O W E N H O W L E T T
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Richard,

I'd like to submit some comments on the draft energy star standard for SSL luminaires. I think the draft standard is well drafted and I think the division into near-tern niche application and longer-term efficacy-based performance is a great idea. However, many of the performance specifications would allow SSL luminaires to be siginficantly less efficacious than CFL, linear fluorescent or metal halide luminaires while still claiming energy star compliance. My main areas of concern are:

1. The niche application for recessed downlights. In 2002 while I was working at the Lighting Research Center, I conducted a survey of commercial downlights to evaluate typical efficacies. The results were used in the LRC's development of lighting metrics for the EPA. The graph attached shows the efficacies (lm/W) of commercial downlights (on the vertical axis--ignore the horizontal axis). From the graph you can see that commercial specular downlights (shown as blue dots on the graph) come in around 35-40lm/W, i.e. higher than the 33 lm/W proposed for commercial SSL luminaires. The other types of fixture (other colored dots) are less relevant because they use additional optics such as baffles, and a SSL luminaire would also need to use baffles or optics to achieve the same appearance. Also, why is the color rendering requirement for commercial downlights set at only 70 CRI? The overwhelming majority of commercial lamps are over 80 CRI because the market doesn't accept color rendering as low as 70. It would be pretty foolish to allow the energy star label to appear on a luminaire that gave poor color rendering--it would be repeating the same mistakes as were made early on with CFLs, i.e. pushing a substandard technology too hard and giving it a poor reputation among purchasers, thereby reducing sales. Since the Category B (Efficacy-based performance) requirement is 80 lm/W for indoor luminaires, it would be consistent to stick with that figure for commercial downlights too.

I guess that the required minimum values for lumens, or lumens per lineal foot are aimed at ensuring that purchasers actually get a useful amount of light out of the SSL fixtures, and are therefore happy with the outcome. It would seem sensible to ensure the same for color rendering.

2. Why is there a requirement for downlights that 85% of the lumens should be delivered within the 0-60 zone? I guess it's for the same reasons as the minimum lumen requirements, i.e. to ensure a useful amount of light. However, in this case the requirement is highly detrimental to the cause of SSL luminaires, because it acts directly against lighting quality and also against overall lighting efficiency. There have been any number of research studies that show that if light is distributed more evenly around a room (i.e. on the walls and ceilings instead of just the working plane), then fewer lumens can be used to achieve the same overall brightness effect, and the occupants prefer a more even spread of light to the more focused effect from concentrated downlights. Did the group drafting the standard include any lighting designers or lighting quality researchers? If so they should have caught this, it's a 101 issue in lighting design.
Btw I think the requirement for X% of lumens within Y zone is entirely appropriate for the other luminaire types in the standard.

3. The efficacy standard for category B (efficacy based performance) is clearly too low. A T8 or T5 HE lamp produces around 100 lm/W with pretty much zero lumen depreciation, and most linear fluorescent fixtures have an efficiency of 65-75%, though suspended fixtures can top 90%. So why do SSL luminaires only have to effectively meet a 60% requirement? (i.e., 60lm/W).

4. I think it might be advantageous to include another niche category, for low-power spotlights, i.e., for retail lighting or architectural lighting.
Current best-practice is ceramic metal halide at 80-105 lm/W, but the spotlight fixtures are only around 45-60% efficient, so SSL could justifiably achieve say 45 lm/W and yet match metal halide in this application. This is a much bigger market than any of the other "niche" applications except recessed downlights.

Overall, I would expect that an ENERGY STAR requirement for SSL should set a higher standard than is currently required for light fixtures, rather than a lower one. I think we're all on board with wanting to support the market for emerging SSL fixtures, but there's also an imperative to support the energy star as a brand, and I think that the current performance requirements in this draft standard are quite compromised and may lead to devaluation of the brand.

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(See attached file: downlight efficacies.doc)