

# Adaptive Corridors

## Latham Square, Oakland, CA



PIER Buildings Program

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### The Problem

Commercial building corridors are often vacant, yet many must be lit 24 hours a day in order to meet safety regulations for paths of egress. The constant illuminance of these secondary spaces, even when vacant, constitutes significant energy waste; it also makes corridors an ideal application for adaptive lighting strategies.

### The Solution

Energy savings can be achieved in corridors and other secondary spaces with an occupancy-based adaptive lighting system. Such a system is generally composed of occupancy sensors, dimmable ballasts and a communication platform. The system automatically lowers light levels to the minimum footcandles required by safety codes during vacancy and raises light output to the recommended level for occupant comfort during occupied periods. The adaptive lighting system installed at the Latham Square office building is based on Lutron's Energi TriPak solution, a stand-alone platform for adaptive lighting that employs cost-effective wireless control devices and programmable dimming ballasts.

The new 64W light fixtures installed for this project utilize Lutron EcoSystem H-Series ballasts. Lutron Radio Power Savr occupancy sensors were installed throughout the corridors to provide adequate PIR coverage for the corridor areas and each point of entry. The wireless sensors work in tandem with Lutron's Wireless PowPak dimming modules, which control the light level of the fixtures.

### Features and Benefits

- Adaptive lighting with occupancy sensors yields significant energy savings
- Wireless controls reduce installation costs (ideal for retrofit applications)
- Compatible with both new and existing luminaires
- Easily commissioned (can be performed by installation team or facility management)

### Technology Costs and Incentives

PG&E covered \$25 per fixture through a utility rebate for newly installed lights and controls. Oakland Shines,

**FIGURE 1: POST-RETROFIT LUMINAIRES**

Adaptive corridor lighting, Latham Square office building



an energy program for Oakland businesses, covered about 80% of the total installation costs.

The total cost of the retrofit, including products and labor, came to approximately \$57,000. After rebates, the total cost was approximately \$7,200 for the entire building.

### Demonstration Results

#### Latham Square Building Oakland, CA

In January 2012 adaptive lighting controls were installed on 12 floors of the Latham Square office building in downtown Oakland, CA. All fixtures in the corridors were replaced using the UA Retrofit Shielding Kit by A.L.P. Lighting Components, Inc. The original 86 W 3-lamp T8 fluorescent fixtures were replaced with 64 W 2-lamp T8 fluorescent fixtures. Retrofit luminaires utilized the Energi TriPak system by Lutron, which consists of Lutron EcoSystem H-Series ballasts, Radio Powr Savr occupancy/vacancy sensors, wireless PowPak dimming modules, and wireless controls.

When occupancy sensors determine a corridor is vacant, the PowPak modules receive this data, and in turn dim the luminaires to a lower light level. In this case, luminaires were dimmed to the minimum required light level in order to maximize energy savings. When the corridor becomes occupied, light levels increase (in this case, to full output). High and low levels can be programmed after installation.

Luminaires were monitored over a 30-day period to determine average occupancy rates. Occupancy rates averaged 8% in the Latham Square Building. Based on this and other project data, CLTC engineers calculated that the new lighting system reduces energy use 86%, saving 113,724 kWh annually and saving \$23,803 in energy and maintenance costs over the life of the fixtures.

The Oakland Shines rebate put simple payback for the project at 6 months, with a return on investment (ROI) of 32.7 and an internal rate of return (IRR) of 221%. Without the Oakland Shines rebate, the project's simple payback would have come to 3 years and 4 months; the ROI would have been 3.6, and the IRR would have been 30%.

## Product Availability

The Lutron products used in this project are widely available through lighting distributors. For information on Lutron products and providers, visit [www.lutron.com](http://www.lutron.com).

Other manufacturers offer similar wireless adaptive lighting solutions. Information on LevNet RF solutions by Leviton is available at [www.leviton.com](http://www.leviton.com). To find out more about wireless lighting controls by Adura Technologies, visit [www.aduratech.com](http://www.aduratech.com).

**TABLE 1: ENERGY AND MAINTENANCE COSTS AND SAVINGS**

\*Figures listed below are per fixture quantities unless otherwise noted

TECHNOLOGY	SYSTEM SIZE (W)	ANNUAL ENERGY CONSUMPTION (kWh)	ANNUAL ENERGY COST	ANNUAL MAINTENANCE COST	TOTAL ANNUAL COST	LIFE-CYCLE ENERGY COST	LIFE-CYCLE MAINTENANCE COST	TOTAL LIFE-CYCLE COST	TOTAL LIFE-CYCLE COST FOR ALL FIXTURES
INCUMBENT	86	752	\$105	\$5	\$110	\$503	\$24	\$528	\$92,338
LUTRON CONTROLS	7 (Low) 68 (High)	561	\$78	\$3	\$82	\$375	\$16	\$392	\$68,535
<b>SAVINGS</b>		<b>191</b>	<b>\$27</b>	<b>\$2</b>	<b>\$28</b>	<b>\$128</b>	<b>\$8</b>	<b>\$136</b>	<b>\$23,803</b>

Annual hours on pre-retrofit: 8,760  
Replacement time: 5 min/fixture  
Post-retrofit lifetime: 42,000 hr

Annual hours on post-retrofit: 8,080  
Energy cost: \$0.14/kWh  
Cost of lamp: \$6

Annual occupancy hours: 680  
Occupancy: 8%  
Lifespan: 5 years

Cost of labor: \$25/hr  
Pre-retrofit lifetime: 42,000 hr

## 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.

**Jerry Brown, Governor**  
**California Energy Commission**

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## What's Next

CLTC continues to develop demonstrations of adaptive lighting technologies through State Partnership for Energy Efficient Demonstrations (SPEED) Program.

## Collaborators

This demonstration resulted from collaboration between CLTC, Latham Square, Lutron Electronics Co., Inc., and Associated Lighting Representatives, Inc. Project costs were covered by the collaborators while monitoring and verification activities were sponsored by the PIER program.

## For More Information

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