SUMMER/FALL 2007

THE
# BOC Bulletin

A Newsletter for BOC Graduates, Enrollees and their Employers

# Creative Cooperation for More Efficient, Cleaner Energy

Jim Gorman, Facilities Manager for Roche Molecular Diagnostics (RMD) in Pleasanton, California has been committed to energy conservation and sustainability ever since the early stages of the 1999-2000 California energy crisis. He and his staff have identified and implemented numerous energy conservation projects at the 180,000 sq. ft. Pleasanton facility, which is comprised of office, lab and warehousing space.

*A view of the PV panels installed at the Pleasanton, CA facility.*

Key success factors involved fine tuning of the building automation system (BAS) to ensure equipment only operated when needed and that set points were optimized for efficient operation. By optimizing the BAS and lighting controls, huge energy consumption savings were realized quickly, with very little financial investment. Results included a total energy consumption reduction of 66% (1998 vs. 2001). While some of the energy savings were related to temporary reductions in site operations in 2000, most were related to changes made to the BAS and a few small capital projects.

Early capital energy conservation projects provided a very large energy-savings return with little financial investment. Two energy projects included retrofitting an 800-ton centrifugal chiller with an AFD/VFD, and the replacement of an oversized air compressor/air dryer with a much smaller, "right sized" compressor/dryer combination. These modest changes to large energy-consuming equipment provided significant energy reductions, high internal rates of return (IRR), and extremely short periods for returns on investment (ROI).

The next step in the sustainable energy program after implementation of the energy conservation measures was to look at renewable energy options. In early 2002, photovoltaic (PV) panels were researched to see if they were a financially viable solution. Unfortunately, the project analysis showed this to be a poor business model, with a negative NPV (net present value), and a simple payback period of over eleven years.

"You should start by implementing energy conservation measures before jumping into renewable energy," according to Gordon. "Optimize the building operation using existing tools

*(Continued on page 8.) See* ***Creative Cooperation.***

## *ARTICLES*



## *Reminder:* 2007 BOC Grads

*By March 2008, you will need Continuing Ed credit to renew your Level certification. Level I renewal requires 5 hours annually and Level II requires 10 hours. See page 10 in this newsletter for details.*

# Tightfisted Ways to Cut HVAC Costs

## *No budget for new equipment? Don't give up. A little money and a fresh look at what's already in place can bring big savings*

*by Lindsay Audin*

Energy costs for HVAC systems can be reduced through many small efforts requiring little or no capital investment. Reputable building management firms have claimed up to 24 percent savings from the latter, making such actions worth a close look.

Some of these measures might be called low-cost - that is, they pay for themselves in a year or less through avoided energy expenses. Other steps qualify as no-cost because they require only staff time.

Where can facility executives find such low-cost/no-cost savings? Four areas are worth looking into:

- **Controlling outside air more effectively**
- **Fully exploiting existing capabilities**
- **Minimizing simultaneous heating and cooling**
- **Using more efficient replacement components**

What may be cost-effective at one facility, however, may not be at another. Even if an option has no out-of-pocket expense, savings may vary because of local climate, current energy pricing, type and age of equipment, use of an energy management system, and staff availability, knowledge and experience.

### *Get the Most Out of Outside Air*

Depending on local climate and the amount of air being recirculated in a building, conditioning outside air may account for a significant portion of cooling load. Spaces that can hold many people at one time (e.g., theater, auditorium) and those that cannot recirculate air due to tasks being performed (e.g., labs, hair salons) spend a lot to heat, cool, humidify or dehumidify outside air before bringing it into a building. In such cases, existing VAV control should be maximized. At some times, it may be possible to reduce air flow to a lower minimum level without violating fresh air requirements. Flow measurements and a check of the building code could yield major savings at practically no cost.

Even where most air is recirculated, however, judicious use of outside air can help cut HVAC bills. An economizer cycle uses outdoor air instead of return air to cool a space when the outside air is significantly cooler and dryer than return air. Depending on outdoor humidity, using more outside air in the 60-65 F range may provide some "free" cooling. When outside temperature is sufficiently low (below about 52-57 F), chillers may be shut off and 100 percent outside air used to perform all necessary cooling. Doing so may involve only changes to EMS programming or alterations to outside air damper linkage settings.

With a bit more sophisticated programming, and possibly the addition of a humidity sensor, even higher temperature outside air may be used, especially in dry climates. By comparing return air wet-bulb (instead of just dry-bulb) temperature to that of outside air, the differential enthalpy value is taken into account (enthalpy measures the total heat content of air, including that held by its moisture). Dry air in the high 60s F may hold much less total heat than moist return air, for example. From the point of view of a cooling coil, maximum use of such outside air makes its job easier.

To maintain an odor-free facility, close outside air dampers as far as possible. Outside air intakes should also be closed at the end of the working day. In spaces that are chronically occupied after 5 p.m., add a window air conditioner that can exhaust air, or a local exhaust fan, so that large air handlers may be shut down at the end of the typical workday. Look for units with built-in timers that shut units off when occupancy is highly unlikely.

As outside air dampers age, they may not close fully or seal tightly in the closed position. Adding edge seals (flexible plastic strips designed to improve sealing) may be an inexpensive way to cut damper leakage, especially in cooler northern climates.

Avoid over-conditioning outside air. In one case, seasonal settings for humidity were reversed in an EMS, forcing wet summer air to be dried to about 35 percent humidity and humidifying dry winter air to 65 percent. The building was comfortable, but chillers had to labor to remove the extra moisture, reheat coils worked overtime to keep anyone from getting a cold shoulder, and electric humidifiers raised winter power bills to a new high. Unless special health requirements are involved (for instance, in a hospital), try humidity settings that are lower in winter and higher in summer. In a one-day test, shut off winter humidification. You may be surprised to find that nobody notices it.

Outside air may be used to pre-cool at night by pulling heat from the considerable mass of a building's floors and interior structure. Cooling such materials with night air reduces chiller load during the first few hours of the next day. Research is needed before pursuing this option, however. Where night electric rates are roughly the same as daytime rates, or evening air is humid, the net effect may be to raise, instead of lowering, energy bills. Even assuming night dry-bulb temperature is low, the cost to run fans for 8 hours

*You can complete your reading of this article on the Web at*
***www.facilitiesnet.com/bom/article.asp?id=5391&keywords=hvac,%20energy%20efficiency***

### About the Author

*Lindsay Audin is president of EnergyWiz, an energy consulting firm based in Croton, N.Y. He is a contributing editor for Building Operating Management.*

# The Commercial Kitchen: Overlooked Energy Savings in Your Most Ignored Room

*by Richard Young*

Every big building has at least one and yet the commercial kitchen, from an energy standpoint, is the most ignored room in the building. Since food service operations are usually managed by an outside company, such as Marriot or Sodexho, and most appliance repairs are handled by a service company, most building engineers have the feeling that the kitchen is not their responsibility. But sub-metered kitchens are extremely rare, which means that the food service operator has no incentive to control energy use – effectively passing that responsibility back to the building engineer. If the food service operator is billed for energy, it is often on a square-foot basis that is equivalent to the rest of the building. This is a great deal for the food service company but not so good for the building owner since the kitchen can use as much as five times more energy per square foot than basic office, lodging or retail space. In other words, the kitchen is one of the most energy intensive spaces in your building and you ignore it at your own peril.

*How much energy do you think this kitchen uses?*

Fortunately there are resources and strategies available to building engineers that can help get a handle on what's cookin', energy wise, in their commercial kitchens. The biggest step, if possible, is to sub-meter the utilities (gas, electric and water) and find out just how much of these expensive commodities the kitchens are actually guzzling. This also provides a baseline against which you can measure (and prove) energy savings.

On the operations side, one of the easiest things you can do to save energy in the kitchen is to retro-commission any energy-management systems, including everything from broken occupancy sensors and twist timers to lighting panels, defrost time clocks and the building EMS. It is not unusual to find kitchen exhaust hoods that run 24 hours a day because the energy system was on override.

On the list of new, clever energy-management tools – and one of the systems best suited to institutional kitchens – is "demand controlled" kitchen ventilation. By using sensors and variable frequency drives to modulate the kitchen exhaust fan-speed based on how much cooking is going on, this system can produce total energy savings (fan and tempered air) in the range around 50%!

For more information on this technology as well as a treasure trove of other energy management strategies for the commercial kitchen, visit PG&E's Food Service Technology Center (FSTC) online at www.fishnick.com. The FSTC also offers commercial-kitchen specific classes on everything from lighting and refrigeration to appliances, kitchen ventilation and hot water systems. These classes qualify for BOC education credits and are offered throughout California in partnership with SCE, SoCal Gas and SDG&E.

*Richard Young is a senior engineer and the director of education at the Food Service Technology Center (FSTC) in San Ramon, CA.*

# BOC Grads Making a Difference!

***BOC graduates Terry Stickney and Shane Conrad*** of World Vision in Federal Way, Washington had a problem. The number of World Vision's data center servers had grown from four to well over 120 and was (and is) continuing to grow, drastically increasing the heat load in the data center. Tasked with cooling the area on a budget, there were several creative options they put into place.

*Shane Conrad and Terry Stickney.*

Hot/cold aisles were established so that all servers exhausted into common hot aisles and received intake air from common cold aisles. Special panels were fabricated for a couple servers with powerful exhaust to ensure that no hot exhaust would escape into the cold aisles. By adjusting perf floor tile placements, they balanced the room air flow. Using an infrared thermometer to locate areas of greatest heat concentration above the servers allowed them to optimize placement of the exhaust egg crates above the servers. Duct work was installed to extend their Liebert AC unit intakes to the drop ceiling, creating a plenum ceiling. This was a step toward focusing on cooling just the cold aisle instead of the whole room. These changes freed up an estimated 8-10 tons of cooling, adding approximately 20% more capacity to World Vision's data center, and helping to recover some of the redundancy cooling that had been given up to cool the ever-increasing high density server heat loads.

Since these original changes, the air-cooled condenser intakes of the portable Movincool backup AC units have been ducted, providing the necessary 9000 CFM of air necessary to cool the condensers from outside the data center. This allows use during emergencies without producing negative pressure in the data center which would draw in unconditioned air from the outside and would hold the doors open.

Currently, Stickney and Conrad are monitoring rack temperatures, especially at tops of the server racks where high density servers often run out of cool air. They are in the process of experimenting with ducting cool air to the tops of these racks, which has decreased the temperatures there by 3-5 degrees with the same amount of energy expended.

As the heat load continues to grow, the facilities staff at World Vision constantly explores ways to increase efficiency. Money not spent on additional cooling equipment translates into additional money for the children and communities World Vision assists, as a Christian humanitarian organization dedicated to working with children, families, and their communities worldwide to reach their full potential by tackling the causes of poverty and injustice.

As BOC Level II graduate Terry Stickney puts it, "BOC provided a great overview of what is available to work with, and allowed me to hear some different perspectives from instructors and fellow students in similar trades. That has been a great asset in my work here at World Vision."

The Avery Research Center in Pasadena, CA had a major problem with their 18-year old chiller. A freon leak in to the water loop had caused irreparable damage to the compressor and it meant that, at a minimum, the chiller system needed to be replaced. The center's ***facilities manager, BOC graduate Roger Recupero,*** worked to pull together the replacement/repair options.

*Roger Recupero.*

An obvious initial option was to simply replace the old chiller with a similar model, which would have meant continuing to operate with the same inefficiencies inherent in an older system. Considering the work done in the laboratories, the chemicals present and the need for a controlled environment 24/7, it made more sense to look for improved technology that would give equal or, hopefully, better performance at reduced energy requirements. After reviewing and updating the original system specs and current needs, an RFP was drafted and forwarded to five contractors in the field.

Opinions came back and it was apparent that the system was going to have to be entirely replaced, both chiller and cooling tower. Proposals were submitted, reviewed and refined. Everything was ordered with a target installation of several months later in November, a cooler, more convenient time of year, since one compressor was still available to maintain the processes.

Of course the best laid plans can go awry and usually do. The compressor died in August and the project had to be completed immediately. Since all the equipment had already been ordered and delivered, everything was in place and ready to go. Total installation and commissioning was completed in September of last year.

Because the new cooling tower is matched to the new chiller, there is much more efficient usage of water and chemicals for treating the water. Recupero says that the projected energy savings are about 260,000 kilowatt hours per year, translating to $36,000 saved annually. The center has also realized a reduction in water usage in excess of 1000 HCF, saving around $3000 in the 10 months the new system has been operational. Another bonus is that with the new equipment, maintenance costs are lower as well. Avery also received a rebate from the City of Pasadena based upon projected savings estimates.

Recupero reports that there are many energy-saving projects in the pipeline, including the replacement of the existing 80-ton package units that currently service office areas of the research center.

*(Continued on page 5.) See* ***BOC GRADS.***

***BOC GRADS.*** *(Continued from page 4.)*

***Jeff Miller, BOC graduate and commercial maintenance technician*** for Harsch Investment Properties in Portland, Oregon, has been busy working in the home office building on a replacing old, inefficient magnetic ballasts (R2P32TP type) with new, electronic lamp ballasts (ICN-3P32-SC 3 type). Replacements are made on an as-needed basis. The old magnetic ballasts fire only two lamps to the three an electronic ballast can accommodate. The old ballasts also tend to flicker once they are starting to go, making the lighting quality distracting.

Not only are the newer ballasts significantly less expensive ($22.63 versus $36.85 each), they also use approximately 40% less electricity. Flickering is also eliminated. Miller has made a dozen or so replacements thus far, but the six-story building has approximately 200 lamps per floor, so savings will be substantial as the switch-outs are made. For even more savings, the lights are on timers to ensure that they are switched off during non-peak hours.

In another recent energy-efficiency project at the home office building, Portland's Reitmeier Mechanical assisted in a swap out of an old, oversized 75-gallon steam boiler for a new 25-gallon hot water boiler, a more appropriate match for the hot water heating system and the building needs. New variable frequency drive equipment was also installed on each floor, along with new VAV (variable air volume) controllers.

Many of these projects are either recently completed or ongoing and so final savings numbers are not yet available, but the trend is significant and the savings are indeed considerable. Between the lighting replacements and the work on the heating system, Miller anticipates they will cut energy bills by at least a third.

# NEEC Takes on BOC Administration in the Northeast

The Northeast Energy Efficiency Partnerships, Inc. (NEEP) announced a recent decision to end its service administering the Building Operator Certification (BOC) program in the Northeast region. NEEP will complete its existing obligations for BOC courses currently in progress, and will transfer administration to the Northwest Energy Efficiency Council (NEEC), the national administrator of BOC.

NEEP Executive Director Susan Coakley stated that, "The BOC course is a tremendous resource for an under-served audience – building operators – providing valuable hands-on information to improve building energy performance through best practices in building operation and maintenance."

NEEC is working with Alan Mulak, and utility and state sponsors in the Northeast to offer BOC courses in 2007-08. Please welcome the new team providing BOC services in New England, New York and New Jersey.


*Alan Mulak*

**Alan Mulak** has served as the founding BOC program manager in the Northeast. A licensed professional engineer, Alan has 36 years of experience in the energy field, working first as a test engineer on nuclear submarines, and then on power plant construction, overhaul and maintenance. Prior to his association with NEEP and BOC, he also worked on a variety of energy management and conservation projects for utilities, private owners/investors and public municipalities.


*Carlos Montanez*

BOC instructor **Carlos Montanez** is associate director of maintenance & utilities at Philips Andover Academy and is also the chief engineer for the school's central heating and electric power plant. With over 30 years of power generation, utility distribution and mechanical systems experience, Carlos plans and coordinates all the utility and building project engineering for the academy and is responsible for all energy-related matters. Carlos has an MS degree in facility management, a BS in marine engineering, a Chief Engineers license in the U.S. Merchant Marine, and is a First Class Stationary Engineer, a Certified Energy Manager, a Certified Plant Engineer, and holds several other licenses and certifications.


*William A. Turner*

**William A. Turner,** MS, PE, and BOC instructor, received his MS in engineering from Northeastern University. He served for ten years on the research staff of Harvard University School of Public Health. Since 1985, Mr. Turner has focused on "Building Science" issues including air quality, moisture, geothermal energy efficiency, sustainable building shell design and building commissioning. His experiences includes unplanned airflow, microbial source amplification, VOCs, soil gas, particle staining, air and water leakage, construction containment, healthy building design and forensic evaluations. He has published and lectured extensively, advising the US EPA, the American Lung Association, and Habitant for Humanity.


*Richard Vaillencourt*

Owner of Canterbury Engineering Associates, LLC, BOC instructor **Richard Vaillencourt** has degrees in both mechanical and electrical engineering, combined with over twenty-five years of practical experience as a designer and project manager in electrical construction, as an industrial plant engineer, and as an industrial corporate energy manager. Richard has presented several papers at the World Energy Engineering Congress over the years and has authored a book, Simple Solutions to Energy Calculations, which is in its fourth edition. Richard has also been published in *Energy Engineering, Strategic Planning for Energy* and the *Environment, and Energy User News*.

If you have ideas for where you would like to see BOC courses in your community, please give Alan Mulak a call or email at 978-486-4484 or AMulak@comcast.net.

# Congratulations!

## *BOC Level I & II Students Certified in January – August 2007*

### *Level I Certified Students*

**Alvarez, Jr., Vidal,** Cushman & Wakefield at Adobe
**Amrine, Gregory,** Snohomish School District 201
**Anderson, Eric,** Whitehead Institute
**Axline, Patrick,** Providence Everett Medical Center
**Babers, Oscar,** CSU Northridge, Phys Plant Mgmt
**Bachman, Roy,** Estee Lauder
**Baker, Arthur,** Town of Monroe
**Barr, Joyce,** Brooklin School
**Batten, David,** Dept. of Corrections
**Beeman, Molly,** Everett Community College
**Bell, Billy,** The Irvine Company
**Bell, Craig,** Cal State University Los Angeles
**Beltran, Jose,** Viejas Casino
**Bennett, Robert,** WSDOT
**Berger, Bill,** Cal State University San Marcos
**Bernardo, Mark,** CSU Stanislaus
**Berzinas, Anthony,** California Highway Patrol, Fac Sect
**Bidot, Pedro,** Olympia School District
**Blunt, David B.,** Corning Incorporated
**Boldis, Imre,** CSU Northridge, Phys Plant Mgmt
**Bourque, Eric,** Tyngsborough Housing Authority
**Bredeson, Thomas,** City of Bellingham
**Brown, Christopher,** Bristol Myers
**Brown, Clint,** Integrated Real Estate Services
**Buchanan Hening, Maureen,** California Lutheran Univ.
**Burr, Willie,** UC Davis Fac Operations and Maint
**Calo, Paul E.,** Berwick Academy
**Campbell, Stephen,** San Diego Gas & Electric
**Cardenas, David,** UC - LLNL
**Carlson, Craig,** Norwalk Community College
**Carpenter, Brian,** Jones Lang LaSalle
**Cavaliere, Angelo,** Dept. of Motor Vehicles
**Chaboya, Robert,** LA County Sheriff Dept. (FSB)
**Chacon, Gary,** CSU Northridge, Phys Plant Mgmt
**Chapman, Eric,** Exotic Metals Forming Company
**Clough, Skip,** South Berwick Sewer District
**Cohen, Marilee,** Three Rivers Community College
**Colello, Jr., Joseph,** Town of Hamden, Attn Mayor's Office
**Coltharp, Cameron,** Telecare Corporation
**Connery, Eric,** Office of Legislative Management
**Contris, Mark,** State of WA, Dept of GA
**Corcoran, Arthur,** Headway Technologies
**Corsa, Christopher,** Town of Marlborough
**Costanzo, Nick,** Dept. of Corrections
**Cuevas, Hector,** CSU Northridge, Phys Plant Mgmt
**Culver, William,** Raytheon
**Curtis, Craig,** Cal State University San Marcos
**Cyr, Philip,** Town of Rocky Hill
**Daffer, Gerald,** UCSD
**D'Arinzo, Pasquale,** Town of Darien
**Davidson, Jeffery,** Jefferson County
**Davila, Gary,** Pleasanton Unified School District
**Davis, Bruce,** Town of Stafford, Dept. of Public Works
**Davis, Lawrence,** United States Postal Service
**Davis, Randen,** Sonoco Products Co.
**De La Rosa, Marco,** Rich Maynard Management Co.
**Deis, Greg,** County of San Diego
**Deuning, Edwin,** Nutrilite
**Deveney, John,** Gill-Montague Regional School District
**Diaz, Mike,** Suffolk County Community College
**Diaz, Rigoberto,** CSU Northridge, Phys Plant Mgmt
**Divjak, Robert,** Naugatuck Valley Community College
**Dolan, Beth,** Seattle Public Schools
**Dooley, Dennis,** SAIF Corporation
**Dorak, Matt,** Smithtown Central School District
**Downs, David,** MSAD 30
**Dukhovny, Lazar,** Applera Corporation--Applied Biosys
**Dunkin, Jerry,** The Irvine Company
**Dwyer, Phil,** PM Property Management
**Erven, Jerry,** City of Gresham
**Fenech, Tim,** Theravance Inc
**Fitzgerald, Thomas,** Essex Elementary School
**Flores, Aaron,**
**Foley, Tom,** CSU Northridge, Phys Plant Mgmt
**Fortier, Richard,** MPV Commission
**Fowlkes, Jr., Willie,** Murrieta Valley USD
**Fox, David,** CSU East Bay
**Fuller, David,** Raytheon, Facilities Maintenance
**Gaeta, Jr., Manuel,** Assoc Students, Inc Cal Poly Pomona
**Gauthier, Scott,** Quinsigamond Community College
**George, Steve,** Precision H2O
**Giampa, Mark,** Whitehead Institute
**Gier, Bruce,** Portland Development Commission
**Gomez, Robert,** CSU Northridge, Phys Plant Mgmt
**Gormley, Michael,** The Winchendon School
**Grace, John,** Gill-Montague Regional School District
**Granillo, Ernie,** CSU Northridge, Phys Plant Mgmt
**Granillo, Tim,** San Mateo County Comm College Dist
**Greene, Allen,** San Diego Facility Solutions
**Greene, Rod,** Olympia School District
**Greisen, Patrick,** Dept of GA/Buildings & Grounds
**Grice, Gardner,** First Unitarian Church
**Grossman, Richard,** Dept. of Children and Families
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**Hagerty, Tony,** Lincoln Unified School District
**Hama, Vinnie,** Stanford Univ - Student Housing
**Hanratty, Anthony,** Suffolk County Community College
**Hansen, Chris,** Providence Centralia Hospital
**Hao, Jian Xing,** Fairmount Olympic Hotel
**Hardcastle, Jeffrey,** Sutter Tracy Community Hospital
**Harrell, Chris,** Smithtown Central School District
**Hawkins, John,** St. Joseph's Medical Center
**Hayes, Stephen,**
**Hernandez, Anthony,** Winbond Electronics Corp of America
**Hescock, Paddy,** State of WA Dept of Corrections
**Hill, Robert,** Pratt & Whitney
**Hinojosa, Martin,** Jones Lang LaSalle
**Holbrook, Steve,** Cal State University San Marcos
**Holland, Terry,** Olympia School District
**Hottle, Kevin,** CSULB
**Hubeny, Linda,** Dept. of Administrative Services
**Huckins, Curt,** Fallbrook Union HS District
**Hughes, Valerie,** CSU Northridge, Phys Plant Mgmt
**Imus, Edward,** Providence Everett Medical Center
**Inokuchi, Richard,** SMCCCD/Skyline College
**Isaacson, Robert,** Snohomish School District 201
**James, David,** LA County DHS
**Jauch, Shannon,** Las Virgenes Unified School Dist
**Johnson, Michael,** City of Snohomish
**Johnston, Christopher,** Commision on Fire Prevention & Control
**Jones, Anthony,** Dept of GA/Buildings & Grounds
**Jordan, Jennifer,** San Diego Facility Solutions
**Jurgens, Mark,** UCSD
**Kardys, Robert,** Town of Lddyard Highway Dept
**Kelly, Gene,** Polaroid Corporation
**Kelly, Waverly,** California Lutheran University
**Kerouac, Mike,** County of San Diego
**Killops, Tim,** The University Corporation
**Knavel, Bill,** WSDOT
**Knittle, Kirk,** The Evergreen State College
**Kofoed, Sharon,** NAS Whidbey, Dept of Defense - PWM
**Korell, Roger,** Providence Place
**Korell, Roger,** Providence Place
**Krogh, Rhawn,** Western Oregon University
**Krueger, Richard,** ContinentalAFA
**Krueger, Richard,** ContinentalAFA
**Ladosky, Gerald,** US Navy, Code N46VO2
**LaFave, Larry,** City of Edmonds
**Lanthier, Wayne,** 939 Coast Management Association
**Larramendy, Jim,** Prometheus Real Estate Group
**Larsen, Dennis,** Vancouver School District
**Last, Michael,** Agriculture Experiment Station
**Law, Robert,** CSU Stanislaus
**Le, Than,** Whitehead Institute
**Lerma, Jose,** The Irvine Company
**Lewis, John,** Sutter Tracy Community Hospital
**Lilly, Allison,** Dept of Information Services
**Logsdon, James,** CSU Northridge, Phys Plant Mgmt
**Loomis, Mark,** CSU Northridge, Phys Plant Mgmt
**Louie, James,** SMCCCD/Skyline College
**Maderazo, Robert,** San Diego Gas & Electric
**Maeyama II, Yoshio George,** St. Joseph's Medical Center
**Magnano, Joseph,** Granby Public Schools
**Marchi, Joe,** JAE Oregon
**Martin,** Christopher, Northrop Grumman Corp
**Martin, Perry,** CSU Northridge, Phys Plant Mgmt
**Martinez, Manuel,** City of Beverly Hills
**Mayer, Belinda,** Chevron Bus and Real Estate Svcs
**McCoskey, Roy,** Pasco School District
**McDuff, John,** Valentine Tool & Stamping
**McKnight, James,** Golden Gate Bridge Highway & Transportation District
**McQuade, Gerard,** Cal State San Marcos
**Mider, James,** 939 Coast Management Association
**Miles, Curtis,** Boston Scientific
**Millard, Terry,** Vancouver School District #37
**Miller, John,** University of Washington, Bothell
**Miller, Paul,** City of Portland, Fire Bureau
**Miller, Ronald,** Suffolk County Community College
**Miranda, Gerald,** UC Davis Fac Operations and Maint
**Misel, David,** Rejuvenation, Inc.
**Mishler, Dennis,** Providence Hospital
**Mix, Raymond,** Sunrise Adult Living
**Moberly, Jon,** Vought Aircraft Industries, Inc.
**Moran, Eddie,** EMC Corp
**Moscatiello, Benjamin, Longwood Schools**
**Moscatiello, Frank,** Three Village Schools
**Mullen, Timothy,** United States Mint
**Muller, Joseph,** Asnuntuck Community College
**Murphy, Bill, CSU** Northridge, Phys Plant Mgmt
**Murray, Lee,** Stanford Univ - Student Housing
**Murrell, Michael,** Snohomish County Facilities Maint
**Nelson, Gary,** Town of Bloomfield
**Nickoley, Chuck,** Raytheon, Facilities Maintenance
**Norman, Michael,** Worcester District / Superior Court
**Nowakowski, Edward,** Dept. of Veteran's Affairs
**O'Neil, Michael,** North American Health Care, Inc.

**Opprecht, Susan,** The Evergreen State College
**Orchard, Paul,** Providence/Hood River Memorial Hosp
**Palamaris, Brandi,** SBM Site Services, LLC
**Paranal Jr., Constancio,** West Inn & Suites
**Peaslee, Travis,** City of Saco
**Perez, Jr., Jorge,** IAC/Interactive Corp
**Peterson, Karin,** Commission on Culture and Tourism
**Pizarro, Joy,** San Diego Gas & Electric
**Plummer, Roger,** MSAD 71
**Poulin, Donald,** Dept. of Public Works
**Precie, Samuel,** Belo Corp--The Press Enterprise Co.
**Quach, Thien,** City of Los Altos
**Rangel, Albert,** United States Mint
**Ranos, Corazon,** Fairmont Olympic Hotel
**Ratcliffe, Keith,** State of WA-GA/Buildings & Grounds
**Redmond, Donald,** WSDOT
**Reiman, James,** Manchester Community College
**Ren, Alan,** United States Mint
**Reyes, John,** The Irvine Company
**Richardson, Larry,** San Mateo County Transit District
**Riley, Marigrace,** Dept. of Public Works
**Roberson, Raymond, T**he Press Enterprise Co.
**Robertson, David,** The Irvine Company
**Robinson, Keith,** Headway Technologies, Inc.
**Rodriguez, David,** Cal State San Marcos
**Rojas, Marcos,** LA County Sheriff Dept. (FSB)
**Rosales, Enrique,** Maynard Rich Management
**Rossley, Kevin,** Lincoln Sudbury Regional School District
**Russell, Larry,** Cal State San Marcos
**Russo, Alan,** Town of New Milford
**Salazar, Ramiro,** Trojan Battery Co.
**Salonga, Francis,** Applied Biosystems
**Santella, Kevin,** The Fay School
**Santoianni, Thomas,** Naval Base Ventura County
**Sauceda, Marty,** Dublin San Ramon Services District
**Sawyer, Charles (Tom),** Lake Oswego School District
**Scherer, Jo,** City of Seattle Fleets & Svcs
**Schultz III, Frank,** CSU Northridge, Phys Plant Mgmt
**Scott, Paul,** SBM Site Services
**Scranton, Dennis,** University of CT Health Center
**Severance, Kirk,** Town of Granby
**Seward, Anthony,** Dept of GA/Buildings & Grounds
**Shackelford, David,** Snohomish School District 201
**Shattuck, William,** Dublin San Ramon Services District
**Sheehy, William,** City of Seattle, Fleets & Fac Dept
**Sherman, John,** Saco Parks and Recreation
**Silvestri, Peter,** Town of Sprague
**Simonton, Ross,** Wildhorse Resort Casino
**Smachetti, Daniel,** Dept. of Transportation
**Snider, Gregory,** Renton Technical College
**Snuggs, Victor,** Community Hospital of Long Beach
**Souza, Anthony,** Cushman & Wakefield
**Speaks, John,** Genl Atomics Aeronautical Syst, Inc
**Spiessl, Richard,** US Navy, NAVFAC SW
**Stables, Susan,** NAVFAC NW, PWD Whidbey
**Startzman, Don,** City of Edmonds
**Stidd, Todd,** Dept of GA/Buildings & Grounds
**Sutphin, Charles,** Volkswagen of America
**Swan, Alyce,** MSAD 71
**Swaney, Clay,** Dept of Genl Admin
**Sweet, Robin,** Port of Bremerton
**Tejada, Mauricio,** Cal State Los Angeles
**Terrazas, Sergio,** CSU Northridge, Phys Plant Mgmt
**Teschera, Arthur,** Headway Technologies, Inc.
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**Thornton, Russel,** Vancouver School District #37
**Tippett, Ronald,** Raytheon, Facilities Maintenance
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**Tonucci, Stephen,** Manchester Board of Education
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**Wagner, Matthew,** Genl Atomics Aeronautical Syst, Inc
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**Webber, Michael,** Tamastslikt Cultural Institute
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**Young, Carolan,** East Valley School District #361
**Zamora, Fernando,** CSU Northridge, Phys Plant Mgmt

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**Alderman, Brian,** ConnectiCare
**Allen, Tyler,** UC, San Diego Facilities Mgmt
**Allred, Myong,** Pierce County Facilities Maint
**Almeida, Michael,** Equity Offices
**Anderson, Anthony,** Jefferson County Bldgs & Grounds
**Andrews, Alec,** Equity Offices
**Bachman, Roy,** Estee Lauder
**Baxter, Arthur,** Equity Offices
**Bazonski, Perry,** Equity Offices
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**Grendell, Mike,** Penobscot Job Corp Center
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**Wright Jr., Lamarr,** Port of Bremerton

## *CREATIVE COOPERATION* *(Continued from page 1.)*

like building automation systems or local controls, identify high energy ROI projects (low hanging fruit) that provide the biggest bang for the buck, and then look at the renewable option."

In late 2002, other energy systems were investigated to try and find a more efficient, lower cost energy solution for meeting the energy needs of the site. A 375 kW combined heat and power (CHP) cogen unit was selected and installed. The analysis at the time revealed CHP to have the best combination of energy efficiency and return on investment. CHP systems are dramatically more efficient than most fossil fuel based generators supplying electricity to the grid. With up to an 80% overall efficiency rating, CHP can out perform grid systems by 50% or more. If the efficiency of delivered electricity from the grid was closer to the CHP rating of 80%, reserves of natural gas would effectively be doubled, and the environmental impact cut in half.

After implementation of the CHP system in late 2003, they took another look at renewable energy, wanting to find a solution that would provide environmental benefits and still meet the investment criteria of the company. The solution identified was a Solar Power Purchase Agreement (PPA).

A solar services provider put together the PPA that included every aspect of the project from financing to a completely designed and installed system. The unique aspect of this type of project is that it requires no capital investment from a company or resources to install and operate the system, other than some basic coordination efforts. The systems are owned by a group of investors that have targeted environmentally beneficial projects and are willing to realize stable but modest returns on their investments. A state rebate paid for about one third of the project costs and federal tax incentives were also part of the PPA, both of which are claimed by the investors (system owners). Ongoing operation and maintenance of the systems is performed by a third party, so the internal facilities team can focus on core business requirements.

Of course there are obligations necessary to making a PPA work. Roche had to provide the space for installation of the photovoltaic (PV) panels and inverters, and agree to purchase 100% of the electricity generated by the system over an initial 10-year term. The electricity produced by the system is purchased at a discount compared to the electrical utility price, providing both a financial and environmental win. At the end of the ten-year term, there are several options including extending the agreement, outright purchase of the systems, or having the systems removed should more attractive options exist at that time.

***Because PV systems burn no fuel and have no moving parts, they are clean and silent, producing no atmospheric emissions or greenhouse gases that have detrimental effects on the planet. The combined systems will provide enough clean, renewable electricity to supply 116 households for one year.***

The concept of the PPA was shared with RMD's sister site in Branchburg, New Jersey, and a combined project approach was developed to increase the overall project size from the initial 200 kilowatt system in Pleasanton to the final combined size of over one megawatt. The larger project allowed RMD to negotiate better terms and further reduce the carbon footprint of the organization. Solar power panels are now being installed on the roofs of three buildings located in California and New Jersey, and the systems are on schedule for completion by the end of August.

Because PV systems burn no fuel and have no moving parts, they are clean and silent, producing no atmospheric emissions or greenhouse gases that have detrimental effects on the planet. The combined systems will provide enough clean, renewable electricity to supply 116 households for one year. The avoided emissions are equal to removing 196 cars from the road for a year, or the protection of 7.44 acres of forest from deforestation. Thanks to the PPA option, RMD was able to overcome the substantial financial hurdles that stood in the way of installing PV and take a green step in the right direction to leave a very small carbon footprint on the planet.

*Jim Gorman completed BOC Level I training in December 2003 and went on to complete Level II in March 2005. His company and department are so committed to energy conservation that every member of his facilities management team has completed Level I training, at a minimum, including the department's administrative assistant.*

## QUICK TIP

**BOC instructor Richard Jackson-Gistelli reminds us that it is important to get to know your utility representative and to use him or her as a valuable resource to get pertinent energy statistics, such as billing history and access to real time usage and demand data. Your rep can also keep you abreast of various financial incentives for lighting, HVAC, motors, and other energy efficiency projects as well as best-practices rate structures for your facility.**

**As he puts it, "It's the best source for all energy consumption and energy savings info. I am a utility rep so I tend to promote this because helping our customers is our job."**

# Continuing Education Opportunities
## For Certification Renewal Credit

*Below you will find listings of various organizations that offer continuing education courses that are applicable to annual BOC certification renewal. Check out the Education and Events Calendars at these sites or call for information regarding upcoming training opportunities.*

**BetterBricks Professional Training Program**
***Website:*** www.BetterBricks.com
***Contact:*** 206-343-3960

Workshops, brown bag presentations and roundtables for design and engineering professionals in the Northwest. Call to request a free Brown Bag presentation for your company in the Northwest.

**BOMI – Building Owners & Managers Institute**
***Class Information:*** www.bomi-edu.org

**BOMA – Greater Los Angeles**
***Class Information:*** www.bomagla.org

**CASBO – California Association of School Business Officials**
***Class Information:*** www.casbo.org

**California Society for Healthcare Engineering**
***Class Information:*** www.cshe.org

**California Energy Efficiency Training Resources**

**Energy Resource Center - Downey, CA**
***Website:*** www.socalgas.com/business/resource_center/erc_home.shtml

**Pacific Energy Center - San Francisco2, CA**
***Website:*** www.pge.com/education_training/classes/energy_efficiency/

**Energy Training Center - Stockton, CA**
***Website:*** www.pge.com/education_training/

**Customer Technology Application Center - Edison, CA**
***Website:*** www.sce.com/RebatesandSavings/EnergyCenters/workshops.htm

**San Diego Regional Energy Office**
***Website:*** www.sdenergy.org/ContentPage.asp?ContentID=50&SectionID=46

**Efficiency Maine**
***Website:*** www.efficiencymaine.com/education_programs.htm

**Energy Services**
***Website:*** www.energyexperts.org/calendar/

**FEMP – Federal Energy Management Program Workshops & Conferences**
***Website:*** www.eere.energy.gov/sro/
For WA, OR & CA, you can also try: www.eere.energy.gov/states/ and click on your state.

**FSTC - Food Service Technology Center**
***Website:*** www.fishnick.com/education/seminars/list.php

**Energy Resource Center (ERC)**
***Website:*** www.socalgas.com/business/resource_center/erc_home.shtml

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

**IFMA International Facility Management Association**
***Website:*** 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.

**Long Island Power Authority**
***Website:*** www.lipower.org/community/education/

**Massachusetts Division of Capital Asset Management**
***Website:*** www.mass.gov/cam/statewide/sw-camistrain.html

**NYSERDA - New New York State Energy Research & Development Authority**
***Website:*** www.nyserda.org/events.asp

**NEEI - Northwest Energy Education Institute**
***Website:*** www.nweei.org
***Contact:*** Erik Westerholm at 541-463-3154 or
***E-mail:*** westerholme@lanecc.edu

**Northwest Lighting Design Lab & Portland Daylighting Lab**
***Class Information:*** www.lightingdesignlab.com/calendar/index.html
***Contact:*** 206-325-9711 x0 or 800-354-3864 x0

**Sacramento Municipal Utility District**
***Class Information:*** www.smud.com/education-safety/index.html

**The UC/CSU/IOU Partnership** (University of California, California State University, Investor-Owned Utility Energy Efficiency Partnership)
***Website:*** www.uccsu.northwoodsoft.com/

**University of Washington Engineering Professional Programs**
***Contact:*** 866-791-1275
***E-mail:*** west@engr.washington.edu
***Website:*** www.engr.washington.edu/epp

**WAMOA – Washington Association of Maintenance & Operations Administrators**
***Website:*** www.wamoa.org

**Washington State Society for Health Care Engineering**
***Website:*** www.wsshe.org

**WSU Energy Program – Continuing Education Calendar**
***Website:*** www.energyideas.org

# BOC Certification Renewal

To retain BOC certification, graduates must accumulate continuing education (CE) hours each year, following a full calendar year after their graduation. Level I certification renewal requires 5 CE hours each year, and Level II renewal requires 10 CE hours each year. The hours may be earned in any of the following ways:

| BOC Certification Renewal Activities | CE Hours Equivalency |
|---|---|
| • 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 per year |
| • Membership in a building operations membership association | 1 hour/year |
| • Offices held in membership associations | 2 hours/year |
| • Awards received for efficient building operations | 2 hours/award |
| • BOC Newsletter quiz (see below) | 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 hrs/year equivalency |

You will be notified by mail when your certification is up for renewal (your renewal date appears on your wallet card). Once you have received a renewal notice, complete the short application, provide a list of your certification renewal activities from the past year and return the information to NEEC. For 2008, the renewal fee is $45 for each of Level I and Level II, or $75 for a "combo" renewal of both Level I and Level II.

### Easy Certification Renewal Credit

Another easy way to get some continuing education credits for your yearly certification renewal requirement is right here in the BOC Bulletin. Just read the featured technical articles (pages 1-4 and continued online), then take the short quiz provided on page 11 of the newsletter. Send or fax it back to us for one CEU credit hour per quiz passed, along with your recertification application.

# Conferences & Symposiums

## National and Regional – Fall 2007

### *NATIONAL*

**Labs 21 2006 Conference**
Charleston Area Convention Center Complex • Charleston, SC
October 2-4, 2007

Co-sponsored by the U.S. Department of Energy, the U.S. Environmental Protection Agency and the International Institute for Sustainable Laboratories

***More info:*** www.labs21century.gov/conf

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

**IFMA World Workplace 2007 Conference & Expo**
New Orleans, LA
October 24-26, 2007

***More info:*** www.worldworkplace.org

### *CALIFORNIA*

**Northern California Plant Engineering & Facilities Maintenance Show (NCPE)**
Santa Clara Convention Center • Santa Clara, CA
September 26-27, 2007

***More info:*** www.biztradeshows.com/trade-events/ncpe.html

**West Coast Facility Engineering Show (formerly the Inland Empire Facility Engineering Show)**
Los Angeles Fairplex • Pomona, CA
October 17-18, 2007

***More info:*** www.iefeonline.com

### *WASHINGTON*

**WSSHE Annual Conference**
Yakima Convention Center • Yakima, WA
September 19-21, 2007

***More info:*** www.wsshe.org

**WAMOA's Annual Fall Conference**
Doubletree Hotel – City Center • Spokane, WA
October 3-6, 2007
Sponsor: Washington Association of Maintenance & Operations Administrators

***More info:*** www.wamoa.org/Conference.html

This annual three-day conference, now in its 25th year, provides workshops, speakers, and roundtable discussions, along with trade show presentations and networking opportunities for industry professionals.

### *NORTHEAST*

**N. New Jersey Facilities Expo**
New Jersey Convention & Expo Center • Edison, NJ
October 24-25, 2007

***More info:*** www.facilitiesexpo.com

# Tightfisted Ways to Cut HVAC Costs

## REVIEW QUIZ

Here is an easy way to earn **earn one continuing education hour** towards annual BOC recertification. Read the article *Tightfisted Ways to Cut HVAC Costs* that begins on page 2 and take this short quiz on the material. Mail or fax your answers to our offices, with your certification renewal application, as directed at the end of the quiz. With a passing grade, we will apply one credit hour to your record.

### *Check your answer(s):*

1) At what outside temperature range can 100% outside air be used to perform all necessary cooling (i.e. chillers can be shut off)?

   a. _____ 48 - 52°F
   b. _____ 52 - 57°F
   c. _____ 57 - 63°F
   d. _____ 63 - 67°F

2) Dry air is "cooler" than moist air.

   a. _____TRUE  b. _____ FALSE

3) For best energy-efficiency results, humidity settings should be:

   a. _____ lower in the winter and higher in the summer.
   b. _____ higher in the winter and lower in the summer.
   c. _____ the same year-round.
   d. _____ set in a range no wider than 10%.

4) Night cooling generally works best where off-peak electric rates equal daytime rates and night air is relatively cool and dry.

   a. _____TRUE  b. _____ FALSE

5) As outside air dampers age, they _____

   a. _____ need to be replaced on a regular basis.
   b. _____ may not close or seal properly
   c. _____ can be repaired inexpensively with flexible plastic strips.
   d. _____ b & c.

6) Lighting efficiency upgrades have no effect on HVAC costs.

   a. _____TRUE  b. _____ FALSE

7) Four-pipe fan coil units use built-in heating coils next to cooling coils to:

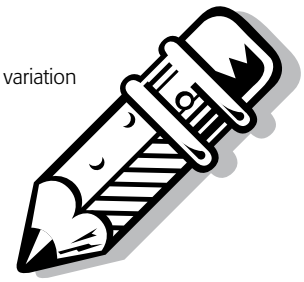
   a. _____ dry air to an acceptable room-appropriate level.
   b. _____ treat air as it is discharged to the outside.
   c. _____ mix air to correct temp before discharging into a room.
   d. _____ make it easier to clean the system

8) Duty cycling and using two- or variable-speed motors are equally effective as cost- efficiency measures to control heating or cooling of a space.

   a. _____TRUE
   b. _____FALSE

9) A wider range of temperature control variation is most appropriate for:

   a. _____ lobbies and hallways.
   b. _____ storage spaces
   c. _____ a & b
   d. _____ a, b & c



10) Fill material in cooling towers is used to allow water to cool faster and more efficiently.

   a. _____TRUE  b. _____ FALSE

***END OF QUIZ***

We include a quiz like this in each of our bi-annual newsletters. To submit your completed quiz for re-certification credit (1 credit per quiz passed), please complete the following and either fax it to 206-292-4125, or mail it to: **BOC Quiz, NEEC Office, 157 Yesler Way, Suite 409, Seattle, WA 98104.** *Please remember to send it with your certification renewal application.*

Your Name:_____

Title:_____

Employer: _____

Address: _____

_____

City: _____

State:_____ Zip:_____

Phone:_____

Fax: _____

Email: _____

**Building Operator Certification**
157 Yesler Way • Suite 409
Seattle, WA 98104-2527

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**206-292-4125**

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**BOCinfo@theBOC.info**

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Editor and Contributing Writer: Christine Doonan
Graphic Design: Thom Harris Design

## 2007-08 COURSE SCHEDULE *

**BOC Level I Certification**
The Level I series comprises eighty 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, Environmental Health & Safety Regulations, Efficient Lighting Fundamental and Energy Conservation Techniques. See websites for cost and updated dates and locations.

**BOC Level II Certification**
Level II has seventy 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 websites for supplemental class topics, dates and locations.

**California – Level I** www.theBOC.info/ca
Sacramento ..... 10/16/07 - 4/08/08
Ontario ..... 10/11/07 - 4/10/08
San Diego (sold out) ..... 10/10/07 - 4/09/08
San Jose ..... 11/28/07 - 5/14/08
San Francisco ..... 11/29/07 - 5/14/08

**California – Level I** www.theBOC.info/ca
Port Hueneme ..... 9/6/07 - 2/26/08
Downey ..... 9/5/07 - 2/27/08
San Francisco ..... 10/2/07 - 3/4/08

**Oregon – Level I** www.nweei.org
Portland ..... 9/27/07 - 03/11/08

**Oregon – Level II** www.nweei.org
Portland ..... (TBD) 4/08 - 9/08

**Washington – Level I** www.theBOC.info/wa
North Seattle ..... 10/04/07 - 4/3/08
Longview ..... 10/16/07 - 4/5/08

**Washington – Level II** www.theBOC.info/wa
Everett ..... 9/12/07 - 2/14/08

**Northeast – Level I** www.theBOC.info/ne
Canton, MA (sold out) ..... 9/6/07 - 9/29/07
Melville, NY ..... 10/24/07 - 10/13/07
Beverly, MA ..... 10/26/07 - 10/14/07
Portland, ME ..... 10/23/07 - 2/5/08

**Northeast – Level II** www.theBOC.info/ne
Waterville, ME ..... 10/3/07 - 12/19/07

* As of publication date; see BOC website for up-to-date schedule information (www.theBOC.info)