ENERGY MANAGER TODAY

Essential Guide to Lighting Retrofits & Upgrades

A SPECIAL REPORT COVERING:

- What You Need To Know When Making A Decision: Trends, Stats, Lighting Controls and other Building-Wide Control Systems
- Questions To Ask Vendors
- How To Convince Higher-Ups To Approve The Project
- And More...

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Essential Guide to Lighting Retrofits & Upgrades

A special report on what you need to know when making a decision, including: lighting controls and other building-wide control systems, trends, stats, questions to ask vendors, convincing higher-ups to approve the project, and more.

Rising utility costs are affecting businesses everywhere, yet commercial buildings have been increasing energy consumption steadily. Energy consumption by commercial buildings grew 69% from 1980 to 2009, and projections from the Energy Information Administration show consumption is estimated to grow another 22% from 2009 to 2035, according to business research analysts from IBISWorld.

This is causing a rapid increase in the drive toward energy efficiency, but it can be difficult to pinpoint the most effective solutions for reducing energy use. At a time when 20% of the world's electricity is used for lighting – and commercial lighting systems count for over 50% of the total electricity used for lighting - retrofits and upgrades that allow lighting systems to use energy more efficiently may be one of the best places to start. And the energy savings realized over time can be significant enough to not only pay for the new equipment but also produce a return on investment.

A recent report from Navigant Research predicts that over the next seven years, annual sales for occupancy sensors, photo sensors and lighting network gear related to LED lighting applications will grow from $1.1 billion in 2013 to $2.7 billion by 2020. Falling LED prices are driving up adoption rates of LED lamps, which in turn will drive up the adoption of lighting controls.

Meanwhile, traditional lighting companies have begun offering a complete range of lighting control products, from local sensors to building-wide software. Established building controls companies have also been expanding their capabilities to include lighting controls along with other building-wide control systems, says the Navigant report.

In fact, says Jesse Foote, a senior research analyst with Navigant, the rise in adoption of LEDs is a significant driver of the controls industry in general. Lighting controls allow companies to monitor and control lighting, add occupancy sensors and other sensing, and connect to the Internet for management and tracking. "And once you have a network of sensors and controls for your lighting system, you may want to tie it back to your

HVAC or security cameras," says Foote. For example, complex manufacturing settings require flexible and reliable building energy management, monitoring, and alerts that provide facility managers the power to improve lighting and enhance workplace safety and productivity.

One such important improvement in lighting is the ability to decide on areas that need granular control vs. zonal control. Granular controls allow every fixture to be controlled, whereas zonal control allows control over specific areas. In a conference room with six fixtures, you don't need waste money adding adapters to every one. In a work area, it may be necessary to control every fixture for customized lighting depending on the project.

But with the rapid pace of change in this arena, knowing where to begin presents a challenge to facilities managers, who have to understand and put to use an enormous amount of information about the space and infrastructure. "Facility managers have so much to worry about. It's one of the most thankless jobs you can imagine," says Mandeep Khera, vice president of marketing and channels for Daintree Networks, a company that offers open, networked wireless solutions for smart building control and energy management. "Nobody knows facility managers exist until something goes wrong, and if they're not completely tech-savvy, using software and wireless control to manage electricity use is something they haven't thought about."

WHAT TO CONSIDER WHEN LOOKING AT A LIGHTING RETROFIT

Energy efficiency is the number-one reason most owners cite for investing in a lighting retrofit or upgrade. The savings depends on the building type, but companies have mentioned savings as high as 70% or more, as well as additional savings on maintenance, says Khera.

"If you do it right, you can combine sound business practices with doing the right thing for the environment," says Ted Pinnow, maintenance manager for United Stationers, a wholesale distributor of business products that recently installed LED fixtures and the Daintree ControlScope smart building control system. The conversion achieved a monthly lighting savings of 94%, Pinnow says.

Additional factors to consider when deciding whether to retrofit or upgrade your lighting:

#1. Operational efficiencies

Consider: will loss of lighting lead to a direct loss of revenue? "The CEO of a company that owns roughly a thousand restaurants told us he was visiting various branches and saw that, at several locations, the outside sign was not working," says Khera. "If a sign is out, what happens? People don't go in. By forestalling that problem, you're lowering business risk." Fault detection is a key benefit to consider in your overall ROI.

Other operational efficiency considerations include:

- Where would it be helpful to control when lights are turned on and off? Are there spaces where lights need to be on 24 hours a day? Others where it would make more sense for them to be off between certain hours? Would occupancy sensors reduce wasted energy in some areas?
- Proactively schedule maintenance of lighting and other devices with alerts from the system
- Keep track of usage and lifecycles of lighting and various equipment

In order to maximize the return on investment of LEDs, consider run time, inefficiency of existing lights, and cost of electricity, says Charlie Szoradi, CEO of Independence LED, a manufacturer of LED tubes. For example, kitchen and bath supplier Davis & Warshow had high lighting run times, outdated bulbs, and a location in an expensive electric market. The company converted its 209,000-sq-foot NYC distribution center from fluorescent tubes to LED tubes, reducing the company's lighting tab by nearly $40,000 a year, according to D&W. The project cost more than $250,000 to complete. With rebates and energy savings, the project will have paid for itself in five years, the company says.

#2. Occupant comfort

Consider whether the level and quality of the existing lighting is effective. Is it too high? Too low? Is glare a concern? Task tuning plays a big role in terms of productivity. "People who work in a cubicle environment have much greater satisfaction when they can control the light over their heads," says Dave Bisbee of the Sacramento Municipal Utility District (SMUD). With personal remote controls in office areas, employees can set the light level of the fixture directly over their heads to the level they find most comfortable, and can adjust it throughout the day as they please. Productivity goes up as satisfaction improves.

SMUD worked with United Stationers on its project to install LED fixtures and a smart building control system in its Sacramento facility. Nearly half of the facility's lighting is now controlled by staff members using personal remote dimmers. Spot checks indicate that their lighting preferences vary widely, from a low of just 6 foot candles to a high of 33 foot candles. The project has resulted in a 94% savings in annual lighting costs, United Stationers says.

General Motors also introduced lighting controls to improve workspace lighting and reduce energy use. GM's Spring Hill, TN, plant integrated lighting and building management systems (BMS) controls to allow the site to optimize lighting to specific tasks and reduce lighting during non-production hours. The project, implemented using Kanepi Wireless Controls, achieved $2 million in annual energy reduction.

Concern #3. Safety

Task tuning at manufacturing sites is an

important consideration, as well. Different tasks call for different types of lighting, and the safety of the occupant can be at stake if lighting is not precise.

Another issue is security. Hallways, entries, and stairwells need to be kept lit any time there is an occupant in the building. Parking lots, too, must be lit at the appropriate time – but they don't necessarily have to be on all night, says Khera. "With lighting controls, you can dim parking lot lights, or even turn them off, but cameras can be linked so that if there's an occupant, you can turn them back on."

Concern #4. Corporate citizenship

Reducing CO2 emissions is a sort of unspoken mandate from the government for large companies. "It's understood that reducing emissions is something companies need to be doing," says Khera. "DOE studies show that CO2 emissions are not going down as fast as people had hoped. It's a big issue from a global warming standpoint."

Concern #5. Regulations

On July 1, 2014, the 2013 California Building Energy Efficiency Standards (Title 24) will take effect. Title 24 will require all new commercial buildings to be net-zero energy by 2030.

Additionally, the DOE has said that energy savings from ASHRAE/IES's 90.1 energy efficiency standard from 2013 is 8.5% higher for source energy and 7.6% higher for site energy. If the preliminary DOE determination is finalized, states would be

INTERNET OF THINGS AND THE ENTERPRISE

The Internet of Things (IoT) is the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment. Gartner, Inc., estimates that the IoT will include 26 billion units installed by 2020, and by that time, IoT product and service suppliers will generate incremental revenue exceeding $300 billion, mostly in services.

"It has been talked about – some say over-talked-about – for a number of years, but it is really starting to come about that more and more objects are being linked to the Internet," says Jesse Foote, senior research analyst with Navigant Research. "The increasing adoption of lighting controls is speeding the adoption of the Internet of Things."

The concept of the Internet of Things does not tend to resonate with facility managers, but higher-level executives find it of interest when talking about controls and energy management systems, says Mandeep Khera, vice president of marketing and channels for Daintree Networks. "Eighty percent of an enterprise's system is connected – lighting controls, thermostat controls, plug load controls, fan controls. We call this the 'Enterprise Internet of Things or E-IoT.' So as a company expands in the future, and adds machines, they can tie into the enterprise IoT, as well." This will allow them to manage and measure billions of machine-to-machine interactions, giving organizations vast streams of knowledge to tap into.

"We'll have profound new levels of insight into the real world and how it actually works, and adapt our business to our better attuned understanding of reality," wrote Dion Hinchcliffe, chief strategy officer at Adjuvi, in a recent article on Enterprise Web 2.0.

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required to update their codes to meet or exceed the 2013 standard. Currently, states must meet or exceed the 2010 standard, which serves as the commercial building reference standard for state building energy codes under the federal Energy Conservation and Production Act.

"In many key markets, including the US, Europe and South America, governments have enacted legislation to mandate the transition away from traditional lighting technologies to increase energy efficiency, which is playing a role in driving demand for LED lighting retrofits," says Charlie Schafer, president and CFO of Revolution Lighting Technologies. Revolution worked with Baldor Specialty Foods in NYC on an LED lighting project consisting of 3,000 Seesmart LED tube lamps and exterior wall packs, which will yield a 70% reduction in lighting energy savings with a payback in about thirteen months. The project will also result in a $124,000 rebate from New York State Energy Research and Development Authority.

Lighting Retrofit Trends

Certain industries are more knowledgeable and leading edge when it comes to lighting, Khera says. Large banks know they need lighting and thermostat control at each branch level. "They might have 5,000 branches, so they're consuming a lot of energy. Then there's the security matter. If a light goes out by an ATM, that's not a good thing. So banks are ahead of the game," he says.

Retail stores are coming up to speed quickly, too. "Food retail stores have distribution centers and retail branches, and they're all huge energy hogs," Khera says. Refrigeration units need to be maintained at a certain temperature. Now they can use sensors to report back to the system to alert it if the temperature goes above a certain level."

Daintree is also seeing tremendous growth in industrial warehouses which are a prime target for energy savings due to high wattage lighting that's consuming heavy loads of energy.

Navigant Research, too, has seen growth in high-bay lighting in industrial areas, big-box retail, and warehouse spaces. "That can be a good target for lighting controls because you have more use of higher wattage fixtures. Reducing the run time from a high wattage fixture gives you more savings," says Foote. "I've talked to a number of lighting controls companies that target those spaces specifically." Foote says office spaces are also early adopters, using lighting controls to make sure employees are comfortable and happy.

Shafer has also seen growth in LED lighting retrofits in commercial, industrial, and municipal segments. "Driven by technology advances and price reductions, corporate executives, facility managers, and municipalities are realizing the proven return on their LED investments," he says.

Foote says the increasing adoption of lighting controls is speeding rates of adoption for other controls systems. "Once you have a network of sensors and controls for your lighting system, maybe you want to tie that back to your HVAC or security cameras," says Foote.

Moving Forward

Facility managers may be recognizing the benefits of a retrofit, but higher-ups are not always so quick to approve such projects. The message that resonates most with executives like a VP of Operations is threefold: savings, corporate citizenship and compliance, says Khera.

Vendor choice is another big decision. The relationship can be most useful when you work with the vendor as a partner, not just a supplier. When choosing a vendor, consider:

- Is the technology driven by true open standards to allow "future-proofing" of customer's facility infrastructure?
- Are they familiar with rebates and tax incentives?
- Do they have references, testimonials, and/or case studies?
- Will maintenance be easier, and will maintenance costs be reduced?
- Do they require that you purchase only their own products, or are they "fixture agnostic?"
- What are the pros and cons of each of these approaches?

This last is a question of great importance, according to Pinnow. He likes that the system they chose for United Stationers uses non-proprietary components. "Having to go back to the manufacturer for proprietary parts is not something that works very well long-term. Having the ability to buy things off the shelf – controllers, daylighting sensors – and have it work with the system was a big plus."

Khera also suggests asking vendors whether they can go beyond lighting controls, in the event you later decide you want to tie other systems – such as thermostat, plug load, or CO2 sensors – together. Controls of these non-lighting devices is also a critical piece for complying with codes and standards like Title 24 and ASHRAE 90.1

Other considerations include whether you want a wireless or wired solution, and whether the solution is proprietary or open-standard.

Finally, Pinnow suggests compiling the right team and being open-minded: "The United Stationers project came about by gathering together the greatest minds in the business - from a control standpoint, from a lighting design standpoint, from an installation standpoint – just to see what could be done if there were no preconceived notions as to what type of energy savings can be made."

ENERGY MANAGER TODAY

EL launched Energy Manager Today (www.energymanagertoday.com) in 2012 for energy management professionals, covering energy management-related services, products, analysis, and events.
