

SOLID-STATE LIGHTING:**L Prize® Drives
Technology
Innovation,
Energy Savings**

The L Prize competition challenges manufacturers to develop high-quality lighting products that set leading-edge performance benchmarks for the industry.

Lighting accounts for one-fifth of all the electricity consumed in the U.S., and most lighting products are far from energy efficient. That's why, at the behest of Congress, the U.S. Department of Energy launched the L Prize competition. The goal is to challenge industry to develop high-quality, high-efficiency solid-state lighting (SSL) products and to move the market to adopt those products much more quickly than would otherwise occur.

DOE recognizes that rewarding innovation without regard to practicality won't have an impact on the country's energy use. To win the L Prize, it's not enough for an entry to meet the competition's ultra-high standards for energy efficiency, output, light quality, distribution, and lifetime—its manufacturer must also demonstrate the capacity for mass production.

But in order for the L Prize competition to actually realize its potential to save energy, the market must adopt the winning product(s). That's where the L Prize partners come in. Thirty-one utilities and energy efficiency organizations from across North America signed on as partners to establish rebates, incentives, and other promotions to support the winning product(s).



L Prize partner Southern California Edison put the Philips 60W replacement lamp through extensive field testing at this Palm Desert resort (including in table and floor lamps in this lobby). *Photo courtesy of Southern California Edison.*

The First Winner

In late 2009, the L Prize competition received its first entry—a product from Philips Lighting North America intended to replace the 60W incandescent bulb. The 2,000 samples submitted by Philips went through a rigorous 18-month evaluation that included industry-standard photometric testing, stress testing under extreme conditions, and long-term lumen maintenance testing at elevated temperatures. In addition, field assessments were conducted by L Prize partners to see how the product performed in real-world settings.

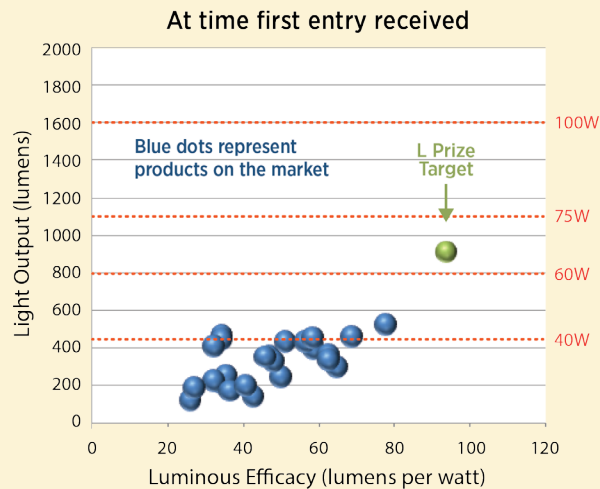
The Philips entry met all requirements and, in August 2011, was declared the L Prize winner in the 60W replacement category. The product hit retail shelves on Earth Day 2012. This energy-saving lamp is comparable to a 60W incandescent in color quality (CRI = 93, CCT = 2727 K), light distribution, and light output (940 lumens) but consumes less than 10W (a savings of 83 percent)

and at 25,000 hours of testing, the actual lumen maintenance was 100 percent, with chromaticity at less than .002.

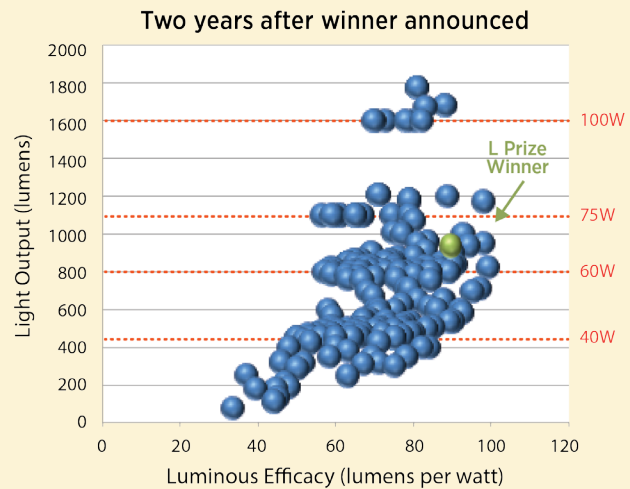
A Rising Tide

A rising tide lifts all boats. When DOE launched the competition in 2008, most LED replacement bulbs were of poor quality and would not satisfy consumers looking for an LED lamp to replace a 60W incandescent bulb. Ed Crawford, head of Lamps and Lighting Electronics at Philips Lighting North America, credits the L Prize with pushing his company to focus their research efforts on LED bulbs—accelerating their efforts 3 to 5 years ahead of where they would have been without the competition. Philips' entry helped catalyze market competition and pushed the whole industry toward a clear target. Recent price reductions have intensified competition and adoption of LED bulbs, with the 60W replacement category remaining a focal point.

L Prize 60W Relative to Market



Source: CALiPER 2008–2009 results for 12 LED lamps and data from 12 LED Lighting Facts labels.



Source: LED Lighting Facts analysis, November 2013

These snapshots of CALiPER and LED Lighting Facts®-listed omnidirectional lamps show the significant progress between 2008–2009 and late 2013. Prior to the submission of the 60W replacement lamp L Prize entry by Philips, no other products listed by DOE were near the L Prize output and efficacy levels. As of late 2013, a growing number of products could meet the L Prize levels.

PAR38 Replacement

Next up is the L Prize PAR38 category, which opened for entries in Spring 2012. The specifications are equally challenging: lamps must produce at least 1,350 lumens, approximately equivalent to a 90W standard halogen or a 70W halogen infrared PAR38 lamp, and draw no more than 11 watts, requiring a luminous efficacy of at least 123 lm/W. Additional requirements for excellent color quality and beam performance aim to ensure winning products will perform well in highly demanding applications such as retail, hospitality, and museum lighting. The role of the L Prize is to challenge manufacturers to hit the highest performance marks, showing what is possible with LED technology and moving the market faster.

While some LED PAR38 lamps can now meet or exceed the L Prize output target, no product comes close to the efficacy target. The innovation needed to meet the L Prize performance requirements is likely to be groundbreaking and far-reaching in its impacts on related

products and the market. Entries in the L Prize PAR38 competition will undergo rigorous assessment, including laboratory photometric, long-term lumen maintenance, and stress testing as well as field evaluations in collaboration with L Prize partners and host sites. This extensive testing results in a high level of confidence in the winning products by potential purchasers in government, energy efficiency programs, and private sector companies.

PAR38s, commonly known as “spot” or “flood” lamps, are in widespread use in the U.S., where an estimated 90 million of them are installed, mainly in retail businesses and as track and outdoor security lights. DOE estimates that switching all these with lamps efficient enough to win the L Prize would save the country \$1 billion worth of electricity per year, and annually avoid 7 million metric tons of carbon emissions—equivalent to removing 1.46 million cars from the road.

The Spot You’ve Been Waiting For

The L Prize PAR38 specs call for a narrower, more intense beam than most LED PAR38 lamps currently provide. While LED lamps with 25° or 40° beams are now common, true spot lights are rare, especially those with excellent color rendering and light output equivalent to 90W halogen. Applications in retail stores, hotels, galleries, and restaurants demand spot lights that deliver color and impact. Imagine an LED PAR38 spot that makes objects “pop,” renders colors—even deep red—beautifully, uses 88 percent less energy, and lasts 12 times as long. Now that would be a winner.

For More Information

For more information on the L Prize competition, see lightingprize.org.

U.S. DEPARTMENT OF
ENERGY | Energy Efficiency & Renewable Energy
BUILDING TECHNOLOGIES OFFICE

April 2014 • DOE/EE-1092

Printed with a renewable-source ink on paper containing at least 50% wastepaper, including 10% post-consumer waste.