



Commercial Building
Energy Alliances

LED Site (Parking Lot) Lighting Technology Procurement Project

Current Members of the LED Parking Lot Lighting Working Group

- Best Buy
- Food Lion
- The Home Depot
- Illuminating Engineering Society of North America
- JCPenney
- John Deere
- Kohl's
- McDonald's
- Target
- Walmart
- Whole Foods Market

The U.S. Department of Energy and its partners are working to support the market introduction of LED (light emitting diode) parking lot lighting. A Commercial Building Energy Alliance (CBEA) working group is focused on making reliable, energy-efficient, and competitively priced outdoor LED luminaires more widely available in the marketplace.

CBEAs can help commercial building owners and managers cut energy costs by working with appliance, heating, cooling, and lighting manufacturers to meet energy-efficiency needs. One area that offers immediate returns is lighting, because high-efficiency lighting systems using Solid-State Lighting (SSL) technology are rapidly improving in terms of performance, and are gaining market acceptance. In April 2008, a working group formed to investigate the use of LED parking lot lighting for retail buildings, and accelerate the market availability of LED parking lot lighting products that meet CBEA members' performance requirements. Initiated by the Retailer Energy Alliance, this working group has:

- Identified candidate luminaires and investigated their field and laboratory performance as well as life and reliability issues
- Developed product performance specifications and evaluation procedures based on group members' needs.

DOE Support

This effort is sponsored by the U.S. Department of Energy (DOE) and implemented by the Pacific Northwest National Laboratory (PNNL) in coordination with CBEA members. Because LEDs have the potential for such significant energy savings, DOE has been actively supporting research and commercialization of LED lighting through its SSL program, which includes

research and development, product testing, technical information development, product demonstrations, and outreach to energy-efficiency program adminis-

trators. See www.ssl.energy.gov for more information on DOE's SSL portfolio.

Through its involvement in the CBEAs and its SSL program activities, DOE will provide technical assistance in support of this technology procurement project, including:

- Product performance testing
- Product demonstration technical support
- Analysis of energy cost savings
- Analysis/quantification of maintenance cost savings
- Investigations into life measurements and other performance indicators
- Development of a CBEA product performance specification
- Technology procurement technical assistance.

CBEA Member Opportunities and Benefits

There are several ways CBEA members have been involved in LED parking lot lighting procurement: identifying candidate products, reviewing product laboratory testing, conducting field demonstrations, evaluating candidate products, and assisting with the development of LED parking lot lighting performance specifications.

Interested CBEA members can benefit from this project in a variety of ways, from simply being better informed of the potential of LED parking lot lighting (from DOE research and reports from other members), to being among the first to hear about new and promising technologies, to participating in demonstration projects and a collaborative RFP for LED parking lot lighting products.



The parking lot lighting demonstration comparing LED (left) and high-pressure sodium (right) shows the even light distribution and good color rendering of LED lighting.



DOE Solid-State Lighting Program

Through its Commercially Available LED Product Evaluation and Reporting (CALiPER) program, DOE tests commercially available luminaires to determine actual performance. Summary reports are available at www.ssl.energy.gov/caliper.html. DOE also supports GATEWAY demonstrations to showcase high-performance LED products for general illumination in a variety of commercial and residential applications. Reports showing a range of economic results for demonstrations of exterior solid-state lighting products are available on the DOE SSL Web site at www.ssl.energy.gov/gateway-demos.html.



To learn more about this project, contact:

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Why LED Parking Lot Lighting?

LED technology is advancing into new categories of white-light applications, including parking lot lighting, where early indications suggest a high-quality light and long life. At present, however, products are available from a limited number of suppliers, performance in the later years of the product's lifetime is still not completely explored, and LED luminaires are expensive on a first cost basis. Table 1 highlights the benefits of LED light in parking lots.

Table 1

Product Feature	LED
Overall Lighting System Efficiency	Very efficient because of LED directionality, meaning nearly 100% of light leaves the luminaire
Life	Expected long life (50,000+ hours) but actual end-of-life performance not completely understood
Maintenance	Very low maintenance expected due to long life and durability
Environmental (Mercury)	Contains NO mercury
Light Output Depreciation	Low lumen depreciation rate
Lighting Uniformity	Directionality and flexibility make uniformity ratios below 10:1 easily achievable
Dimmability	Fully dimmable
Durability	Solid-state technology is much less fragile and less susceptible to vandalism, breakage, or damage from high winds and vibration
Light Pollution	Easy to reduce light pollution effects due to inherent directionality of source

Project Next Steps

- Updates to the performance specification are expected to occur in the future.
- Demonstration projects hosted by CBEA members will continue.
- Large coordinated CBEA purchases are anticipated in summer 2009.

Overview of the CBEA Specification

Typically, technology procurement specifications focus on a product, rather than an application. In order to maximize benefits of converting from the traditional HID technology to SSL technology, the CBEA team developed a performance specification that should be applied to a specific site. SSL area luminaire manufacturers will work with either DOE or commercial building organizations (i.e., large retailers or developers) to provide lighting solutions for different locations. The specification provides information about both the luminaire and how the site should be lighted. Key details of the specification:

- Luminaires should be compliant with “BUG” requirements in IESNA TM-15.
- Luminaires should carry a 5-year warranty covering the luminaire, finish, and power supply.
- Testing requirements are identified.
- Both power density and illuminance requirements are by Lighting Zone (LZ); different environments need more or less light (and thus use power differently).
- Different amounts of light (illuminance) are needed for different parts of the parking lot.
- Uniformity is treated differently than the standard maximum-to-minimum ratio and is instead represented by a weighted average of relevant illuminance measurements.

Table 2 provides information on the basic power density and illuminance requirements.

Table 2

Lighting Zone	Power Density	Minimum Illuminance (fc) requirements per LZ			
		Main Area	Perimeter	Front Aisle	Vertical
LZ1	0.04 W/sf	N/A	N/A	N/A	N/A
LZ2	0.05 W/sf	0.50 fc	0.20 fc	1.00 fc	0.25 fc
LZ3	0.06 W/sf	0.75 fc	0.40 fc	1.50 fc	0.50 fc
LZ4	0.08 W/sf	1.00 fc	0.50 fc	2.00 fc	0.50 fc