BEST-IN-CLASS LEDs:
HOW UTILITIES CAN USE THESE RECOMMENDATIONS

Issue Brief
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The Edison Foundation
INSTITUTE for ELECTRIC INNOVATION

Best-in-Class LEDs: How Utilities Can Use These Recommendations

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INTRODUCTION

Today, light-emitting diode (LED) lamps are the most energy efficient and transformative lighting products on the market, but they can also be quite expensive. A positive, first-time customer experience is crucial for these new products to gain market acceptance. Electric utility rebate programs and customer education efforts can help facilitate such an experience by lowering the purchase price and arming customers with important information about these new, highly efficient technologies. Such education efforts are also vital to informing customers about the potential of LED lamps to deliver energy savings to millions of homes.[1]

Since 2011, the Edison Foundation Institute for Electric Innovation (the Institute) has worked with utilities, energy efficiency stakeholders, and lighting experts to identify best-in-class LED reflector lamps.[2] Best-in-class LEDs are both energy efficient and consumer-friendly in terms of light quality. These recommendations, available, at www.toptenusa.org, are helping to advance the transformation of the residential lighting market toward high quality, highly efficient LED lamps.

- In December 2013, the Institute posted an updated set of recommended LED lamps to www.toptenusa.org.

The information that follows briefly explains the importance of LED lamp recommendations and how utilities can best leverage these recommendations to help customers save money and energy, and have a positive experience with LEDs.

QUALITY MATTERS

The ultimate goal of lighting efficiency programs is to save energy, and the best strategy for achieving energy savings is to highlight high quality, efficient products that everyday customers will enjoy using, readily adopt, and recommend to others. To be 'best-in-class' lamps must meet four criteria: excel in visual parameters; be listed as an ENERGY STAR-qualified product; be compatible with common dimming controls; and, deliver energy savings cost-effectively. We understand that customers want lamps that save energy and meet or exceed performance

[1] McKinsey & Co., Lighting the Way (2011)

[2] For full list of advisors and details on evaluation approach, see IEE, Evaluation of Best-in-Class LED Reflector Lamps (January 2013). LED recommendations, current as of December 2013, are available at the TopTenUSA website, www.toptenusa.org.

expectations, but light quality needs to be visually appealing. In fact, a recent McKinsey report identified "light quality" as the second most important criteria when deciding on lighting technology within a new building.[3] Ultimately, the path to purchasing energy efficient LEDs must be easy and without buyer's remorse.

USING THE BEST-IN-CLASS LIST

Utilities are using the Best-in-Class lists to fine tune LED-specific product promotion, education, and incentives for customers. The intent is to elevate exceptional LED lamps that bear the ENERGY STAR label and also deliver above average efficiency, dimming performance, light distribution, and faster paybacks relative to other LED reflector lamps in the market.

Customer education and promotion efforts include:

- Developing consumer friendly documents to help customers make informed selections when choosing from the expanding set of ENERGY STAR lamps.
- Preparing a basic fact sheet on uses of LED lighting in households.
- Identifying the attributes that make a best-in-class lamp.
- Conducting brand recognition experiments.

Utilities are also exploring ways to use the list to enhance their customer incentive programs and are considering the following:

- Using the list to screen products for use in utility direct-install programs.
- Incorporating "aesthetics and customer acceptance" into lighting program incentives.
- Potentially rebating only the top ten lamps.
- A different incentive level for top ten lamps than other ENERGY STAR LED lamps.

MARKET POTENTIAL

The focus of this work is on LED reflector lamps that are installed in residences and small commercial storefronts, and are readily available through common retail channels such as big box stores and online vendors. We focused on LED PAR38 and PAR30 lamps because of their

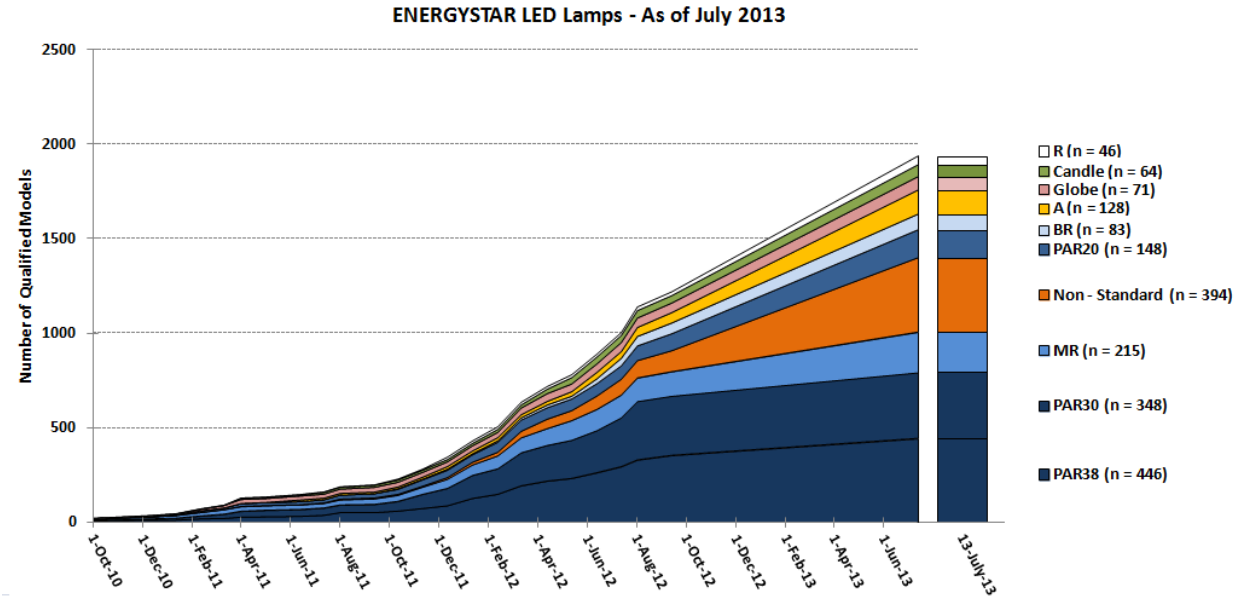
[3] McKinsey & Co., Lighting the Way (2011).

increased potential for energy savings and availability. LED reflector lamps are typically 360 percent more energy efficient than a halogen reflector lamp, and offer extended operating life – usually in excess of 30,000 hours compared to 2,000 hours for a long-life halogen lamp. With approximately 150 million halogen lamps of this type in use in U.S. households and hundreds of LED product offerings to choose from, guiding customers to the top ten performing lamps is critically important.

Selecting best-in-class LED reflector lamps is not simply a matter of choosing the most energy efficient model, as they are all quite efficient. Metrics like efficiency, color rendering index (CRI), and color correlated temperature (CCT) measure only a portion of what people really care about; numerical charts do not tell consumers the complete story about what they will see.

Figure 1 shows that as of July 2013, ENERGY STAR had already labeled close to 2,000 LED lamp models. While ENERGY STAR labeling criteria ensures the energy efficiency and color performance of qualifying products, our analysis goes further by also evaluating lamps based on purchase price, light quality, dimming smoothness, and other attributes important to customers. In fact, our recommended lamps cost 20 percent less than the ENERGY STAR LED average.

Figure 1. ENERGY STAR LED Lamps thru July 2013



SUMMARY

Electric utility customer-funded energy efficiency lighting programs have historically contributed substantial savings at a program cost that is below the energy efficiency program portfolio average. As new LED options enter the market at price points well above the legacy lighting technology, it is critical for utilities to educate their customers and highlight high quality, efficient products that customers will enjoy using and can readily adopt. Using our best-in-class LED lamps is an important step in the consumer education process.

Utilities recognize the savings potential from LED lamps but LEDs also vary in product quality. Some utilities have decided to offer a fixed rebate and uniform promotional support to all ENERGY STAR models. Others offer supplemental incentives for and promotion of the very best models.

Going forward, we recommend that utilities utilize these findings to help steer residential customers to LED reflector lamps that are both efficient and desirable in cost and performance. Our recommendations provide a principled basis for selecting products that are more likely to meet or exceed consumer expectations in a cost effective manner. Utilities can continue to generate significant energy savings in residential lighting by identifying and highlighting efficient light bulbs that customers will enjoy using.

Ultimately, customers purchase light bulbs to provide light. It is entirely reasonable for them to expect aesthetic lighting performance from LED lamps and good value for their additional investment. We found, under a wide variety of scoring scenarios, that certain LED reflector lamps consistently rise to the top, for some very good reasons:

- *LEDs save a significant amount of energy relative to their incremental cost*, so they provide a relatively short payback time to the customers and a cost-effective efficiency resource for the utility.
- *An LED light beam is controlled, uniform, and free of shadowing or color aberrations.* In other words, it delivers its light cleanly and unobtrusively into space, whether operating at full brightness or when dimmed.

The top ten recommended lamps can be found at www.toptenusa.org.

LIST OF RECOMMENDED LAMPS AS OF DECEMBER 1, 2013—PAR 30 (#1-5)

#1
Satco/Nuvo
Score (out of 100): 65.2
Lifetime energy savings (kWh): 1,525
Lifetime cost savings vs. halogen: $186
Payback with typical use: 5.4 years

#2
Ecosmart
Score (out of 100): 61.3
Lifetime energy savings (kWh): 1,825
Lifetime cost savings vs. halogen: $223
Payback with typical use: 4.3 years

#3
Lighting Science Group
Score (out of 100): 59.6
Lifetime energy savings (kWh): 1,800
Lifetime cost savings vs. halogen: $220
Payback with typical use: 6.0 years

#4
Revolution Lighting Technologies
Score (out of 100): 59.4
Lifetime energy savings (kWh): 1,638
Lifetime cost savings vs. halogen: $200
Payback with typical use: 8.4 years

#5
Technical Consumer Products (TCP)
Score (out of 100): 59.4
Lifetime energy savings (kWh): 1,525
Lifetime cost savings vs. halogen: $186
Payback with typical use: 5.5 years

LIST OF RECOMMENDED LAMPS AS OF DECEMBER 1, 2013—PAR 30 (#6-10)

#6
Osram Sylvania
Score (out of 100): 58.8
Lifetime energy savings (kWh): 1,550
Lifetime cost savings vs. halogen: $189
Payback with typical use: 7.3 years

#7
Technical Consumer Products (TCP)
Score (out of 100): 57.4
Lifetime energy savings (kWh): 1,575
Lifetime cost savings vs. halogen: $192
Payback with typical use: 3.2 years

#8
EiKO
Score (out of 100): 57.1
Lifetime energy savings (kWh): 1,750
Lifetime cost savings vs. halogen: $214
Payback with typical use: 5.6 years

#9
Lotus LED Lights
Score (out of 100): 56.3
Lifetime energy savings (kWh): 1,625
Lifetime cost savings vs. halogen: $198
Payback with typical use: 4.6 years

#10
Philips
Score (out of 100): 56.0
Lifetime energy savings (kWh): 1,550
Lifetime cost savings vs. halogen: $189
Payback with typical use: 5.7 years

LIST OF RECOMMENDED LAMPS AS OF DECEMBER 1, 2013—PAR 38 (#1-5)

#1
LightKiwi
Score (out of 100): 66.4
Lifetime energy savings (kWh): 1,750
Lifetime cost savings vs. halogen: $214
Payback with typical use: 4.3 years

#2
Philips
Score (out of 100): 65.6
Lifetime energy savings (kWh): 1,550
Lifetime cost savings vs. halogen: $189
Payback with typical use: 6.0 years

#3
EiKO
Score (out of 100): 64.4
Lifetime energy savings (kWh): 2,000
Lifetime cost savings vs. halogen: $244
Payback with typical use: 4.9 years

#4
Technical Consumer Products (TCP)
Score (out of 100): 62.7
Lifetime energy savings (kWh): 2,025
Lifetime cost savings vs. halogen: $247
Payback with typical use: 5.4 years

#5
Technical Consumer Products (TCP)
Score (out of 100): 62.1
Lifetime energy savings (kWh): 2,575
Lifetime cost savings vs. halogen: $314
Payback with typical use: 3.2 years

LIST OF RECOMMENDED LAMPS AS OF DECEMBER 1, 2013—PAR 38 (#6-10)

#6
Litetronics
Score (out of 100): 62
Lifetime energy savings (kWh): 1,625
Lifetime cost savings vs. halogen: $198
Payback with typical use: 4.8 years

#6 (tie; different model)
Litetronics
Score (out of 100): 62
Lifetime energy savings (kWh): 2,125
Lifetime cost savings vs. halogen: $259
Payback with typical use: 4.8 years

#8
Philips
Score (out of 100): 58.9
Lifetime energy savings (kWh): 1,800
Lifetime cost savings vs. halogen: $220
Payback with typical use: 6.0 years

#9
Greenlite
Score (out of 100): 58.8
Lifetime energy savings (kWh): 1,750
Lifetime cost savings vs. halogen: $214
Payback with typical use: 5.8 years

#10
Satco/Nuvo
Score (out of 100): 56.4
Lifetime energy savings (kWh): 1,700
Lifetime cost savings vs. halogen: $207
Payback with typical use: 6.2 years

About the Edison Foundation Institute for Electric Innovation

The Edison Foundation Institute for Electric Innovation focuses on advancing the adoption and application of new technologies that will strengthen and transform the power grid. The Institute's members are the investor-owned electric utilities that represent about 70 percent of the U.S. electric power industry. The membership is committed to an affordable, reliable, secure, and clean energy future.

The Edison Foundation Institute for Electric Innovation promotes the sharing of information, ideas, and experiences among regulators, policymakers, technology companies, thought leaders, and the electric power industry. It also identifies policies that support the business case for the adoption of cost-effective technologies.

The Institute is governed by a Management Committee of electric industry Chief Executive Officers. It has a permanent Advisory Committee of leaders from the regulatory community, federal and state government agencies, and other informed stakeholder groups. In addition, the Institute has a Strategy Committee made up of senior electric industry executives and more than 30 smart grid technology company partners.

Visit us at: **www.edisonfoundation.net**

About The Edison Foundation

The Edison Foundation is a 501(c)(3) charitable organization dedicated to bringing the benefits of electricity to families, businesses, and industries worldwide. Furthering Thomas Alva Edison's spirit of invention, the Foundation works to encourage a greater understanding of the production, delivery, and use of electric power to foster economic progress; to ensure a safe and clean environment; and to improve the quality of life for all people. The Edison Foundation provides knowledge, insight, and leadership to achieve its goals through research, conferences, grants, and other outreach activities.

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