

LEDs

Lean Approach to Lighting May Lead to Unanticipated Benefits

References to energy savings and "green" processes have become ubiquitous in our society; sometimes, people do not realize that achieving such savings could be as easy as changing a light bulb.

The benefits of going sustainable when retrofitting a commercial building's lighting are not limited to energy savings. Reducing maintenance costs and health hazards, while increasing tenant efficiency and the space's overall aesthetic appeal, are likely by-products of the changeover.



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Most existing buildings have downlighting that was installed in the 1980s or earlier, meaning that their current lighting is either incandescent-based or structured around relatively inefficient, first-generation compact fluorescents.

Before changing a building's lighting, it is necessary to change one's mindset and become attuned to what is happening in the field of energy independence today. In December 2007, the federal government enacted the Energy Independence and Security Act of 2007. Under its provisions, incandescent light bulbs will be phased out in the United States beginning January 2012.

As an LED (light emitting diodes) or solid state lighting retrofit is considered, it should come as a source of comfort that you are not alone. Many commercial buildings in a variety of industries are already lighting the way as a result of the great energy cost savings, and increased aesthetic appeal, this envelope- pushing light source affords.

In fact, LED is one of the most energy-efficient options on the market today, using from 2 – 20 watts of electricity and helping to cut energy consumption by more than 30 – 50 percent. It is understandable that in today's cost-conscious world, facility managers may opt to delay a lighting upgrade; however, changes do not need to come all at once. It can be integrated on a room-by-room approach to upgrade the lighting.

Instantly, the improved eye-catching aesthetics would be noticed. Shortly, you would start reaping other benefits to integrating LEDs - namely, energy costs.

According to EnergyStar.gov, "Lighting uses about 18 percent of the electricity generated in the United States, and another four to five percent goes to remove the wasted heat generated by those lights. Lighting in commercial buildings accounts for close to 71 percent of overall lighting electricity use in the United States. With good design, lighting-energy use in most buildings can be cut at least in half while maintaining or improving lighting quality. Such designs typically pay for themselves in energy savings alone within a few years, and they offer more benefits in terms of the potential for smaller and less costly cooling systems and more productive work environments."

In addition, LED lighting eases both the volume and cost of maintenance work. Lamps do not need to be changed as often, and in some cases, they do not need to be changed at all, adding to the cost-savings experienced as a result of the installation of LEDs.

Perhaps an unintended consequence of a lighting makeover is an increase in tenant comfort and efficiency. Several green-building studies have shown that workforce productivity gains of as much as seven percent are possible with properly designed lighting. Not surprisingly, studies have also shown an inverse relationship exists between productivity and stress; as productivity heightens, stress typically lowers. With high stress levels – many of which are derived from the workplace – being ever-present, why not try to achieve the highest-quality space for your tenants?

Because of the many ancillary boons to a lighting upgrade, it is easy to forget that, simply, LEDs offer an excellent quality of light. They are also able to achieve a high uniformity of light, which is equally as beneficial.

While choosing a sustainable light source over incandescents should be a no-brainer, it can be difficult to assess all the products available to one when considering retrofitting a building. Since it may come down to a choice of CFLs (compact fluorescent lamps) and LEDs, it is helpful to know how they compare. Both provide energy savings over incandescents, and they equally provide uniformity of light. CFLs can also qualify for between one and five light-based LEED points.

LEDs are still the superior choice though. Unlike CFLs, they do not emit harmful UV rays, have no mercury content, and can achieve a 30-percent energy savings over CFLs and easily qualify for all five light-based LEED points as well as meet the most stringent ASHRAE 90.1 energy standards – all while lasting 50,000 hours. Replacing a building's existing lighting with LED also offers:

- Maximum energy benefit
- Excellent quality of light
- Faster financial payback

**When Mixing Sources Makes Sense**

One barrier to pursuing a complete LED retrofit can be cost. If the price becomes prohibitive to pursuing a complete LED overhaul, consider a mixed-source approach to lighting. If done correctly, this approach can yield savings that are similar to those afforded by LED for both the built space and the environment. Key to mixing sources effectively is layering – a process that entails varying the light sources used, including LEDs, as well as the following:

- *Ceramic Metal Halide*: With an exceptional CRI of 90+, this is a high-efficacy source appropriate for high ceilings, general and accent applications.
- *Compact Fluorescent*: Featuring a good CRI of 80+, this efficient source is designed for general, task and wall wash applications. Properties can consider replacing inefficient public-space incandescent lamps, i.e. wall sconces and recessed downlights, with this source.
- *Low Voltage Halogen*: Having the highest CRI of 100, the punch and sparkle of this source's faceted reflectors enhance perceived brightness within a space, and when incorporated with an architectural dimming system, there are numerous lighting possibilities available in the same space with minimal energy consumption.

**Peeling Back the Layers**

To effectively layer light, it is essential to incorporate three types of lighting: general/ambient, task and accent.

General/ambient lighting is the base level of lighting and the primary focus of energy-reduction efforts. Much of that focus is directed at lighting the horizontal surfaces of a space. By making sure that the vertical surfaces are also properly illuminated, via sconces or wall washers, one can lower the required light level contribution from other fixtures and subsequently enhance the energy savings within the overall space.

Task lighting is the functional level of lighting used to accommodate activities that require higher levels of concentration. Task lighting is typically three times more intense than general lighting levels and is not usually impacted by a project's energy-reduction efforts for the following reasons:

- Too necessary to the function of the space;
- May utilize more energy-efficient sources, but fixture reductions are not likely because the number of "tasks" to be performed in a space are static;
- Often accomplished by portable lamps/fixtures that are introduced into the space after the project is complete.

Accent lighting is the most impacted layer and often, even eliminated because general lighting reductions become such a focus that accenting is downplayed or overlooked altogether. But it should not be forgotten. It is essential to remember the importance of accent lighting in creating character within the space for its tenants. This emotional layer of lighting complements the general and task lighting layers for a complete lighting application and should, as a general rule, be a minimum of four to five times the general lighting level to provide the appropriate contrast.

**Making Sense of Sensors**

To ensure that all of the above are performing at an optimal energy level, they should be utilized in conjunction with a lighting controls system. Sensors and dimming systems play an important role in multiplying the energy effects of deploying the above sources when used within the lighting design of a hospitality property, for example.

Savings achieved by the utilization of more energy-efficient lighting fixtures are significantly enhanced when combined with lighting control solutions. In fact, average savings of 25 to 30 percent with more efficient lighting fixtures can be increased to as much as 75 to 80 percent savings during peak power usage, depending on the control solution deployed and the application at hand. The options that can be considered for maximizing energy efficiency include sensors, daylight harvesting systems, networked lighting and wireless controls systems.

Primary sensor types that can be leveraged to reduce maintenance costs – associated with the lengthened relamping intervals sensors produce – include:

- Occupancy Sensors – turn lights on in a vacant space when an individual enters;
- Vacancy Sensors – turn lights off when an individual leaves a space.

Both occupancy and vacancy sensors are available with different types of sensing technology and can be utilized in a number of areas within a hospitality property. Most frequently this technology is used in hallways and stairwells. Infrared sensors work based off of motion in a space – for use in areas where ambient noise is prevalent. Ultrasonic sound waves bounce off surfaces in a space – where line of sight is not always available. Multi-technology sensors employ a combination of infrared and ultrasonic technologies for optimal sensing capability.

Another control technology to consider when wanting to increase energy efficiency within a space is a daylight harvesting system. This sustainable solution utilizes photocell technology to sense a presence of ambient daylight and can be tuned to detect desired levels of daylight in terms of foot-candles (FC). This option has two types of controls associated with it:

- Switched – turns some or all of the system light sources on/off;
- Dimmed – lights levels to corresponding pre-set light levels based on level of ambient light it detects.

A networked lighting controls system is another alternative to evaluate as this programmable lighting control system can integrate all of a hospitality property's various lighting controls into one single network. For example, it can link sensors with daylight harvesting with more "static" fixtures. In fact, when used properly, these systems can turn whole sections of a building's lighting system off automatically during nonusages times. Sensors deployed in banquet areas, conference rooms, hallways, etc., can turn lights on and off again in spaces that are occupied during these programmed "off" periods. As a general rule it is important to ensure light is only on when needed.

A final system to consider is a wireless control system. This is especially easier to install in retrofit applications because of a lesser need to run wiring from lighting control stations to desired fixtures. By broadening one's understanding of the energy-efficient light sources that are now available and their range of function, proper layering of light provides even more flexibility in meeting lighting requirements for today's energy codes and achieving greater energy and cost savings.

**Less is More**

So whether it is a straight LED or mixed source lighting installation, it is important to remember to deploy a lean approach. With the advent of new lighting and controls technology, new sources are now part of the design equation, and previously discounted sources are now viable options to consider when planning a space's lighting design. As there is no one source that is 100 percent correct for every installation, focus on eliminating waste, not fixtures.

The very point of being lean and efficient is to perform the same task with less energy expended; not to perform a lesser task with less energy expended.

*Al Near is senior vice-president of sales and marketing for USAI, an industry leader shining an entirely new light on commercial and residential lighting. To learn more, visit [www.usalighting.com](http://www.usalighting.com) or call 845.565.8500.*

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