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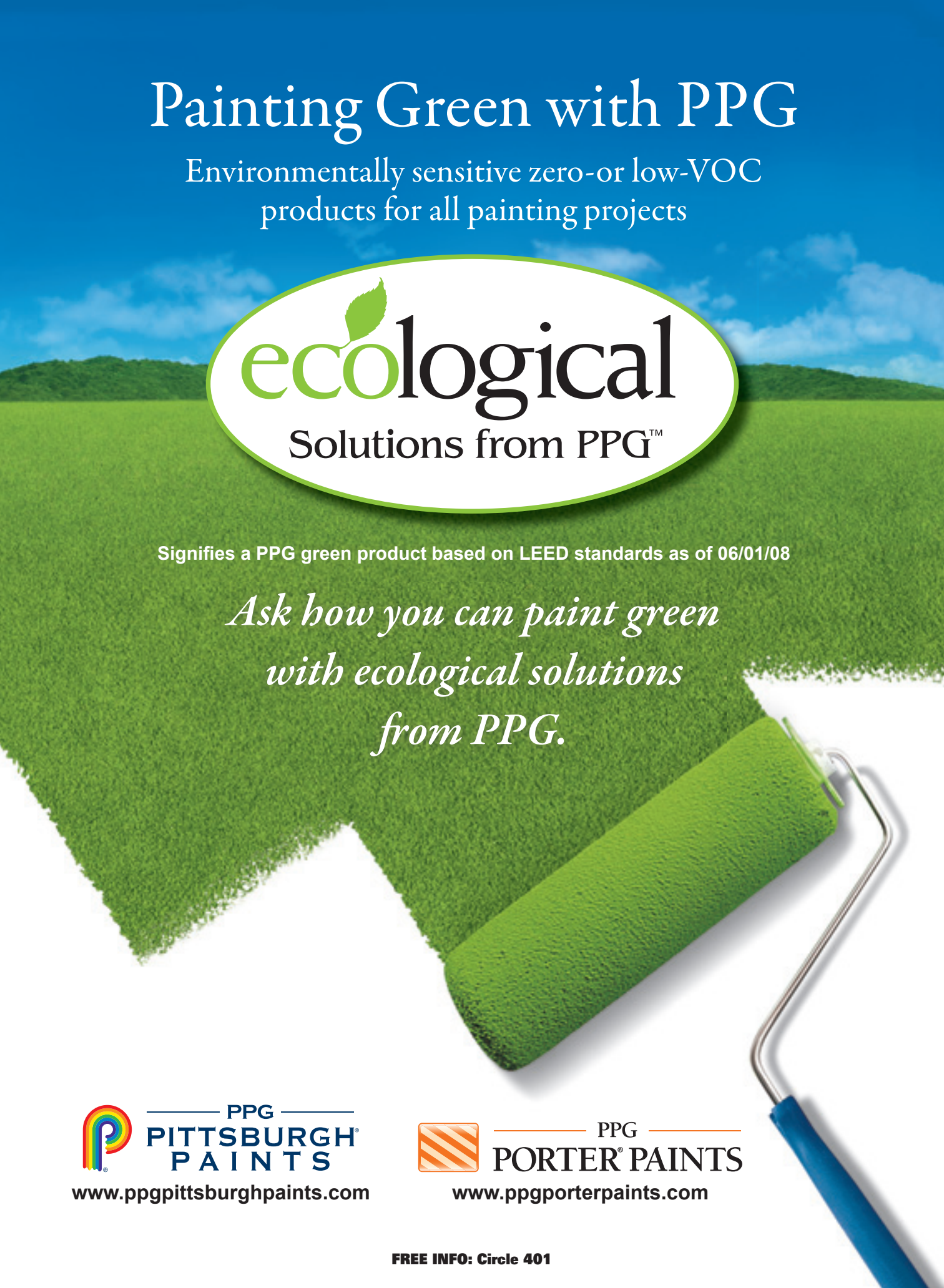

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# It's a New Day in Cleaning

## HHPC Day program allows facility managers to know when contractors are certified day cleaning specialists

Traditional facility cleaning is an "out of sight, out of mind" process. The cleaners show up at night, clean the building, and are gone by the next morning.

But taking another look at when to have facilities cleaned can have some big benefits for facility managers and building owners. Day cleaning offers both financial and nonfinancial advantages.

Start with the financial savings, such as not having to keep lights on for as long at night if facilities are cleaned during the day. State Farm Insurance Facilities Specialist Steve Spencer says the company averages $6 million in savings a year since converting to day cleaning over the last decade.

But don't stop there, Spencer says.

"First and foremost, it's an energy saver. That saves money for the bottom line, but it's also sustainable and a good thing for the environment," he says. "But the other factors they don't realize is your building will be cleaner and your people will be more involved in keeping your building cleaner as a result of going to daytime."

Spencer was one of a group of day cleaning experts that took part in a roundtable discussion on the topic as part of Diversey's inaugural Healthy High Performance Cleaning (HHPC) Day Academy for cleaning contractors.

"Diversey is convinced that day cleaning will grow rapidly," says Area Vice President of Sustainability Solutions for Diversey Rob Kohlhagen. "Our training academy and certification for cleaning contractors will help ensure that property managers have access to service providers who are capable of executing day cleaning with excellence."

### Day Cleaning Key Benefits:

**For Building Managers:**
- Up to 8 percent energy savings
- Reduced janitorial cost
- Corporate social responsibility

**For Occupants:**
- More personal cleaning service
- Improved customer service
- Environmental responsibility

### Experts: Day Cleaning Has More Benefits Than Expected

In sharing their day cleaning experiences and insight, the panelists repeatedly touched on two themes: the obvious benefits are substantial, but the unexpected benefits have made day cleaning an even better choice.

One of those unexpected benefits is psychological. What they've all found is that having the cleaning crew in during the day leads to more cooperation from employees and an improved sense of the building's cleanliness.

"Cleaning is perception and perception is reality," for employees, Spencer says. "And when they see people cleaning, they assume it's clean."

Spencer, who has overseen the transition of more than 10 million square feet of office space in the last decade, saw that effect in an unusual way in one location.

"We put seat covers in all the restrooms in a facility in Tennessee, because the people were demanding them," he says, noting the facility was using a case or two a month. "We transitioned about eight months later to daytime cleaning, and I got a call six months later saying 'we haven't bought another case of seat liners since.' Obviously the impression was 'it's clean, so I don't have to use a seat cover.'"

University of Washington Director of Building Services Gene Woodard oversees more than 10,000 offices on the University of Washington's main campus. And he agrees that when buildings are cleaned during the day, it helps improve overall cleanliness and employee involvement, as evidenced by one particular building where the residents had a reputation for not always being the tidiest.

"When we moved that building to days, they took better care of the facility because they knew Mary, and saw Mary, and spoke to Mary every day and they

Diversey is leading the world to a cleaner, healthier future by protecting lives, preserving the Earth and transforming our industry. Our HHPC Day program goes beyond green cleaning to help our building service contractor partners deliver a real and sustainable impact on client facilities.

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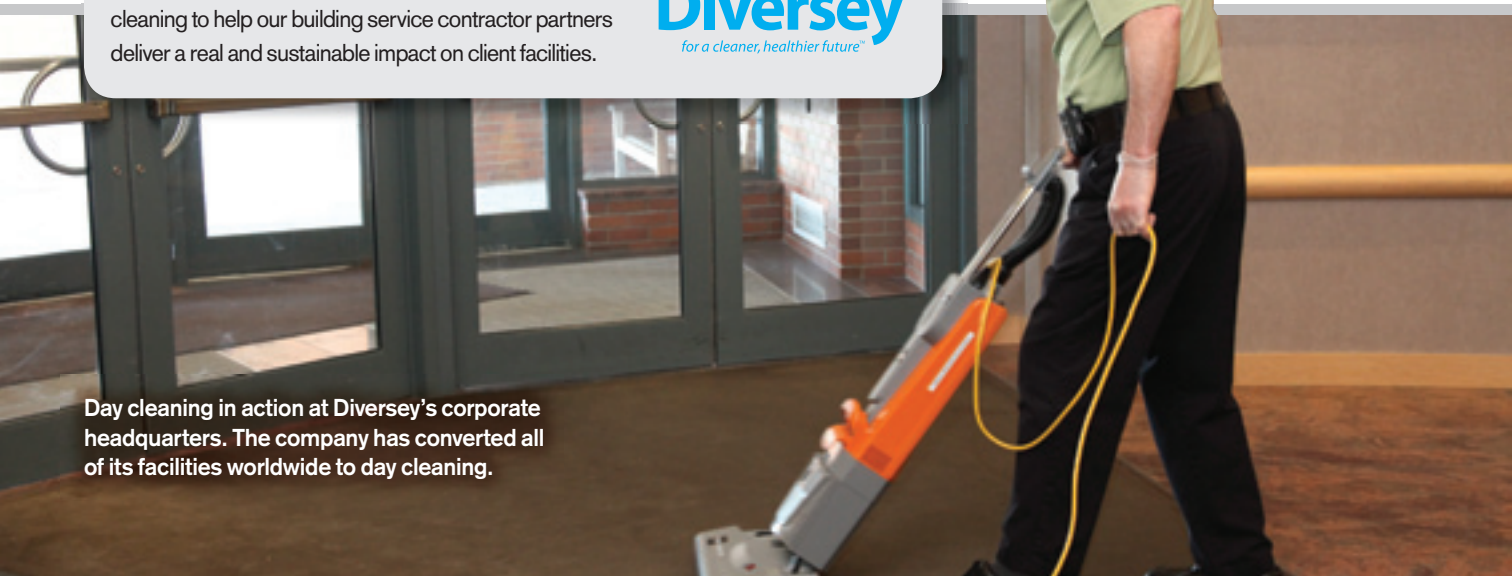
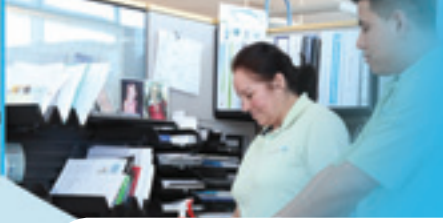


Day cleaning in action at Diversey's corporate headquarters. The company has converted all of its facilities worldwide to day cleaning.



didn't want to create extra work for her," he says. "The users of the space tend to take a little more care when they see a person going by with a cart, or sweeping or vacuuming."

Going hand-in-hand with employee perception of cleanliness is improved response time. With cleaners in the building during the day, small problems can be addressed immediately so they don't turn into bigger projects later. Day cleaning can even help extend the life of floor coverings by allowing for repeated cleaning of a lobby area during bad weather or by no longer having garbage bags sitting out for a length of time before they're collected.

### Not Just Savings, But Security Too

Security is another benefit, says Diversey Manager of Corporate Facilities and Services Dave Nicklas. Without cleaning crews in buildings at night, a security routine can be executed more easily.

"Now you can rely on your alarm systems or if you have a guard service that's doing tours, things should be expected to be locked at all times and secured," he says. "You can verify that much easier as opposed to when cleaners are in the facility; they might be opening doors, putting wedges in the bottom of a door to keep it open and you don't know if someone had passed by a point."

Spencer also points out that it lessens the chances of someone bluffing their way into the building by convincing the cleaning crew to let them in.

### Making It Work

Day cleaning does have its challenges. It requires scheduled cleaning of certain areas so as not to disrupt work, such as cleaning conference rooms early in the morning when there's no use of them scheduled. It also requires buy-in from employees and tenants.

"It's getting the occupants of that building to understand that the culture of what you're going to be doing is going to be different," inPoint Advisors CEO and former BOMA Chairman Dave Hewett says. "It's not going to be negative, and ultimately it's going to be positive. "

The panelists were in agreement that employees usually come around to the benefits pretty quickly, even when they're asked to help out by bringing wet trash to a common area and dumping their own dry trash when needed. By doing that, it lessens intrusions in the workspace and saves time for the cleaners. (For those who argued they make too much money to make it cost-effective to empty their own trash, Spencer countered with a calculation proving that was only true for employees making at least $350,000 a year.)

### Tenant Buy-In

For reticent tenants, Innovative Cleaning Services and Clean Solutions Inc. CEO Jennifer Corbett-Shramo says the bottom line is usually a good persuasive tool. Smaller tenants are usually pretty flexible, but larger ones sometimes try to dig in their heels.

"If they're a very, very large tenant, then I would sit down and explain the huge financial benefits to them, whether it's energy saving or custodial savings. Generally, when you're able to provide facts, and they know that's money coming back in their pocket, it's important."

Overall, day cleaning is a big change from simply having the cleaners come in at night. It certainly offers payoffs beyond just the bottom line.

"Obviously cleaning is Diversey's business," Nicklas says, but also, "We're reducing energy consumption and we're providing a better social environment for the employees."

Diversey congratulates these leading edge building service contractors who participated in the inaugural HHPC Day Training Academy.

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www.cardinalmaintenance.com

**Cavalier Services, Inc.**
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**DMS Facility Services**
www.dmsfacilityservices.com

**FBG Service Corporation**
www.fbgservices.com

**GCA Services Group**
www.gcaservices.com

**McLemore Building Maintenance, Inc.**
www.mbminc.com

**Premier Maintenance, Inc.**
www.pmiclean.com

**Redlee/SCS, Inc.**
www.redleescs.com

**United Services of America**
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**HHPC Day panelists (left to right) Dave Nicklas, Diversey; Dave Hewett, inPoint Advisors; Gene Woodard, University of Washington; Steve Spencer, State Farm Insurance; Jennifer Corbett-Shramo, Innovative Cleaning Services and Clean Solutions Inc.**

For more information and to see day cleaning in action, visit:
**http://www.diversey.com/HHPCacademy**

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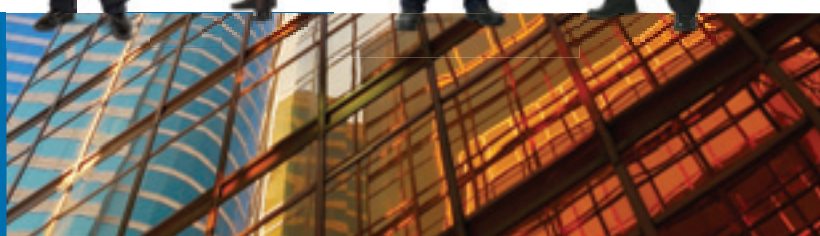

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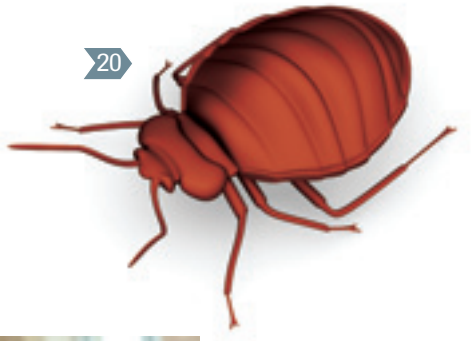
## close-up



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Ask An Expert: Bill Hoffman of Water Management Inc. answers questions about how FMs can be more water efficient.
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EDITORIAL

# Magazine Renovation

What I want to ask all of you, of course, is, "Well, what do you think?" We've spent months working to improve *Building Operating Management,* and now, ta-da, here it is. I imagine you feel much the same way when you renovate a building or upgrade space. But as editors we can't even see the expressions on your faces as you move through the redesigned pages of the magazine.

As a substitute for seeing you in person, I'll point out some of the principles that guided us as we worked to make a good magazine better.

• One thing facility managers always want to know is what other facility managers are doing. We're going to focus more attention on the experience and expertise of individual facility managers. We'll tap other knowledgeable sources as well, but we want to make sure that we're sharing the current practices of leading facility managers. To that end, we also updated our Editorial Advisory Board, listed on this page. We'll use that distinguished group as a sounding board for our ideas as well as for feedback on topics we should be addressing.

• From square feet to kWh to ROI, numbers fill a facility manager's day. To reflect the environment you work in, we're going to highlight numbers that can help shape your decisions, including numbers from our own surveys.

• Over time, magazine designs, like building furnishings, start to show their age. We've given the magazine a cleaner and more contemporary look.

So what do you think of the redesigned *Building Operating Management*? Take a minute to shoot me an email or post a comment at myfacilitiesnet.com/edsullivan. Even better, let me know what challenges you're facing, what successes you've achieved. Think of it as a post-occupancy evaluation. Your feedback will help us know what we're doing right and where we can improve.

**Edward Sullivan**
Editor • edward.sullivan@tradepress.com

Post comments at myfacilitiesnet.com/edsullivan

building OPERATING management

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PRODUCT GALLERY

# Knock-down Air Handler Helps Symphony Center Recover from Flood

CASE STUDY

Schermerhorn Symphony Center, completed in 2006, was becoming known as one of Nashville's musical gems when the city's worst-ever flood occurred in 2010. The 197,000-square-foot, 1,844-seat neo-classical building suffered approximately $40 million in damages, including the loss of 11 air-handling units, which were custom-designed to provide efficient airflow at the lowest possible sound levels.

Everything was replaceable; the challenge was how to complete the job quickly and so that such damage would never happen again. Once the area was a clear zone, Nashville Symphony officials had four months to complete the task. A grand re-opening was scheduled for New Year's Eve.

The original air-handling system utilized single large plenum fans and motors in custom cabinets. The six units serving the performance hall were stacked top-and-bottom units because of the extra space required by the plenum fans. With the location 20 to 30 feet below building grade, it would have been impossible to bring in motors or fan wheels to match the original units without knocking down one of the Symphony Center's exterior walls.

The new air-handling units had to be compact enough to meet the space needs of a new flood-remediation scheme and quiet enough to measure up to the Symphony Center's stringent noise criteria. The answer came in a modular knock-down air handler from Huntair, Inc. Integral to the air-handling units is Fanwall technology — an array of smaller fans and motors in individual cube-shaped cells, each of which houses a fan, motor and electrical connections.

To reach the original sound design levels, the original air-handling units had four-inch-thick panels with fiberglass insulation between two sheet-metal layers. Similar noise-attenuating panels are installed in the ductwork connected to the air handlers.

In most octave bands, the units were more than a 15 decibel improvement over the Symphony Center's old air handlers. As a result, more than 25 percent of the sound-attenuation structure installed in the ductwork of the air-handling systems was removed. In addition, the six air handler systems serving the performance hall required much less sound-attenuating paneling than their much larger "stacked" predecessors.

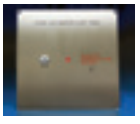
The new units are single-level units sitting on structural steel platforms raised six feet off the floor of the mechanical rooms. The vertical space gained allows those spaces to be used as sump pits in the event of a future flood. **HUNTAIR: CIRCLE #200**

**BACKUP POWER TEST** solution collects data from and provides control for components such as generators and automatic transfer switches to validate their function. The Square D PowerLogic Emergency Power Supply System test solution verifies automatic transfer switch performance and ensures that backup generator testing occurs at or above minimum recommended manufacturer ratings for load and engine temperature. Also integrates an energy efficiency evaluation into the testing process.
**SCHNEIDER ELECTRIC: CIRCLE #201**

**METAL CEILING SYSTEM** for open plenum and exposed structure spaces has panels with less weight and 10 times less deflection than standard aluminum panels of the same size, without the use of panel stiffeners, according to the company. MetalWorks Capz panels are offered in seven standard sizes up to 4 by 8 feet. When backed with an acoustical fleece, the panels have a Noise Reduction Coefficient of 0.75. With a one-inch acoustical backer, the NRC is 0.95.
**ARMSTRONG CEILINGS: CIRCLE #202**

**SMART METERS** can monitor power consumption for individual tenants, departments, and pieces of equipment, or other loads. The Series 3000 meters measure kWh, demand, instantaneous power, volts, amps, watts, VAR and VA per phase. Equipped with an isolated pulse output channel and RS-485 serial port for AMR/BAS/BMS/EMS system interface. Energy-direction arrows (per phase energy and total energy) in the custom display indicate if the meter is installed correctly.
**LEVITON: CIRCLE #203**

**ELEVATOR PHONE LINE MONITOR** provides audible and visual signals in the building lobby in the event of phone line failure. The Line Monitoring Alert Panel can operate as a standalone unit or be incorporated into a lobby panel. Onboard volume control adjusts the audible signal, with a reset function to silence it using a standard J200 key. **JANUS ELEVATOR PRODUCTS: CIRCLE #204**



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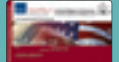

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**ALTUS GROUP: CIRCLE #206**

### »a. SEISMIC CERTIFICATION

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**NOTIFIER: CIRCLE #207**

### »b. MEDIUM VOLTAGE POWER TRANSFER SWITCHES

have an integrated ASCO Power Control Center to improve the systems' communications capabilities and better manage circuit breaker operation. ASCO MVPTS are functionally similar to the company's low voltage transfer switches, but incorporate a pair of medium voltage circuit breakers as the preferred transfer mechanism. They monitor power and provide information about potential fault problems. **EMERSON NETWORK POWER: CIRCLE #212**

### »c. THERMAL IMAGER

offers the largest total pixel image count in the industry, according to the company, as well as full VGA-color LCD display. The P3 Series Thermal Imagers feature multiple viewing modes and allow users to manipulate images right on the camera's display. Units come with a 2GB memory card.

**FLUKE: CIRCLE #209**

### »d. METAL PANEL SYSTEM

features concealed fasteners, several panel thicknesses and widths, and a variety of reveal options. UNA-FOAM Insulated Metal Panel System can be installed horizontally or vertically as a single element. Offers more than 25 colors and multiple finish options that can be used with existing product lines.

**FIRESTONE METAL PRODUCTS: CIRCLE #210**

### »e. LIGHTING CONTROL PLATFORM

has enhanced demand response capabilities, multifacility management, and more powerful wireless control for larger and more diverse networks. ControlScope 2.0 wireless lighting control platform uses ZigBee open industry standards. User interface software improvements include improved energy and utilization reporting as well as broadened dashboard and visualization options.

**DAINTREE NETWORKS: CIRCLE #211**

### »f. FIRE/CO DETECTOR

combines the Advanced Multi-Criteria Fire Detector and CO1224T carbon monoxide detector. The Advanced Multi-Criteria Fire/CO Detector works with the B200S addressable sounder base. The B200S produces both Temp 3 and Temp 4 patterns for fire and CO alarms. For evacuation signaling, the sounder base can be fully synchronized to other company horns and horn strobes. **SYSTEM SENSOR: CIRCLE #208**

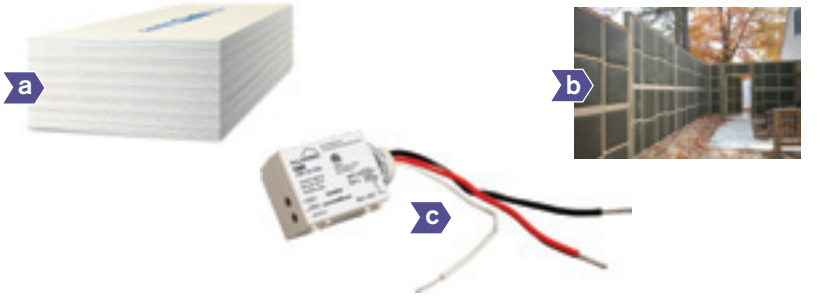
### »g. ENERGY MONITORING PLATFORM

provides real-time and historical energy data via any standard Web browser. Web-Mon Enterprise directly communicates over the facility's existing IP backbone with remote Class 3000 and 5000 E-Mon D-Mon meters and up to three connected pulse-output utility meters per Web-Mon Enterprise device. Provides a dashboard display of kWh, kW, power factor and other functions from up to 24 meter inputs. **E-MON: CIRCLE #213**

### »h. LED WALLPACK

replaces up to 250W Metal Halide systems. The LPACK52, a 52 Watt LED luminaire, provides over 3,400 lumens of light, is available in three cutoff options and is fully Dark-Sky certified. Has a minimum starting temperature of -40 C for and is suitable for operation in temperatures of up to 40 C.

**RAB LIGHTING: CIRCLE #214**



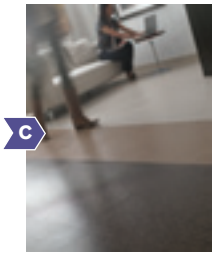

**FLUSH VALVE, like all products in the company's EcoPower self-generating hydropower line, uses flowing water to power its electronics, creating a sustainable loop. The exposed EcoPower Sensor Flush Valve provides a .125-gallon flush with no need for hard wiring or batteries and has a heavy-duty zinc die-cast cover with nickel chrome finish. The unit automatically flushes every twelve hours if not used. TOTO: CIRCLE #215**

**»a. ROOF COVER BOARD** has reinforcing glass mats fully embedded into a water-resistant gypsum core, preventing delamination of the glass mat facers and offering easier handling with less skin irritation. GlasRoc Roof Board cuts like regular gypsum board, according to the company, and meets UL Class A and FM Class 1 fire-resistance ratings.
**CERTAINTEED: CIRCLE #216**

**»b. NOISE BARRIER FENCE** has an NRC of 1.00, an STC of 31 and withstands wind speeds in excess of 130 mph. AcoustiWood Noise Barrier Fence Systems are lightweight wooden post-and-panel systems developed specifically to reduce noise levels — including highway and industrial noise. Available in five finishes.
**ACOUSTICAL SOLUTIONS: CIRCLE #217**

**»c. LIGHT POLE CONTROL** shuts off lights during the second half of night. One CMR device is installed per pole or fixture to shut off lights not needed for maintaining safety lighting levels. The CMR automatically synchronizes to existing dawn/dusk sensors, adapts to changing seasons, and limits peak demand inrush through sequenced start up.
**ILLUMRA: CIRCLE #218**

**SOLID SURFACE CASEWORK and furniture is designed for infection control. The Futrus Casework, Headwall, and Wall System resists the growth of bacteria and viruses, according to the company. The line of furniture for health care includes a bedside table, over-bed table, IV pole and occasional tables. Recyclable and complies with the EU Directive 2002/95EC on the Restriction of Hazardous Substances. FUTRUS: CIRCLE #219**

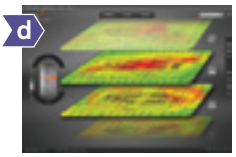





**»a. OPTICAL TURNSTILE** has glass pedestal sides. GlassGate 150 has LED lane status lights at the top and bottom of the pedestals to indicate the available directions of travel and any alarm issues. Measures 6.3 inches wide and 44.9 inches long. The glass barriers are just below pedestal height and quickly swing away from the user in the direction of travel. **SMARTER SECURITY SYSTEMS: CIRCLE #220**

**»b. VINYL TILE** is available in 18-inch by 18-inch tiles in 8 colors. Natural Elements Luxury Vinyl Stone Tile has a UV-cured ceramic bead finish with a 28-mil wear layer. No wax is required. Contains 50 percent recycled content. Can be installed using the company's Spray-Grip spray adhesive, which allows for immediate foot traffic. **FLEXCO: CIRCLE #221**

**»c. RUBBER TILE** is manufactured with a 4.5 percent loading by weight of pre-consumer waste stream walnut shell. ECO-NATURALS Eco-Shell with Cork also contains pre-consumer waste stream cork at a loading of 2.5 percent by weight. Available as 24-by-24-inch tiles in a palette of 24 colors with a standard hammered texture. Stair treads are also available. **JOHNSONITE: CIRCLE #222**



**»d. LIGHTING CONTROL SOFTWARE** offers a single, 360-degree, three-dimensional navigation in a multi-floor view, to improve navigation to a desired control zone. Polaris 3D permits access to the system via a web browser and provides a colorized thermo-graphic representation of system parameters for lighting status, power consumption, light levels, occupancy status, load shedding status and comparative energy trends. **ENCELIUM TECHNOLOGIES: CIRCLE #223**

**»e. KEYPAD'S** features include stainless steel faceplates, single gang flush mounting and 12/24 VAC/DC operation. CM-120 Series keypads support up to 999 users, variable 1- to 8-digit code lengths, 1- to 255-second time delay, as well as a request-to-exit input, door contact input, anti-tailgating, door open and global lock out. **CAMDEN DOOR CONTROLS: CIRCLE #224**

**»f. DEADBOLT** provides privacy control in areas requiring visual notification of use. The Arrow Occupancy Indicator, available on the E Series Grade 2 Arrow Deadbolt, has a large external viewing window to signal whether a room is in use or vacant. An emergency key has override capability to unlock a door from the outside via an exposed external slot. **ARROWLOCK: CIRCLE #225**

**»g. WATERPROOFING MEMBRANE** is for use on below-grade horizontal and vertical surfaces. WeatherTech WeatherSeal BG is a single-component, non-fibrated, asphalt-modified, neoprene membrane that can be either troweled, rolled, brushed, or spray applied. Allows low levels of moisture vapor to escape to prevent blistering and delamination of the applied membrane while prohibiting moisture infiltration. **PAREX USA: CIRCLE #226**

CLOSE-UP: UTILITIES

# Incentive Programs Can Help Save Energy Dollars

by james piper, contributing editor

Rising demand for electricity has led utility companies to seek ways to reduce the need to invest in new generation facilities, system power purchases, and additional transmission and distribution capacity. The problem for utilities is especially critical at periods of peak demand. As a result, utilities have devoted significant resources to programs designed to reduce consumption, particularly at peak.

Some utility incentive programs have been designed to persuade facilities to reduce overall electricity use. For example, utilities may offer grants and rebates to customers to assist in the purchase of energy-efficient products. Other programs provide awareness and education resources to aid facility managers in implementing energy efficiency building practices.

Other types of incentives are tied to peak demand reduction. These programs do not necessarily reduce total energy use within a facility. Instead, they are designed to help customers curtail their energy use during hours of peak demand, typically between 11 a.m. and 7 p.m. on weekdays, or to shift demand to hours when the demand for electricity is lower: evenings, nights and weekends.

Traditionally, all but the largest customers paid for electricity at a rate based on average annual generation costs. While this pricing scheme did reimburse utilities for the cost of generation and delivery, it did not reflect the higher costs incurred by utilities when they had to either purchase power or bring higher cost peaking generators online to meet the highest periods of peak demand. Nor did it cover the cost of building and maintaining the infrastructure needed to meet peak demand. The pricing scheme also did not offer customers any incentive to reduce their energy use during peak demand periods.

## Green Energy Programs

These programs offer grants to commercial and institutional facilities for renewable energy systems, including photovoltaic, solar water heating, solar space heating, wind, fuel cell and geothermal-based systems. Most programs offer rebates to cover part of the installation costs and other incentives based on the annual kWh the system displaces. "To do's" for facility managers: ask if the utility is offering grants and incentives and if their facility is eligible to participate, then perform a site assessment to see if the facility qualifies. Funding is limited, and competition is high.

— james piper

## How Demand Response Works

A variety of programs have been developed that focus directly on reducing peak demand. For example, utilities have offered lower, "interruptible" rates to large facilities that would agree to reduce consumption upon request. But there were complications with these programs that led many utilities to morph them into demand response programs.

The most common approach to current demand response programs centers around a demand response event. Demand response events are those occasions when the utility foresees the demand for electricity increasing to the point where outside purchases of electricity will have to be made or higher cost peak generating equipment will have to be brought online in order to meet demand. A demand response event also may be the result of equipment failure within the distribution system that could result in an overload to a portion of the system.

When the utility determines that demand must be reduced, those participating in the program are notified of the demand response event. Depending on the specifics of the program, participants are given an advance notice of 30 minutes to two hours. Participants are then asked to take steps to reduce their demand for electricity according to a preplanned load reduction scheme. In smaller and medium-sized facilities, customers typically turn off certain electrical loads, such as building air-conditioning systems, for the duration of the demand response event. Larger facilities and those with a building automation system can rotate

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Many utility programs are designed to help customers curtail energy use during hours of peak demand, typically between 11 a.m. and 7 p.m. on weekdays, or to shift consumption to hours when demand for electricity is lower: evenings, nights and weekends.


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the load curtailment among a number of different systems in order to minimize the impact on building operations and occupants. Facilities with standby generators also have the option of running their generators instead of or in addition to shedding electrical loads.

In order to participate, facility managers will have to identify loads that can be shed without serious disruption to operations and occupants.

Facility managers must also take into consideration how long it will take them to reduce loads when notified by their utility. Facilities with a building automation system can typically respond very quickly when notified. In large facilities, loads can be shed on a rotating basis as needed to meet demand targets.

Managers of facilities that do not have a centralized building automation system will have to take into consideration the time required for operating personnel to manually turn off and restart equipment as required.

## Strategies for Success

Not all facilities are well suited for demand response programs. Demand response programs are particularly helpful for managers of facilities with electrical loads that can be shifted or temporarily curtailed without impacting operations.

It is also important that managers take into account how building occupants will react to participation in a demand response program. Turning off loads to reduce electrical demand will impact operations and building occupants. To increase the chances of success, it is important that building occupants be part of the decision making process when identifying loads that can be shed. Occupants may even be able to identify additional loads that can be shed. Ignoring the impact that the program will have on the occupants will only create resentment and resistance.

The importance of utility programs will increase as utilities move towards more widespread pricing of electricity based on its cost of generation rather than using average costs. Even if the local utility is not currently using that type of pricing schedule, facility managers should plan for its eventual adoption.

While these programs offer facility managers a variety of methods for reducing both their facility's electricity use and cost, it is important not to lose sight of the big picture when considering their energy options. In most facilities, even minor adjustments to operations can result in significant efficiency improvements. These opportunities are simply too good for facility managers to ignore. ■

*James Piper, PhD, PE, is a writer and consultant who has more than 35 years of experience in facilities management. He is a contributing editor for* Building Operating Management.

*Email comments to edward.sullivan@tradepress.com.*

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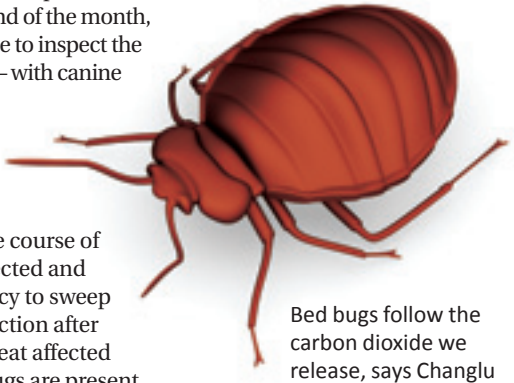
CLOSE-UP: PEST MANAGEMENT

# Take the Bite Out of Bed Bugs

by naomi millán, associate editor

The first report of bed bugs on Wake Forest University's campus came just days into the 2010 fall semester. Following a canine inspection, several affected dorm rooms were identified. By the end of the month, dozens of rooms were affected. The decision was made to inspect the entire freshman side of campus — about 800 rooms — with canine teams.

A few more areas of concentration were identified. All affected rooms were heat-treated to follow up on some pesticide treatments done at the very beginning of the semester to gain ground quickly against the bed bugs. Over the course of the year, hundreds of rooms were affected and treated. The university now has a policy to sweep all residential units with canine inspection after major population changeovers and treat affected rooms if the dogs indicate that bed bugs are present.



Bed bugs follow the carbon dioxide we release, says Changlu Wang at Rutgers University. Body heat and body chemicals help them zero in. Even a hand warmer in a room is enough to attract them.

"Everything was surprising," says Bill Yost, assistant director of housing at Wake Forest. "Just the magnitude of it was very surprising." As was the level of strategy it required. The Residence Life and Housing staff had to figure out what to do about winter and spring break. And fall move-in.

"You have 3,300 people moving in with everything that they own," Yost says.

Bed bugs are unlike other pests in that facility conditions don't lure them in, the way that cockroaches are attracted by open food in a breakroom, for example. They are tiny, the size of apple seeds at adult size, and phenomenal hitchhikers on personal belongings. They have been around for ages, but the U.S. public is only now beginning to get reacquainted with them. Their population in the United States has boomed for a variety of reasons, such as increased global travel, decrease in use of certain pesticides and general ignorance as to what they are and how to deal with them.

**$350,000**

spent by one FM to address bed bug infestation. The majority (59 percent) spent less than $5,000, though 27 percent spent between $5,001 and $15,000.

*Source: BOM Survey*

And they are unlike other pests in that they carry a stigma and elicit a potentially intense emotional/psychological reaction, unwarranted though it may be, that requires facility managers to educate themselves on the tiny invaders, create a response plan that covers both physical treatment of an infestation and internal and external communications policy, and react quickly and decisively to mitigate the negative effects of the discovery of bed bugs.

At least, that's what the experts say. Despite the problems that bed bugs have the potential to cause, facility managers who haven't been affected generally aren't very worried about the pests, according to a survey conducted by *Building Operating Management*.

Of 515 survey respondents, almost a quarter (23 percent) reported having had bed bugs at their facilities, with an average of three facilities in their portfolio affected. Of the 77 percent of respondents who said they had not been affected, 72 percent are not doing anything to monitor for bed bugs and 43 percent are not at all concerned they will be affected. Only 6 percent were seriously con-

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cerned and 51 percent were somewhat concerned.

Among those reporting no infestation, 28 percent report monitoring for bed bugs, with visual inspection being the most prevalent step taken (83 percent). Visual inspection was also prevalent among facility managers who had been affected by bed bugs, at 75 percent.

Visual inspection is a valid and important strategy in monitoring for bed bugs, but it is only one in many steps that can be taken and it doesn't work very well for many types of property. As a preventive measure, visual inspections work best in places where there is a sleeping person.

"When you get to office buildings, daycare, retail, it can be maddeningly difficult to find bed bugs in those early stages because there's no sleeping human, which is the main attractant to congregate," says Michael Potter, professor and urban entomologist at the University of Kentucky. "It's like hunting a needle in a haystack in these types of situations, especially with visual inspection."

As their name implies, bed bugs are most closely associated with the places where a host sleeps or sits still for prolonged periods of time. But that doesn't mean they stay there; instead, they hitch a ride on pant cuffs, backpacks, or books and go anywhere a person goes. Movie theaters. Changing rooms. Schools. Office buildings.

The increase of the general population of bed bugs means that they are being introduced in greater numbers in all types of facilities, even if the spaces are not the ideal environments to establish a breeding population. In the Building Operating Management survey, the facility types reporting being affected by bed bugs ran the gamut from hospitality to hospitals, K-12 to government facilities. (See chart above.)

Just because non-residential environments are not likely places for bed bugs to establish breeding populations doesn't mean facility managers can be casual in their response, or that it will be cheap. The Council on Foreign Relations, a 55,000 square foot facility in New York City with about 200 employees and staff, has had two bed bug events. The number of bed bugs found was small. The response was not.

Early last year, a suspicious insect was spotted crawling up a wall in an area with eight workstations. It was trapped by an employee and confirmed as a bed bug by a pest management company. A canine unit inspected the entire facility and identified the main area of infestation. The employees in that area were asked to work from home until the space — and their homes — could be cleared by canine inspection.

In the facility, the affected area was steam cleaned and vacuumed, then resinspected by dogs. Any further hot spots were removed and heat-treated or recleaned with steam. Then the dogs came back to give a final all clear. All said, it took a week and $20,000, says Ian Norray, deputy director of facility operations at the Council.

The second incident involved an employee in an office shared with three other employees. The employee reported having bed bugs at home, so the office was inspected and the employee worked from home until she could document that her home was clear.

## Bed Bug Control

In the future, Norray says, they are planning twice-yearly inspections with canine units and dealing with problem spots quickly and quietly, without unduly alarming staff.

"There are much worse things than bed bugs, like cockroaches and rats," Norray says. "All a bed bug wants is a nice warm meal. No different than you and me. They don't pass on diseases, to my knowledge."

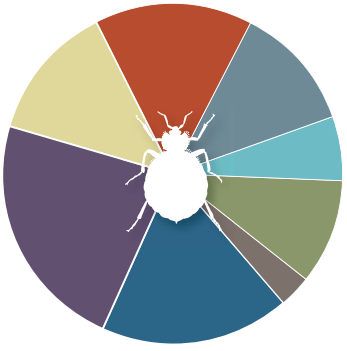
Bed bugs are not known to be a classical carrier of human pathogens and cause disease, says Potter, though it has been known for better than 40 years that there are any number of pathogens that can be found on bed bugs, including MRSA.

"The question is, can they infect people through the bite," Potter says. "It seems this is unlikely with bed bugs, as a lot of these pathogens don't seem to be able to multiply in the bed bug's body."

Certain people have an allergic reaction to bed bug bites, and if someone were to scratch a bite, breaking their skin and creating a path of entry for pathogens that might have been on a bed bug's body, they could possibly end up with an infection, Potter says. "We're a long way from saying bed bugs are causing infections, but it certainly does add to the concern," he says.

In the general population, the main concern is that humans are the meal, and that the predation happens

## Where the Bedbugs Are Biting



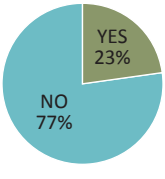
Of the total reported infestations, facility type was:

- Office Building ..... 23%
- Hospital ..... 13%
- Higher Education (including dorms) ..... 15%
- K-12 ..... 12%
- Government ..... 6%
- Hospitality ..... 10%
- Retail..... 3%
- Other ..... 18%

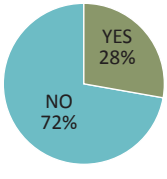
*Source: BOM Survey*

## Many FMs Not on the Watch For Bedbugs, Survey Shows

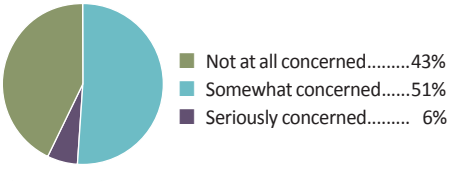
Has your organization been affected by bedbugs?




If no, are you taking any steps to monitor for an infestation?




If no, how concerned are you that one of your facilities will be infested in the coming year?




*Source: BOM Survey*

while we sleep in our beds, violating a sense of personal space and ability to control the situation in a way that mosquitoes, for example, do not. This has fueled a healthy trade in all manner of products claiming to kill bed bugs.

"Steam and heat are the most effective non-pesticide tools," says Jody Gangloff Kaufman, urban entomologist with Cornell University. Of the pesticides that are available to effectively deal with bed bugs, none are available over the counter.

"Ant and wasp sprays, insect foggers — these do not work," says Changlu Wang, assistant professor in the department of entomology at Rutgers University. "There are no data showing they have a significant effect on bed bugs. Don't just buy over the counter. Professionals have professional products they can use."

Sensitivities of a facility's population will influence which bed bug treatment options are pursued. When a few bed bugs were found in an elementary school in the Anchorage School District, the administration wanted to deal with the issue decisively, says Darin Hargraves, director of operations.

"We didn't want these things going from our schools back to people's homes," Hargraves says. "We wanted it to stop with us."

Because the infestation coincided with a three-day holiday weekend, the district, covering 8 million square feet and serving 50,000 students, didn't have time to give the parental notice required to use a pesticide solution. So over the course of two days, when the outside temperature was 10 F, their pest control contractor brought different rooms in the affected wing of the school up to 135 F for over an hour.

"The reality is that bed bugs came to our school through our population that uses the facility," says Hargraves. "No sooner do you get it cleaned out, it's very possible that the next person coming in can bring one." Though 69 percent of affected survey respondents report a one-time infestation, 31 percent have had an average of three infestations about four months apart.

But dealing with children, and as a public entity, the school district never considered making affected children stay home. They have, however, instituted some protocols to address the situation. Students might go to the nurse's office to have their clothing and personal items heat-treated; the school has a clothes dryer and a heat treatment box. "But we do this with the permission of the parents and as discreetly as possible," Hargraves says.

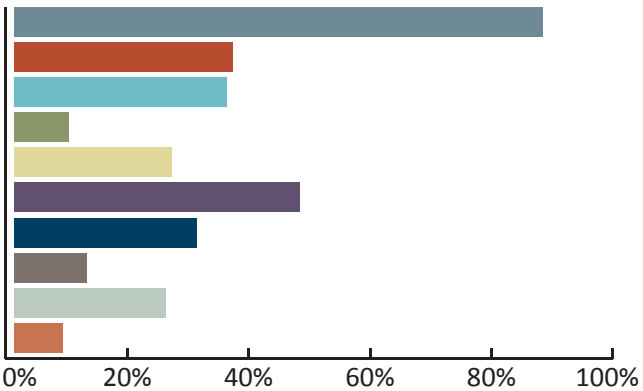
## Lessons Learned

The experts agree that the chief weapon against bed bugs is education and having a plan in place. "Staff training and awareness on bed bugs is going to be your first defense," says Gangloff Kaufman. Understanding what they look like and how they travel is important. "There's a lot of misinformation about bed bugs still, even in the media,"she says. She suggests facility managers check out the New York Department of Health's bed bug page at www.nyc.gov/bedbugs for layperson training materials.

Yost recommends having a plan in place ahead of finding a bed bug at your facility, including who will be contacted and what resources are available. Norray agrees.

"The thing is having a policy in place," he says. Especially in high risk areas, have a consultant come in and do an assessment. "And from that consultation, write policy."

## How FMs Are Fighting Bedbugs




- Hired a pest management professional..... 87%
- Washing/drying fabric at high temp..... 36%
- Heat Treatment ..... 35%
- Cold Treatment..... 9%
- Encasement..... 26%
- Throwing Away Affected Items..... 47%
- Using Pesticides..... 30%
- Using Non-chemical pesticides..... 12%
- Increased Cleaning ..... 25%
- Other..... 8%

*Source: BOM Survey*

Developing a response plan involves deciding how internal and external communications are going to be handled. At Wake Forest, the focus was on keeping everything out in the open. "We didn't want anything to come back that Wake Forest was trying to hide anything," says Yost.

Of course, releasing information to the school's external relations department meant that it was picked up in short order by the local and national media. At the Council for Foreign Relations, the entire population was notified about the first bed bug incident, a practice that was not repeated for the second event. "It became too much water cooler gossip," Norray says.

Whichever way communications are handled, facility managers should take note of the occupants' reaction and keep it from getting it to the point where people are going overboard about bed bugs. Hargraves suggests positioning the facilities department as being informed and on top of the issue. "When information comes to us that we have an issue, we immediately respond," he says. "And we respond visibly." For example, he talks to the teacher in the affected classroom and might put up a carbon dioxide emitter to monitor for additional bed bugs.

Even if a facility has not experienced bed bugs yet, experts say it is likely to happen in the future.

"The (bed bug) population will grow until it gets to the point that people are very well educated and begin to take action," says Wang. "Then we may see the peak. Our society is not quite ready or educated yet. Learn about bed bugs. Don't be panicked, but be prepared." ■

*Email comments to naomi.millan@tradepress.com.*

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# COVER STORY

Allan Skodowski, Senior Vice President, LEED and sustainability services, Transwestern
*Right:* Transwestern's Milwaukee-based sustainability services team.

# GREEN Team Leader

Allan Skodowski uses sustainability as the cornerstone for best practices across a 192 million-square-foot real estate portfolio

by greg zimmerman, executive editor

Visit Allan Skodowski at Transwestern sustainability services team's new 3,500-square-foot Milwaukee headquarters, and it's easy to see how the small space is a perfect launching pad for the organization's big sustainable goals. The office is tucked into a third-floor corner of a rehabbed turn-of-the-century knitting factory. Transwestern sustainability services was one of the first tenants to build-out space in the building, a LEED for Core and Shell Silver certified facility clad in rich Cream City brick with a skeleton of striking timber columns.

Skodowski, who is senior vice president, LEED and sustainability services for Transwestern, is clearly proud of the space, which he and his 16-member team have occupied for about 18 months. Earlier this year, the bright, high-ceilinged, open-plan space earned LEED for Commercial Interiors Platinum certification.

On a sunny mid-July morning, Skodowski stands in the reception area, shows off how he can adjust the blinds with a remote control, and then spends several minutes explaining how his team selected the building and built out the space, why the LEED certification on the core and shell was a critical factor, and how his team went about managing the process of its own Platinum certification.

But beyond the "wow factor," it seems the real reason Skodowski beams as he describes the office is that it represents the confluence of several aspects of his Transwestern duties. As head of the Transwestern sustainability services team, he is the company's sustainability

guru. Transwestern sustainability services helps the organization's property managers use the LEED for Existing Buildings: Operations and Maintenance (LEED-EBOM) rating system and Energy Star rating system to green their clients' buildings. But Transwestern sustainability services also acts as a sort of side business, working in a consulting role for other customers interested in help with LEED certification, Energy Star, commissioning or an energy audit. He describes this function as a "means to an end." Every dollar Transwestern sustainability services earns with its expertise in green is reinvested back into the company to build tools and fund other initiatives that benefit the company at large.

Yet another part of Skodowski's charge is "turning Transwestern green from the inside out," as he puts it. That is, he makes the space Transwestern itself leases — as strictly a third-party manager with no owned space – sustainable as well.

But this is no run-of-the-mill "walking the talk" story. It's a story about how Skodowski and Transwestern, one of the largest privately owned real estate and property management firms in the country, use sustainability as a cornerstone of an effort to standardize the practices and policies for a national organization that operates on a de-centralized, regional basis and manages more than 770 properties comprising 192 million square feet. There are two main prongs of this standardization approach. One is what Skodowski calls the "good, better, best" approach to rating the level of sustainable performance of the organization's portfolio of managed space. The other is an internal committee, of which Skodowski is a member, called the innovation and quality assurance (IQA) team. Both initiatives work toward moving Transwestern to what Skodowski says is its ultimate goal, that every building it manages meets LEED-EBOM criteria.

## Innovation and Quality

Transwestern was founded in 1978 as a small Texas-based development company. Throughout the 1980s it

## Transwestern's "Good, Better, Best" Rating System

| | Not rated | Good | Better | Best/LEED Certified |
|---|---|---|---|---|
| **Energy** | Not benchmarked or Energy Star score < 50 | Energy Star score of 51- 65 and data are current | Energy Star score of 66 - 74 and data are current and water is metered | LEED CERTIFIED Energy Star labeled (score of 75 or above); and water is metered |
| **Water** | Aerators: > 1.5 gpm<br>Toilets: > 3.5 gpf<br>Urinals: > 1.5 gpf | Aerators — 1.5 gpm<br>Toilets — 3.5 gpf<br>Urinals — 1.5 gpf | Aerators — 1.0 gpm<br>Toilets — 1.6 gpf<br>Urinals — 1 gpf<br>Must achieve 2 of 3 | LEED CERTIFIED<br>Aerators — 0.5 gpm<br>Toilets — 1.28 gpf<br>Urinals — 0.5 gpf<br>Water Systems Submetered |
| **Operations and Maintenance** | No documented Building Operations Plan, no documented Preventive Maintenance Program | Documented Building Operations Plan **OR** Preventive Maintenance Program | Documented Building Operations Plan **AND** Preventive Maintenance Program | LEED CERTIFIED Documented Building Operations Plan **AND** Preventive Maintenance Program |
| **Indoor Air Quality** | No Green Cleaning Program implemented | Green Cleaning Program implemented **OR** Integrated Pest Management Program (IPM) implemented | Green Cleaning **AND** IPM Programs implemented WITH contracts | LEED CERTIFIED Includes Better plus Regular Tentant Communication Programs implemented |
| **Resources and Materials** | Recycling Rate: ≤ 25%. Has a current recycling-hauler OR waste-hauler contract | Recycling Rate: 26% - 50%. Includes paper and cardboard AND has current recycle-hauler AND waste-hauler contracts | Recycling Rate: 26% - 50%. Includes Good plus 3 of these 4: plastics 1&2, glass, mercury lamps, batteries. Has current contracts with waste-, recycling-, battery/lamps- and lighting haulers | LEED CERTIFIED Recycling Rate: > 51% Includes Better plus recycling metal and E-wastes, or a co-mingled pick-up AND tenant participation in outreach programs related to sustainability |

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transitioned into a third-party property manager and leasing business and grew its portfolio to more than 30 million square feet. Mergers in the last two decades expanded the company's reach from coast to coast.

Then, in September 2009, Transwestern got some really good news. It had been selected to manage about 47 million square feet for RREEF Americas, the real estate investment management business of Deutsche Bank's asset management division. Though this deal wasn't the first time Transwestern would be managing properties located across the country for an organization, the magnitude of the RREEF deal triggered Transwestern's leaders to start thinking about how they'd keep their service consistent nationwide.

"It struck me that we had to have internal processes to standardize how we operate," says Steve Harding, Transwestern's chief financial officer. "We had to determine our best practices to roll out to our clients."

'It makes sense that as we're developing and reinventing best practices, sustainability should be added'

The solution is the IQA team. The team is made up of five members — leaders of the engineering, property management, IT, accounting, and sustainability groups — that conduct monthly conference calls and meet in person quarterly.

"The idea is to make sure everyone communicates in the same way," says Skodowski. "Our goal is to ensure that a national company that had worked regionally is able to work with national standards."

Last summer, Vicki Hollon, senior vice president and head of the property management division, went to each of the company's nine regions to ask the regional leaders and as many of the company's 1,700 employees as she could about hot button issues and what keeps them awake at night.

"What we found is that the issues were similar across the country," says Hollon. The need for more training was one of those similarities, especially in regards to sustainability, Energy Star and LEED.

"It makes sense that as we're developing and reinventing best practices, sustainability should be added," says Hollon. "Sustainability should be standard operating procedure, and the IQA team will take it out to each region."

It's not like the company was a sustainability newbie. Harding explains that the company had been committed to green since its founding, but it really started strategically in the late 1990s with a partnership with the U.S. Environmental Protection Agency to use Energy Star to rate its buildings. That partnership was partially driven by the energy crisis in California.

But these days, the company firmly believes that a systematic, standardized approach to sustainability can be something that sets it apart from its competition.

Skodowski had already been heading up the first pass at standardizing best practices in sustainability. He'd also been working with the U.S. Green Building Council on its pilot programs for LEED for Portfolio — a way to certify a large number of facilities without having to submit paperwork on each one. Suffice it to say, then, Skodowski already had his finger on the pulse of what owners were looking for in terms of green.

The founding of the IQA team made it easier to develop a standardized program — the "good, better, best" rating system for assessing the space Transwestern manages. The "good, better, best" approach also has the advantage of promoting systemized training for the company's property managers to deliver best practices at whatever level of sustainability a client's asset currently occupies. Given that different clients want different

## ENERGY PLAZA: LEED ISN'T THE FINISH LINE

One of the big changes in the real estate market has been the willingness of building owners to set their sights higher when it comes to sustainability.

A case in point is Energy Plaza, a Class A 49-story, 1.2 million-square-foot building located in downtown Dallas. Energy Future Holdings Corp., a privately owned Texas electricity utility, owns the building and occupies about 250,000 square feet of the building's office space.

Getting LEED certification was one of the owner's big goals, says David Bryant, Transwestern property manager for Energy Plaza. Skodowski suggested the best cost/payback result would be to try for LEED-EBOM Silver certification. The owner had just done lighting and BAS upgrades, so the Energy Star score at the start of the LEED initiative was already pretty good: 78.

After the 60-day assessment period in mid-2009, the team realized the building was only a few points shy of a Gold certification. So Skodowski did a proposal and calculated the cost to get to Gold. The owner accepted the proposal and, by adding some drought-resistant plants to the landscaping and a few other strategies, the building earned Gold.

Bryant says he's still in regular communication with Skodowski to bounce ideas off of him and try to learn about ways to improve. Since the certification, the building's Energy Star score has increased to 88.

"We're excited and proud of our building," says Bryant. "But we see LEED not as a destination, but as a process. Continual improvement is key. It's a lot of work when you're doing it, but the tools you get allow you to quantify things you never quantified before."

*— Greg Zimmerman*

## ONE WASHINGTONIAN CENTER: PATIENCE PAYS OFF

One Washingtonian Center, a 316,000-square-foot Class A office building located in Gaithersburg, Md., stands as one of Transwestern's greatest successes, but also one of its most bitter disappointments — at least for one property management team.

The building, constructed in 1989, earned LEED-EBOM Platinum certification last year. It was a road to certification that started more than seven years ago, says Natasha Evstigneeva, senior property manager and vice president with Transwestern. In 2004, with a long deferred maintenance backlog and a laundry list of inefficiencies, engineers set to work on how to transform the building from an energy hog — with an Energy Star score of 54 — to an Energy Star.

In 2009, after several energy upgrades and a close partnership with tenants — including anchor tenant Sodexho — the building earned a Certified rating with LEED for Existing Buildings.

"Allan and his team took the lead from the beginning (of the LEED process)," says Evstigneeva. "He gave a real boost to the sustainability and LEED process."

Two of the main initiatives that secured certification were a recycling program that saved $160,000 in solid waste disposal fees in the first three years, and a program of working with tenants to cut conditioned air in the building during weekends when the building is mostly empty. If tenants wanted conditioning, they could simply email the property managers and cooling or heating would be turned on.

Still, the team wasn't satisfied. "We knew the building could do better," says Evstigneeva. They worked with the owner, LaSalle Investment Management, and made investments in variable frequency drives ($33,500 per year savings, 11-month payback), a garage lighting retrofit ($7,350 per year savings, 3.83-year payback) and a cooling tower upgrade. Water efficiency upgrades and pumping water from a decorative man-made lake in the front of the building for irrigation earned some innovation points, as well.

The team re-certified in 2010 with LEED-EBOM, this time at the Platinum level and with an Energy Star score of 95.

But, then, heartbreak. This spring, LaSalle Investment Management, which had purchased the building in 2000 for $59.25 million, sold it to CB Richard Ellis for $90 million, or about $285 per square foot. CBRE took over the day-to-day management of the building. Evstigneeva says she and her team were very sad when Transwestern lost the building. She says Sodexho gave her a framed photo of the building as a farewell gift, and told her how much they'd miss her and Transwestern. "It really was like a family," she says.

But there is a silver lining. LaSalle Investment Management has hired Transwestern to complete a LEED certification on another building — at 2020 K Street in Washington, D.C., an 11-story, 400,000-square-foot Class A building for which LaSalle Investment Management is the asset manager. "So we're starting the same process — looking at inefficiencies, deferred maintenance and recycling. It feels like déjà vu," says Evstigneeva.

*— Greg Zimmerman*

sustainable outcomes (from a simple recycling program to a LEED certification) and different property managers are at different levels of expertise, the "good, better, best" system is the way by which Skodowski defines where a facility is now, the level of its managers' knowledge, and how they can all work together to improve.

### Stepping Up to Sustainability

The "good, better, best" program kicked off last fall. Skodowski and his team sent assessment questionnaires to all the managers of office properties in the company's portfolio. The questionnaire used LEED as its framework to outline the level of sustainability in the areas of operations and maintenance; purchasing, waste and recycling; water; energy; and indoor environmental quality.

"This was a major undertaking," says Skodowski. "In collecting this data, we made sure to get the data we needed, but not much more than that. We determined it took about eight hours to complete each survey."

The reason the surveys were so time-intensive is that managers had to gather and upload invoices, contracts and other documentation — no small feat in multi-tenant facilities.

Skodowski set up a help line to assist property managers "having heartburn," so that the Transwestern sustainability services team could help them do parts of the survey over the phone. All told, by May of this year, the team had received surveys back for 224 properties — about half of the company's portfolio of office properties. Huddling with the members of the IQA, and starting by defining "best" as strategies that would meet LEED-EBOM criteria, Skodowski developed the parameters for "good, better, best" in each of the categories of sustainability. (See "Transwestern's 'Good, Better, Best' Rating System" on page 28.) For example, in the operations and maintenance section, a property that has a green cleaning program is "good," one that has a green cleaning and pest management program with contracts is "better," and one that has green cleaning, integrated pest management and tenant communication programs documented to meet LEED-EBOM standards is "best."

With all that data, Skodowski and his team could then start analyzing

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The important thing is that owners and tenants understand that LEED-EBOM certification is not a zero-to-60-in-five-seconds proposition

which regions were deficient in which areas. "Once we've identified the problems, we can literally go out and pull teams together and show them the strategies the 'best' facilities are using, and here's how you can make changes," he says. For example, if a region is almost all "good" on green cleaning, Skodowski says he'll go to that region, walk its leaders through the RFP process, bring in providers, set up training for the property managers, and allocate other resources to help them move up to "better" and then "best." Property managers can also use the data to benchmark against facilities in the same regions — giving those managers motivation to improve.

Again, the holy grail is that each facility in the portfolio will move up to "best," whether or not the property goes through formal LEED certification — though both Skodowski and Harding say they believe many will choose to do so. And if they do, Skodowski's team is right there to help them with the LEED application process.

ONLINE MULTIMEDIA
Skodowski explains why LEED is the basis for the company's "good, better, best" approach, the importance of certification, and why Transwestern has committed itself to the Better Buildings Challenge.
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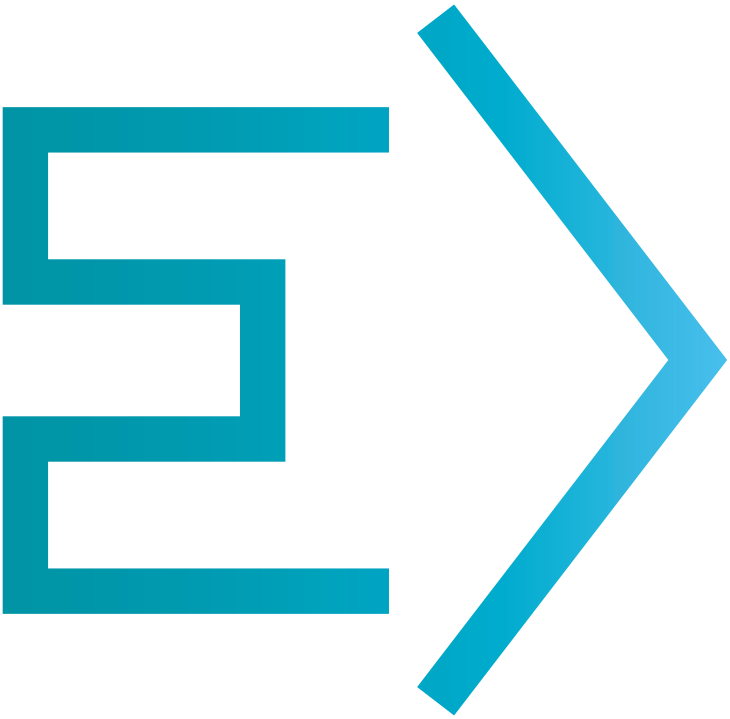
The important thing, though, is that owners and tenants understand that LEED-EBOM certification is not a zero-to-60-in-five-seconds proposition. "In today's environment, it's challenging for owners to own real estate, much less put in new capital," says Harding. "So we're telling them to start on the path today, and we'll walk you through the steps. If it's an onerous process, it won't happen."

Especially for multitenant facilities, with several different agendas and corporate policies, LEED-EBOM certification isn't the easiest thing in the world.

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## Why Certify? LEED-EBOM is a Winning Bet

Over the years, Skodowski has had several conversations with owners about the real value of LEED certification. Why is certification more important than simply using LEED as a guide? Skodowski says one of the best answers to that question is from a building owner he talked to recently about why he went through with formal LEED-EBOM certification. The owner said that if certification results in a penny-per-square-foot reduction in operating costs, or a lease signed a month earlier, or a longer lease term, or higher rent, or an increase in building value, then it's at least a cost-neutral proposition. "I'm not a betting man," Skodowski says the owner told him, "but I'm probably not going to lose on all five of those bets."

Skodowski suggests offering "bribes" to get tenants excited. Have a pizza party for the highest participation in the comfort survey, for instance. Give away twelve months of dedicated parking for the highest participation in the transportation survey, as another example. Managers at One Washingtonian Place (see "Patience Pays Off" on page 32) even brought in car dealerships to let tenants test-drive hybrid and alternate fuel vehicles to celebrate Earth Day. "We did an online quiz about environmental issues and those who did the best got to go first with the test drives," says Natasha Evstigneeva, senior property manager and vice president.

All told, Skodowski and his Transwestern sustainability services team have achieved LEED certification on 38 properties comprising more than 14 million square feet. And that number is increasing rapidly. It's a golden age for sustainable initiatives, says Skodowski. "Today, when we pull tenants together to discuss LEED, all too often, it's 'wow, that's all we need to do?'" he says.

Without question, Skodowski and his team have the eagerness and drive to match the ambition of the company's sustainable goals, say his colleagues. "Allan's group has such a passion for sustainability," says Harding. Indeed, Skodowski's passion is one of the first things you notice talking with him. As he poses for his photo, the photographer actually has to shush him a time or two to get him to stop talking about his team and their recent projects. Talking sustainability is his real comfort zone, and his excitement is infectious. As Evstigneeva says, "He's so passionate, just talking with him, you're carried away on the same current." ■

*Email comments and questions to greg.zimmerman@tradepress.com.*

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# Rolling Out LEED-EBOM Across the Campus

## Efforts now underway should save time and money for facility managers who want to certify multiple buildings

by dan ackerstein

Without question, LEED for Existing Buildings: Operations and Maintenance (LEED-EBOM) is challenging. And for Andy Coghlan, it's even more so — indeed, Coghlan has an enormous task. As the sustainability specialist for the University of California's Office of the President (UCOP), Coghlan helps coordinate efforts on 10 campuses in the University of California system as they develop and implement sustainability strategies to keep the nation's largest college system on the cutting edge of sustainable operations.

UC's 10 campuses are made up of over 17,000 acres of land, serving 400,000 students and staff. They include 5,755 buildings encompassing 122 million square feet. Recently, the UC system has instituted a goal of LEED-EBOM Silver certification on campus buildings over 50,000 square feet (except for "acute and patient care buildings, and buildings scheduled for demolition or major renovations").

The UC system understands LEED, and EBOM specifically — by the end of 2010, five campuses had about 50 LEED-certified buildings under various versions of the rating system, with many more in the pipeline. The UCOP's own office was certified under the LEED-EB system in 2007. So Coghlan's problems aren't technical sophistication or even selling sustainability to his campuses; it's more an issue of implementing LEED-EBOM at scale, given severe budget and staffing constraints.

It's a process on which Coghlan and the rest of the UC campuses are hard at work to systemize.

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Fortunately, they have help. The U.S. Green Building Council (USGBC) is well aware of the challenges campuses face in applying the EBOM rating system, and has been working diligently on the issue for the last several years.

LEED-EBOM is built around a fairly simple building model. The design of the rating system was historically based upon — although by no means limited to — an owner-occupied commercial office building standing alone on its own piece of land, where property lines clearly demarcate boundaries of responsibility and operations.

That model is often tested from two distinct directions — when that building is located on property shared with other buildings (as in a corporate office park) or when multiple distinct and unrelated (or partially related) tenants occupy a single building. Combine those challenges and multiply them times a dozen or more buildings and one can start to see the problem facing Coghlan and folks like him who are wrestling with certifying multiple buildings in the campus environment.

In a campus setting, buildings don't have natural property or even "project" boundaries. As one example, the landscaping between two laboratories at University of California, Davis isn't divided between those labs; it is functionally shared by both, and its management is handled by parties who do not occupy either building. In addition, those laboratories may each contain multiple departments, which also are spread across two or more additional buildings.

Adapting LEED-EBOM's strategies for campuses has been on USGBC's radar since the very beginning, when the Existing Buildings Pilot Program wrestled with buildings on campuses like Emory University and UC Santa Barbara, as well as the corporate campuses of Nike and Microsoft. These buildings made clear that a thoughtful approach to adapting the LEED suite of tools to campuses would be a

## One Policy, Multiple Buildings

Allen Doyle is a reasonable man. With more than 5,300 acres of campus and 5 million square feet in his portfolio as sustainability manager at the University of California, Davis, the UC system's largest campus both in terms of acreage and enrollment, Doyle understands the need for a measured approach to LEED for Existing Buildings: Operations and Maintenance (LEED-EBOM) certification. "If we can certify 400,000 square feet of building on this campus by 2013, we will be very satisfied," he says. "It's a lot of space, but on a campus this size, it's just a beginning."

UC Davis, like many university campuses, not only has dozens of buildings to consider, but a diversity of building types as well — many of them larger than 50,000 square feet. "We have everything from administrative buildings to performing arts halls to basketball gyms and dormitories," says Doyle. "One of our student rec centers actually shares a building with conference and meeting space. We have more than 1.6 million square feet of energy intensive laboratory space, and one of our hallmark laboratories has a cyclotron in the basement."

Doyle's challenge is not uncommon on campuses. Beyond the relatively common feature of a central plant, campuses often house research and development facilities, laboratories, production or manufacturing lines, health clinics, sports facilities, and data centers. This diversity can make the application of overarching sustainability policies difficult.

### Adaptable Policies

Ensuring that sustainability strategies maintain flexibility and adaptability for diverse building types is critical. This may mean creating a lean set of blanket sustainability policies for the campus while planning on supplementing those policies with more detailed, building-specific implementation documents — one strategy the LEED Application Guide for Multiple Buildings and On-Campus Building Projects (AGMBC) suggests. The core contents of those blanket policies can be focused on the elements of performance that can be implemented campuswide; where buildings differ, the policy may leave room for building-specific information.

According to Melissa Gallagher-Rogers, a LEED director and leader of the group developing the parameters for the AGMBC, policies that apply to multiple buildings across campus is one of the major ways the AGMBC can help facility managers with LEED-EBOM certification, and save time and cost on certification fees to boot.

The AGMBC is intended to provide guidance to achieve two different efficiencies — the more efficient production of policy documents and the more efficient review of those documents after they have been submitted as part of the LEED-EBOM certification process.

When policies that require extensive building-specificity are under development, a blanket policy may end up being so thin as to come up short in the master site review process. But that doesn't mean efforts are wasted. If the multibuilding policy approach doesn't work for a given policy, a campus will still benefit if the facility manager can create a partial policy document, even one that is limited in scope, that establishes consistency in form, structure and as much content as possible. Although that policy will need to be resubmitted with each LEED-EBOM application, the facility manager's confidence in the policy will grow with each successful certification.

*— Dan Ackerstein*

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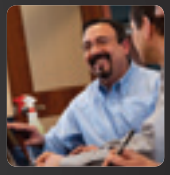

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game-changer.

"One of the reasons we started to work on a systematic campus approach is that lots of organizations that have made a commitment to LEED are scaling up," says Melissa Gallagher-Rogers, a LEED director with USGBC, who is leading efforts to create guidance for campus certifications. "There's no longer just one showcase building. They want EBOM certification on as many buildings as possible."

But to decide where campuswide performance and documentation could be helpful to projects and still maintain the integrity of the EB rating system, Gallagher-Rogers and her team had to first decide what things simply had to stay the same.

Organizations that have made a commitment to LEED are scaling up. No longer is there just one building that is the showcase

One thing that has to stay the same, regardless of whether the focus is on individual buildings or an entire campus: The driving principle behind LEED-EBOM remains performance at the building level.

"We still certify individual projects, but we look at the factors that lend holistically to the campus," says Gallagher-Rogers. "For EBOM, that's anything that is policy-based."

Although certifying campuses as a whole, or groups of buildings on a campus, may be a future goal, even that variation on LEED-EBOM will likely be predicated on understanding building-level performance for a core subset of prerequisites and credits.

USGBC's first step towards formally accommodating campuses, the 2010 LEED Application Guide for Multiple Buildings and On-Campus Building Projects (AGMBC), is consistent with that guiding principle. The AGMBC clearly signals USGBC's interest in testing the waters of campuswide credit compliance, but in a carefully measured and limited scope. The AGMBC introduces a platform called the "master site," by which campuses can submit a set of credits through a separate review process. The idea is to get pre-approval for all campus projects that later pursue LEED-EBOM certification. Credits identified for potential campuswide documentation, via the "master site" process, can be categorized in three general groups: geography credits, policy credits and systems credits.

• **Geography Credits.** The term "master site" sends an accurate signal as to the ease with which credits based on the physical geography and functional infrastructure of a campus can be documented on a campuswide basis. When credit

*article continued on pg. 46*

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# Day Cleaning Aids LEED Efforts on Campus

One of the prerequisites for LEED-EBOM certification is a green cleaning policy. At the University of Washington, that goal is accomplished by combining aspects of green cleaning with a day cleaning program.

The day cleaning program started in 1997, and over the course of the next 13 years, the facility department moved cleaning of more than 10,000 offices, classrooms, lecture halls and laboratories in 173 buildings to day cleaning.

Gene Woodard, the university's director of custodial services, and recycling and solid waste facilities services, says the day cleaning program has helped the university's sustainability efforts in a number of ways. Although the university is still in the process of upgrading its electrical system to allow for building-by-building metering, electricity use has gone down since day cleaning started.

Projects such as retrofitting lights have contributed in that area. But, Woodard says, "it is highly likely that not having the lights on in buildings from 5 p.m. to midnight so that custodians can clean," has contributed to the energy savings.

Another benefit that doesn't necessarily show up on the bottom line is a reduction in the number of cars coming to campus every day.

"The early day shift is far more conducive to employees forming vanpools and carpools," Woodard says. "We have created 10 new vanpools with approximately 90 (cleaning) staff who used to drive in a car alone when they worked evening shift."

In addition to day cleaning, the university uses other green tools, including walk-behind floor scrubbers that use only water; Green Seal-certified floor finish remover; micro-fiber wet mops; and even thinner trash can liners.

Woodard says that the green cleaning program has helped the university earn LEED for New Construction Gold certification on every new building completed since 2006. And there's more on the way. The university currently has more than 25 ongoing LEED projects across various rating systems, including LEED-EBOM.

*— Casey Laughman, managing editor*

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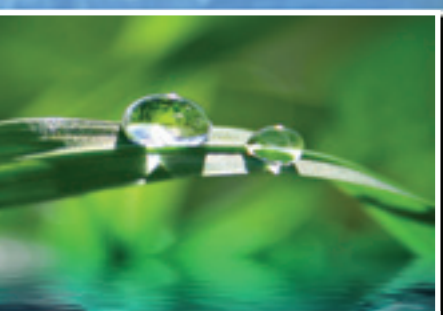

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documentation is based on a site map or relatively fixed physical features of a campus, which are unlikely to vary within building-specific performance periods, it's a good bet campuswide documentation is viable. Examples include Sustainable Sites Credit 5 Open Space & Habitat and Sustainable Sites Credit 7.1 Non-Roof Heat Island Reduction.

• **Policy Credits.** There's no reason the green cleaning policy developed and implemented at one building can't be adopted at several others as well; in fact, USGBC would love green cleaning to be standard operating procedure at every building on campus. And they would happily ensure a more efficient and predictable review process by reviewing that policy once in a master site application rather than over and over again. Policies that can be adopted campuswide are a perfect fit for the master site model. Examples include Indoor Environmental Quality Credit 3.6 — Indoor Integrated Pest Management and Materials & Resources Prerequisite 2 — Solid Waste Management.

• **Systems Credits.** Credits based on technologies or tools implemented throughout the campus are the third category of potential master site credits, and arguably the ones least likely to be earned campuswide. A small number of campuses, particularly those constructed or comprehensively upgraded more recently, do have universal building automation systems, for example, that allow for campuswide documentation that every building on campus meets the credit requirements.

For more information on campus guidance from the U.S. Green Building Council, including a free download of the Application Guide for Multiple Buildings and On-Campus Building Projects, visit www.usgbc.org/campusguidance

## Conceptual Tools

These categories are more useful as conceptual tools for thinking about credits than as hard-and-fast rules or models. Some credits that seem like natural fits for the categories above — documenting that every building on a campus has 10-foot entryway mats doesn't seem decidedly more difficult or technically unsound than documenting that every building has lighting controls in perimeter spaces, for example — are not included in the first round of guidance. And a handful of credits combine the models described above; projects pursuing Water Efficiency Credit 3 — Irrigation Water Use can integrate elements of geography and systems to illustrate efficient irrigation water strategies over an entire campus.

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LEED-EBOM projects are never easy; even the basic act of taking an existing building from conventional practices to sustainable operations is an enormous challenge, and documenting that achievement is all the more difficult. But buildings on educational campuses face a unique set of challenges and opportunities in making sustainability and LEED part of their operating lives.

The sheer size and complexity of the campus environment often conflicts with LEED's focus on building-specific performance, and enrolling diverse occupants, service providers, and decision-makers in campuswide initiatives is notoriously difficult. At the same time, the opportunities for economies of scale are substantial, and USGBC's continuing open-mindedness in this arena suggests a growing understanding that the principle of building-specificity can be successfully balanced against campuswide realities in a way that maintains the integrity of the LEED program and enables continuing sustainability benefits.

And as more and more campuses turn to LEED-EBOM to guide and validate their sustainability decisions, the ability of both building owners and facility managers to thoughtfully adjust that balance will determine LEED's place on campuses in the days ahead.

The AGMBC and "master site" approach represent a first step toward altering that balance. Projects will still struggle with the limitations of the master site concept; in many instances, the master site will be of limited utility and conventional approaches may have to suffice. But as a conceptual bridge from total building-specific thinking to consideration of the campus as an interconnected "facility" this step is of critical importance.

The AGMBC and master site approach may not have yet solved Andy Coghlan's problem for him, but it's a start. The UC campuses are moving forward with a combination of approaches — using the "master site" to document a variety of geographic and policy credits, creating policy and program base templates for others, and focusing on building-specific data where necessary — but the tool has provided some efficiency and certainty relative to a subset of credits that will be earned for every building on campus through a single review process. And for any LEED project, not to mention the dozens of projects Coghlan hopes will come from the UC System in the years ahead, efficiency and certainty are things of enormous benefit. ■

*Dan Ackerstein, LEED AP – O&M, is principal of Ackerstein Consulting, LLC, a firm he founded in 2008. Ackerstein has been involved with LEED for Existing Buildings since the program's origination. He served as lead developer of the online LEED-EBOM submittal templates and is the co-author of the LEED-EBOM Reference Guide. Ackerstein can be reached at dan@ackersteinsustainability.com.*

*Email comments to edward.sullivan@tradepress.com.*

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# While **saving lives**, this hospital **saves money** with Steril-Aire

The president of Muskogee Community Hospital, Mark Roberts had a goal when developing this state-of-the-art hospital – make it the cleanest hospital in the world. To help them attain that lofty goal, he and Glenn Martin, president of Martin Engineering Design, retained Steril-Aire – the global leader in high-output ultraviolet germicidal solutions.

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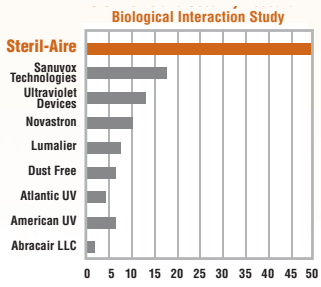


## Providing "two sometimes even three layers of UVC protection"

The superiority of Steril-Aire is perhaps one the reasons why president Roberts and Muskogee Community Hospital chose to install the UVC devices in the 77 individual air handling units that serve patient areas and in seven ceiling-mounted devices especially engineered for "after-hours" disinfection of the surgical and procedural areas with cleansing germicidal light. This physician-owned hospital is serious about IAQ (indoor air quality) and patient safety.

## Reducing contaminants while reducing costs

While the business of a hospital is to provide the best care for the patient, it's also a "business." Reducing costs related to energy and maintenance while reducing absenteeism was also a goal for Muskogee Community Hospital. As Glenn Martin explains, "UVC offers an important advantage: It continuously cleans the coil and drain pan surfaces of biofilm buildup, reducing or eliminating the need for costly manual cleaning and keeping the units in 'as-new' condition so they run more efficiently. As a result, UVC saves on maintenance and energy." That's precisely why Steril-Aire maintains that it provides sustainable solutions for healthy buildings and a healthy bottom line.

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FM PULSE

# How the Recession Remade FM

## It took more than cost cutting to get FMs through the downturn

by maryellen lo bosco

The great recession didn't spare facility management, but the tough economic times didn't devastate facility managers either. Some of the change has been painful, but the new normal of having to do more with less has spurred innovation in the allocation of both people and resources. Facility managers have sharpened not only their pencils, but also their communication and management skills.

"You have to continue to reinvent yourself, adapt and figure out new ways of doing things," says Mike Kastner, director of building services and construction management at Lakeland Health and Healing.

At Lakeland, the biggest effect of the recession was severe cuts in overtime. "We used to manage our overtime, but now we have to report any overtime we have by pay period," he says. "Overtime has gone to 20 percent of what it used to be."

Workers were not happy about the cutbacks at first, but given the economy, they were able to adjust fairly quickly, and it helped that cost-cutting measures were spread equally throughout the organization. "The bottom line is they recognized that there were a lot of people who didn't have jobs, and that although our operating costs and capital budgets are tightly scrutinized, we can still get what we need," Kastner says.

> "We are much more careful about the way we evaluate growth projects and spending in general."

**Julie O'Loughlin**
Senior director of operations and facilities, Fenwick & West

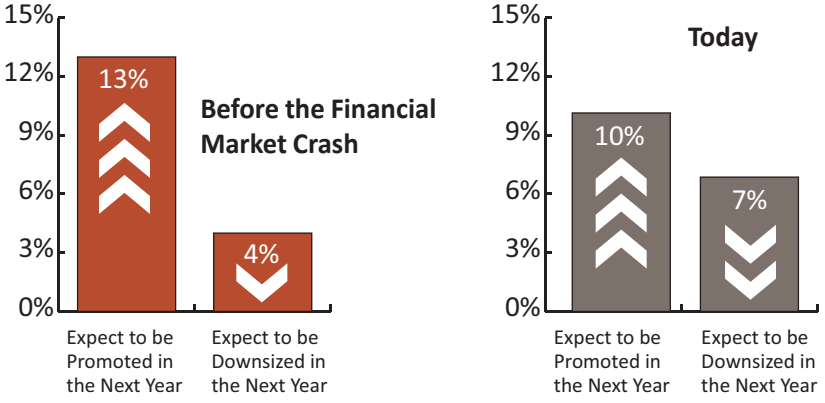
Kastner says his organization has been fortunate because it has gone through more than one merger, which has wrung costs out of the system. "We bring value and purchasing economies to partners and have less overhead collectively," Kastner says. "But tough times are not over. They are looking in Washington for ways to squeeze more money out of the payment system."

### Becoming More Efficient

SAP responded to the recession with a hiring freeze for the past four years, says Larry Morgan, head of operations for SAP in Palo Alto and Vancouver. As an alternative to filling

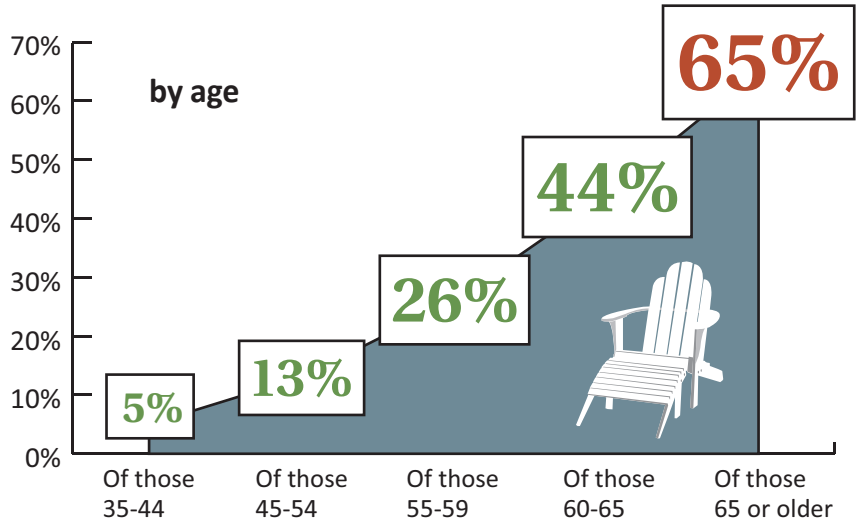
## FM Careers: Then and Now

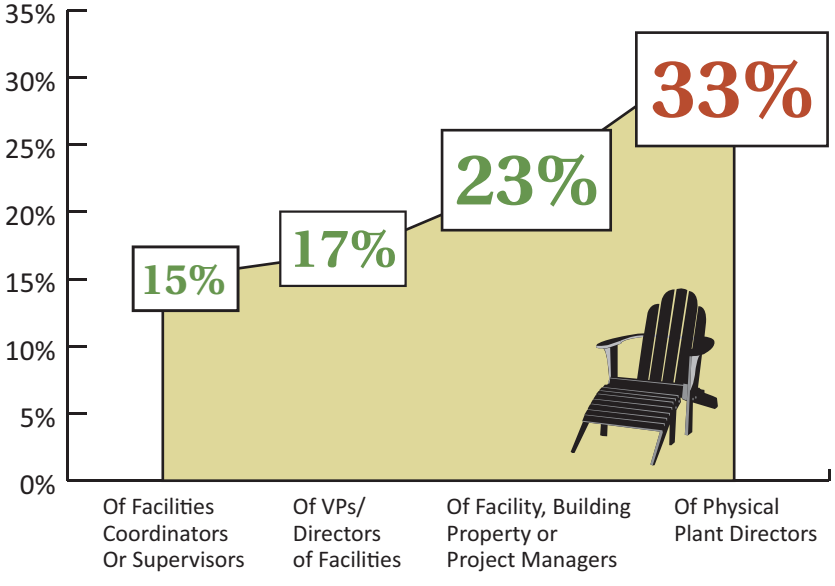
The number of FMs who expect to be promoted in the next year fell by 23 percent following the crash in the financial markets, while those who fear they will be downsized in the next year rose by 75 percent.



## FM Careers: Who Delayed Retirement?

Of facility managers who responded to the FM Pulse survey, 21 percent reported that they had delayed retirement because of the recession.




## ABOUT THE SURVEY

Information for the survey was gathered through a series of emails to facility professionals, including subscribers to *Building Operating Management* and *Maintenance Solutions* magazines and electronic newsletters, and NFMT and webcast attendees. Conducted during June and July 2011, the survey included 2,451 responses. Salary and raise information is reported as the median amount, which indicates a middle point of data. Half of those who responded are below the median, while half are above. Numbers that are extremely high or low do not distort it. Some charts may not add to 100 percent because of rounding.

vacancies, SAP uses contract employees. "That gives us flexibility on staffing levels as well," Morgan says.

Because staff numbers are down, the FM team has to be more effective and efficient. For example, instead of washing all the windows semiannually, it is possible to wash certain parts of the windows at certain times. Morgan says that the company looks for the "pain point," or the place right before austerity measures begin affecting morale and productivity. The pain point, he says, is different for different lines of business. Another example is when touch up painting might be done instead of repainting an entire room. Most of the belt tightening, not surprisingly, is in repairs and maintenance, since fixed costs, such as leases, utilities, insurance and so forth, cannot be easily altered.

Lakeland Health and Healing is taking a similar approach. "Yes, we have to get the job done, but there are some deferred items. You don't get as much painting done, or not as quickly as you would like to," Kastner says.

### The Outsourcing Option

The facility management team at ADP has also reduced its U.S. staff, according to Art Elman, vice president of corporate real estate and facilities. "We reduced headcount by about 10 percent," Elman says, but the reductions were "mostly organic," through retirement or normal attrition. A slowdown on new hiring was also instituted as the company studied its true staffing needs. "We've eased up on that this year," Elman says. Most significantly, the company radically changed the way it handles human resources when it began outsourcing its facilities management about two-and-a-half years ago. ADP retained six people in-house. Previously, more than 200 decentralized staff worked in ADP's U.S. buildings, where each facility was fairly independent.

"The good news is that for our associates who work in our buildings, [the transition] was almost invisible. To the people who got outsourced, it was major," says Elman. The employees, as well as outside service providers — for example, the window washing company — switched their

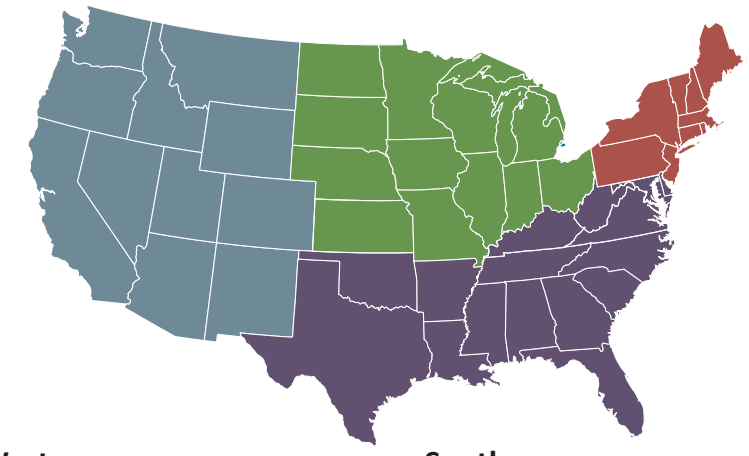
employer from ADP to the outsourcing firm. "Our first thought had been to consolidate [FM] within our own organization," Elman says, "but we didn't have the tools in house, and it wasn't our primary expertise." ADP instead decided to look for a company with better tools to manage facilities operations. Putting all of FM under the outsourcing provider's umbrella has improved management, consolidated purchasing and provided access to intelligence on a broader scale. The staff cuts, together with outsourcing, have allowed ADP to reduce facility management expenses by 7 percent.

Not surprisingly, opinion on the "new normal" was mixed. For "shining stars," the change has created an additional career path within the outsourcing firm and allowed managers to become part of a group that specializes in what they do. But everyone had to stretch a little more, and there were a few who opted to quit or retire. "Some people bought into the fact that it was a career move, but some others said 'it's time for me to go,'" Elman says.

Overall, outsourcing has been a success. ADP still has more bumps in the road ahead, says Elman, but facility management is now more tightly controlled and uses more sophisticated tools to purchase and better metrics to determine staffing. Currently

## Fewer Staff Cuts, Slightly Larger Raises

West Midwest South Northeast



### West
Median salary: $85,000
Median raise: 0% (same as 2010)
Bonus eligibility: 40%
Added staff: 17%
Reduced staff: 36% (vs. 39% in 2010)

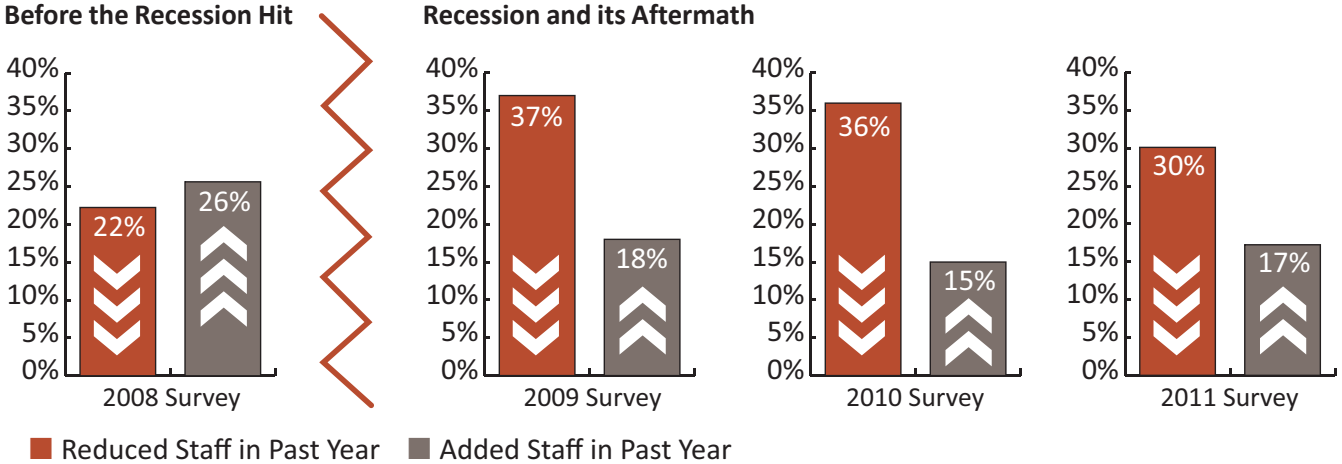
### South
Median salary: $80,000
Median raise: 1.1% (vs. 0.7% in 2010)
Bonus eligibility: 46%
Added staff: 18%
Reduced staff: 27% (vs. 33% in 2010)

### Midwest
Median salary: $74,000
Median raise: 1.4% (vs. 0.5% in 2010)
Bonus eligibility: 42%
Added staff: 19%
Reduced staff: 29% (vs. 38% in 2010)

### Northeast
Median salary: $85,000
Median raise: 1.4% (vs. 1.2% in 2010)
Bonus eligibility: 46%
Added staff: 14%
Reduced staff: 32% (vs. 35% in 2010)

## Impact of the Recession on Staffing

Although the number of respondents saying they added staff has fluctuated since the economy crashed, the number who say they cut staff dropped significantly in the past year. (Numbers from all surveys reflect staffing changes in previous year.)



the company is focused on improving the quality of services and facility reliability and may even adjust some budgets upwards.

## Cutting Costs with Care

The recession has led companies to demand that facility managers take a very hard look at expenditures. That's been the case at the law firm Fenwick & West. The last two years have been very successful, and Julie O'Loughlin, senior director of operations and facilities, says that was a direct result of "cutting out the fat and focusing in." Nonetheless, when the recession hit three years ago, there were some layoffs (less than 1 percent of staff). "We looked to eliminating unnecessary budget items throughout the organization," O'Loughlin says.

O'Loughlin says that the recession has permanently changed the way FM operates. "With regard to project approval, the tech bubble and the recession are cautionary tales," she says. "We are much more careful about the way we evaluate growth projects and spending in general." O'Loughlin says that as she talks to her peers in Silicon Valley, there is agreement that each project must be more thoroughly researched. Fenwick & West is just now beginning a $6 million expansion of a conference center, a project that was actually approved a year ago, because the firm took more time doing its homework. "We are pushing the limits in sustainability, quality and aesthetics," she says. Putting more time in on the front end, looking for "multiple wins" and looking toward the future and not just the fulfillment of immediate goals, have all been the result of the recession.

Morgan expects there will be no going back from the new normal. "Companies aren't going to open their checkbooks again. [They will be] working more in a performance-based rather than a prescriptive-based world," Morgan says.

For example, the traditional janitorial contract, where "one size fits all" and companies pay per square foot, will no longer suffice. Rather, contracts are now based on performance and requirements of individual locations and facilities, where the difference between cleaning the ex-

# Salaries by Job Title

### VICE PRESIDENT/DIRECTOR OF FACILITIES
Median salary: $102,000
Salary range: $38,000 - $291,200
Median raise: 1.5%
Median bonus: $10,000
Bonus eligibility: 45%

### VICE PRESIDENT/DIRECTOR OF FACILITIES ENGINEERING
Median salary: $108,252
Salary range: $42,000 - $210,000
Median raise: 2.3%
Median bonus: $8,000
Bonus eligibility: 59%

### VICE PRESIDENT/DIRECTOR OF REAL ESTATE
Median salary: $120,000
Salary range: $75,000 - $200,000
Median raise: 0%
Median bonus: $9,000
Bonus eligibility: 84%

### VICE PRESIDENT/DIRECTOR OF BUILDING/PLANT SERVICES
Median salary: $97,000
Salary range: $48,222 - $186,660
Median raise: 0.3%
Median bonus: $6,500
Bonus eligibility: 43%

### PROPERTY MANAGER
Median salary: $75,000
Salary range: $27,000 - $165,000
Median raise: 1.3%
Median bonus: $5,000
Bonus eligibility: 68%

### PROJECT MANAGER
Median salary: $83,000
Salary range: $35,000 - $170,000
Median raise: 0.8%
Median bonus: $4,400
Bonus eligibility: 50%

### DIRECTOR OF PHYSICAL PLANT
Median salary: $85,500
Salary range: $45,000 - $150,000
Median raise: 0.9%
Median bonus: $3,250
Bonus eligibility: 24%

### BUILDING OR FACILITY MANAGER
Median salary: $77,480
Salary range: $23,000 - $175,000
Median raise: 1.6%
Median bonus: $4,000
Bonus eligibility: 47%

### ASSET MANAGER
Median salary: $93,000
Salary range: $48,000 - $224,000
Median raise: 0%
Median bonus: $3,050
Bonus eligibility: 68%

### FACILITIES COORDINATOR/ SUPERVISOR
Median salary: $62,000
Salary range: $18,000 - $150,000
Median raise: 1.7%
Median bonus: $2,200
Bonus eligibility: 42%

### CONSTRUCTION MANAGER
Median salary: $86,000
Salary range: $33,218 - $160,000
Median raise: 1.5%
Median bonus: $6,000
Bonus eligibility: 31%

### PLANT/OPERATIONS MANAGER
Median salary: $72,900
Salary range: $36,000 - $160,000
Median raise: 1.1%
Median bonus: $3,000
Bonus eligibility: 43%

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|---|---|---|
| Federal government | $95,000 | 0.0% |
| Corporate office | $89,000 | 2.3% |
| Municipal government | $83,200 | 0.0% |
| Medical | $80,500 | 1.4% |
| Industrial | $80,000 | 1.9% |
| Hospitality | $79,000 | 2.5% |
| Commercial leased office | $78,350 | 1.9% |
| Retail | $76,000 | 1.3% |
| Higher education | $75,000 | 0.1% |
| Education – K-12 | $74,000 | 0.0% |
| State government | $68,000 | 0.0% |

### MORE FM SALARY, CAREER INFO

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ecutive suite and the loading dock is taken into consideration.

The FM team must make the most effective use of resources, which can mean renegotiating contracts. "Suppliers have to be part of the process, especially for long-term relationships," says Morgan. "There's rigorous negotiation on supplies and external staff support to give us a great rate for an extended period of time and to lock that in." Vendors have also felt the effects of the recession and are granting suppliers longer contracts with less frequent bumps on pricing. This is somewhat advantageous to vendors, says Morgan, since long-term relationships create income stability.

**45%**

of FMs with less than 5 years to retirement decided to delay retirement

One lesson from the recession is the need to evaluate the impact of cost-cutting measures. Budget cuts sometimes lead companies to sacrifice energy efficiency as a way of reducing first costs. That hasn't been the case at SAP. When equipment must be purchased, efficiency is a priority. "A seven-year return on investment is the break point," Morgan says. "Sustainability and energy efficiency are two of our sacred cows." However, less time and effort is being spent on replacing chairs, tables and carpet. "We are repurposing and extending the life of fixtures and finishes — carpet, wallpaper, light fixtures," he says.

When it comes to cutting costs, potential savings should be carefully targeted. "It's important to maintain the same level of service and maintenance without spending the same money, and we have been successful at that," says O'Loughlin. For example, an expensive summer picnic was replaced with monthly events that highlight diversity — such as Martin Luther King Jr. Day or Cinco de Mayo. Friday "Beer is Here" events sponsored on a rotating basis by various departments have also increased employee cohesion at a much lower cost. These events are like "pot lucks," where department members provide beverages as well as hors d'oeuvres.

### Communication Is Essential

During periods of upheaval, it is important to communicate with employees for the purpose of managing resistance and facilitating buy-in. ADP implemented a major communication plan to help with the transition to outsourcing, including "road shows," webcasts, telephone conferences and an extensive change management program. Elman says that ADP worked hard to map employee benefits structures to the new company so that employees did not experience losses. At the same time, employees had to adjust to new reporting responsibilities and more paperwork.

At SAP employees were given information about the need for creating a smarter, more efficient organization. "We needed education, clarity, and transparency with regard to corporate objectives," says Morgan. SAP employees worked collaboratively to achieve a 4 percent cut, and participatory decision making helped achieve "buy in" on austerity measures.

Fenwick & West has worked hard to communicate with employees about reductions and changes, often us-

ing social media techniques such as Facebook, Twitter and blogging. "We have stepped up the marketing of the department," O'Loughlin says. "You have to justify what you are doing. [We] highlight the good things we are doing, educate on the changes. We send a digital newsletter with an internal portal that looks like a Facebook fan page."

Digital marketing has been a great success and has allowed a lot of interaction with employees, which creates buy-in about cost-cutting strategies, says O'Loughlin. For example, in the past, every kitchen on every floor used to have a selection of 20 teas and multiple kinds of coffee. Since many of these choices were not used, and since these products have a limited shelf life, the company was wasting a lot of money. An on-line survey of flavor choices eliminated about 60 percent of what was being offered in the kitchen, which was a significant cost savings for the company. "There was no pushback," says O'Loughlin.

## Silver Linings

The recession hasn't been uniformly bad news for facility managers. Because of the recession, many companies have deepened their understanding of how facility management can contribute to or take away from the bottom line. The technical expertise that facility management can offer is now more valued, according to O'Loughlin. At O'Loughlin's company, strategic meetings involving facility management now take place every week.

The pain of the recession has forced facility managers at SAP to become "more core-business savvy," says Morgan. "We've always been good at managing our money by being efficient, but in the last four years we've become more effective as financial leaders and are much more aligned with the C level and core business activities of the organization."

More discipline and foresight has created more innovation, says O'Loughlin. "Innovation makes or breaks a company," she says. "The recession made us lose our complacency." ■

*Maryellen Lo Bosco, a contributing editor for* Building Operating Management, *is an Asheville, N.C.-based freelance writer who covers the facility market.*

*Email comments and questions to edward.sullivan@tradepress.com.*

> **"Companies aren't going to open their checkbooks again."**
>
> 
>
> **Larry Morgan**
> Head of operations, SAP
> Palo Alto and Vancouver

ENERGY EFFICIENCY

# There's a Lot Happening at Energy Star

New rating scales and easier benchmarking are among the important developments in the well-known program

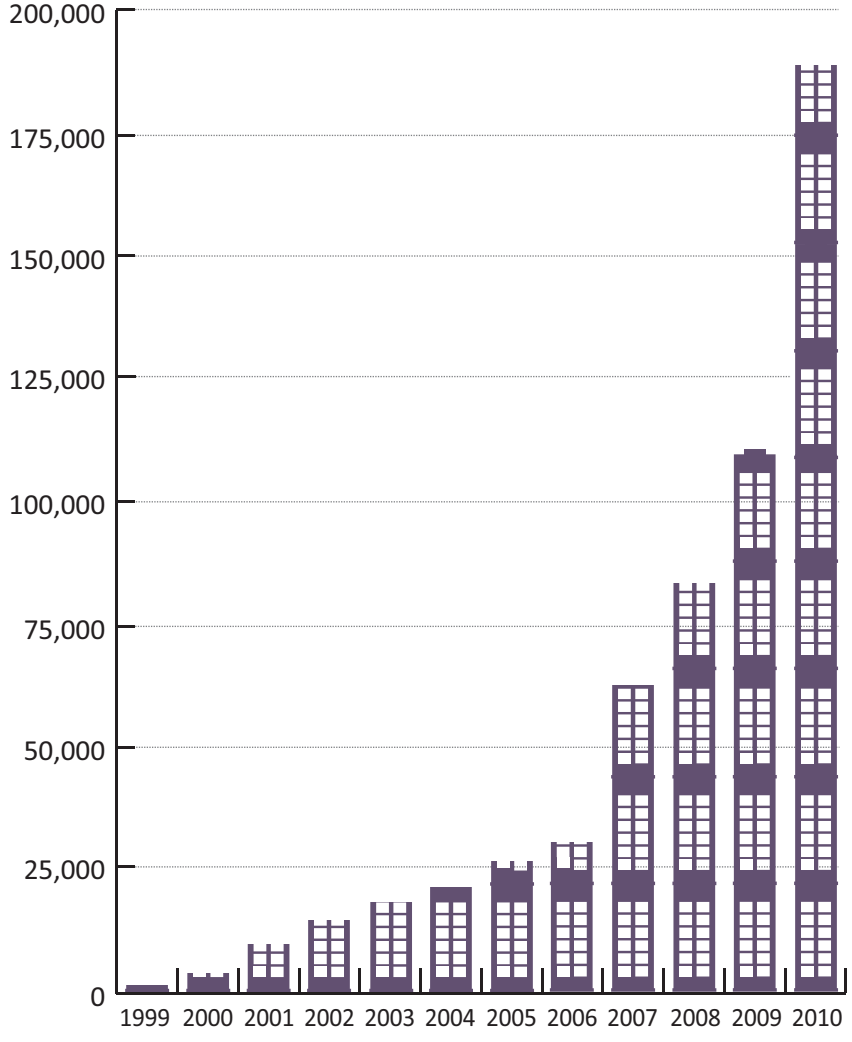
by robert sauchelli and deborah e. miller

After more than 10 years, the U.S. Environmental Protection Agency's (EPA's) Energy Star Buildings program has become well established as a resource to help building owners and managers reduce energy use and improve their bottom lines. The Energy Star score — which shows how a building's energy use stacks up to comparable buildings on a 1 to 100 scale — is not only widely used by individual building owners, but also has been adopted by the LEED for Existing Buildings: Operations and Maintenance program and as part of mandatory local and state benchmarking and disclosure regulations. A variety of other factors — including customer demand for greener buildings, the widespread recognition of the value of Energy Star certification, and the availability of federal, state and utility incentives — has also led owners to take advantage of Energy Star's free tools and resources to measure, track, and improve building energy efficiency.

As well-known as the overall Energy Star Buildings program is, there are important elements of the program that many building owners may not be aware of. One reason for this is that EPA has continued to expand the program over the years. Consider the Portfolio Manager tool. As most building owners know, Portfolio Manager can be used to track and assess energy use within individual buildings as well as across an entire portfolio. All that is needed is to enter the building's energy consump-

## Steady Growth In Energy Star Benchmarking

Cumulative number of buildings to earn an Energy Star score



# $4.9 million in savings never looked so good.

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tion and facility characteristics into a Portfolio Manager account to benchmark building energy performance, assess energy management goals over time, and identify strategic opportunities for savings and recognition.

What is less well-known is that Portfolio Manager can also be used to track energy costs, water consumption and carbon emissions, increasingly important considerations for many building owners.

## Energy Management

To help building owners get started quickly with Portfolio Manager, EPA has developed a Benchmarking Starter Kit. To provide another way to ease benchmarking with Portfolio Manager, EPA has partnered with automated benchmarking service providers. These service providers can offer customers the Energy Star's 1 to 100 energy performance rating for eligible buildings. That way, these customers don't have to manually upload their own energy data. Weather-normalized energy intensity and emissions inventories are also available for buildings that are not eligible for an Energy Star score.

In just five years, automated benchmarking services have experienced substantial growth, with 86 companies offering or planning to offer such services. During 2010, these services were responsible for more than 45 percent of all buildings benchmarked in the Portfolio Manager tool. From January through June 2011 alone, more than 12,250 new buildings representing approximately 1 billion square feet were uploaded to Portfolio Manager via automated benchmarking services.

There's another element of the Energy Star Buildings program of which building owners may not be aware: Energy Star service and product pro-

## EPA Committed to Keeping Energy Star on Track

More than 21 billion square feet of commercial building floor space, representing close to 30 percent of the market, has been benchmarked in the Energy Star Portfolio Manager tool. The Energy Star score has been a valuable tool to motivate energy-use reductions and to identify top performing buildings.

Recently, however, there have been problems with a little-known federal database that Energy Star uses. Despite those problems, the U.S. Environmental Protection Agency is confident that the Energy Star rating remains a valuable tool for building owners.

That federal database — referred to as CBECS (Commercial Building Energy Consumption Survey) — comes from a national survey administered by the Department of Energy's (DOE's) Energy Information Agency. The survey draws from a statistically valid sample of the universe of commercial and institutional buildings and provides important building and energy data.

Using CBECS, EPA made a startling discovery in the late 1990s: the gap between the country's best- and worst-performing buildings was greater than anyone had previously acknowledged — as large as tenfold. To help building owners understand how their buildings compare, EPA launched the Energy Star 1 to 100 scale in 1999 to provide feedback on where a building's energy use falls along this spectrum. That 1 to 100 scale is largely based on data from CBECS.

Unfortunately, DOE recently announced that results from the most recent survey (2007) would not be published because it had not yielded valid statistical estimates. At the same time, DOE reported that, as a result of lower funding levels, it would temporarily suspend work on the survey scheduled for this year (2011). That means CBECS data continues to be drawn from the 2003 survey.

**Even with questions surrounding CBECS, Energy Star still offers relevant benchmarks. Here's why:**

1. The 2003 CBECS survey still offers a solid benchmark. The rate at which new construction and retrofits replace building systems is slow. According to recent studies of actual energy use, new buildings can still perform more poorly than the CBECS 2003 average.

2. Each time EPA has analyzed the key drivers of energy use for offices, the major drivers were the same: workers, hours of operation, computers, size, and climate. This consistent result over 12 years suggests that the methodology underlying the Energy Star score, which is based on those drivers, remains sound.

3. Because the Energy Star score applies the same calculation to everyone, it remains a consistent means of placing all buildings on the same scale.

4. In addition to being an industrywide benchmark, the Energy Star score can also be used to track energy use of a building over time. Regardless of the age of the data on which the score is based, the actual number provides a uniform measure of how performance has changed.

5. While CBECS is used for many Energy Star scales, it is not the only data used by Energy Star. The scales for hospitals, senior care facilities, and data centers are all drawn from other surveys. EPA continues to work with industry to find other nationally representative data (or means of collecting data) to make Energy Star scales available for more building types.

6. As more buildings save energy, questions may be raised about whether it is becoming too easy to earn the Energy Star. If that becomes a concern, EPA could reset the minimum Energy Star score higher than 75.

For all these reasons, EPA is confident that Energy Star continues to serve the market effectively. However, if the CBECS 2011 survey is cancelled, EPA will examine data and track trends of buildings using the Portfolio Manager tool and other surveys to assess market conditions and evaluate alternatives. It is possible to generate alternative data sets that are nationally representative, and EPA is willing to explore this option to ensure that Energy Star remains a valuable energy management tool.

*— Jean Lupinacci is chief, Energy Star commercial and industrial branch, U.S. Environmental Protection Agency.*

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viders (SPPs). SPPs are companies that have the track record to assist in developing and implementing a building's energy management plan, including the critical steps of benchmarking building energy use, setting goals, and certifying high performance Energy Star buildings. All SPPs must meet strict Energy Star program requirements for benchmarking customer buildings using Portfolio Manager or helping customers to earn EPA's Energy Star certification for buildings. SPPs can help building owners assess energy performance and recommend low-cost upgrades, cost-effective investments, and longer-term strategies that make the most sense for a building owner.

## Rating Data Centers, Senior Care Facilities

Energy Star has steadily expanded the range of building types that are eligible for a 1 to 100 score. In the past year, two new types have been added: data centers and senior care facilities. That brings to 15 the number of building types that can use Portfolio Manager: banking and financial institutions, courthouses, commercial and corporate real estate, data centers, hospitals, houses of worship, K-12 schools, medical office buildings, municipal wastewater treatment plants, residence halls and dormitories, retail stores, senior care, supermarkets and both refrigerated and non-refrigerated warehouses. All can receive a 1 to 100 energy performance score with the exception of wastewater treatment plants.

> In just six months, automated benchmarking services accounted for roughly 1 billion square feet of space benchmarked with the Energy Star Portfolio Manager

The expansion of Energy Star to data centers was the outcome of more than two years of work with the data center industry to define an energy use metric and collect data.

It is estimated that there are more than 17,000 buildings that have some type of data center in them. With the growing use of the Internet, reducing

## Energy Star Resources

Whether you own or manage one building or a portfolio of buildings, the Energy Star website provides valuable information and training to develop an energy management strategy. Here are some resources in which building owners might be interested.

- Most active Energy Star service and product providers: www.energystar.gov/spp
- Searchable list of professional engineers and registered architects that can verify a building's energy performance and certify it to earn EPA's Energy Star: www.energystar.gov/index.cfm?fuseaction=PE_DIRECTORY
- Experienced automated benchmarking service providers: www.energystar.gov/index.cfm?c=spp_res.pt_spps_automated_benchmarking
- For other experts, as well as success stories, go to: www.energystar.gov/index.cfm?c=expert_help.find_exp_help
- Companies interested in becoming Energy Star service and product providers can find information at: www.energystar.gov/index.cfm?c=spp_res.pt_spps
- Information on EPA's data center energy performance scale and other initiatives: www.energystar.gov/index.cfm?c=prod_development.server_efficiency

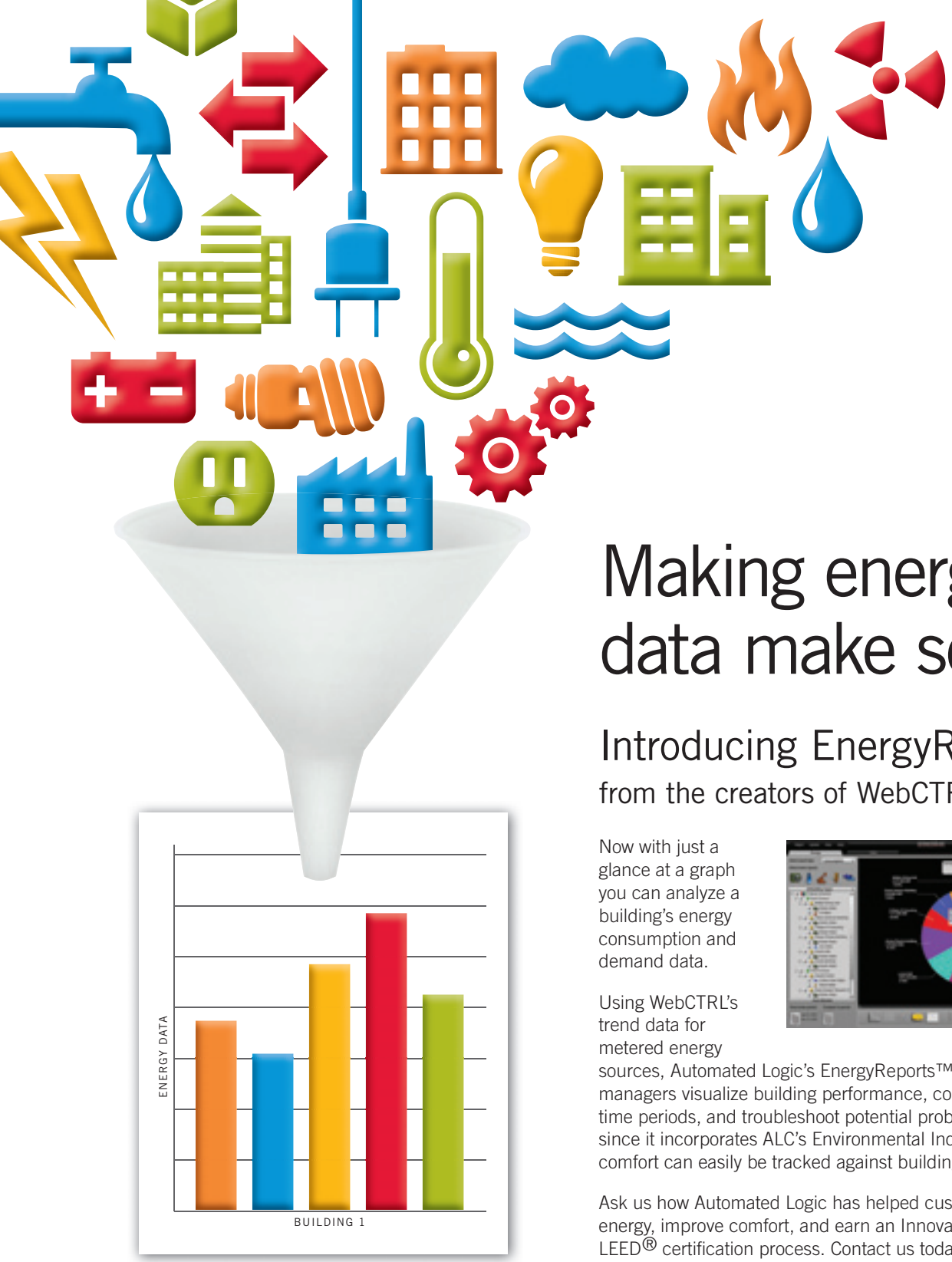
data center energy consumption is critical for our country's energy security because of the energy-intensive nature of these operations. In 2006, data center and server energy use was estimated at approximately 61 billion kilowatt hours (kWh), or 1.5 percent of total U.S. energy consumption, costing approximately $4.5 billion. According to an EPA report to Congress published in 2007, the energy use of data centers, servers, and infrastructure more than doubled from 2000 to 2006, and it is expected to continue to grow exponentially.

In late 2010, EPA released an energy performance scale for data centers to enable operators to measure and compare their energy performance to similar facilities across the nation. During EPA's analysis of data center energy use, which drew upon information from both stand-alone data centers and data centers located within commercial buildings, an important finding was that the variability in energy use was more dependent on energy management practices than on operating characteristics.

EPA's energy performance scale for data centers is based on a common industry metric, power usage effectiveness (PUE), which is the ratio of total energy consumed by the data center to the energy consumption of just the IT equipment (e.g., servers, switches and storage). Building owners with data centers in their buildings (usually in commercial office space) must work with tenants to ensure that they have the proper metering in place to capture the IT energy consumption output of the uninterruptible power supply (UPS).

> There are now 14 facility types which are eligible for a 1 to 100 Energy Star score using Portfolio Manager, including data centers and senior care facilities

In March 2011, EPA released an energy performance scale for senior care facilities. Now, nursing homes, assisted living communities, and certain types of continuing care retirement communities are eligible to earn the Energy Star. A senior care community is defined as all buildings in a multi-building campus setting or a stand-alone facility that are designed to house and provide care and assistance for elderly residents including assisted living, skilled nursing, and select con-

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Energy Star benchmarking tools help track building operations at Williams Tower and show that the building operates 29 percent more efficiently than the national average. The corporate headquarters of Hines, as well as Hines REIT, Williams Tower is one of more than 150 buildings owned or managed by Hines that have current Energy Star ratings.

tinuing care retirement communities. Recently, EPA recognized 30 Sunrise Senior Living communities as the first senior care facilities to earn Energy Star certification.

## The Near Future for Energy Star

Two other important initiatives are underway this year. One involves an updated Energy Star scale for hospitals. To date, over 3,000 hospitals have received an Energy Star score for their buildings in Portfolio Manager. Since the current energy performance scale for acute care hospitals was de-

veloped using data from 1997, the American Society of Healthcare Engineering worked with EPA to collect more recent energy and operational data from its members. EPA is in the process of completing its analysis of the data to develop a revised energy performance score, which is expected to be released by the end of 2011.

Energy Star worked with the data center industry for more than two years to create a 1 to 100 rating scale for data centers

In March 2011, EPA and Fannie Mae signed a memorandum of understanding to cooperate on improving the energy and water efficiency of the nation's multifamily housing stock through exploring the development of an energy performance scale for multifamily buildings. Depending on the outcome of the analysis, EPA anticipates rolling out an energy performance scale for the multifamily sector in late 2012 or early 2013.

As changes continue within the Energy Star program, outside factors are increasingly leading building owners to use the Energy Star rating. A good example: According to new regulations mandated by the Energy Independence and Security Act of 2007 (EISA), any space leased by the federal government as of December 2010, must be in buildings that have an Energy Star certification.

There are exceptions to that requirement: if no space is available in an Energy Star building that meets the needs of the agency, if the agency will remain in its currently occupied building, if the building is on the National Register of Historic Places, or if lease is for rentable square feet of 10,000 square feet or less. Nevertheless, the requirement is significant. The federal government is the largest tenant for leased commercial space, with over 370 million square feet under contract. What's more, if the building that an agency currently occupies is not Energy Star, the lessor may have to renovate the space with all energy efficiency improvements that are cost effective over the life of the lease.

There's a lot going on at Energy Star. Consider taking a few minutes to log on to the Energy Star commercial buildings website. Become a partner, use the many resources EPA has to offer, benchmark your buildings, and get Energy Star recognition. If you are looking for ways to improve your Energy Star score, evaluate whether using an experienced SPP will help. ■

*Robert Sauchelli (sauchelli.robert@epamail.epa.gov) is Energy Star Buildings program manager, U.S. Environmental Protection Agency. Deborah E. Miller (DEMiller@icfi.com) is vice president, ICF International.*

*Email comments and questions to edward.sullivan@tradepress.com.*

ROOFING

SIKA SARNAFIL

The project team for the new 248,000-square-foot building for Stansbury High School in Stansbury Park, Utah, used several LEED strategies, including a reflective roof.

# A New Roofing Golden Age?

## Environmental regulations are spurring the roofing industry to make changes to practices and products

by john d'annunzio

**For a comprehensive list of roofing-related codes and standards, visit: www.coolroofs.org/codes_and_programs.html**

In the last decade there has been an intensive effort in the United States to address health, safety and environmental issues in relation to roofing materials. Driven by codes, regulations and concerns about depletion of natural resources, the industry has developed technologies and materials that will be used from this point forward. Facility managers who understand these new materials and codes will be in the best position to take advantage of innovations that are reshaping the roofing industry.

As we enter the second decade of the 21st century, many modifications are being made to low-slope roofing systems. The recent changes are minor modifications compared to the vast changes that occurred near the end of the 1990s. In the time period from the 1980s through the end of the 1990s, the low-slope roofing market witnessed its greatest changes in materials and technologies since World War II.

The changes — which included advances in single-ply and modified bitumen systems, as well as the reduction in use of hot-applied systems and increased use of cold-applied and self-adhered membranes — were largely driven by econom-

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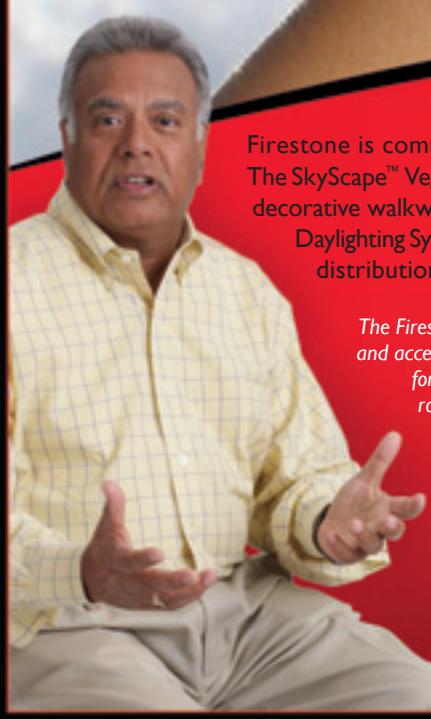

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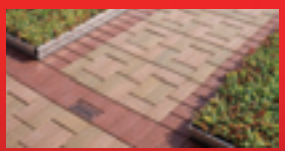
***– Riaz Hasan,***
*Accessories Product Manager*



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ics, reductions in the workforce and environmental considerations. All of these issues continue to be vital concerns in the market. In fact, a recent poll about roof purchasing habits indicates that environmental issues are now the No. 1 factor in the selection of roof materials for consumers, while the material's ease of application is the first priority in the contractor's selection process.

## New Codes and Regulations

Before taking a look at the specific requirements of the various codes and voluntary rating systems, it's important to understand the metrics they use.

Reflectivity ratings are based on the roof surface's ability to reflect ultraviolet rays from the sun. Studies have indicated that reflective surfaces will cool the building in the summer, decreasing the use of air conditioning, which decreases cooling costs and energy capacity. The Energy Star program establishes the reflectivity rate of a roof surface for low-slope (less than 2:12) roof systems at .65 the first three years and .50 after three years. LEED provides points based on this program.

Emissivity measures the ability of a roof to emit back to the atmosphere the solar energy that it has absorbed, rather than transferring that absorbed energy to the interior of the building. Finally, the Solar Reflective Index (SRI) is a relatively new measure that combines solar reflectivity and emissivity. It is calculated via ASTM standard E 1980.

LEED for New Construction's "heat island reduction" credit gives one point for a reflective roof with an SRI of at least 78

The past decade has seen a concentrated effort to develop standards for environmental and sustainable materials. So far, these standards have not been added to the International Building Code (IBC). However, some of these regulations have become codes in select municipalities and states. For instance, in California, Title 24, the state's energy code, has been part of the state building code for a number of years. Several municipalities throughout the country have incorporated Energy Star roof reflectivity ratings into their codes. And most industry experts agree that it is just a matter of time before LEED becomes part of the IBC. In fact, the new International Green Construction Code, due out in 2012, will include standards for cool roofing.

LEED is a green building rating system based on points through energy

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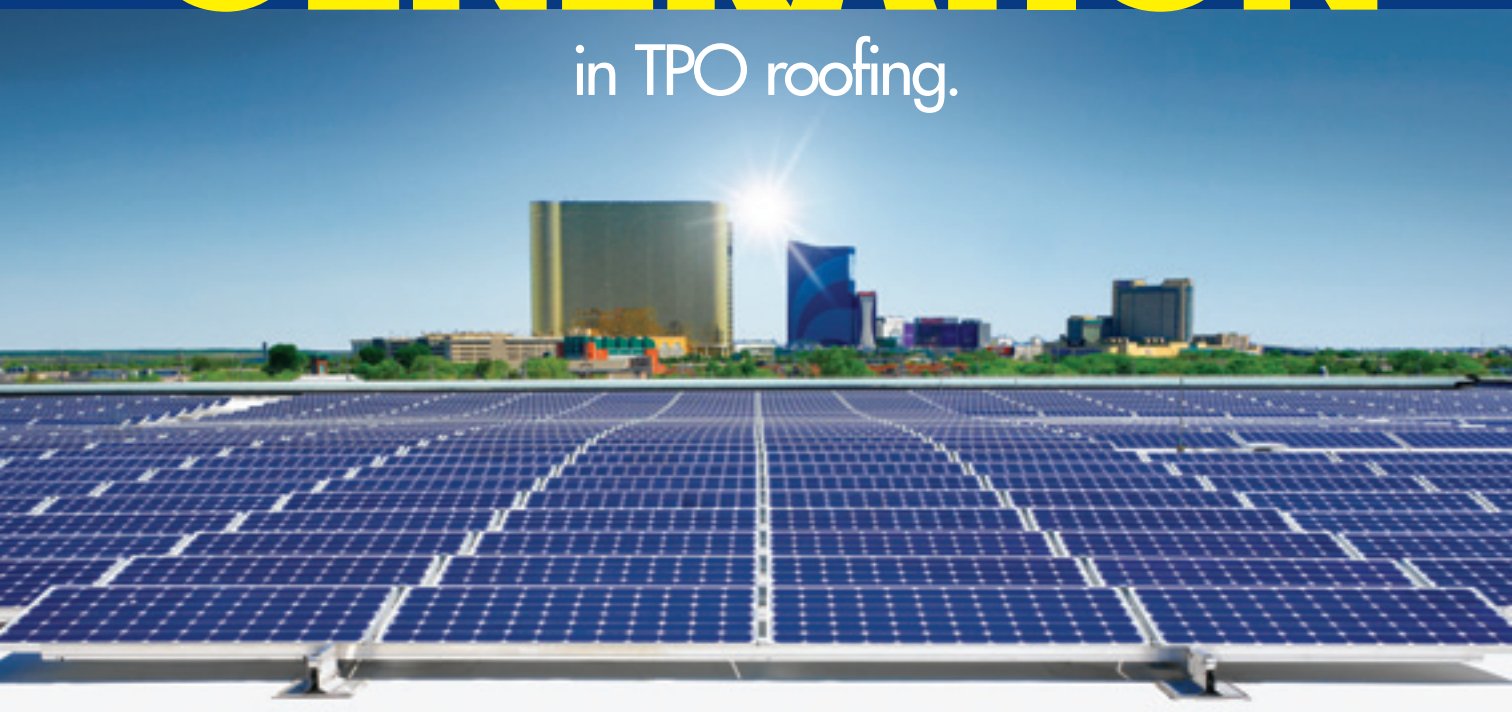

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savings and other sustainable strategies accumulated on a whole-building basis. Roofing materials can have an impact in three of these categories: Sustainable Sites, Energy and Atmosphere, and Materials and Resources. Roof systems can have an impact through thermal capacity, reflectivity and emissivity. Thermal capacity is achieved through higher R-values, predominantly from insulation. High thermal value insulation will reduce heat loss in the winter months, which decreases heating costs and energy capacity. LEED for New Construction's credit for "heat island effect — roof" requires low-sloped roofs to have an SRI of 78 and steep-sloped roofs (roofs with greater than 2:12 pitch) to have an SRI of 29.

LEED points can also be achieved if any of the roof system materials are manufactured within 500 miles of the building site. Additional points can be accumulated if a member of the project team is a LEED accredited professional and for exceptional performance in innovation of application or design. Recyclable materials or materials manufactured from recycled products (some perlite and fiberboard insulations) can also provide LEED points on a project.

The most recent regulation that will have an impact on the roofing industry is ANSI/ASHRAE 189.1 *Standard for the Design of High-Performance Green Buildings*. This new whole-building green code relies on ANSI/ASHRAE 90.1. The goal of the new standard is for buildings to be 30 percent more energy efficient then the 2007 version of ASHRAE 90.1. The standard covers all new buildings and new systems in existing buildings except low-rise residential buildings. This regulation provides the requirements for roof insulation R-values and reflective and emissivity requirements for every region of the country.

It should be noted that ASHRAE 189.1 hasn't yet been adopted on a widespread basis, but many experts expect that it will be soon. So it is a best practice to check the local codes on all of your projects.

Due to this new focus on environmentally responsible roofing, there has been a concentrated effort by roofing manufacturers to produce products that meet the requirements spelled out in these green building initiatives.

## Recent Changes to Attachment Methods

Although we are not seeing the sweeping system changes that we witnessed in the past decade, there are some material changes that will have an impact on the roofing industry. Many of these changes are occurring because of environmental issues or to reduce the amount of labor required. The biggest impact is in material application methods. With the substantial decrease in both hot applied and torch applied systems, there has been an increase in adhesive applications and mechanically attached systems.

The biggest change in roof adhesives

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SIKA SARNAFIL

A new reflective PVC roof was one of several recent renovations at Attleboro High School in Attleboro, Mass.

has been as a result of increased volatile organic compound (VOC) regulations affecting solvent-based adhesives. The current VOC level of adhesives is 20 percent of the total material content. Solvents are primarily added to adhesives to improve their adhesion capabilities. In the older adhesive technologies, low solvent content produced a thick adhesive that was hard to apply. As more solvent was added, the adhesive became lighter and easier to apply.

Adhesive manufacturers have been working since the late '90s on producing quality adhesives that meet the current VOC content regulations. These regulations have led to the increase of water-based adhesives. There has been a significant improvement in low VOC solvent-based adhesives and some U.S. manufacturers can now produce solvent-based adhesives with no VOC content. Some single-ply manufacturers are offering latex/neoprene-bonding adhesives that also are produced with no solvents.

Mechanically attached systems are also becoming more common. One of the primary concerns regarding mechanically attached membranes has been their susceptibility to wind flutter, which creates substantial interior noise and contributes to membrane-fastener separation. A primary reason for the membrane's roof flutter is the width of the sheets.

When mechanically attached systems were first introduced, the most common width of the sheets was five feet. This allowed for sufficient fastening attachment and limited the chance of wind flutter. Over the years, the effort to reduce labor costs led to wider sheets — 10 to 12 feet in width. These expanded widths have contributed to the susceptibility of wind flutter.

In an effort to eliminate roof flutter in these sheets, at least one manufacturer has developed a securement system that heats the existing fastener plates to allow for adhesion of the membrane to the plates without membrane penetration. The system provides more attachment points, which ultimately eliminates roof flutter. The system includes three primary components — the induction welder, a set of magnetic cooling weights and

specialty plates that are designed for use with both PVC and TPO membranes. Most of the membrane manufacturers have approved the use of such a system with their membranes.

## Other Material Changes

With the advent of impending code changes to include roof reflectivity requirements, some modified bitumen manufacturers have begun manufacturing cap sheets with factory-applied coatings. These sheets eliminate the labor costs of applying the coating in the field while meeting the required reflectivity ratings.

Another emerging technology involves installation of photovoltaics (PVs) on rooftops. Some roofing contractors have begun partnering with solar manufacturers as installers. One of the early drawbacks of these types of applications has been the increased ultraviolet transmission to the roof surface at points adjacent to the PV installations. The enhanced UV has led to delamination of roof membranes and increased heat transmission in the building.

In an effort to eliminate these risks, some material manufacturers have begun offering membranes specifically designed for application of PVs.

There are currently enhanced-UV modified bitumen sheets and 80-mil thermoplastic membranes available for these applications. Another solution is to provide an application of a reflective coating over the existing membrane in these areas.

In an effort to comply with VOC regulations, some roof coating manufacturers have eliminated use of solvents by manufacturing waterborne coatings.

The two most recent entries into this segment of the market are elastomerics and polyvinylidene fluoride (PVDF) polymers. PVDF is a hybrid of latex particles with both fluoropolymer and acrylic resins. ■

*John D'Annunzio, president of Paragon Consultants and Paragon Roofing Technology, Inc., has more than 20 years experience as a consultant on projects around the world. D'Annunzio, a construction consultant specializing in roofing and waterproofing materials application and field performance, has written four books about roofing. He can be reached at john_paragon@ameritech.net.*

*Email comments and questions to edward.sullivan@tradepress.com.*

FIRE

# 5 Steps to Safer Buildings

## These sometimes overlooked measures can reduce the dangers of fire

by chris jelenewicz, contributing editor

Each year in the United States about 3,000 people die, 17,000 are injured and $10 billion in property is damaged as a result of fire. In addition to these direct costs from fire, there are indirect costs, such as the cost of business interruption. For instance, the One Meridian Plaza high-rise fire in Philadelphia that occurred in 1991 resulted in the building never being re-opened. In 1988, the fire at the Interstate Bank Building in Los Angeles kept the building out of use for six months.

Because building fires can have dramatic impacts on the operations of a facility and the quality of life of its occupants, protecting a facility from fire should be high on every facility manager's radar screen. Facility managers are important stakeholders in the development and implementation of a building's fire protection program. As such, they play an essential role in ensuring their facilities are safe from fire.

When planning a facility's fire protection, there are many things for facility managers to keep in mind. But facility managers may not be aware of five important points in fire/life safety system planning. Paying attention to them can reduce risks to people and property.

To get more information about this topic visit:
**www.facilitiesnet.com/firesafety**

## 1. Understand the Occupants in Your Building

Discussions about fire protection usually focus on active and passive fire protection systems. Although these systems play an essential role, it is also important to consider the factors that may influence the behaviors of people during building emergencies.

While human actions during fire emergencies are difficult to predict, there is a significant body of knowledge that addresses how humans behave when there is a fire in the building. Understanding these behaviors can help implement better fire protection programs.

For example, when there is a fire in a single-family home, the building occupants normally take action to investigate the problem and evacuate immediately. Conversely, if the emergency is in a public building, occupants usually do not take action but instead rely on the building staff for information about the emergency and evacuation instructions. Although 165 people died in the 1977 Beverly Hills Supper Club Fire in Southgate, Ky., many lives were saved when the wait staff assisted with the evacuation of the occupants.

Another factor that affects occupant response is how familiar they are with the building. During a fire emergency, infrequent users of a building are more likely to attempt to evacuate by the route they entered, as opposed to leaving by the shortest and fastest route. They will also ignore exit signs indicating the best route. Because people feel more comfortable with exiting by the familiar route, they will only change paths if the familiar route becomes impassable due to conditions such as smoke, fire or crowds.

Many people assume that occupants will panic during a fire emergency, crushing and fighting others in an attempt to evacuate a building. That happens regularly in movies and on television. Fortunately, there is little evidence that shows people will panic during an actual fire emergency. It is more likely that occupants will act rationally in relation to their understanding of the situation.

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What occupant characteristics can affect the way a given building population will respond in a fire? Beyond the ones just mentioned, important characteristics can include: age; gender; level of alertness; physical and cognitive ability; building population and density; and the activity performed by occupants at the time of the emergency.

Understanding all of these human characteristics can be very helpful when developing and implementing a facility's emergency plan. Although occupant characteristics cannot be changed, effective emergency planning will increase the likelihood that building occupants will evacuate to a safe location when there is a building emergency. Accordingly, when planning for an emergency, every plan should focus on nullifying specific human characteristics that may hinder an effective building evacuation. For example, if a facility has occupants who aren't regular visitors to the building, the emergency plan should include the important role that staff has in assisting occupants who are not familiar with the building. Once this emergency plan is implemented, it is important that periodic drills be performed so that staff can become familiar with the plan.

## 2. Do Not Assume That People WIll Evacuate Just Because a Fire Alarm Sounds

Typically, when a fire alarm system is activated in a public building, the response to the alarm is slow, if the alarm is not ignored entirely. Why? Sometimes occupants fail to recognize the signal or are unaware of the proper response; sometimes they just don't hear the signal. Nuisance alarms also decrease system credibility.

One of the foremost roles of a building's fire alarm system is to initiate evacuation and ensure that sufficient time is available for the occupants to get out of a building before conditions become untenable. There are several steps that can be taken to increase the likelihood that occupants will respond immediately to a fire alarm signal.

First, when selecting a fire alarm/emergency communication system for a building, consider a system that notifies occupants through voice communications. To ensure a successful evacuation in an emergency, people need information. They want to know what the problem is, what

When selecting a fire alarm/emergency communication system, consider one that notifies occupants through voice communications




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they need to do and how they need to do it. As opposed to generating a standard evacuation signal, voice alarm systems have speakers that provide voice messages. Because voice systems can clearly state the problem and give specific instructions on how to evacuate, people are more likely to respond. These systems can also instruct occupants to relocate to areas of refuge when complete building evacuation is not feasible.

Second, when a fire alarm system is installed in a building, it is imperative that everyone in the building can hear the evacuation signal. And if the system transmits a voice message, occupants must understand the message. Audibility does not guarantee intelligibility. In other words, just because an occupant can hear that a voice is speaking, it doesn't mean the occupants can understand what the voice is saying. It is imperative that fire alarm system speakers be designed and distributed so that people can understand the voice messages.

Third, to increase system credibility and avoid unwanted alarms, it is important that the best type of fire detection is installed and is placed properly. When properly selected and placed, fire detectors can provide early warning that a fire emergency has occurred in a building. The proper selection and placement of automatic fire detection equipment is dependent on the expected fire signatures (heat, smoke or radiant heat); ambient and environmental conditions; and ability to adequately maintain the individual fire detectors.

Finally, it is important that every building's emergency plan has provisions for emergency evacuations and exit drills. This will give the building occupants the opportunity to become familiar with the building's fire alarm notification signal and better understand the building's evacuation plan.

## 3. Remember Fire Protection When Planning Security

Security and fire protection have common goals in building design — protecting life and property. Although both have the same goals, the desire for increased building security has contributed to countless deadly building fires.

In 1911, one such fire occurred in New York at the Triangle Waist Factory, where locked doors to an exit stair contributed to 146 fatalities. Although the Triangle fire occurred 100 years ago, the threat can still exist today if security is not balanced with fire protection. For instance, locked doors on the inside of an exit stairwell contributed to six fatalities in Chicago's Cook County Administration Building in 2003. Another catastrophic fire occurred in a Buenos Aires nightclub in 2004 when padlocked exit doors contributed to the deaths of more than 190 concertgoers.



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It is important for facility managers to understand the building and fire code requirements in place in regards to building security. Although avoiding the installation of padlocks on exit doors seems to be one of the most fundamental rules of life safety, locked exit doors still exist. At the same time, other security measures such as exit control devices and the locking of doors inside an exit stair have more complicated life safety implications. When designing a security system for a building, it is possible to protect life and property from fire while also ensuring a secured building. It's up to facility managers to coordinate the design of security systems with a fire protection engineer so that the security and life safety considerations do not conflict with each other.

## 4. Make Sure the Fire Protection Systems Work

Inspecting, testing and maintaining fire protection systems is essential to ensuring these life safety systems respond properly during a building fire. An inspection, testing and maintenance program needs to be part of any facility's fire protection program.

There are numerous types of active and passive fire protection systems. Active fire protection requires some kind of "action" or a "response" to a fire for it to provide protection. Examples of active fire protection systems include: fire sprinkler systems; special hazard fire protection systems; smoke management systems; fire alarm and emergency communication systems; and explosion protection systems. Passive systems do not need any type of action to protect people and property from smoke or fire. Passive fire protection systems include: structural fire protection; fire barriers (e.g., fire-rated walls, floors and ceilings); opening protection (e.g., fire doors and windows); and firestopping materials.

Each type of system has its own set of inspection, testing and maintenance requirements, which makes a comprehensive program critical. This program should include type of system, proper procedures, procedure intervals, who performs the procedure and documentation to show that the procedure was performed properly.

## 5. Bring in an Expert When the Building Changes

Any time a building's use, occupancy or layout changes as a result of a building modification (e.g., renovations and additions), it is essential to ensure that the facility's fire protection system is not compromised and the most efficient fire protection is still being provided. Something as simple as applying the wrong type of wall finish can have significant life safety consequences. For example,

Passive fire protection systems do not need any type of action to protect people and property from smoke or fire

one of the contributing factors to the 100 deaths that occurred in a 2003 fire at the Station nightclub in Rhode Island was the highly flammable polyurethane foam that was used for sound insulation on the nightclub walls.

To ensure that the most efficient level of fire protection is provided for a building modification, a fire protection engineer can assist with the planning, design and construction of all building modifications that may have life safety implications. They also can analyze how buildings are used, how fires start, how fires grow, and how fire and smoke affects people, buildings and property.

Fire protection engineers can also be a valuable resource when developing an emergency plan for a facility or when implementing a testing, inspection, and maintenance plan for a building's active and passive fire protection systems. ■

*Chris Jelenewicz, PE, is engineering program manager for the Society of Fire Protection Engineers.*

*Email comments and questions to edward.sullivan@tradepress.com.*

HVAC

# Free Cooling: Don't Let Savings Slip Away

## Understanding what goes wrong with airside economizers can help FMs ensure the systems operate at optimum effectiveness

by dave moser

Return air dampers that are too big may not provide proper control because they lack adequate air velocity across them. The problem can be solved by blanking off a section of the dampers.

Airside economizers are simple, effective systems that significantly reduce cooling energy use and improve indoor air quality. They increase the energy efficiency of the HVAC system so much that most energy codes require them for most commercial applications. Yet these systems are often neglected and, over time, can degrade to the point that they don't operate correctly, resulting in energy waste. A little periodic maintenance can help keep them operating correctly.

Sometimes referred to as "free cooling," an airside economizer system consists of a set of outside and return air dampers that operate together to reduce the load on the mechanical cooling system. When outside air conditions are cool enough, the mechanical cooling can be shut off completely and the system can use outside air to cool the building, thus reducing the overall energy use of a facility. Indoor air quality is increased during airside economizer operation. That's because a greater amount of ventilation air is provided to the occupied spaces than during minimum outside air mode.

Airside economizers come in various different forms (e.g., temperature-based or enthalpy-based); they're typically more cost-effective for larger buildings with a greater percentage of internal zones; and they may not make much sense in some climates, especially hot, humid climates. These design considerations are important and have to be addressed, but design is only one side of the question of making airside economizers effective. If you already have an airside economizer system, how can you maintain it to keep energy costs down and indoor air quality high? The principles involved apply to small packaged HVAC systems as well as larger built-up air handling systems.

Airside economizers operate behind the scenes, meaning that most occupants and sometimes operators do not sense whether an economizer system is working correctly or not. If it's not working correctly, the main consequence is higher-than-necessary energy bills.

How do airside economizers typically fail? What are the aspects that contribute to sub-optimal operation, and what can building operators do to address these issues and maintain proper performance? There are a wide variety of methods of maintaining performance, from periodic testing to trend data analysis. Here are some of the key issues to consider when it comes to airside economizer performance and maintenance.

A recent PECI study showed that optimizing the performance of airside economizer systems is one of the most common and most cost-effective measures implemented as part of an existing building commissioning process, usually with a simple payback of less than one year. For more information, go to www.peci.org/documents/annex_report.pdf

### Dealing with Design and Construction Problems

Some airside economizer systems are essentially doomed from the start, whether from sub-optimal design or improper construction. This is especially common for buildings that were not initially commissioned during construction. Common issues and their related fixes include:

• Improper sensor type. In theory, enthalpy-based control of airside economizers is more energy efficient than temperature-based since enthalpy controls account for humidity. In practice, enthalpy sensors are especially prone to drift out of calibration — assuming they were ever calibrated properly to begin with — which can result in energy waste. Recent studies have shown that it may be more cost-effective to use temperature-based control when operation costs, maintenance costs and sensor error are considered along with energy benefits. If your sys-

DAVE MOSER

tem uses enthalpy sensors, evaluate the energy benefits against the added operation and maintenance costs of maintaining the calibration of these sensors.

• Oversized return air dampers. For proper control, return air dampers need adequate air velocity across them. This is especially true for systems that use return fans instead of relief fans. Measure the air velocity across the return air damper during minimum outside air mode, when the return air dampers are 100 percent open. If it's much less than 1,500 fpm (a rule of thumb), consider blanking off some of the return air dampers to increase performance.

• Inadequate building pressure relief. During economizer operation, adequate pressure relief must be available to avoid building over-pressurization issues such as doors standing open and reduced supply airflow. Measure the difference between the indoor and outdoor pressure during economizer operation. If the difference is much greater than a tenth of an inch, investigate the relief air system to see if it has an adequate airflow path and that it's controlling properly.

• Poor sensor placement. Temperature and enthalpy sensor placement is crucial for proper economizer operation. Verify that the outside air sensor is in a good, representative location (i.e., never in direct sun, not too close to air outlets), and make sure the mixed air sensors are located correctly as well (e.g., in a place with good mixing). Averaging sensors are the best choice for mixed air temperature.

According to a PECI study on existing building commissioning, air handlers typically have more performance issues than any other type of equipment. There are many aspects to maintain on an air handler, and this maintenance can easily be overlooked or deferred. The Building Owner and Managers Association's (BOMA's) recently updated preventive maintenance guide, "Preventive Maintenance: Best Practices to Maintain Efficient and Sustainable Buildings," suggests preventive maintenance tasks for air handlers, which include quarterly and semiannual preventive maintenance tasks for maintaining the performance of airside economizer systems. Here are some common maintenance-related issues and periodic tests that can be done to address and avoid performance problems with air-handling units.

• Stuck dampers or broken linkages. Economizer dampers, especially outside air dampers, can seize in place due to entrained debris and humid conditions. This is especially an issue for salty, corrosive marine environments. Also, the linkages, which connect the actuator to the damper, can fail. Cycle your dampers open and closed periodically, and verify that they operate as intended. This often requires one person at the control system's operator workstation, and another person observing damper operation. When the damper is commanded open, does it actually open? Don't just rely on the output signal from the operator workstation as the final word in how a system is actually working.

• Actuators not adjusted for full closure. A slight opening in the "closed" return air dampers during integrated economizer and mechanical cooling mode (100 percent outside air) can significantly reduce the efficiency of the system due to increased mechanical cooling load, because the system is operating at less than 100 percent outside air. The pressure characteristics are typically such that a slight opening in the return air damper translates to a significant amount of airflow. Command your return dampers closed, and verify that they close completely by feeling for leakage. If they're not closed completely, adjust the actuator/linkage connection. When closing the return dampers, be sure the outside air dampers are open, to prevent the plenum walls from collapsing inward.

An air handler requires a lot of maintenance, and this work, important as it is, can easily be overlooked or deferred

• Worn blade and jamb seals. Blade and jamb seals help reduce damper leakage when the damper is closed. With no seals, leakage can be as much as 10 percent of rated damper airflow. Inspect your blade and jamb seals for leaks by feeling around the damper blades when they're closed, and if your dampers don't have seals, consider installing them as a way to increase the efficiency of your system through reduced return damper leakage during 100 percent outside air mode.

• Sensors out of calibration. Temperature and enthalpy sensors are prone to drift out of calibration, especially enthalpy sensors. It's important to keep the outside air and return air sensors calibrated, as these are typically the sensors that make the determination for the economizer operating mode. Developing and implementing a sensor calibration program can help keep these sensors calibrat-

## Most airside economizer damper systems are intended to operate in a manner similar to this:

**When outside air conditions are very cold:** The unit is in the heating mode. Mechanical cooling is off, economizer dampers are at minimum outside air position, and the heating coil operates to maintain supply air temperature setpoint.
**When outside air conditions are cold:** The unit is in economizer cooling mode. The heating coil is off, mechanical cooling is off, and economizer dampers modulate to maintain supply air temperature setpoint.
**When outside air conditions are cool:** The unit is in "integrated economizer" and mechanical cooling mode. Heating coil is off, economizer dampers are at 100 percent outside air position, and mechanical cooling operates to maintain supply air temperature reset.
**When outside air conditions are hot:** The unit is in mechanical cooling mode. The heating coil is off, economizer dampers are at minimum outside air position, and mechanical cooling operates to maintain supply air temperature setpoint.
This general description applies to most systems. The specific type of system, climate and control sequence will dictate how a system is intended to perform for actual installations.

*— Dave Moser*

ed and maintain the overall performance of the system. This is good to do for other HVAC sensors too, especially those used as inputs to control sequences, such as measuring chilled water flow for a chiller staging sequence.

### Tackling Controls Issues

Airside economizer damper control requires close coordination and integration with the system's heating and cooling systems to maximize the energy efficiency of the system. Common controls-related issues, and their corresponding fixes, include:

• The economizer is not integrated with mechanical cooling. It's beneficial to operate the system in full economizer mode (100 percent outside air) when the outside air conditions are just a bit cooler than inside conditions and the system is asking for mechanical cooling. This helps reduce the mechanical cooling load by keeping the cooling coil's inlet air (mixed air) temperature as low as possible. Take a look at your air handler control sequences, and observe system operation during these cool outside air conditions (e.g., 55 F to 65 F outside air, depending on the control sequence) to verify you're getting the full benefit of airside economizer operation.

• Economizer control disabled. Some buildings have disabled their airside economizers in reaction to a performance issue where the economizers weren't the main culprit or due to a lack of understanding of the system's benefits and performance. If you've disabled your airside economizers, consider re-enabling them, but also address any outstanding performance issues.

• Reduced economizer effectiveness. Past existing building commissioning projects have uncovered many control strategies that reduce the efficiency of the system. Two examples: a 30 percent minimum return air damper setpoint rather than a zero percent setpoint, and a low economizer changeover setpoint (the point at which the system changes from economizer mode to non-economizer mode, usually around 70 F outside air temperature). Review your control sequences to see if there are any opportunities for increased energy efficiency.

In general, first determine the intended operation of the airside economizer system. Review the original construction documents and consult with your operating staff to see how the system is currently programmed to operate. Investigate and implement optimization opportunities based on this exercise. Then, periodically test the system to determine if it's performing as intended and take corrective action when it's not. When testing the control sequences, be sure to test them in all operating modes (heating, economizer cooling, integrated economizer and mechanical cooling, and mechanical cooling with minimum outside air).

As a final note, your building automation system (BAS) can be a powerful tool to help monitor the performance of the economizer system. Periodically collecting and analyzing BAS trend data can be a good way of viewing system performance. X-Y scatter plots are often more telling than time-series plots, which can be confusing. Neither will show what problem exists, only that there is a problem requiring investigation. Be sure to filter the data to show "fan on" operation only, and also be sure that your BAS temperature and enthalpy sensors are calibrated.

Airside economizers can save a significant amount of energy, but they need to be maintained for their "free cooling" energy benefits to be realized. ■

*Dave Moser, P.E., is a senior engineer at PECI. He provides engineering services for a diverse range of projects and programs at PECI, all centered on building energy efficiency. His experience includes implementing and managing the technical aspects of utility existing building commissioning programs, leading in-building existing building commissioning projects, and supporting research projects. You can reach him at dmoser@peci.org.*

*Email questions to edward.sullivan@tradepress.com.*

### FOR MORE INFORMATION

**>>>** on airside economizer fundamentals, methods of control, and test procedures, consult the Functional Testing and Design Guides at **www.peci.org/ftguide**
Always consider the effects on other systems and include necessary precautions in any test procedures.

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**Monday October 10, 1:00 – 5:00 p.m.**

#### Best Practices for Energy Management

Presenters: Richard G. Lubinski, CEM, CDSM, CSDP, CEMSC, BEP, President, Think Energy Management LLC
Bob Holesko, Vice President, Facilities, HEI Hotel and Resorts

**Learning Objectives:**

1. Understand how to interpret your current building energy data and the best way to benchmark
2. Know the key elements of an energy audit
3. Comprehend the real payback time and ROI on projects and ways to calculate these figures
4. Learn energy management best practices: identify low/no cost EMCs and demand-side strategies

#### Measure What You Manage: How to Communicate Performance vs. Goals

Presenter: Michael B. Cowley, CPMM, President, CE Maintenance Solutions

**Learning Objectives:**

1. Understand the purpose and use of maintenance scorecards
2. Comprehend the true cost of maintenance: labor, materials, contractor costs
3. Learn the top 10 maintenance measurements programs currently in use
4. Understand the benefits of scorecards including manpower adjustments, program justification, capital improvements and equipment overhaul

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# Sessions At a Glance

## MONDAY, OCTOBER 10

1:00 - 5:00 PM

Pre-Conference Workshops*

PC1 Best Practices for Energy Management

PC2 Measure What You Manage: How to Communicate Performance vs. Goals

* Fee applies (see website for details)

## TUESDAY, OCTOBER 11

8:00 AM

T1.AN BACnet Fundamentals 101

T1.MA Leading in the New Economy: The Opportunity to Recalibrate What is Important

9:00 AM

T2.AA Best Practices for Using Your CMMS

T2.AB Why Emergency Call Systems Shouldn't Be a Roll of the Dice

T2.AN BACnet Puts the M in EMS

T2.JA Three Steps to Maintenance Reliability

T2.MA The Five Myths of On the Job Training

T2.MB Turning Down the Lights with Centralized Controls

T2.MC Take the Mystery Out of Water Audits and ROI Calculators

T2.MD How Sonoma County Saved Energy and Water

T2.MF Energy Management: From Audit to Action

T2.SA BIM+FM: Bridging the Divide

T2.SB FM Information Systems in a University Setting

10:00 AM

T3.AA Legionella and Waterborne Pathogens

T3.AB Fines and Notices of Violations: Environmental Regulation and Commercial Buildings

T3.AN Specifying Data Points for Expected System Performance

T3.JA Best Practices in Building Your Facilities Engineering Team

T3.MA Maintaining Good Customer Relationships

T3.MB Controlling Sustainable Project Costs

T3.MC Healthier Schools via Process Cleaning

T3.MD Facilities Master Plan: Developing a Business Case

T3.SA Preparing your Building for Smart Consumption

T3.SB The Top Seven Problems with Fire Alarm/Suppression Systems

11:00 AM

T4.AA Analyzing the Health of Your Electrical System

T4.AB Net-Zero Feasibility Study

T4.AN When Interoperability Isn't

T4.MA Are We Still Fighting the Maintenance Crisis?

T4.MB Implementing Lighting Management Technologies and Practices to Drive Building Efficiency

T4.MC Cleaning for Health: Ensuring a Clean, Healthy and Green Indoor Environment

T4.MD Energy Audits vs. Retrocommissioning

T4.MF Look Ma -- NO Chillers! Building Automation Systems in Green Data Centers

T4.SA Building Enclosure Commissioning

T4.SB Managing Workplace Violence

Noon to 4:00 PM

Exhibit Hall Open

3:00 to 4:00 PM

Kickoff Party (In Exhibit Hall)

4:00 PM

Solutions Exchange

## WEDNESDAY, OCTOBER 12

8:00 AM

WS.AN LEED Credits and Controls

WS.JA Implementing Maintenance Plans in a Reactive Culture

WS.MA Maintenance: Training the Next Generation of Technicians

9:00 AM

W1.AA Combustible Dust: A Hot Topic

W1.AB Retrocommissioning HVAC/Lighting Systems

W1.AN Open System Spec Interpretation

W1.JA Adding Sustainable Green and Energy Efficient Building Requirements and Technology to Courses

W1.MA Budget Reduction Strategies

W1.MB Understanding Green Incentives and Wireless Controls

W1.MC Risks and Rewards of LED Lighting

W1.MD Are You Providing Value as an FM Leader?

W1.MF ASHRAE's Building Energy Quotient

W1.SA Smart Buildings: Implementing Predictive Energy Optimization Technology

W1.SB Fire Protection for IT and Telecommunication

10:00 AM

W2.AA Learn from Your Investments: Energy Modeling, Measurement and Verification

W2.AB What is Monitoring-Based Commissioning?

W2.AN BACnet Operator Workstations

W2.JA Streamline Your Maintenance Program with Reliability-Based CMMS Practices

W2.MA A Review of the ADA Final Regs

W2.MB Water Conservation Measures

W2.MC The 2030 Energy Challenge

W2.MD Gaining C-Level Support for Sustainable Projects

W2.MF How to Intelligently Buy, Use and Manage Your Energy

W2.SA Integrated Building Management Systems

W2.SB Data Center Efficiency Evolution

11:00 AM to 2:00 PM

Exhibit Hall Open

2:10 PM

W3.AA How and Why of Plate Head Exchangers Fouling

W3.AB Current Status of Trends in Energy-Efficient and Sustainable Facilities

W3.AN BACnet for Equipment Suppliers

W3.JA Congeneration Plant

W3.MA Performing Effective Building System Re-Commissioning Studies

W3.MB Integrating Green Incentives for Your Existing Building Portfolio into the Capital Planning Process

W3.MC To LEED or Not to LEED

W3.MF Using EPAct to Make Energy Projects Possible

W3.SA How a Reliable Smart Grid and High Efficiency UPS Improves Data Center Efficiency

W3.SB Ensuring Fire Safety for Food Service Operations in Commercial Facilities

3:10 PM

W4.AA Reducing Project Costs

W4.AN BACnet Lighting Integration 101

W4.MD Integrated Solutions to Facility Management

W4.MF Installing On-site Solar Projects on a Budget

W4.SA BIM for Facility Management

W4.SB The 10 Things Your Staff and Vendors Won't Tell You

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EPAC Software Technologies Inc.

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Facility Wizard Software

FiberTite Roofing Systems by Seaman Corp.

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SHOWCASE: HVAC

# Know What to Look for When Upgrading HVAC

by casey laughman, managing editor

Upgrading an HVAC system represents a major investment of time and money, so it's not something to enter into without proper planning. What that plan involves isn't always clear at the beginning. Just as every building is different, so is every HVAC system. And while replacing one piece may work out just fine, it also could simply be the first in a series of dominoes.

"It may be that you replace a component and it will make it even more inefficient than it was before. You have to look at the whole system and look at what really needs to be done for the money to give you the best return on your investment," says Jon Cogdill, senior property manager, Hines.

Cogdill, and other experts agree on one point: While there's no such thing as a standard HVAC upgrade, there are some aspects of the process that always apply.

## Begin at the Beginning

If you're looking into upgrading your HVAC system because equipment is reaching the end of its life or because the building needs better service, it can be an easier sell than simply looking to become more energy efficient.

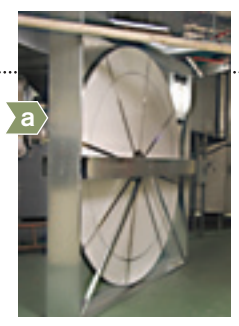
"Are you trying to solve a problem? Or are you trying to make it more efficient?" says Clayton Ulrich, senior vice president, engineering services, Hines. "It's clearly very hard to justify what we would loosely call an HVAC upgrade in an existing building if there isn't a problem."

If you can combine efficiency with another compelling reason to replace part or all of an HVAC system, it becomes a much easier sell. A big part of that sell, however, is knowing exactly what you need.

Say you're replacing a chiller. Because chillers can easily last 30 years or more, the odds are good that the needs of the building and its occupants have changed since it was installed.

"The first thing is to consider the asset you're talking about," says Tony Bamonte, vice president and regional property manager, Liberty Property Trust. "I don't suggest you just replace units with a like kind."

Cogdill says he can attest to that from personal experience. Hines has been working on an HVAC upgrade of Two Shell Plaza in Houston, a more







**»a. AIRXCHANGE** field-assembled energy recovery wheel cassettes are cut into halves or quarters and marked for reassembly to fit through standard doorways and allow for installation in limited-access areas. Wheels recycle up to 80 percent of heating and cooling energy contained in exhaust air. Wheel segments can be removed for cleaning. **AIRXCHANGE: CIRCLE #255**

**»b. FRIEDRICH** packaged terminal air conditioner features indoor and outdoor motors, three-speed fan and universal heater/power cord. Tangential blower wheel has surface area almost five times larger than previous fans. Fits standard 42-inch sleeves without baffle kit. Separate heating and cooling limits. Unit supports centralized desk control and is compatible with energy management systems. **FRIEDRICH: CIRCLE #227**

**»c. GREENHECK** rooftop ventilation unit conditions and controls any mixture of outdoor and return air. The unit has 2-inch double-wall construction and direct-drive plenum fans. Indirect gas furnace, hot water or electric heating options; packaged or split direct-expansion or chilled water cooling options. Optional energy wheel. Capacity up to 9,500 cfm. **GREENHECK: CIRCLE #228**

**»d. AEGIS SGR** protection ring channels electrical current away from motor bearings. Available in standard sizes to fit AC motors from 1 to 1,500 HP with shaft diameters from 8 mm to 153 mm. Larger sizes are available for shafts with greater than 6-inch diameter. Screw-on mounting brackets require no machining. **AEGIS: CIRCLE #229**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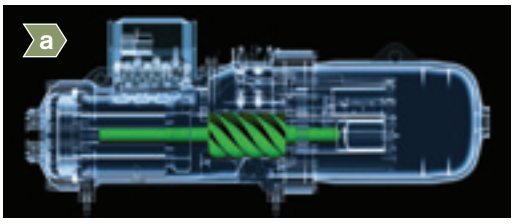





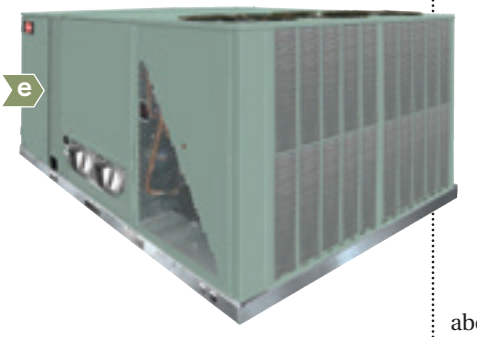


**»a. BITZER** CSW screw compressors are designed to replace screw or reciprocating model compressors in water-cooled chillers or air-cooled systems operating under moderate climate conditions. Suction and discharge gas connections can be rotated in 90-degree increments. Compatible with R134a, R407C and R22; R404A and R507A available on request. Available with or without economizer. **BITZER: CIRCLE #230**

**»b. CLIMATEMASTER** TMW high efficiency water-to-water series is available in 30- and 50-ton sizes. Can be used for radiant floor heating, snow and ice melting, chilled water for fan coils, and hot/chilled water for make-up air. Digital controls for BAS interface, four LEDS for unit status, and compressor isolation switches. **CLIMATEMASTER: CIRCLE #231**

**»c. SIEMENS** CO2 room units offer temperature, relative humidity and CO2 readings in sensor-only and fully interactive models. Designed to work with the company's APOGEE building automation system and BACnet programmable terminal equipment controllers. OLED display is 96 x 64 pixels and alternately shows available readings. Includes plug-in human machine interface (HMI) port. **SIEMENS INDUSTRY: CIRCLE #232**

**»d. FULTON** condensing boiler can use B-100 biodiesel and ultra-low sulfur heating oils. Available in sizes up to 4,000,000 BTU/hr. Can be configured for liquid fuel, natural gas, or dual fuel operation. Boiler controls can allow the boiler to be fired short-term with conventional No. 2 heating oil in non-condensing mode. **FULTON: CIRCLE #233**

**»e. RHEEM** gas/electric and air conditioning package units are available in sizes ranging from six to 20 tons. Designed to meet federal requirements of EER at or near nominal capacities and airflow, the units have all-aluminum heat exchangers to provide less obstruction to airflow. **RHEEM: CIRCLE #234**

than 550,000-square-foot, mixed-use building that was completed in 1972.

The building was formerly outfitted with four 500-ton chillers. Two of those chillers remain, but only in a backup role. The cooling is now provided by a pair of 680-ton chillers with variable frequency drives. That approach not only allows for more efficiency, but also gives more flexibility when it comes to providing cool air during off-peak hours when only a limited number of tenants need it.

Instead of simply replacing a unit with a like kind, look for options that improve efficiency or flexibility

Changes like that can only come about if a project is properly evaluated beforehand and the building's usage is carefully examined. For that, Bamonte says, bringing in an outside engineer, while an added expense, is probably a good idea.

"The unit that might be 15, 20 years old, is older technology, not as energy efficient as things today. In fact, with an engineer, you might find out that the sizing of the unit back then doesn't necessarily meet with the sizing of the unit for current occupants and future occupants," he says.

Good data help, too, especially in those cases where it might be preferable to replace pieces with similar units. Kirk Beaudoin, territory facilities manager, North American retail operations, Nike, says that tracking service calls, breakdowns and temperature complaints helps identify problems that would prevent the company from being able to swap out old units for similar new units.

"Our assumption is that our stores were properly designed when built. So unless we have identified ongo-

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**a. MOVINCOOL** CMW30 water-cooled, ceiling-mount air conditioner is 20 inches high, allowing it to fit above a drop ceiling. Cooling capacity is 29,400 BTU/hr (total) and 22,000 BTU/hr (sensible) for server rooms. Built-in mounting bracket, flanges and vibration isolators. The unit requires no external condensing unit, refrigerant connections or charging. Uses R-410A refrigerant. **MOVINCOOL: CIRCLE #235**

**b. TITUS** EOS is a solar-powered diffuser that automatically adjusts to horizontal or vertical configuration. Logic system monitors air temperature and adjusts the air discharge position using harvested power to complete auto-changeover function. Plenum slot diffuser changes discharge pattern to the correct horizontal or vertical position for heating and cooling applications. **TITUS: CIRCLE #236**

**c. AERCO** boiler line has been expanded to include 750MBH and 1,000MBH models. Boilers are 24 inches deep by 28 inches wide by 79 inches high. The line has 20:1 turndown and NOx of less than 20 PPM. Features include stainless steel fire tube heat exchanger, remote monitoring and oxygen level monitoring. Operating range of 50 to 190 F. **AERCO: CIRCLE #237**

**d. BELL & GOSSETT** submersible water pumps include a self-cleaning impeller and casing designed for improved processing of solids, reduced clogging and improved efficiency. Designed for commercial and building services use. MK model has air-filled motor and dual mechanical seal. MV model has vortex impeller and is designed for low-volume use. **BELL & GOSSETT: CIRCLE #238**

**e. TESTO** thermal imagers feature sensitivity of less than 80 millikelvin and measuring range of -4 to 232 F. Most models include integrated digital camera and software that blends thermal and digital images. All models include hard shell case, SD card, USB cable, software, power supply and tripod mounting plate. **TESTO: CIRCLE #239**

**ATLAS SALES AND RENTAL** provides portable cooling systems in 1- to 5-ton sizes and mobile cooling systems in 12- and 25-ton sizes. Units available in both air- and water-cooled configurations. Water-cooled units can be used with either cooling tower or portable dry coolers and require no exhaust ducts. (Not pictured) **ATLAS SALES AND RENTAL: CIRCLE #256**

ing comfort issues that are related to sizing of equipment, or if there have been any modifications to the store which would require a review of the systems, we generally replace with the same tonnage," he says.

Don't forget to look ahead, as well. "You should take into consideration what the outlook is for future occupancy of the building to determine what the best approach is going to be," Cogdill says. "If you're just trying to maintain what you had before, well, did you have a lot of redundancy before? Did you need all that redundancy?"

## Timing is Everything

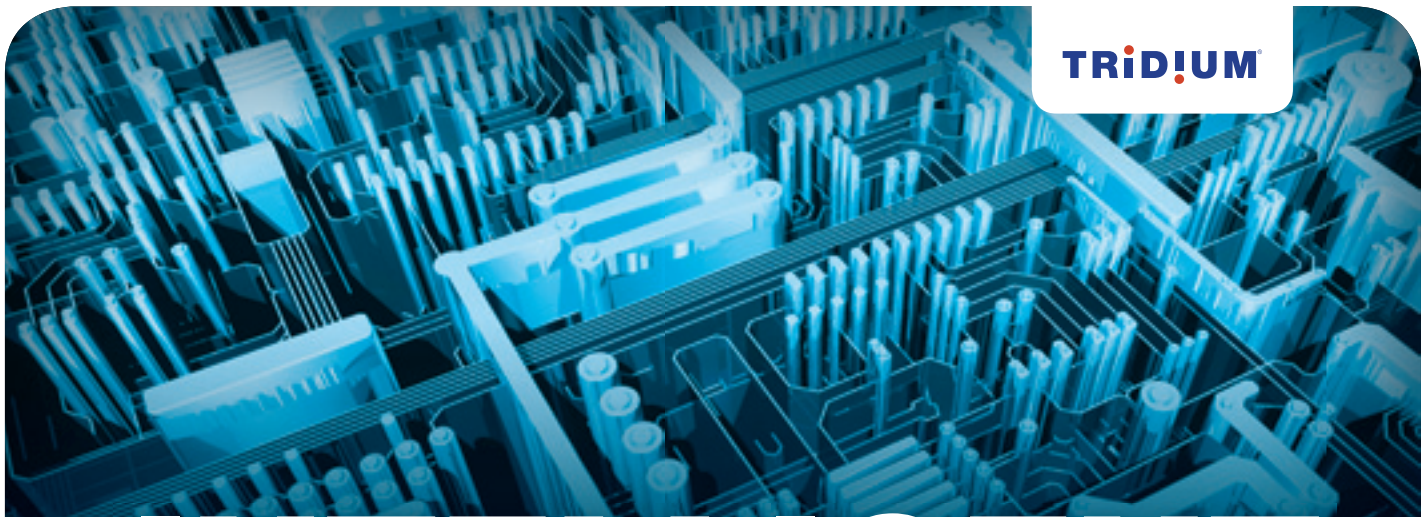
The timing of an upgrade can go a long way towards determining its success or failure as well. While upgrading HVAC equipment is never an easy process, it's certainly easier to do it before something breaks.

> HVAC efficiency upgrades are an easier sell when combined with other compelling reasons

Nike found this out the hard way. "We had a reactive plan in place when it came to replacing HVAC equipment, due to budget restrictions, and would only replace the units after they had failed and had no more life left in them to be salvaged," Beaudoin says. "After a few difficult summers, where multiple units had failed, causing major discomfort and lost sales as consumers left complaining of the temperatures, leaders asked what we could do to avoid these issues in the future."

The result was a program that allows for Beaudoin and his staff to replace rooftop units at the stores before they fail. It also allows them to replace all of the units — usually five — at once.

"It allows us to bring the whole store up to our new equipment brand standards, with greater energy efficiency, R410a refrigerants, and makes con-



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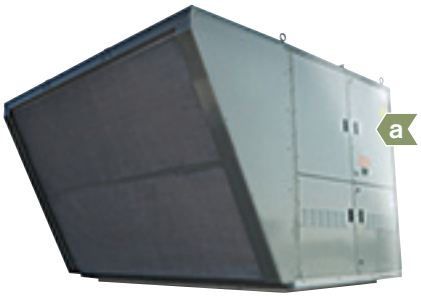





**»a. MODINE** Atherion packaged ventilation system is available in cooling capacities of 15, 20, 26 and 30 tons. Meets ASHRAE 90.1 and 62 standards for efficiency and indoor air quality. Features include tandem digital scroll compressor, two-inch double-wall construction, full-length hinged access doors and factory-installed microprocessor controls. Optional energy recovery ventilator. Uses MERV16 filters. **MODINE: CIRCLE #240**

**»b. TRANE RENTAL SERVICES** offers cooling units for temporary applications ranging from 10 ton to 1,000 ton cooling units, 36 kW to 1.4 mW of power generation, and 25 hp to 300 hp of compressed air. Can be used in scheduled or emergency situations. Generators, skid-mounted pumps and flatbed trailers are also available. **TRANE RENTAL SERVICES: CIRCLE #242**

**»c. HONEYWELL** Excel 800 controller has double the memory of the Excel 500 controller and uses the same application programs. Supports EBI, SymmetrE and ACSELON building management interfaces. Hot-swappable replacement of I/O modules. CPU automatically detects and commissions replacement modules. Housings can be separated by up to 120 feet. **HONEYWELL: CIRCLE #243**

**» WEIL-MCLAIN** Ultra commercial boilers are available in 550 and 750 MBH. Boilers offer 93.9 percent thermal efficiency and 94 percent combustion efficiency. Low NOx certified. CSD-1 compliant. PVC venting for direct vent and exhaust. Turn down ratio of 5:1. Includes 11 pre-set applications and text LCD display. Integrated multiple boiler control. (Not pictured) **WEIL-MCLAIN: CIRCLE #241**

**» GOODWAY** CTV-1501 TowerVac removes cooling tower bacteria and micro-organisms without requiring cooling system shutdown or draining. Adjustable flow control can produce recovery rate of up to 60 GPM. Comes with 15-foot inlet hose, 25-foot outlet hose, 24-inch wand, 36-inch extension tub and 6-inch gulper tool. Centrifugal pump, 1½-HP engine. (Not pictured) **GOODWAY: CIRCLE #257**

nectivity with our EMS easier," he says. "As the fleet is slowly replaced/upgraded, we'll have to revisit the replacement plan, as the equipment 'should' be in greater shape, and last longer, so replacing them one off as needed will likely make more fiscal sense, as we can squeeze more life out of each unit."

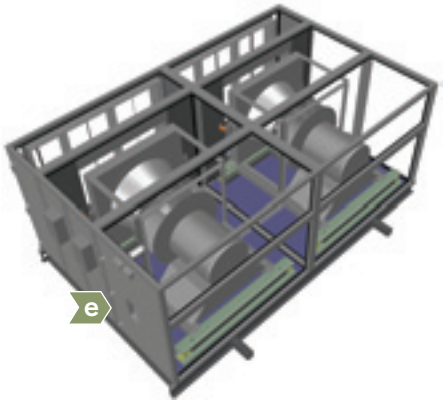
Even if you're not replacing multiple units, the day will come for an upgrade.

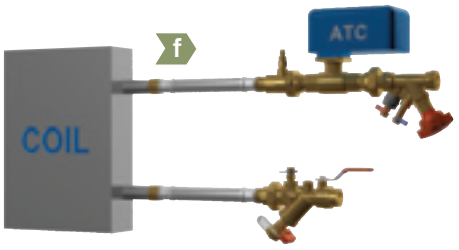
"There's usually a point in time where you realize you need to do something. One of the issues is efficiency. When you've got 40-year-old equipment, it's not going to be as efficient as modern-day equipment," says Cogdill.

But timing doesn't just mean the equipment's lifespan. The time of year plays a big part as well.

Jeff McCauley, engineering manager at Two Shell Plaza, points out that summer in Houston is not conducive to HVAC work. The way Hines has done it is to start work on the cooling equipment in the fall and have it completed, including commissioning, by March or April at the latest.

"With our climate here, it has to be done during the cooler months," McCauley says. "This could not possibly work during the summertime."


**»d. MAMMOTH** V-Cube Slim air handler can be disassembled into sections that fit through a standard 3-foot door. Eleven capacities range from 15 to 70 tons. Cooling efficiency is as high as 16.1 EER and heating efficiency goes up to 4.3 COP. Features include digital scroll lead compressor and factory-installed variable frequency drive. Quick-connect design.
**MAMMOTH: CIRCLE #244**

**»e. MCQUAY INTERNATIONAL** Vision indoor air handlers are in side-by-side arrangement with options for energy recovery wheel and dual belt-drive plenum fans. Side-by-side configuration is up to 70 inches shorter than vertical arrangements, according to the company. Plenum drives option can offer up to 100 percent redundancy. Designed for new building construction with small or restricted access areas.
**MCQUAY INTERNATIONAL: CIRCLE #245**

**»f. VICTAULIC** KOIL-KIT coil packs are customizable, preassembled coil-circuit installation kits. Kits include drain valve, coil hoses, union port fitting and balancing valve. Can be custom-built. Usable in hot- and cold-water applications in both treated and untreated water systems. Components are available in half-inch to 2-inch sizes. **VICTAULIC: CIRCLE #246**

**» STERIL-AIRE** UVC kit for 61-inch emitters is designed for medium and large indoor air handler units with coils over 62 inches. UVC emitter has 12-month service life. Usable in air handlers with limited access. (Not pictured)
**STERIL-AIRE: CIRCLE #247**

**» FLUKE** P3 series thermal imagers offer 240 by 180 resolution and high-definition display. Optional telephoto and wide-angle lenses. Field-replaceable batteries and three-button menu. Includes voice recorder that allows for annotation by speaking directly into the imager. Enclosure is tested to IP54 and units have been tested up to 2-meter drops. (Not pictured)
**FLUKE: CIRCLE #258**






**»a. JOHNSON CONTROLS'** YORK YVAA air-cooled variable-speed screw chiller does not require a cooling tower and offers design efficiencies up to 11.6 EER. Load can be limited to reduce noise; according to the company, ambient noise can be reduced by as much as 16 dBA. Uses HFC-134a refrigerant, which has no phase-out date.
**JOHNSON CONTROLS: CIRCLE #248**

**»b. RITE-HITE** Revolution fans have four blades, as opposed to six or 10, and have an airflow of more than 428,000 cubic feet per minute. Available in 8-, 12-, 16-, 20- and 24-foot diameters. Steel universal mounting brackets. Mounting system includes beam clamp, motor housing, stabilization cables and three-way motor-to-hub safety connection.
**RITE-HITE: CIRCLE #249**

**»c. MITSUBISHI** Y-Series outdoor heat pump is available in 208/230 volt, 3-phase or 460 volt, 3-phase units. Units are available in three sizes. The smallest can be connected to up to 15 indoor units; largest up to 50. Outdoor temperature range is -4 F to 60 F when heating; 23 F to 115 F when cooling.
**MITSUBISHI: CIRCLE #250**

**» DATA-AIRE** GForce chilled water units are available in 7 to 176 nominal kilowatt configurations with either upflow or downflow air distribution. Designed for data centers, telecommunications sites and other process cooling applications. Controller provides information on temperature, humidity, air flow, cleanliness, component runtimes, alarm history and automatic self-test. Eighty-character LCD display. (Not pictured) **DATA-AIRE: CIRCLE #251**

**» QUIETSIDE** The Samsung Free Joint Multi allows two, three or four zones to be connected to a single outdoor unit. Total capacities range from 18,000 to 36,000 Btu. Maximum height difference is 49 feet; maximum pipe length is 100 feet for two units and 225 feet total for four. (Not pictured) **QUIETSIDE: CIRCLE #252**

While it's certainly possible to replace one particular piece of an HVAC system and not touch the rest for 10 years, it's not likely. When considering upgrading one piece, take a look at everything else, as well.

"You wouldn't want to replace one piece and not consider the other pieces," Ulrich says. "If you have a chiller that's reaching the end of its useful life, you have to consider the condition of the cooling tower. It's a mistake to replace the component of a system that has an obvious problem and not have the foresight to take a holistic look at it and say, 'the chiller's 30 years old and it has a problem, what else is that old?'"

One good place to start when looking for other areas that might be affected by an upgrade is the control system. If you have a legacy control system, you're running the risk of either limiting your upgrade options or not getting the most out of them.

"I wouldn't limit myself with an old BAS or energy management system and have that tail wag the dog, if you will," Bamonte says. "I wouldn't say, 'since the controls can't handle certain types of equipment, let's not go down that road.' I would start with the main equipment and then work from there."

Don't just assume that a new piece will fit in the right spot — or be the right weight if it's a rooftop unit

Other things to consider have more to do with the building's infrastructure than anything else, such as ductwork and piping. And, Bamonte points out, don't just assume that a new piece will fit in its intended spot — or be the right weight to be supported if it's a rooftop unit.

Codes play a part as well. With HVAC components having such long lifespans, codes can change multiple times from the time an HVAC product is installed until the time it is replaced.

"Say I've got an A/C unit in the middle of a 20,000-square-foot floor," says John Fallon, vice president of service for Donnelly Mechanical. "I want to change it, but now the code says I have to have fresh air going to it. It's in the middle of a floor. How am I going to get fresh air to it?"

There's one other consideration before diving into upgrades, says Fallon.

"If you're going to be there five years or longer, then I would be looking at upgrading," he says. Less than that, and stretching a system's lifespan while repairing when needed becomes a more attractive option.

## The Human Element

Regardless of how many parts of an HVAC system you're going to replace,

how much money you're going to spend or how long it's going to take, one big factor is making sure that everyone's on the same page.

"Obviously you're going to communicate well with the engineer that you might work with; you're certainly going to communicate well with facilities management, the technicians on staff and the potential contractor that you're going to use," Bamonte says.

> Equipment is important, but so is operating it correctly. A control system is only as good as its operator

"But even more important is to talk to the occupants of the building. If we've had any slips, if you will, it's when we haven't successfully communicated to customers what we're thinking, what the plans are for the project, what's the timeframe, what are our expectations, what are the expectations for you, the tenant."

And in the end, equipment is important, but so is operating it correctly.

"The fundamental piece of it is the quality of the operating staff," Ulrich says. "How well you take care of (equipment) really has an effect on its useful life. The manufacturers make some pretty darn good equipment that stands up over time." Bamonte agrees, pointing out that a control system is only as good as its operator.

"You can have the greatest energy control system out there, but if it's not properly utilized by property management or facilities management, you'll have wasted the dollars and lost opportunity on the potential energy savings going forward." ■

*Email comments and questions to casey.laughman@tradepress.com.*

PREVIEW FACILITY DECISIONS

# Tax Benefits for Efficiency Projects

## From HVAC upgrades to LEED projects, federal tax deductions may help justify energy investments

The summer of 2011 began much like any other, with pockets of scorching temperatures affecting states throughout the Midwest and Southwest and heavy rains drenching others along the East Coast. Across the country, facility managers continued to pursue strategies that offered the most energy-efficient operation of HVAC systems, lighting, and building controls. Some facility organizations considered equipment upgrades, while others planned a retooling and recommissioning of existing systems. As usual, budget played a big factor in determining next steps.

Charles Goulding will discuss the impact of changes to the Energy Policy Act (EPAct) at next month's Facility Decisions conference in Las Vegas.

Then two extraordinary things happened: the U.S. debt ceiling rose, and the stock market plunged. Facing an incredibly unpredictable environment, many facility operating budgets were suddenly in peril. And those energy efficiency initiatives? They were in danger, too.

They don't have to be, according to Charles Goulding, president and founder of Energy Tax Savers Inc., which specializes in advising building owners, architects, engineers and designers on tax benefits related to energy saving building investments.

Last year's updates to the Energy Policy Act (EPAct) have ushered in "a whole new category of projects qualifying for HVAC tax deductions," says Goulding, who will be presenting "Using EPAct to Make Energy Projects Possible" at next month's Facility Decisions Conference & Expo in Las Vegas.

"EPAct benefits are applicable to investments made to reduce energy use," says Goulding, adding that the current push toward LEED certification is a natural fit for EPAct tax deductions as well. "LEED buildings and EPAct integrate almost perfectly. Any time you have a LEED building, you should be thinking that you're platformed for tax savings."

Goulding points to 11 categories of HVAC equipment that now fall under EPAct's Section 179(D), noting that many of them are becoming more widely adopted throughout the facilities management marketplace and include thermal storage, demand control ventilation, chilled beam ceilings, magnetic bearing chillers and VAV devices in buildings of less than 75,000 square feet.

For facility managers who develop expertise in applying these deductions, an unbeatable opportunity to recoup upgrade investments and save energy dollars for the long haul awaits. And in a world where financial stability is a long way off, these tax savings offer a way forward for vital energy- and cost-saving projects. ■

BUILDING OPERATING MANAGEMENT'S FACILITY DECISIONS CONFERENCE & EXPO

Facility Decisions is free to attend and will be held at the Mirage Event Center in Las Vegas. Hotel rooms are also available at the Mirage. Call 800-499-6311 to reserve now.

**FacilityDecisions.com**

### EVENT HOURS

**Monday, Oct. 10**
Pre-conference Workshops (fee applies): 1 p.m. – 5 p.m.

**Tuesday, Oct. 11**
Conference Sessions: 8 a.m. – noon

Exhibit Hall: noon – 4 p.m.

Opening Night Party: 3 p.m. – 4 p.m.

Solutions Exchange: 4 p.m. – 5 p.m.

**Wednesday, Oct. 12**
Conference Sessions: 8 a.m. – 11 a.m. & 2 p.m. – 4 p.m.

Exhibit Hall: 11 a.m. – 2 p.m.

## Facility Decisions Pre-Conference Workshops Offer More Ways to Cut Costs

**Two pre-conference workshops are available to Facility Decisions attendees on Monday, Oct. 11 from 1 p.m. – 5 p.m. The cost is $149 in advance, $249 on-site. Learn more at www.nfmt.com/education**

**Workshop 1: Best Practices for Energy Management**
Presented by Richard G. Lubinski, CEM, CDSM, CSDP, CEMSC, BEP, President, Think Energy Management LLC, and Bob Holesko, Vice President, Facilities, HEI Hotel and Resorts

**Workshop 2: Measure What You Manage: How to Communicate Performance vs. Goals**
Presented by Michael B. Cowley, CPMM, President, CE Maintenance Solutions

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