has a monthly newsletter column at United Radio; Burkart had done a newsletter, but decided that in her circumstance a website presence on the CSD site was more effective. Her posts talk about pending grants and their goals, events, awards, and various other topics. It is a continuous job of transparency and visibility to the staff, highlighting progress made and defining energy saved. Saving energy as a district is a team effort and creative communication is needed to reach the entire Camas community.

The Importance of a Suitable Plan

There are many different ways to engage building occupants but the key is communicating with them and determining how this is most effectively achieved in the variety of situations and constructs facilities personnel encounter. The EPA's ENERGY STAR site has many tools – some customizable – with which you can begin and continue to build your efforts to run an efficient facility.

One of the factors that BOC graduates regularly say is a huge benefit of the training is the networking aspect of meeting people who can become valuable resources with different knowledge and experience than their own. This extends to occupant engagement practices, what has worked and what hasn't – and why. Communication is, once again, key.

Resources :

http://www.theboc.info/continuing-education/recorded-technical-webinars/

See the 2015 listings for the Communication series.

http://www.energystar.gov/buildings/tools-and-resources/

http://fmlink.com/articles/occupant-engagement/

http://www.facilitiesnet.com/green/article/Top-5-Occupant-Engagement-Myths-of-High-Performance-Buildings-Facilities-Management-Green-Feature--13325

http://www.automatedbuildings.com/news/apr15/articles/osisoft/150329020404osisoft.html

Also, many utilities are now have programs to address and support SEM (Strategic Energy Management) and RCM (Resource Conservation Management). Check out your local utility's website or call your representative to see what is available in your area.

BOC Grads Making a Difference

Revisiting an Action List

Ron Frantzen
Director of Facilities Management
McFarland Clinic
Ames, Iowa

In the Summer/Fall 2012 issue of this newsletter, the cover piece featured the efficiency measures being taken at the McFarland Clinic's network of health-care facilities located throughout central Iowa. When starting at McFarland in 2000, Director of Facilities Management (and BOC graduate) Ron Frantzen did an assessment of all facilities and drew up an action list for each.

Frantzen had heard of BOC training about three years prior to the 2012 piece, and decided it "sounded like something for me." He then had his entire facilities management team take the training. The team (see photo) made great progress with HVAC, lighting, and controls projects at that time, but FM isn't static and they have continued attacking the action list, refining it as various efficiency technologies evolve.

Two new medical clinics were built with geothermal systems. Frantzen did a year-over-year comparison of one of these with a like-site, non-geothermal one just two years older. The comparison showed that the building with the geothermal system was running at about half the cost of operation.

Updates on efficiency measures continue across all sites, which means a constant review of equipment. Improvements suggestions are added to their action list to ensure that they are addressing the high-energy usage equipment. Frantzen lists details below:

- Our company has a fleet of vans that are on the road six out of the seven days a week and will average 100,000 miles a year averaging 17.5 mpg. We just completed the purchased of three new vans that: (1) have smaller engines but deliver the same load carrying capabilities, (2) are front wheel drive, and (3) will average 22 mpg. This will result in fuel savings of about 21 percent annually.
- At one location the domestic hot water system was redesigned, removing four older, inefficient water heaters and a 175 gallon storage tank, which made room for two high efficiency, fast recovery 75 gallon water heaters. This reduced the gas consumption over 50 percent while reducing stored energy (hot water) from the system, with no perceptible change to the end user. We accomplished this by installing low-flow faucet aerators throughout the clinic, reducing hot water demand. These measures not only reduced our natural gas consumption, but also save on water and sewer monthly costs.
- During the spring of 2015 at one clinic location, we updated five 1987 120,000 BTU furnaces with eight SEER condenser units with new 96 percent high efficiency furnaces, along with 17 SEER AC units. This project resulted in an annual energy savings of approximately $2,375 a year. We received electrical rebates of $500 for each of the five furnaces and Alliant Energy, our natural gas provider, offered rebates of $2,100 that include the installation of five new programmable thermostats.
- We retrofitted five exterior HPS (high pressure sodium) wall packs with five LED exterior lights. Wattage consumption went from 875 to 130 watts, an 85 percent drop.
- Incandescent light bulbs in the elevators were changed to LED. These lights are on 24/7 so it only made sense to change to LED's to increase lifespan, reduce maintenance costs, and save energy. With a rebate from our local utility, Alliant Energy, payback was thirteen months.
- Putting in a solar powered LED lighted flagpole had great ROI and was the most cost effective way to go. It was going to cost $3800 to get power to its location but only $900 for the solar package. This means no future electrical costs for running flood lights.
- Both the Carroll and Jefferson Family Medicine locations have LED lighting, occupancy sensors and lighting panels, which really helps with energy waste from leaving lights on. The panels use about 80 percent less wattage than incandescents.
- We built a new 8,400 SF family medicine location in Jefferson, to which Alliant Energy contributed $1,900 in lighting rebates and other energy efficient measures such as windows, wall insulation, deck insulation, and a rooftop unit with economizers.
- The McFarland Clinic was recognized as a Smart Business Participant by the City of Ames' Smart Business Challenge for sustainable efficiencies and implementing business strategies that grow the economy while helping the environment.

Back row (left to right): Craig Walker, Scott Cochran, Chuck Pille, Tom Willenborg, Tom Bell. Front Row (left to right): Ron Frantzen, Randy Bitz, Matt Pflug, Jim Thomas.

In 2016, Frantzen and his staff will be implementing a variety of energy saving projects. They will replace two older chillers that, on average have a kW consumption rate of .75 kW/ton with new chillers that will have a consumption rate of .45 kW/ton, an estimated 35 percent savings. A new rooftop solar array at one clinic will provide approximately 350,000 annual kWh, which should result in an annual savings of about $34,300 per year. At the main clinic, the Building Automation System will receive more upgrades that further the ability to drive down energy consumption while maintaining or improving space comfort.

Frantzen credits the regular BOC webinar updates for keeping him and his staff abreast of new technologies as they become available. As noted in 2012, despite continuing to bring on more energy-hungry equipment, such as MRIs and scanners, total kWh consumption since 2000 had actually dropped by 16 percent. As Frantzen noted then, "We're actually doing more with less."

*(Continued on page 4 see **BOC GRADS**.)*

BOC GRADS *(Continued from page 3)*

A Campus Community Comes Together for Efficiency

Brian Kerns
Facility Engineer
University of Montana
Missoula, Montana

In 2014, eight facilities management staff at the University of Montana (UM) attended the BOC Level I training. Brian Kerns, facility engineer there since 2010, was one of the attendees. Also an adjunct instructor at the university teaching classes in bioenergy and alternative fuels, Kerns mentioned the training to his class and four students signed on to take it as well.

The State of Montana's Department of Environmental Quality provided funding for the student tuition. Including students in the energy efficiency training gave them an opportunity to learn about an issue they care about, which would directly benefit the university's efficiency goals.

> ***"We had been implementing a number of efficiency measures on campus before BOC, but the training helped to give us some tools to focus our efforts."***
>
> *– Brian Kerns*

"We had been implementing a number of efficiency measures on campus before BOC, but the training helped to give us some tools to focus our efforts," notes Kerns. One of the first projects tackled after the training targeted inefficient air handlers at the recreation center on the main campus by employing variable speed drives and fixing leaky dampers. This effort decreased the building's utility costs by 25 percent.

The school has an energy funding mechanism, initiated by UM student Sonny Kless in 2009 and now named in his honor: The Kless Revolving Energy Loan Fund (KRELF). KRELF is funded by a voluntary student fee and is used solely for energy efficiency projects. The fee has funded solar photovoltaic systems, pipe insulation, HVAC renovations and more. One goal is to get the fund balance up, via fees as well as cost savings from efficiency projects, to a level where larger projects can be tackled.

Kerns highlights the fact that one of the student attendees of the training basically shepherded the pipe insulation project solo – getting quotes and researching options. "It was a smaller project – about $25,000 – but had a payback of less than a year," he notes.

Projects are constantly in the pipeline and sometimes yield dramatic results. One of the science buildings had a supervisory controller* that went out of service a few years ago, at which time no funding was available to replace it. That building underwent a retro-commissioning review where a replacement was installed. "I superimposed one year against the start of this heating season after the repair. You could almost pinpoint the day that controller was installed," notes Kerns. That one fix yielded significant and dramatic change, highlighting the importance of building controls. He estimates that there was about a 70 percent reduction in heating costs, normalized for conditions, over the November to April heating season.

Kerns notes that students on campus have taken up the cause of efficiency. A couple of years ago, they formulated the Smart Building Initiative. One of the first things they did was to fund metering upgrades so that the buildings could be more efficiently monitored. "The students were key to helping us get funding. They didn't fund it completely but financed about 50 percent" via KRELF. Currently, he estimates, about 85 percent of the campus has smart meters, with heavy energy-use buildings targeted first; they continue work on the rest.

In 2014, Kerns entered five of the university's buildings in the EPA's Battle of the Buildings Team Challenge and entered five more in 2015. At mid-year in 2014, they were in second place. While disappointed by a setback in the second half of the year, Kerns likes the competition. "If you win, you get bragging rights and if you don't, you still have five more buildings benchmarked."

Kerns completed BOC Level II training in early 2015. Another advantage he sees to the program is one that is echoed often by grads: networking with facilities management peers. While regularly utilizing utility incentives and rebates, Kerns found out about another cost saving measure through a network contact. "We have two points of taking electricity into the campus and the separate metering led to two demand charges. My colleague told me about one of the more arcane programs at our utility (Northwestern Energy) called 'coincident metering' where they basically make those two meters behave as one." The result is that the demand charge for one coincident meter set up is larger but considerably less that the sum of the two.

The projects continue with the next major one a $1.2 million upgrade of building controls at one of the main campus' most energy-intense buildings, the Lommasson Center, which serves as an administrative hub and houses the cafeteria. Several wings have been added over time and systems are either older pneumatic ones or simply a "mish-mash" of various controls systems. Recent budget restraints have pushed the timing of this out a bit, probably to the spring, but they continue with other measures and will continue to benefit by having the enthusiastic support of the university's student body

** In the control of HVAC systems, supervisory and optimal control aims at seeking the minimum energy input or operating cost to provide the satisfied indoor comfort and healthy environment, taking into account the ever-changing indoor and outdoor conditions as well as the characteristics of HVAC systems.*

Recycling, Reclaiming, Sustaining

The Rhode Island Resource Recovery Corporation (RIRRC) in Johnston, RI, processes the majority (all but one town) of the state's municipal and commercial waste. Established in 1974, the facility has a staff of 107, three of whom are BOC graduates and the core of the facilities maintenance team: Gary W. Maddocks Jr. (chief of security and maintenance), Anthony Zanni (facility maintenance technician), and Richard Fallago (FMT as well, and also BOC Level II certified).

> ***"We are always looking for ways to save energy and BOC provided us with valuable information, training, and experience."***
>
> *– Anthony Zanni*

As a reclamation and recycling center, a heavy emphasis on energy conservation is no surprise. As Zanni notes, "We are always looking for ways to save energy and BOC provided us with valuable information, training, and experience." Zanni took the training in 2015 but had also taken Level I several years ago when it was first offered in the area. Three years with RIRRC and 35 in facilities management has made him well aware of the rapid technological changes that the field has experienced and he figured an update of the training would help.

Zanni has been working with the RIRRC FM team on a three-year effort to update the lighting in the various buildings at RIRRC. The three-stage project was developed with Bluestone Energy Services (now Opterra Energy Services), an energy consulting company, as well as with local utility National Grid (a long-time BOC sponsor). Both interior and exterior lighting was switched from incandescent, fluorescent, and high-

Rhode Island high school students listen attentively as their RIRRC tour guide explains the state's recycling process at the Education Center.

There are various types of recycling systems and until the new facility came online in 2012, the state was a paper bin/container bin recycler, which tends to discourage people, especially in the commercial sector, from recycling. The new system was retrofitted to serve as a single-stream system, using a combination of manual, mechanical, and optical sorting, so that customer sorting was not needed. Indeed, in its first year of operation, a year-over-year comparison with the previous 12 months revealed a seven percent increase in recycled tonnage. Amazingly, while they converted their old dual system into the current single-stream one, they remained entirely operational, with the exception of a four-hour period in the initial testing phase.

pressure sodium lighting to state-of-the-art LED and the increased illumination has greatly enhanced both security and safety in and around the buildings. Lower maintenance costs are another benefit and ROI's for the three projects range from about 30 to 60 percent (See chart below for details.). Lighting options were chosen as appropriate to function, of which there were many: parking lots, offices, warehouses, recycling processing. All exterior LED lighting used fixtures with "shades" to avoid light pollution. They have even outfitted their service trucks with LED lighting.

Touring the RIRRC's facilities is a real eye-opener. Besides the landfill, which is the largest and most heavily regulated one in New England, there are eight buildings: administration, composting, wood processing, tipping, electric power generating stations, small vehicle acceptance area, an eco-depot for hazardous waste, and the Materials Recycling Facility (MRF), all contained in approximately 1,200 acres. In 2013, the Solid Waste Association of North America (SWANA) named the MRF Facility of the Year for North America. It is also one of the largest recycling facilities in the northeast.

Another aspect of RIRRC's efforts to improve recycling in the state is to get the word out. Their web site (www.RIRRC.org) has several videos available that explain the dos and don'ts of the new single-stream process. You can also arrange a site tour by going online and the MRF building has a classroom set up where kids can come to understand the importance and the "how-to" of recycling and make it a part of their daily life.

The videos and, even more so, the on-site tour give an idea of why the lighting projects were so important. While sophisticated technologies are being used, there is still a big element of manual work and sorting that needs to be done. Glass that gets broken might not be seen and cause injury; sorters might let refuse that is not recyclable go through the system, resulting in a poorer quality recycled product. High-ceilinged warehouse areas, such as the tipping area where trash and recyclables are delivered have much stronger, whiter light.

Projects	2013 Center LED Project	2014 Tipping Facility Lighting & Sensors	2015/16 Exterior Lighting & Sensors
Annual Lighting Energy Savings	$12,052	$12,249	$11,656
Annual Lamp Maintenance Savings	$5,000	$872	$611
Annual AC Savings	na	na	$1,592
TOTAL Annual Savings	**$17,052**	**$13,121**	**$13,859**
Total Project investment	$80,961	$65,059	$51,466
Utility Incentive	$25,934	$19,275	$29,292
Net Project Investment	$55,027	$45,784	$22,174
Project Payback (in years)	3.23	3.49	1.6
Return on Investment (ROI)	31%	29%	63%

The members of RIRRC FM team are constantly looking for ways to improve efficiency in their efforts to recycle, reclaim, and sustain. A resource like BOC helps them stay abreast of new opportunities in this rapidly changing field.

Getting to Know a New Facility

Ali Wandy
Operating Engineer
King County Environment Lab
Seattle, Washington

Ali Wandy has been in facilities management since 2000, starting at entry level tech work in hotels and apartment complexes, progressing to mixed-buildings, then hospitals. At each step of the way, he learned more. He got several licenses and certifications for HVAC issues and has 4,000-plus hours of electrical training and education – all in an effort to advance in the work he relishes.

"You'll be successful in your field if you love what you're doing, and I love what I do," says Wandy. So where is he now? Since 2011, Wandy has been the operating engineer at the King County Environmental Lab in Seattle, Washington. The building is a 43,000 square foot facility on the water canal that connects Lake Washington to the Puget Sound – apropos for a full service lab that is purposed to protect the local water quality. "The lab provides the expertise to identify the extent of any problems that may occur in the area and to help natural resource managers make informed decisions about how to minimize harm to the environment, people, fish, and wildlife."

When Wandy started at the lab in 2011, he had only a week to come up to speed on the facility. He did his walk-through to find efficiency opportunities. "I found a good opportunity to save some energy by converting old 32 watt T12 fixtures, high-wattage halogen bulbs, and metal halite bulbs to a low-watt LED bulbs or new LED fixtures. I also found low-cost or no-cost repairs and adjustments to HVAC controls to get some extra savings on energy usage," he notes. There were also many no-cost/low cost HVAC tweaks he implemented, such as removing operator overrides, changing schedules to match needs, calibrating sensors to actual readings, and changing temperature setpoints for outside air to maximize benefits of free cooling.

In the first stage of the lighting projects, Wandy estimated the yearly savings were 94,932 kilowatts (kWh), and a reduction of 50 tons per year of greenhouse gas, with a

*(Continued on page 7 see **BOC GRADS**.)*

With this issue we present our second round of Q&A columns, one with a BOC sponsor and another with a BOC instructor, which detail the benefits each sees in training.

Q&A With NorthWestern Energy

How did you first hear about the BOC program and how long have you been involved?

NorthWestern Energy has been involved with BOC through NEEA (the Northwest Energy Efficiency Alliance) since the early days. We have hosted classes since 2001 with emphasis on building operators in public schools, government, and non-profit hospitals.

Why does your company sponsor the program?

We started out with an interest in providing more in-depth training of building operators in our markets. If building operators are more aware of energy usage and the opportunities to save energy, they're more apt to adopt energy efficient operating practices, including specifying high efficiency equipment when the opportunity arises. It also gives us an opportunity to draw more participation to our energy efficiency programs, highlight specific incentives and rebates available, and provide cost effective energy savings strategies.

How do you go about promoting the training to your commercial and institutional customers?

We promote BOC through email, an electronic newsletter, our website, and at targeted association meetings with booths and speaking engagements. The emails are to individuals and to associations. We also partner with the Energy Office folks at the State of Montana for additional promotion across all sectors and with the Lt. Governor's Office for the Smart Schools program. Our promotion is to ALL commercial sectors but we sweeten the pot with tuition waivers for the public schools, government, and non-profit hospitals, where tuition barriers can be a concern. A lot of it is word of mouth though. I send the information to those who have been through the program and ask them to share it with someone they think would benefit from training.

Are there any sectors you'd like to see participate that are not?

Where we don't get many from is the hotel and lodging industry. They would benefit so much from sending their people to BOC. It can be costly to send people to training, in terms of time, travel costs – especially in this area. Many properties have only one building operator and can't have him or her gone for the required time to attend classes. We are piloting a webinar version of the 1003 session in 2016 in lighting to see if this makes it available to more people.

What benefits do you see BOC providing for its participants?

In addition to what we discussed already, the classroom setting for a group of participants allows building operators to hear the perspectives and issues of others. In fact, I promote networking by moving people around each session and making sure that everyone meets. I tell them I'm going to do it, that we are there to create a network of varied resources that they can reach out to when they go back to their facility.

Do you know of particular success stories from any of your clients that resulted from their BOC training?

There are several but School District No. 2 in Billings, MT is a good example. They started with four attendees but felt doing it a few at a time wasn't enough so they invited us to set up a training for the rest of the district facility maintenance staff – 28 more people – and they are now an ENERGYSTAR-rated school district. *(Editor's note: Billings has 30 K-12 schools with over 16,000 students.)*

Is there anything else you'd like to add?

It's exciting to see a growing interest in energy management and in the evolution of new approaches in the courses for BOC. We look forward to how on-line courses will allow greater participation in rural markets like Montana, bringing the classroom to the facility operator rather than always requiring the travel time and expense.

This discussion was with Betsy Pahut, DSM Professional of NorthWestern Energy.

Q&A With BOC Instructor John Welch

How did you become involved with facilities management?

Out of college with my electrical engineering degree, I started at Detroit Edison in Michigan in the primary service division. I wanted a larger corporate environment and it proved to be a really good starting position because there were numerous high-profile customers that demanded a lot, and challenged me to be on my game technically and interpersonally. It also helped my social skills in the business world because very quickly I had to become a good listener and fast problem solver in servicing high voltage and medium voltage 24/7 users of electricity.

When and how did you hear about BOC?

I met Gail Edwards of Gwinnett Technical College (a BOC Partner) through a mutual friend at a Chamber of Commerce meeting in 2008. She was talking up the BOC program and thought that I might be a good fit with my background. I had never really taught in a classroom setting before, although I had done a lot of electrical safety training. So I started teaching a few classes here and there. Now I just enjoy the heck out of it – I've been to a bunch of different BOC locations throughout the country and have just met some great people. It's regular folks getting practical training from industry professionals, not just some dry, book-oriented class.

Obviously your area of expertise is electrical engineering but what do you think is your specialty within this as it connects with the BOC training?

I do the electrical classes at both BOC levels. I like to do a lot of hands-on training, which can be tricky to do with electricity without getting people hurt and ruining the day, so I built this little electric panel and use it to do a skit on safety at the start of my classes to teach them AHA (activity hazard assessment). Some students tell me it's a highlight of the class.

The stat is that six to ten electrical workers get burned per day so that within the EE field, electrical safety is very near and dear to my heart. I've built my business around it and process drive the work with electrical managers to create risk management programs for their staff. It's not improving without strong leadership because the systems are getting more complex. Training is crucial and a lot of industries aren't investing in their FM staff for this – they outsource instead of educate and what do you think that does to internal FM staff morale?

What do you see as the greatest challenge to facilities management in your particular field? To facilities management in general?

Within the industry, I think one of the biggest challenges is that there is stereotypically a lack of focus on the full life-cycle cost of running a building and not concentrating on preventative action. Our buildings are becoming obsolete. Continuously developing technologies requires more energy and we need to account for that. It's a lot better to be out in front, steering rather than pushing. Many technologies don't have a chance to go through proper development cycles and so tend to have shorter life cycles and equipment failures.

Is there anything that surprises you when you teach BOC classes?

One thing that surprises me is that because many of the students have been out of school so long, some have lost the basic math skills. Not a lot, mind you, but some. So I spend the time necessary at the beginning of each class to drill them on Ohm's Law until I'm sure everyone gets it. It's the basis of everything I do.

Do you have any FM tips you'd like to share?

The facilities management world is underbudgeted, under-trained, and overworked. When you have a system like that, the solution is process. Process, with the right tools in front of people, allows them to standardize what they do every day and allows them to be more efficient

John Welch, PE, MBA, EE, CEM, CDSM and licensed electrician, has been teaching BOC since 2008. He is the president of Bowtie Engineering (www.bowtie8.com) in Atlanta, Georgia.

(Continued from page 5.)

payback of 1.6 years and 63 percent return on investment (ROI), resulting in estimated $5,981 in annual cash savings. The second stage was done in 2015, and the estimated yearly savings were 82,000 KWh per year and 49 tons per year of greenhouse gas reduction, translating to an estimated $5,210 in annual cash savings, a 19 percent return on investment and 5.1 years payback. ROI and payback estimates include incentives from local utility Seattle City Light of $14,700 for the first project and $17,541 for the second.

It was not easy coordinating the conversions though. Doing them in-house saved thousands but also had scheduling issues, since the labs are constantly in service. Lighting changes can be troublesome for building occupants who get used to status quo. "Some staff did not take to the new color or intensity of the LEDs versus fluorescent tubes. In time everyone started to love the new lighting, especially hearing about the savings, and some were very pleased to know that we replaced all high mercury bulbs with zero mercury LED bulbs," he explains.

In 2012, Wandy heard about the BOC program through the King County Energy Program. Funds were available to underwrite tuitions and he completed Level I. "Anyone involved in building management can benefit from BOC. I have attended a lot of different types of training but I think BOC is really good because the instructors are so knowledgeable," says Wandy. Now in Level II, he says that he'll sometimes try to "test" an instructor by asking something he may know the answer to. He tried this in his recent HVAC class. "Duane was amazing – came back at me with the answer and gave me even more information. That's teaching." (Hat-tip to long-time BOC instructor Duane Lewellen!)

Wandy also says that the people he meets in BOC classes are dedicated to their buildings. "The people I have spoken with take responsibility for the building – they call it "my building" as if it's personal."

So what's up for future projects? A big one on the horizon is fume hoods in the labs. Fume hoods are huge energy consumers because they tend to be on 24/7 since they need to be available to researchers and lab technicians. But they aren't actually used a good bit of that time. As noted above, the labs are in constant service so scheduling is difficult.

Wandy believes the issues can be overcome with good planning. "I love to go to work because it's another day I will find a new challenge."

BOC's Updated Website Has a New Look and Enhanced Features!

Head over to theboc.info and check out:

- Easier ways to find training opportunities with a simple zip code search and provider listing
- Access to energy savings reports that prove the BOC training and certification save facilities money
- Streamlined information on what the BOC program can do for you and your facility
- New responsive design
- Mobile friendly: Register for courses, watch webinars, and read articles from your smart phone or tablet.

Show Your BOC Pride!

Check out the online BOC Shop where you can purchase t-shirts, polos, hats, mugs and BOC patches to highlight your well-earned BOC credential. BOC handbooks are also available to keep you up-to-date on the latest in the field! Visit **www.shop.theboc.info** for available products.

You can also read about the continuing success of the fully BOC-certified team at McFarland Clinic, BOC caps on display, in the BOC Grads *Making a Difference section on page 3.*

Stop Water Infiltration

Inspection and maintenance tips for failing envelopes

By Janelle Penny

Inspection and maintenance tips for failing envelopes.

Water infiltration is the biggest culprit in envelope failures, but its causes range widely. Frequently the result of multiple factors converging over time, leaks can take years to show up – and if you can see water on the inside, significant damage to your envelope is likely.

"By the time water shows up on the inside of your building, it's had to pass through a lot of materials to get there," explains Michael Smith, a design consultant for Wheaton Sprague Engineering, a professional services practice focusing on facades, envelopes, and curtainwall.

Repairing a damaged envelope becomes costly very quickly. Stop pending exterior failures in their tracks by spotting them early and taking appropriate action.

5 Reasons Why Exteriors Fail

"All areas of the building are susceptible to different types of failures, but the building envelope in particular comprises most of the failures we commonly see," explains Dustin Smoot, Department Manager of the Forensic Sciences Group for Pie Consulting & Engineering. "Knowing the causes of the failure can help you monitor the building to prevent a catastrophic event."

If you're not keeping an eye on trouble spots and early symptoms, you may not discover a slow leak until considerable damage is done. Deficiencies like the ones below can build on each other to exacerbate an issue.

1) Thermal expansion and movement: "One big problem that we see repeatedly is a lack of accommodation for thermal expansion and contraction," says Warren French, President of French Engineering, a specialty engineering firm focusing on roofing, waterproofing, and curtainwall. "Nature will do a good job of opening joints and cracking materials, whether they're stone, cladding, or masonry. Movement leads to cracking, which leads to water intrusion that overwhelms the flashing systems."

This problem is particularly pronounced in areas like the Midwest where wide temperature variations can wreak havoc on improperly flashed buildings, says Bill Derrick, President and CEO of Derrick Building Solutions.

"Our temperatures can vary from 30 to 100 degrees F.," explains Derrick. "That can wear on joints around walls and wall openings. Many of the failures we find are around openings in the walls, such as windows and doors, that weren't properly flashed when installed."

2) Improper specification: Areas like docks have special needs depending on the type of building they're attached to, explains Walt Swietlik, Director of Customer Relations and Sales Support for RiteHite, a manufacturer of loading dock equipment. That's why it's imperative that you make your designer aware of how you'll use the space.

"The most common problem is specifying the wrong size of dock door, which can lead to all kinds of contamination issues," Swietlik explains. "The same thing happens with types of dock enclosures – the client will specify the wrong type for the way they intend to load and unload trailers. Far too often, we see clients who need access to the back of a trailer. They want to be able to open the building door and see nothing but the trailer's walls, floor, and ceiling, which would normally require a dock shelter for the trailer to back through. Yet they'll specify a dock seal – an enclosure that seals tightly and creates a gasket between the outside of the building and the trailer – even though it will significantly limit access to the back of the trailer. Forklift drivers hit the product and it fails prematurely."

3) Drainage areas: Wherever water drains, leaks can occur. This is especially true along the top of the building, which shoulders the largest share of storm damage.

"If a building has gutters and downspouts, those are probably the No. 1 reasons we have leaks and failures," says Smith. "That's due to a combination of being underdesigned, the amount of rain drainage, or most commonly, a lack of maintenance and routine inspections. Gutters and downspouts get clogged and are prone to wind damage."

Buildings with a collection-and-weep system (internal drainage that allows water to enter and exit masonry and stone) require floor-to-floor flashings that collect and expel water. However, the flashings may not be properly integrated with other components and weeps must remain unobstructed, French adds.

4) Construction defects and poor repairs: Joint seals and transitions are especially vulnerable to deferred maintenance and poorly executed repairs. One case Smith tackled involved an expansion joint for a gutter on a centuryold building. Smith determined where the joint should be, but when he went to find it, the joint was missing.

"Somewhere along the line, a maintenance person decided to take it out when they didn't have the money to repair it," Smith explains. "In doing so, water flowed in different directions, and all of a sudden gutters that weren't intended to handle that much water were getting more than they should."

5) Incompatible materials: Watch out for compatibility issues with repair materials, Smith says. Heading to a home improvement store when you need caulk can backfire, as bigbox stores generally don't sell the highperformance caulk used in commercial construction and your purchase may be incompatible with the existing building.

"People also don't think about incompatible metals," adds Smith. "If you put galvanized steel across a copper roof to extend a downspout, the copper will eat the less noble metal. If you're doing maintenance, use compatible materials, and if they're not compatible, separate them."

Intercept Issues with Inspections

Inspect your building at least twice a year, preferably after winter and summer, and immediately following high winds or storms that could have caused damage, French recommends. Look for cracks, wear and tear on sealants and paint, and cladding or siding that appears to be detaching.

"The biggest preventive maintenance requirements relate to components that wear out quickly, such as sealants," explains Ted Sheridan, President of Fishburn Sheridan & Associates Ltd. and Region VII Director for RCI, an international association of building envelope consultants. "They prevent moisture from infiltrating from the outside and slow down related deterioration. That's a good first step."

Look closely at the areas where window frames meet the building to see if the caulking is splitting or cracking. These adhesive failures can lead to insidious leaks that may not be noticeable from the inside, Smith recommends. If your building has wooden window trim, look for signs that the trim is rotting – that usually indicates more wood in the wall behind it has deteriorated, Smith adds.

Some signs indicate more than a need for maintenance. If one of these red flags appears, take immediate action to ensure safety isn't compromised.

Falling debris: "When you start seeing slates slide off a roof because a 100-year-old copper or iron fastener has weakened, that's an obvious hazard," Smith says. "We've seen this in schools – talk about a scary scenario.

(Article continued online. See listed link below).

Janelle Penny is senior editor for ***BUILDINGS*** *magazine.*

This article originally appeared in the August 2015 issue of ***BUILDINGS*** *and is reprinted with permission. For the complete version of this article, please visit www.buildings.com and enter the search term "water infiltration". The direct link is* ***http://www.buildings.com/article-details/articleid/19189/title/stop%20water%20infiltration/viewall/true.aspx***

Also, you can earn 1 hour of credit towards your BOC renewal by taking a quiz on the material in this article at ***www.theBOC.info****.*

After scanning various online sources, the Tech Horizons column highlights current or soon-to-be-available technologies and techniques either currently or soon-to-be available for facilities personnel to implement in their buildings, summarizing the developments, and providing links for more detailed information.

FROM BUILDINGS.COM:

The Next Frontier in LED Efficiency

The savings benefits of LED lighting are well known. This October 2015 article details the added benefits of raising the bar of LED fixtures by adding daylight and occupancy sensors into the fixtures themselves. "The LEDs integrate advanced lighting control systems (ALC) that can switch, dim and brighten lights in response to daylight and occupancy."

In the two cases explained in the GSA evaluation (performed by the Lawrence Berkeley National Laboratory for GSA's Green Proving Ground), the ALC-integrated LED lights replaced fluorescents using legacy wiring. The fixtures are assigned zones and, once set up, communicate wirelessly and can operate as part of the zone group or individually. According to one of the facilities building managers, "The system was so easy to set up that it literally took us less than an hour to commission all 300 fixtures."

Please see the full article at:
http://www.buildings.com/article-details/articleid/19404/title/the-next-frontier-in-led-efficiency.aspx or go to www.buildings.com and use the search term "ALC-integrated LED".

FROM NHSAVES:

Commercial HVAC: Fifteen Energy Saving Technologies

As this article notes, "HVAC systems account for more than half of the total energy consumption in commercial buildings."

This piece summarizes the different types of HVAC technologies currently available and describes the purpose of each. Of course as noted, not all of the technologies serve every situation but this provides a great thumbnail of each type.

Please see this summary at:
http://www.nhsaves.com/business/commercial-hvac-fifteen-energy-saving-technologies/ or go to www.nhsaves.com and use the search term "Commercial HVAC".

FROM CNN'S MONEY SITE:

How to make your "dead" battery last eight times longer

With so many devices these days using disposable batteries, would it surprise you to know that when that AA battery in your handheld or remote goes dead, there's actually about 80% of the battery's power still there? A new technology, made commercially available in the fall of 2015, can extend battery life as much as 80 percent.

The Batteriser currently comes in AA, AAA, C and D. Fifteen billion disposable batteries are bought annually world-wide, as the article notes, and the typical American household has 28 battery-operated devices.

Please see this piece at:
http://money.cnn.com/2015/06/02/technology/make-battery-last-longer-batteriser/?sr=cnnmoneybin060615battery0900story or just Google "Batteriser".

Check out BOC's Technical Webinar Series!

The BOC web site (www.theBOC.info) offers both live and recorded webinars, available for viewing at your convenience. Complete a quiz at the conclusion of the session and you can earn 1.5 points towards maintaining your BOC certification. Visit the BOC site to check out current options of recorded webinars, as well as the schedule for 2016 live sessions.

New sessions for 2016 Building Tool Diagnostics Series will cover:

- **Temperature and CO2 Loggers**
  – *February 10th*
- **Managing Your Plug Loads**
  – *March 16th*
- **Occupancy and Lighting Data Loggers**
  – *April 26th*
- **Infrared Cameras**
  – *May 18th*
- **Addressing Indoor Air Complaints**
  – *September 15th*
- **Managing Water Use in Your Facility**
  – *October 13th*

Check out the BOC web site for details. And remember, BOC graduates who maintain their certification receive a 20% discount on the BOC webinars series.

New to BOC?

Register for a FREE Informational BOC Webcast:

BOC Informational Webcasts are for newcomers to the program. Learn about 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, starting at :

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

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

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

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

The next live broadcasts for 2016 are scheduled for **February 3rd, March 9th, August 10th & September 14th.** Please note that pre-recorded webcasts can be downloaded from the BOC website 24/7

To sign up go to: **www.theBOC.info**

Stay Ahead: Prep for BOC Maintenance Now!

To maintain BOC certification, graduates must accumulate maintenance points each year following a full calendar year after their certification. Level I maintenance requires 5 points each year and Level II requires 10. Points may be earned as follows:

- Continued employment in building operations ..... ***2 points/year***
- Continuing education in building operations..... ***1 point per hour of classroom time***
- Energy efficiency projects completed at your facility..... ***Up to 11 points/year***
- Membership in a building operations association ..... ***1 point/year***
- Offices held in membership associations..... ***2 points/year***
- Awards received for efficient building operations..... ***2 points/award***
- BOC newsletter tech article quiz (see page 9 for details) ..... ***1 point/passed quiz***
- Completion of an energy consumption benchmark for the previous twelve-month period using Energy Star® Portfolio Manager or alternative energy accounting tool ..... ***3 points/year***
- Enrollment in a BOC webinar and completion of its quiz (See webinar announcement on this page) ..... ***1.5 points/passed quiz***

BOC graduates whose certification expires March 31, 2016 should have received their applications via email and US mail the week of January 5th. To complete the application, certificants will report maintenance points (Level I maintenance requires five points and Level II requires ten) and submit the maintenance application fee ($65 for either Level I or II).

Use our HELP Desk (1-877-850-4793), whose knowledgeable staff can address questions and assist with the maintenance application. ***The deadline for application submission is March 31, 2016.***

Are you a Current Credential Holder?

WIN FREE STUFF! – Twice a year, current credential-holders may enter a drawing to win merchandise such as BOC gear from our Shop, diagnostic tools, or reference manuals. Our next drawing for a BOC hat, mug or shirt is April 1st.

Congratulations to the winner of our October drawing, **Allen Howen** of Energy Systems Group in Independence, Missouri!

Enter to win here:

https://www.surveymonkey.com/r/WinterSpring2016

Another Benefit for BOC Certified Operators

BOC graduates who maintain their certification receive a ***20% discount off the BOC webinar series.*** Watch for details of new offerings at the BOC website (www.theBOC.info).

Find a BOC Training in your area

When such a high value is placed on energy efficiency, knowing how to run your building at its optimal performance is an essential skill set for building operators. Join the growing number of facilities professionals that recognize the value of BOC certification, both for their facilities and for their own career paths .

BOC Level I Certification

The Level I series comprises 74 hours of training and project work in building systems maintenance. There are six core classes, complemented by one supplemental class, selected by area program administrators to enhance the BOC training experience specific to their region of the country.

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 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 Hawaii, Montana to Texas – and now even Ontario!

National Conferences & Symposiums 2016

NFMT (National Facilities Management & Technology) Conference/Expo
Austin, Texas • May 3-4, 2016
MORE INFO: www.nfmt.com

IFMA Facility Fusion 2016 Conference & Expo (Canada)
Montreal, Quebec • May 4-5, 2016
MORE INFO: www.ifma.org

Facilities Expos by Cygnus
Southern California
Anaheim, California • May 18-19, 2016
Northern California
Santa Clara, California • September 2016
MORE INFO: http: //www.facilitiesexpo.com/

Association of Energy Engineers (AEE) Conferences & Technology Expos
West Coast Energy Management Congress (EMC)
Seattle, Washington • May 25-26, 2016
World Energy Engineering Congress (WEEC)
Orlando, Florida • September 21-23, 2016
MORE INFO: www.aeecenter.org/shows/

American Public Power Association (APPA) National Conference & Public Power Expo
Phoenix, Arizona • June 10-15, 2016
MORE INFO:
www.publicpower.org/NationalConference

BOMA 2016 International Annual Conference & Expo
Washington, DC • June 25-28, 2016
MORE INFO: www.boma.org

American Society for Healthcare Engineering (ASHE) 53rd Annual Conference
Denver, Colorado • July 10-13, 2016
MORE INFO: www.ashe.org/annual

I2SL (formerly Labs21) 2016 Conference
Kansas City, Missouri • September 25-28, 2016
MORE INFO: www.i2sl.org

IFMA World Workplace 2016
San Diego, California • October 5-7, 2016
MORE INFO: www.ifma.org/events/

Continuing Education Opportunities for Certification Maintenance Points

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 maintenance. Check out the Education, Professional Development and Events Calendars at these sites.

ASHE:
American Society for Healthcare Engineering
www.ashe.org

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

BOC:
Building Operator Certification
Live and recorded seminars
www.theBOC.info/m-live-webinars.html

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

BOMI:
Building Owners & Managers Institute
www.bomi.org

Energy Star®:
Live web conferences, pre-recorded trainings, self-guided presentations
www.energystar.gov/index.cfm?c=business.bus_internet_presentations

Energy University :
http://www2.schneider-electric.com/sites/corporate/en/products-services/training/energy-university/energy-university.page

A FREE online educational resource offering more than 200 vendor-neutral courses on energy efficiency and data center topics to help you identify, implement, and monitor efficiency improvements within your organization.

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

GreenBuild:
US Green Building Council
www.usgbc.org

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

IFMA:
International Facility Management Association
www.ifma.org

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

PNNL:
Pacific Northwest National Laboratory
http://retuningtraining.labworks.org/training/lms/

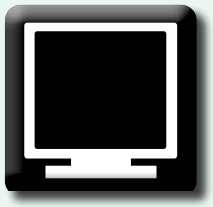
This interactive online class, Building Re-tuning, enables you to learn the initial steps involved in re-tuning a building controlled with a building automation system (BAS). Interactive exercises are included to provide you "hands-on" practice of the re-tuning process within a virtual building. Training takes about six hours to complete but does not have to be done in one sitting, and entitles you to six maintenance points .

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 brings you to a database of state incentives for renewables and efficiencies.

BOC:
You can also follow us on Facebook or visit our blog at the BOC website:

www.theBOC.info/blog



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Partners in the BOC program include: Canadian Institute for Training, Energy Training Foundation (South Africa), Focus on Energy, Gwinnett Technical College, Intermountain Building Operators Association, Midwest Energy Efficiency Alliance, National Sustainable Structures Center at Pennsylvania College of Technology, New York State Energy Research & Development Authority, Northwest Water & Energy Education Institute, Northwest Energy Efficiency Council, Pellissippi State College, Sacramento Municipal Utility District, Santa Fe Community College, South Carolina Community College System BOC Consortium, South-Central Partnership for Energy Efficiency as a Resource, University of Hawaii – Maui College, and University of Hawaii – Manoa.

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