



NRDC Comments on ENERGY STAR's Draft 1, Version 1.0  
Light Bulb Specification

Submitted by:

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On behalf of the Natural Resources Defense Council (NRDC) and its more than 1.3 million members and e-activists we respectfully submit our comments on ENERGY STAR's Draft 1 Product Specification for light bulbs that was issued on October 21, 2011. NRDC is supportive of the direction EPA has taken in developing a single specification for energy saving light bulbs and we agree with the specification's focus on the various performance/quality issues that have the potential to be consumer "dissatisfiers." Consumers need to be satisfied with the way their energy efficient light bulb performs (e.g. bright enough, good light quality, sufficiently fast enough run-up time, good dimming, long life, etc.) in order to realize the massive remaining energy-savings potential for lighting. Broad availability of bulbs that meet the new ENERGY STAR requirements should result in dramatically improved consumer experience and a much higher success rate than today's unsatisfactory situation where 3 out of 4 sockets still contain an inefficient bulb.

NRDC is in agreement with nearly all of the details of the proposed specification and we provide in our comments some suggested additions/edits to the specification and supporting rationale for moving forward with key portions at currently proposed levels of stringency. The topics we highlight in our comments below include:

- Establishing requirements and testing on the whole bulb
- Minimum Lifetime
- Dimming
- Rapid Cycle Switching/Stress Test
- Toxics (Hg)

- Run-Up Time
- Color
- Power Factor
- Creation of a ENERGY STAR Most Efficient specification and label

**1. *Base requirements and associated testing on the entire light bulb, not just the key components***

The ENERGY STAR specification for luminaires (more commonly referred to as fixtures or lamps by consumers) is based largely on the performance of critical components that get placed inside a luminaire. In simple terms, a luminaire qualifies as meeting ENERGY STAR if the stand-alone components are shown to meet the specification requirements.

Some of the early requirements and test methods for LED bulbs only addressed the performance of certain components or packages referred to as the “light engine.” While a light engine might be very efficient and perform well over time by itself, its initial performance and that over time may change dramatically once it is enclosed within a light bulb. The performance of an LED bulb for example could degrade dramatically over time with product designs that do not properly manage the heat.

The proposed bulb spec as drafted is based on the whole bulb and we urge EPA to maintain that structure as it finalizes its specification.

**2. *Maintain the minimum bulb lifetime of 10,000 hours as proposed.***

NRDC supports setting the minimum rated lifetime for ENERGY STAR bulbs at 10,000 hours as proposed.

This results in an increased lifetime requirement for CFLs from the current requirement of 8,000 hours. During its presentation at the November stakeholder roundtable, EPA demonstrated the existence of numerous CFLs currently on the market that already meet this higher level. In addition, the longer life provides an added benefit of reducing the overall amount of mercury used to produce CFLs.

While many LEDs on the market today claim to offer 25,000 or more hours of life, NRDC supports EPA’s proposal to only require 10,000 hours of life. Our rationale is two-fold:

a) LED bulbs are in their infancy and future bulbs are likely to offer even better performance, be more efficient, and have much lower prices. As such, we think consumers and society may not be best served by locking into today's LEDs bulbs for up to 25 years, when greater energy savings would be achieved by the next generation of bulbs that will become available within the next few years.

b) A minimum lifetime level at 10,000 hours also opens up the door for new LED designs to enter the market at significantly lower price points, yielding the potential for significant incremental energy savings in the near term. Some manufacturers and component suppliers have stated that they can reduce the number of LEDs (the most expensive part of the bulb) used in the bulb if they raise the current and drive the LEDs "harder". While this would shorten the bulb life, the consumer would still receive no less than 10 years of service ( at 3 hours per day) for an ENERGY STAR qualified LED bulb and it could be much more affordable than today's 25,000 hour rated offerings.

Availability of such products could be a big win not only for the environment but for those consumers who were unwilling to buy a CFL due to misconceptions about light quality, poor dimming, or exaggerated concerns about their mercury content, and are now willing to move up to a LED at this new, reduced price point.

While several LED manufacturers expressed their concern about lowering the lifetime requirement for LEDs, we believe it is important at this time to allow shorter life and lower cost LEDs to enter the market. As we stated during the meeting, manufacturers may of course continue to produce ENERGY STAR qualified LED bulbs that have lifetimes of 25,00 hours and beyond.

### ***3. Add dimming performance requirements for bulbs marketed as dimmable.***

The typical CFL sold today does not dim, and the few that are marketed as dimmable may not dim well on most dimmers. While most LED bulbs are sold as dimmable, their dimming performance is also highly variable. NRDC is pleased to see that EPA plans to add dimming requirements for those bulbs marketed as dimmable. (Note - The current version of ENERGY STAR has no additional requirements for dimmable bulbs and all testing for dimmable bulbs is done at full light output.)

NRDC recommends ENERGY STAR promptly develop dimming performance requirements that would require dimmable bulbs to:

- Dim down to a minimum light output level, somewhere around 10%.
- Dim without noticeable hum or flicker
- Re-strike from dimmed position

In addition, using dimmable bulbs in the dimmed position should be shown not to adversely impact lamp life or accelerate lumen depreciation. Additional research

should be done to assess if this issue exists and if so, dimmable bulbs should also be tested at a common dimmed position, perhaps 50%, in addition to full light output for long term performance.

While there is currently no consensus performance specification or test method for assessing dimming performance, we think these materials can be developed rather quickly and that EPA should not delay this portion of the specification till an “official version” arrives. Organizations like NEMA have been working on this for a long time and it does not appear that they will have a usable product anytime soon. As such we encourage EPA to create a small group of interested stakeholders to quickly develop a set of dimming requirements and test methods. NRDC is poised to participate in such a group. This group, with technical support from an independent group like the Lighting Research Center, can work through the details such as what dimmer(s) to use during the test and how to measure flicker, etc. and test drive the methodology in the lab on selected products.

**4. Increase rapid-cycle stress test requirements as proposed.** – There are many anecdotal complaints that CFLs do not last anywhere close to the advertised 5 to 10 years of rated life ( at 3 hours use per day). We believe many of these cases of lamp failures are due to the cumulative effect of switching the lamps on and off.

The current version of ENERGY STAR only requires lamps to survive a number of cycles equal to half the bulb’s rated life (e.g. a 6000-hour rated lamp must survive at least 3000 cycles). Some bulbs, such as those used in the bathroom or kitchen, can easily be switched on five to ten times per day, which translates to up to 3650 cycles per year. (The number of on/off cycles is likely to be even greater in those residences with multiple occupants.) In such cases, it is conceivable that an ENERGY STAR qualified bulb could fail after just one year of operation due to cycling. As such, we think it is critical to raise the minimum number of cycles a bulb must survive as a means to discourage the use of inferior, less expensive components.

EPA has proposed tightening the requirements for rapid cycle in two ways: require 9/10 lamps to survive the cycling test and double cycling rate to once for every hour of rated life. We strongly support EPA’s proposal and urge them to move forward without any relaxation of their proposal.

**5. Move total lamp mercury levels down to 2.5 mg and add additional verification requirements to the qualification process** – NRDC strongly supports EPA’s proposal to bring down total mercury content from 5 to 2.5 mg per bulb. This reflects current market conditions where many long-life ENERGY STAR qualified bulbs already meet the lower 2.5 mg requirement. This is a guaranteed low cost means to remove 50% of the mercury contained in new CFL bulbs, as opposed to recycling programs that have very high mercury capture costs and low participation rates.

The current draft of the specification does NOT however require manufacturers to provide any type of “evidence” or documentation that their bulb meets the mercury limit. This seems wildly inconsistent with the other parts of the specification that require extensive testing for a wide array of parameters including how many tenths of a second it takes for the lamp to turn on. We strongly recommend EPA require additional documentation as part of the product qualification and review process governing the bulb’s mercury content. This could consist of required submissions of lab reports of the pellet’s mercury levels and invoices tied to their purchase, and documentation on the manufacturer’s dosing process including a digital photo and purchase order of the automated dosing equipment the factory is using.

#### ***6. Tighten the bulb “run-up time”***

One of the remaining barriers to greater CFL usage is the fact that they take an unacceptably long time to come to full brightness. This is often manifested by consumers as “CFLs are too dim when you turn them on.” We support EPA’s commitment to shorten the allowable run-up times. As the consumer frustration is most acute during the first 30 seconds or so, we encourage EPA to further explore the performance of CFLs on the market and see if it is feasible to move the requirement at 30 seconds from 50% light output, to a higher value around 65 to 70%.

#### ***7. Strive to get “color” right***

Many of us have heard consumers complain that they don’t like the “color” of the energy saving light bulbs and/or that the color of the same type of bulb (e.g. same color temperature) can vary significantly in the recessed cans in their ceiling.

EPA seems to be headed in the right direction on these issues by:

- a) Requiring minimum CRI of 80. We would like EPA to explore the feasibility of raising the CRI to 85 or 90 over the long term, with an effective date for the higher CRI of 18 months after the initial effective date of the overall specification.
- b) Establishing CCT temperatures and meeting minimum numbers of McAdam ellipses or quadrangles.
- c) Adding minimum R9 requirements

We encourage EPA to vet their proposals with research institutions such as LRC, CLTC and PNNL, all of whom are recognized independent experts in this area.

#### ***8. Raise power factor requirement to 0.9 for LEDs***

There are various parts of the specification that provide different requirements or test methods for CFLs and LEDs. As LEDs utilize digital solutions, it is easy for manufacturers to integrate high power factor solutions ( $\geq 0.9$ ) directly into their driver circuits at little to no incremental cost. There are multiple integrated circuit vendors and technology available for lamp manufacturers to choose from and we think it's the right thing to do for the grid to ensure LEDs establish high power factor as a core feature as this technology matures.

We also support EPA's proposed increase of PF to 0.7 for CFLs.

**9. Maintain lumen equivalency claims guidance in the ENERGY STAR specification** – The current version of the ENERGY STAR CFL specification includes a table that governs the types of claims manufacturers can make when making a comparison to existing incandescent bulbs (e.g. 25W = 100 W, or 100W replacement). NRDC strongly recommends EPA continue to maintain its current policy on this topic.

This is even more relevant today because the FTC's revised light bulb package labeling regulations do NOT include lumen equivalency claims. Without this, some manufacturers will undoubtedly make exaggerated claims regarding their bulbs (e.g. incorrectly claim a LED bulb that gives off only 690 lumens to be a "replacement" for a 60W incandescent even though 60W incandescents give off at least 800 lumens.).

***10. Consider establishing an ENERGY STAR Most Efficient Specification and Label for light bulbs***

ENERGY STAR has a very successful pilot program underway that provides retailers and consumers the means to identify the truly most efficient products on the market. As part of its program, EPA has developed specifications that exceed the core requirements for ENERGY STAR for selected product categories like TVs and air conditioners and qualified models earn the designation ENERGY STAR Most Efficient 2011.

As the proposed ENERGY STAR specification does not include rigorous requirements for some key parameters such as efficacy, lifetime, CRI, etc, we think it would be a valuable tool for EPA to create a "reach" spec for light bulbs that manufacturers could strive and interested utilities could offer an increased rebate.