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ENERGY STAR Lamps v.2.0 DRAFT 3 (+ Interim Proposal) Specification Comments

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CLEAResult – Consumer Products Services Comments to Draft 3 (+ Interim Proposal) of the ENERGY STAR v.2.0 Lamps Specification

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INTRODUCTION

It is critically important for the success of residential lighting programs that leverage the ENERGY STAR brand that there be an ample selection of low cost (retail price: $1.50-$2.75/bulb) light bulbs that meet the v.2.0 ENERGY STAR specification which would go into effect in early 2017. Three aspects of the current draft of the v.2.0 ENERGY STAR specification (including interim proposal issued on 11/6/15) challenge this outcome:

1) The minimum efficacy requirement of 80 lpw for lamps with Color Rendering Index (CRI) < 90 will effectively remove CFLs from ENERGY STAR certification.
2) The minimum rated lifetime requirement of 15,000 hours for LEDs is a level that most value line LEDs (≈$2.50/bulb) do not achieve.
3) The luminous intensity distribution requirements for LEDs (5% of total flux distributed within the first 50° from the base of the bulb and at least 80% of the measured luminous intensity values varying no more than 35% from the average value across all planes from the top of the bulb down to 135°) may be challenging to achieve at low cost for value line LEDs.

These aspects of the current DRAFT v.2.0 ENERGY STAR lamps specification will exclude all CFLs and nearly all value line LED products (retail price: $1.50-$2.75) from being ENERGY STAR certified. The fundamental problem with the exclusion of these low cost, efficient products is that efficiency program sponsors (most of whom are ENERGY STAR partner utilities) have already filed program plans that include, even in the 2017 timeframe, the promotion of a substantial fraction ENERGY STAR CFLs at low incentive levels. If this v.2.0 specification is finalized without CFLs and without an ample selection of value line LEDs, these program sponsors will not be able to achieve their energy savings goals within their already filed budgets. This is a substantial problem for program sponsors and generates unnecessary risk.

Additionally, if low cost bulbs are excluded from the ENERGY STAR specification, the price position of baseline EISA compliant halogen bulbs will strengthen their market share, and residential lighting programs will need to make a very difficult decision at the start of 2017 when the v.2.0 specification goes into effect:

A) Promote only higher cost ENERGY STAR general service LEDs in direct competition with lower cost value line LEDs *and* lowest cost EISA compliant halogen bulbs. As already mentioned, under these conditions, program sponsors will fail to meet energy savings goals within the filed budgets.
B) Choose to promote non-ENERGY STAR, value line LEDs (and CFLs) which significantly weakens the brand position of ENERGY STAR in the market.

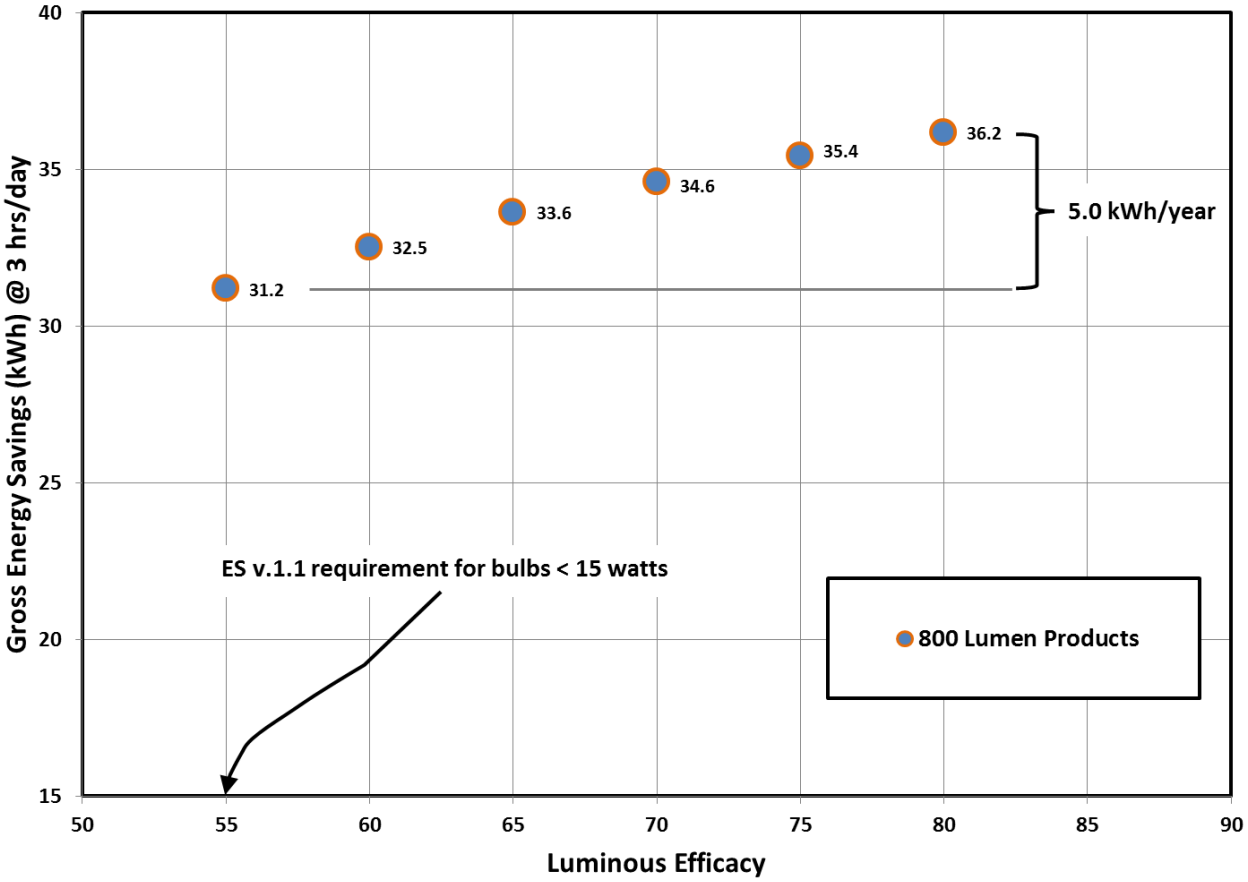
To understand the full implications of modifications away from the current draft of the ENERGY STAR v.2.0 specification, we consider each of the three aspects above in more detail.

MINIMUM EFFICACY REQUIREMENT

Although we recognize that ENERGY STAR has always aimed to identify the highest efficiency level products available in the market, it is important to keep in mind that there's not a linear relationship between efficacy and energy savings.

The overwhelming majority of savings generated by promoting light bulbs in the U.S. market are already enabled by the current v.1.1 ENERGY STAR level compared to the baseline conditions established by the EISA, 2007 legislation for omnidirectional lamps (e.g. EISA compliant halogen lamps). The increase from the current v.1.1 ENERGY STAR specification at: 55 lpw (for lamps under 15 watts) and 65 lpw (for lamps ≥15 watts) to 70 lpw (for lamps with CRI ≤ 90) and 80 lpw (for lamps with CRI < 90) delivers only marginal improvement (at most, an additional 5 kWh/yr) in energy savings (see Figure 1). Don't forget, the baseline EISA compliant halogen technology in the market ranges from *only* ≈18 lpw to ≈22 lpw.

Figure 1: Marginal Improvement Based on Higher ENERGY STAR Efficacy Requirement



We understand that there could be locations within the U.S. where stakeholders are arguing for the highest possible efficacy requirements to maximize net savings calculated from a mixed baseline of all three technologies (LED, CFL, and HAL). However, the areas of the country where this approach is acceptable (e.g. Pacific Northwest) -- given the regulatory environment -- is a considerable minority compared to the balance of the U.S. In most program areas throughout the country, gross savings are calculated from the mandated baseline and then net adjustments are researched and applied accordingly.

MINIMUM RATED LIFETIME REQUIREMENT

Most value line LED products in the market today have a rated lifetime of 10,000 hours. Our communications with manufacturers (e.g. GE, Philips, TCP, Sylvania, etc.) suggest that value line LED products are not likely to be re-engineered to meet the 15,000 hour requirement simply to obtain ENERGY STAR certification. Manufacturers have already made considerable investments to develop these low cost LEDs to attract a critical mass of cost sensitive customers. Given the success of the value line LEDs to date, these products will remain in the market in their current form regardless of how this specification proceeds.

One of the primary advantages of long product lifetimes for efficient products is the extent to which it enables cost effective promotion of the product because energy savings continue for years after the promotion of the product. Over the past ten years the efficiency industry has accomplished an extraordinary level of cost effective efficiency improvements for lighting products with 10,000 hour lifetimes (or less), especially through the upstream incentive mechanism. For lower cost (≈$2.50, retail) products such as CFLs, longer lifetimes have not been needed to meet cost effectiveness criteria even beyond the first tier of the EISA legislation (2012-14). Craigo-Snell (2014) presented analysis of the cost effectiveness of promoting CFLs and LEDs during each year in the timespan 2012-2023. Standard CFLs (with 10,000 hour lifetimes) were found to be highly cost effective throughout the entire period, albeit diminishing through time (TRC: 11.68 → 1.51; PAC: 7.46 → 1.51). The same would be true (even more so due to larger delta watts) for value line LEDs at 10,000 hour lifetimes.

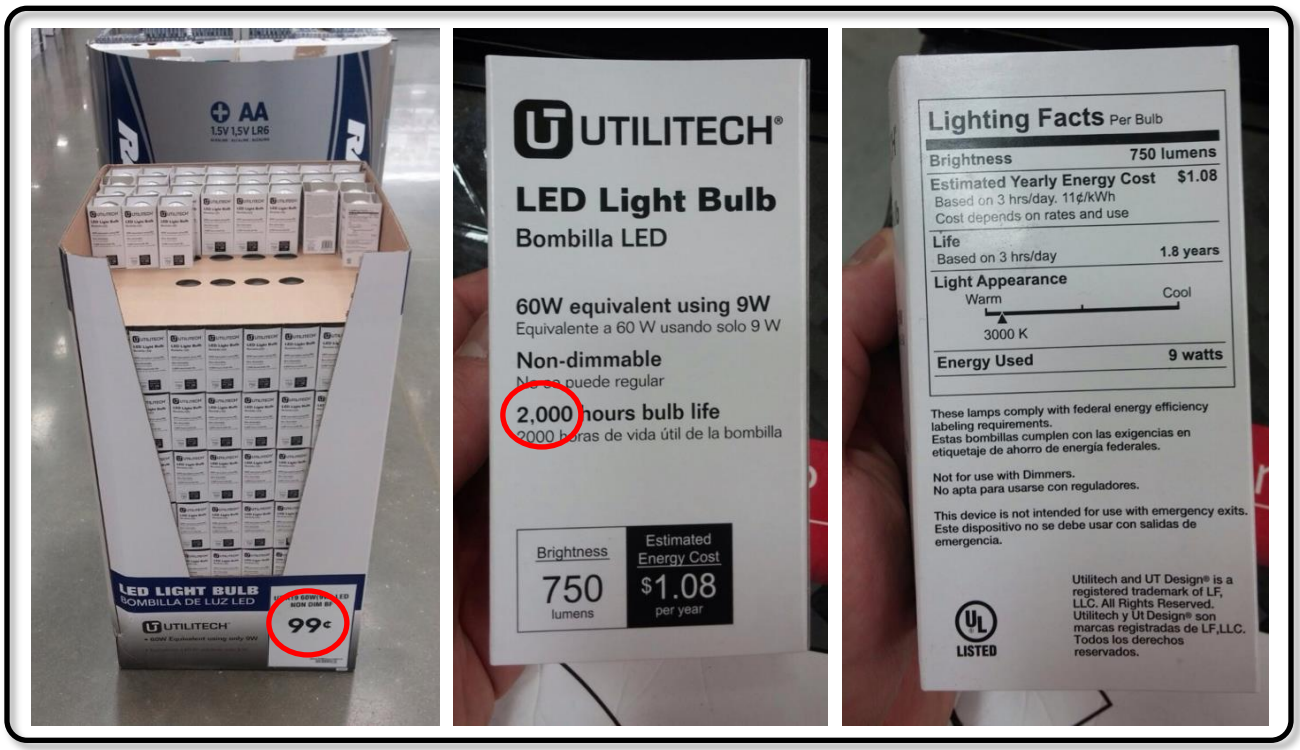
So, if longer lifetimes are not needed to meet cost effectiveness, how about consumers? What do consumers require/prefer in terms of lighting product lifetimes? There is no definitive source on what consumers require, but what we do know is that consumers have purchased quite a large number of 10,000 hour products through programs over the past several years and are generally satisfied with the CFL products that have been the mainstay of the market the past 4-5 years. Also, there is considerable value in simply considering (from the consumer's perspective) how these lifetime *hours* translate into *years*. At 2.3 hours per day (a good "middle of the road" estimate for average residential lamp usage):

- 1,000 hours (Federal Standard Baseline) = 1.2 years
- 10,000 hours (Typical ENERGY STAR CFL) = 11.9 years
- 15,000 hours (interim proposal for LEDs) = 17.9 years
- 25,000 hours (Typical ENERGY STAR LED) = 29.8 years

All efficient product options (CFL, value line LED, and ENERGY STAR LED) ***far exceed*** the federally mandated baseline product as established in the EISA legislation. Additionally, the 25,000 lifetime hour (≈30 years!) of a current ENERGY STAR LED far exceeds the consumer expectation for a commodity good.

It is useful to keep in mind that consumers are extremely sensitive to the first cost for commodity purchases such as light bulbs and although higher price linked to longer lifetimes might be an important consideration for some (even most) consumers, extremely long lifetimes (over 15 years) do not generate a commensurate price premium. An interesting illustration that indicates consumers' sensitivity to first cost (and willingness to forego longer lifetimes for a lower cost) is evident in the recent availability of an extraordinarily short lifetime LED product at a Lowe's location in western Massachusetts documented last week (see Figure 2). This 2,000 hour (*yes, 2,000 hour! – not a typo*) house branded product has a retail price of $0.99 per bulb in a high profile, off-shelf opportunity within a territory where there is an active residential lighting program.

Figure 2: Extremely Short Life LEDs



Not to pick on a particular retailer, manufacturer, or house branded product, but this speaks volumes about how consumers purchase light bulbs. This is an extremely attractive price point for a technology that consumers are interested in (or curious about), and from the product placement alone, it would seem that retailers/consumers are not concerned that it isn't a long-life product. There are other less extreme cases of this kind of shorter lifetime product in the market (e.g. 5,000 hour LEDs). It seems clear

that ENERGY STAR will want to differentiate from these shorter life products, but the key question is: how much differentiation is needed?

A final, but VERY important point regards the importance of lighting product lifetimes to efficiency program sponsors. As we have mentioned previously, product lifetime savings are critically important for assessing the cost effectiveness of promoting a given product, HOWEVER, nearly all efficiency program sponsors across the U.S. have filed and are trying to attain ANNUAL savings targets. Given that most lighting products are highly cost effective, even at 10,000 hours, program sponsors (ENERGY STAR Partners, in most cases) are much more sensitive to considerations that affect their ability to achieve annual savings goals (e.g. the inclusion of low cost – to consumers – efficient products).

LUMINOUS INTENSITY DISTRIBUTION REQUIREMENT

There is no doubt that luminous intensity distribution is an important criterion to have for LED bulbs. The industry is in strong agreement that some of the early LED designs for "non-standard" bulbs did not adequately meet consumer preferences and satisfaction. However, LED bulb designs have greatly advanced from those early iterations, and generally speaking, the luminous intensity distributions for today's value line LED bulbs are much more consistent with full omnidirectional performance.

Unfortunately, it simply is not known what the average consumer's tolerance is for deviations from full omnidirectional performance for these kinds of lighting products. We have not seen a single piece of research that details consumer satisfaction with the luminous distribution of this current generation of value line LED products compared to ENERGY STAR LEDs.

ENERGY STAR has indicated that most ("all but one") of the value line LED products reviewed meet the draft 3 (+ interim proposal) requirements for luminous intensity distribution.[1] We have not been able to confirm exactly what models were reviewed by ENERGY STAR to verify that the models are *truly* value line LEDs (retail price: $1.50-$2.75/bulb), but are hopeful that the products reviewed by ENERGY STAR do, in fact, represent a reasonable selection of value line LEDs.

It is also our hope that key LED manufacturers (e.g. GE, Philips, TCP, Sylvania, CREE, etc.) will offer detailed comments on the feasibility of value line LEDs meeting this luminous intensity distribution requirement for the ENERGY STAR v.2.0 specification. From our conversations with industry partners, it seems unlikely that manufacturers will invest substantial effort and dollars into refining value line LED products to meet the v.2.0 ENERGY STAR lamp specification.

RECOMMENDATIONS

First and foremost, we believe that it is ESSENTIAL that there be an ample selection of low cost (retail price: $1.50-$2.75/bulb) light bulbs that meet the ENERGY STAR v.2.0 Lamps specification.

[1] EPA Response to Q&A on Thursday, November 12, 2015, 1PM teleconference. See: http://www.energystar.gov/sites/default/files/Chat%20comments%20received%20during%2011-12%20Lamps%20V2.0%20stakeholder%20call.pdf for questions.

To this end, we suggest reducing the lifetime requirement to 10,000 hours for all bulbs in the v.2.0 specification. We recognize that this is a significant reduction from the current 25,000 hour LED lifetime requirement in the v.1.1 specification. We have outlined several important considerations and complications around bulb lifetimes in the section above. Let us simply say here that an ENERGY STAR specification that exceeds the current federal standard by 10 times is more than adequate to identify high performing product and given the other market and efficiency program considerations, this is a smart decision for maintaining the relevance of ENERGY STAR.

Although we do not have a firm recommendation on modifying the current luminous intensity distribution requirement, we strongly urge ENERGY STAR to engage with manufacturer partners on this issue particularly (exclusively, even) in terms of how it will affect their ability to provide low cost LED products (retail price: $1.50-$2.75/bulb) to the U.S. market.

IF, manufacturers indicate that the luminous intensity distribution requirements for LEDs are infeasible for value line LED products, we urge ENERGY STAR to relax the requirements in whatever fashion necessary to ensure that value line LED products meet the v.2.0 specification.

REFERENCES

Craigo-Snell, Seth (2014). “Where Are We Headed? A Road Map for Efficient Products.” Proceedings of AESP’s 24th National Conference and Expo. San Diego, CA: AESP.