

Lighting Retrofits Are Now A ‘Brighter Idea’

Lighting has always been a critical component in successful building design. The right mix of ambient, task, and decorative illumination can be an important contributor to occupants’ comfort and productivity.

But lighting systems also add significantly to a building’s overall operating expenses. Improving the efficiency of these systems can have a big impact on an owner’s bottom line. A comprehensive approach to upgrading your lighting systems can improve building aesthetics and performance.

Many existing buildings don’t really have “a lighting system,” per se. Instead, they don’t have much more than a mixture of varied ceiling and desk fixtures, with no coherent operation or control strategy. This patched-together approach can end up working at cross purposes to itself.

In other words, one nets the worst of both worlds: inefficient use (waste) of energy and strained eyesight (lower productivity). With owners facing rising electricity rates, greenhouse gas emissions concerns, and a nationwide shortage of skilled workers, such inefficiency can no longer be tolerated.

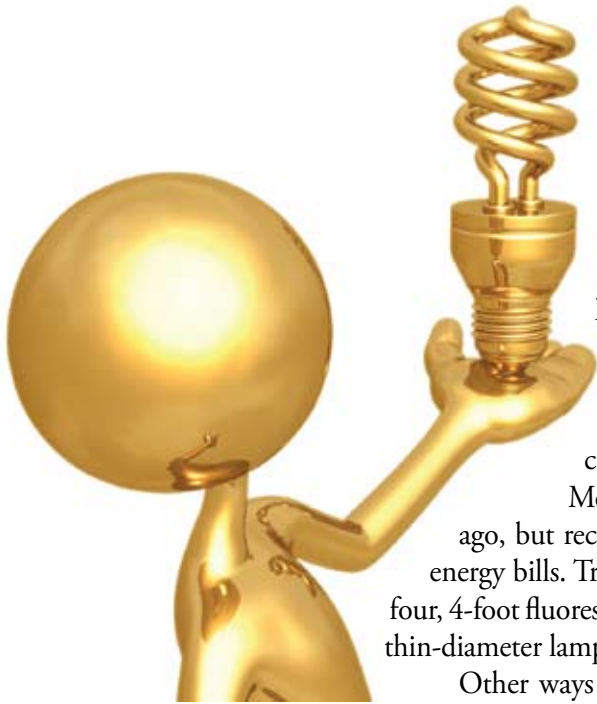
On the bright side, savings from a top-to-bottom lighting upgrade are almost immediate. Systems combining modern lamps and fixtures with a control system that ensures lights only operate when they’re needed can offer very attractive returns on investment.

Further, current tax benefits make installing such improvements even more attractive; deductions are available up to the full cost of new equipment and installation. What’s more, energy efficiency is becoming (or perhaps has already become) an important cultural value—meaning that going “green” with a more effective lighting system can offer marketing benefits.

illuminating the bottom line

As any commercial building owner knows, lighting is a significant contributor to overall energy costs, both directly and indirectly. According to the American Council for an Energy-Efficient Economy (ACEEE), as a direct impact, lighting systems—including lamps, ballasts and fixtures—account for approximately 20% of U.S. electricity use. They account for more than 40% of the electricity used in commercial buildings. Indirectly, the heat these systems emit affects the amount of energy needed to cool buildings. Lighting retrofits mean more efficient equipment and less of this waste heat.





Among commercial building owners, retailers are the leading users of incandescent fixtures because the equipment works well in display-lighting plans. The problem is that incandescent light bulbs—called “lamps” by professional lighting designers—are the least efficient light source currently on the market. They consume up to four times the energy of compact-fluorescent alternatives.

New halogen “IR” lamps can offer an energy-efficient alternative in what were formerly incandescent installations. A 60-watt halogen lamp produces the same illumination as a standard 150-watt incandescent spotlight, but it provides a 60% energy savings. Purchase costs are higher for the halogen lamps, but they last 50% longer than incandescent models and each lamp saves \$20 in energy costs over its lifetime, according to ACEEE figures.

Most non-retail commercial buildings switched to fluorescent lighting years ago, but recent advances have created new opportunities to cut energy use—and energy bills. Traditional fluorescent light fixtures draw 160 to 180 watts and include four, 4-foot fluorescent tubes and two magnetic ballasts. Newer, more efficient fixtures use thin-diameter lamps and electronic ballasts and require approximately 115 watts.

Other ways to cut energy demand include optimizing a lighting plan to ensure spaces aren’t over-lit—a common condition and incorporating reflectors designed to maximize light output. In such designs, the number of individual lamps required may be able to be reduced to two or three.

Rising electricity costs mean any investments you make in energy savings today will be even more important to tomorrow’s bottom line. The U.S. Department of Energy’s Energy Information Administration has predicted electricity rates will rise 19% between 2004 and 2014.

Tax advantages

Many lighting upgrades will pay for themselves in resulting energy-cost savings in less than two years. Building owners who take advantage of tax incentives in the Energy Policy Act of 2005 (EPAct) can see even faster returns on their lighting investments.

The Commercial Buildings deductions enacted under EPAct allows building owners who act before Dec. 31, 2008, to take an accelerated tax deduction (meaning a capital-improvement deduction that can be taken in a single year, rather than depreciated over a number of years) equal to the cost of purchasing and installing energy-efficient equipment. The legislation targets lighting, HVAC and building-envelope systems. Owners can choose to upgrade all three systems, for a maximum deduction of up to \$1.80 per square foot, or take a system-by-system approach, with a maximum deduction of up to \$0.60 per square foot.

Whether lighting improvements are undertaken on their own or as part of a comprehensive plan, they must follow specific guidelines, and performance levels must be verified by an independent consultant. The guidelines use the ASHRAE/IES 90.1-2001 energy standard as a reference point, and base the amount of the allowed deduction on the degree to which newly installed systems exceed that standard’s targets, as follows:

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- ◆ Systems must be certified to reduce lighting power density (calculated as watts per square foot) to 25% to 40% less than the minimum requirements in ASHRAE 90.1-2001 (as shown in either Table 9.3.1.1 or 9.3.1.2).
- ◆ All control provisions in the standard must be met. Additionally, you'll need to install bi-level switching in all occupied areas (except motel and hotel guest rooms, store rooms, restrooms and public lobbies).
- ◆ Calculated light levels must meet the minimums established in the 9th Edition of the Illuminating Engineering Society of North America's *Lighting Handbook*.

Green-label marketing

In addition to cutting energy bills, a well-designed lighting retrofit can boost a building's marketability. Improving lighting systems and their controls can help owners achieve certification to the U.S. Department of Energy's EnergyStar standard and the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) standard. These programs are becoming more important to companies who want to be seen as leaders in the movement to reduce both energy consumption and greenhouse-gas emissions.

Since 2000, LEED has become a primary influence in how U.S. buildings are designed. Today, two federal agencies and more than 20 states and 75 municipalities have policies requiring or encouraging construction to one of the system's four tiers of sustainable design.

USGBC has designed its LEED for Existing Buildings rating guidelines specifically for owners considering larger renovation efforts. Lighting systems relate specifically to three separate credits in these guidelines. Exterior lighting is called out in a credit on reducing light pollution. This point directs designers to incorporate shielded light fixtures into their outside lighting plans, and to ensure interior lighting systems don't add to exterior light pollution. Providing accessible lighting controls for at least 50% of building occupants also gains a point toward a building's LEED rating, as can ensuring mercury levels are kept to a specified minimum in the light bulbs used in the building.

Indirect references to lighting within the LEED system could have an even bigger impact on your building's overall plan. Most importantly, the guidelines require buildings achieve an EnergyStar rating of at least 63 points, documented using that program's Portfolio Manager tool. The efficiency of the building's lighting system plays a large role in achieving that rating. Additionally, building owners must meter the electricity used by individual building systems—including lighting—to monitor current performance and identify opportunities for improving future performance.

Why Does LEED Matter?

Developed by the U.S. Green Building Council, LEED is a voluntary, national rating system for buildings. The National Electrical Contractors Association (NECA) is a member.



LEED emphasizes using state of the art strategies to encourage sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality. Project certification provides independent, third-party verification that a building project meets the highest green building and performance measures. Not only do LEED-certified projects make sense for the environment, but also they make good financial sense, as well. Thus, they

- ◆ Reduce operating costs and increase asset value,
- ◆ Send less waste to landfills,
- ◆ Conserve energy and water,
- ◆ Increase occupants' health and safety,
- ◆ Decrease harmful greenhouse gas emissions,
- ◆ Provide an opportunity to qualify for tax rebates, zoning allowances and other incentives, and
- ◆ Demonstrate an owner's commitment to environmental stewardship and social responsibility.

To find out more about LEED, visit usgbc.org.

Turn to the pros

To make a real impact on your energy bills—and to meet the certification requirements outlined by EnergyStar and LEED—a lighting-retrofit project must involve more than changing a building's light bulbs.

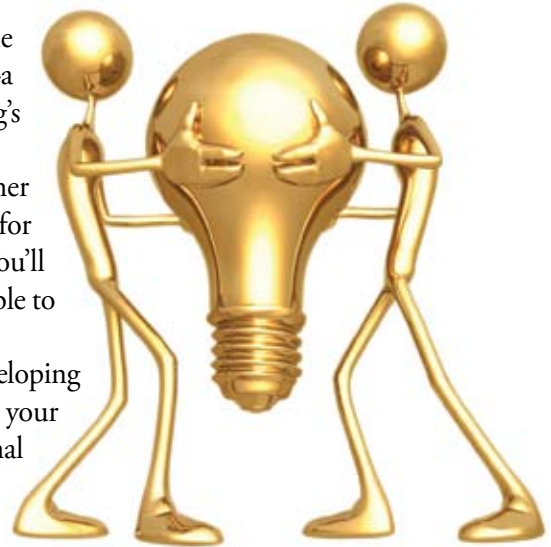
Take a close look at the lighting needs of employees and other occupants, and make sure any special requirements—such as those for areas dedicated to computer-intensive operations—are addressed. You'll also want to tie the system together with controls that make it possible to monitor unoccupied spaces and make the most of natural light.

A professional electrical contractor is your best resource for developing a comprehensive solution that fits your building and how you and your tenants use it. These contractors are also likely to install using National Electrical Installation Standards (NEIS), such as the *NECA/IESNA 504 (200x) - Standard for Installing Lighting Control Devices and Systems*, which go beyond minimum safety requirements.

Contractors will analyze your current lighting use and ask you about your goals for your new system. For example, are you only upgrading the lighting system or is this project part of a larger building-renovation project. If so, do you want to pursue EnergyStar or LEED certification to aid your building-marketing efforts? With an understanding of your goals in mind, your electrical contractor will then:

- ◆ Design a comprehensive system that provides the appropriate quantity and quality of light,
- ◆ Specify lamps and ballasts that maximize efficiency, based on your budget requirements,
- ◆ Incorporate automated controls to turn lights off—or dim them—in daylight or unoccupied spaces,
- ◆ Establish a maintenance schedule for relamping and fixture cleaning, to ensure your efficiency gains don't decrease over time, and
- ◆ Help you create a plan for responsibly disposing of potentially toxic lamps, ballasts and other equipment when they need to be replaced.

Key to obtaining LEED-certification for a project, is finding a contractor who has access to LEED Accredited Professionals. Such individuals have demonstrated, via comprehensive exam, their ability to serve on a LEED project team and provide detailed knowledge of LEED project certification requirements and processes. ■



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