

R-5: High-Efficacy Lighting (R202)

Summary: Redefine "high-efficacy" to acknowledge the marketplace penetration of LED lamp technologies. The availability of LED lamps is growing rapidly and prices are falling just as quickly. This proposed change attempts to increase the lighting efficiency in homes by encouraging higher efficiency Light Emitting Diode (LED) lamps while still permitting many CFL technologies. LEDs have been steadily gaining popularity over the last few years due to their higher efficiencies, better light quality (relative to Compact Fluorescent Lamps), and remarkably long lifetimes compared to traditional CFLs or incandescent lamps.

A comment review for DOE proposal R-5 was added on December 18, 2015.

Stakeholder Feedback: There were five public comments received for proposal R-5. Comments are summarized below, followed by a DOE review:

- One comment that is generally supportive.
- One comment seeking clarification whether the proposed change will eliminate compact fluorescent (CFL) and linear fluorescent (LF) lighting options.
Review: The proposed threshold for luminous efficacy was selected to encourage new lighting technologies without prohibiting all existing CFL and LF technologies.
- One comment suggesting that DOE include in its analysis the costs and challenges of disposing of fluorescent lamps.
Review: Because there are no existing lamps to dispose of in new homes and the code change would not affect occupants' replacement of existing lamps in existing homes, there are no disposal costs to consider.
- One comment suggesting that DOE conduct a sensitivity analysis on the price of current CFL lamps.
Review: DOE understands that lamp prices, both for existing technologies and newer LED technologies, are variable. However, rather than rely on anecdotal data to establish prices for the analysis, DOE has used price summaries and projections from the best available studies, as referenced in the proposal's *Reason* statement.
- One comment suggesting that the proposal focus on luminaires rather than lamps.
Review: It is DOE's understanding that screw-based lighting dominates residential applications. While it is possible that newer LED technologies may lead to a shift to pin-based or other products, it is unknown if that will be the case. At this time, focusing on screw-based technologies will cover both higher end CFLs and newer LEDs.
- One comment suggesting the proposal be replaced with a controls-based proposal.
Review: The variability of schedules and usage patterns in residences makes analysis of controls technologies difficult. At this time DOE is focused on encouraging the use of cost-effective new technologies that lower overall power requirements regardless of occupant use.

While the public comments have highlighted some possible approaches to better lighting in residences that may be appropriate for future codes as technologies mature, DOE will not modify its original proposal at this time.

== IECC PROPOSAL:

Modify section R202 as follows:

HIGH-EFFICACY LAMPS. Compact fluorescent lamps, T-8 or smaller diameter linear fluorescent lamps, or lamps with a minimum efficacy of:

- ~~1. 60-75 lumens per watt for lamps over 40 watts;~~
- ~~2. 50 lumens per watt for lamps over 15 watts to 40 watts;~~
- and
- ~~— 3. 40 lumens per watt for lamps 15 watts or less~~

Reason: The wide availability and falling prices of LED lamps makes them a cost effective option for improving residential efficiency. The proposed threshold of 75 lumens/Watt encourages the use of the new technologies while still permitting many better CFL technologies.

Energy Savings: In analyzing the energy cost savings and cost-effectiveness of this code change proposal, DOE evaluated the option of replacing all CFLs (luminous efficacy of 55 lumens/watt) with LEDs (luminous efficacy of 78 lumens/watt). The energy analysis indicates that LEDs save about \$6 per year in overall energy costs across all climate zones. This represents 0.22% to 0.75% of IECC-regulated end uses (heating, cooling, lighting and water heating), depending on climate zone.

The U.S. Department of Energy (DOE) develops its proposals through a public process to ensure transparency, objectivity and consistency in DOE-proposed code changes. Energy savings and cost impacts are assessed based on established methods and reported for each proposal, as applicable. More information on the process utilized to develop the DOE proposals for the 2018 IECC can be found at: <https://www.energycodes.gov/development/2018IECC>.

Cost impact: The cost of LEDs has been steadily declining over the last several years and is expected to continue to decline between now and the publication of the 2018 IECC. Based on current price estimates and projected price reductions as the LED market matures, this analysis assumes that in 2018 LEDs will cost \$4.84 per lamp compared to CFLs at \$3.10 per lamp.

Cost-effectiveness: Based on these assumptions and the established DOE cost-effectiveness methodology,¹ the analysis indicates life-cycle cost savings in all climate zones, ranging from about \$33 to \$63.

¹ DOE Cost-effectiveness Methodology available at <https://www.energycodes.gov/development/residential/methodology>