

Task/Ambient Lighting: Efficient, Stylish, and Portable

PIER Buildings Program

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The Problem

The most effective way to illuminate an office space is with a combination of task lighting and ambient lighting. In small offices such as may be found in homes or office buildings, providing that kind of illumination can be difficult. Home offices often don't have a ceiling outlet for uniform ambient lighting, and floor and desk space may not be adequate to accommodate multiple lamps. Two earlier PIER projects led to an efficient, effective alternative: portable lamps—a desk lamp and an office torchiere—that use compact fluorescent lamps (CFLs) to efficiently provide both indirect ambient lighting and direct task lighting in a single unit. However, manufacturing challenges, high costs, and market barriers that favor traditional overhead lighting prevented widespread use.

The Solution

Building upon earlier designs, a desk lamp (**Figure 1**) has been developed to provide individually controllable uplighting and downlighting. The designs incorporate improved optics and features that will enable low-cost manufacturing. The California Lighting Technology Center worked with Full Spectrum Solutions to develop the products, introduced on Earth Day 2008 with the name Berkeley Lamp II. Full Spectrum Solutions is an established lighting company that uses recycled materials and other sustainable practices and offers access to consumer markets.

Features and Benefits

The new products incorporate many of the features of the earlier designs, including the following.

Uplighting and downlighting capability. The lamp provides separate, user-controllable light sources for both an ambient uplight component and a direct downlight component in a single, movable fixture (**Figure 2**).

Dimming capability. Each component is fully dimmable, allowing great flexibility in meeting individual illumination needs and reducing unnecessarily high illumination levels.

Energy efficiency. At full power, the two-lamp fluorescent system matches the combined luminous output of a 300-watt halogen lamp and a 150-watt incandescent table lamp while using only one-quarter of the energy. Additional savings come from the dimmer, which, product tests have shown, people tend to use. In

addition, an occupancy sensor can be built into the lamp to automatically turn lamps off when the space is unoccupied.

Uniformity. The lamp provides a uniform light, reducing the harsh “hot spot” effect produced by halogen lights and some CFL designs.

Portability. The lamps can be moved around to accommodate changing office configurations and task requirements.

Users of the earlier lamps gave them high marks for functionality and energy efficiency and made several suggestions and comments that have been incorporated in the new design.

Desk friendliness. Some users noted that the original lamp took up too much valuable desk space, so the overall dimensions of the lamp body, base, and shade have been reduced. In addition, an electrical outlet was added to the base to give users extra capacity on their desks.

Improved optics. The upper dish of the lamp was enlarged so the upper lamp could nest farther inside the fixture. This allowed the lamp height to be reduced with improved cut-off angles.

Better ballasts. The lamp features higher quality, user-replaceable dimmable ballasts with quick-connect electrical connections in a housing that's easy to access.

CFL flexibility. The lamp will come with two 70-watt CFLs that are fully dimmable and can be independently switched, offering a range of power options from 0 to 70 watts. They

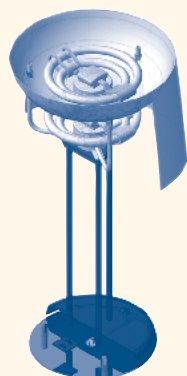
Figure 1: Uplight/downlight

A lamp designed for use in small offices provides individually controllable task and ambient lighting as well as full dimming capability.



Figure 2: Uplight/downlight

A pair of double circline (2C) compact fluorescent lamps efficiently provides even illumination for task and ambient lighting.



have a high color-rendering index and are available in color temperatures of 5,500 or 3,000 K. The lamp will also accommodate 55-watt 2C or 2D lamps (lamps with a profile that looks like two Ds), 58-watt 2C lamps, and 65-watt 2C lamps. For new construction applications, the Berkeley Lamp will be configured with two 55-watt compact fluorescent lamps.

Lower manufacturing cost. To help reduce manufacturing costs, the lamp's posts and base were simplified.

To gauge lamp performance, luminance values were measured in a 144-square-foot (ft²) enclosed office. The lamp provided 12 to 200 foot-candles on the work plane and acceptable luminance ratios with a lighting power density of 0.90 watts/ft². With 55-watt lamps instead of 58-watt lamps, the lighting power density drops to 0.83 watts/ft². Measurements with the lamp with 58-watt CFLs in an open office showed a power density of 1.04 watts/ft².

Bulk purchase discounts will be available through the California Lighting Technology Center and various other utility-sponsored programs in California.

Applications

The products are aimed primarily at small office and home office applications. They could provide task ambient lighting for home offices or hotel rooms, or an efficient, aesthetic option for office waiting rooms and lobbies.

California Codes and Standards

The Berkeley Lamp will be Energy Star[®]-rated and will also be available with an integrated occupancy sensor that will allow for additional savings opportunities. For new construction applications, the lamp will be configured with two 55-watt compact fluorescent lamps, which will align with the Title 24 power density recommendations for small offices.

What's Next

Demonstrations of the Berkeley Lamp II are planned for several campuses and state facilities throughout 2008. Several of the lamps have already been installed in Department of General Services buildings. The field data will also provide an opportunity to gauge user satisfaction. In addition, the manufacturer, California Institute for Energy and the Environment (CIEE), and PIER are working with the utility Emerging Technology on programs to qualify the product for rebates.

Collaborators

The organizations involved in this project include the California Lighting Technology Center, CIEE, and Full Spectrum Solutions.

For More Information

For more information on this project, please contact the California Energy Commission researcher listed below.

More PIER Technical Briefs can be found at www.energy.ca.gov/research/techbriefs.html.

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About PIER

This project was conducted by the California Energy Commission's Public Interest Energy Research (PIER) Program. PIER supports public interest energy research and development that helps improve the quality of life in California by bringing environmentally safe, affordable, and reliable energy services and products to the marketplace.

Arnold Schwarzenegger, Governor
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