



DAYLIGHTING *initiative*

Design tools and information from PG&E

Industrial Applications

Restaurant Application

[Office Application](#)

School Application

Museum Application

Retail Application



Phillip Burton Federal Building



Pacific Gas and
Electric Company.

WE DELIVER ENERGY.™

Lighting The Way

Daylighting controls gained large en



PG&E'S DAYLIGHTING INITIATIVE

PG&E's Daylighting Initiative has two goals: to raise awareness of good daylighting practice within the design community and to improve the practice of daylighting design. This case study is one of a dozen case studies undertaken within the initiative.

Together, they document a wide range of successful technical solutions demonstrated across a number of different commercial applications.

The Daylighting Initiative includes projects that will make better design tools available to the daylighting design community. The Desktop Radiance project, a collaborative effort of Lawrence Berkeley National Laboratory and PG&E, is bringing the powerful Radiance lighting simulation capabilities into the practical world of architectural CAD software. The Daylighting Initiative also includes a series of workshops and seminars at the Pacific Energy Center in San Francisco. For more information, visit the project's web site at www.pge.com/pec/daylight.

Built in 1962, the 20-story, 1.45 million sq.ft. Phillip Burton Federal Building is the second largest building in San Francisco. It is located at 450 Golden Gate Avenue and houses Federal Courts, the FBI, GSA, and other public agencies. A partnership among the General Service Administration (GSA), Pacific Gas & Electric, and the Department of Energy created an unprecedented 180,000 sq.ft. advanced lighting controls test bed at the building.

Current lighting controls have the potential to reduce lighting energy use by up to 35% in existing multistory office buildings compared to conventional lighting systems without controls.

Strategies for lighting control include:

- Daylighting (automatically dimming the lights in response to available daylight).
- Scheduling (dimming or switching fixtures on and off according to occupancy).
- Lumen maintenance (automatic light compensation for long-term lumen losses).

DAYLIGHTING FEATURES PHILLIP BURTON FEDERAL BUILDING 450 GOLDEN GATE PROJECT

1 VERTICAL GLAZING

The conventional building envelope has single-glazed windows running from 3 feet above the floor up to the dropped ceiling. Each window is fitted with miniblinds that are operated by occupants to block direct sunlight and glare. All but the north-facing

windows had been retrofitted some time ago with solar film to reduce the visible transmittance to about 40%.

2 LIGHTING CONTROLS

Lighting controls from eight different manufacturers were installed on floors 3 and 5. Several different control system configurations were tested.

In single- and multiple-person offices, occupancy sensors plus daylight and occupancy sensors with manual dimming were installed. In the open-planned areas, daylight dimming and wide area occupancy sensors were incorporated. In the 2,900 sq.ft. open-planned office spaces on the north and south sides of the 3rd floor, dimming 3-lamp electronic ballasts were installed.

Each light zone is controlled by a single photosensor and controller. Adjustment of the system is set at the controller after installing the lighting controls.

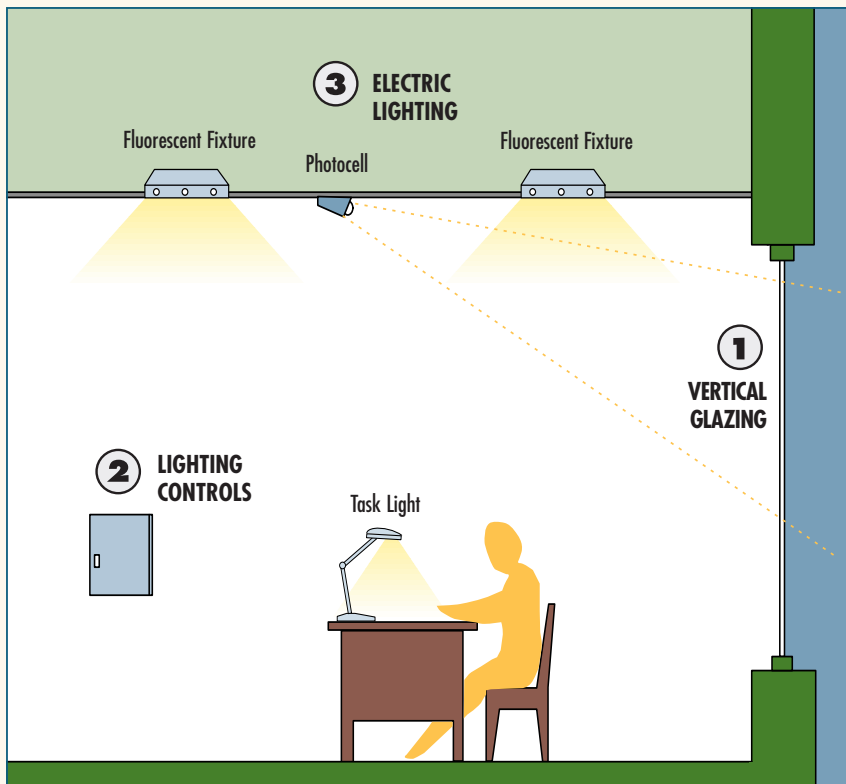
3 ELECTRIC LIGHTING

Electric lighting for the test bed consists primarily of 3-lamp direct parabolic-type luminaires, T-8 fluorescent lamps, and electronic ballasts that have become a building standard since 1993. In the perimeter areas, dimmable ballasts were specified.

T-8 fluorescent lamps are installed throughout the test site.

To Energy Savings

energy savings for this test site retrofit.



These lamps were seasoned on-site by operating continuously for 100 hours at full intensity immediately after re-lamp-ing. Based on a survey conducted at night, the interior illuminance in open-planned spaces without partitions was measured at 80–90 foot-candles. In the partitioned spaces and in the individual offices with ceiling-high partitions, the measured illuminance at the work plane was 50–70 fc.

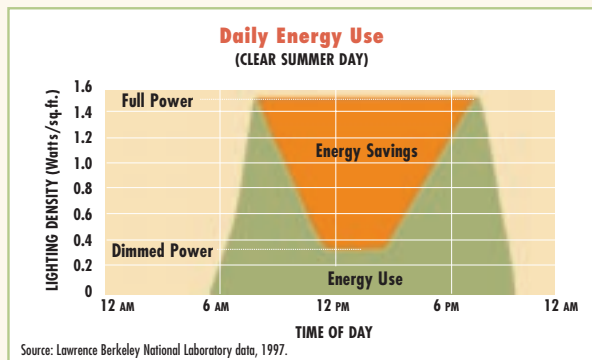
“We’re very excited about the Phillip Burton Federal Building. It is an outstanding demonstration of the very latest in lighting controls... [and is] a great model for other industries to follow.”

Christine A. Ervin
Former Asst. Secretary
Energy Efficiency and Renewable Energy
Department of Energy



Following the National Energy Policy Act of 1992, President Clinton issued Executive Order 12902 directing federal facilities to reduce energy consumption by 30% by the year 2005, based on 1985 levels. The 450 Golden Gate Project aims to provide valuable information that can be transferred throughout the industry, as well as the federal government. In addition to testing a variety of daylighting controls for perimeter lighting, the advanced lighting control test bed evaluated various applications of occupancy, manual dimming, and scheduling control strategies. Additional evaluation of lighting energy monitoring and real time price scheduling strategies continues. For additional information on Executive Order 12902 and the Federal Energy Management Program, refer to web site: www.eren.doe.gov/femp. Additional technical papers on the 450 Golden Gate Project test bed can be found at <http://eetd.lbl.gov/btp/pub/LGpub.html>.





This chart illustrates how the electric lights, in the first row on the building's south side, respond to available daylight on a clear summer day. Annual energy savings reached a high of 2.0 kWh/sq.ft.-yr., or 41% in some of the daylight-linked control areas.

RESULTS

This office building represents a type that is prevalent in today's building stock. A building such as this, with significantly occupied areas exposed to the perimeter skin and adequate windows, can be retrofitted with daylight sensors. Doing so will have a large impact on our national energy use. In this building, the results are impressive. After analyzing a half year's data in the daylight-linked control areas of the test site, the annual energy savings was 41% and 30% for the outer rows of lights on the south and north sides of the building, respectively. The annual energy savings dropped to 22% and 16% for the second row of lights for the south and north, respectively. Combined, these two areas represent 30% of the office floor space.

This program is funded by California utility customers and administered by Pacific Gas and Electric Company, under the auspices of the California Public Utilities Commission.

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These results help the GSA improve the operation of its lighting systems and move toward the goal of 30% energy savings. The results also provide the lighting community with invaluable information for taking advantage of control technologies that improve user comfort and reduce energy costs.

RESOURCES

PG&E does not endorse particular products or services from any specific manufacturer or service provider. High efficiency products and services similar to those used in this project are available from multiple suppliers. For informational purposes, PG&E notes that the following companies provided equipment or services to the project:

Dimmable Ballasts/Lighting Control/Photosensors:
Lutron Electronics Co, Coopersburg, Pennsylvania
www.lutron.com — 1-800-523-9466

ADDITIONAL CONTACT INFORMATION

Pacific Energy Center, San Francisco, California
www.pge.com/pec/daylight — 415-973-7206

Building Technologies Program
Lawrence Berkeley National Laboratory, Berkeley, California
Contact: Francis Rubinstein
FMRubinstein@lbl.gov — 510-486-4096
For technical papers:
<http://eetd.lbl.gov/btp/pub/LGpub.html>

Federal Energy Management Program (FEMP)
www.eren.doe.gov/femp — 1-800-363-3732