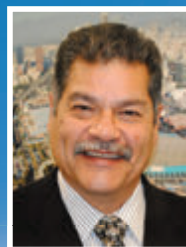


building OPERATING management

APRIL 2013 • FACILITIESNET.COM/BOM • \$8



Rey Castro explains
how the L.A.
Convention Center
uses outsourcing to
trim energy costs

Staying Sustainable

From guest demands
to dolphin tanks,
hospitality facilities
face challenges going
green. Here's how FMs
make it work

**PLANNING
EXTERIOR
LIGHTING**

5 **STEPS**
Help FMs Cut
ENERGY USE



COMMERCIAL



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VEHICLES



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BLOW



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[online exclusive]



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EDITORIAL

FMXcellence: FMs Take the Next Step

There's a lesson to be learned from this year's FMXcellence honorees, but the lesson may not be obvious.

This year's honorees were recognized for very large projects or programs. The enterprise real estate group of TD Bank Group helped meet a corporate commitment to carbon neutrality by creating an enterprise green building program that has produced three net-zero energy use buildings and more than 65 LEED certified buildings. Lawrence Berkeley National Laboratory has undertaken a broad-based sustainability effort that ranges from fostering a culture of sustainability to use of green technology in construction and retrofit projects.

Some programs that earned FMXcellence recognition this year started small and had to prove themselves. That was true at BAE Systems, where a utility cost takeout initiative that began with one building has since been recognized as a tool to help business units across the organization. The energy efficiency program at HEI Hotels & Resorts got rolling because top management was shown the payoff from individual energy upgrades.

Then there were programs that couldn't start small, simply because the task at hand was enormous. For the New York City Department of Education, the goal of SchoolStat was to rate conditions of buildings in a 130 million square-foot portfolio. When Georgia Tech purchased the former Atlanta Olympic Village, there was nothing small about the decision to seek LEED-EBOM Gold certification for the 800,000 square-foot facility.

These diverse efforts have one thing in common. The facility department identified a way to add value, then took action. Sometimes the first step was small, other times it was a doozy. What really counts is taking the step.



Edward Sullivan

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Post comments at myfacilitiesnet.com/edsullivan

For more on the 2013 FMXcellence honorees, go to
<http://myfacilitiesnet.com/fmxcellence/default.aspx>

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A high-angle, top-down view of a woman sliding down a bright green water slide. The slide is curved and has a textured surface. The woman is lying on her back, wearing a red and white patterned swimsuit and blue swim trunks. Her arms are outstretched. The slide is supported by brown metal poles. The background shows a sandy area and other parts of the slide structure.

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PRODUCT GALLERY

**IN-CEILING AIR CURTAIN**

is rated for doorways with up to 16-foot-high ceilings. The ICB flush-mount curtain uses 1-hp motors and is available in 3- to 12-foot lengths in white or custom colors. The series comes with Intelliswitch digital control package and seven operating modes. The system complies as a vestibule substitute, which is now allowed by the International Green Construction Code. **BERNER INTERNATIONAL CORP:** CIRCLE #263

EV CHARGING STATION

provides up to 40 amps of continuous power at 240 volts. Evr-Green 400 Charging Station consists of watertight steel enclosure with a thermoplastic cover



and has a 25-foot charging cable. Can be installed with either a cord-connected or hardwired power source. **LEVITON:** CIRCLE #279



BOLLARDS can be customized to match specified equipment and protect proximity readers, CCTV cameras, intercoms, wheelchair access push buttons,

and other electronic devices. Constructed of aluminum, cold-roll or stainless steel. **CHASE SECURITY SYSTEMS:** Circle #265

Duct Sealing Technology Saves OSU Dorm Project

Just weeks from Ohio State University's William Hall dormitory's grand opening for the Fall 2012 session, the building's ventilation system failed to pass pressure tests needed to meet fire code regulations and targeted LEED requirements.

CASE STUDY

Among other innovations, the dorm was designed with a goal of exceeding ASHRAE 90.1 energy standards by 30 percent. The building's ventilation system consists of 19 individual exhaust shafts, each made up of three layers of fire-rated drywall.

Pressure tests revealed significant leaks in every shaft. While the fire-rated dry wall was sufficient to keep out fire for up to three hours, with leaks, it did little to keep smoke from spreading from room to room.

The various leaks throughout the shafts would also drive up energy usage. Initial tests showed that 30 percent to 45 percent of heating and cooling energy was being lost. Additional energy would be needed to drive the exhaust fans at sufficient levels to ventilate all areas of the building.

It was clear the leaks needed to be sealed. However, to do so, workers would have to access the entire length of each of the shafts, and that meant tearing down most, if not all, of the building's newly constructed walls, manually locating and sealing each leak, and then rebuilding — no minor setback.

Then an engineer remembered hearing about a duct sealing technology developed at Lawrence Berkeley National Laboratory that uses an aerosol-based approach to sealing ductwork.

The sealant is a vinyl acetate polymer with a cure rate of approximately two hours. It exhibits minimal VOC off gassing with no OSHA maximum exposure limitations. The process begins by blocking the wall registers so air can only escape through the leaks in the ductwork. The duct system is slightly pressurized and the sealant is then heated up and blown into the ventilation shaft. The dry 7 to 10 micron-sized adhesive particles remain suspended in air as they travel throughout the ductwork until they reach a leak. Here they begin to accumulate around the leak, bonding to other sealant particles until the entire hole is permanently filled.

In less than two weeks, workers had each ventilation shaft sealed and operating to both fire code and LEED Silver specifications. AeroSeal had located and sealed 98 percent of the leaks — without tearing down a single wall or disturbing any of the completed construction.

AEROSEAL: CIRCLE #290

DOWNLIGHTS are Energy Star rated. S9051 LED series comes in a 4-inch aperture in 15W and 21W optics for new (S9051N) and retrofit (S9051E) construction. Both models feature dimmable drivers and machined aluminum lamp bodies. Multiple heat fins allow for optimum heat dissipation; lifespan of more than 50,000 hours; 5-year limited warranty.

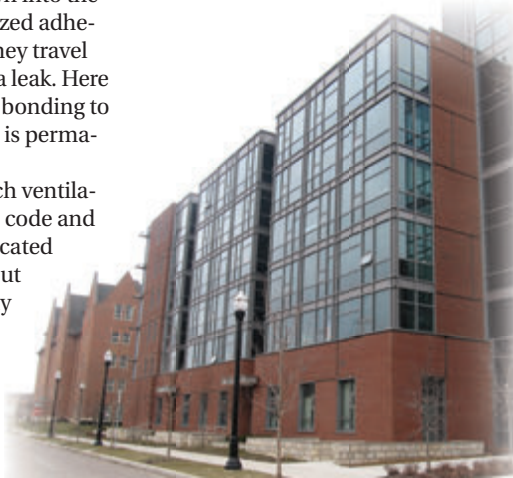


ORR LIGHTING: CIRCLE #266

PANELBOARDS provide overcurrent and short-circuit protection for low voltage power and lighting applications. SynergEX Panelboard is designed to withstand temperatures ranging from -40 degrees C to 55 degrees C. Breakers are individually encapsulated without any bolts or screws. Breakers can be reset without a hot permit and feature quick snap installation, according to the company.



COOPER CROUSE-HINDS: CIRCLE #267





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»»**a. BUILDING OCCUPANCY SENSORS** are designed for energy savings and code compliance. The Perfect-Sense ceiling-mounted 24V sensor covers 1,000 square feet with both PIR and Ultra-sonic detection technologies. All models feature daylight sensors to inhibit lights from turning on. **NEXLIGHT: CIRCLE #269**

»»**b. BIOMETRIC TIME CLOCK** records an employee's punch by the size and shape of the hand in real-time. The HandPunch GT-400 has a printed hand outline for accurate placement and is infused with an antimicrobial agent. The unit has ATM-style interface, 3.8-inch display and 10/100 Ethernet connectivity. **SWIPECLOCK: CIRCLE #270**

»»**c. COATINGS** contain 316L stainless steel for superior durability, according to the company. Steel-tech coatings are available in epoxy and polyurethane finishes and dry to a metallic gray. According to the company, only one coat is required and the finish is quick-drying. Epoxy finish is designed for severe environments and can be applied without a primer. Polyurethane finish can be applied directly to metal, clean steel or tightly adhered rust without a primer. **RUST-OLEUM: CIRCLE #271**

»»**d. BURDEN CARRIER LINE** is designed for a variety of payload and towing capacities. Titan vehicles include LD with 36-volt DC motor, 1,750-pound payload capacity; HD with 36- or 48-volt motor, 2,500-pound payload and 3,600-pound towing capacity; and XD with 5,000-pound towing capacity and 3,000-pound payload capacity powered by a 48-volt motor. **CUSHMAN: CIRCLE #272**

»»**e. CEILING** offers a flat, grid-free washable surface, uses interlocking PVC panels and rails and is Class A fire rated. Zip-UP Ceiling System surface is paintable, mold- and mildew-resistant, and unzips for cleaning and access overhead. The ceiling comes in white or beige and smooth and serrated finishes. The main rails and panels come in 8-, 12-, and 16-foot lengths, the wall trim in 8- and 12-foot lengths, and seam trim in 12-foot lengths.

MP GLOBAL PRODUCTS: CIRCLE #273

»»**f. NETWORK VIDEO RECORDER** is designed for small security systems. The ESV4 features HDMI output in 1080p high-definition video, simultaneous recording of four-megapixel IP cameras, mobile app support and free video management software; is compatible with Toshiba IP cameras and more than 500 other OnVIF-compliant IP cameras. On-board CMS software uses standard network protocols and Linux operating system; supports H.264 live monitoring and recording. **TOSHIBA: CIRCLE #274**

»»**g. LED LIGHTING SERIES** luminaires come in 1-by-1-foot, 2-by-2-foot, 2-by-4-foot, and 1-by-4-foot sizes and in 3000K, 3500K, and 4000K correlated color temperatures with an 85 CRI. Metalux Arcline series offers seven lumen package options with an efficacy up to 103 lumens per watt and one-piece shallow housing (3.25 inches) with tool-less hinged door. Offered with a five-year warranty; the product is designed to last 50,000 hours. **COOPER LIGHTING: CIRCLE #275**

ELECTRIC ANODE SYSTEM is designed for maintenance of large, glass-lined storage tanks. Non-consumable titanium anodes balance the tank without the need for replacement anodes. System can serve tanks up to 850 gallons; titanium rods connect to a wall-mounted power unit using a standard 120V power outlet. **NILES STEEL TANKS: Circle #268**





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SURGE PROTECTORS are enhanced with selenium to offer better protection from utility-induced switching surges, according to the company. All Select (SL3) models are UL listed; models with integral disconnect include a safety barrier that blocks access to the line side of the disconnect. Power quality monitoring system offers remote access via either ModBus or Ethernet. **CURRENT TECHNOLOGY: CIRCLE #276**



h. EDGE-LIT LED PANELS come in 2-by-2-foot and 2-by-4-foot sizes for installation in most ceiling grids to provide overall illumination. Fixtures are 120V/277V and are dimmable. Panels are ½-inch thick with 2-inch back box and can be surface-mounted, recess-mounted into hard ceilings, or pendant-mounted. **NORA LIGHTING: CIRCLE #277**

i. POWER METER is designed for retrofit applications. Meter assembly in NEMA enclosure comes pre-wired in a 120V or a 277V (for 277/480V systems) configuration and can be mounted and wired next to existing switchgear. The assembly can be ordered with the Shark 100, 100B, or 200 meters. **ELECTRO INDUSTRIES/GAUGETECH: CIRCLE #278**

j. PAINT is GREENGUARD certified in Children & Schools and Interior Air Quality categories. Premium Plus Ultra also meets Collaborative for High Performing Schools (CHPS) guidelines. Product is an interior stain-blocking paint and primer in one. Blocks stains and seals and covers uncoated and previously painted surfaces with no separate primer needed. Provides scuff, stain, and mar resistance as well as an antimicrobial, mildew-resistant finish. Low-VOC Paint is 100 percent acrylic. **BEHR PRO: CIRCLE #264**

k. MORTISE LOCK adds push-pull paddle. The ML2000 paddle trim allows door to open with pressure from hips or elbows. Lock body features quick reversible latch bolt and a 1-inch stainless steel deadbolt. Paddle trim features antimicrobial finish option and is fully ADA-compliant. **CORBIN RUSSWIN: CIRCLE #280**

l. VARIABLE FREQUENCY DRIVES support UL Type 1 and Type 12 applications at 230V, 460V and 600V. ACB line horsepower ratings range from fractional to 550. Drives support variable torque, constant torque or constant horsepower applications. Drives use plain language interfaces and control routines and are heavy-duty rated. **BALDOR ELECTRIC COMPANY: CIRCLE #282**

m. DISPENSERS can use the same cartridge refill regardless of whether cartridges are touch-free or manual models. REFRESH 4 in 1 hand cleanser and sanitizer refills are available in either foam, spray, liquid or gel in either 500 ml or 1,000 ml sizes. Dispenser is available in either white or black and offers more than 40 different window-color combinations. **STOKO: CIRCLE #281**

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| 4/9 | Cleveland, OH
"Brownstown" at
The Cleveland Browns Stadium | 3-7pm |
| 4/16 | San Antonio, TX
OMNI San Antonio Hotel
At The Colonnade | 3-7pm |
| 4/17 | Foxborough, MA
Gillette Stadium | 3-7pm |
| 4/23 | Randolph, NJ
Meadow Wood Manor | 2-6pm |
| 4/25 | Arlington, TX
Texas Rangers Ballpark | 3-7pm |
| 4/25 | Denver, CO
Sports Authority Field at Mile High | 2-6pm |
| 4/30 | Minneapolis, MN
Target Field | 3-7pm |
| 4/30 | City of Industry, CA
Pacific Palms Conference Resort | 3-7pm |
| 4/30 | Fresno, CA
TorNino's Banquets, Inc. | 2-6pm |

MAY 2013

- | | | |
|------|--|-------|
| 5/1 | Long Island, NY
The Carlton at Eisenhower Park | 2-6pm |
| 5/2 | Tarrytown, NY
Westchester Marriott | 3-7pm |
| 5/2 | Columbus, OH
Crowne Plaza Columbus-Dublin | 3-7pm |
| 5/2 | Tempe, AZ
The Buttes, A Marriott Resort | 2-6pm |
| 5/8 | Philadelphia, PA
Lincoln Financial Field
The SCA Club Level | 2-6pm |
| 5/8 | Richmond, VA
Richmond Int'l Raceway Torque Club | 2-6pm |
| 5/9 | Atlanta, GA
755 Club at Turner Field | 3-7pm |
| 5/9 | Pontiac, MI
Auburn Hills Marriott Pontiac
at Centerpoint | 3-7pm |
| 5/9 | Seattle, WA
Bell Harbor Int'l Conference Center | 3-7pm |
| 5/15 | Landover, MD
FedExField | 2-6pm |
| 5/15 | San Francisco, CA
Le Meridien San Francisco | 3-7pm |
| 5/16 | Ft. Lauderdale, FL
Broward County Convention Center | 3-7pm |
| 5/16 | Houston, TX
Sam Houston Race Park | 3-7pm |
| 5/21 | Chicago, IL
Drury Lane Oakbrook Terrace | 3-7pm |
| 5/22 | Raleigh, NC
Scott Bldg @ NC State Fairgrounds | 3-7pm |
| 5/23 | Orlando, FL
DoubleTree by Hilton at the
Entrance to Universal Orlando | 3-7pm |

FREE INFO: Circle 406



p



r



s



PORCELAIN PANEL LINE is designed for interior, vertical surfaces and comes in eight colors with metallic effects and texturized surface. All Laminam Filo panels are 1-by-3-meters with 3mm thickness. The porcelain body, reinforced with fiberglass mesh backing, can be installed over most structurally sound substrates, including existing tile or painted walls. **CROSSVILLE: CIRCLE #283**



»n. WIRELESS CIRCULATOR SYSTEM

is designed for plumbing systems without a recirculation line and turns the pump on only when the system needs hot water. No electrical outlet is required under the sink. Features of the ecocirc include 24-hour timer, wireless RF communication, and operation on 2 AA batteries.

XYLEM: CIRCLE #284

»o. SHADE DRIVE

can control 300 sq. ft. of fabric and be controlled from either in-room keypads or solar-adaptive system. The roller 300 is designed to fit within a standard 5-inch pocket. Drive produces 60 in-lbs. torque and operates at 3.6 inches per second linear speed. Audible noise is less than 50 dbA. (Not pictured.)

LUTRON ELECTRONICS: CIRCLE #285

»p. ANGLED MIRROR

is backlit and illuminates the surrounding area with LED lamps. The Mirror-Lux comes in three standard sizes that meet ADA requirements, with custom sizes and shapes available. Available with LED or T5 lamps with color temperatures from 2700K to 4000K.

AAMSCO LIGHTING: CIRCLE #286

»q. TOUCH-SCREEN LEVER LOCK

features voice-guided touch keypad and is equipped with standard 2 3/4-inch or 2 1/2-inch backset and is designed to fit door thicknesses of 1 3/4-inch to 1 3/8-inch. The Revolution V3 is weather resistant and uses four AA batteries. Up to 25 unique users may self-assign PIN codes.

ARROW LOCK: CIRCLE #287

»r. LED FLOODLIGHT

uses recessed optics to reduce glare, delivers up to 4,000 lumens and is ETL/cETL certified. The MidLev series is available in 12, 24, 36, 60, and 96 watts and offers multiple optical packages including spot, medium, and wide flood options.

PHOENIX PRODUCTS CO.: CIRCLE #288

»s. LED CONVERSION KITS

are designed to convert existing incandescent, metal halide and fluorescent wall packs and canopy lights to LEDs. AC kits offer on-site assembly and carry five-year warranties.

AC ELECTRONICS: CIRCLE #289



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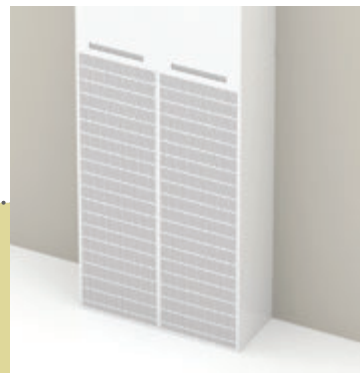
» **CARRIER** Evergreen 19XR, 19XRV, and 23XRV water-cooled chillers now feature faster capacity recovery after an unexpected power loss. AccuMeter device helps start and recover a unit to full load in as little as two minutes after power has been restored to a central water plant, according to the company. Integrated part load values as low as 0.299 kW/ton exceed ASHRAE 90.1 efficiency standards by up to 44 percent and conform to International Building Code seismic qualification requirements. **CIRCLE #151**



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» **YASKAWA** iQpump 1000 pump controller automatically adjusts operating conditions as process variables change. The pump can replace phase converters when converting from a single-phase to a three-phase pump motor. Operator keypad messages are formatted in pump terminology. Other features include preconfigured power/control options, inlet suction control, setpoint boost after destaging, and flow meter data logging. **CIRCLE #155**



» **JOHNSON CONTROLS** York absorption chiller uses PV waste-heat recovery technology designed to convert 75 percent of energy from sunlight into energy. The system qualifies for state and utility incentives across North America, especially in warm climates, and integrates into any building controls system, according to the company. It generates hot water for the absorption chiller to air-condition buildings and electricity to reduce demand from the power grid. The solution features a solar-collector system developed by Cogenra.

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» **DAIKIN MCQUAY**

Energy recovery wheel option has been added to Rebel rooftop units. The feature recovers approximately 75 percent of energy from the exhaust air stream, drawing outside air across one-half of the wheel and exhaust air across the other half, transferring sensible and latent energy, according to the company. Slide-out accessibility to wheel simplifies service and cleaning. The unit exceeds ASHRAE Standard 90.1 requirements for energy recovery; greatest energy savings come in climates with varying humidity. **CIRCLE #156**

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» **TRANE** CenTraVac Series S chiller is designed for replacement and retrofit applications. Bolt-together design and smaller footprint allows installation in tighter spaces. AdaptiSpeed technology integrates direct-drive compressor, permanent magnet motor and AFD3 adaptive frequency drive, which can reduce harmonic distortion to 5 percent or lower. Mixed-flow impeller design provides a balanced thrust load on the driveline. **CIRCLE #158**



» **GOODWAY** CoilPro handheld coil cleaner offers 400 PSI and a 3 GPM flow rate with a tip that is safe for use on coil fins, according to the company. Cleaner operates on AC power and connects to a 3/4-inch water line for continuous operation. Can be used with either expanding foam detergent or other non-acidic cleaners. Includes 25-foot power cord and 12-foot hose; spray gun has detachable 18-inch wand, flat spray and pinpoint nozzles, and 40-inch sectional wand.

CIRCLE #159

» **RHEEM** H2AC

integrated air and water system rooftop unit uses heat removed by the HVAC system to heat water. The unit can pre-heat a facility's cold water supply to as much as 125 degrees F. Unit is designed for restaurants and uses a refrigerant-to-water system to transfer heat that would normally be released into the atmosphere to hot water; when simultaneous demand for hot water and air conditioning does not exist, unit releases heat into the atmosphere. **CIRCLE #160**



» **EMERSON NETWORK POWER**

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CLOSE-UP: OUTSOURCING

Outsourcing Can Bring Energy Savings

by david lewellen



Rey Castro, chief building operations engineer for the Los Angeles Convention Center, uses long-term alliances with outsourced service providers to sleuth out energy efficiency opportunities.

A few years ago, the Los Angeles Convention Center had a problem it didn't recognize. The center air-conditions its 4 million square feet of space with two sizes of chilled-water pumps. When the 30-horsepower pump couldn't handle the load, a 75-horsepower pump would kick in — but if the required load was only 40 horsepower, energy was being wasted.

The inefficiency was spotted by an engineer with the outsourced provider that manages the facility. The firm was able to program the larger pump to run at variable speeds, without retrofitting equipment. That tweak, along with many more, helped the convention center jump from certified to Gold-level LEED-EBOM (Existing Buildings: Operations and Maintenance) certification in 2010.

Facility managers can outsource a wide variety of facility services, from cleaning to security to day-to-day operations. Facility managers who have developed ongoing relationships with companies that specialize in energy efficiency say that the providers' expertise can aid in reducing energy costs while providing other benefits, like helping to improve investment decisions and gaining recognition for sustainable performance.

Gaining Expertise

One of the most important of those benefits, and one cited by many facility managers, is summed up in the words "core competency."

"Our focus is on owning and managing real estate," says Doug Hoffman, president of BPG Management Co., which manages 9 million square feet of office space along the East Coast. BPG uses EMCOR Group for ongoing mechanical and maintenance needs, as well as energy management. "I feel that outsourcing saves money in the long run. I don't want to have to hire a staff of 15 engineers and a vice president to supervise them."

For better energy management, he says, "we want to turn to someone whose mission in life is finding inefficiencies," and has the technical resources to fix them. If a building's costs are out of line, Hoffman says, BPG calls the service provider to "figure out better ways of doing things."

Hoffman says that when the move toward sustainability began gathering momentum five or six years ago, "we were pretty skeptical." But, he says, the savings are real, which is important in the competitive real-estate industry. While a 25-year-old facility might not have been built to be as efficient as one built last year, operating more efficiently is not hard, Hoffman says. "Ten percent is a no-brainer," he says, but beyond that, BPG turns to its outsourced service provider for advice.

Don Newell, director of energy services for EMCOR Mechanical & Facilities Services, a division of EMCOR Group,

Understanding Needs

Although many facility managers are looking for a service provider with expertise in energy efficiency, that doesn't mean one size fits all when it comes to meeting facility managers' needs. To reduce energy costs, a service provider needs to combine expertise in energy efficiency with ability to understand the specific characteristics of a client. For example, people at different companies may respond to different incentives, says Brian Barmmer, director of energy sustainability solutions for DTZ, which provides a variety of real estate and facility management services. He says that a tech company full of young workers running lava lamps at their desks may respond better to a game-style approach than to an edict from above.

There are other variables besides organizational culture when dealing with the needs of facility managers, Barmmer says: "In some cases, changing light bulbs might not be the best approach, because of how long you're going to hold the asset." But connecting real-time meters to the building automation system can bring quicker results, he says — as can something as simple as cleaning the building during the day, which could save both on lighting costs and on shift differential payments.

— David Lewellen

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says that the usual goal is 10 percent savings with low-cost or no-cost modifications. One such step, Newell says, is schedule verification and compliance for major pieces of equipment — that is, ensuring that a unit's run schedule matches the requirement

knew there was some tweaking that could be done."

There were some big-ticket items, like an upgrade to the building management system (BMS) and air balancing. But, Davenport says, "Energy savings are not that complicated when you simply flip a switch. We did a lot of that." Steps included replacing incandescent lamps with LEDs and connecting motion sensors to stairwell lights.

Richard Estremera, KeyBank's senior vice president for critical sites and national operations, says that Key budgets money every year for building efficiency, but the outsourced service provider "helped us to be more strategic about the investments we were going to make anyway." The roughly \$750,000 that Key spent on the Brooklyn campus was "low-hanging fruit, low cost, lots of opportunity," he says.

LEED certification was not part of the goal, Estremera says; in 2010, banks did not want to be perceived as doing anything that wasn't their core business. But "the incremental cost has brought back twofold, threefold savings," Estremera says. "I remember hearing that with my mouth open."

"Platinum was an afterthought," Davenport agrees. "No money was spent with the intent to get LEED certification," but results were immediate as the BMS upgrade and air balancing were completed. "We began to see utility reductions immediately."

Six of the outsourcing firm's employees work at the Key campus on two shifts, and the companies talk "every day, over weekends, at Easter, Christmas, New Year's," Estremera says, who says that his company's workers can't tell if a facility staffer is a Key employee or works for the outsourced service provider.

Convention Center Gains Edge

In a competitive market, LEED certification for the Los Angeles Convention Center is a way to stand out, according to Ari Kobb, director of sustainability and green building solutions in Siemens' Building Technologies Division, the outsourcing firm that manages the facility.

The ups and downs of energy use at the convention center make LEED targets especially difficult to meet, says Rey Castro, chief building operations engineer, Los Angeles Convention Center. But in the most recent certification, the building got 15 of a possible 18 points for energy efficiency. "I'm very proud of those 15 points," he says. "That got us to gold from green."

The convention center outsources

L.A. CONVENTION CENTER



Operations tweaks by its outsourced service providers helped the Los Angeles Convention Center earn LEED-EBOM Gold in 2010, including 15 out of a possible 18 points for energy efficiency.

of the space. Another measure is to verify temperature set points, making sure that they are neither too cold in summer nor too warm in winter, Newell says.

Saving energy is more than a matter of adjusting equipment. "We're peeling off the layers of the onion to see what's truly possible," says Newell. "It's behavioral science, to get people to want to do things more efficiently."

Bank Gets Investment Guidance

KeyBank wasn't aiming for LEED certification when it began to make upgrades to two office buildings in Brooklyn, Ohio, totaling 740,000 square feet. But advice from its outsourced service provider, Johnson Controls, helped the bank not only reduce costs, but also achieve LEED-EBOM Platinum certification.

When upgrades at the Brooklyn buildings began in 2010, the site, which dates from the mid-'90s, was "not in terrible shape," says Rob Davenport, customer business director for Johnson Controls. "But we



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management of HVAC and indoor air quality, including monitoring temperatures and carbon dioxide levels. A consultant from the HVAC services firm meets with building staff several times a month to review data and make adjustments — a convention hall full of thousands of people, for example, will have

different levels of temperature and carbon dioxide than the same hall would when it's empty.

The constant stream of data is also necessary for LEED recertification every five years, and gathering it immediately is cheaper and more efficient than searching for it at certification time. "You can't

control things you don't monitor," says Castro.

Results Over Time

The convention center has had a long-term relationship with its outsourced service provider, and many efficiency measures have been completed over the years. Castro cites one example: Years ago, in a hall that holds 5,000 people, "the original program just had on and off" for the HVAC units, but the service provider installed a system that could "anticipate the setpoint and start backing off." Castro says that minor adjustments like that save several thousand dollars a month in demand charges.

At present, the service provider's job is "making sure things operate the way they're supposed to operate," Kobb says.

The outsourced energy services provider "finds things you don't even think about," says Castro. "They optimize the system as much as possible to conserve power and energy."

According to the convention center's 2010 Building Performance Report from the U.S. Green Building Council, the facility uses 64 percent less energy than a building of its size would be expected to. From the baseline year ending in June 2008 (the year that the center initially received LEED certification) to the year ending March 2010 (the year it was recertified at the Gold level), the center reduced its site energy use intensity by 11 percent, as measured in kBtUs per square foot per year, according to the report.

With a building as complex as the convention center, Castro says it makes sense to contract for energy services. "Without that presence, you could be missing something, and you don't know it," he says. "It's critical to have a service technician that understands your system." For a building the size of the convention center, Kobb says, "you need a greater depth of knowledge on how the system works." ■

David Lewellen is a freelance writer who regularly covers facility issues for Building Operating Management.

Email comments and questions to edward.sullivan@tradeprss.com.



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Staying Sustainable

From guest demands to dolphin tanks, **hospitality facilities** face challenges going green. Here's how FMs make it work

by casey laughman, managing editor

At the Mirage Hotel and Casino in Las Vegas, 100-degree days are common and below-freezing nights are not out of the question, so the building systems have to be able to handle extreme temperature swings in an efficient manner.

With more than 3,000 guest rooms, the hotel places a wide range of demands on the HVAC, hot water, and lighting systems at any given time. Gaming commission regulations also require robust, reliable lighting and security systems on the casino floor, which in turn draw heavily on an overworked electrical grid in a city carved out of the desert.

And then there's the dolphin tank.





At facilities such as the Hyatt Regency Pier 66, changes in sustainability programs were often brought about by guest interest.

A dolphin tank that must be kept at 72 degrees is one of the challenges the Mirage Hotel and Casino in Las Vegas faces in its energy-saving efforts.

PHOTO COURTESY MGM MIRAGE

"We have 2 million gallons of water out there and we've got 10 dolphins swimming around," says John Leslie, manager of energy and automation, MGM International. "We have to keep that water 72 degrees, and it has to be 72 degrees if it's 120 outside and it has to be 72 degrees if it's 20 outside."

Guest Comfort

While not every facility manager or energy manager in a hospitality facility has a dolphin tank to deal with, sustainability challenges overall are similar in those facilities. Guest comfort has to be a priority, so there will always be a certain amount of energy and water that can't be saved without telling guests they can't crank the thermostat down as far as they want or take an endless shower. But that doesn't mean there aren't improvements that can be made, and many big-name hotels have ongoing sustainability efforts that focus

on efficiency in a way that boosts the bottom line while still fulfilling their primary mission.

The No. 1 consideration for a hospitality facility is to keep guests happy, because energy savings don't matter if nobody's willing to book a room. So, when setting up systems to account for times that guests are not in the room, hotels have to be careful not to go too far, says Lenny Jachimowicz, vice president, engineering, Marriott International.

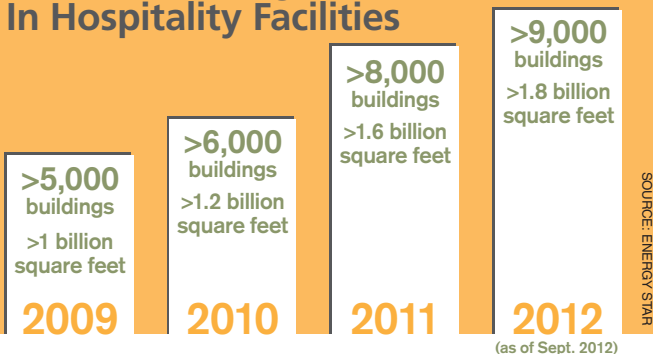
"If you set back five degrees, that's probably too much," he says. "We want to make sure we're saving energy and we're prudent about that; at the same time, we're balancing that with customer comfort. We have learned that's not the best place to be over-aggressive, so we may take a two-degree setback instead of a four or five," even if it costs a little bit more in energy.

One way to account for the impact of guests is by tracking the times when they create the most demand. In many hospitality facilities, there are dramatic spikes at certain times of the day. By building those into planning, a facility manager can provide what is needed gradually instead of having to ramp up quickly, says Randy Gaines, vice president, engineering, housekeeping, laundry operations, Hilton Worldwide. "We know the peaks and valleys," he says. "We know that everyone gets up at 7 a.m. and they take their shower and we need hot water then."

Guests can sometimes help drive positive change as well, says Brigitta Witt, vice president, corporate responsibility, Hyatt Hotels and Resorts. As other hospitality companies do, Hyatt offers the option of not having towels and linens washed every night, something that guests often asked for.

"When we didn't have a global program like that in place, we would actually get feedback from our guests saying 'we

Portfolio Manager Use In Hospitality Facilities





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Lenny Jachimowicz
vice president, engineering, Marriott International



Bob Holesko
vice president, facilities, HEI Hotels and Resorts



Brigitta Witt
vice president, corporate responsibility, Hyatt Hotels and Resorts

don't want to have our sheets changed and our towels changed daily," she says.

Tracking Usage

Over the last few years, much of the industry has moved from words to action, says Bob Holesko, vice president, facilities, HEI Hotels and Resorts, which manages 43 hotels in 16 states under the Marriott, Starwood, and Hilton brands. As customers and employees have become savvier, simply saying that facilities are sustainable

— as long as nobody looks too closely — isn't enough. Hotels have to be able to demonstrate that their sustainability efforts are actually having an effect.

"All the main players have sustainability objectives and programs in place that are valid," as opposed to the "greenwashing" that occurred in the past, Holesko says. "They are stated goals and they're based on measuring the data that's available, so there's no more faking it. You either are reducing your carbon footprint or you're not. You're either benchmarking or you're not."

One of the key changes has been the ongoing expansion of usage of the Energy Star Portfolio Manager program, which gives facility managers the ability to not only track energy use across a portfolio of facilities of different sizes in different areas, but compare those facilities to similar facilities to see how they are performing. As of September 2012, more than 1.8 billion square feet spread across more than 9,000 hospitality facilities was being tracked in the program, giving facility managers an in-depth data set to use for comparison purposes.

"The No. 1 thing I check when we take over a hotel is, 'Are you on Energy Star Portfolio Manager?'" says Holesko. "There's no cost to that program. If they say 'no,' then they have no way to measure their results. If you're not measuring it, if you're not tracking it, you have no way to determine what you're doing."

Tracking usage not only helps identify areas for improvement, but also helps justify investments to improve efficiency, says Michael Bendewald, consultant, Rocky Mountain Institute.

"What you've got to do up front is say 'OK, this is what I want to do in my building. This is the purpose of gathering this data, and this is the analysis I want to do with that data,'" he says. From there, data can also help make the argument for capital spending on something like a chiller by showing the extra benefits from replacing it, even if it's early, Bendewald says.

From a capital standpoint, data doesn't just help facility managers make the argument for a big investment. Smaller, yet still expensive equipment can have a big payoff, says Leslie, but a facility manager has to be able to demonstrate the savings. In his case, peak demand charges in Las Vegas are extremely high, so investing in variable-frequency drives (VFDs) on two of the six chillers at

More Room to Keep Going Green in Hospitality Industry

While the hospitality industry has made great strides in its sustainability efforts over the last few years, there are still opportunities for improvement, says Michael Bendewald, consultant, Rocky Mountain Institute, a non-profit energy consulting firm and think tank. According to Bendewald, the industry spends nearly \$8 billion annually on energy costs, but is often limited in how aggressively it approaches efficiency due to concerns about occupant demands.

"People demand services, not energy," Bendewald says. "So the question is 'how can hotels provide the same, or often better, services with reduced energy use?'"

One reason the hospitality industry offers a lot of potential is the similarity in design across portfolios. While there are likely substantial differences in design between a hotel in Manhattan and a hotel of the same chain in Phoenix, for the most part, buildings of the same chain will be very similar. So instead of having to evaluate each building from scratch, facility managers can test strategies and products in one or two facilities, then roll them out across the chain.

"For example," says Bendewald, "perhaps the most energy efficient window type is operable in order to enable natural ventilation during fall and spring months, which saves energy costs as well as improves indoor air quality and guest comfort."

By testing those windows in one or two locations, facility managers can determine if they're feasible across the portfolio without having to test them at each site. Conversely, if operable windows or another tactic don't work in a mild climate, they can be dropped from consideration in more harsh climates.

The Rocky Mountain Institute has been involved in a number of large-scale energy efficiency projects since its inception in 1982, including an in-depth energy retrofit project at the Empire State Building.

— Casey Laughman, managing editor



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the Mirage helped mitigate some of those costs.

"When you start a 1,500-horsepower motor," during peak demand, Leslie says, "you're going to have a \$10,000 addition just for that one start."

With the VFDs, the chillers can be started slowly when needed during peak demand times. As Leslie says, if firing up a chiller at full bore is equivalent to flooring your car and using the brakes to control your speed, VFDs allow you to actually manage the acceleration with the gas pedal. That flexibility has led to substantial savings.

"It would normally cost about \$1,800 a day to run one of those machines," he says. "By coming up with our own controls and adding this machine to a couple of our chillers, we've been able to save about \$20,000 a month off our electrical bill with just two of these machines with drives on them."

Going to Work

While guests sometimes offer new ideas, they come and go constantly, are generally only on the premises for a short period of time, and don't exactly expect to be asked to be part of conservation efforts beyond deciding whether they want their towels washed every night or not. Employees are a constant, and even employees outside of the facilities staff can play a big role, says Gaines.

When it comes to the environment, employees leave a big footprint, Gaines says. "Employees are aware of their footprint and it yields a lot of returns," he says. "As a result, they're watching their fellow employees and holding each other accountable because they understand that every little bit counts."

With employees outside of the facilities department, it's often the little things that make a big difference, such as getting employees in the habit of turning off lights and checking thermostats in unoccupied meeting rooms, as well as having them remind each other to keep an eye out for potentially wasteful use.

A side benefit of involving non-facilities employees in sustainability efforts is the force multiplier effect, Witt says. Every little bit helps, so when employees take these lessons home, it can expand out the effect of sustainability efforts.

"Ideal for us would be if we give a housekeeper the tools to minimize the amount of water that she uses when she cleans the bathroom, then that person in turn goes home and teaches her kids to turn the tap off when they're brushing their teeth," she says.

Holesko also stresses the importance of training employees outside the facilities staff on what they can do to

Asking employees to focus on the little things like turning off unneeded lights can make a big difference in energy savings.

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Hilton's Avenue of the Americas location in New York City uses a vegetative roof as a local complement to the company's nationwide sustainability plan.

help. When he was the chief engineer at the Buffalo Marriott, he would conclude each briefing of a new employee by pulling out a \$100 bill and offering it to the employee if he or she could answer "yes" to the following question:

"I would say, 'How many of you, when you left your home or apartment today, left your oven on, your refrigerator door open, the air conditioning cranking and every light in your house or apartment on? Because that's what happens in our hotels.'"

Nobody ever claimed the \$100, but the point stuck. By keeping an eye on the lights, turning down — or off — ovens that weren't in use, and not propping open cooler doors, employees with no energy management experience or responsibility could help contribute to big savings.

Balancing Act

On the operations side, facility management staff has a large role to play as well. The first thing they have to do is understand that it is a balancing act when it comes to what guests want versus sustainability efforts.

"You want to continue to give people a comfortable, acceptable shower without sacrificing using more water," Jachimowicz says.

Getting to that point of balance sometimes requires breaking some old habits. The difference between a domestic water temperature of 135 F and 130 F water in a holding tank is a substantial amount of energy use. But when it's ingrained that 135 F is the right temperature, it requires some cajoling to change people's minds, Holesko says.

"We had chief engineers, some of whom had been there five, 10, 15 years, and they were convinced that their settings had to be at this point," he says. "I'd say, 'Hey, just drop that domestic (hot water) two degrees and see what happens.'"

Witt points out that creative thinking can pay off, especially at facilities in extreme climates such as the Grand Hyatt Dubai, a 37-acre complex that includes the hotel, apartments, and conference and business facilities.

"They're using the condensation that results on top of air conditioning units — because it's hot outside and cold inside — and they're putting that

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into their cooling towers, and they're saving up to 30,000 gallons of water a day," she says.

Even little steps can make a big difference, Gaines says.

"We used to put bottled water in every one of our meeting spaces. Now we're using water coolers," he says.

Looking Forward

Waste is one area with the potential for big improvement. In many cases, hotels end up throwing out a lot of waste that could have been recycled. The reason is a lack of local support for recycling programs, Jachimowicz says.

"We would move forward with recycling if the local trash haulers had the ability to do that today," he says. "We're recycling at 60 percent of our properties. We'd like nothing better than to get that number up. Short of separating it and hauling it ourselves — and we're not in the trash-hauling business — we're at the mercy of the local haulers."

One way to work around the recycling challenge, Gaines says, is to reduce potential waste brought in the door in the first place. "We eliminated the USA Today," he says. "That's huge. All those newspapers? They're gone.

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At the Waldorf Astoria in New York, night and overnight staff walk the hotel with checklists to ensure that lights and HVAC aren't running unnecessarily.

Everybody's reading it on their iPad."

When it comes to future improvements, one of the biggest is continuing to provide engineers and other front-line personnel with the tools they need to track and manage energy and water usage in an efficient manner. While Portfolio Manager has been a big step, Jachimowicz is looking down the line to a setup that allows for not only tracking, but also active participation in facility operations from more experienced personnel to quickly head off potential issues or preventing them from becoming a recurring problem.

"The vision someday is to have a networked operating center somewhere that would be looking at our bigger buildings and how they're performing," he says, "and then letting the operators know, mentoring the operators, training and developing the operators on anomalies that take place so that we can prevent it from happening again." ■

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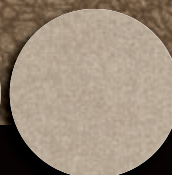


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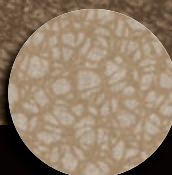
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5 Steps Help FMs Reduce Energy Use

A focus on how decisions are made in organizations has helped facility managers overcome barriers to energy-saving projects

by jake hillier and chris riso

Success stories keep energy performance at the top of the agenda and encourage investment of additional human and financial resources.

The United States spends more than \$108 billion on energy for commercial buildings each year, according to the Commercial Buildings Energy Consumption Survey (CBECS). It doesn't have to be that much, as it is increasingly possible to have a big impact without spending much money to reduce energy use. However, optimizing a building's energy performance takes time — something not typically in surplus for facility managers.

The fact is, organizations face many barriers to implementing energy-saving projects, which have nothing to do with technology and everything to do with the way people make decisions.

Saving money by saving energy is more of an art than a science. It is about understanding how decisions are made in organizations and how resources are allocated. A roadmap for facility managers looking to optimize energy performance, called "The Virtuous Cycle of Organizational Energy Efficiency," was recently published by Environmental Defense Fund and MIT. It is a model of change proven to apply across even radically different organizations. It includes five powerful, interdependent components.

The components of the virtuous cycle model affect one another for better or worse. When the performance of one component improves, the performance of other components is made more likely to improve in a virtuous cycle of positive feedback. Conversely,

if the performance of one component worsens, this can negatively impact the performance of other components through a vicious cycle of negative feedback. In an optimized organization, all components function at full capacity, and the virtuous cycle runs smoothly to improve energy performance, generating maximum financial and environmental returns.

1. Executive Engagement. Top-level executives recognize energy efficiency as a key strategic priority for generating cost savings and building long-term value. They shift from seeing energy as an inevitable and growing cost, and instead see its optimization as a source of continuous leverage for building an efficient and resilient organization capable of meeting its broader mission and goals.

2. Resource Investment. To empower an organization to capture energy savings, executives make strategic, capacity-building investments to free up the necessary human and financial resources to make concrete action possible. Energy efficiency projects will pay for themselves, but they need dedicated seed capital to get started and attentive managers to ensure those seed funds grow and are reinvested on an ongoing basis.

3. People. Resources are deployed to build staff capabilities and equip them to go after efficiency opportunities. Providing training opportunities, organizing cross-functional teams, and establishing full-time positions

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all help to build employee knowledge, foster enthusiasm, and create accountability for improvement. A workforce that feels ownership and responsibility for its energy use at all levels and is actively encouraged by leadership to work toward a shared vision of efficiency will maintain the momentum needed to make real progress.

4. Opportunity Identification, Implementation, and Measurement & Verification. To aid the organization's staff, effective processes and tools should be developed and refined over time to make sure increasingly ambitious projects are identified and implemented. Comprehensive and detailed energy data collection is vital to identifying sources of inefficiency and measuring the energy savings achieved through specific interventions — generating the verified financial and environment results that prove the benefits of taking action in the first place.

5. Stories and Sharing. To maintain momentum beyond a first round of projects, successful results are leveraged into stories that are shared directly back with top-level executives, validating their prioritization of energy efficiency as a key strategy and proving the business case for doing additional

energy projects. By re-engaging the executives continuously, success stories keep energy performance at the top of the agenda and encourage the investment of additional human and financial resources to go after even bigger wins, keeping the virtuous cycle spinning for yet another round.

Success Story: Shorenstein

Building momentum in the virtuous cycle of organizational energy efficiency requires persistent, well-targeted effort. Shorenstein Properties is one company making progress toward comprehensive, self-reinforcing energy management practices.

Shorenstein Properties is a real estate company that owns more than 23 million square feet of commercial building space across the United States. The company has participated in EDF Climate Corps, a fellowship program that places graduate students in leading companies, cities, and universities to develop energy efficiency plans, since 2009.

In 2010, Shorenstein's engineering managers completed an "energy savings tour," a survey of energy projects across their portfolio of commercial buildings. As part of the tour, the engi-

neering managers spent three months visiting all properties in the portfolio. They walked through each building with the chief engineer and property manager to inventory and prioritize efficiency projects. From this tour, they identified more than 300 energy-saving strategies — some big, some small — in almost every building system category. These included everything from building management system tuning opportunities to lighting retrofits to installing variable frequency drives on fans and pumps. At this time, the energy managers also set a goal to achieve 3.5 percent energy savings portfolio-wide.

Once all of the project opportunities had been identified, the projects were then prioritized by no-cost, low-cost, or capital cost. The no- and low-cost items were typically easy operational changes — low hanging fruit — and were implemented right away. The capital cost items were recommended for budget approval.

In 2011, Shorenstein wanted independent evaluation and verification of their actual savings and environmental impact from the projects implemented as a part of the energy savings tour. But there was a problem. This

VIRTUOUS CYCLE OF ORGANIZATIONAL ENERGY EFFICIENCY

	VIRTUOUS CYCLE STAGE				
	Executive engagement	Resource investment	People and tools	Actions and wins	Results and stories
Cause of friction	Diminishing attention	Diminishing budget	Diminishing capability	Diminishing opportunity	Diminishing bandwidth
How Shorenstein addressed the problem	Public goals and verified success ensures top level buy-in	Dedicated resources and time allocated to energy efficiency enables action	Established evaluation and verification methods enable companies to identify success	Inventorying the full set of potential projects identifies projects for now and the future	Identifying and sharing results makes success visible to stakeholders
Other possible solutions	Hiring a dedicated corporate energy manager ensures attention is maintained	A dedicated energy efficiency fund and/or revolving loan fund ensure capital is always available	Building energy performance into personnel evaluation and rewarding success motivates employees	A real-time and up-to-date database of energy projects enables decision-makers to see available opportunities	An energy scorecard identifies top performing projects while also revealing learning opportunities

Source: EDF Climate Corps

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type of performance evaluation for corporate energy efficiency programs was uncharted territory.

For that reason, Shorenstein engaged EDF Climate Corps to adapt the methodology used for verification of utility-scale energy efficiency programs and confirm evaluation techniques.

Overall, this evaluation showed

that the projects implemented from the energy savings tour reduced energy consumption by 5.1 percent across the entire commercial building portfolio, far exceeding their 3.5 percent energy savings goal. The evaluation also confirmed \$1.7 million and 12.3 million kilowatt hours saved annually, as well as 4,800 metric tons of annual

greenhouse gas emissions avoided. The resulting savings was equivalent to taking more than 1,000 homes off the electric grid. The payback period for the program was just six months.

Measuring the impact of the energy savings tour reinforced the virtuous cycle, propelling it forward for another round at Shorenstein. Here are some specific examples of how the Shorenstein case study proves the virtuous cycle framework.

1. Executive Engagement. When a clearly defined goal is put into place, management will pay close attention to the efforts involved. In Shorenstein's case, the energy savings tour produced energy and financial savings that easily surpassed the goals set by energy managers. This resonated with Shorenstein's senior management and validated the notion that environmental and financial outcomes do align.

2. Resource Investment. The motivations of executives need to translate into resource provisions that support employees and reward them for identifying and implementing projects. For Shorenstein, energy managers were able to spend four months identifying energy efficiency opportunities at 33 of the company's properties. This investment in time and resources enabled Shorenstein to identify not only low-hanging fruit, but also a large portfolio of projects that can enable energy savings over the long term.

3. People. Hiring a dedicated corporate energy or sustainability manager ensures attention is maintained and focus is kept on energy saving opportunities. Shorenstein's experience with this project led to its decision to create the new role within the organization of sustainability program manager to increase productivity.

4. Identification, Implementation, and Measurement & Verification. The energy savings tour resulted in impressive savings, but it uncovered even greater opportunities for the future. The company is pursuing several strategies to enable deeper cuts to energy consumption. Specifically, Shorenstein is addressing the human aspects of energy use in buildings. In commercial offices, tenant behavior determines up to 70 percent of a building's energy use, so Shorenstein has launched its "Flip the Switch" tenant engagement program to catalyze



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tenant action on energy efficiency and environmental performance. The program combines an educational presentation series with a customized sustainability resources website for tenants.

5. Results and Stories. To demonstrate progress towards its energy savings goal, Shorenstein made the effort to quantify the success of its energy savings tour. In adapting an evaluation method for Shorenstein's specific needs, the EDF Climate Corps optimized the virtuous cycle of organizational energy efficiency and broke down internal barriers. In the future, this evaluation method will enable Shorenstein to know the effectiveness of its efforts and accurately communicate success. Furthermore, sharing its story will help Shorenstein to engage stakeholders within and external to the company, and once again affirm support from executive management.

Shorenstein's corporate energy efficiency program provides an in-

novative example of how companies are cashing in on sustainability strategies with positive economic and environmental impact. With its energy savings tour, efficient allocation of resources and a fresh new approach to measuring and verifying success,

Shorenstein's evaluation of its energy efficiency program showed a savings of \$1.7 million and 12.3 million kilowatt hours.

Shorenstein has established momentum in implementing its energy efficiency program. It takes investment in both time and resources, but optimizing the virtuous cycle of organizational energy efficiency can provide significant benefits for any company. ■

Jake Hiller is the project development analyst for corporate partnership programs of Environmental Defense Fund (EDF). EDF has worked with hundreds of organizations across the nation to uncover energy savings for commercial buildings, finding an average of \$1 million for each organization involved. Hiller works with a team to identify market opportunities, engage business leaders, and forge new corporate partnerships. He can be reached at jhiller@edf.org.

Chris Riso works with a team to run EDF's Climate Corps program. He can be reached at criso@edf.org.

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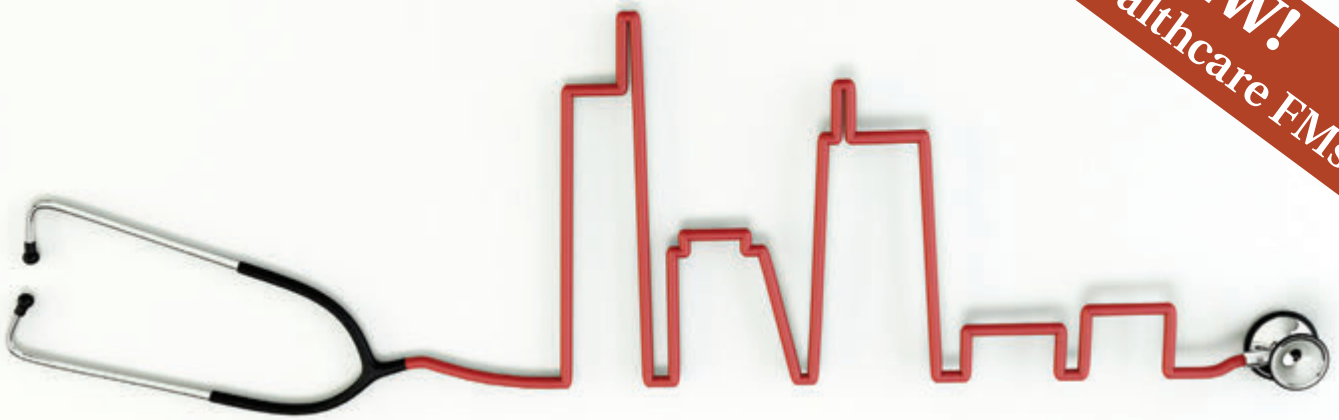
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FACILITY MANAGERS CAN OFTEN FIND
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IN A STILL-TIGHT ECONOMY and a world increasingly guided by energy conservation and sustainability-focused decisions, it's no surprise that facility managers continue to look for ways to reap savings in overall operating costs.

Facility managers can achieve significant savings by carefully examining existing lighting systems. According to Energy Star, lighting in U.S. commercial buildings accounts for 35 percent of a building's electrical use. Upgrading lighting systems to take advantage of efficient light sources, fixtures, and controls can help facility managers reduce lighting energy use, improve the visual environment, and find true cost savings.

"Many commercial facilities have aged lighting systems, some of which are more than 20 years old. There is huge potential for upgrades," notes Keith T.S. Ward, president and CEO of Luminus Devices and chairman of the National Electrical Manufacturers Association's (NEMA) enLIGHTen America campaign,

formed in 2008 to promote energy savings for new and existing buildings.

"In the last 30 years, lighting has changed completely, in every socket application," Ward says. "It's more efficient, and it has more capability. What's more, updated, efficient lighting can also increase worker productivity and reduce operating costs. There is a clear economic story here from many angles."

Examine Lighting Needs

The journey to a total lighting upgrade involves numerous factors along the way. The first crucial step is ensuring proper light levels.

"Given the diversity in applications — ceiling height, fixture spacing, lamps per fixture — it is difficult to provide rules of thumbs for making sure the light levels are acceptable," says John Brelus, General Electric's global product general manager — fluorescent systems.

Medical Mutual of Ohio in Cleveland, Ohio, used retrofit kits with T8 lamps and electronic ballasts to replace 3,000 T12 deep cell parabolic fixtures. (above)



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The Illuminating Engineering Society (IES) provides recommended light levels for different applications. A lighting audit is one way to determine the right lighting levels in a specific space.

"The best option is to have a lighting professional audit your facility," says Silvie Casanova,

check on what works for their specific workforce," he says.

It's important to note that the equation for a successful upgrade involves more than just light levels, says Larry Leetzow, president of Magnaray International Division. According to Leetzow, light quality (which includes color, uniformity, and glare control) is the most important desired result.

"We can't design high-performance lighting systems with just an intensity metric anymore," Leetzow says. "We can save lots more energy, while improving productivity, safety, etc., with high-quality lighting systems that can result in lowering lighting levels." He calls human visual efficacy factors — based on color, uniformity, and glare control — "extremely important."

Getting the Most Efficient Light Sources

The next step in the upgrade journey is ensuring the light sources specified deliver proper light levels, are efficient, and suit the needs of a facility. Advances in lighting technology have given facility executives a wide variety of good

choices for replacing incandescent lighting and upgrading other lighting categories, including fluorescents, metal halide and more.

"Facility managers not only need to inquire about the latest and most efficient (and efficacious) light sources, but also learn what is the best source for the application," says Rob Freitag, vice president of marketing for EYE Lighting International.

For example, linear fluorescent lighting has a wide range of options with varying degrees of efficiency, notes GE's Brelus. "Traditional halo-phosphor T12 lamps had a nominal lumens per watt (LPW) in the mid to high 70s," he says, while 32W T8s have a nominal LPW in the low 80s. The most efficient T8 and T5 options can have nominal LPW exceeding 100, Brelus explains.

It's evident that a simple switch from T12 fluorescent lighting to T8 or T5 will guarantee a more efficient light source. For example, fluorescent twin T5 systems might provide the best results for many dirty, interior environments, as well as exterior applications for security, area flood, parking garages and even some

get a lighting upgrade checklist

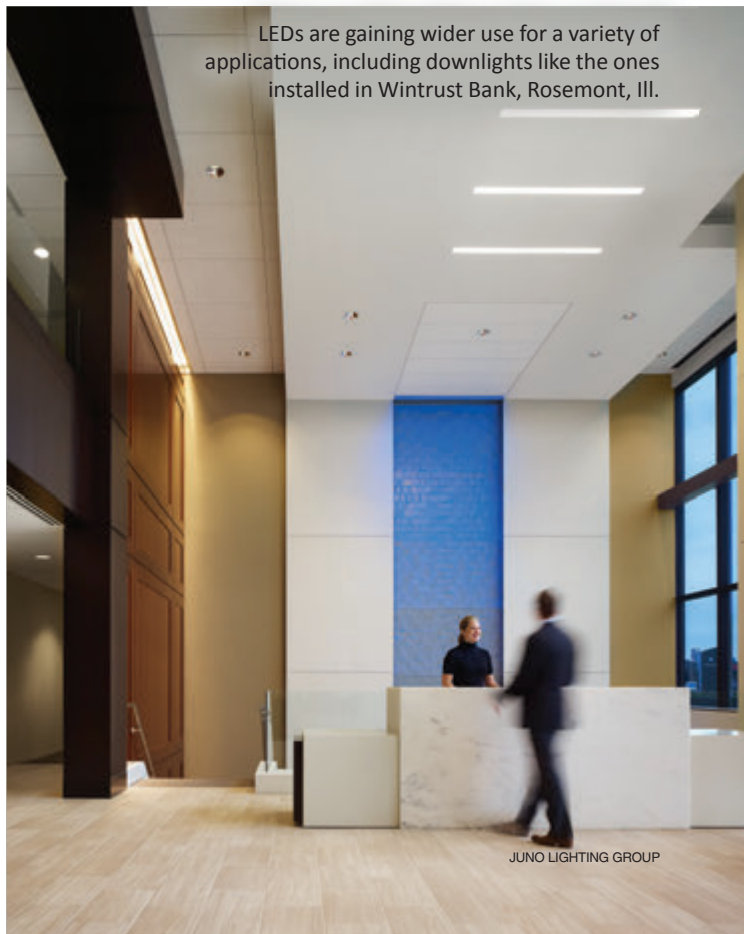
NEMA has published a new edition of its popular Lighting Upgrade Checklist for building owners and operators. The handy guide will help lay persons ask the right questions while working with lighting professionals on both new and renovation projects. The 4-page brochure covers Commercial, Institutional and Industrial space, with guidance on lamps, ballast, controls, and luminaires. The Checklist is organized by type of space; offices, hallways, restrooms, manufacturing, warehouse, outdoors, and many others, with specific advice on the latest lighting equipment. Visit www.nemasavesenergy.org and request bulletin number: NEMA.EA.2013.CHKL.V4

lighting communications manager, Philips Lighting North America. "Audits provide insight to energy consumption and potential savings, as well as light level calculations for existing and new lighting solutions to ensure they are meeting recommended IES levels."

"To assure the proper IES levels are met, have the auditor report the levels found during the audit and report the recommended IES levels," says Bob Smith, director of Energy Marketing Solutions for Eaton's Cooper Lighting business. "When the proposal is provided, have the auditor report the expected light levels once the retrofit is complete." Finally, he says, verify light levels once the installation is complete, bearing in mind the light levels should be roughly 5 to 40 percent above IES recommended levels, depending on the lighting technology used, to account for lumen depreciation.

Facility managers also can survey building occupants before a retrofit to gauge occupant satisfaction with light levels, adds Scott Roos, vice president of product design at Juno Lighting Group. "See if they think the existing levels are too high, too low or just about right as a real-world

LEDs are gaining wider use for a variety of applications, including downlights like the ones installed in Wintrust Bank, Rosemont, Ill.



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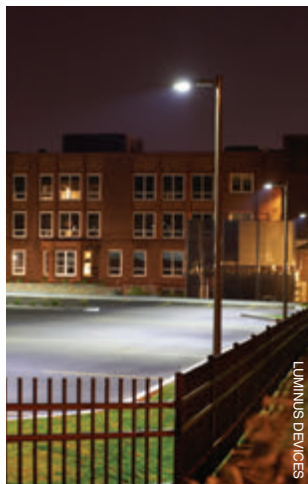
sports lighting applications, according to Magnaray's Leetzow.

And as Philips' Casanova notes, "The typical industry standards seem to have settled in the 25- to 28-watt range for 4-foot T8s."

In a real-world example, Medical Mutual of Ohio recently upgraded aging lighting in Cleveland's historic Rose Building, its headquarters location since 1948. The 16-floor, 381,000-square-foot facility (including an annex) had an outdated lighting system of nearly 3,000 T12 deep cell parabolic fixtures. After a professional lighting audit and working closely with engineers, the company upgraded its system with a retrofit kit that fits into existing fixtures but uses T8 lamps and electronic ballasts and provides a new appearance and improved light quality. Each new fixture saves 61 watts compared to the previous fixtures, according to Lithonia Lighting, an Acuity Brands company.

Another efficient upgrade is the replacement of traditional high pressure sodium and probe-start metal halide lighting in outdoor, industrial and high-bay applications with more efficient technology.

"Pulse-start quartz metal halide can be an upgrade to standard quartz lamps, delivering better lumen maintenance and less color shift," explains Cheryl Ford, marketing manager for



The MRH Early Childhood Center in Maplewood, Mo., installed LED luminaires to improve visual acuity with whiter light and to save energy.

OSRAM SYLVANIA. Lighting experts say that the life cycle of pulse-start metal halide is superior to probe-start metal halide.

Additionally, ceramic technology HID lamps are widely available in a wide array of wattages, which makes this category attractive, according to EYE Lighting's Freitag.

"Advances in this technology offer a very high LPW (lumens per watt) rating (efficacy), which allow for significant reductions in energy without sacrificing light levels and improving color rendering characteristics," Freitag says.

Perhaps the biggest revolution in lighting upgrades centers around light emitting diode (LED) technology, particularly in such applications as recessed down-lighting, wall sconces, task lighting, track lighting, landscape and accent lighting, to name a few.

"Certainly replacing older, inefficient fluorescent lamps and ballasts with the latest fluorescent technology offers significant savings, but in applications with longer burning hours, LEDs can provide an even more compelling alternative," Juno's Roos says. In those applications, Roos says, the improved performance, energy savings and significantly reduced maintenance costs contribute toward a strong ROI for LEDs.

What's more, the cost of LED

technology is continuing to fall and the efficacy is still improving. It is leading to more viable — and efficient — solutions.

What About Delamping?

Delamping is another effective method to consider during an upgrade process in existing facilities. It consists of removing unnecessary lamps or fixtures in areas with greater-than-needed illumination.

"It's a classic strategy to decrease energy consumption and still retain proper light levels," Casanova explains. "The increased efficiency and light output in some fluorescent lamps helps make this an extremely cost-effective strategy, as you often can take advantage of the existing system, assuming the optics allow for it."

"Moving to a lower wattage is a great idea when the light levels are higher than needed and the ballast accommodates multiple wattages such as what is found in many linear and compact fluorescent technologies," says Smith of Eaton's Cooper Lighting business.

Although removing lamps from existing fixtures can be a good solution when light levels are higher than needed, facility managers should be aware this does not always assure the lighting distribution is maintained, says Smith.

What's more, he says, removing lamps means that parabolic luminaires will normally have cells that are no longer illuminated. The result could be that another lamp will not operate, depending on the way the ballast is wired. So, before delamping, the ballast wiring needs to be examined, Smith says.

"If the ballast is wired in series, it is a must that you should remove all the lamps for that ballast." If not, lamps sharing the same ballast may flicker or produce less light and the life span of those lamps may be shortened. Those cautions usually don't apply to parallel-wired ballasts. "Generally, if the ballast is in parallel, lamps can be removed without removing all the lamps," says Smith.

Before deciding on a delamping strategy, it's always a good



lighting recommendations

The Illuminating Engineering Society (IES) provides recommended light levels for applications that are intended to provide adequate lighting for the tasks at hand in a handbook that can be purchased online in PDF format by non-members for \$250 at www.ies.org/handbook/pdf.

Lighting upgrade recommendations can be found at the General Services Administration website under the facilities standards link at www.gsa.gov/portal/content/101308. "While the free data may not reflect the most up-to-date or complete recommendations that factor in age, the nature of the task, etc., they still can offer useful basic guidelines," says Scott Roos, vice president of product design at Juno Lighting Group.

idea to explore options with lighting experts.

"The facility manager should perform a lighting assessment to determine which approach is best for the application — reducing the wattage or reducing the number of luminaires," says Teresa Bair, marketing director, luminaires for EYE Lighting International.

Integrating Controls

Beyond changing out lamps, installing basic lighting controls throughout a facility is one of the easiest and fastest ways to jumpstart energy savings, lighting experts say. From installing occupancy sensors to using to facility's energy management system to schedule light levels to change or even go off in various areas within the facility, lighting controls can reshape a facility's energy use.

At the most basic level, energy savings can be derived from a simple scheduled control strategy. Scheduling provides for automatic on/off or dims lights at specified times of the day. Scheduling can be customized to include all lights in a building or within specific zone, such as a hallway, a conference area, or an office space.

According to estimates from the California Energy Commission, scheduling alone can generate between 5 percent and 15 percent energy savings in a commercial facility.

Designed to increase energy savings beyond what scheduled controls can achieve, occupancy/vacancy sensors are more tuned to activity levels and actual space use.

Sensors detect when the room is occupied or vacant or turn lights on or off accordingly. They begin saving energy immediately by ensuring lighting remains off when areas are vacant, as opposed to running on a timed schedule.

"The more granular the control, the greater the opportunity for savings," notes Rita Renner, director of marketing and communications at WattStopper. "In fact, several years ago, the Lighting Research Center conducted some research that concluded adjusting time delays could impact savings. Reducing time delays from 20 to 30 minutes down to 15 or 10 minutes could result in significantly higher energy savings."

According to Cheryl De Los Santos, manager of marketing communication at Leviton, facility managers can expect a minimum savings of 23 percent with up to 80 to 90 percent savings in some cases, depending on how the space is typically used and how often lights were being left on unnecessarily.

In new facilities, occupancy/vacancy sensors now are required by building energy codes in nearly every space, notes Brian Dauskurdas, director of global energy solutions at Lutron, who adds that there are simple retrofit solutions for existing buildings.

"There are wireless options available that can

be installed in a space in less than 15 minutes, and with zero labor costs," he says.

A third basic option comes in the form of bi-level switching, which uses photocells, occupancy sensors and bi-level lights to reduce the number of lamps illuminated in a bank of lights when ambient light is present or the space is unoccupied. It can save up to 50 percent of energy costs.

"With a bi-level switch, the occupancy sensor will switch lights on to 50 to 75 percent

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of full capacity, while 100 percent capacity will require a manual switch from the occupant," De Los Santos explains. "As such, the frequency of full brightness is lowered, saving energy."

The road to energy savings isn't a difficult one when it comes to basic lighting upgrades and controls. The technology is there, as a low-hanging fruit that facility managers easily can reach.

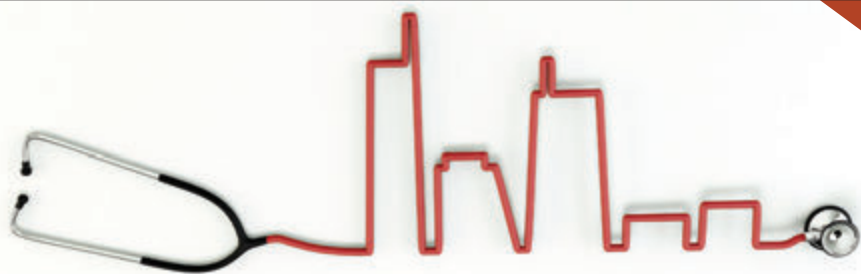
"Corporate leadership in facilities management has to be willing to bring the technology up to current times," says NEMA enLIGHTen America chairperson Ward. "With all the new developments out there, it's a most exciting time in lighting history. Mr. Edison might not agree, but I'll bet he sure would be excited now. He might even ask, 'What took you so long?'" ■

about enLIGHTen America

Chartered by the NEMA Lighting Division, the enLIGHTen America campaign operates on the strategic mission to build awareness of quality lighting products and systems designed for retrofit and renovation applications.

More than 75 percent of America's 5 million buildings were built prior to the introduction of today's energy-efficient lighting technologies. The enLIGHTen America message focuses on energy savings, sustainability, cost reduction, fast payback and the quality of modern lighting.

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Squeezing More Savings Out of the Lighting System

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FOR FACILITY MANAGERS who have taken basic steps to reduce lighting system energy costs, the ability to wring savings out of lighting systems doesn't end there.

Advances in technology continue to provide additional opportunities for savings. In fact, the average commercial facility could stand to do more than just basic upgrades to its outmoded lighting systems. Options run the gamut — including fixture replacement, daylighting, dimming, advanced control and ballast strategies.

"[A facility manager's] best bet is to explore the different energy management strategies that are available," says John J. Brelus, General Electric's global product general manager — fluorescent systems.

For example, changing out actual fixtures can bring more savings than merely changing to a more efficient lamp. New fixtures can help improve both quality lighting and efficiency.

Case in point: In a recent U.S. Department of Energy study, the highest performing LED troffers were found to be up to 44 percent more efficient than their fluorescent counterparts, says Scott Roos, vice president of product design at Juno Lighting Group.

"When selecting an LED fixture, it is critical to compare the actual performance of the luminaire, not just the rated lumens of the lamp or fixture, as LED (luminaires) generally will yield superior results," he says. "For example, an LED downlight can be twice as efficient

Moravian College in Bethlehem, Penn., replaced HID lighting in a gymnasium with fluorescent fixtures and dimming ballasts. The upgrade also included preset lighting controls. (above)



At the Cleveland Public Library Tech Center, existing fixtures were refurbished and relamped with T8s that provided longer life and higher CRI. New ballasts have a higher ballast factor, so the fixtures deliver more lumens.

ADAM KILBOURNE, TEC INC./COURTESY OF COOPER LIGHTING

in extracting the available lamp lumens out of a round hole as compared to traditional CFL technology. And they can be more efficient in placing the lumens where they are needed, allowing an LED fixture of substantially less lumens to do the same or better job as compared with conventional technology."

Roos says that LED technology and fixtures also compare favorably to fixtures featuring pulse start metal halide lighting. He says that his company continues to manufacture conventional light sources and is equally happy to sell a metal halide or LED fixture. "But in applications ranging from outdoor area lighting and wall packs to recessed downlighting," he says, "well-designed LED luminaires simply are more effective at distributing the lumens to useful zones with greater uniformity, with less wasted light, than metal halide luminaires."

Solid-state lighting remains an emerging technology, albeit

one that is increasingly viable. But facility managers should not forget about traditional lamp/fixture options. One example is replacing metal halide with a high-output fluorescent solution, says Silvie Casanova, lighting communications manager, Philips Lighting North America.

"Although (high-output fluorescent) is often associated with higher costs because it is a completely different fixture, there are many benefits of this kind of fluorescent, such as longer life, comparable, if not better, light quality, and energy savings to be had for switching," she says.

Advanced Ballast Strategies

For many facilities, the move to more energy-efficient T8 lamps and new electronic ballasts may now be the next step in making lighting even more energy efficient.

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GE's Brelus says. "These ballasts are suitable for use with low wattage F28T8 and F32/25T8 lamps. They incorporate anti-striation control and arc guard protection. Light output and wattage consumption also can be tuned by using ballasts with a lower ballast factor, combined with low wattage lamps."

As Cheryl Ford, marketing manager for OSRAM SYLVANIA, notes, "High-efficiency ballasts are the best choice to maximize energy savings. For T8 fixtures, a high-efficiency ballast will save between two and four watts per fixture. They're a no-brainer."

Rob Freitag, vice president, marketing, EYE Lighting International, agrees, noting that improvements to electronic fluorescent ballast systems, combined with advances in electronic ballasts for HID lamps, make choosing an "e-ballast" system a logical one — both in energy savings and lighting system control.

"These systems are quite reliable and are now available in a wide variety of wattages to ensure a proper wattage is available to upgrade virtually any lighting system," Freitag says. "Some electronic ballasts offer interesting controls options for dimming and daylight harvesting."

Daylight Harvesting

Daylight is free, and many spaces inside buildings are daylit, yet electric lighting is left on unnecessarily. Daylight harvesting harnesses this free, natural

In the interior fit-out of Philips North America headquarters in Andover, Mass., more than 90 percent of the lighting used LEDs. The project also included a variety of lighting controls, including daylight harvesting.



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financial incentives and support

Financial incentives — ranging from utility rebates to federal tax deductions — are commonly available for lighting renovation projects. But those programs have specific requirements that facility managers should be aware of.

For example, for T8 upgrades, Consortium for Energy Efficiency specifications for High Performance T8 and Supersaver T8 lamp and ballast systems using high-efficiency ballasts serve as a baseline by many utilities for establishing rebate programs. Go to www.CEE1.org for more information.

Rebates for LED luminaires are given by many utilities for Design Lights Consortium-qualified luminaires. Go to www.DesignLights.org for more information.

To find incentives, the first place to look is the Database of State Incentives for Renewables and Energy (DSIRE) at www.dsireusa.org.

"EPAAct 2005 tax incentives are also still available through the end of 2013," notes Cheryl Ford, marketing

manager at OSRAM SYLVANIA. "Both utility rebates and EPAAct 2005 tax incentives lower the initial cost to install and provide higher ROI." For more about EPAAct, check out Energy Efficient Commercial Buildings Deduction at www.lightingtaxdeduction.org.

Other lighting upgrade resources:

- General Lighting Product and Application Information: NEMA's enLIGHTen America, www.nemasavesenergy.org
- Lighting Service Companies: Nalmco, www.nalmco.org
- Energy Services Companies (ESCOs): National Association of Energy Service Companies (NAESCO), www.naesco.org
- Electrical Contractors: National Electrical Contractors Association, www.necanet.org
- Lighting Resources and News, The National Lighting Bureau (NLB), www.nlb.org



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light, using such building control system strategies as light sensing, occupancy sensing, and shade control, while automatically adjusting the energy use of HVAC and electric lighting systems.

The results? Reduced overall energy costs, coupled with healthy and productive working environments. Daylight harvesting technologies include photocells, occupancy sensors and centralized or distributed control systems. The strategy can be implemented during building design and planning or even retrofitted flexibly at a later time.

"Retrofitting holds many cost-effective daylight harvesting opportunities, making it an attractive option for many facility managers," says Cheryl De Los Santos, manger, marketing communications, Leviton. "Hardwired or wireless technologies can be added to existing systems, as part of one large overhaul or in stages. For example, a facility may begin a daylight harvesting initiative by implementing photocells in skylit spaces, then windowed areas, and finally adding a new, centralized control system with strategic scheduling."

One major takeaway surrounding daylight harvesting is the fact that energy-saving opportunities track with energy consumption during the course of an ordinary day, says Rita A. Renner, director of marketing & communications at WattStopper.

"That is, when energy consumption is peaking, the savings opportunity with daylighting controls also is peaking," Renner says. "The time when daylight contributions are highest, typically from noon until around 4 p.m., is often when the energy or load profile of a facility is highest, as well. So incorporating daylighting control also can provide some opportunities to reduce demand charges in addition to capturing regular energy savings. Reducing the lighting load also can reduce the cooling load, realizing additional savings."

Energy codes also have begun to recognize this opportunity. ASHRAE 90.1-2010 and IECC 2012 incorporate mandatory daylighting control requirements. In California and a few other jurisdictions, these have been already required for a few years.

Dimming Tactics

Dimming strategies are becoming more popular as ways to reduce energy use. "Dimming strategies will allow for more energy savings than on/off strategies alone," says Brian Dauskurdas, Lutron's director, global energy solutions. "Once you add dimming to your building, additional energy saving lighting control strategies can be implemented above and beyond basic automatic lighting shut-off. For instance, continuous daylight dimming (i.e., unobtrusively lowering electric lights when daylight is available) can be done with dimming.

Also, light level tuning, personal light control and demand response lighting also can be done with this strategy."

As mentioned above, dimming strategies offer the ability to capture additional energy savings, even when lighting is in use. Various code-making bodies are including multi-level control requirements in emerging codes.

Beyond energy savings, there are other reasons why facility professionals should consider dimming, notes WattStopper's Renner.



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Custom optics provide backlight control in outdoor LED luminaires installed on the grounds of Maplewood Richmond Heights high school in Maplewood, Mo.

"Providing adjustable light levels can boost individual worker productivity," Renner says. "Research suggests when workers have control over their own lighting in their personal work environments, they often will select lower light levels to accommodate personal preferences."

According to the LightRight Consortium, personal lighting control not only saves energy but

also increases occupant comfort and productivity. "Distributed control systems allow for individual control of lighting loads, providing the ultimate in precise settings and user satisfaction," De Los Santos of Leviton says.

Other Advanced Controls Strategies

There are numerous other advanced controls methods that

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can help facility managers squeeze even more savings out of their facilities' lighting systems. They include the following:

- Light level tuning. Adds to energy savings by reducing lighting output at modest levels, undetectable to the human eye.

"Often design light levels are needlessly high, so reducing lamp output by 5 to 10 percent can bring energy savings benefits without compromising occupant satisfaction," Renner says.

When Medical Mutual retrofitted its lighting system, it installed step dimming ballasts to take advantage of an existing control system, according to Lithonia Lighting, an Acuity Brands company. As a result, each floor of the 16-story building can have its own light level.

When Medical Mutual started tuning each floor, fixtures were dimmed gradually to a point that occupants did not notice the light level was changing. Once employees did take notice of light level changes and confirmed preferences, the controls were set at a desired level.

- Demand response/load shedding. By shedding loads at times of peak electricity demand, facilities can save money on demand charges. What's more, by providing two-way communication with their local utility, and being able to shed load at a utility signal, facility managers can to qualify for demand response programs.

In California, demand response capabilities are mandated by Title 24 for specific business types in the 2008 revision and more widely in the 2013 revision.

- Digital addressable controls. Using digitally addressable lighting controls and fixtures provides flexibility throughout a facility. As spaces change, from employee churn or new tenants, no new wiring or light fixtures will need to be installed, nor will old ones need to be removed.


"A digitally addressable system allows facility managers to reprogram new lighting zones of grouped-together fixtures that are controlled together with the click of a few buttons," Dauskurdas says.

- Astronomical time clock. Distributed or centralized control systems with an internal astronomical time clock take seasonal changes into account and adjust light accordingly. For example, the clock will adjust the system on Daylight Saving Time to automatically compensate for the shifted time schedule to avoid turning lights off too early. These clocks are preferred over automatic clocks because facility executives can schedule lighting scenes not only based on time of day but also on astronomical events like sunrise or sunset. Some lighting experts say this type of control is ideal for exterior lighting, including landscape and parking garages.


Today, for a facility manager to get the most out of a lighting retrofit, it's important to stop

thinking strictly in terms of ballast replacement or relamping. "Next-generation lighting is much more of a systems solution than in yesteryear when it was a series of components — lamps, ballasts, and fixtures," says NEMA's enLIGHT-en America chair Keith T.S. Ward, president and CEO of Luminus. "We're upgrading entire systems with new fixtures and advanced controls. It's all integrated now, and it's time for facility managers to get on board." ■

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AS MANY FACILITY MANAGERS are well aware, heating, cooling, and lighting buildings can require large amounts of energy. In fact, the energy required to carry out these functions in both residential and commercial buildings across the U.S. accounts for about 40 percent of the country's energy use, notes James Hoff, vice president of research with the Center for Environmental Innovation in Roofing (CEIR), a not-for-profit organization focused on the development and use of environmentally responsible roofing systems and technologies. That's more than the amount of energy we use getting to and from those buildings.

The roofing systems on these buildings, although they may not grab occupants' and visitors' attention in the same way that, say, upscale lobbies or plush boardrooms do, have a tremendous impact on energy use. Hoff estimates that if all of the approximately 60 billion square feet of commercial roofing surfaces currently in place in the United States were built to the most recent minimum energy codes, the annual energy savings would top 700 trillion BTUs. By way of comparison, that's more than the amount of energy derived from petroleum used by the commercial sector in 2011, according to the U.S. Energy Information Administration.

Of course, every roof will never be replaced at the same time. However, about 3 to 3.5 billion square feet of new roofing systems are



Extensive Vegetated Roofing System (Front)



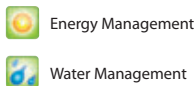
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installed each year, with about 2.5 billion square feet placed on existing buildings, Hoff says. The potential to save energy by choosing more efficient and sustainable systems is significant.

The fact that the majority of new roofing systems are installed not on new construction but on existing buildings prompted Hoff and his colleagues at CEIR to develop the RoofPoint Rating System. RoofPoint is a method for assessing the energy efficiency and sustainability of roofing systems. This is in contrast to some other programs designed for evaluating and boosting facilities' energy efficiency. "Their formats are more suitable for new construction versus retrofits," Hoff says. As a result, these systems tend to be more involved and expensive.

That's left a gap in the market. Hoff notes that the average re-roofing project comes in at about 10,000 square feet, and at a cost of \$5 to \$10 per square foot. "It's difficult to apply a sophisticated, expensive rating program at that scale." (Currently, the RoofPoint application is free, although CEIR may charge a nominal fee at some point in the future.)

At the same time, the average commercial building is one to two stories tall, adds

James Kirby, vice president of sustainability with CEIR. "The roof is a significant portion of the building envelope," he says. Roofing systems play a key role in keeping energy loss to a minimum.

How RoofPoint Works

RoofPoint, which was developed in 2012, already has been applied to about 250 roofing projects, Hoff says. About 60 percent of the projects are re-roofing projects, and 40 percent are new construction, he adds. Initially, CEIR has focused primarily on reaching out and explaining the system to roofing contractors, more so than building owners. Of course, the ultimate goal is to have all parties involved in roofing design and construction understand and apply the RoofPoint system.

Among the buildings that have applied for the RoofPoint designation are some true showcases, such as the Target Center in Minneapolis. "But the great majority are relatively mundane," Hoff says. They're simply well-constructed and energy efficient, he says.

While a RoofPoint roof may be installed on a LEED facility, that's not a requirement, Kirby says. The goal has been for

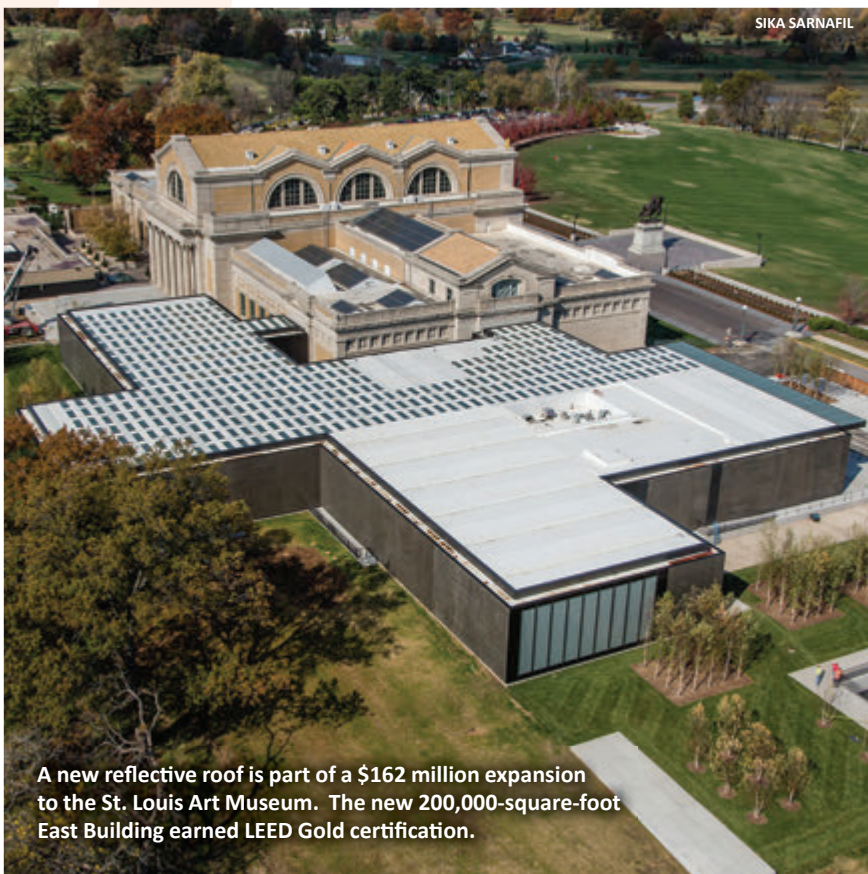
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the two programs to mesh nicely, but they don't have to be used together. Generally, a LEED-certified building would qualify for RoofPoint, although the reverse isn't automatically true.

The RoofPoint rating system consists of a total of 24 possible points, distributed across four categories:

Energy management (6 possible points): In this category, roofing systems earn points by having high R values (which measures the resistance to heat flow), as well as daylighting and other features.

« About 3 to 3.5 billion square feet of new roofing is installed each year. About 2.5 billion square feet of that goes on existing buildings. »



A new reflective roof is part of a \$162 million expansion to the St. Louis Art Museum. The new 200,000-square-foot East Building earned LEED Gold certification.

Materials and water management (6 possible points): Roofing systems earn points in this category in several ways, including the use of recycled content and by reducing roofing waste and scrap.

Durability/life cycle management and water management (9 possible points): This category includes the roof drainage design and the durability of the roof insulation system, as well as the roof's maintenance program.

Innovation in roofing (2 possible points): This category covers innovation in design as well as exemplary performance, and could include both innovative energy management features, as well as attributes that contribute to a better overall roof, such as more effective fall protection systems.

To earn the RoofPoint designation, a roofing system must earn at least 12 points total, distributed across each of the four categories. At least three must come from energy management, two from materials and water management, and four from durability/life cycle management.

To date, either Hoff or Kirby have personally reviewed each application. As the program grows, it's likely that a larger group of qualified examiners will be needed to assess the applications.

As the categories indicate, the Roof-

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Point criteria cover both energy efficiency and longevity. The focus on energy efficiency is self-explanatory; after all, that's the goal of the program. Roofing systems can gain points by having appropriate levels of insulation and adequate air barriers, among other features. At the same time, the focus on a roof's durability and longevity recognizes that a roof lasting, say, 20 years will require less energy overall than one that needs replacement every five or seven years, Kirby notes.

However, the RoofPoint program is not "system-specific," Hoff says. "A variety of commercial roofing systems can qualify," including single-ply, asphalt, and spray foam systems. "We think we provide a large number of options for building owners."

Similarly, it's not as though a roof must be white to qualify for the RoofPoint rating, Hoff notes, although he adds that many of the roofs are lighter-colored. Rather than focus solely on the color, RoofPoint breaks down the cool roofing credit into three sub-credits: net energy savings, peak energy demand reduction, and heat island mitigation.

In fact, most of the factors that comprise

« The RoofPoint program is not system-specific — a variety of commercial roofing systems can qualify. »

the RoofPoint application simply are solid design principles, Kirby notes. Examples include the use of such features as staggered joints and multiple layers of insulation. "If you read through RoofPoint, you can understand how to design" a solid, durable and energy-efficient roof, he adds.

Curt Liscum, senior consultant with Benchmark Inc., roofing and paving consultants, agrees. "RoofPoint doesn't, in and of itself, increase the cost of a job. RoofPoint for the most part is good, honest design principles for roofing," he says.

Liscum does point out that not every building owner follows good design prin-

ciples; some try to get by with the minimum required. For instance, they may decide not to put on more insulation than what's mandated by code. While the extra insulation would, of course, raise initial costs, it could offer a solid payback, particularly if energy costs rise significantly.

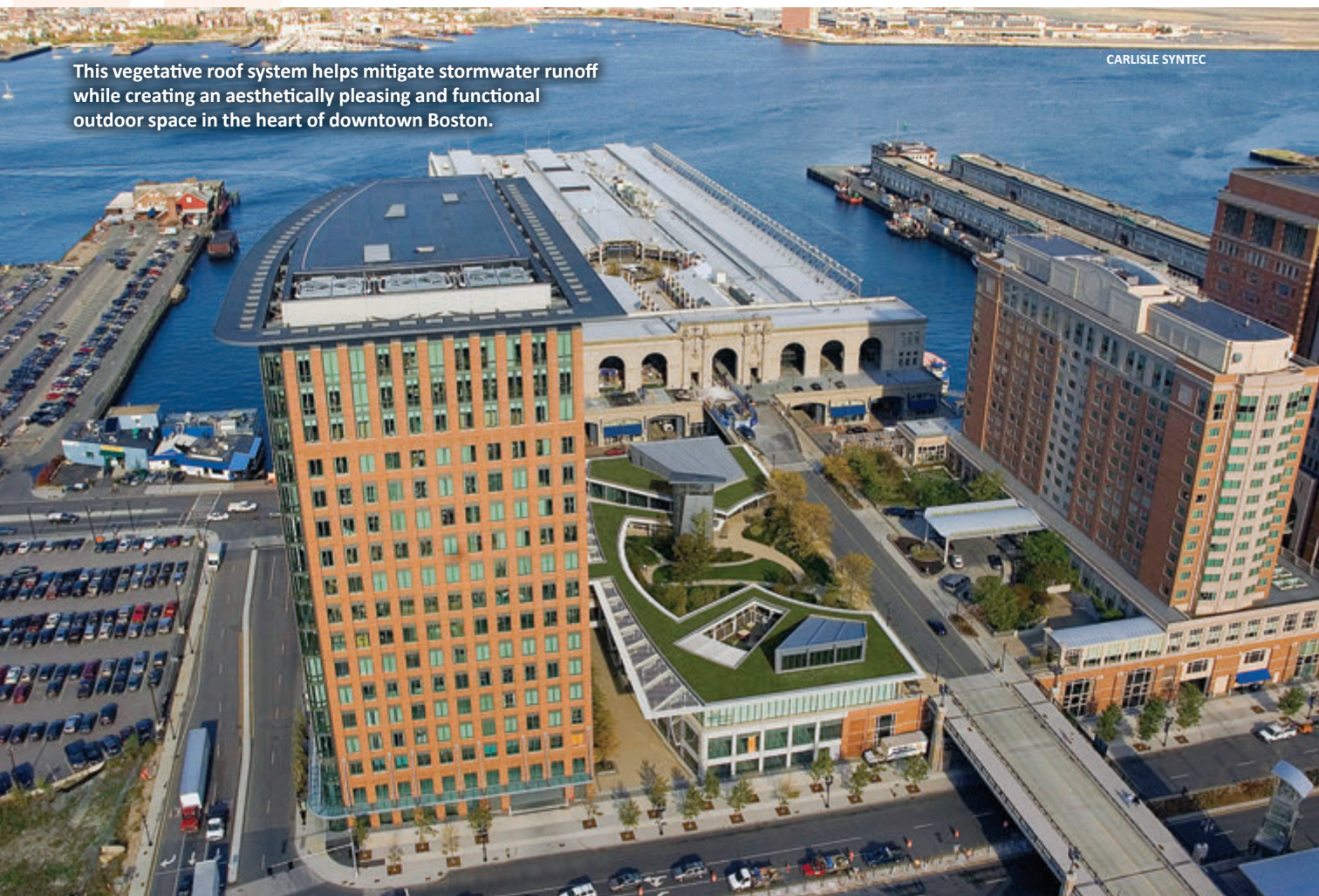
Applying for the RoofPoint designation takes about 45 minutes, says Liscum. His firm has completed the application for about 20 facilities. Not all have been submitted, as some building owners like using the system to evaluate their facilities, but prefer to keep the details of their projects quiet.

The documentation involved in completing the RoofPoint application is similar to that required to obtain a roofing warranty, Hoff adds. As a result, the process typically is reasonable, even on smaller, less expensive roofing projects.

RoofPoint can be used in several ways, Liscum says. For starters, it's a way to check that designs take into account all the factors necessary for a durable, sustainable roof system. The rating system also shows building owners that the planned roof work incorporates principles of sustainability and durability. In addition, if several companies

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The Richard Riordan Central Library in Los Angeles uses a reflective roof to help control energy costs.

RoofPoint validates the efforts of facility managers, contractors, and manufacturers who have focused on environmentally responsible roofing.

are bidding for a job, and all are working with the RoofPoint rating system, clients can be reasonably sure they're comparing designs of similar quality when they consider the bids. "The building owner gets the same quality design if everyone follows the same process," Liscum says.

Tecta America Corp., a commercial roofing contractor, began focusing on environmental roofing solutions, such as



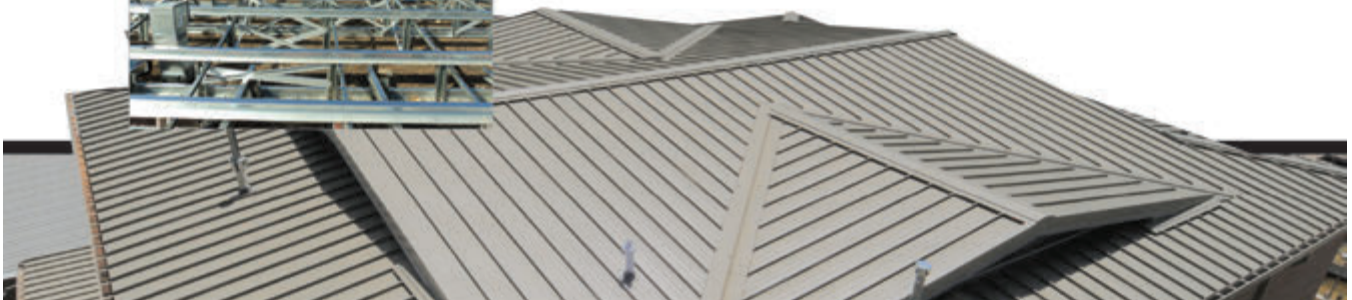
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about CEIR

The Center for Environmental Innovation in Roofing (CEIR) is a not-for-profit 501(c)(6) organization focused on promoting the development and use of environmentally responsible and high performing roofing systems and technologies. It is based in Washington, D.C.

CEIR accomplishes its mission in several ways. It undertakes research on sustainable roofing. The Center also talks with policy makers about the impact buildings can have on health, welfare and the economy, as well as methods for increasing their energy efficiency and exerting a minimal influence on

the environment.

CEIR's initiatives include educating building owners about the choices available in high performing roof systems, as well as promoting high performance design by honoring companies that design long-lasting, energy efficient and environmentally friendly/sustainable roofing systems.

One such initiative is RoofPoint, which CEIR describes as "a comprehensive roof rating system for the assessment and selection of sustainable roof systems." Another initiative is the Center's PV (PhotoVoltaic) Taskforce, which was launched in October 2011 with the aim of increasing communication between the roofing and solar industries.

CEIR is a member of the American High-Performance Buildings Coalition. The Coalition includes companies and other industry groups focused on promoting and supporting the development of performance-based building standards.



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daylighting and green building principles, about five years ago, says Geoff Hagan, environmental solutions manager with the company. "RoofPoint validates those efforts and the efforts of manufacturers and contractors across the country who've focused on environmental roofing," Hagan says. "It's a validation of our approach to environmental construction." So far, Tecta America has used RoofPoint on about a half dozen roofing projects.

Hagan notes that not every building can afford applying for LEED certification. In contrast, "RoofPoint is for any building owner." The RoofPoint designation shows

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According to CEIR, a roof does not need to be white to qualify for the RoofPoint rating system. Roofs like this dark EPDM are good candidates as well.



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customers and occupants that the building owner wants to take the right steps when it comes to the performance and durability of the roofing system, yet he or she doesn't have to go to the expense of LEED. In fact, most of the construction methods allowed under RoofPoint are widely available, Hagan says.

At the same time, RoofPoint keeps building owners focused on the efficiency

and durability of their roofing systems — two qualities that can be compromised when a roof design is value-engineered, Hagan notes. "RoofPoint helps you realize that you don't want to take these (attributes) out because they have benefits."

At CEIR, the goal is to help even more building owners and managers keep these attributes in mind. By the end of 2013, CEIR would like to have at least 1,000

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applications in the RoofPoint system, with 10,000 applicants over the next five years, Kirby says.

Moreover, while the RoofPoint program currently is focused on new roofing systems (even if they're on existing buildings), Hoff says that may change as the program matures. Over time, he and his colleagues will begin examining ways to apply the criteria to existing roofs. "We want to get the basic program up and running before addressing ongoing commissioning and renewal," he says.

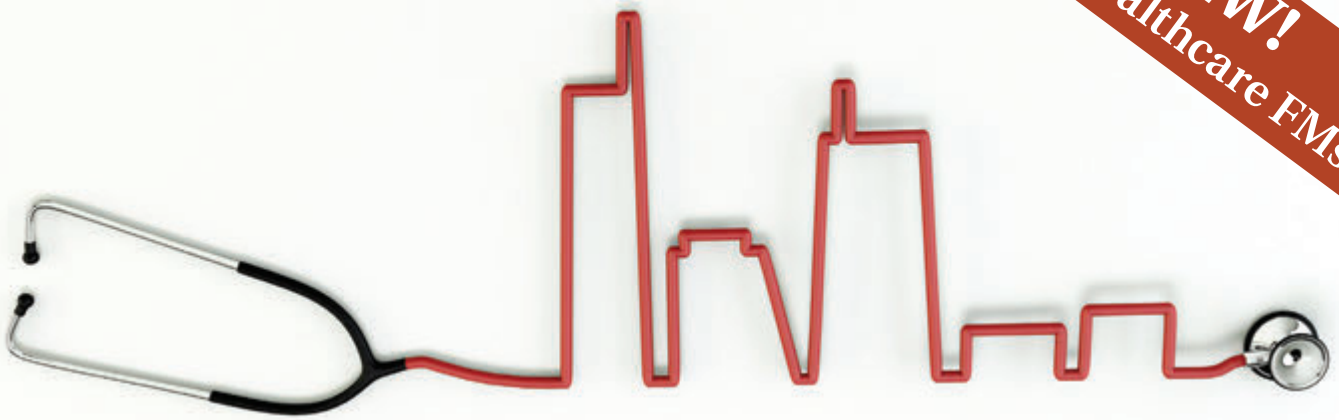
Making Better Decisions

In the meantime, RoofPoint can help facility managers involved in roofing projects assess their efficiency and durability. As Kirby notes, it can be easy for a building owner to spring for a glam lobby and then value engineer the roof to the point that it's not as efficient as it could be. One goal of RoofPoint is to minimize the frequency of this trade-off.

"RoofPoint offers a check and balance that the design is sustainable, durable and provides the longevity (facility owners) are looking for in a roof," Liscum adds.

Moreover, the RoofPoint rating system is designed for what Kirby calls "blue collar roofs." That is, they're built to be energy efficient, but aren't necessarily show stoppers or inordinately expensive. The goal is "a blue-collar roof that keeps water out of the building, lasts a long time and is energy efficient," he says. ■

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SHOWCASE: OUTDOOR LIGHTING

Avoiding Pitfalls with Safety/Security Lighting

by maryellen lo bosco, contributing editor

Outdoor safety and security lighting requires just as much attention as an illumination system inside a building. But exterior lighting brings a very different set of considerations to be addressed, issues that are often less familiar to the facility manager. The result is that facility managers sometimes overlook important considerations when planning for exterior lighting installations.

One big mistake is not conducting a risk assessment. This may seem obvious, but this step is often bypassed on the way to installing new outdoor lighting. Often facility managers add security features after a problem arises, explains David Salmon, law enforcement advisor for OSS — Law Enforcement Advisors, who is also a past chair of the security lighting committee for the Illuminating Engineer-

ing Society of North America (IESNA); he was chair in 2003 when the organization last published the G-1-03 guidelines. A facility should look at its vulnerabilities and apply reasonable and cost-effective measures to protect itself. Salmon notes that “85 percent of facilities have never had a risk assessment done.”

Facility Needs

For the purposes of risk assessment, it's important to know who the occupants of the building are and what their needs are, Salmon says. “If a tenant has after-hours activities, that will influence the lighting scheme,” he says. “[Facility managers must] have enough lighting in the parking lot for hours that people are coming and going, especially unescorted females.”

Too often facility managers focus

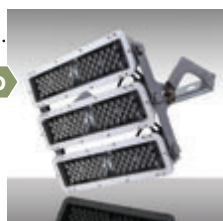
on buying a certain number of fixtures, when it would be better to hire a lighting designer “to meet specifications of what they want on the ground and to ensure light uniformity,” Salmon says. Correct lighting design will take into account local ordinances and guidelines as well as the light from surrounding businesses, Salmon says.

“Facility managers need to focus on high-efficiency lights that draw less energy but produce a high quality light with a broad color spectrum,” says Salmon. Light waste and light trespass can be avoided by using lamp cutoffs, which shield lamps so they don't throw light off the property. Correct lamp design can also ensure that light is not unnecessarily thrown up into the sky to create sky glow.

One big mistake in design is not taking transitions into account. For



»a. EYE LIGHTING Aphos brand LED luminaires are offered in ceiling-mount, wall-mount, and pole-mount configurations. Aphos is rated at 60,000 hours of life, is suitable for ambient temperatures of 35 degrees C below zero to 40 degrees C above zero, and is compatible with standard photocontrols. **CIRCLE #250**



»b. MAXLITE Element LED Flood Light Series is designed to replace metal halide fixtures. The lamps offer modular housing in three modules, and each module can have one of three beam angles. Customized configurations allow users to create distributions not previously obtainable with floodlights. Multiple circuits guard against full outage. The lights come in 5000K correlated color temperature. **CIRCLE #255**



»c. OSRAM SYLVANIA PermaLED low-profile luminaires are 2.7 inches tall and have a lamp life of more than 70,000 hours. The luminaires are tested in accordance with IEE62.41-2002 category C to suppress most transient AC line surges. Luminaires carry a five-year warranty and come in 42 and 54 watts. **CIRCLE #252**



»d. GE LIGHTING Evolve LED scalable area lights are designed as retrofit for outdoor spaces originally optimized only for HID. Lights use reflective — not refractive — technology to minimize glare and spill light, and are rated for 50,000 hours of life. Housing is die-cast aluminum. Design incorporates a heat sink light engine directly into the unit to improve heat transfer. **CIRCLE #253**

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»**a. PHILIPS** LytePro32 is designed for building perimeters 18 feet and taller. Luminaire uses 32 high-output LEDs. It delivers 54,000 lifetime hours and offers 80 lumens per watt. It is fully gasketed for dust control, has a CRI of 71 and five-year warranty, and is available with a 4000K color temperature. **CIRCLE #254**

»**b. RAB LIGHTING** SLIM wallpacks can be mounted as uplights or downlights. They feature an IP rating of 66 and a UL listing as suitable for wet locations. The lights are available in 12-, 18- and 26-watt models with cool, neutral or warm color temperatures, with a 100,000-hour LED lifespan. **CIRCLE #251**

»**c. ACUITY BRANDS** Lithonia Lighting D-Series LED wall luminaires are produced in two sizes, three power packages and six photometric distribution options. The product has an expected service life of 100,000 hours and includes options such as a motion sensor for bi-level dimming, a diffused lens, and emergency battery backup. **CIRCLE #257**

»**d. HUBBELL** Laredo LNC2-18LU architectural LED WallPack is now available in a 45W configuration that delivers up to 3306 lumens and efficiency of 74 lumens per watt. The series includes multiple LED color temperatures, additional distributions, expanded photocontrol options, 29W and 45W configurations, and 60,000 hours of life. **CIRCLE #258**

»**e. COOPER LIGHTING** Galleon LED luminaire offers 12 specialized optical distributions, including four asymmetric, three symmetric, and five spill light eliminator distributions. Nine lumen packages range from 8,000 to more than 40,000. Available in four sizes, the Galleon luminaire comes standard with a 4000K neutral white correlated color temperature and offers a 60,000-hour life. **CIRCLE #259**

»**f. CREE** XSP Series LED Street increases lumen output more than 35 percent compared to the original XSP luminaire. The product carries a 10-year warranty and a calculated L70 lifetime of more than 100,000 hours. It features a thermal management system to improve overall performance. **CIRCLE #260**

» **KIM LIGHTING** ALTITUDE features PicoPrism optics. Housing is proportional and scalable, with six sizes to cover pedestrian/site/roadway environments. ALT3P70-60L5K, ALT3P70-96L5K, and ALT3P70-120L5K are DLC approved. Sizes are ALT small 17-inch (60, 96, 120 diodes) and ALT large 25-inch (180, 240, 300 diodes). [Not Pictured] **CIRCLE #256**

example, says Salmon, a guard shack or an ATM machine may be lighted by 10 foot-candles, while the parking lot is lighted by three foot-candles, and the sidewalk that leads into the building gets one foot-candle. "You have to account for transition from one area to the next," he says. "You don't want to have abrupt changes of lighting, because the eye needs to refocus and utilize light." This is a safety issue, one that is especially relevant with an aging population. According to Salmon, elderly people require 60 percent more light to see than those in their 20s, and it's important for a facility to take this fact into consideration, especially if it caters to an older clientele.

The Low-Cost Trap

Too many facility managers attempt to meet lighting requirements as inexpensively as possible, says Mike Ross, vice chair of the IESNA security lighting committee and president of GMR. This often results in using low-cost fixtures mounted on building fascia, which throw light outward. "This is done to minimize or avoid the use of pole-mounted fixtures," which are a lot more expensive, he says. "The end result is that glare is produced in an attempt to provide light, and experientially we find that wall-mounted fixtures simply do not have the ability to produce enough light, measured horizontally, based on lighting standards."

IESNA promulgates standards for lighting in a series of publications. The anchor publication is *The Lighting Handbook*, 10th edition, with additional guidelines published for exterior environments (RP 33), parking facilities (RP 20), security lighting (G-1-03), and glare and light trespass (TM 15). "To avoid mistakes one should be designing for those different circumstances according to IES standards," says Donald Monahan, vice president of Walker Parking Consultants. Moreover, lighting levels should be established according to the International Energy Conservation Code, which limits watts per square foot, Monahan explains.

Ross says that it is common for facility managers to wind up with an inaccurate design if they buy fixtures solely based on light output. Regulations for installing certain types of exterior lighting may require that light be measured at a prescribed number of inches above the ground, on a horizontal plane, so it's important to ensure that the fixture can meet those requirements.

Similarly, facility managers can get into trouble when they hire contractors without practical knowledge of how lighting fixtures respond in specific environments. Each lighting manufacturer must provide photometrics (measurement of the luminous intensity of light) for its products and how they relate to IESNA guidelines (for example, a specified average of foot-candles is required within a roadway or a sidewalk). The contractor may look at product information for a lighting fixture and assume it will work, but he or she doesn't realize that the measures are calculated at grade (instead of 36 inches above the ground) in a laboratory environment.

"A lot of what has been put out has not been field-verified," says Ross. "It's not a quality issue. It's a practical application issue." When cost is the biggest driver, facility managers may agree to cheap solutions that result in glare and uneven light. What is worse, they will not be aware of the problem unless they conduct inspections to verify lighting levels, or until an assault or robbery occurs and a customer files a lawsuit.

The level of technical expertise needed for an optimal design requires the services of an experienced lighting designer, according to both Monahan and Ross. Legal liability can result if an accident happens out of doors and on a facility's property. "Owners are at risk if they don't meet standards," Monahan says, "[but] they have a defensible position if they are meeting industry standards and the lights are being maintained." Monahan conducted a study based on insurance claims of a national parking operator and found that 75 percent were related to "trip and fall" and "slip and fall."

Facility managers should consider conducting periodic assessments at night for the quality of lighting and operational status, possibly using a qualified third party. "Are the lights operating or not?" asks Ross. "Are they shutting off intermittently because of ballast problems?" A quality design means light is ambient, ambient across the location, confined to the premises, compartmentalized (within the boundaries of the property), and in compliance with relevant standards, guidelines, and regulations.

Keeping Up With Technology

An important error to avoid is ignoring developments in technology. That doesn't mean trying unproven products. Rather, it means evaluating new choices to determine if they are a good choice for a specific application.

A good example is LEDs (light emitting diodes). According to Eric Richman, senior research engineer at the Pacific North-

west National Laboratory, there is a wide range in the quality of LED products on the market, but high-quality LED lighting does afford a number of advantages in an outdoor setting.

For one thing, LED lights come on immediately, unlike HID (high-intensity discharge) lights such as metal halide or high- or low-pressure sodium, which need time to warm up. Some HID lights can take up to 30 minutes to get to full luminescence. As a result, HID lights generally do not work well with occupancy sensors, because once the lights go off, they need re-strike time to come back on. "There are some metal halide lights with quartz re-strike lamps that can work with occupancy sensors," says Richman. "If the light goes out and comes back on, the quartz lamp provides a reasonable level of light until the metal halide fully kicks in."

Quality LED lighting also performs well in cold temperatures, which can be an advantage over HIDs or fluorescent lights. In moderate climates, where the temperature is cool to cold in the evening, LEDs are performing in their optimum environment. By contrast, HIDs need more time to warm up in colder climates. Fluorescent lights also have trouble warming up in the cold and may not reach their full output when they do. "In really cold climates you need specifically rated fluorescent bulbs for colder temperatures," Richman notes.

LED lights can also provide an advantage when it comes to uniformity of illumination. Unlike any other type of light, LEDs have many point sources of light within the fixture. Thus, it is possible to take the diodes and aim them a row at a time or



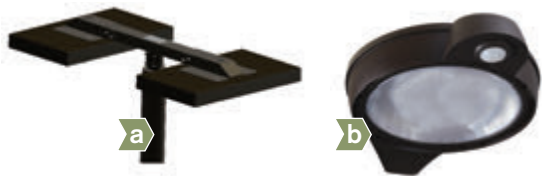
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»a. **ORION ENERGY SYSTEMS** Orion exterior lighting fixtures have a powder-coated galvanneal steel frame for corrosion resistance, according to the company. UV inhibitor can withstand temperature variance from 40 degrees F below zero to 250 degrees F. Available in high-bay, forward throw or back-to-back forward throw optic types. **CIRCLE #291**

»b. **KENALL** TopDek deck/surface lot luminaire features optic configuration for glare control, field rotatable optics, integrated houseside shield, concealed heat sink, and daylight and occupancy controls. The fixtures use replaceable high-brightness ANSI 4000K (65 CRI min.), 5000K (65 CRI min.), and 5700K (70 CRI min.) white LED array. **CIRCLE #292**

» **AMERLUX** SmartSite incorporates programmable audiovisual components into outdoor lighting. A wireless mesh network connects the system's microprocessors to a Web-based portal. The lamps replace 175-250W HPS/MH sources, and contain distributed intelligence via integrated processors and data storage, as well as audio speakers. Wireless transceivers on each pole provide bi-directional communication between streetlights and other integral sensors. [Not Pictured] **CIRCLE #261**

» **JUNO** AccuLite LED Mini-Security Light uses 6 watts for mounting heights under 10 feet. Dark-sky-compliant fixture designed for lighting pathways and entrances in commercial and hospitality settings. It features optional dusk-to-dawn photo sensor. [Not Pictured] **CIRCLE #262**

even one diode at a time. "You can tilt them so that the ones on the outside [of the board on which the diodes are arrayed] are aimed at an outward angle, while others are aimed straight down," says Richman. "This provides more uniform illumination across a wide area." It's harder to do that with a single-point source of light. "You can bend the reflector that's behind the light source," explains Richman, "to try to get more rays to shoot out to the side and fewer to shoot straight down, and you can put a refracting lens in front of [the light source], but this decreases light efficiency."

Every light source will depreciate over time. Technically, LEDs can work for a very long time, but they will degrade like other lights, says Richman, although at a slower rate. Still, longevity is another reason LEDs are a good choice for outdoor lighting, despite their higher cost. "They have more longevity than HIDs — either sodium lamps or metal halides," says Richman.

Maintenance and Inspection Issues

Another major error that facility managers can make with regard to exterior lighting is not servicing lamps. "No matter how good a lamp is, it will get bugs and dirt in it, and there needs to be an annual inspection process where lamps are cleaned, inspected, and put back into service," Salmon says. He notes that about 40 to 45 percent of properties his company inspects have lamps that are malfunctioning, meaning they are performing far below standard or are burned out. Acrylic lenses become yellowed, and lamps can have bugs, dirt, or birds' nests in them.

Because it is expensive to get a bucket truck to repair pole lights, facility managers often wait for individual lamps to burn out instead of scheduling maintenance once or twice a year for all fixtures. According to Salmon, the latter route is a cheaper and more efficient way to maintain exterior lighting. Monahan says that a good standard of practice is to replace lights when they are at 70 percent of their rated life, which is another reason for scheduling regular maintenance.

Doing inspections during the day is another common mistake made by facility managers. "Environments are very different at night," Ross notes, "and fixtures perform differently." Shadows and places of concealment are not visible by day. Unfortunately, most maintenance done for large retail businesses takes place during the daytime, Ross says, although it's important to identify the quality of lighting at night. Moreover, the only way to determine whether the lights are in compliance with safety requirements is to conduct a nocturnal inspection. Failure to do so can result in a sense of false security, which can lead to problems down the road — in the form of injury or liability.

The numerous technical issues that must be addressed to ensure compliance with guidelines and to create optimal exterior lighting make it worthwhile for facility managers to consider hiring experts, in the form of lighting designers or security consultants. ■

Maryellen Lo Bosco is a freelance writer who covers facility management and technology. She is a contributing editor for Building Operating Management.

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PREVIEW NFMT

As NFMT 2013 Winds Down, NFMT 360 Ramps Up

by wendy dietzler, director of education



Wendy Dietzler
Director of Education

As this year's NFMT 2013 Conference & Expo wrapped up in Baltimore in March, I was reminded of one of Yogi Berra's most popular quotes: "It ain't over 'til it's over." I realized that, like a lot of our attendees, I wasn't ready for the event to end. There was more to learn, see, and discuss — there just wasn't enough time left in the week.

With the biggest exhibit floor in event history, and more attendees than ever before, I'm sure there were plenty of facility professionals who left Baltimore with a few outstanding items on their NFMT to-do lists. Fortunately, there's NFMT 360: the year-round, online conference and expo resource for the facility management

The following sessions were recorded at NFMT 2013; portions of the sessions will appear on NFMT 360 throughout the year. NFMT members can access the videos in their entirety at any time. For information on becoming a member of NFMT, please visit www.nfmt.com/online/members/

- TS.16 FMXcellence: Elevating the Role of Facility Managers
- T1.24 The ENERGY STAR Portfolio Manager Tool
- T1.27 Existing and Pending Federal Lighting Regulations
- T2.24 Building Envelope Commissioning
- T2.27 The Power of the Data, the Data of the Power
- T2.24 Best Practices for EE Program Participation, Breaking Down the Barriers
- T2.27 LED's Deep, Dark Secrets
- W1.18 Hunger Games: How to Curb Your Building's Appetite for Energy
- W1.47 Mission Critical Facilities: FM to IT, Can We Talk?
- W2.18 Inspection Routes: Backbone of a Reliability Program
- W2.47 Intelligent Facility System Management
- W3.37 LEED: the Good, the Bad, the Ugly
- W3.45 So You Think You Know Your MSDS
- W4.37 Rooftop Solar: The Good, The Bad and The Right Way!
- W4.45 Facility Management and Human Resources: Creating the Dream Team
- RS.16 Unconventional Facilities Management: Leaders Who Use Creativity and Flexibility to Run Facilities
- R1.18 How to Develop and Write Effective, Repeatable Maintenance Procedures
- R1.43 Fire Alarms: The A-Z of Inspection, Testing and Maintenance
- R2.18 Electric Vehicle Charging Stations
- R2.43 NFPA Code Updates
- R3.37 On-site Water Reclamation: Greening our Footprint, Maximizing Cost Savings
- R3.39 Take Your Facility to a Higher Plane with Smart Integration
- R4.37 Save Money and Energy Through Consolidated Building Management
- R4.39 Distributed Generation Wind Projects



NFMT 360 not only provides information about the in-person Baltimore and Las Vegas shows, but also allows you to review videos from previous shows, learn more about exhibitors, and explore the benefits of becoming an NFMT member.

industry. From conference videos to supplier brochures to exhibitor information, NFMT 360 lets me tap into the information you may have missed at the show — or reinforce some key concepts you picked up onsite.

New videos are added to the site weekly under the conference videos tab, and are organized into key topic areas such as energy, building automation, leadership and sustainability. For those unable to get to all 600-plus booths in Baltimore (reminder to self: next year, pack roller skates), the showcase area of the website features videos supplied by NFMT exhibitors offering an in-depth discussion of the latest building technologies and services.

Another resource on NFMT 360: The suppliers area, which offers a sneak peek at the exhibitors lining up for our next live event, NFMT Vegas, taking place September 17-18 at Mandalay Bay. There is enough information on the NFMT 360 site to keep me — or you — busy for quite some time. As it turns out, it ain't over, after all.

Visit NFMT 360 today at www.nfmt.com/online. ■

Email questions to wendy.dietzler@tradeexpress.com.

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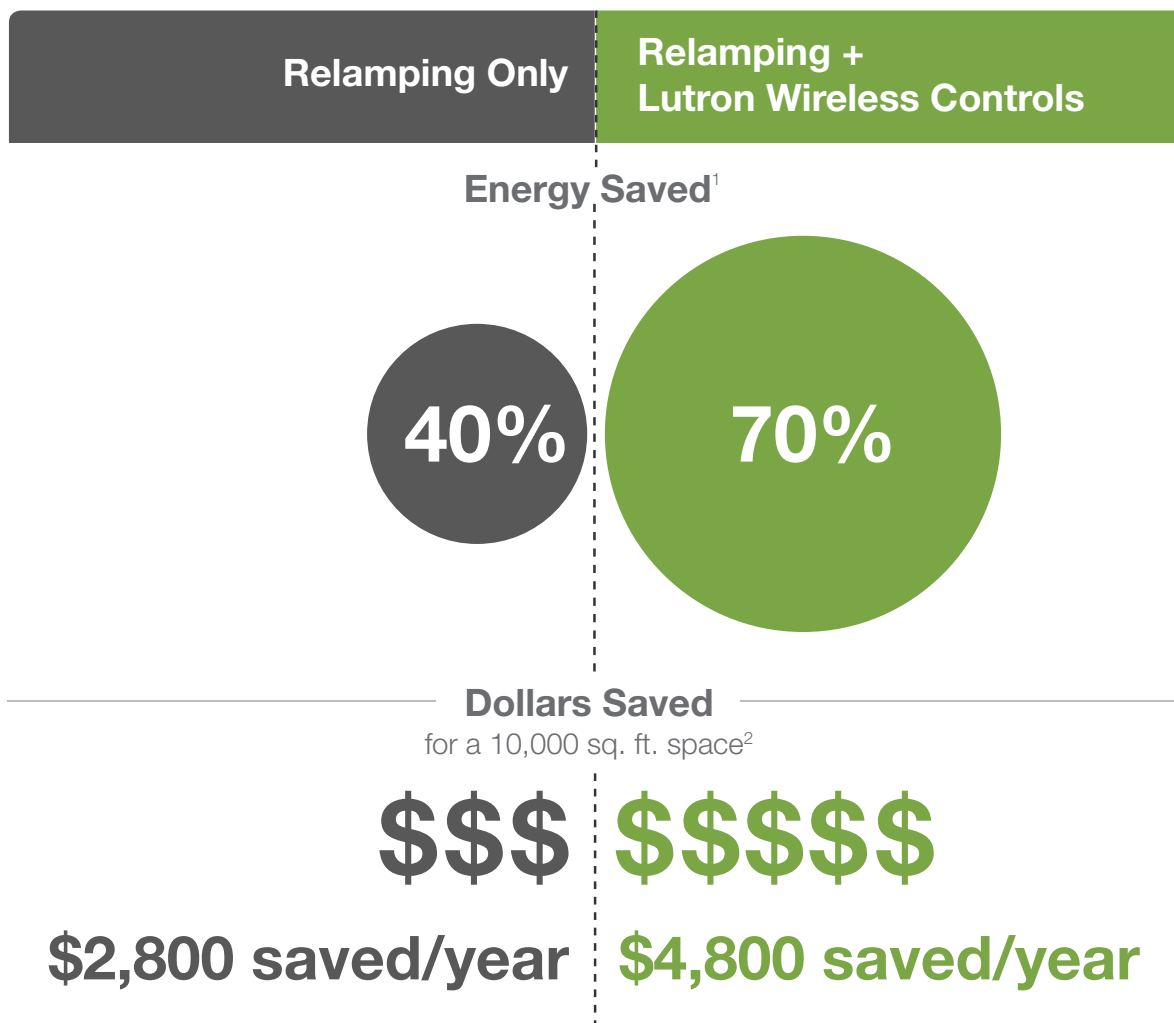


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¹ Fixture retrofit savings based on replacing 3 T12 lamps (109W input) with 2 T8 lamps (65W input). Depending on factors such as ballast efficiency, lamp efficacy, and fixture efficiency, this retrofit may result in reduced light level. Compared with manual (non-automated) controls, a 50% reduction in lighting energy use from controls is possible on projects that utilize all of the lighting control strategies (occupancy sensing, high-end trim, personal control, and daylight harvesting). Actual energy savings may vary, depending on prior occupant usage, among other factors.

² Lighting energy cost savings based on a 10,000ft² space with 140 light fixtures (1.5W/ft²) operating for 4100 hours annually at an electricity rate of \$0.11 per kilowatt hour.

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