

To LED or Not to LED

It's the Wild West as LED Lighting Emerges from Early Adopter Phase

by B. Alan Whitson, RPA

All technologies go through phases of adoption as more and more consumers embrace the technology. It starts with the innovators, and then expands to successive groups – early adopters, early majority, late majority, and finally the laggards. LED lighting is in the first part of the early adopter phase and could quickly move to the next phase since it offers energy savings and long lamp life. Yet, with any evolving technology, change can happen quickly and this can increase risk. It wasn't that long ago that video recorders were the hot, new technology. Those who bought Betamax were stunned when their high priced recorders rapidly became useless as VHS technology displaced Betamax as the industry standard.

No topic has created more interest than LEDs in the educational programs given by SquareFootage.net and its partners in 2011. Here are some insights to help sort out the playing field, or answer that famous Abbott & Costello question: Who's on first?

Chuck Silverman, Silverman & Light, a respected lighting designer based in San Francisco Bay Area says, "LED lighting has come a long way in the last few years, and is an excellent choice for replacing any point light source, such as an MR-16 or PAR-38." One of Silverman's clients is Kaiser Permanente, a leader in adopting energy saving technology.

Now some may balk at spending over \$50 for a LED lamp to replace a \$5 incandescent lamp. Nevertheless, the numbers make economic sense as illustrated in the example run for this column.

On the other hand, replacing liner fluorescent lighting with LED is another

story. Today, a 25-watt low mercury fluorescent lamp that lasts 40,000 hours sells for \$5.00 or less; replacing it with an 18-watt liner LED that produces fewer lumens, last 50,000 hours, and costs \$70 is a difficult financial proposition.

More troublesome than understanding the cost equation, is the speed of technological change and sorting through a proliferation of suppliers. Hundreds of manufacturers and suppliers of LED lighting products exist. It takes an astute detective to sort through their claims. Many of these firms are undercapitalized or inexperienced. Combine this with few product standards and the LED marketplace resembles the Wild West.

It's notable that Philips, one of the world's largest, most stable manufacturers, recently won the U.S. Department of Energy's "Bright Tomorrow Lighting (L Prize)" for its LED bulb to replace the 60-watt A type incandescent lamp. Philips plans to make this LED lamp in the U.S., counter to today's trend of manufacturing products overseas.

The Bright Spot for LED Lamps

A bright spot for designers and building owners are the direct replacement or screw-in LED lamps. These LED lamps replace NEMA standard incandescent lamps, so the changeover is quick and simple. This offers a fast way to start using LED lighting without the cost to retrofit or replace existing light fixtures.

There are millions of down lights and wall washers in use across the country. One of the more common lamps is a PAR-38. Here's the financial analysis for replacing a PAR-38,

79-watt halogen lamp with a PAR-38, 17-watt LED lamp. Assumptions for the analysis are:

- >Energy cost \$0.1007/ KWH (U.S. average)
- >Inflation rate 2.5%
- >Discount rate 5.0%
- >Reinvestment rate for any savings 8%
- >Investment horizon 10-years
- >The lamps operate 12-hours a day, 365 days a year
- >The LED lamp received a \$15 utility rebate. See the table for lamp specifications
- >Shipping and handling costs were excluded
- >Rated life for the halogen lamp selected is 5,000 hours. However, it's not unusual for PAR-38 lamps to burn out at 3,000 hours or less
- >Labor costs to change lamps are excluded.

It's significant to note, that some building owners are shifting to LEDs to reduce labor costs. **Fred Lastar**, Facility Director at the newly opened \$588 million Phoenix Children's Hospital, zeroed in on this during a tour of the hospital he conducted during **IFMA World Workplace**.

During the analysis period, nine PAR-38 halogen lamps were used compared with one PAR-38 LED lamp. Both lamps types were due to be replaced at the end of the 10-year investment horizon. Total cost of ownership (TCO) over the ten-year analysis for the PAR-38 halogen lamp was \$295.61 present value; the PAR-38 LED lamp has a TCO of \$99.41 present value. Changing to the LED lamp saves \$196.20 present value. After adjusting for the reinvestment of the cost savings, the financial benefit grew to \$255.78 present value.

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Replacing a PAR-38 halogen with a PAR-38 LED lamp has a break-even point of just over 13 months. The return on investment (ROI) is a whopping 751%! In cities where energy costs are significantly higher than the national average (Boston, New York, San Francisco, Los Angeles, Anchorage, and Honolulu), the ROI skyrockets. ■

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Per Lamp	Halogen	LED
1st Cost	\$5.98	\$55.00
Watts	79	17
Lumens	1,000	930
Lm/Watt	12.7	54.7
Avg. Life Hrs.	5,000	45,000
Color °K	2,900	3,000

