



NRDC Comments on ENERGY STAR's March, 2011 Light Bulb Specification Framework

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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 to ENERGY STAR's March, 2011 Product Specification Framework document for light bulbs. We support EPA's efforts to create a single set of requirements for energy efficient screw based light bulbs. In our comments below we provide some background on the issues involved, provide responses to the questions posed by EPA in its framework document, and list a few instances where separate requirements for CFLs and LEDs remain warranted regarding performance levels and/or test methods to be used.

Background

ENERGY STAR currently has separate specifications for CFLs and for integral LED light bulbs and is attempting to create a single "technology neutral" specification to be applied to any type of light bulb regardless of the technology the bulb is based on. While this idea makes a lot of sense philosophically, there may be some cases where different test methods or requirements may continue to be justified.

We also want to point out the fact that the CFL and LED product categories are in very different places in terms of their market maturity. Screw based CFLs have been on the market for more than 20 years and today's bulbs are dramatically better than the earlier versions (instant on, no hum/flicker, much smaller and fit in almost all sockets, etc.). There has been an ENERGY STAR specification for CFLs for more than 10 years now and the specification not only includes that the bulb be energy efficient but also includes several critical performance requirements to help ensure the consumer has a "good experience". In addition, ENERGY STAR CFLs have very high market share, most likely in excess of 90% of CFL sales in the US.

One piece screw based LEDs however are just beginning to enter the market and today there is limited to no available product for bulbs that deliver greater than 900 or so lumens. As such today's LEDs are only able to provide as much light as the traditional

25, 40 and 60 Watt incandescent bulbs. Recent testing done by DOE's Caliper program has shown that: a) there is a wide range in performance of similar LED product offerings; b) some products are making exaggerated performance claims in terms of their light output, lumen equivalency (e.g. replaces a 60W bulb or as bright as a 60W bulb), life time, etc.; and c) dramatic efficiency gains and lumen maintenance improvements were observed over the past 2 years for the LED products tested.

In developing our comments, we provide the following high level recommendations/observations:

1. In order to achieve the greatest overall energy savings, ENERGY STAR should place greater emphasis on improving CFL quality and performance than on significantly increasing CFL efficiency levels

There is very little difference in the energy use of similar CFLs, ENERGY STAR labeled or not. For example, CFLs that are intended to replace today's 60W bulb typically use between 13W and 15W, yielding a savings of 45W to 47W per bulb. While ENERGY STAR should consider further tightening of the efficiency requirements in its specifications, it's important to recognize that this will yield very little incremental energy savings. (The big savings occur from moving from an incandescent light bulb down to a CFL.) We think a higher priority is for tomorrow's ENERGY STAR qualified CFLs to perform better and meet currently unfulfilled consumer needs. Areas where CFL performance can be improved include: bulbs that come to full brightness more quickly, can dim without noticeable hum or flicker, have lower mercury levels, and do not fail prematurely. Once ENERGY STAR rated CFLs address these current performance issues, CFLs sales and adoption should increase dramatically and yield much greater savings than would be achieved by simply tweaking the spec by a few lumens per watt (LPW).

While an upgraded specification may result in a lower % of CFLs qualifying for ENERGY STAR in the future, NRDC believes this is a satisfactory outcome. Once in effect, new ENERGY STAR labeled CFLs will provide the means for consumers to easily distinguish the better performing CFLs on the market.

2. As LED light bulbs are a relatively immature and rapidly evolving category we think the focus of ENERGY STAR requirements for LED bulbs should focus on ensuring the consumer has a decent experience and not for the ENERGY STAR spec, in the near term, to represent the very best LED bulb on the market.

We can expect a flurry of new LEDs to be introduced at all price points. Some of these bulbs will perform well and others will be very dim, have very poor lumen maintenance, be perceived as having poor "color" (bluish light when the consumer wanted more yellowish light). We believe, the near term goal is to develop a tool that will help ensure consumers have a good experience with LEDs and want to come back for more. As the LED category matures, ENERGY STAR should then promptly ratchet up its requirements accordingly. We need to avoid repeating the costly mistakes that

were made during the introduction of CFLs that resulted in heavy promotion and sale of inferior CFLs. This caused huge consumer backlash and 20 years later we still need to remind people – *It's OK to buy this new CFL, its nothing like the one your Dad used to have.*

Again, we think it's more appropriate at this time for the LEDs to work well rather than deliver the absolute lowest energy use possible. As LEDs become more efficient and the bulb designs are improved and better performing, ENERGY STAR should revise their specifications. For example, while today it might be appropriate to set the efficiency part of the ENERGY STAR specification for LED bulbs equivalent to those for CFLs, we are probably looking at a future where LEDs may soon draw 10 to 30% less power while CFLs only see little incremental improvement. At that point we think the efficiency requirements should be tightened for LEDs, while still maintaining the efficiency levels for CFLs at near current levels. Otherwise ENERGY STAR will essentially eliminate CFLs from being able to qualify in the future and retailers and consumers will no longer have an easy way of identifying the “good” CFLs from inferior offerings.

Topic Specific Comments

1. Expand scope to include more bulb shapes and bases – We think the scope should be for all one piece lamps that have integral ballasts/drivers. In lay language we are looking at “drop in” replacement lamps that go into today’s fixtures.

We encourage ENERGY STAR to use as a starting point a scope that includes lamps of all bulb shapes. The fact that a lamp is pear shaped, has a bulge in the middle, etc should not impact the requirements. We do not see any reason to restrict eligibility to a set of limited bulb shapes contained in a list of ANSI specifications. We can easily expect some new lamp shapes to emerge as LED technology evolves.

We also encourage ENERGY STAR to include bulbs with different socket configurations. The fact that a bulb has a medium, intermediate or candelabra screw base should not limit the product’s ability to qualify for the program.

We also recommend the specification include both omni-directional and directional types of light bulbs, and both “bare” and “covered” bulbs. Where necessary, EPA can establish different requirements for these types of bulbs (e.g. have slightly less stringent efficiency requirements for covered bulbs.)

2. Consider Adding Bulb Size Requirements – One of the initial barriers that restricted early CFL usage was their size. One simply couldn’t get the bulb to fit within existing fixtures and/or it stuck out of the lamp shade. ENERGY STAR should consider setting maximum allowable size dimensions in its specification. This will help ensure the consumer is able to fit the bulb into their existing sockets and fixtures. A good starting point is the dimensions of today’s incandescent light bulbs. While it is not

prudent to require an exact match to the pear-shaped incandescent light bulb, the new bulb should ideally not significantly exceed the length of the incumbent bulb nor should it be significantly wider at its widest point.

ENERGY STAR should review the proposed size limits contained in the California Super Bulb spec and those in DOE's L Prize competition.

3. Establish Similar Efficiency and Minimum Lifetime Requirements for CFLs and LEDs in this Version of the Specification – As stated previously we are comfortable with the first version of the proposed combined specification to set identical life time and efficiency requirements for both CFLs and LEDs. We are likely to see dramatic improvements in LED efficiency but only very small future improvements for CFLs. As such future revisions may result in different efficiency levels for different technologies.

Regarding bulb life time, it's probably bad policy to require new LEDs to achieve state of the art lifetimes, say 25,000 hours or more, at this time. First of all, one probably should not require today's LEDs to last so long if the new LEDs brought to market in the near future uses 30% less power and have superior performance. (To the extent a manufacturer is currently able to achieve much longer life than ENERGY STAR requires, they can use that advantage in their marketing.) We also think it's more important at this stage of their introduction for consumers to "like" their LEDs than for them to perform poorly but last a long time.

4. Reduce the "Run-up" Time –While the shift towards electronic ballasts has eliminated the frustrating delay and blink, blink that consumers experienced with older CFLs, most of today's CFLs continue to take several minutes to come to full brightness. Different lamps have different run-up profiles, with the most problematic being those lamps that give off very little light during the first 30 seconds or so when a consumer first walk into a room.

It is our understanding that recently redesigned CFLs should be able to have much faster run up times than the current ENERGY STAR requirements of reaching 80% of full light output within 1 or 3 minutes, depending on the form of mercury used. As a starting point, we believe ENERGY STAR should seriously consider adopting the levels developed by California utilities and the California Technology Center in their 2009 Super Lamp specification:

- 50% of full stabilized light output in <30 seconds, and
- 80% of full stabilized light output in 45 seconds.

We think the one second start time value is sufficiently fast and no further revision is needed at this time.

We are not sufficiently familiar with the run up profiles of LED bulbs on the market today. If their profile is dramatically better than for CFLs, a tighter requirement for LEDs could be justified to lock in a “floor” for run up time for LED ENERGY STAR qualified bulbs.

5. Add a Section on Dimming to the ENERGY STAR specification – The vast majority of CFLs sold on the market today are not dimmable and in some cases installing them in dimming circuits can result in poor performance and shortened life time. Many of the dimmable CFLs that are available do not dim well and suffer from one or more of the following – narrow dimming range, color shift when dimmed, noticeable hum or flicker. While most LEDs that are being introduced to the market are dimmable, their dimming performance is also not always satisfactory. A further complicating factor with both CFLs and LEDs is that dimming performance can vary dramatically depending upon the dimmer that is used.

NRDC has a two pronged recommendation for ENERGY STAR concerning dimmers:

a. Require all bulbs to be “dimmer safe”. Dimmer safe means a CFL or LED would have the appropriate circuitry to ensure the bulb’s lifetime is not significantly shortened when operated in a dimming circuit. Scientists at the California Lighting Technology Center (CLTC) can provide further advice on this topic.

b. Establish minimum dimming requirements and testing protocols for those bulbs that are marketed as being dimmable. The guts of a specification include requiring the bulb to have smooth and continuous dimming down to at least 20% of rated light output, without noticeable hum or flicker. There can also be additional requirements regarding acceptable color shift when dimming. ENERGY STAR should also specify a set of widely available dimmers which the testing must be performed with. PNNL has extensive expertise in this area and can provide further guidance.

Although a formal test method does not currently exist, we think ENERGY STAR should publish their requirements and issue an interim test method regarding dimming performance. Over time the test method can be upgraded and replaced with a more refined version adopted by a leading standards organization.. While the industry trade association NEMA has a task force working on this issue it appears their solution is to simply produce a list of dimmers which the bulb is deemed to be compatible with. We do not think this approach is sufficient or user friendly as most consumers have no idea what the model number of their dimmer is.

ENERGY STAR will also need to revise its testing requirements for dimmable products and require testing for lumen maintenance and interim life testing at not only 100% of light output but also in a commonly dimmed position (e.g. 50% of rated power or light output) .

6. Establish common terms for light appearance (color temperature ranges) – There is a lot of consumer confusion regarding color temperature. Marketing terms

such as natural light, day light, soft white, cool, warm etc exist. We think consumers and the market would benefit by creating a set of uniform terms and applying consistent definitions. This work would complement the new disclosure requirements on the FTC label regarding color temperature.

7. Lower Mercury Level to 3 mg - The amount of mercury contained in CFLs has come down dramatically in the past few years. Many of the products on the market today are down to 3 mg of total mercury, with some models down in the low 2 mg range. We recommend ENERGY STAR move its requirements from 5 mg down to 3 mg. A more comprehensive approach would be to require lead free glass and solder and address other toxics by adopting the most recent revision of the European ROHS regulations.

8. Raise Power Factor to 0.7 – In developing the Super Lamp spec, manufacturers indicated that it was relatively easy to increase the power factor from 0.5 to 0.7, and that the incremental cost/challenges from going from 0.7 to 0.9 were significant. As a compromise position, NRDC recommends adoption of a 0.7 power factor.

9. Increase the Stringency of the Rapid Cycle Stress Test.– The off the shelf testing done by PEARL has shown a consistent 20% failure rate (1 in 5 tested models failed) for the rapid cycle stress test. We have heard numerous anecdotal complaints about premature lamp failure and some of those are likely due to the use of inferior, lower cost components that fail due to rapid switching. We believe the number of cycles used in the ENERGY STAR specification for rapid cycle should be increased. Today a lamp rated 8000 hours must survive 4000 cycles (30 seconds on, 30 seconds off). In some frequently visited rooms such as the bathroom it's not uncommon for the bulb to be switched on and off, at least 15 times a day. For an 8000 hour rated lamp, the bulb would only be required to survive 267 days, which is far shy of the 5 year type lifetime that CFL owners expect.

We think at a minimum this part of the spec should be revised such that the lamp must survive an amount of cycles equivalent (not 50%) to its hours of rated life.

In addition, we recommend EPA remove its “marginal failure” compliance path for rapid cycle. Rapid cycle requirements are well justified and the requirements are clear. Compliance and enforcement for this parameter should be equally stringent as other parameters.

10. 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 – manufacturers are not required to make lumen equivalency claims but if they do their claim must comply with the minimum lumen values contained in the table.

While FTC has revised its light bulb package labeling requirements, their regulations do NOT include lumen equivalency claims. As such we think it's important for ENERGY STAR to maintain its policy for the products covered by this specification and that their rules are not "pre-empted" by FTC. 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.)

11. Review and Update Efficacy Requirements for Covered and Reflector Lamps

The current version of the ENERGY STAR CFL spec contains significantly lower efficacy levels for CFLs that have an outer cover on them, such as spiral CFLs that have a pear shaped enclosure on them to appear like a conventional incandescent light bulb. While the cover will prevent some of the light from getting out, we believe many of the products on the covered ENERGY STAR models on the market today significantly exceed (e.g. beat) the efficacy requirements in the spec. We encourage EPA to review the data and revise the efficacy levels accordingly.