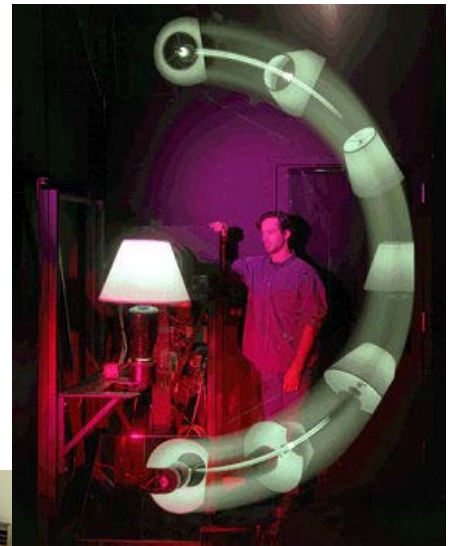


The Berkeley Lamp

An Evaluation of Dimmable Compact Fluorescent Table Lamps



Prepared by

David A. Bisbee, CEM
Customer Advanced Technologies Program
Sacramento Municipal Utility District
October 29, 2002

Table of Contents

<i>Introduction</i>	1
<i>Technology Description</i>	1
<i>Evolution of the Berkeley Lamp</i>	2
<i>Observations</i>	
❑ Commercial and Governmental Office Applications	3
❑ Hospitality Applications	5
❑ Residential Applications	5
<i>Conclusions</i>	
❑ Market Potential and Barriers.....	7
❑ Technology Transfer & Recommendations.....	8

Note: SMUD does not endorse products or manufacturers. Mention of any particular product or manufacturer in this report should not be construed as an implied endorsement

Introduction

SMUD's Customer Advanced Technologies (C.A.T.) program works with customers to encourage the use of and evaluate new or underutilized technologies. The program provides funding for customers in exchange for monitoring rights. Completed demonstration projects include lighting technologies, light emitting diodes (LEDs), residential building shell construction, geothermal heat pumps, indirect / direct evaporative cooling, non-chemical water treatment and a wide variety of other technologies.

Technology Description

The [Berkeley Lamp](#) is a high-quality, energy-efficient alternative to overhead lighting in office spaces. Scientists at Lawrence Berkeley National Laboratory (LBNL), in partnership with SMUD and other utilities, developed a table lamp system ideally suited to computer and office work environments. The lighting system increases visibility while reducing energy use by allowing the overhead lights to be turned down or off.

The Berkeley Lamp is a dimmable, two-lamp fluorescent system capable of providing intense illumination without becoming very hot. Because of the two-lamp design, the fixture is able to fully illuminate the ceiling and desk space at the same time.

The lamp is expected to retail for \$270. When the lamp is used instead of overhead lighting, it could pay for itself in two years.

Although the lamp was primarily designed for commercial offices, it may also offer significant benefits to the hospitality and residential market sectors.

For more information about the innovative Berkeley Lamp, see the project's [Web site](#) or visit the manufacturer's web site at <http://www.lightcorp.com>



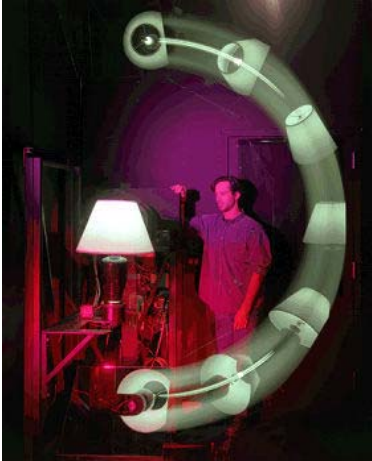
The Berkeley Lamp



The Berkeley Lamp uses two General Electric 55-watt, 2D compact fluorescent lamps. The lamps are rated at 10,000 hours

Note: SMUD does not endorse products or manufacturers. Mention of any particular product or manufacturer in this report should not be construed as an implied endorsement

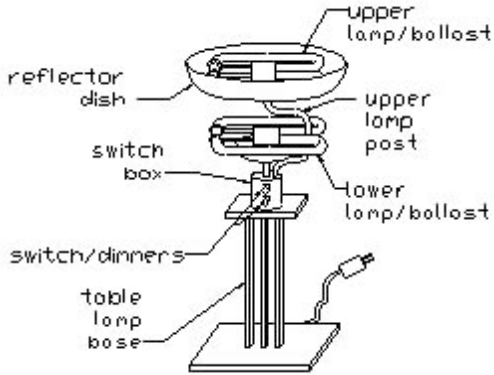
Evolution of the Berkeley Lamp



In the early 1990's LBNL conducted a series of studies to optimize the optical characteristics of table lamps. Optical research on table lamp fixtures was not commonly done before this study.



In the late 1990's LBNL responded to energy consumption and public safety concerns by developing the CFL torchiere as an alternative to the hot-burning halogen torchiere.



Combining technical and design elements from the table lamp and the CFL torchiere projects, LBNL developed the High Performance Table Lamp. This new concept combines independently controlled uplight, similar to a torchiere, with the downward focused task lighting of a table lamp.

Reprinted with permission from Lawrence Berkeley National Labs
Source: <http://lighting.lbl.gov/projects/table/evolution.html>

Note: SMUD does not endorse products or manufacturers. Mention of any particular product or manufacturer in this report should not be construed as an implied endorsement

Note: SMUD does not endorse products or manufacturers. Mention of any particular product or manufacturer in this report should not be construed as an implied endorsement

Observations

Commercial and Governmental Office Applications

Although most desktop lamps are used for supplemental task lighting, the Berkeley lamp was designed to be an *alternative* to overhead lighting systems. The Lawrence Berkeley National Lab completed four commercial test installations. The study included participant surveys and extensive end-use monitoring. A summary of the resulting energy savings is presented in the table below.



Summary of Energy Savings for Pilot Projects

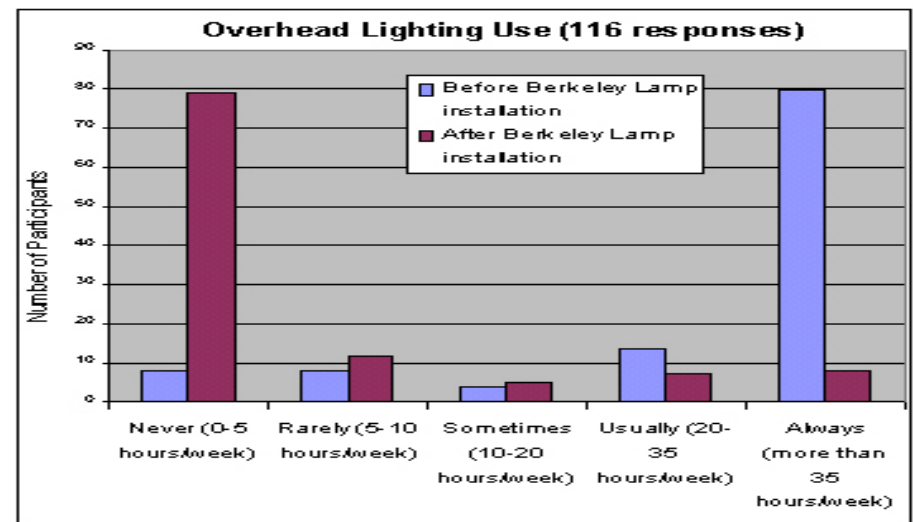
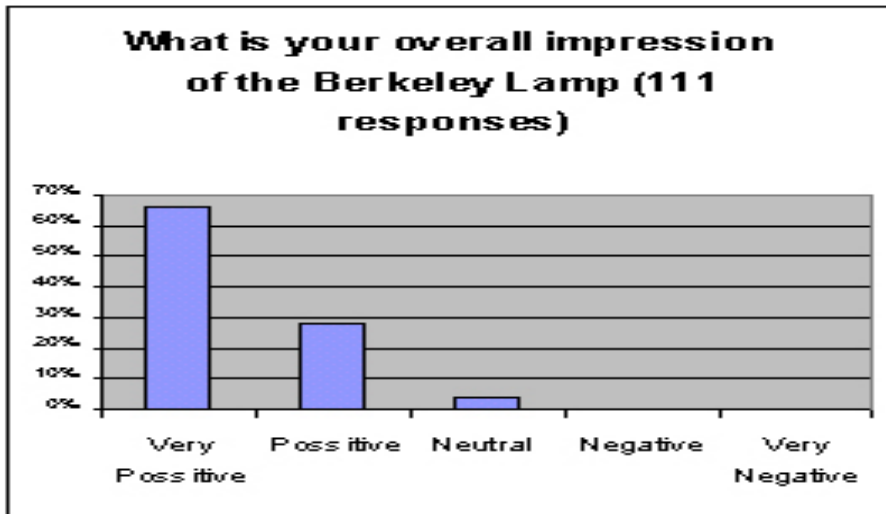
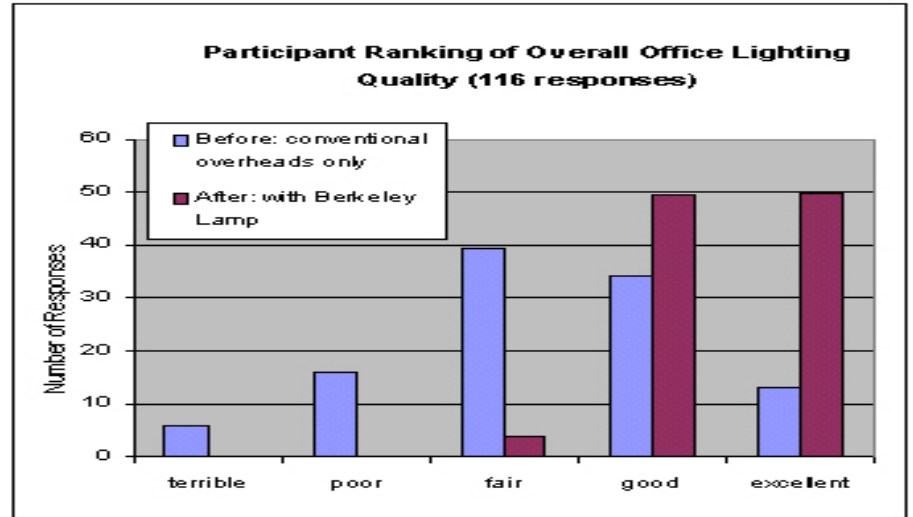
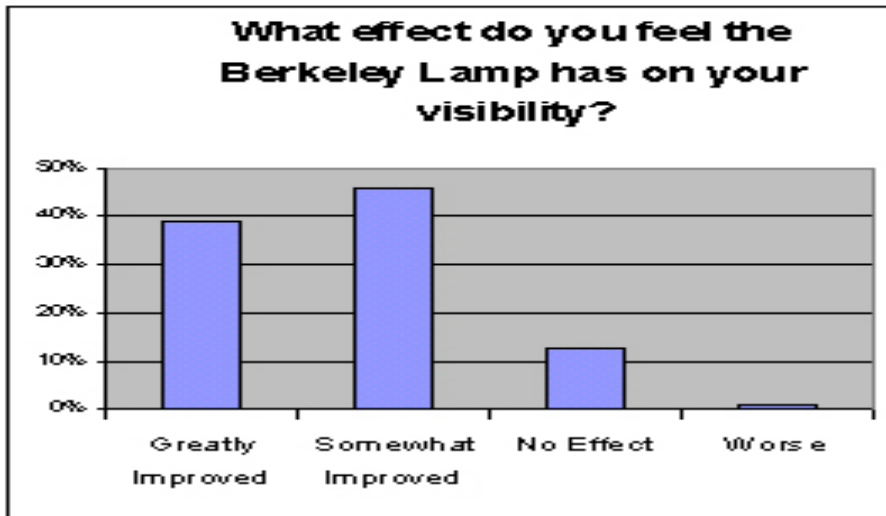
Name of Site	Average Daily Use	Average Wattage During Use	Savings From Installing Berkeley Lamps
City of Berkeley (14 office spaces)	8.5 hours	87 Watts	50%
UC Berkeley (21 office spaces)	8.0 hours	97 Watts	38%
Berkeley Lab (8 office spaces)	7.2 hours	66 Watts	88%
VA Hospital (3 office spaces)	4.1 hours	98 Watts	48%

In addition to the end use monitoring, participants were asked questions about their usage habits and their overall impressions of the Berkeley Lamps. The graphs on the next page depict the results of the survey.

Local Project: LED Effects, Rancho Cordova, CA

When LED Effects was developing plans for their new location, they made a bold decision; they chose not to install overhead lighting and to use Berkeley Lamps for their individual offices. According to Kevin Furry, President of LED Effects, “We do a lot of computer work. The lamps offer flexibility by allowing us to vary the light levels to suit the task that we’re working on.”

Note: SMUD does not endorse products or manufacturers. Mention of any particular product or manufacturer in this report should not be construed as an implied endorsement



Reprinted with permission from Lawrence Berkeley National Labs Source: <http://lighting.lbl.gov/projects>

Note: SMUD does not endorse products or manufacturers. Mention of any particular product or manufacturer in this report should not be construed as an implied endorsement

Note: SMUD does not endorse products or manufacturers. Mention of any particular product or manufacturer in this report should not be construed as an implied endorsement

Hospitality Applications

As surprising as it may seem, adequate lighting in hotel rooms is very important to hotel guests. According to Bob Hughes, Director of Operations for the DoubleTree Hotel, "Before we installed these lamps, lighting was the No. 3 complaint among our guests. Now it's not even in the top 10."

Many hotels, including the DoubleTree, feature desks in the guest rooms to accommodate the needs of business travelers. Before the Berkeley Lamps, the DoubleTree was using 60-watt desktop lamps. After they replaced these lamps with the 110-watt Berkeley Lamps, they recorded a ten percent *reduction* in energy use. Mr. Hughes believes the reduction is probably due to the fact that the guests now only need to use the Berkeley Lamp instead of having to use most of the lamps in the room.

The base of the Berkeley Lamp also features a convenience outlet and a RJ-45 data port (phone jack). These features make it easier for guests to plug in and use their laptop computers.



"Before we installed these lamps, lighting was the No. 3 complaint among our guests. Now it's not even in the top 10."

-- Bob Hughes, Director of Operations, Doubletree Hotel

Residential Applications

For years, proponents of energy efficiency have recommended compact fluorescent lamps for residential table lamps. Unfortunately, widespread acceptance by consumers has faced significant challenges including:

- ❑ **Light Output:** most table lamps are designed for use with 'traditional' incandescent A-19 lamps. Many customers currently use 100 or 150-watt lamps for reading light applications. Although compact fluorescents are available with comparable lumen output, the physical size and shape of the lamps often makes it difficult (or impossible) to retrofit these fixtures without extending the shade holding brackets (aka lamp harps). Furthermore, since these fixtures were designed for use with incandescent lamps, their photometric performance is very poor when using compact fluorescent lamps. In other words, much of the light produced by the lamp is not delivered to the task.
- ❑ **Lack of Economical Dimming Options:** many compact fluorescents are not compatible with conventional dimming devices.
- ❑ **Cost:** compact fluorescent lamps are usually more expensive to purchase than incandescent lamps. Although many customers are aware of the energy-savings potential offered by compact fluorescent lamps, they may still be reluctant to purchase the lamps based solely upon energy savings.

Note: SMUD does not endorse products or manufacturers. Mention of any particular product or manufacturer in this report should not be construed as an implied endorsement

Since the Berkeley Lamp was *specifically designed* for use with compact fluorescent lamps, it overcomes many of these challenges and offers customers several benefits and features including:

- ❑ Superior illumination levels: provides up to 185 foot-candles of illumination directly under the lamp when the controls are set for maximum intensity
- ❑ Improvements in lighting quality. The Berkeley Lamp was carefully designed to provide glare-free lighting, good color rendition and flicker-free operation.
- ❑ Continuous dimming from 10% to 100%
- ❑ Down (direct) lighting for tasks such as reading
- ❑ Uplighting (indirect lighting) for aesthetic purposes and use while working with computers
- ❑ Independent control of the both the direct and indirect lighting
- ❑ Convenience: an electrical outlet and phone jack are included in the base of the lamp

Although Berkeley lamps are relatively expensive, customers may be more willing to make the investment since the lamps offer several benefits in addition to energy savings.

Conclusions

Market Potential and Barriers

The potential market for the Berkeley Lamp appears to be enormous – particularly in the residential and hospitality sectors. However, significant market barriers exist including:

- ❑ **Price:** The current retail price for the Berkeley Lamps is \$265 per lamp plus \$30 for shipping. Although most all of the local end users surveyed liked the features, light output and quality of the lamps, they *all* felt that the lamps were too expensive to purchase for their own homes or offices without subsidies or rebates.
- ❑ **Desktop Space Constraints:** Some local office workers were initially very interested in using the lamps, but were unwilling to sacrifice or lacked the required available desktop space.
- ❑ **Concern Over Added Plug Loads:** With the advent of computers, fax machines, printers and other plug load devices, some facility managers may be reluctant to add another device to plug load circuits. This concern is further exacerbated by the low power factor of the ballast (0.50) currently used in the Berkeley Lamp.
- ❑ **Concerns Over the Availability of Replacement Parts:** The fluorescent lamps and ballasts used in the Berkeley lamps are currently only offered by one manufacturer. If the manufacturer

Note: SMUD does not endorse products or manufacturers. Mention of any particular product or manufacturer in this report should not be construed as an implied endorsement

chooses to discontinue offering the compact fluorescent lamps and ballasts, the Berkeley Lamps could instantly become obsolete.

Technology Transfer and Recommendations

The Berkeley lamp is already commercially available but may be struggling to reach full market potential. Utilities, government agencies and other large user groups should consider negotiating discounts for large quantity purchases, offering rebates or buy down programs to reduce the cost of the lamps for their customers. Furthermore, the manufacturer will need to address the issues listed above.

Note: SMUD does not endorse products or manufacturers. Mention of any particular product or manufacturer in this report should not be construed as an implied endorsement