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EDITORIAL

Training Goals Give FMs Edge

How important are goals? Not general goals, like do more or spend less, but specific, numerical targets? That question occurred to me because *Building Operating Management's* recent training-budget survey asked facility managers if they had goals for the number of hours that managers and supervisors receive each year. Only 25 percent said they had goals. Which made me wonder, do goals really matter?

The answer, based on the survey, is a qualified yes.

Goals don't assure facility managers of larger training budgets or do much to protect those budgets from cuts, though on both counts departments with goals do a little better than those without targets, according to the survey.

But training programs with goals seem to produce better results, with 5 to 10 percent more of those departments reporting training-related gains in safety (83 percent of departments with goals versus 78 percent without), facility staff productivity (67 percent versus 56 percent), and cost reduction (62 percent versus 53 percent). Added gains seem to come from extra effort, not extra cash. Departments with goals get more training from vendors and in-house sources, and use online training much more.

Perhaps it isn't surprising that facility managers with goals generally report having enough training dollars to meet their needs, even though they don't have much more money for education. But among the departments with goals that don't have enough money, a higher percentage report that the shortfall has a significant impact, compared to departments without targets.

I suppose it's no surprise that goals matter. After all, it's easier to hit a target you're aiming at. Goals offer a structured approach to education that gives facility managers one more way to get an edge.

Of course, goals aren't the whole story. You have to understand why training is essential, not just for staff but for you. Lenny Jachimowicz, in this month's cover story, calls ongoing professional development "investing in yourself." Read more, starting on page 24.

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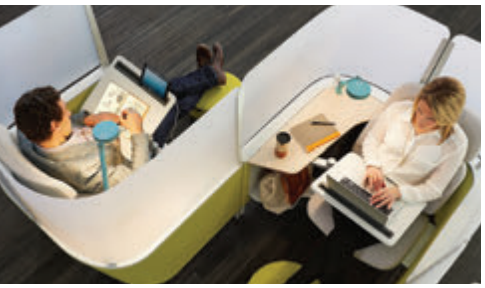

LOUNGE SEATING creates a cocoon-like space that blocks visual distractions in open environments. Brody WorkLounge features an ergonomic design with an adjustable worksurface. Power, personal storage, and lighting are integrated into each unit. Available in three configurations with optional footrest. An alternative to enclaves, units can stand alone or be configured together to support underused in-between spaces. STEELCASE

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PRODUCT GALLERY

BACNET CONTROLLER features an optional on-board 0-to-2,000 ppm CO2 sensor and latching relays, which allow both AC and DC loads to be switched. The SMART-Space Controller (SSC) revision E is designed for small point-count, standalone, or distributed network applications supporting up to 200 SSCs per network. Models include up to four outputs and four inputs. Additional options include occupancy sensor and humidity sensor. **RELIABLE CONTROLS**

CEILING SYSTEM of lightweight aluminum beams and baffles enables a wide range of design possibilities. Tavola Divergent enables configuration of non-parallel, diverging beams and baffles in pinwheel, basket weave, and chevron designs, along with client-specific layouts. A range of finishes is offered, plus Woodwright wood-look powder coat, film, and real wood veneer options. **HUNTER DOUGLAS**

LEVER LOCK is an ANSI/BHMA-certified Grade 1 cylindrical lever lock series featuring conventional cylinders and small-format interchangeable cores (SFIC), and comes equipped with lever security caps to help prevent theft and sag after continual use. The Falcon K Series' clutching lever design allows the lever to move when locked without unlatching the door, preventing damage to the chassis, and has four screws through-bolted for added strength. **ALLEGION**

VRF DUCTLESS SYSTEMS use adjacent water or geothermal sources as the energy exchange medium. Trane Water-Source VRF provides simultaneous heating and cooling, and unoccupied areas can be switched off. Delivers up to 30.1 IEER, 27.4 SCHE and up to 48 tons of capacity. Alternatively, systems can be connected to a cooling tower. **TRANE**

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Lighting

OSRAM SYLVANIA The Sylvania Ultra RT6 HO LED Recessed Downlight Kit is a universal input voltage 5- and 6-inch compatible solution that is optimized for new-construction and retrofit applications using compact fluorescent lamps. The downlight is now offered in a 0-10V dimmable 900-lumen version using 13W, in addition to a 1,500-lumen option. The new HO is available in 2700K, 3000K, 3500K, and 4000K color temperatures. It is designed to deliver light output comparable to traditional 1x18W, 1x26W, and 2x26W pin-based compact fluorescent luminaires. UL1598 listed and Energy Star qualified.

LEDTRONICS The company's latest series of UL-Listed LED Universal Retrofit Kits are true screw-in retrofit units for installation into nearly all existing lighting fixtures. The kits directly replace 80- to 1,500-watt HPS and metal halide lamps while using only 35 to 450 watts. They are designed with adjustability for a variety of applications and mounting options. The many available wattages each offer a choice of three color temperatures: Natural white (4000K), Daylight white (5000K), or Pure white (5700K). The kits operate on a wide voltage range of 100-277VAC; lamp luminosity ranges from 2,870 lumens (35W) to 50,765 lumens (480W).

ELB ELECTRONICS
The TTL/Biax Quick-Fit Linear LED replacement lamp is designed to save up to 40 percent in energy when compared with replacing standard 40-watt and 50-watt TTL fluorescent lamps using electronic ballasted lighting fixtures. Features a rotatable 2G11 end cap for applications where existing lamp socket is not perpendicular to the ceiling and directing illumination can enhance the space. Available in four standard color temperatures (3000K, 3500K, 4000K, and 5000K) and clear or frosted lens. Product does not flicker and is dimmable.

GE LIGHTING Lumination LED Luminaires take the form of thin, flat, minimalist plates of light, opening up new creative opportunities and offering the first true alternative to linear fluorescent lamps, according to the company. Product is designed to provide perfect uniformity of light, with no visible diodes or glare. It comes in opaque or transparent finishes, and recessed, suspended, and linear versions. The luminaires provide energy savings of up to 30 percent versus T5 fluorescents, the company says. Designed for T-grid ceilings.

STACK LIGHTING Responsive light bulbs using embedded sensors and learning algorithms enable lighting to automatically adjust itself based on presence or absence of daylight and occupants. A Stack mobile phone app allows user to change moods, set schedules and alarms, and access energy and retail analytics. Lights are built to last 30,000 hours. At maximum brightness, output of a Stack BR30 consumes 750 lumens and uses 13 watts of power.

FINELITE The Series 11 LED Micro Profile Cove Luminaire is available in three LED color temperatures — 3000K, 3500K, and 4000K — and comes in 2-, 3-, 4-, and 8-foot lengths. The LED light engine uses mid-powered LEDs and is designed to distribute heat properly to maximize LED life. Total output for a 4-foot model is 1,797 lumens (449 lumens/foot) and 19.6 watts (4.9 watts/foot). An optional telescoping light engine provides up to 12 additional inches of luminaire. A related product, the Series 11 LED Micro Flex Cove, uses connector cables to join 1-foot segments and makes curved cove illumination easy.

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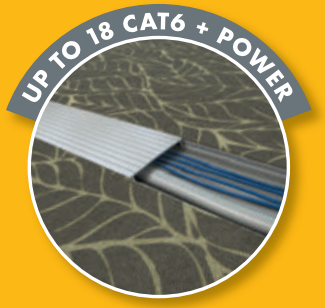

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» TCP The LED Sky Bay Luminaire is designed for most commercial and industrial applications and mounting heights up to 60 feet. It is available with either a 20,000- or 24,000-lumen package and in a 4100 Kelvin or a 5000 Kelvin color temperature. It is designed to replace fixtures equivalent to an eight-lamp T5HO linear fluorescent or a 400-watt HID. The company says Sky Bay offers a long life of 50,000 hours, and provides substantial energy savings over a traditional fluorescent or HID fixture.

» PIXI LIGHTING An enhanced line of LED FlatLight Luminaires maintains the thin 0.55-inch profile. Available in beveled and straight-edged bezels, the luminaires come in 2700K, 3000K, or 4000K CCT (or warm and cool) versions and, for commercial grade, in two sizes, 2-by-2 feet and 1-by-4 feet. Product offers a minimum 85 lumens per watt, certification by the DesignLights Consortium, a UL listing suitable for dry and damp locations, and cleanable diffuser plates. It is designed to enable lighting design innovations in tight spaces that cannot accommodate conventional LED luminaires that are 3 to 5 inches thick.

» AIR CYCLE The Bulb Eater 3 with Intelli Technology is the next generation of the company's lamp-crushing machine. The system crushes, in less than one second, spent fluorescent lamps of any length, u-tubes, and CFLs into 100-percent recyclable material, while capturing over 99.99 percent of the vapors released, according to the company. The system, mounted to a 55-gallon drum, can hold up to 1,350 4-foot fluorescent lamps. Five-stage filtering process removes hazardous particulates and vapors. New onboard controls include multiple sensing points that assist with machine diagnostics and maintenance/filter change outs.

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» USHIO The 30W Uphoria LED PAR38 narrow flood lamp, designed for high ceilings and long throws of light, offers 1,880 lumens of light in a 20-degree beam angle. The dimmable product is a high-power LED lamp which the company says offers substantial energy savings over high-wattage halogen lamps currently used in most high ceilings. Advanced heat sink design guarantees reliability and stability through proper thermal management, according to the company. The lamps carry a five-year warranty and a rated life of 50,000 hours, operate on 120V, and have a 3000K Warm White color temperature.

» LIGHT EFFICIENT DESIGN The LED8090M is a 120W HID retrofit lamp designed for parking lot and building-exterior applications where traditional shoe box, wall pack, and cobra-head fixtures are in place. The compact size fits most shoe box fixtures. Active cooling from an internal fan prevents heat issues in enclosed fixtures. Choice of optics are Type V (standard) along with Types III and IV. Built-in support brackets help eliminate "socket sag." Meets UL1598C.

» RAB LIGHTING Porto is an LED garage fixture that replaces up to a 175W metal halide with an efficacy rating up to 118 lumens/watt, providing substantial energy savings, according to the company. Optics deliver 20 percent uplight, eliminating the "cave effect" of a dark ceiling. A sensor enables a full range of code-compliant lighting controls. High/low settings, dimming delay, cut-off timing, and ambient light detection are adjustable for optimal efficiency using a wireless configuration tool. All PORTO models have a 100,000-hour LED lifespan, are UL listed for wet locations, and are protected from dust and water intrusion with an IP66 rating.

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CLOSE-UP: ENERGY INFORMATION

Energy Monitoring: Real-Time, Real Smart

by greg zimmerman, executive editor

Yes, it's true that you can't manage what you don't measure. But it's time to attach an addendum to that tried-and-truism. It's this: You can't manage what you do measure, but don't have a plan in place to act upon. These days it's easier to collect massive amounts of data than ever before, but if there's no strategy for how to use that data, having unmanaged data is just as bad as having none at all — in either case, nothing good happens. "Just looking at data on a computer screen won't change anything," says Jerome Conraud, energy manager at McGill University. "Success is a matter of creating methods and processes to analyze data and do something with it."

The smart grid, better technology, and less expensive submeters have all combined to make monitoring energy use in real time much easier — the benefits of which are many, from cost savings to identifying malfunctioning equipment quickly. The most successful real-time energy monitoring always begins with a plan of how the data will be used prior to plastering submeters willy-nilly all over a facility.

But where do you start? And how do you set up a system to reap the most rewards? Experts who have been successful in setting up real-time energy monitoring all have one common piece of advice: Don't bite off more than you can chew.

"It's about starting small and building sophistication over time," says Jay Black, director of sustainability for SL Green. "Become accustomed to dealing with this volume of data. Design, implement, learn, and repeat. We keep gradually improving to allow for new opportunities. It's a process of refinement."

20%

Reduction in energy use at McGill University since 2010 due in part to real-time energy monitoring.

> "Become accustomed to dealing with this volume of data. Design, implement, learn, and repeat."
> — Jay Black, director of sustainability for SL Green

Choose How to Manage Data

At his 40,000-student Montreal campus, Conraud has deployed more than 400 meters, an unmanageable number to monitor manually. "It's easy to be overwhelmed with data," he says. "So that's why you need a solution that can arrange data for you. That's what we did first. Before installing meters, we actively looked for a package to analyze data."

Keeping that software set-up manageable is important as well. "The imagination is the limit on these real-time monitoring systems, but then reality sets in," says George Paterson, manager of the Energy Control Center at the University of Iowa. His colleague, energy engineer Katie Rossmann, echoes this sentiment: "You can build something you think is really cool, but if it's not usable or if it's overly complicated, it won't be adopted. Don't keep yourself from being innovative, but be smart about where to spend resources and time."

What's more, just as with any piece of facility equipment, a key criterion to choosing how to manage data is how much maintenance of that data will be required — less is almost always more.

Indeed, the human element to managing real-time energy data shouldn't be underestimated. While it's important to minimize the time and effort required, it's also necessary to understand that

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"there's no such thing as a set-it-and-forget-it technology," says Black. Buildings themselves are like people — quirky and mercurial. "It takes time to get to know the buildings," says Conraud. So no matter how precise benchmarks and standards might be, it still takes a human to make a real-world judgment about what action is required.

And truly, no matter how simple a real-time monitoring system starts or how it evolves in complexity, the critical question about how effective a system will be is how the data can be used to effect positive results.

Benefits of Real-Time Data

"Data by itself doesn't accomplish anything," says Paterson. "You need to learn how to turn data into actionable information." Adds Rossmann: "You can write a million fault-detection rules, but if there is no process to respond and prioritize, then you're not successful. You can't magically fix a VAV box only because you've learned a valve is stuck."

The ability to respond to energy-wasting problems is the most important benefit of real-time energy monitoring. But the question often arises, how can I justify the cost of this complex system that doesn't use energy itself, and therefore has no direct return on investment?

For Paterson, this question represents outmoded thinking. Today, real-time data is as non-negotiable an ingredient to energy management as computers are to the average office worker. "This is an essential piece of infrastructure if you want to manage energy," he says. But still, devil's advocates may wonder what can be done with real-time energy data that can't be done with the energy data from the monthly utility bill.

Simply put, says Conraud, real-time data allows immediate action. "This is how we catch a ventilation system put on manual load when it shouldn't have been," he says. "In this case, a week of 24/7 operation could destroy the savings for a whole year." At McGill, Conraud is just wrapping up a five-year efficiency plan that started with the installation of meters and his real-time monitoring system. In that time, McGill has reduced its energy intensity by 20 percent and its greenhouse gas emissions by 29 percent. Conraud is now looking at implementing another five-year plan using the real-time monitoring data to find further ways to save energy, including implementing Six Sigma principles, as one possibility.

Immediate ROI

Yes, the benefits of real-time energy monitoring are many. And even if, from a cost perspective, you don't buy the "essential infrastructure" argument, Black offers another: immediate ROI. In his case, in New York City, installing the software and infrastructure in partnership with a third-party vendor (i.e., with no upfront cost) allowed his organization to take immediate advantage of incentives from the local utility for demand-response.

In regard to the question of real-time versus less-frequent interval, Black says real time is a no-brainer. "It allows for better decisions; decisions at a more granular level. If we don't have the incremental data, we couldn't make these decisions."

And that's the rub: The true benefit of real-time energy monitoring is allowing a continuous process of optimizing systems, detecting and correcting problems, and ultimately, saving energy.

You might even call this, as Black

The University of Iowa's Energy Control Center

The end goal for any real-time energy monitoring system might look like what's in place at the University of Iowa. There, a system of thousands of meters and at least 100,000 data points is constantly monitored and analyzed to identify problems and opportunities for greater efficiency.

This system is managed by a team of engineers and facility managers known as the Energy Hawks (Iowa's nickname is the Hawkeyes), and George Paterson runs the Energy Control Center, a physical control room of all the campus' energy data and analytics. Created in 2010, the Energy Control Center won APPA's Effective and Innovative Practices Award in 2012.

Paterson describes the Energy Control Center as "an actual room in our facilities department, but also a service we provide to gather data, cleaning and validating it, and creating reports for benchmarking. It's a hub of information centered around how we leverage data in facilities."

PHOTOS: UNIVERSITY OF IOWA

On the Energy Control Center's website, visitors can see real-time data for the energy use — electricity, chilled water, and steam.

In total, with the support of the Energy Hawks and the Energy Control Center, the University of Iowa is saving more than $1.5 million per year on energy costs, against its 2010 baseline. Its goal is to use no more energy in 2020 than it did in 2010, despite nearly $1 billion in new construction over the next several years, according to Paterson.

— Greg Zimmerman

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does, real-time commissioning. Or, similarly, as Rossmann calls her program, "an extension of retrocommissioning." And not only does real-time monitoring keep systems running smoothly, countering the argument that measuring in real-time and parsing the data takes more facilities staff time, it actually saves time, according to Rossmann and Paterson. If the data uncovers a problem or simply a more efficient way of operating, says Paterson, the solution is something that can be rolled out campus-wide. For instance, the campus has 900 air handlers, and every one has common information, he says. So standardizing operation can have a huge impact on savings.

> Today, real-time data is as non-negotiable to energy management as computers are to the average office worker.

'Templating' Ability

"Really try to focus on things that give you the most 'templating' ability or repetition," says Paterson. "This gives you the most bang for the buck."

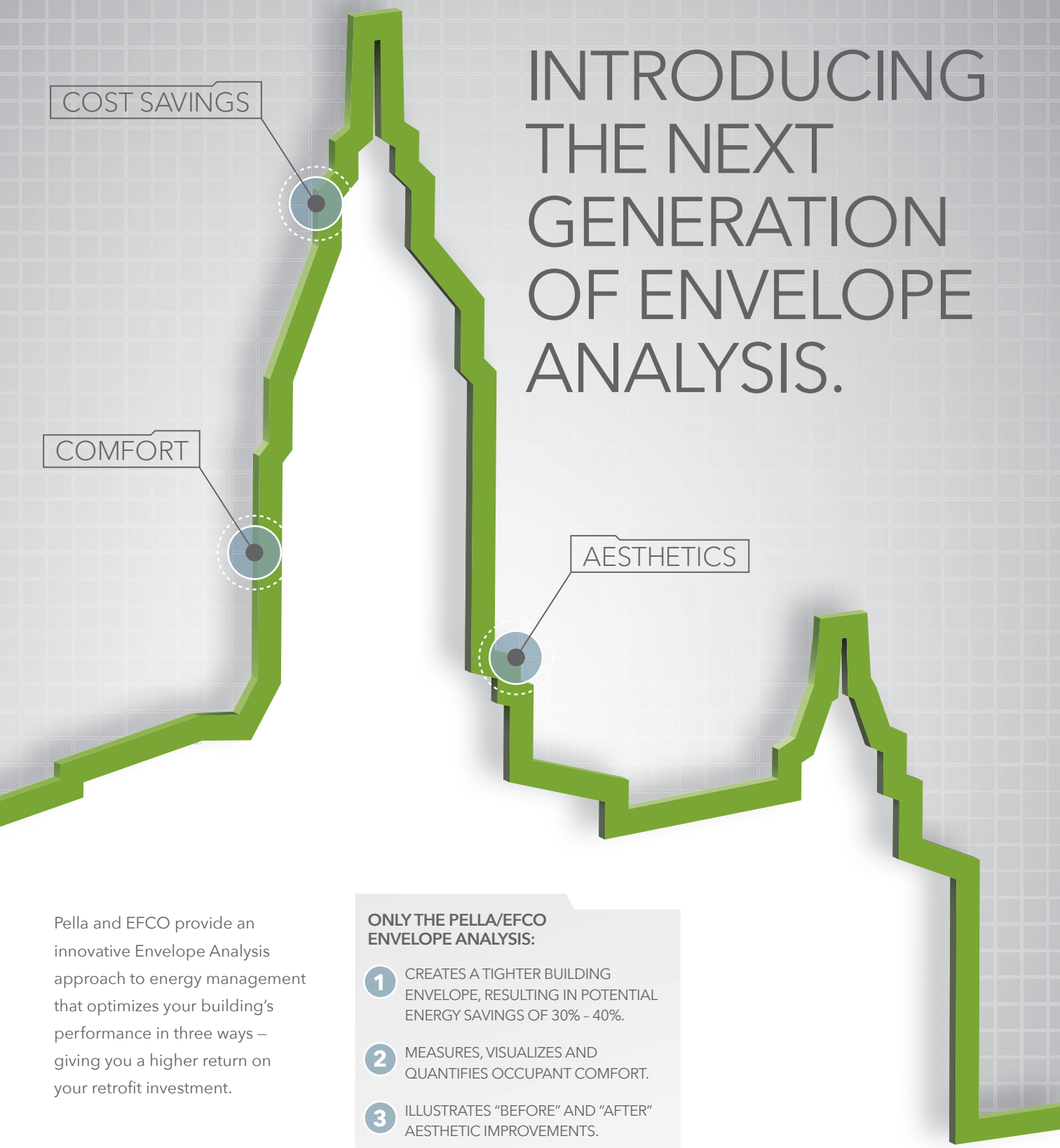
And finally, don't forget the humans. One of the benefits of real-time energy monitoring is showing building occupants and tenants not only how much energy a building uses in real-time, but also how much it's saved against a baseline — or how specific actions they've taken have resulted in energy savings.

For SL Green, New York City's largest landlord, Black says tenant energy use is "by far the lion's share of consumed energy." So allowing tenants to see in real time with a dashboard system "allows them to start questioning their own use — 'why are we using so much after everyone's left for the night or on weekends when no one's here?' "

Paterson says showing both students and university leaders energy use can be eye-opening for them. "Most people have no idea how much energy or money it costs to operate a building," he says. "This includes administrators of the university — they're astounded when we show them how many dollars per hour it costs to run a building."

So he says a huge benefit of the real-time monitoring is to show those who have influence over the budget exactly how and why, for instance, a lab uses more energy than an academic building, something obvious to him, but not to administrators. "People are smart; give them the information, and they'll figure out how to use it," he says. ■

Email comments to greg.zimmerman@tradepress.com.



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CLOSE-UP: ENERGY

Battery Storage Ready for Prime Time in Commercial Facilities

by naomi millán, senior editor

Facility managers are no strangers to the concept of energy storage at their facilities. Most any facility of size has a UPS with a bank of lead acid batteries to carry the critical load for the few minutes it takes the generator to kick on. It has been a vital, if humdrum, system.

But there has been a revolution in the world of energy storage, and the commercial market is poised for explosive growth in the adoption of energy storage systems behind the meter. This growth is driven by a variety of factors, such as plummeting hardware costs and skyrocketing demand charges.

The time to take a close look at energy storage systems for commercial applications is clearly now, but facility managers will need to do a bit of research to find the right contractor and solution for their facility.

Types of Energy Storage

In commercial facilities, what's hot is lithium ion. Sized up from what everyone already has in their cell phones, housed in enclosures around the size of a wardrobe, lithium ion battery systems have capabilities lead acid batteries simply do not. The first advantage is that they can cycle much more than lead acid. A lead acid battery system likes to be fully charged and store that energy for a long period of time. Lithium ion can be charged and discharged once, perhaps even twice, a day, and cycle at that rate for many years. Lithium ion is also more energy-dense than lead acid, allowing for a much smaller package.

Lithium ion technology has been around for years, but recent changes in the market have made it a viable solution for commercial facilities. "Just a few years ago, lead acid was the standard in the energy storage space," says Arjun Gupta, senior systems design engineer with UGE. "Large-scale production and demand has driven the cost down and opened up the market for lithium ion in this industry." Lithium ion cell prices have been dropping year over year, especially in the last two years, says Darren Hammell, co-founder and chief strategic officer with Princeton Power Systems. The industry, he adds, sees energy storage on a similar cost curve as solar was at its beginning.

Another battery storage technology that is just starting to move into the commercial market is flow batteries. The technology was developed by NASA in the 1970s. In a flow battery, energy is stored in a liquid electrolyte, and energy is added to or taken from the battery as the liquid literally flows through the cell. Because the liquid is separate from the cell, you can either add more cells to create more power or add more liquid to create more energy, says Tim Hennessy, president of Imergy, which manufactures vanadium flow batteries. With lithium ion technology, you have to add more cells regardless of which parameter you're trying to increase, which can result in oversizing the system either in terms of power or energy. Also, in the case of vanadium flow batteries, they can cycle endlessly because the electrolyte never wears out, says Hennessy.

The major drawback on flow systems is their size, which currently

43 minutes

Average duration of power outages in the United States in 2014.

Source: Eaton

Three Types of Batteries

Lead Acid
Pro: Holds a charge over long time, least expensive.
Con: Not compact, can't cycle often.

Lithium Ion
Pro: Compact, rapid, and frequent charge/discharge.
Con: Expensive when sized for very large loads/durations.

Flow
Pro: Long duration, potentially endless cycles.
Con: Big, expensive.

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can be as big as a shipping container, and their weight. And they tend to be expensive, though steps like using vanadium from steel manufacturing waste and designing batteries that don't need high purity levels can bring down the cost somewhat. Among these three battery technologies, lead acid is still the least expensive option on first cost.

Though batteries dominate the energy storage conversation in commercial facilities, other options have been on the market for years. One of these is thermal storage, such as ice storage systems. In these systems, instead of storing electrons, ice is made overnight to store cooling capacity, and this is deployed during the day, allowing for a cascade of benefits such as smaller-sized chillers and savings on the electric bill.

WOODSIDE HOTELS

Energy storage at the Lafayette Park Hotel & Spa in California has shaved total demand charges by 20 percent.

Energy Storage Applications

The primary use for energy storage in commercial applications is peak load shaving. Demand charges in some markets have risen dramatically in a short span of time. "In certain locations, like San Diego, the rate structure changed recently, so the demand charges increased by over 20 percent year over year over the last few years," says Hammell.

Battery storage systems are economically viable in regions where there is a sufficiently high utility demand charge on the commercial tariffs, says Carl Mansfield, general manager and co-founder of Sharp's energy storage division. "Right now, California is ground zero," he says. Hawaii, New York, and New Jersey are the states with demand charges significant enough to drive deployment of batteries. Other states such as Ohio and Colorado are close behind, with the industry expecting that demand charges will only go up nationwide.

Narrow peaks in energy demand at a facility set demand charges, and a 15-minute window sets the rate for the rest of the month, even if that peak is never hit again. Battery systems, specifically lithium ion, are particularly suited to shaving that peak by feeding their energy to the facility on a just-in-time basis. In addition to bringing down the peak demand charge, battery systems are typically charged late at night, when grid energy is usually least expensive, and deployed when grid energy is usually most expensive.

For that strategy to work, however, the battery system has to be able to monitor the facility's energy use and anticipate when a peak will be set. In addition to lithium ion cell costs coming down, the other salient factor in the viability of the solution is the development of complex (and proprietary) algorithms and control mechanisms that use historical energy use data at a facility and are also self-learning.

One adopter of this technology, the Lafayette Park Hotel & Spa in the San Francisco Bay Area, installed an "intelligent energy storage system," as it is called by the manufacturer, this past spring to help address the high peaks set by summer cooling demand as well as banquet-driven kitchen energy use. Nick Bozych, vice president of Woodside Hotels and general manager of the Lafayette Park Hotel & Spa, says that so far the demand portion of the hotel's bill is down by around 20 percent of total demand charges, which is around 10 percent off his total bill. "It was an easy way to lower the operational costs for the hotel," he says, adding that it requires no change of operations.

Solar Power Connection

Another application for energy storage is for use with onsite renewable generation, currently driven by photovoltaic installations. PV installations by themselves address overall energy charges at a facility, but they can't necessarily address peak demand. By pairing solar with storage, you get a holistic solution, says Bob Rudd, director of energy project development, energy storage, Solar City. Rudd adds that in facilities where the PV system is large enough to be able to charge the batteries at least to 75 percent, there are federal tax credits available, because at that point the two systems are considered to be operating as a single asset.

To be clear, in a typical PV plus storage system, the battery storage is still likely being charged by the grid at off-peak rates and being deployed to shave peaks in demand, while the PV system is helping to supply the base load. The possibilities for system configuration are limited by local utility tariff structures and regulations, engineering prowess, and available capital at a facility.

Improving Resilience

Energy storage starts speaking as well to resilience. According to research from Eaton, the average duration of a power outage in 2014 in the U.S. was 43 minutes. Bob Magyar, product marketing manager for VARTA Storage, says facility managers should consider whether it makes economic sense to fire up a diesel generator for that duration. "Would it make more sense to install a (storage) system that can handle the load for 30 minutes, 60 minutes, or two hours? If we get beyond that, then we'll switch over to the generators," Magyar says. Different systems and chemistries could provide a range of backup capacity. However, a battery without a fuel resource is an inherently shaky backup power solution, says Rudd.

It is still early days for energy storage in commercial facilities, and in the future facility managers should expect to see aspects like enhanced demand response and monetized grid services become available as options. With the systems and structures available today, for facility managers in areas of the country with high demand charges and narrow peaks in energy use, or those in areas where the local utility is incentivizing grid resilience, it is a good time to have your facility evaluated for energy storage system suitability. Just do your homework. A lot of new players are coming into the market, so pick a company that will be able to support the system for the decade to come. ■

Email comments to naomi.millan@tradepress.com.

LEGAL NOTICE

If You Purchased a Product That Contains Flexible Polyurethane Foam, Such as a Mattress, a Couch, or Carpet Underlay, You Could Be Eligible to Receive Money by Participating in Nine Proposed Class Action Settlements Valued at $151,250,000.

TO DETERMINE IF YOU ARE ELIGIBLE TO RECEIVE MONEY, READ BELOW.

YOUR LEGAL RIGHTS ARE AFFECTED.

PLEASE READ THIS NOTICE CAREFULLY.

To File a Claim, Visit www.PolyFoamClassAction.com

Para una notificación en español, llamar o visitar nuestro website.

Who is paying the settlement money?

A lawsuit known as *In re Polyurethane Foam Antitrust Litigation*, Case No. 10-MD-2196, is pending in the United States District Court for the Northern District of Ohio in Toledo. The Court previously approved Settlements with two Defendants in the lawsuit: Valle Foam Industries, Inc. and Domfoam International, Inc.

Additional Settlements have now been reached with the following Defendants: (1) Carpenter Co., (2) FFP Holdings LLC, (3) Future Foam, Inc., (4) FXI Holdings, Inc., (5) Hickory Springs Manufacturing Company, (6) Leggett & Platt, Incorporated, (7) Mohawk Industries, Inc., (8) Vitafoam (Vitafoam Products Canada Limited, and Vitafoam, Inc.), and (9) Woodbridge (Woodbridge Foam Corporation, Woodbridge Sales & Engineering, Inc., and Woodbridge Foam Fabricating, Inc.). Together, these "Additional Settling Defendants" will be paying a total of $151,250,000 into the Settlement Fund. There are no other Defendants that have not settled.

What is the lawsuit about?

Several individuals and businesses ("Plaintiffs") brought claims on behalf of a Class of end-user "indirect" purchasers of products that contain flexible polyurethane foam manufactured or supplied by the Defendants. These products include bedding (for example, mattresses, mattress toppers, or pillows) carpet underlay (also called carpet padding or carpet cushion), and upholstered furniture (for example, a sofa with foam cushions).

Plaintiffs claim Defendants engaged in a conspiracy to: (i) increase prices of flexible polyurethane foam and (ii) not compete for, or "allocate," customers. Plaintiffs contend Defendants violated numerous States' antitrust and consumer protection laws. Defendants deny these claims and deny they are liable to Plaintiffs in any way. The Court has not decided who is right.

Who is included in the lawsuit?

YOU are included in the lawsuit and may be entitled to money **IF**:

1. You purchased one or more of the following products containing flexible polyurethane foam that was manufactured in the United States: upholstered furniture (such as a couch with foam cushions), carpet underlay (foam padding), or bedding products (such as a foam mattress or pillow), *and*
2. You are the end-user of the product that you purchased, meaning you did not buy it for resale to someone else, *and*
3. You made your purchase in AL, AZ, CA, CO, DC, FL, HI, IL, IA, KS, ME, MA, MI, MN, MS, MO, NE, NV, NH, NM, NY, NC, ND, OR, RI, SD, TN, VT, WV, or WI, *and*
4. You made your purchase during the time period January 1, 1999 to August 1, 2015.

What do the Settlements provide?

Defendants in the nine Settlements will pay a total of $151,250,000. If the Plan of Allocation is approved by the Court, payments will be made to each Claimant from each Settlement *pro rata* based on the number of valid claims filed and the amounts paid for qualifying products. You can obtain more details about the Plan of Allocation at www.PolyFoamClassAction.com, or by calling 1-866-302-7323.

The Settlement Fund may also be used to pay for: (1) the cost to administer the Settlements, (2) attorneys' fees, costs, and expenses, and (3) awards to Class Representative Plaintiffs. Plaintiffs' counsel will request attorneys' fees not to exceed thirty percent (30%) of $151,250,000, plus reimbursement of costs and expenses. The Court will then decide a reasonable fee and expense award.

How can I get a payment?

You must submit a Claim Form to get a payment. You can submit a claim online or by mail. The deadline to submit a claim is **FEBRUARY 29, 2016**. Claim Forms are available at www.PolyFoamClassAction.com, or by calling 1-866-302-7323.

Who represents you?

The Court has appointed Marvin A. Miller of Miller Law LLC to represent the Plaintiff Class.

What are your options?

1. Participate. If you made purchases that include you in this lawsuit and you do *not* timely request to be excluded from the Settlements, then you will automatically be bound by the terms of the Settlements. You will also be legally bound by all orders and judgments of the Court. You will not be able to sue the Additional Settling Defendants in any other lawsuit for conspiring to fix prices or allocate customers of flexible polyurethane foam. In order to get a payment from the Settlement Fund, you must submit a Claim Form.

2. Don't Participate. If you do not want to be a part of one or more of the nine Settlements, you may request to be excluded. If you are excluded from a Settlement, you will not be bound by or benefit from that Settlement, or any other Court orders relating to that Settlement, but you will keep your right to sue or resolve your claims on your own against that Additional Settling Defendant. To see the requirements for submitting a valid request to exclude, visit www.PolyFoamClassAction.com, or call 1-866-302-7323. **Requests to exclude must be in writing and received by NOVEMBER 25, 2015**.

Court Hearing

The Court will hold a hearing to decide whether to approve the nine proposed Settlements. The hearing will be on **DECEMBER 15, 2015, at 10:00 a.m.** at the Ashley U.S. Courthouse, 1716 Spielbusch Avenue, Toledo, Ohio 43604. The Court may change the date, time, or location of the hearing. To obtain the most up-to-date information regarding the hearing date and location, please visit www.PolyFoamClassAction.com, or call 1-866-302-7323.

If you choose to participate in one or more of the Settlements, **you may object to or comment on those Settlements in writing by NOVEMBER 13, 2015**. You or your own lawyer may appear and speak at the hearing at your own expense. To see the requirements for filing an Objection, visit www.PolyFoamClassAction.com, or call 1-866-302-7323.

Do you have questions?

If you have questions, want more details, or want to see other documents describing this lawsuit and your rights, visit www.PolyFoamClassAction.com, or call 1-866-302-7323.

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PLEASE DO NOT CONTACT DEFENDANTS OR THE COURT FOR INFORMATION REGARDING THIS LAWSUIT OR THE SETTLEMENTS.

COVER STORY

Road TO THE TOP

For Lenny Jachimowicz, a continuous self-improvement ethic led him from plumber's helper to global vice president at Marriott

by ronald kovach, managing editor

At age 19, Lenny Jachimowicz, one of seven children of a Philadelphia cop, was already a kid full of energy and drive, and with an affinity for multi-tasking. He was working three jobs: playing drums in a band, running the plumbing business his uncle had passed along to him, and working as a maintenance helper at a Marriott hotel. In 1972, the hotel was one of only a dozen or so Marriotts in existence. "There was a guy walking behind the plumber carrying a plunger — that was me," is how he tells it. He was learning how to take chemical readings and blow down the boilers, educating himself about boiler room systems. For the spirited Philly kid, it was fascinating stuff, and it was the start of a journey that would take him "from boiler room to boardroom."

Today, Jachimowicz, as vice president of engineering, facilities and guest experience, global operations, for Marriott International, is responsible for about 2,000 hotels, and Marriott, by one reckoning, has become the third-largest hotel company in the world by number of rooms (660,000). And now, with 43 years at Marriott, Jachimowicz is an unusual study in how to get way ahead in facility management and operate effectively at a high level for a long time — all without a formal college degree. In his case, it seems, the success ingredients were intellect and curiosity, a commitment to educating himself and broadening his skills, polished people and presentation skills, and a passionate brand of leadership. The guy commands a room.

PHOTOS: DAVID EVANS, MARRIOTT CREATIVE SERVICES

Jachimowicz's arena — the hospitality industry — presents special challenges to a facility manager. The happiness and comfort of millions of constantly changing customers is king, and everything is a 24/7 operation. "For someone paying $500 a night in a Ritz-Carlton," he says, referencing one of Marriott's 19 brands, "that building's got to be right, things have to work, the experience overall has to be spot-on."

Big-Picture Guy

It's a very complex business. Marriott itself owns very few of its properties; instead, it manages for other owners, typically under long-term management contracts. It is also a franchise company, where a building has Marriott's brand but is managed by others.

The company, which earned about $14 billion in revenues in fiscal 2014, has a global empire of 4,300 properties scattered among 81 countries and territories. Jachimowicz is paid to be a big-picture guy, developing strategies and leading development for both managed and franchised hotels in key areas such as engineering and facilities, guest experience, and in-room technology (specifically focusing on entertainment). His main facilities areas encompass asset management, which includes preventive maintenance and capital planning, and human capital development, which includes training, changing demographics, compensation, and recruiting. Another area is energy and sustainability, and here the company's targets are to reduce both energy and water consumption per occupied room by 20 percent by 2020, compared to a 2007 baseline. Other areas of responsibility: improving facility efficiency and risk management.

> "Leadership is stretching yourself; it's being a visionary when everyone else is living in the present. I love the phrase 'What if?' "

Looking for Results

Although he's worked in the facilities arena for his entire career, Jachimowicz makes a point of saying he's not a facilities person, but a business person with a technical background. For him, it's more than a difference of semantics. "Everything I do in the facilities space," he says, "has got to be sanctioned with some kind of business result, otherwise why are we doing it?" To get a project funded is one thing, but what the money people really want to hear, he says, is the facility manager saying: "And it will drive this business result...."

That's an essential perspective for facility managers. "You're here for a reason: If you're in an office building, they're renting this space to make money," Jachimowicz says. "You're a small part of something bigger going on here; so how do you support that?"

Facility managers cannot afford to think narrowly and present poorly. "Many of those I meet," he says, "do not do a good enough job of presenting themselves in a situation where they're talking to somebody they're asking for money. Hone up on your presentation skills, your body language, the way you use words in certain contexts."

To anyone who says executives don't care about facili-

DAVID EVANS, MARRIOTT CREATIVE SERVICES

The Lenny Jachimowicz File

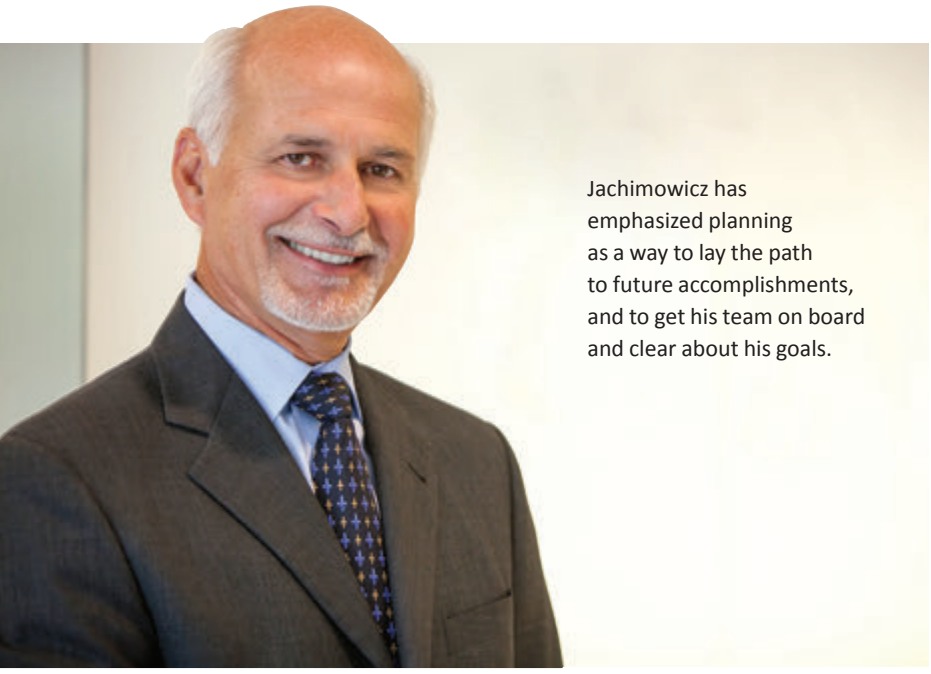
He is married, has a son, a daughter, a stepdaughter, and four grandchildren. In 1988, after 24 years of marriage and two children, his first wife, in perfect health, died suddenly from complications of the flu. He later remarried.

He credits his late mother, in large part, with giving him a strong sense of core values. For a time in his Philadelphia youth, he says, she'd raise seven kids by day, make sure they were fed and their homework was done, then head off to work in a bakery at night. He says her memory of young Lenny would be this: "From the day you could walk, you were into everything, you were inquisitive, you were a bit on the rebellious side. You were my black sheep, 'most likely not to succeed,' but you always had drive.' "

He started boating at 16, and now keeps a 27-foot speedboat on Chesapeake Bay. He also enjoys fishing, wine, snow skiing, running, spending time with the grandkids, and traveling with his wife.

He has an active bucket list and a clear-eyed view of what he wants to accomplish. His wife says he checks two goals off and puts three new ones on. He's attended a Super Bowl, fished for salmon in Alaska, skied almost every mountain in Colorado, and taken a cooking class in Italy. In December, he plans to captain a chartered boat and island-hop with friends around the British Virgin Islands.

— Ronald Kovach



Jachimowicz has emphasized planning as a way to lay the path to future accomplishments, and to get his team on board and clear about his goals.

DAVID EVANS, MARRIOTT CREATIVE SERVICES

ties, Jachimowicz has a direct answer: "They're not going to care, unless you give them a reason to pay attention.

"It's common sense, isn't it? You want to make sure you are looked at as a professional and you are a person who can go beyond the boundaries of your core competencies and discipline. You are a person who takes an interest in the world outside of facilities and engineering."

Jachimowicz's broad perspective has led to a broad range of accomplishments. His colleagues say he built the structure of engineering at the company, emphasized training, and has been a strong leader and mentor. While not alone in his efforts, Jachimowicz says he played key roles in building a global platform for asset management and preventive maintenance, spearheading a three-year technology roadmap for facilities, and implementing a global structure for energy reporting and other energy programs.

His achievements aren't limited to what might be considered traditional facility management areas. He is especially proud of brokering a deal with RedVector to establish an ambitious global training program called eCampus, which offers his staff self-training and advancement through the use of hundreds of online modules. He also led this year's licensing agreement giving guests at select Marriott hotels direct access to Netflix.

Rising Through the Ranks

When Jachimowicz took his first Marriott job as a Philadelphia teen, it was a far different era. In expressing mild regret about not finishing a college degree in his youth, he says his career path probably wouldn't be possible today. Back in 1972, he says, the company was young, with few hotels. If you were good, you could move through the ranks, from job to job — in his case, working his way through the maintenance ranks to senior mechanic, then assistant chief engineer, chief engineer, and up from there. "Marriott is all about your performance," he says. "Once you get in the door here, if you perform and you're a contributor on a regular basis, you'll be recognized and rewarded for the work."

He's more than made up for the lack of a formal degree by taking business courses, attending Hofstra University Continuing Education, graduating from Marriott's Executive Development Program, and following a lifelong pattern of self-education. "I don't feel as though I can't hold my own in a room," he says. "And really I meet some brilliant people. I'm not intimidated by them; I'm energized by them."

To which his former Marriott colleague John LaHaise says, "He shouldn't feel intimidated — he can stand up against anybody in the business." LaHaise, now owner of Cooper Solutions, adds, "He knows everything about the business. But he's not an arrogant person, not a know-it-all at all. He's very kind and considerate. He just makes you feel good."

For another longtime colleague, Robert Jones, a vice president of engineering and facilities at Marriott International, Jachimowicz endears himself to coworkers because he has never forgotten his roots. In the morning, he says, the one-time "plumber from Philadelphia" can have an inspirational, funny talk with hourly engineers, then that afternoon turn a switch and conduct himself effectively in a meeting with CEO Bill Marriott about multi-million-dollar engineering decisions.

A Self-Improvement Ethic

A key to his career, Jachimowicz says, has been a constant desire to learn one new thing every day, then apply it and build on it. For him this can be as simple as, say, learning the language of marketing so he can have an engaging conversation with those colleagues. Or it can be his desire to understand a term someone uses in a meeting — e.g., "cap rate," "API," an acronym — or to emulate someone's presentation style. "I'm not ashamed to say, 'I don't know what that means; you're an expert, explain that to me,' " he says.

Jachimowicz peppers his conversation with references to learning experiences. One month he's at the Rocky Mountain Institute learning from scientist Amory Lovins about renewable energy; the next, he's absorbing project management theory from Arizona State University's Dean Kashiwagi. He recently took his Marriott team to a NASA facility to meet with Nobel Prize-winning astrophysicist John C. Mather and see the James Webb Space Telescope that's being built there. "We learned about detail, we learned about focus, making sure that things get done right the first time," he says. "It really energized my team."

Jachimowicz uses an annual professional development plan to continually reinvest in himself. "I tell people it's the greatest gift you can give yourself. Go find someone who impressed you, someone you want to aspire to be more like, and build a relationship with that individual or someone like them." Jachimowicz has created small internal and external circles of such go-to people. "These are people I bounce ideas off, these are people that inspire me, that I can

call up when I have a problem and say, 'Hey, have you run across this before? How would you handle it?' "

Jachimowicz says he thrives on additional challenges. For example, his Marriott responsibilities now include the entertainment side, especially in-room television, and that has meant a big new area to learn.

"Lenny has really done a fantastic job of reinventing himself," Jones says. Jachimowicz heard what the people in the field were saying about efficiency and took the lead in technology, he says. "The systems we have today for doing preventive maintenance, rounds, inspections, the devices we're using, getting away from paper and clipboard — Lenny was inspirational in making all that happen."

Jachimowicz advises facility managers to be astute enough to sell their successes, and to capitalize on opportunities to appear in front of senior executives by describing positive results and what is driving them. "Go in with a little crib sheet and any time you see an opening, put a plug in," he says. His example: "Here's our technology roadmap around the customer service side. We're here; then next year we're going to start developing to get here; with the end goal in 2018 of being here."

Becoming a Leader

His parting advice for facility managers is that they get outside their comfort zone and be active learners. "Don't only speak the language of facilities and maintenance," he says. "Speak the language of finance. Take an interest in some of the key words. When someone uses a phrase in a meeting that you don't know, go find out about it, educate yourself."

Jachimowicz's drive and passion are perhaps most evident when he talks about leadership and his job philosophy. "What is leadership?" he asks. "It's raising your hand when no one else will volunteer; it's leading by example; it's creating this environment for others to be successful; it's stretching yourself; it's continuing to reinvest in yourself so you're one step ahead of everyone else; it's being a visionary when everyone else in the room is living in the present. I love looking out into the future. I love the phrase 'What if?' "

The goal of continuous improvement, he says, is an abiding goal of his — "raising the bar, challenging yourself, making the environment around you better. I have a phrase I live by: My job now is to create an environment where everyone around me can be successful. If I can do that every day, and people around me are rising and aspiring and moving to a higher level of performance, then I feel really good when I go home at the end of the day." ■

Send questions and comments to ronald.kovach@tradepress.com.

DAVID EVANS, MARRIOTT CREATIVE SERVICES

Building Out the Vision

The hospitality industry is a dynamic field, with new competitors and changing customer expectations. Jachimowicz's job is helping to make sure the company is well-prepared.

"I'm looking out ahead three to four years on behalf of the company," Jachimowicz says, "making sure we're mitigating every potential risk exposure point we can. My team is really building out the vision, the long-range plan, and, in collaboration with the continent leaders, handing it over for execution by the continents." For example, he says, what should the company do in energy and sustainability? "How can it get more solar and renewable projects into its buildings, and how can we build a strategy around that?"

A key to forward thinking and leadership, Jachimowicz says, is planning. "I have to be able to talk about what's going to happen in 2016, and if we do that well, what that will set us up to do in '17 and '18. Planning is the cornerstone of getting people on your team to understand the end game, to rally to the cause, to be aligned and clear on what you're asking them to do, and it also will lay out the deliverables: How do we know when we get there? This fly-by-the-seat-of-your-pants thing — that worked in the '70s. It doesn't work today."

— Ronald Kovach

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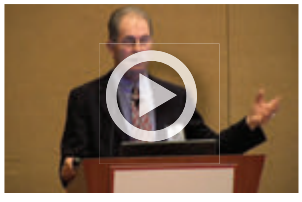

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FM PULSE

Changing of the Guard

Facility departments are starting to plan for life after the Baby Boomers

by maryellen lo bosco, contributing editor

FM Offers a Stable Career ...

... but will a slow career path be a detriment to recruiting and retaining younger professionals?

Only **13%** of FMs expect a ***promotion or new job*** in the next year

86% of FMs say that ***opportunities to advance*** are **VERY SLOW** (56%) or **SOMEWHAT SLOW** (30%)

Only **6%** have been ***downsized*** out of a job

Only **9%** say ***lack of opportunity to advance*** is their biggest job-related concern

It's a retirement juggernaut: some 76 million Baby Boomers (or a quarter of the population) systematically exiting the workplace. That's a challenge in many fields, but particularly so for facility management. Facility managers in both managerial and technical and trade positions tend to stay in their jobs for long periods of time and accumulate a great deal of institutional knowledge. So a big challenge for facility management organizations is to figure out how to transfer that knowledge and maintain continuity in the institution's culture.

While some facility managers are more than a little concerned about the Boomer exodus, many are not. Citing a recent survey of the general marketplace done by the Robert Half organization, which found that some 63 percent of chief financial officers were unconcerned about retirements, Stormy Friday, founder and president and owner of The Friday Group consulting firm, confirmed the lack of urgency based on her own research. Only about half of facility management organizations have a plan for coping with Boomer retirements, she says. "Facilities organizations are less concerned than people in human resources, facilities management consulting, and in the external placement world, but they are beginning to realize it is an issue." Friday predicts that up to 60 percent of facility management staff — electricians, plumbers, HVAC mechanics, and operations and maintenance workers, among others — will exit in the next five to seven years, with potentially serious problems for organizations.

When people retire, the loss of institutional knowledge can be devastating. "In the trades, for example, people are there for eons — up to 45 years — and many practices and processes are undocumented," explains E. Lander Medlin, executive vice president

ABOUT THE SURVEY

Information for the survey was gathered through a series of emails from FacilitiesNet, the website of *Building Operating Management* and *Facility Maintenance Decisions* magazines. Data were submitted during May, June, and July 2015 and included 3,020 responses. Salary and raise information is reported as the median amount. The median is a measure used to indicate a middle point of data. Half who responded earned less than the median, while half earned more. Numbers that are extremely high or low do not distort it. Some charts may not add to 100 percent because of rounding.

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of APPA, Leadership in Educational Facilities. "How people will transfer knowledge is a problem. Institutional memory walks out the door."

Succession planning has been an issue for at least 10 years, in both management and the trades, says Larry Morgan, senior facilities manager at SAP. "Legacy knowledge is falling off the table," he says, and the gap is being filled through outsourcing contracts. "A body is being replaced by a body," he says, but "there is no transfer of legacy knowledge and relationships."

One reason facility departments haven't been hit harder by Boomer retirements so far is the sluggish economy. People are working longer because they are living longer and are afraid of running out of money, says Friday.

There are many things organizations can do about the brain drain, once they put some attention to it. Nancy Bechtol, director of the office of facilities engineering and operations at the Smithsonian Institution, lost 107 people in 2014 — with 60 percent of them leaving as retirees. She says there are many ways to pass on institutional knowledge, including hiring a new person before the retiree leaves and then overlapping for several months. The person who knows the job might be assigned elsewhere but is still available to transfer knowledge.

"In the federal government there is part-time work, so we can get a retiree to work part-time for a while to transfer knowledge to the new person," Bechtol says. "We have great success with part-time or half-time work. People want Friday and Monday off. Sometimes two part-time retirees can get the job done. The Boomers want to retire from the grind but do not want to totally retire. You can retain the Boomers for another 10 years in this way."

The Smithsonian also works on getting institutional knowledge into procedural books. "Tasks are put in a book with some history and background on how things are done," she says. That's especially important with operating equipment when the same person ran it for 30 years.

In a similar vein, some organizations encourage senior managers plan-

Article continues on pg. 33, after regional supplement.

Salaries by Job Title

Asset Manager
Median salary: $93,444
Salary range: $53,450 - $125,000
Median raise: $1,900
Bonus eligibility: 47%
Median bonus: $1,381

Building or Facility Manager
Median salary: $80,000
Salary range: $22,000 - $210,000
Median raise: $1,500
Bonus eligibility: 42%
Median bonus: $5,000

Construction Manager
Median salary: $86,000
Salary range: $45,000 - $140,000
Median raise: $1,880
Bonus eligibility: 54%
Median Bonus: $1,825

Director of Physical Plant
Median salary: $80,000
Salary range: $48,000 - $310,000
Median raise: $2,000
Bonus eligibility: 27%
Median bonus: $1,000

Energy Manager
Median salary: $80,000
Salary range: $40,000 - $150,000
Median raise: $1,900
Bonus eligibility: 34%
Median bonus: $2,650

Facilities Coordinator/ Supervisor
Median salary: $60,000
Salary range: $25,000 - $160,000
Median raise: $1,200
Bonus eligibility: 37%
Median bonus: $1,500

Plant/Ops Manager
Median salary: $72,500
Salary range: $22,256 - $154,000
Median raise: $1,500
Bonus eligibility: 35%
Median bonus: $2,000

Project Manager
Median salary: $80,000
Salary range: $31,000 - $145,000
Median raise: $1,300
Bonus eligibility: 48%
Median bonus: $3,000

Property Manager
Median salary: $80,300
Salary range: $30,000 - $180,000
Median raise: $1,500
Bonus eligibility: 72%
Median bonus: $5,550

Real Estate Firm President/CEO/COO/GM
Median salary: $122,500
Salary range: $35,000 - $1,200,000
Median raise: Not available
Bonus eligibility: 58%
Median bonus: $15,000

VP/Director of Facilities
Median salary: $102,000
Salary range: $30,000 - $256,000
Median raise: $2,000
Bonus eligibility: 43%
Median bonus: $6,000

VP/Director of Facilities Engineering
Median salary: $110,000
Salary range: $40,000 - $190,000
Median raise: $2,000
Bonus eligibility: 56%
Median bonus: $9,500

VP/Director of Real Estate
Median salary: $150,000
Salary range: $75,000 - $250,000
Median raise: $2,200
Bonus eligibility: 82%
Median bonus: $15,300

VP/Director of Building/Plant Services
Median salary: $100,500
Salary range: $50,000 - $175,000
Median raise: $2,000
Bonus eligibility: 30%
Median bonus: $2,500

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Minding the *details*

When the Owensboro Health leaders decided it was time to build a new facility, they made the decision to use the Integrated Project Delivery (IPD) method (page 3). The extra work required in the initial phases of IPD paid off later in every detail of the project, allowing the team to maximize benefits to the patients while keeping the schedule and bottom line healthy.

Design details and material choices are especially important when the physical environment plays an integral part in the treatment. For instance, the design decisions in recent behavioral health projects (page 7) needed to balance a focus on the safety of vulnerable patients with creating a comforting a warm, comfortable setting.

For more project news and other key information for healthcare facilities professionals, be sure to visit healthcarefacilitiestoday.com

Best regards,

Editor
Cathryn Jakicic
cathy.jakicic@tradepress.com

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HALKIN/MASON ARCHITECTURAL PHOTOGRAPHY L.L.C.

Integrated Project Delivery creates collaboration and builds value into design

By Kimberly Bonvissuto / Special to Healthcare Facilities Today

When Owensboro Health leaders decided it was time to start over and build a modern, new facility that would revolutionize patient care quality, they looked into – and eventually bought into – the Integrated Project Delivery (IPD) method.

In 2013, the health system opened Owensboro Health Regional Hospital, a nine-story, 477-bed, 780,000-square-foot hospital that replaced the existing 359-room Owensboro Medical Health Center in Owensboro, Ky. The new hospital sits on a 145-acre campus that includes the nine-story tower, three-story diagnostic and treatment building, Emergency Department, Women's Center, Heart Center and Outpatient Diagnostics Center.

IPD

The project team – Smith Seckman Reid Inc. (SSR) in Nashville, Tenn.; HGA Architects and Engineers in Milwaukee, Wis.; construction manager Turner Construction in Nashville; and Owensboro Health – worked under an IPD contract that set a guaranteed maximum price of $385 million. The IPD method incentivizes all of the parties to work together on the same contract rather than under individual contracts to the client.

"What that does is, instead of having incentive for themselves and only wanting to protect themselves if something goes wrong, they are really protecting each other," said Tim McCurley, director of project management for CBRE Healthcare (formerly KLMK Group Inc.), the owner's representative on the project. "IPD is a value-based virtual business. You're looking at outcomes that you want, developing a core group that works as an investment committee and runs the project as they would a business."

McCurley said the IPD model brings more talent to the table in a more accountable structure that provides better information earlier in the process. That makes all parties willing to make decisions in a more accelerated timeframe.

Owensboro Health project used IPD method to redefine idea of patient care

The IPD team had an incentive structure based around not just meeting the schedule, but on meeting certain goals, including completing the project earlier than the proposed timeline, meeting and beating budget goals, and exceeding safety guidelines.

"The IPD provided a single focus for all parties involved in the project. Everyone had skin in the game and everyone had a singular purpose to produce the best facilities for delivering high quality, safe, and cost-effective care. The patient was at the center of the project and the clinicians provided invaluable input in the design of their respective areas to accomplish the goals and objectives the patient experience needed to deliver," according to Greg Strahan, Owensboro's chief operating officer.

"Each member of the IPD team was engaged and they interacted with each other to accomplish the goals and all

looked at the challenges of the project as an opportunity to deliver a better product regardless of the change requested. It became an expectation that the team solved all problems as a group for the project and not for the individual team member. The question of 'What is best for the project?' was the driver and the second question 'Is it the best solution and will the owner get a better value?'," Strahan said.

Mark Bultman, HGA project manager, said the IPD method was a "wonderful collaboration" between the partners on defining the anticipated scope of the project in great detail early on, assigning budget numbers to that, and having the ability to design within those targets.

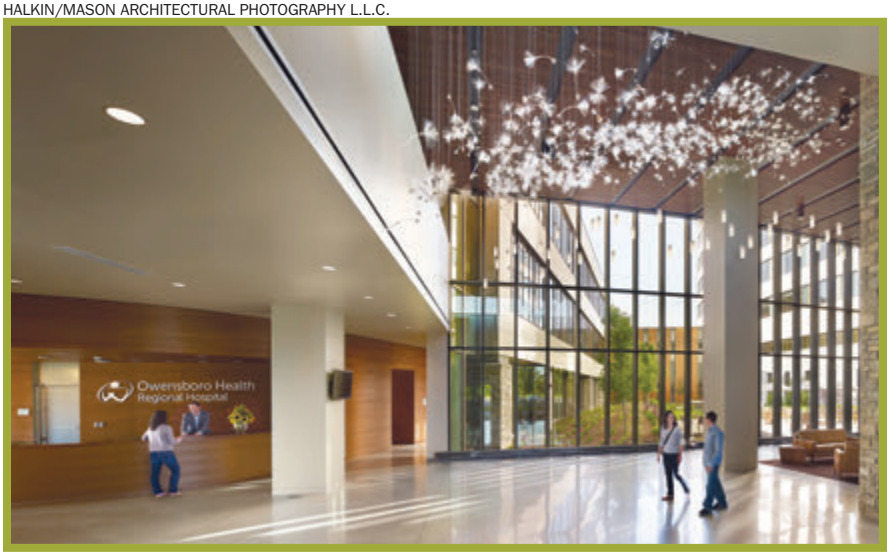
"It was empowering," Bultman said. "We could make decisions knowing that we were staying within budget. If we had a new idea or something that would take us in a new direction, we could interact with other partners, get feedback quickly and determine if we could afford to do that. It eliminated a lot of waste – budgetary and re-design time."

John Alsentzer of SSR said the agreement between the contracting parties was an Integrated Form of Agreement (IFOA) that fostered a positive partnership with all firms working toward common goals. IFOA is an agreement with shared risks and rewards aligned with the interests of the parties that supports lean design principles.

"It is time intensive to get to an agreement legally about the expectation of each member," Strahan said. But the work you put into getting a project on an IPD agreement will pay dividends in the money saved and the quality of the project if the team members are appropriately engaged and committed to work together as a group."

The IPD team, Alsentzer said, assisted the owner with their primary goals of providing a state-of-the-art healthcare facility that was delivered under budget and ahead of schedule.

HALKIN/MASON ARCHITECTURAL PHOTOGRAPHY L.L.C.



The new hospital sits on a 145-acre campus that includes a nine-story, 477-bed tower.

Lean principles

"IPD is relational, collaborative and lean," McCurley said. "By its very nature, you're trying to drive out waste. Waste in a construction project means missed opportunity for the owner and profit for the people doing the project."

Merrill Bowers, project executive at Turner Construction, said lean design concepts – working to eliminate waste, continuously improving, maximizing customer value and respecting people – go hand-in-glove with IPD. He said IPD is the "great enabler" that allows teams to eliminate common inefficiencies and waste that are inherent to traditional project delivery due to risks, restrictions and impediments imposed by segregation of team members.

"IPD is a value-based virtual business"

— TIM MC CURLEY

One example of lean principles on the Owensboro Health project was in the development of the building information modeling (BIM) design model that provided enhanced communication via iPads. Mechanical, electrical and plumbing (MEP) design-assist subcontractors were brought in early, streamlining the process of delivering construction documents to the contractor. Model development was phased and contractor modeling teams took on coordination and design evaluation activities early in the process.

The team also focused on early prefabrication of building elements – including pre-assembly of numerous elements of the structural frame, exterior wall panels, unitized curtainwall, headwalls, in-wall electrical rough-in and all plumbing assemblies.

"Perhaps most importantly, though, was the element of trust – something so foundational and critical to lean design and IPD," Bowers said. "We had times where we struggled as a team, but the fact that we maintained a trust in each other and in the process and delivery method is something that made lean principles and IPD delivery real, and the ultimate results possible."

One of the early aspects of total team engagement were patient/community experience sessions led by HGA that engaged 400+ clinician, nursing, administrative, maintenance and community members to brainstorm and provide input and improvement suggestions on everything from parking to wayfinding, materials management, furniture comfort, accessibility to food services and pharmacy processes.

"Integrated project delivery does not just include those signing an agreement to design and build the building, but also includes those who will use, work within,

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operate and maintain the facility," Bowers said. "In a collaborative environment, these voices were heard by all team members, and it truly helped guide the directives we had as a design/building team, and helped us be better listeners so that the ultimate product really reflected the desires expressed by the patients and staff."

"The IPD provided a single focus for all parties involved in the project"

— GREG STRAHAN

Technology

The IPD method proved helpful with the technology design on the Owensboro Health project. Technology had its own component team, giving technology a greater voice in the process and the opportunity to more directly interact with the other component groups – envelope, interior, power, site, structural and thermal control.

"It was a wonderful process," said Linda Sadler, project manager and Technology Systems Design Consultant at SSR. "All parties had buy-in and ownership of the systems. I believe it helped in the implementation and adoption of each system we selected."

Sadler said the partnership fell in line with the trust and collaboration the IPD had established. That was important since today's technology systems are highly integrated with many other building systems. SSR was on site and worked alongside Turner during construction, then worked with the owner during the patient move.

Challenges

While there was continual collaboration, there were challenges.

Through the design phase, the team was repeatedly challenged on how to do things better, how to add additional square footage and still maintain high quality materials and finishes, and how to do all of this without altering the project schedule.

Challenges came in the form of overall patient rooms/bed count, exterior skin composition, site development and landscaping, expansion of the pediatric care unit and shuffling the building program/unit placement late in the design phase.

"Without an integrated approach, there would have been traditional silos of accountability, and protection of project elements and risks that are most associated with one particular team member over another," Bowers said. "This would have promoted a lot more emphasis on 'can't do' and 'cost avoidance' rather than focusing more on what the owner was asking and having all parties motivated to achieve those requests."

Other challenges that were accommodated along the way included assisting the owner in overcoming community concerns about the need for a new facility and fiscal responsibility. Alsentzer said this was accomplished by providing detailed cost feedback, early facility imaging at planning and zoning sessions, and the ability to manage budget issues throughout the project to maintain a "final impressive facility" that followed through on early promises.

Another challenge included accommodating owner-requested reorganization of bed tower floors during the construction phase due to revised service line planning efforts. Alsentzer said preliminary discussions estimated a three- to four-month delay and significant cost impact to the project, but the IPD team worked together on changing construction critical path schedules and providing early delivery of revised design information that allowed the schedule to recover and costs to be minimized.

"Other delivery models typically cannot recover from these challenges without a significant project impact," Alsentzer said.

Providing value

Solving challenges was made easier by the construction manager maintaining an open book format with the IPD team, with all project costs, contingencies and fees available for team review. All building/system purchase savings were added back to the owner contingency, allowing the team to maximize the facility scope based on the available budget.

As an example, Alsenter said, the IPD team felt construction costs were at a low point during the early design phases in 2008. Based on that, early MEP equipment purchases were made with the resulting savings returned to the owner and alternate wish list items added to the base project scope during the design phase. This limited cost impact because they were not out-of-sequence decisions.

Early MEP purchases also facilitated project prefabrication efforts, which improved quality and reduced costs, and allowed for significant involvement by the staff in the selection of major equipment. This gave staff the opportunity to review costs from various vendors and secure detailed service response time commitments.

"Other delivery models do not typically offer this level of owner involvement," Alsentzer said.

The team developed an incentive plan that promoted early decision-making for additional items in scope that were not included in the original design . Ultimately, Bowers said, there was sufficient savings to allow for incentives and savings sharing at the end of the project, and to allow Owensboro Health to incorporate some "11th-hour betterments" following substantial completion.

Better outcomes

"I think the IPD approach and the lean approach really allowed this client to achieve something really exceptional and to position them to continue to deliver exceptional service to their patients for many years to come," Bultman said. "They got a lot more value for the investment using the IPD approach than they would have gotten under a traditional approach."

Alsentzer said the IPD team process benefited the staff and patients on many levels, from incorporating lean principles in staff work effort – decentralized nurse work stations to minimize staff travel distances and improved patient monitoring – to improved patient safety – providing same-handed layouts in all patient rooms to avoid staff errors and improve efficiency.

"On a more global level, the partnering efforts and willingness to work as a common team v. independent silo effects resulted in a facility getting 10 pounds of scope for a five-pound budget."

Rethinking behavioral health facility design

The physical environment needs to play a critical therapeutic role in patient care

By Karen M. Kroll / Special to Healthcare Facilities Today

Few people would be surprised to learn that designing an operating room or radiology laboratory is a complicated undertaking. Although it might not seem so at first glance, designing and operating an effective behavioral health unit can be just as complex an endeavor.

Behavioral health units need to keep safety top of mind, while also fostering healing—two goals that aren't always easy to reconcile. For instance, most fixtures used in a behavioral health setting need to be ligature-resistant, or designed to make it difficult for patients to attach a cord or cable to them, which they could use to harm themselves.

Just as importantly, the environment needs to play a critical therapeutic role in helping patients with mental illness live productive, enjoyable lives. That requires creating a warm, welcoming environment that strives to maintain patients' dignity.

"We tried to tamper-proof the environment while keeping in mind the beauty needed to promote a calm environment," said one executive with several behavioral health facilities located in the Midwest.

Making behavioral health units as home-like as possible also alleviates some of the unease family members may have when leaving loved ones there. "It reduces the stigma when they're in a warm, beautiful environment," said Joseph Doherty, principal and studio director with Array Architects, which focuses on healthcare design.

Behind the current trends in the design of behavioral and mental health units are several shifts in the treatment of patients with behavioral health challenges. Previously, the emphasis was on custodial care, and patients' and caregivers' safety. More recently, the focus has expanded to include therapeutic care. While patient and staff safety remains critical, behavioral health facilities today are charged with helping their patients live full lives.

And as with many other areas of healthcare, a greater emphasis is being placed on outpatient care, including prevention, observation, and wellness checks, Doherty said. At the same time, because more people have access to insurance, more are seeking mental health treatment. That can boost demand for inpatient beds.

As a result, many behavioral health units need to handle multiple purposes, Doherty said. For instance, meeting rooms may serve both inpatient and outpatient populations. That means they need to be secure and also located so outpatients can easily reach them from outside the facility.

A restorative environment

Color, lighting, and nature often are key in fostering a restorative environment within behavioral health units. When it comes to color, pastels might seem like a logical solution. However, many older patients don't see as sharply as younger ones, and pastels can seem "grayed-out," said Jon Sell, project designer with Array Architects. Instead, he may turn to saturated tones in grounding, calming colors, such as blues, greens, and purples.

The use of contrasting colors can help patients navigate the facilities. For instance, the flooring might be one wood tone in the centers of hallways and rooms, and another

Behavioral health units need to keep safety in mind while also fostering healing.

along the borders. This helps guide patients with vision problems as they walk.

In contrast to the patient areas, the staff areas may incorporate brown tones, said Nicole Wood, interior designer with Array. "They recede into the background, and the brighter colors pop."

> "Input from the facilities team is crucial to the design process"
>
> **— JOSEPH DOHERTY**

Lighting also plays a key role in many behavioral health facilities. "Being able to bring in natural light is paramount," Doherty said. Strategically positioned lights and windows can allow for a great deal of natural light. In addition, lighting controls that enable the staff to gradually lighten areas in the morning and darken them in the evening, give an outdoor feeling to indoor spaces.

At the same time, windows need to be placed so they don't inadvertently allow outsiders to see into the behavioral health units, nor let behavioral health patients see into other patient areas, Doherty notes. Unlike many hospital patients, who spend much of their time in their rooms, behavioral health patients tend to be up and about. Privacy is a key concern.

When space allows, creating an outside area that's enclosed, safe, and private can help in the treatment of patients with behavioral health challenges. "There's a benefit to seeing trees and sky," Doherty said.

Safety concerns:

Effective behavioral health spaces must limit any opportunities for patients to harm themselves or others. One way is through the use of flooring and wall material that require minimal seaming, thus reducing the ease with which patients can hide contraband.

Because many behavioral health patients are able to walk around, they're also more likely to touch the walls than other patients might be. Epoxy paint is durable and difficult to chip, Doherty said.

Most plumbing fixtures in behavioral health units are anti-ligature, minimizing the risk patients can hang themselves. In some facilities, the shower fixtures are activated by sensors, rather than handles. Patients position their hands in front of the fixtures to turn them on or off, or to adjust the temperature.

The plumbing and lighting fixtures also can be controlled through a central computer, so the staff can turn these on or off to a specific room if there's a safety need.

Along with durability, the finishes on the fixtures and flooring should be low maintenance. This minimizes the need for the facilities staff to bring equipment and chemicals to the units that could be used by patients in a harmful way.

Making behavioral health units as homelike as possible also alleviates some of the unease family memebers may have.

High ceilings—say, at least nine feet in patient areas—also help with safety, Sell said. The height makes its difficult for patients to hide contraband or to use the ceiling to harm themselves.

Silent alarms within patient rooms allow staff members to request help from their co-workers, should it be needed. Alarms placed across the tops of doorways alert the staff if a patient should try to hang him or herself.

One decision that can turn contentious when designing behavioral health units is whether to incorporate some sort of transparent wall between the nursing staff and patients. "The trend over the past ten years has been toward open nurses' stations," Doherty said. It allows patients to more easily connect with the nurses and build stronger relationships. In itself, this can alleviate some of the stress patients feel, and may make them less likely to harm themselves or others.

Safety remains a concern, however. One worry is that an agitated patient may try to throw a piece of furniture at a member of the staff, or other patients. To mitigate that risk, manufacturers of the furniture used in behavioral health units are making them heavier.

Another design tactic that can alleviate tension or agitation within patients is a sensory calming room. These may feature wall panels constructed of varying textures, ceiling coverings that mimic the sky, and air flow that can be adjusted to feel like a breeze.

The team

The project team when designing a behavioral health facility should include individuals with a range of expertise, including architects and designers, healthcare professionals, mechanical, electrical and plumbing engineers, facilities and the food service departments. "A lot of people are instrumental in pulling off a project like this," Sell said.

Input from the facilities team is crucial to the design process, Doherty said. "They're involved day-to-day, and they get the phone calls in the middle of the night." Doherty said his team has tried to develop solutions to the problems identified by the facilities staff.

One example is the installation of small lockers outside patient rooms. Patients often bring more clothes or other items than they'll need for their stay, Doherty said. In the past, these often were held in a storage area away from the unit. However, patients would worry about their things. Keeping them closer helps alleviate some of their concern.

When thoughtfully designed and operated, behavioral health facilities can help patients feel welcomed and nurtured, and also remain safe. The executive with the facility in the Midwest said, "We've had patients say, 'It's a beautiful environment. I don't feel like I'm behind locked doors and thrown away."

ning on retiring to keep a diary for six months and "record how they spend their time and what they see as issues," explains Friday. Some companies may do job shadowing of facility managers or "walk in your shoes" days to help new people learn more about a managerial position.

Recruiting and Training the Next Generation

In the past, the industry has not done a good job in getting the word out about why young people should choose facility management as a career path. Efforts are underway to change that.

According to Geoff Williams, general manager for the Center for Health & Safety Innovation and a member of the board of directors for IFMA (International Facility Management Association), where he chairs the task force on knowledge strategy, IFMA has "a number of initiatives underway to facilitate knowledge transfer" at the managerial level. IFMA has developed an online knowledge library, for example.

Traditionally, facility managers have "made a lateral move from other building sciences," but now foundational knowledge can be studied in college. IFMA has educational programs through the IFMA Foundation, Williams says, and accredited degree programs. Currently IFMA is "working to develop a pathway through high school, college, and university, and into the workforce," he says, and has accredited 30 college and university programs.

Similarly, Medlin's organization is developing future leaders with college degrees in facility management or technical fields like engineering, as well as future technicians, through apprenticeships in vocational or technical training programs. "There are about 40 college degree programs across the country," says Medlin, but so far no college of facilities management. APPA began hosting Emerging Professional Summits in 2013, connected with its annual conference, and will continue to promote a dialogue between senior facility officers and new professionals on the management track.

Training the army of people to do the great variety of specialized work that keeps a facility humming will be no easy task, and many organizations "are trying to establish relationships with vocational-technical schools and community colleges (and create) their own in-house programs tailored to their needs, through third party providers," Friday says. "Where there is a union environment, they work with unions to develop some job training programs; they are also going to academic institutions that provide facility management curricula."

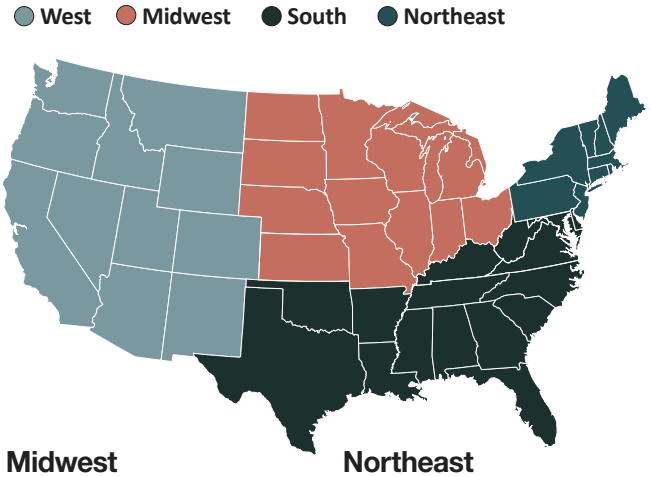
Bill Warren, manager of the training and development facilities engineering maintenance department at the University of Pittsburgh Medical Center, is concerned about the retirement of people in crafts positions. "Some of the new people we've hired were hired into established apprentice craft positions," he says. Apprentices then train with journeyman craft technicians while on duty. However, they are required to complete either a union or technical school apprenticeship training program, and are reimbursed for their tuition costs.

"We need to consider the establishment of in-house crafts apprenticeship programs and recruit employees with a strong mechanical and technical aptitude," he says. "We should also actively recruit graduates from local union apprenticeship training programs and/or technical schools and colleges. The goal then would be to hire their apprentice training program graduates into our open journeyman crafts positions."

Medlin also notes the importance of increasing the number of apprenticeship programs. For example, the University of Arizona recently created an apprenticeship program that combines coursework with practical experience and ultimately leads to journeyperson certification. A few other universities also have apprenticeship programs. "These programs will be growing," Medlin says.

Internship programs are also beginning to get some traction, says Morgan. "We need to get into the high schools

Pay, Staffing Show Regional Variations



Midwest
Median salary: $75,000
Median raise: $1,200
Bonus eligibility: 40%
Added staff: 21%
Reduced staff: 21%

Northeast
Median salary: $90,000
Median raise: $1,800
Bonus eligibility: 40%
Added staff: 21%
Reduced staff: 26%

South
Median salary: $80,000
Median raise: $1,500
Bonus eligibility: 42%
Added staff: 24%
Reduced staff: 20%

West
Median salary: $84,000
Median raise: $1,500
Bonus eligibility: 44%
Added staff: 24%
Reduced staff: 20%

Pay and Building Type (Median)

	Salary	Raise
Commercial – Corp. Office	$86,750	2.3%
Commercial – Leased Space	$85,000	2.1%
Education – K-12	$82,305	1.5%
Higher Education	$79,000	1.3%
Government – Federal	$98,000	1.2%
Government – Municipal	$80,000	1.5 %
Government – State	$72,000	0%
Hospitality	$68,000	1.3%
Industrial	$85,000	2.4%
Medical	$78,000	1.9%
Retail	$80,000	2.4%

to articulate the profession," he says. Veterans are another population group to be tapped. "They build places in foreign countries, which often requires a great deal of fortitude, and we need to do a better job of recruiting them."

Another pool of potential employees is made up of young people who want a career in technology. They don't consider facility management "because they don't think of it as a high-tech industry," notes Friday. "We need to market better to young people who are considering (high tech) as a potential career path. There's a lot of systems work associated with facilities management."

High school students rarely think of facility management as a career option, which makes it harder for college programs to attract students. In Madison, Wis., a group of volunteers associated with the local IFMA chapter tackled that challenge with a competition for high school students called FaciliThon. The group partnered with SkillsUSA, which has 350,000 members in the United States, to attract students, says Jim Zirbel, co-director of the FM Pipeline Team, which created FaciliThon. The prize for the winner was a $1,400 scholarship. The goal is to roll the approach out nationally.

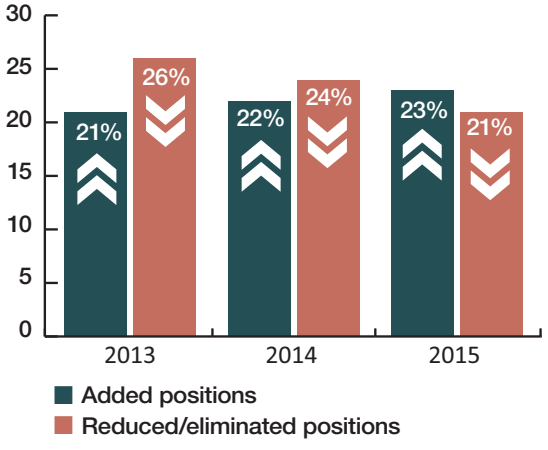
Succession planning is needed for both management and trades, says Morgan. "Facilities management is a substantial career," Morgan says, "and we in the profession have done a horrible job of marketing the value proposition, and that has to change. It is a great career, because it provides you with long-term employment."

Marching to a Different Drummer

As young people in their 20s and 30s enter the facility management workforce, organizations will need to accommodate their work styles and expectations, which are often very different from their Baby Boomer predecessors. First, today's young people expect to be promoted quickly. "The opportunities may be there, but they may not have the patience to pay their dues," says Friday. "This is a problem that will plague our and other industries."

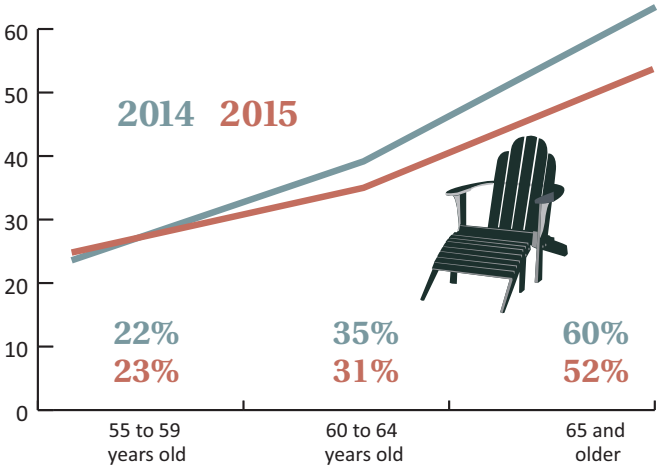
Retention is a problem, says Bechtol, especially in an industry used to long-term employees. "They may give you an ultimatum about a promotion, and they do leave," she says. "They will move around and even go across the country."

Staffing Picture Brightened in 2015



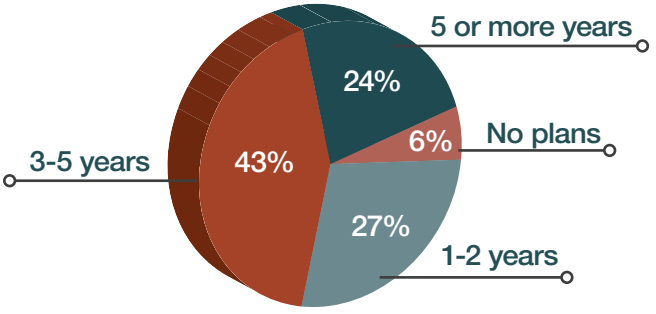
Fewer FMs Delay Retirement…

The number of FMs in their 60s who reported delaying retirement because of the economy fell in 2015:



…But No Rush to Stop Working Among FMs in Their 60s

The survey asked FMs how many years they have left until retirement. The answers, for those in their 60s:



These employees may be making lateral moves, but for them moving is an adventure, she says.

"They will be with the company for a couple of years, but then they will move," Morgan says. "They may have four, five, or six jobs by the time they are in their 30s."

The younger people are also more particular about what they actually do at work, and how they do it. For example, according to Medlin, while Baby Boomers were willing to pitch in wherever they were needed, Millennials and Gen-Xers want to know exactly what is expected of them, and they are more technologically savvy. Social media is a good way to recruit these young professionals. "We have to go where they are," Medlin says.

For these up-and-coming professionals — from 18 to the early 30s — having a good, stable job may not be enough, he says. They may want to work for an exciting company that has a lot of perks, such as gym facilities, subsidized food, child care, and the like. They also want to work for a company they can feel good about. For Baby Boomers, salary and stability were important. The new workers need to

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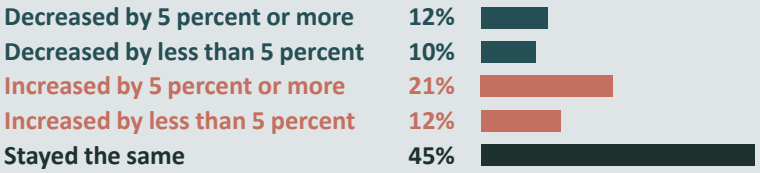
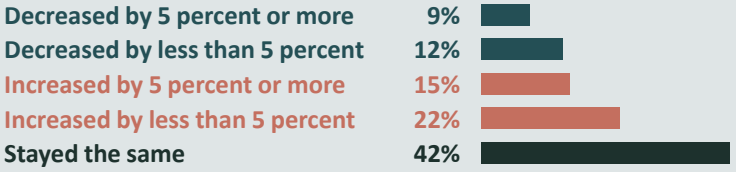


Past Year Operating Budget



know they are making a contribution, and they want to know what the company can do for them.

Young people are more likely to stay with the organization if they feel challenged and empowered, Williams says, and if they move forward with the help of a professional development plan. "It will be a challenge for all industries to fill jobs, and for that reason we have to focus on retention," Williams says.

Clearly the road ahead will be bumpy, as the Boomers gradually disappear from the workplace and are replaced with a new crop of professionals. Nonetheless, an influx of young people is an opportunity, since new blood and new ideas from a technologically-savvy generation can bring new vitality to facility management. ■

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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ROOFING

3 Key Steps to Roof Asset Management

Cut corners and you'll pay the price in hidden costs and shortened roof life

by james piper

Facility managers are forever under pressure to reduce operating and maintenance expenses. It's the old admonition "Do more with less." In practice, though, it almost always reverts to "Do less with less." Cuts are made in short-term spending to meet budget cuts, often without serious consideration as to the long-term impact of those cuts.

Those short-term cuts are everywhere in maintenance budgets. New designs are "value engineered." Maintenance activities are deferred. Inspections are skipped. Overhauls and replacements are put on hold. And while these cuts will produce short-term savings, there often are long-term consequences that can easily offset these savings. Perhaps in no other area is this as apparent as with roofing systems.

Roofing systems are already at a disadvantage when it comes to cuts in short-term spending. Most people never see a building's roof. Few maintenance personnel spend much time on a roof, and those who do generally have different priorities, such as the operation of the equipment installed on the roof. And the attitude of those who control the maintenance budget is that unless the roof is actually leaking, why spend money on it.

Unfortunately, this approach does not save money. Roofs are an asset to be managed. They require regular inspections and maintenance if ownership costs of that asset are to be minimized. Why then do many organizations think they are reducing costs by cutting corners on roof maintenance? Perhaps they don't recognize the hidden costs associated with ignored maintenance.

When roof maintenance is ignored, the most obvious impact is shortened roof life. Even though most roofs require replacement before they reach their rated service life, the connection between lack of maintenance and early failure is seldom made simply because most developing roof issues are not obvious. It's only when leaks occur that someone pays attention, but by then, what started out usually as a minor, inexpensive repair now includes additional costs for repairs to the roof's insulation and deck.

The costs don't end there. When leaks occur, there will be additional costs as the result of cleanup, loss of use of the impacted space, damage to interior finishes, cleanup of potential mold and mildew, and possible premium time for roof repairs. And don't forget additional energy costs. Wet roof insu-

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Fall and spring are the times of year to do roof inspections, but it's also important to examine the roof after severe weather or when work is done on rooftop equipment.

lation is less efficient, increasing heat loss and gain rates through the roof. Seldom are these costs factored into the equation.

A comprehensive roof maintenance program starts well before the roof is installed. It continues with regularly scheduled roof inspections. It is tailored to the type of roof installed, the climate in which the building is located, and how the roof is being used. Here are the three critical steps in roof asset management:

1 Proper Design and Installation

Good roof performance starts with a good design and installation process. Too many roofing projects get off to a bad start when facility managers simply look for the lowest-cost new or replacement roof installation. While lack of maintenance is a major cause of early roof failure, roofs can only be maintained well if the proper type of roof is selected for that application and the contractor installing the roof does so correctly.

The roof design must be appropriate for the application. For example, what level of foot traffic is expected on the roof? Not all roof membranes hold up equally well to repeated foot traffic. Similarly, consider the operations taking place within the facility. Not all membranes hold up well to grease or chemicals that may be exhausted onto the roof's surface.

Another factor that must be considered when evaluating roof options is the weather conditions where the building is located. How much snow does the region get? What are the seasonal temperature ranges that the roof will be exposed to? Is the building located in a region where high winds occur? In what season will the roof be replaced? Some roofing materials can only be applied when temperatures are within a particular range. All of these issues must be factored into the roof-system selection process.

If the organization lacks the right in-house people with the experience necessary to make the necessary design selection, then it would be wise to bring in an outside, independent consultant. He or she can help in selecting the most cost-effective, appropriate roof system for a given application.

Selecting the most appropriate type of roof is only the first step. A qualified contractor must be selected to perform the installation. If at all possible, managers should pre-qualify contractors before they are invited to bid on a particular project. Being an experienced roofing contractor is not sufficient for pre-qualification. That contractor must be experienced with the type of roof you're installing.

Some things to look for when pre-qualifying contractors: Do they have experience with that roofing system? For how long? Are they certified by the roofing manufacturer? Will they provide references, with contact information? Are they bonded and insured? What is their track record? How have they resolved conflicts that arose during previous work? Is there any pending litigation concerning their work? Again, if you lack the skills to properly research these and other issues, it may be beneficial to hire a consultant to perform the vetting process.

The process does not stop with the awarding of a contract. Depending on the size and scope of the project, it is often worthwhile to use an outside, independent inspector to monitor the roof installation, and to perform a final inspection of the installation before it is accepted. That inspection will verify that the roof was installed as contracted and is free of defects, and that any installed equipment on the roof has been properly tied in with the roof.

Each of these steps will add to the overall installation cost. For the typical 100,000-square-foot roof installation, manag-

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Surveying the roof is not sufficient by itself. If survey information is not acted on promptly, it will become obsolete.

ers can expect to spend an additional 5 to 10 percent of the total roof cost for the consultant. While it increases first costs, that investment can be expected to increase the service life for the roof and reduce repair requirements because it will help to identify construction defects to be repaired at the contractor's expense. As a general rule of thumb, managers can expect that every dollar spent ensuring that the most appropriate roof is installed correctly will return $5 over the life of the roof.

Inspections, Twice a Year

After the roof has been accepted, facility managers should establish a schedule of regular inspections. Most are required by the roof warranty. Many roof warranties are voided because they are not performed.

In most applications, a visual inspection should be performed twice each year, once in the fall and once in the spring. Those inspections are timed to identify any defects that may have been caused while the roof was exposed to the extremes of summer and winter weather. The inspections must include all of the roof components: the membrane, flashings, penetrations, drains, and equipment installations. The goal of the visual inspection is to identify all defects while they are still small and can be easily corrected.

The twice-yearly inspections should be considered the minimum requirement. Additional inspections should be performed following certain weather events, such as heavy rains, windstorms, or heavy snow and ice storms. If the mechanical and electrical equipment installed on the roof is replaced, altered, or undergoes a significant maintenance overhaul, the roof should be visually inspected once the work has been completed. Roof membranes can be punctured or torn by inadvertently dropped tools or equipment panels.

In addition to the visual roof inspection, roof moisture surveys should be conducted every three of four years. In most cases, this will involve the use of an outside contractor to perform the testing and interpret

the results. Each new survey should be compared with the past surveys to determine what changes have taken place since previous surveys.

For most visual inspections, managers can expect to spend 2 to 5 cents per square foot per inspection. Moisture surveys, which require the use of specialized equipment, typically cost 10 to 15 cents per square foot. Inspections cost money, but money spent identifying developing issues before they grow too large will reduce repair costs while extending the life of the roof.

Prompt Repairs

Surveying the roof is not sufficient by itself. The results of the survey must be acted on, and quickly. The roof, particularly one that has a number of developing defects, is not a static component. Defects will grow. Water will migrate. Hidden damage will occur. Therefore it is essential that managers treat survey information as being dated. If it is not acted on promptly, it will become obsolete.

Managers must be prepared to make the required repairs once the surveys have been completed. In-house personnel can perform some of the repair activities, such as cleaning out roof drains and removing debris. If the facility's staff has the proper experience and training, they can perform at least some of the additional repairs.

Beyond these, it will be necessary to bring in an experienced roofing contractor to complete the repairs. Contracts will have to be set up ahead of time to ensure that the roof contractor is qualified to work on that particular type of roof and will respond within the time frame expected.

If managers are to minimize the life-cycle costs of their roofing systems, they must commit to this roofing maintenance program. Spending a little more initially to verify that they receive a quality roof inspection, and following this up with annual expenses to inspect and repair the roof is the only way a roof can be expected to achieve its rated service life. Studies have shown that those roofs that are ignored until leaks develop only last on average of 13 to 14 years. Where a proactive maintenance program is implemented, the same type of roof has an average service life of 21 years or more — an increase of 50 percent or more. And this does not even take into account the reduced costs of planned repairs versus emergency repairs. There too, managers can expect to save 25 to 50 percent on maintenance costs over the life of the roof. ■

James Piper, P.E., is a national consultant based in Bowie, Md., with more than 25 years of experience with facilities management and maintenance issues.

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

The Human Element

All the technology in the world won't make a building perform well. Consider how to train staff and occupants to achieve sustainability goals

by lawrence melton, charles dilley, and linda osgood

Congratulations, you've just achieved LEED certification for your high-performance green building which includes a new photovoltaic system, a green roof, and state-of-the-art advanced metering, all of which is supported by the latest computerized maintenance management system. Your new building also boasts a sophisticated new building automation system that has the smartest building infrastructure in the entire metropolitan area, bringing in millions of data points per day, and is supported by a futuristic network operations center. You can declare victory!

Then the phone rings. It's your CFO asking you to brief the executive team on the latest savings attributed to all of the investments you've been talking about for the past two years during design and construction. Everyone in the organization (including your stakeholders) has been anticipating that the savings would be achieved by now.

Your gut response is that they just don't understand. As the champion, sponsor, and visionary for the improvements, you know these things take time. The question is, how long and when?

You knew that when you set out on this journey to invest in a high-performance smart building, it was going to require the entire organization, including occupants, to ensure that the savings were achieved. But let's face it. It's your job. You're the one who's expected to find the efficiency and savings that will bring the organization to the head of the class. So what does a smart facilities leader need to do to make a smart, high-performance, sustainable asset meet and exceed expectations?

Making use of new technology, while ensuring that people know the best way to implement and use this technology, is critical for any high-performance building.

All About the Building?

So it's all about the building, right? Wrong. If you are looking for optimal results, you need to invest in the people. Not just the occupants in the building, but those who manage, operate, and maintain it. While technologies are designed to automate and improve the processes needed to operate these high-performance smart buildings, it still takes improved skill sets and a new performance standard to drive the savings. Remember, connecting is merely the first piece of the puzzle.

The larger challenge is how to get the facilities team to manage the facility using a different model (or as some experts like to call it, "propagating new norms") and setting the expectation that leveraging these systems will enable greater cost savings, specifically around the labor costs of the operation. This expectation has some industry experts assuming that these smarter, high-performance assets will eventually put people out of jobs. Simply put, that's nonsense. Our industry has seen technology evolve and be

incorporated to a tremendous degree, and today more than ever, these technologies need expert facility managers to oversee, manage, and optimize them.

Many real estate and facilities management organizations make assumptions that a LEED-certified, high-performance smart building is a mere technology upgrade that will deliver sustainability goals while reducing the total cost of operations. Too often there is an expectation that if we connect, automate, and integrate our systems, we will quickly achieve savings. This is a fundamental misunderstanding of where these savings come from. Connecting your building is merely one piece of the success puzzle. What often gets left out of these smart building plans is the entire change management strategy that is required to deliver the operational savings these technologies have the potential to produce. Without a change management strategy that incorporates investing in people, your building won't achieve the results you expected. These investments must enlist occupants, motivate the facilities team, and engage upper managers.

How To Invest in Technology

So how do you ensure that your facilities technology investment delivers the savings and performance everyone expects? The importance of creating an environment inviting to technology cannot be overstated.

First and foremost, engage the organization by adopting decision-making processes for technology investments. Focus on the adoption of new internal policies built around these technologies and ensure that training and contract specifications are written to capitalize on these investments. Too often, organizations scramble to catch up to the technology, rather than capitalize on it right out of the gate.

As well, organizational alignment absent a collaborative governance process leaves requirements unclear and results in siloed solutions that might have benefited the entire enterprise. To avoid such pitfalls, engage your occupants and other stakeholders early and get them involved in making the key organizational changes.

Collaboration between the C-suite, real estate and facilities managers, construction management, and financial folks is critical for success. Excessive autonomy and fragmented decision making at the highest levels in the organization make adoption and maximization of technology challenging at best. In the case of the federal government, with a real estate footprint totaling nearly 3.6 billion square feet across 756,000 buildings and structures, the ability to drive savings has to start with a global strategy across the public sector that will generate true return on investments in the technology decisions that are being made every day across the enterprise.

> If you are looking for optimal results, you need to invest in people — both the occupants as well as those who manage, operate, and maintain the building.

Addressing maintenance issues in a traditional building differs greatly from the same task in a smart building. Ensuring that facility managers have the skills, systems, and competencies will require leadership to develop career paths that will motivate and reward facilities teams to learn new norms. The engineers in a smart building must understand not only the building control systems and how to respond to sensor-generated data points, but how this data can be used for strategic asset management and cost savings.

Furthermore, building engineers must use these new skills and information that flows along with the building controls to deliver optimal performance and shift the blend of reactive maintenance work orders toward predictive and reliability centered maintenance (PdM + RCM) programs. Not only will these steps extend the life of the equipment, achieve sustainability goals, and enhance the careers of the facility workforce, but they will make happier occupants.

Know Thy Occupants

The truth about smart, high-performance buildings is that they cannot be successful without managers knowing the occupants, understanding how they are using the space, and educating the community on how their actions will help meet the long-term goals of the facility. The evolution of workplace mobility is occurring rapidly, and engaging the occupants is one of the single most important success factors in the global push to save energy and reduce operating costs.

For example, providing occupants the ability to consume only those utilities they require, rather than powering up everything they may or may not engage with on a daily basis, will improve the facility's performance. This could be called "smart occupancy." It's important to understand the typical work styles of occupants and what percentage of time the space is fully, moderately, or minimally occupied.

When occupants are on site, do they spend their time at assigned desks, in formal meetings, participating in informal conversations with one individual, or in small groups? Does the culture of the organization support a mobile work environment with telework policies and mobile devices (laptops, WiFi accessibility, etc.)?

"'Smart occupancy' is a great term," says Bob Peck, director of consulting for Gensler's Southeast Region. "We also need detailed data about time spent on different tasks and on individual and collaborative work, mobile or tethered work. That drives how much space the occupant needs and how it should be laid out to create a high-performing workplace." Understanding these issues and equipping the occupant with the option to control the space not only changes the results, but improves occupant satisfaction.

Answering these questions up front will drive intelligent decisions on how space is designed and operated. Consider the use of shared workstations and collaborative space, building operating hours, and unoccupied areas in the building that might be "shut down" for certain periods to reduce HVAC and electricity use and costs.

Increasingly, we realize that performance in energy and water efficiency, waste diversion, improved human health, and quality of living are only in part a function of a facility's technologies. The most significant impact comes from occupant behavior.

Occupants in Mind

A building system or program is only effective if it is implemented and used properly with the occupant in mind. Models and calculations may serve as valuable tools, but they don't tell the whole story. Automated lighting controls can provide significant energy savings, but savings will evaporate if the building occupants override the controls due to a gap in understanding how they operate. For a building to perform well over time, it is imperative that the sustainable technologies and initiatives are aligned with how building users will interact with them.

To achieve optimal results from a high-performance smart buildings program, employ occupant engagement strategies early in the smart building process in order to influence tenant behaviors. The right strategy should leverage information, drive accountability toward priorities, and capture the attention of a broad audience. This will increase tenants' awareness and ownership of their building's performance in terms of functionality and sustainability while also delivering savings.

Smart and high-performance buildings are more than a technology upgrade; they provide an opportunity to realign the entire real estate operations toward greater efficiency. Selecting the right experts who understand smart buildings, smart occupancy, and smart workforce strategies will maximize technology investments by investing in the people. These new operational norms begin with an organization's top stakeholders and move all the way through to its most valuable asset, the tenants. It is a three-dimensional approach of technology, buildings, and people.

Propagating new norms is more than installing technology, solar, or a building automation system. It is about transforming how the workplace functions, how facility operators manage workloads, how leadership collaborates and develops career paths for the future, and how data gets transformed into knowledge. To get your smart buildings program to achieve the desired results and move your organization into the future of facilities operations, you need a comprehensive smart buildings strategy that includes not only the technology but also a change management plan that is focused on the people. Get the strategy right up front, and watch your technology investments deliver results. ■

Lawrence Melton is CEO of The Building People, and an industry expert on real estate and facility management. Charles Dilley and Linda Osgood are managing directors at The Building People.

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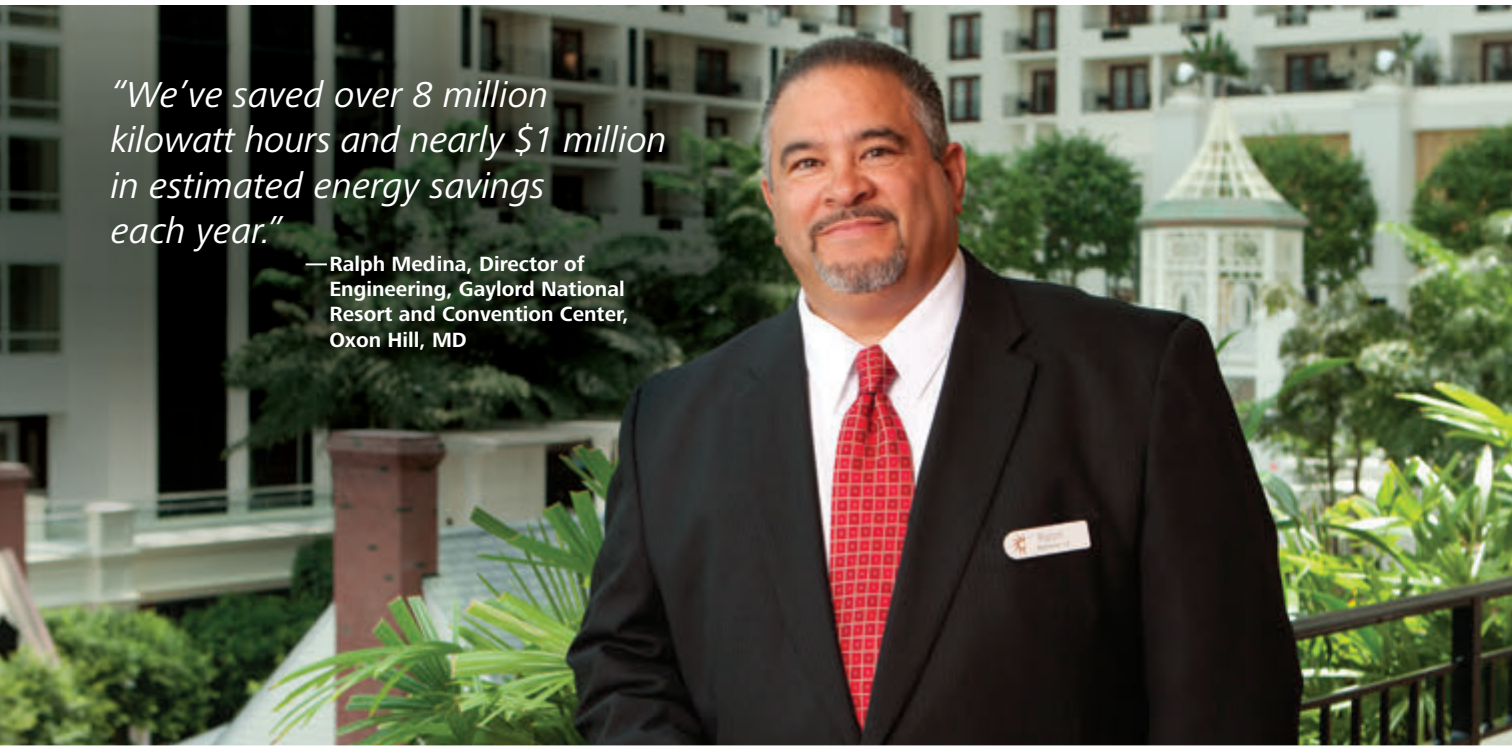

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A customized dashboard enables facility managers to choose which buildings and systems populate for real-time information. Real-time alerts indicate exactly when an "event" occurs, indicating systems have reached a predetermined trigger point or experienced an unforeseen issue. Audit logs track which users have accessed the system and what adjustments they've made. With global scheduling, facility managers responsible for a few — or a few thousand — locations can easily create schedules for individual, multiple, or all buildings across the enterprise with efficiency and ease. **www.buildinginsights.se/**

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The new FTXL Fire Tube Boiler delivers up to 10:1 modulation turndown and up to 98 percent thermal efficiency — higher than any other boiler in its class. Five models range from 399,999 to 850,000 Btu/hr. With the SMART SYSTEM operating control's built-in cascading sequencer, up to eight fully modulating FTXL units can efficiently operate as a single boiler with total inputs of up to 6.8 million Btu/hr. Cascade sequencing can be programmed for "Lead-Lag" or "Efficiency Optimized" operation by the user.

With the CON-X-US remote connectivity option, status alerts can be sent to a smart device such as a phone or tablet, and the user can monitor and re-program control parameters from almost anywhere.

FTXL can operate over a wide range of flow rates with very low pressure drop. This permits installation of a "full flow" (variable primary) system, eliminating the time and materials cost of additional piping and pumps needed to maintain flow in a water-tube boiler. Variable flow also makes FTXL more flexible at handling frequent fluctuations in the system flow rate as when a variable speed pump is used.

FTXL boilers have a top-mounted, micrometal fiber burner, with a blower/gas valve assembly that drives heat energy downward, through stainless steel fire tubes, with exhaust venting through the bottom of the unit.

FTXL can be installed with zero clearance on left and right. Installed footprint is 6.2 square feet. FTXL operates with supply gas pressure as low as 4 inches water column.

www.lochinvar.com/products/Default.aspx?lineid=205&type=productline

ECOCIRC XL BELL & GOSSETT

Bell & Gossett's ecocirc XL, a Xylem brand, is a high-efficiency large wet rotor circulator pump with smart communications capabilities that improve operations across a broad range of commercial HVAC and plumbing applications.

The ecocirc XL features an easy-to-use digital interface that provides the user with real-time pump performance information (such as operating or fault modes, flow control, and set point) through proactive self-monitoring.

Performance data is mapped into the on-board variable speed drive, so the drive can be designed specifically for each motor size. The ecocirc XL features an electronically commutated permanent magnet (ECM) motor that enables pump operations to match demand, delivering superior energy efficiency and cost savings.

The ecocirc XL has different sets of control modes that are dependent on either differential pressure or temperature. These control modes will vary the pump's speed to meet the current building's demand, making the ecocirc XL a jack-of-all-trades. The pump can optimize its performance based on the demand of the building by carefully monitoring the temperature or differential pressure. There is a temperature sensor built into the motor housing and the ecocirc XL can easily estimate the differential pressure by using the mapped hydraulic performance.

The ecocirc XL significantly reduces system downtime and decreases setup and installation time. Additional settings and access to in-depth historical pump data can be obtained through a laptop or an optional Wi-Fi module and standard Wi-Fi enabled tablet or smartphone. Advanced control options, including Modbus or BACnet access, provide dynamic system management.

www.bellgossett.com/pumps-circulators/large-wet-rotor/ecocirc-xl/

POWER MANAGER FOR SMARTSTRUXURE SCHNEIDER ELECTRIC

The Power Manager for SmartStruxure solution enables organizations with non-critical electrical network applications to better monitor, manage, and optimize their buildings from a single, easy-to-use interface. This ensures electrical system health, increases power quality awareness, and improves energy accountability. Energy optimization benefits:

- Fully embedded, cost-effective power monitoring solution that can be managed via a single system; reports on energy cost, multi-device usage, usage trends, and load profiles.
- Electrical network health summaries.
- Direct access to power meter data.
- Support of all WAGES utilities.

Power Manager gives access to key information on electrical network health. Acting on that information can lead to preventive maintenance, better tenant billing, positive behavior changes, and adequate information to audit electric utility bills.

Assuming a facility is equipped with sufficient meters of appropriate capabilities, facility managers can use Power Manager to:

1. See present and past energy usage for any point or area within the facility to identify excessive consumption and periodic high demands (e.g., all of Building 1 or Cooling Plant only).

2. Compare present and past consumption data (today over yesterday, week, month, year) to see what has changed, or if conservation measures are having an effect (period over period reporting).

3. Visually scan time-duration-of-consumption data presented graphically to see if there is any demand out of place (unexpected usage on a weekend, for example).

This information can be visualized graphically via easily configured "dashboards" or reports.

Automation can be used to initiate load-shedding and load-scheduling programs (or call for on-site generation) once demand approaches limits that result in increased billing.

www2.schneider-electric.com/sites/corporate/en/products-services/buildings/smartstruxure/power-manager.page

SHOWCASE: FIRE SAFETY

Many Factors Can Trigger Changes to Fire/Life Safety Systems

by scott m. golly and alan j. kouchinsky

For reasons often beyond your control, the fire protection and life safety systems in your facility will be forced to change, either due to obsolescence, new code adoptions, or repairs to keep equipment operational. These changes can be gradual, or they can be rapid as a result of catastrophic failures. Understanding why your systems may be required to change is the first step to coping with these changes.

Once building fire protection and life safety systems are commissioned and accepted by the authority having jurisdiction (AHJ), new codes and standards do not retroactively require the systems to be upgraded to account for new technological changes or code provisions. An exception to this is when local code amendments require system changes to account for a code deficiency, which may be directly related to a fatality. For example, in recent years, the installation of carbon monoxide detectors and residential automatic sprinkler systems in existing buildings have been at the forefront of many local jurisdictions' new requirements.

Beyond addressing a code deficiency, one reason that fire protection and life safety systems are forced to change is because of changes to the building. Often, buildings are sold, leased, or reconfigured to accommodate the needs of occupants for the changing business environment. Prior to the building being repurposed or remodeled, the owner will need to consult the building codes to determine if upgrades to the building construction (elements and materials), fire protection, life safety, accessibility, structural, and mechanical/electrical/plumbing (MEP) systems are necessary. Most jurisdictions adopt the International Existing Building Code (IEBC) to deal with this situation. The IEBC defines the various levels of work and whether the project would be classified as a repair, alteration, or addition, and if the scope would include a change in occupancy. Each scenario defines whether the building systems and construction will need to be upgraded to the current code requirements or can be left in place with no changes. Pertinent definitions from the IEBC are:

Work Areas — Defined as that portion or portions of a building consisting of all re-configured spaces as indicated on the construction documents, and excluding other portions of the building where incidental work entailed by the intended work must be performed

a. SIEMENS Cerberus PRO fire protection system with Intelligent Voice Communication for small- to mid-sized buildings has a built-in two-channel message player supporting 64 digital messages. The system features a wide frequency response for amplifiers, CD-quality sampling rate for messages, and hi-fi speakers. Fire and VoIP network over the same copper or fiber connection.

b. TYCO SIMPLEXGRINNELL Simplex 4100ES addressable fire alarm control panels support up to 2,500 addressable points, fire alarm and emergency voice communications, and peer-to-peer networking operation. With its scalable design flexibility, 4100ES panels are ideal for medium to large facilities and multi-building campus style networks. All Simplex addressable panels rely on TrueAlarm addressable detectors.

c. SYSTEM SENSOR FAAST XS aspirating smoke detector for smaller applications has a variable speed fan that allows users to select the best coverage for their space — up to 5,000 square feet. The FAAST line features three-stage filtration, very early warning fire detection, increased nuisance immunity, and various built in connectivity options.

d. HONEYWELL Focal4 Shared Situational Awareness (SSA) system from Gamewell-FCI uses the CAPSOL add-on to search Twitter feeds for keywords such as "shooter." Most Twitter activity is public and includes IP-address-based geo-location information, so the software can pinpoint the location of that tweet, and determine if it is relevant to the safety and security of an organization.

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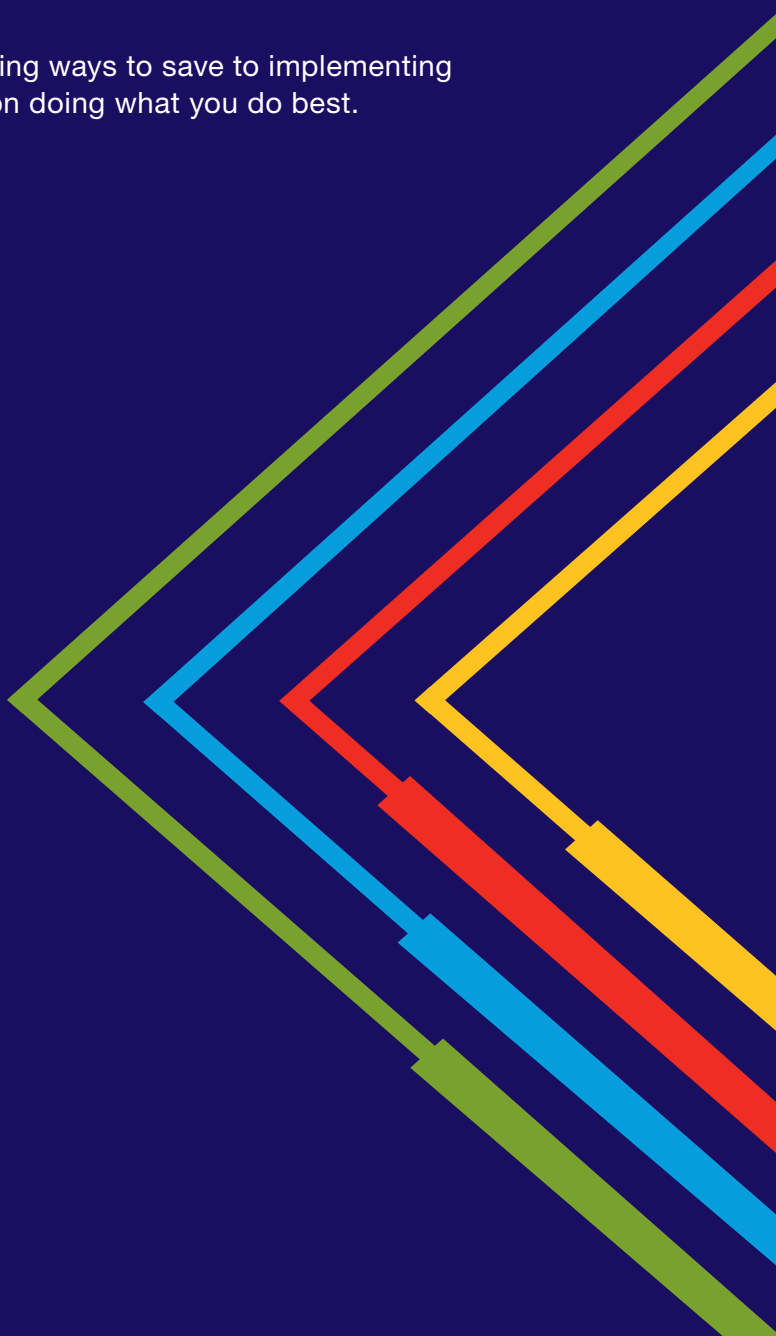

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delmarva power

These programs support the EmPOWER Maryland Energy Efficiency Act.

»a. POTTER The IntelliPurge Nitrogen Purge Valve (INS-PV) works in conjunction with the company's nitrogen generators to monitor the level of nitrogen in a fire sprinkler system, maintaining a 98 percent nitrogen purity level. This helps prevent corrosion in both dry and pre-action pipe systems. The INS-PV can be used as a standalone device, or with a remote annunciator.

»b. KIDDE FIRE SYSTEMS The Advanced Delivery System (ADS) using 3M Novec 1230 fire protection fluid uses cylinders that can be stored more than 200 feet from the space they are protecting. Piping runs can be reduced by adding directional valves at strategic locations. ADS nozzles cover up to 42.5 feet by 42.5 feet with a single nozzle, and can be mounted 18.5 feet above the floor deck.

»c. ARMSTRONG FLUID TECHNOLOGY HSC Firepak is an integrated fire pump solution featuring a compact design for fast and easy installation. The pump and motor, with either electric or diesel driver, are mounted on a steel base, requiring only one alignment check, and pressure is factory tested. Product features include connection up to 12 inches, pressure up to 250 psi, flow up to 3,000 US gpm.

AGF MANUFACTURING The COLLECTanDRAIN Model 5300A pre-assembled dry fire sprinkler auxiliary drain collects moisture and provides a method for its removal while minimizing excessive loss of air pressure or tripping the dry valve. A water detection alarm can be added to give audible and visual notification when maintenance is required so the drain valve doesn't freeze and break.

SAFETY TECHNOLOGY INTERNATIONAL STI Universal Stopper helps prevent false alarms while guarding against damage. Interior 105 dB horn is triggered when cover is lifted, bringing immediate attention to the area. Indoor/outdoor clear polycarbonate cover is waterproof Type 3RX with enclosed back box, sealed mounting plate and FIRE label. Sized to fit most pull stations.

FIKE Qualifire PRO aspiration smoke detector combines high-power-light-source technology with fire pattern recognition algorithms and a wide range of accessories to ensure sensitivity down to +/- 10 percent changes, and false alarm immunity. Optional second plug-in detector module allows one air sampling unit to monitor two separate areas or to be used for cross-zoned alarm verification.

and portions of the building where work not intended by the owner is specifically required by the code.

A Repair — Defined as patching or restoration or replacement of damaged materials, elements, equipment, or fixtures for the purpose of maintaining such components in good or sound condition with respect to existing loads or performance requirements.

For example, the replacement of the fire alarm control panel or fire suppression system isolation valve due to part obsolescence or manufacturer defects could count as a repair to the fire protection and life safety systems. The new system or component would be required to be installed in a manner that maintains the level of fire protection provided.

An Alteration — Defined as any construction or renovation to an existing building other than a repair or addition. Alterations are classified as Level 1, Level 2, and Level 3.

Level 1 alterations include the removal and replacement or the covering of existing materials, elements, equipment or fixtures using new materials, elements, equipment or fixtures that serve the same purpose. An example of a Level 1 alteration would be the one-for-one replacement of sprinklers based on the upgrade of the suspended ceiling from an acoustical ceiling tile assembly to a gypsum ceiling. Specifically, the owner may have requested concealed-type sprinklers that are painted white in place of the existing semi-recessed pendent sprinklers that were chrome plated. The new system/component would be required to be installed in a manner that maintains the level of fire protection provided.

Level 2 alterations include reconfiguring of space, the addition or elimination of any door or window, the recon-

figuration or extension of any system, or the installation of any additional equipment. For example, the reconfiguration of the fire alarm notification appliances and sprinklers based on the reconfiguration of a large open space to smaller offices and work rooms would be a Level 2 alteration. The additional notification appliances and sprinklers would be required to be installed in accordance with the referenced applicable installation standards of the International Existing Building Code.

Level 3 alterations apply where Level 2 work areas exceed 50 percent of the aggregate area of the building.

A Change of Occupancy — Defined as a change in the level of activity or purpose within the building and must comply with the Change of Occupancy chapter in the IEBC. A portion of an existing building that is changed to a new occupancy group and that is separated from the remainder of the building with fire barriers having a fire-resistance rating as required in the IEBC or the separate occupancy is required to comply with all the requirements of the Level 3 alteration chapter and change of occupancy chapter. Where the portion of the building changed to a new occupancy is not separated from the remainder of the building, the requirements set forth in the Level 3 alteration chapter and change of occupancy chapter must be applied throughout the entire building.

Additions or Alterations — Additions or alterations to any building or structure must comply with the requirements of the applicable building code for new construction. Portions of the structure not altered and not affected by the alteration are not required to comply with the code requirements for a new structure.

Advances in Technology

Technological advances often drive the fire alarm and emergency communication industry to change as well. One recent development in the fire alarm industry has been the installation of mass notification or emergency communication systems. These systems provide the ability to transmit live voice messages and other types of messages throughout the building to warn occupants of approaching bad weather or dangerous events inside the building.

Wireless initiation devices, which eliminate the need to run wire in finished spaces, are another evolving technology in the fire alarm industry. It is very common for hotels to utilize this technology for upgrade projects since it not only reduces the total installation time but eliminates the need to close down a hotel room for the upgrade.

Often the changes in the fire alarm systems equipment are made to integrate with other building safety technologies. For example, Internet-protocol-based technologies are now being used by the fire alarm industry. Emergency communications must also take into account the numerous devices that are used by virtually everyone today. For example, almost everyone carries a smartphone and has a tablet and a personal computer. To reach this audience, emergency communications must capitalize on all of these technologies.

Depending on the proposed changes to a building, other building automation systems may require integration with the fire protection and life safety features. Will combination fire/smoke dampers be required in the new fire-resistance-rated barrier? Will a new floor control valve assembly be required for the new building addition? Will smoke detection be required for the installation of a new air-conditioning system or needed to perform recall functions associated with the installation of a new elevator? All of these systems will need to be interconnected in some fashion to the fire alarm system and may require an upgrade to your existing system.

Deciding on an Upgrade

You may find that any of a variety of issues — such as your sprinkler system failing due to corrosion, your fire alarm system reaching its end of life and parts no longer being manufactured, or your building being renovated — force a fire alarm system upgrade to be code compliant. Or it may be that you simply want to be proactive to avoid a crisis system replacement in the future. For example, as a result of issues uncovered by inspection, testing, and maintenance programs, building owners may voluntarily elect to upgrade various system components depending on their obsolescence or overall dissatisfaction with the system's operation. How do you decide to upgrade your fire protection systems and when do you react to changes?

It isn't always obvious when a system upgrade should take place. It is challenging for a building owner to be knowl-

edgeable in all aspects of fire protection and life safety. Codes and standards are always evolving, and the code of record for your 20-plus year old building may be very different from the latest adopted code requirements.

If you are in doubt about whether an upgrade is warranted, consider having an unbiased expert determine the status of your systems. It may be possible to see the onset of an impending failure so that you can plan your system replacement before the failure occurs. For example, dry sprinkler systems often are far more maintenance intensive than water-based suppression systems, which often have extremely long life expectancies. Sprinkler systems can be evaluated externally and internally to identify problems before they become unplanned disasters that result in business continuity and high cost issues.

Even if you aren't an expert in fire-life safety systems, you can avoid crisis problems by reviewing test reports and visually inspecting your systems. For example, if your dry sprinkler system seems to require constant maintenance including repair of pinhole leaks or visible corrosion, or if it has an air compressor that is continually operating, these are indicators that you should consider having an evaluation of the condition of the system.

Fire alarm systems present issues in a similar manner. If your service technician (internal or external to your company) is continually indicating that device replacements are needed, or system troubles or other functional problems are recurring, then further evaluation is needed.

Get the Best System You Can

If you are being forced to upgrade a system due to obsolescence, don't assume you cannot afford to add better functionality. For example, voice fire alarm systems offer far greater system versatility for very little additional cost. You may be able to add mass notification capabilities, eliminate recurring costs associated with telephone landlines, reduce inspection, testing, and maintenance costs and improve overall system reliability by installing the right detection technologies for the application. Wireless is becoming an excellent system architecture for both new and existing systems but should be evaluated based on your specific long term needs. Applying new, robust detection technologies can dramatically simplify maintenance costs. But beware of the latest trend or widget that does not serve your operational needs. Decisions about upgrades should be made based on an analysis of the specific facility conditions and organizational objectives.

Also, be careful when you are advised that a one-for-one device and appliance replacement is all you need to do. Your existing system may not meet all of the current code requirements; therefore you may need a complete system redesign.

An independent designer can help you evaluate your needs and review options. Be aware that anyone other than an independent designer may have a different motivation than providing you the most cost efficient design.

Fire protection and life safety systems that are aging can be evaluated in a manner that allows for a planned replacement. Planning for replacements before a crisis allows for a design-bid-build process that offers competitive pricing and enables you to budget for replacement and to build these upgrades into your future business objectives. For example, upgrading a fire alarm system's head-end or sprinkler system water supply this year can assist with expansion capability that will be necessary for a building expansion that is being planned for two years down the road.

Fire protection and life safety is a complex field, and it's worth educating yourself and your staff. An often underutilized tool is simply capitalizing on the local and national associations that offer training. The National Fire Protection Association (nfpa.org), the National Fire Sprinkler Association (nfsa.org), and the Automatic Fire Alarm Association (afaa.org) are just a few examples of organizations that offer training, seminars, and certifications for you or your staff. Local installers or trusted vendors can typically offer training on the various systems you have at your facility. If they cannot, consulting firms can tailor training programs to your facility. ■

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Alan J. Kouchinsky, PE is a fire protection engineer with JENSEN HUGHES.

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

PREVIEW NFMT ORLANDO

To the Victor Go the Energy, Cost Savings

by wendy dietzler, vice president of education and conferencing

If, as the saying goes, hard work is its own reward, the recipients of this year's *Facility Maintenance Decisions* Achievement Awards have already received their prize: Each honoree has dedicated significant time and expertise to improving operations throughout their facilities, making strides in renovation processes, personnel management, financial oversight, and sustainability initiatives. And they show no signs of stopping when it comes to identifying new approaches for boosting performance and efficiency.

The awards, sponsored by *Building Operating Management*'s sister publication *Facility Maintenance Decisions*, highlight the vital role of maintenance and engineering in institutional and commercial facilities. Teams are nominated and vetted online by their professional peers, a panel of judges, and the magazine's editors.

"The overall quality of the entries in this year's awards program was outstanding, and this year's recipients truly demonstrated the value of their departments to their organizations," says Dave Lubach, *FMD*'s associate editor. "Each of the award recipients demonstrated all of the qualities that make up successful maintenance and engineering departments, presenting innovative ideas that produced energy and financial savings."

Lubach will host a panel discussion, "Achieving Excellence in Maintenance Operations," with several of this year's honorees at the upcoming NFMT Orlando Conference & Expo, taking place Oct. 27-28 at the Orange County Convention Center. He says the session offers an opportunity for attendees to learn from some of the country's best maintenance and engineering departments.

The *FMD* Achievement Awards recipients participating in the panel discussion include: Sean Devaney, director of maintenance, mechanical and electrical services for Broward College in Davie, Fla.; Bert M. Gumeringer, assistant vice president-facilities operations at Texas Children's Hospital, and David King, director of energy management at Oral Roberts University. To view a list of 2015 recipients, visit www.facilitiesnet.com/fmd/fmdaa.

King's staff earned recognition for reducing energy consumption by 50 percent at the university's CityPlex Towers complex. His efforts have helped him earn the full support of the university's C-Suite, and he continues to push the envelope when it comes to energy management initiatives.

Gumeringer will be on hand to receive Texas Children's Hospital's third award in the program's six-year history, having won in 2010 and 2011. This year, his team managed to reduce utility costs per square foot from $7.04 to $5.20 by maximizing the use of its building automation system.

Broward College received an Achievement Award in 2011 as well. This year the recognition is for Personnel Management, as the college centralized more than 100 full-time employees from different departments into a new maintenance team.

NFMT Orlando Schedule At-A-Glance

TUESDAY, OCTOBER 27
2 to 3 pm Opening Night Networking Party
3:10 to 5 pm Educational Sessions
4:10 to 6:30 pm Women in FM

WEDNESDAY, OCTOBER 28
7 am to 2 pm Registration
8 to 10:50 am Educational Sessions
11 am to 2 pm Exhibit Hall Open
2:10 to 4 p.m. Educational Sessions

Detailed schedule information available at nfmt.com/orlando/previewschedule.asp

"There's no doubt attendees will glean highly valuable information to take back to their own facilities, and benefit their own departments and organizations," Lubach says. "I am looking forward to a great conversation, and I'll be encouraging our audience members to ask questions and interact as much as possible with this year's winners."

Registration for NFMT Orlando is now open, and there is no cost to attend. Learn more at www.nfmt.com/Orlando. ■

Email questions and comments to wendy.dietzler@tradepress.com.

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