Case Study: Hospital Lighting Controls

LIGHTING ENERGY EFFICIENCY IN PARKING CAMPAIGN

Overview

NorthBay VacaValley Hospital completed lighting retrofits to their 150,000 square foot parking lot and its 225 parking spaces. They did so with help from The California Lighting Technology Center (CLTC) at the University of California, Davis. The project has achieved 65% savings and received a 2014 Lighting Energy Efficiency in Parking (LEEP) Campaign's award for best use of lighting controls. In addition, the retrofits improved lighting maintenance operations and end-user satisfaction.

The lighting retrofit included replacing roughly 50 induction luminaires with new LED fixtures with embedded lighting controls. The new LED fixtures were coupled with various kinds of lighting control systems, including a radio frequency (RF) connectivity control system that was installed in dedicated zones with passive-infrared (PIR) and long-range microwave sensors to achieve energy savings. An "ultra-smart" lighting control network was also put in place, giving facility managers the ability to adjust lighting schedules, light levels and time-out settings, monitor the system's energy use, and receive automated alerts when luminaires require maintenance.

Keys to Success

Generally, the health care sector has relatively stringent lighting requirements, but it also has the potential to realize lighting energy savings with broader use of controls. Consequently, energy savings was the primary driver to install more efficient fixtures and controls. Like many commercial facilities, the NorthBay VacaValley Hospital operates all night long. The old induction fixtures in the parking lot operated at full power for 24 hours each day, which was inefficient and costly and drove CLTC to address maintenance requirements, in addition to energy savings. As part of the retrofit analysis, CLTC ensured that the parking lot's lighting would require very little maintenance to be fully-operational at all times, not missing hours due to "burnt out" lamps.

VacaValley Hospital. Image courtesy of CLTC

Results	
Energy Savings	14,600 kWh, a savings of 65%
Lighting Power Density (W/ sq. ft.)	0.04, a reduction of 40%
Utility Savings	$2,300 annually
Installation and Maintenance	Lighting components were customized to integrate them into a single, fully functional system, and hospital personnel were consulted to ensure settings met the site's lighting needs. CLTC also ensured that parking lot lighting would require little maintenance to be fully-operational at all times.
Overall Performance	The new LED lights improved overall light distribution, which enhanced overall security and made users feel safer at night.

In addition to savings, the new LED lights improved the overall light distribution, which enhanced overall security and helped make users feel safer at night.

CLTC began the project by customizing the lighting components to integrate them into a single, fully functional system, and by working with hospital personnel to ensure system settings met the site's lighting needs. Each dimmable LED luminaire, from Leotek, was installed and equipped with a fail-safe photocell to prevent operation and energy waste during daylight hours. Also, to help reduce usage during the night when the parking lot is vacant, WattStopper's PIR motion sensors were installed where suitable and new long-range microwave motion sensors by Echelon/Lumewave, Inc. were installed to provide coverage in larger zones. The network control system includes occupancy logging features, maintenance alerts, and emergency override to full ON to ensure that hospital staff, patients, and visitors are always provided lighting. The system allows an authorized administrator to adjust lighting schedules and tuning levels, adjust luminaire groupings, and gather revenue-grade energy metering data using an Internet-connected device.

Available incentives ranged from $40 to $70 per luminaire through the local energy provider, Pacific Gas and Electric Company. The selected energy service company, Siemens, fully covered the installation costs of the exterior system and provided a host computer for the RF-system software. The hospital pays a lower electricity rate than the national average which draws out the payback period. If the rate was $0.10 - $0.20 / kWh, the simple payback periods would be correspondingly lower. As the market for adaptive lighting systems grows, costs for LED luminaires, controls, and installation time all continue to decline. Since the hospital already had an efficient induction system, the improvement was less marked.

"When conducting a lighting system upgrade, the economic analysis and maintenance savings will be largely affected by the incumbent lighting system's baseline energy use profile."

Bernhard Goesmann, CLTC

2014 LEEP Award: Best Use of Lighting Controls in a Single Facility	
Location:	NorthBay VacaValley Hospital Vallejo, CA
Parking Area:	150,000 sq. ft. (225 spaces and 67 fixtures)
Solution:	New LED fixtures coupled with advanced lighting controls

Lessons Learned

- Light levels and uniformity of the post-retrofit LED lighting were better than expected and the new microwave sensor was key to the success of this adaptive system. Energy savings were significant, but lower than expected. The change from induction to LED lighting yielded lower energy savings and resulted in a lower return on investment (ROI).

- Had the hospital installed the LED system with controls initially there would have been greater savings. However, the LED system with controls only saves a little more than $2,300 annually compared to the induction system and results in a simple payback of 21 years. Several economic factors were considered in the project, but the primary focus was to demonstrate the performance of adaptive, occupancy-based lighting controls in a real world setting.

- With any installation of adaptive, occupancy-based lighting controls, it is important to ensure that the sensors are configured so that they can accurately and reliably detect occupants. With this installation, a three-dimensional overlay of sensor coverage at the site was critical in the planning phases of the project.

Learn More

Learn more about how to join the Better Building Alliance's Lighting Energy Efficiency in Parking Campaign, at www.leepcampaign.org/. LEEP Participants are collectively saving over 120 million kilowatt-hours and over $10 million annually across 430 million square feet of lots and garages by upgrading to high efficiency parking lighting.