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EnOcean Technology Sets a New Standard for Lighting

Self-powered sensors and switches will revolutionize the way buildings are designed and renovated

By Jana J. Madsen

Imagine planning and designing a building that has walls without wires, or selecting wireless occupancy sensors that don't use batteries. You could mount a light switch wherever you want – at whatever height – and, next week, it can be moved without making a service call to an electrician. This isn't a crazy dream; it's a new reality that technology from Germany-based EnOcean – the originator of the patented, self-powered wireless technology – enables.

"EnOcean [converts] energy commonly found in the environment into useful electrical energy to power devices, such as wireless switches and sensors, that are used in building automation," explains EnOcean North America President Jim O'Callaghan, Cottonwood Heights, UT. The energy that O'Callaghan is referring to can be harvested from artificial or natural lighting, or from the simple motion of flipping a light switch, and is sufficient enough to power and transmit data from switches to sensors. The most common applications for the technology are temperature control and lighting – both of which enable the dramatic reduction of energy consumption in facilities.

Manufacturers in North America have only recently taken note of the technology, but it's nothing new in Europe: More than 10,000 buildings there have installed EnOcean-enabled products. But, it's beginning to catch on in Canada and the United States, too. "More OEMs are integrating it into their products," says Shawn Pedersen, president at Echoflex Solutions in Squamish, BC. "The acceptance level of it [grew] in leaps and bounds in late 2008 [and] early 2009." Early adopters have formed an alliance to standardize and internationalize the innovative wireless technology. "By joining this alliance, members agree to develop products that are interoperable. If you buy an EnOcean-enabled light switch from manufacturer A, it can talk to a dimming controller or relay controller from manufacturer B," explains O'Callaghan.

Energy and the Environment

Not only are EnOcean-enabled photosensors and occupancy sensors easy to install because there are no wires, they can also be tied into lighting systems to curb the use of artificial light when it's not necessary. "Depending on where you put an occupancy sensor, [your client can] save roughly between 20 and 80 percent of the electricity used to light that area," explains Bob Freshman, marketing manager, Leviton Manufacturing Co. Inc., Little Neck, NY. "Your overall savings run an average of at least 30 percent." And, because these products provide significant energy savings over time, and are capable of giving building occupants personal control of their lighting, LEED points can be achieved.

Maintenance and Installation

Ease of installation is why the North American market is touting EnOcean-enabled products as the ideal solution for retrofits. In an existing building, the switch is replaced with a wireless one containing an EnOcean transceiver. Then, the wireless occupancy sensor, which is powered by artificial lighting due to its integrated solar cell, is mounted to the ceiling. Then, the installation is complete. "It's very quick. It's very easy. It's peel and stick. It's reusable, and it's interoperable," explains Pedersen.

These products can dramatically cut the time, mess, and inconvenience of a typical lighting retrofit. "A common retrofit today means you do it all, or you do none. It's very disruptive, and it can cause a lot of problems in a work environment," explains Pedersen. "With this technology being point-to-point technology, you can [retrofit] one office or a group of offices without impacting anywhere else."

Whereas most applications with occupancy sensors and photosensors require wire to be run from the sensor to the light fixture and switch, EnOcean products are wireless. This

Justifying the Expense of EnOcean

If you spec this technology into your next project, don't be surprised by the sticker shock. The price of the switches and sensors is *much* higher than a standard hard-wired switch (\$2 vs. \$80). "You can never think of this as 'pricing a product.' You have to price it as a *solution*," says Shawn Pedersen, president at Squamish, BC-based Echoflex Solutions. The following factors *must* be considered when justifying the expense:

1. *The energy saved.* According to EnOcean, using self-powered wireless technology can result in savings of as much as 40 percent in energy and operating costs for the building owner.
2. *Fewer labor costs for installation.* "Because there's only one high-voltage wiring point, the electrician's time is very short. The rest of it is very easy to deploy. It can almost be done by a facility manager who walks behind the electrician and sticks switches on the wall. That's where a lot of the cost savings are – in the labor component," explains Pedersen.
3. *Wireless.* Because the system is wireless, there's no need to pull wires through walls, increasing future flexibility and decreasing the expense of copper wire. "Even though the fixtures – the parts themselves – are

dramatically cuts down on labor costs. Installation is faster, too, and there's no better proof than the renovation project that Boston-based real estate firm Leggat McCall Properties LLC completed in just 15 days. The fit-out of its third-floor office (totaling 10,000 square feet) was an experiment that was conducted to show clients that:

- Construction projects don't need to be riddled with scheduling inefficiencies.
- Embracing new technologies can be both beneficial *and* green.
- Spaces can be built for future flexibility through thoughtful planning.

Using access flooring and movable walls, the firm coined the term "dumb walls and smart floors." Since no wiring was run through interior walls, light switches and thermostats with EnOcean technology were used.

Because these wireless devices are self powered, there are no batteries. When only one or two battery-powered devices are deployed, changing batteries is no problem; however, if your project is anything like Torre Espacio – the 55-story high-rise in Madrid, Spain, that deployed 4,200 EnOcean nodes – changing batteries on battery-powered wireless sensors and switches that have been moved can be a little like an Easter egg hunt, says O'Callaghan. (It's no wonder that project planners opted to use EnOcean products.)

Short-Term and Long-Term Flexibility

Because the wireless devices can be placed anywhere, architects and lighting designers have the freedom to place switches wherever they'll be most convenient for the user – instead of where it's easiest to wire. "Our products have been placed on brick, cement, and glass, [and even] stuck to ceilings. That tends to provide the architect [with] flexibility and freedom that they oftentimes have not had," says O'Callaghan. "What some designers have been doing is creating zones and allowing cubicle occupants to flip switches [that are] literally Velcro-ed to their cubicle walls ... or [placed] right on their desks."

Long after the devices are installed, flexibility remains. New switches and sensors can be added to the system with ease. Additionally, building end-users will no longer need to pay for an electrician to rewire a space when their tenants change or an office is reconfigured. "Rather than having to rewire all of these occupancy sensors, have an electrician pull wires, take stuff out, and rewire it to a new location, you simply take the [EnOcean-enabled] occupancy sensor off the ceiling and stick it somewhere else," explains Freshman.

This is a real boon to property managers, especially during the economic downturn. "In a seller's market, they might be able to charge the occupant [for the fit-out]; in a buyer's market, they may have to absorb the cost of renovating the building to make it compete with the new unoccupied building down the street," notes O'Callaghan.

These easy-to-install lighting devices are virtually maintenance free, offering the reliability of hard-wired lighting controls along with the flexibility of wireless. Already, historic buildings, commercial offices, and hotel guestrooms are reaping the benefits that EnOcean-enabled technology offers. "It's a very flexible technology with products that provide real solutions right now," concludes Pedersen. "It's going to gain a lot of momentum in the next year or two."

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more expensive than a non-wireless part, considering the cost of the part and the very small amount of labor to install it, the overall expense would be 50-percent less using wireless," says Bob Freshman, marketing manager, Leviton Manufacturing Co. Inc., Little Neck, NY.

4. *No battery-replacement costs.* Your clients will appreciate the self-powered technology of EnOcean. Batteries add to the expense over time.
5. *Tax credits and incentives.* "There are federal tax credits now through EPAct that Congress extended through 2013 that give tax credits to people installing and retrofitting energy-efficient lighting," says Freshman. "A lot of utility companies also offer rebates to people putting in these types of products."