

# NRDC Feedback on ESTAR DRAFT LIGHT BULB SPECIFICATION



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# Overall Philosophy

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- Roughly 3 out of 4 times consumers still pick inefficient bulb
- Goal – ensure consumer has good experience with energy saving light bulbs AND comes back for more

# Overall Philosophy (cont.)

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- ESTAR Does **Not** Need To:
  - Signify the very best bulb on the market today
  - Squeeze out the last few incremental watts of savings

# Test the Whole Enchilada

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- Critically important for testing to be done on the whole bulb
- Do not allow qualification to be based on test results of stand alone components.
- Good “guts” (light engine) does NOT ensure good whole bulb performance, especially over time.

# Verification Testing Critical

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- Program needs strong “Off the Shelf” Testing and Enforcement
- Want to ensure bulbs perform as promised – both out of the box and over time
- Data must be made publicly available and EPA needs to act on a timely basis
- PEARL experience shows numerous examples of ESTAR qualified CFL bulbs that failed off the shelf testing

# Energy Star – Most Efficient

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- NRDC also recommends creation of “ENERGY STAR - Most Efficient” specification for light bulbs
- Provides target and way to identify the best on the market. If EPA doesn’t do this the utilities will likely create their own.
- Appropriate place to set:
  - Longer lifetimes
  - Tougher efficacy (more energy savings)
  - Higher CRI

# Topical Input

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- Lifetime
- Dimming
- Switching/rapid cycle
- Run-up time
- Toxics – Hg
- Color
- Power Factor

# Lifetime

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- NRDC OK with 10,000 hours as a floor
  - Raises bar for CFLs (also reduces life cycle Hg)
  - Opens door for lower cost LED options in near term
  - Manufacturers still able to claim higher lifetime if they can back it up

# Dimming

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- Do NOT require all ESTAR bulbs to be dimmable
- DO require ESTAR bulbs that are marketed as *dimmable* to meet additional requirements

# The Goal – Decent Dimming

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- Bulb should provide decent dimming with most commonly installed dimmers without noticeable hum or flicker, or gross color shift
- Dimming should not significantly shorten bulb life

# Reality

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- Dimmable bulbs will not dim/dim well with every dimmer
- NEMA and others working on this for a long time
- We can't keep waiting – lets start with something simple and build upon it

# Dimming -Issues to Address

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- **Impact on lifetime/lumen maintenance?**  
**Must add testing requirements in dimmed position (say 50% dimming)**
- What dimmer to test with? Pick 2 or 3 most common/biggest sellers
- How to spec/measure: hum/flicker – Is qualitative OK for now?

# Dimming -Issues to Address

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- How much dimming is needed at a minimum (down to 20% of light output or rated power?)
- Test circuit – test dimming performance with one bulb and one socket, or a more complicated circuit (eg – 3 sockets and 3 of the same bulb, etc.)?
- Reach out to PNNL ( L Prize and Caliper experience) and CLTC for their expertise

# Longer Term Dimming Oppty

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- New dimmers – come up with specification for “universal” dimmer (e.g., max rating for new dimmer 50 or 100 W) that will work with all new low power bulbs

*Can build this into new luminaire spec, E-Star homes, building codes, LEED, etc.*

# Premature Bulb Failure

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- Heat build up – bulb fails and/or significant degradation in light output
- Electronics fail – due to cumulative impact of on/off switching

# Rapid Cycle

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- Some bulbs in the home turned on/off 5-10 times/day (1825-3650 cycles/yr)
- Old ESTAR – survive one cycle for every two hours of rated life (e.g., 3,000 cycles for 6,000 hours bulb).  
TOO LOW.
- A 5-year bulb would need to survive ~ 9,000-18,000 switches
- New proposal – one cycle for each rated hour – NRDC STRONGLY SUPPORTS THIS UPGRADE – WILL DISCOURAGE CHEAP/SHODDY ELECTRONICS

# Run-Up Time

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- Key remaining barrier for CFL acceptance
- **STRONGLY** support increased stringency as proposed
- Consider tightening first 30 seconds requirement from 50% to 65% of full light output

# Color Stuff

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- Color consistency of similarly labeled bulbs important – especially down lights and specialty lamps.
- CRI – opportunity to render colors more realistically. 85 to 90 is achievable for LEDs with sufficient lead time (perhaps have initial requirement and higher requirement 12 months later)

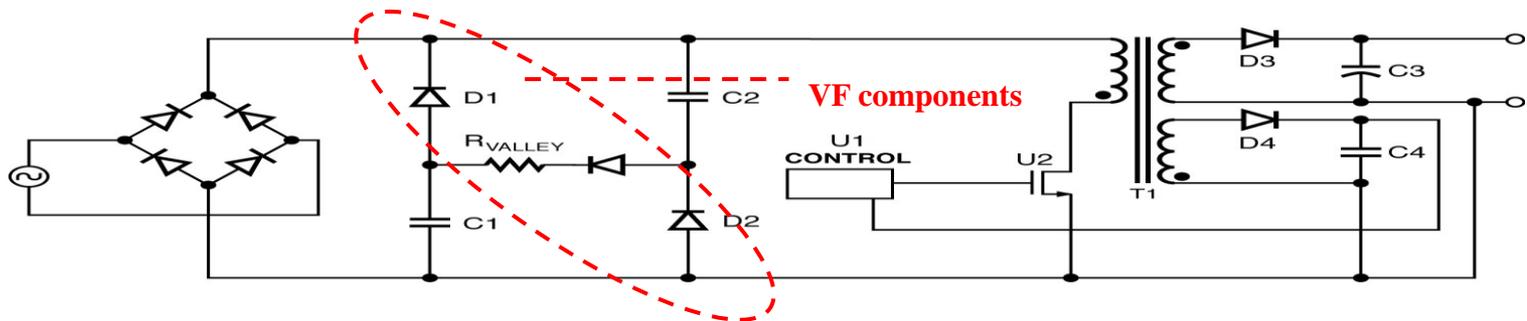
# Mercury

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- Support move from 5.0 mg down to 2.5 mg
- Recommend submissions of chemical analysis of Hg “pellets” to document compliance with mercury content
- **BENEFIT** – equivalent to recycling 50% of new CFLs

# Power Factor

- NRDC Recommends 0.9 power factor for LED bulbs and 0.7 for CFLs
- Many 0.7 PF solutions use an outdated “Valley Fill” design which use high voltage electrolytic capacitors. This component is often the source of failure in LED driver circuits



# Lets Get PF Right From the Beginning for LEDs

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- Reduces utility costs
  - Lowers distribution grid power loss
  - Minimizes distortion on the AC distribution network
- Can result in more reliable LED bulbs
- Low cost, High PF LED driver Integrated Circuits (IC) available from multiple IC vendors
  - All use widely available technology
  - PFC implemented in the driver chip