

## Understanding Consumer Interpretation of Common Lighting Metrics and Packaging

As lighting technology has advanced, the packaging of consumer products has changed. Anecdotally, this has led to confusion in the lighting aisle (or internet browser) when consumers are making their purchase decisions.

Now, LED technology and manufacturers are positioned to incorporate even more features into their products as a means to improve product performance, consumer satisfaction and the sustained use of LED solutions—all of which will help increase environmental benefits and electricity savings.

To help address existing and future lighting product packaging issues, CLTC recently deployed a survey to 50 participants designed to quantify consumer understanding of common lighting metrics and information typically found on product packaging. This work was supported by the California Energy Commission.

The survey consisted of a two-part online questionnaire composed of seven multiple-choice questions.

- Part 1 of the survey used the full color Lighting Facts label, which provides a basic level of information on lighting characteristics including metrics.
- Part 2 of the survey focused on the overall appearance of the lighting-product packaging and the information it contained.

The survey results suggest that the primary metrics consumers use when evaluating lamps to purchase at a retailer are light output, energy consumed and color temperature. The efficacy of the lamp itself fell just short of being in the top half of consumer ranking; however, efficacy is the relation between energy consumed and light output, a metric composed of the top two parameters.

It is understandable that these are the most important factors since they most directly relate to consumers' conscious reactions to a space's lighting: how bright a room feels, the amount of energy used and the color of the light.

As to lamp longevity, consumers predominantly perceived a rating given in years (such as 22.7 years) as longer than its equivalent in hours (25,000 hours in this case). Consumers also tended to assume that a lamp would noticeably dim and burn out at the end of its stated life.

Consumers appreciated the information on the Lighting Facts label; it was highly ranked in their decision-making process despite

its widespread use, which would typically diminish its relevance, as it allowed them to compare the products' attributes. General differences in package color, lamp shape and other aesthetic considerations appeared to influence their purchase decisions slightly.

**LED Product Life.** As LED "life" is often presented as a long-term benefit of using LED sources, the survey asked two questions specifically about consumer understanding of this metric. Life ratings may be presented in terms of hours, years or warranty periods; however, the study showed that making accurate comparisons and selections among these choices did not result in selection of the longest time. Information presented in terms of years, for example, relies on an assumed number of operating hours per year. When presented with three different statements regarding life of the same LED product, presented in different units of

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hours, years and warranties, and asked to select the one with the longest life, 74% of people believed that a lamp rated in terms of years would last longer than the same lamp rated in hours. Individual results are shown in **Figure 1**.

When survey participants were asked how the LED lamp might behave at the end of its life, 50% of respondents believed that the LED would fail completely or “die.” Similarly, 46% thought the lamp would be less useful in terms of lighting provided and would be dimmer, faded or less bright. Other responses included comments that the LED lamp would flicker, be less efficient, or change color (become more yellow). In contrast, a significant number of respondents thought the LED lamp would be unchanged at the end of its rated life.

Given that consumers may often link a product’s life to the length of its warranty, warranty terms and information can indirectly affect product purchase decisions when product longevity is a decision-making factor. Survey respondents were presented with several different common LED product warranty terms and asked to select those that were unacceptable and

likely to affect their purchase decisions negatively. Only four percent of respondents felt that all of the warranty terms were acceptable. Participants could select more than one term as unacceptable. All options and selection rates are provided below in **Table 1**.

**Consumer Expectations.**

In addition to questions regarding product life, the survey included one question focused on better understanding consumer expectations regarding

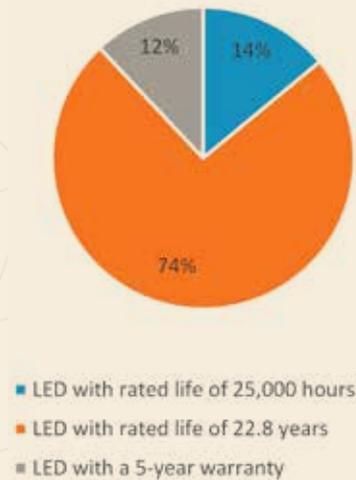


Figure 1. Percent of survey respondents indicating metric for LED life with the longest period.

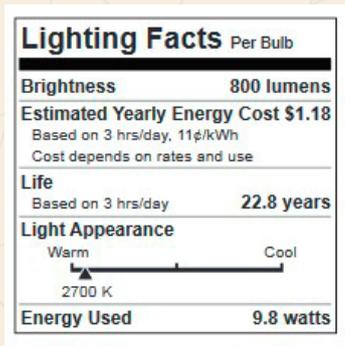
Warranty Language or Clause	Unacceptability Rate
Cost of returning the lamp to be paid by the customer.	72%
This warranty only applies to lamps operating on a burn cycle of 12 hours or more per start and no more than 4,400 hours per year.	58%
Lamp must be returned with proof of purchase or cashiers receipt to receive a refund or replacement.	38%
To obtain coverage under this warranty, customer must complete and deliver to the manufacturer a “warranty form” within 30 days of product installation.	38%
Manufacturer may issue a partial refund (cost of original purchase reduced by duration of use) or send you a replacement lamp.	26%
Lamp must be properly installed, wired and operated or the warranty is void.	22%
All the terms listed are appropriate.	4%

Table 1. Warranty terms included in lighting product survey question.

Figure 2. LED lamp characteristics ranked from highest to lowest importance.



Figure 3. An example of the Lighting Facts Label, which is found on packaging of most light sources.



other product benefits. People were asked to rank the relative importance of nine individual product characteristics on a scale of 1 to 5, where one indicates “most important” and five, “least important.” Scores were summed and lower scores indicated characteristics most important to consumers. Cost and light output ranked as the top two characteristics. Brand name was ranked as the least important. All characteristics

and rankings are shown in **Figure 2**.

The second part of the survey consisted of three questions focused on consumer perception of LED product packaging.

Overall, packaging that included the Lighting Facts label (**Figure 3**), Energy Star label and other common information ranked higher than purely aesthetic considerations such as lamp shape, package color or brand name. However, when respondents were asked to rank their overall relative preference for their top pick as compared to the other two, respondents indicated only a “slight” preference for their top pick.

**Education Efforts.** Helping to educate consumers at “point of purchase” has been a priority for many stakeholder types, including retailers, utili-

ties and the California Energy Commission. Many retailers have installed CCT comparison boxes for just that reason. To help address point of purchase education, CLTC developed an infographic, pocket guide and video series to assist consumers, available for download at <https://cltc.ucdavis.edu/publication/how-choose-right-light>.

**A**s new lighting technology features continue to emerge onto the market, surveys and education materials should be updated to ensure the features are fully understood and used by the consumer. ©

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