APRIL 2019 • $8
facilitiesnet.com/BOM

building OPERATING management

Lighting and wellness

Net-zero energy

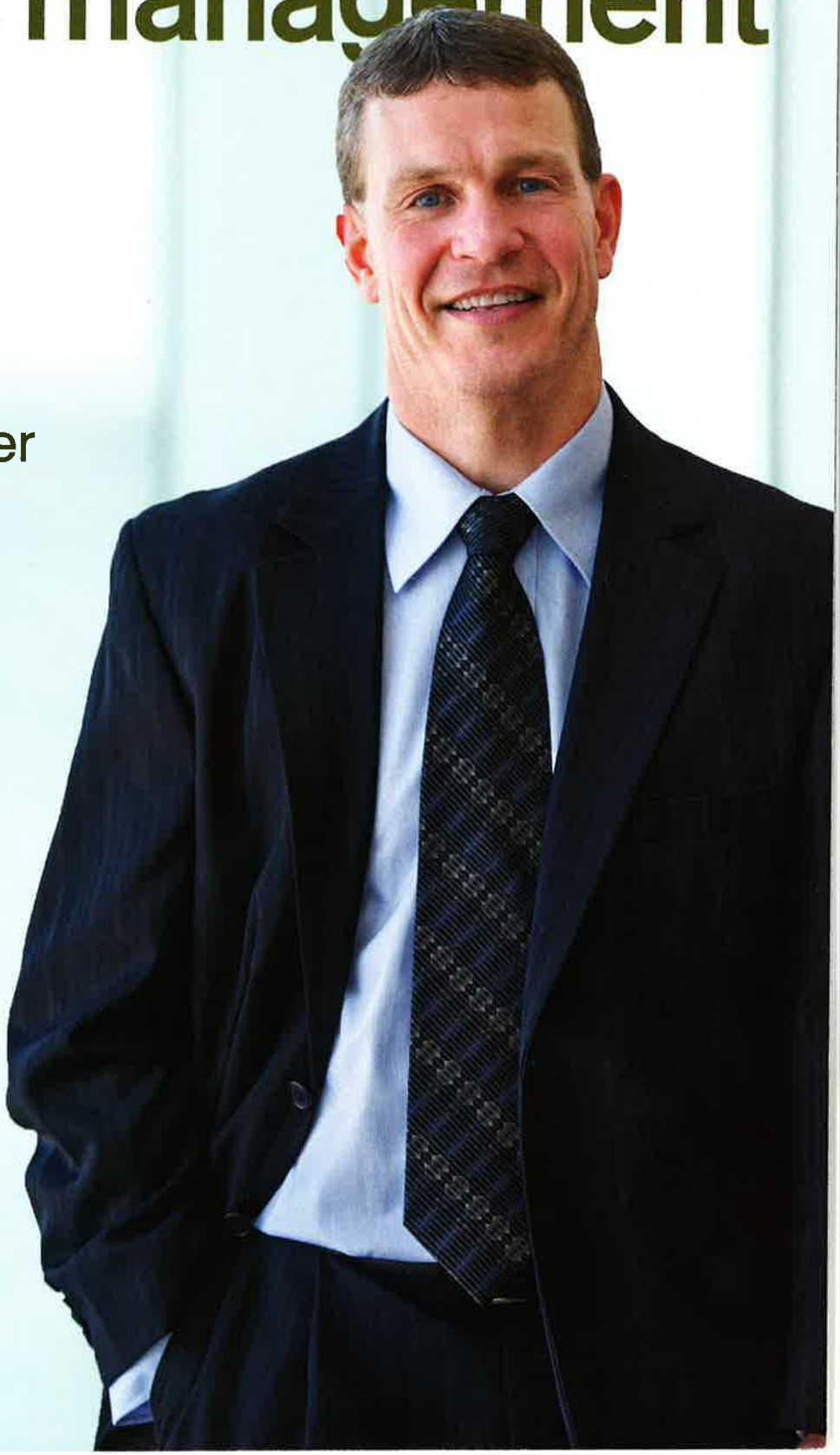
IoT products boost green efforts

4 levels of power reliability

Resilience on campus

ENERGY BLACK BELT

Creative renewables and driving out energy waste have become Corey Zarecki's profession and passion.



Corey Zarecki, director of engineering and operations, Envision at Gundersen Health System

CLOSE-UP LIGHTING CONTROLS

Adjusting occupancy sensor delay can bring big energy savings

By Ian M. Shapiro

An LED lighting retrofit can make a facility manager a hero in the organization because of the energy savings and reduced maintenance costs that the upgrade provides. But most facility managers aren't aware that they can save significantly more energy, over and above the savings from the LEDs, simply by reducing the time delay on occupancy sensors. What's more, reducing the time delay will improve both safety and occupant satisfaction, and there's research to prove it.

The time delay is the time duration that lights stay on after occupants leave a space, when lights are controlled by occupancy sensors. This is time when the lights are on but no one is in the space. Energy codes and standards, like the International Energy Conservation Code, typically require that this delay not be longer than 30 minutes. But there's no reason that the lights should be on for 30 minutes while the space is unoccupied. Recent research has shown that facility managers can reduce this time delay significantly, which can even substantially increase savings, even doubling savings or more, while not reducing safety or occupant satisfaction, and in fact improving them.

Think about your building. How frequently do people enter lobbies, corridors, stairwells, bathrooms, copy rooms, elevators, and even offices or conference rooms, or spaces like kitchenettes, mail rooms, and the like? In other words, what is the time between one person leaving a space and the next person entering the space? Typically, it's more often than every 30 minutes. If that's the case, and the lights are controlled by occupancy sensors, and the time delay is set for 30 minutes, the lights are going to stay on all the time.

With fluorescent lights, or outdoor HID lights, facility managers didn't want to reduce the time delay, for fear of reducing the life of the lamps. But with LED lighting, reducing the time delay does not reduce the life of the lamps. And the added savings are substantial.

Energy savings

How much can be saved by reducing the time delay? A study examined potential savings in medium-rise apartment building corridors. With a 30-minute time delay, energy savings were 24 percent. With a 30-second time delay, energy savings more than tripled, to 74 percent. For other space types, savings are smaller, but are still measurable. For example, in the same medium-rise apartment buildings, lighting energy savings in stairwells went from 60 percent to 78 percent when the time delay was reduced from 30 minutes to 30 seconds.

For different space types, the savings depend on how long your current time delay is, and how short you go. One recent study, also for lighting in corridors, found that savings increased from 69 percent for a 15-minute time delay to 78 percent for a 5-minute delay.

Product options

Occupancy controls typically allow facility managers to choose time delays from one of several settings. Some devices allow the time delay to be adjusted with a dial, so you do not know the setting unless you test it. If you have not bought occupancy controls yet, make sure to choose a control that allows you to go as short as you want.

Occupancy sensors can either be stand-alone, to control one or more light fixtures, or they can be integrated into light fixtures.

5 minutes:

A study found that, for lighting in corridors, savings increased from 69 percent for a 15-minute time delay to 78 percent for a 5-minute delay.

> "With LED lighting, reducing the time delay does not reduce the life of the lamp. And the added savings are substantial."

ADAPTED FROM ILLUSTRATION BY FRANCIS D.K. CHING

Occupancy controls typically allow facility managers to choose time delays from one of several settings or by means of a dial. For new controls, choose a product with a delay that can be set as low as desired.

Exterior lighting

Exterior lighting can benefit from a combination of photosensors and occupancy sensors, and many controls combine both for this purpose. The photosensors ensure that the lights are off during the day. And the occupancy sensors keep the lights off at night, except when needed for people who are passing by. Historically, facility managers used one or the other, but not both, and more often than not used photosensors, which has meant that lights stayed on all night. Occupancy sensors reduce this runtime from "all night" to "just when people pass by, plus the off-delay." So, again, if people are passing by every 30 minutes all evening, then the lights stay on all evening, and savings are only from end-of-evening till dawn. But if the time delay is reduced, facility managers can see significant additional savings through the evening hours.

An increasingly common approach with exterior LED lighting and occupancy sensors is to have the lighting ramp up and ramp down, rather than instantaneously turn on and off, and this approach delivers both good energy savings and customer satisfaction.

The energy code is starting to catch up to these savings. For example, for most types of exterior lighting, the code now requires the maximum time delay to be 15 minutes, instead of 30 minutes. And the code calls for most types of lighting to be reduced by at least 30 percent between midnight and 6 a.m. But these improvements don't come close to delivering the full potential energy savings, and facility managers don't need to be limited by the energy code. To maximize savings, facility managers should use occupancy sensors and crank down those time delays — down to 5 minutes at most, and even consider going down to 1 minute. There's no need to light the outdoors when nobody is out there.

How short should the time delay be? That might depend on the application. Spaces with active occupancy, such as corridors and stairwells, can use shorter time delays of five minutes or less. Applications such as parking lot lighting might deserve longer time delays, to give people time to walk from their cars to a building, when they might be moving out of range of the occupancy sensor. But even in these applications, longer time delays such as 15-30 minutes are simply not needed.

Cost versus benefits

What do these changes cost? If a facility already has occupancy sensors, this is just a change to the setting, and there's no cost at all. For facilities that are planning an LED retrofit and were not thinking of occupancy sensors, the sensors can be added at modest extra cost to the project, and no added cost to then reduce the time delay once the controls arrive. Facility managers might even consider using bi-level lights with built-in occupancy sensors, at an added cost of about $100 per fixture for both the occupancy sensor and dimmer driver. And even if a facility has already upgraded to LED lighting but didn't install occupancy sensors at the time, the payback is so good that it is worth the cost of adding occupancy controls, especially for low-occupancy areas like stairwells and exterior lights, and then reducing the time delays.

The key to getting time delays right is in commissioning. Specifications for installing occupancy sensors should call for an exact delay, whether it's 5 minutes or 1 minute or shorter. Specifications should also call for commissioning the sensors, to confirm that the time delay has been set correctly. ■

Ian M. Shapiro (imshapiro@taitem.com) is the founder of Taitem Engineering, Ithaca, N.Y., and is the author of the books "Green Building Illustrated" and "Energy Audits and Improvements for Commercial Buildings."

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

CHECK IT OUT

For more information, check out these resources:

- Sensor-Controlled Lighting in Multi-family Corridors, Delta Field Test Snapshots, Lighting Research Center, Rensselaer Polytechnic Institute, 2018: www.lrc.rpi.edu/programs/delta/publications/publicationsDetails.asp?id=947&cat=17
- Boosting Energy Savings through Lighting Occupancy Control Settings, Taitem Engineering: www.taitem.com/wp-content/uploads/Taitem-Motion-Sensor- Tech-Tip-2012.3.16.pdf
- www.darksky.org/light-pollution/lighting-crime-and-safety/