

The New Foundations of Residential Light Control Alternatives for New Lamp Regulations Session W343

Session Goal: Dispel the rumors and establish the facts with regards to new federal lamp legislation and its impact on the design community

- Identify which lamp types will be phased out and when
- Discuss the benefits and limitations of our new options
- How to apply this information on your future designs

Energy Independence and Security Act of 2007 (EISA)

- to move the United States toward greater energy independence and security,
- to increase the production of clean renewable fuels...
- to increase the efficiency of products, buildings and vehicles...
- to promote research...
- to improve the energy efficiency of the Federal Government...

The EISA lighting regulation facts...

- incandescent light bulbs are not being 'outlawed' however the new regulations will make them obsolete
- the new standards will phase in over 3 years starting in 2012 (California to start in 2011) for medium base general service bulbs
- in 2012, general service light bulbs must be up to more energy efficient than current standards require
- many decorative and specialty incandescent bulbs less than 40 Watts and more than 100 Watts are exempt

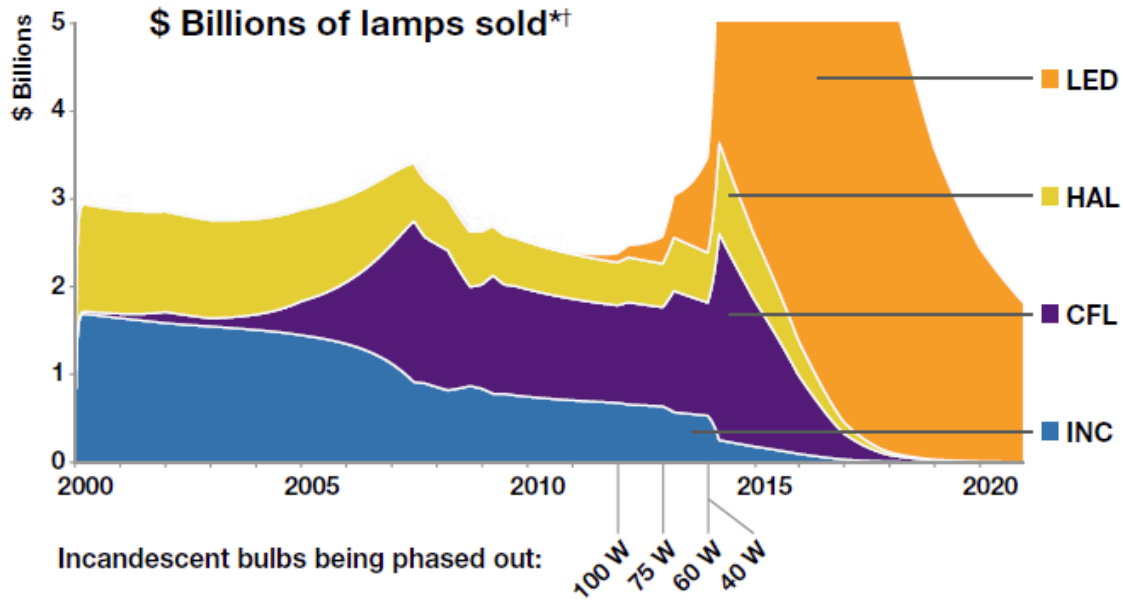
The EISA lighting regulation phase in

| Current Wattage | Rated Lumens | New Max Wattage | Min Rated Lifetime | Effective Date |
|-----------------|--------------|-----------------|--------------------|----------------|
| 100W | 1490-2600 | 72W | 1,000 hrs | 1/1/2012 |
| 75W | 1050-1489 | 53W | 1,000 hrs | 1/1/2013 |
| 60W | 750-1049 | 43W | 1,000 hrs | 1/1/2014 |
| 40W | 310- 749 | 29W | 1,000 hrs | 1/1/2014 |

Your post-EISA bulb options...

- halogen: generates light due to the creation of heat in the filament, a more energy efficient version of incandescent, easily dimmable, mercury free
- compact fluorescent (CFL): generates light due to the creation of photons, contains mercury to ensure operation, life reduced by turning on and off frequently, only specialty lamps are dimmable
- LED (light emitting diode, solid state, SSL): generates light due to the creation of photons, mercury free, only specialty lamps are dimmable

Lamp Technology Forecast



*"CFL Lamp Index Gives Back Prior Gains for Second Quarter 2010." NEMA.

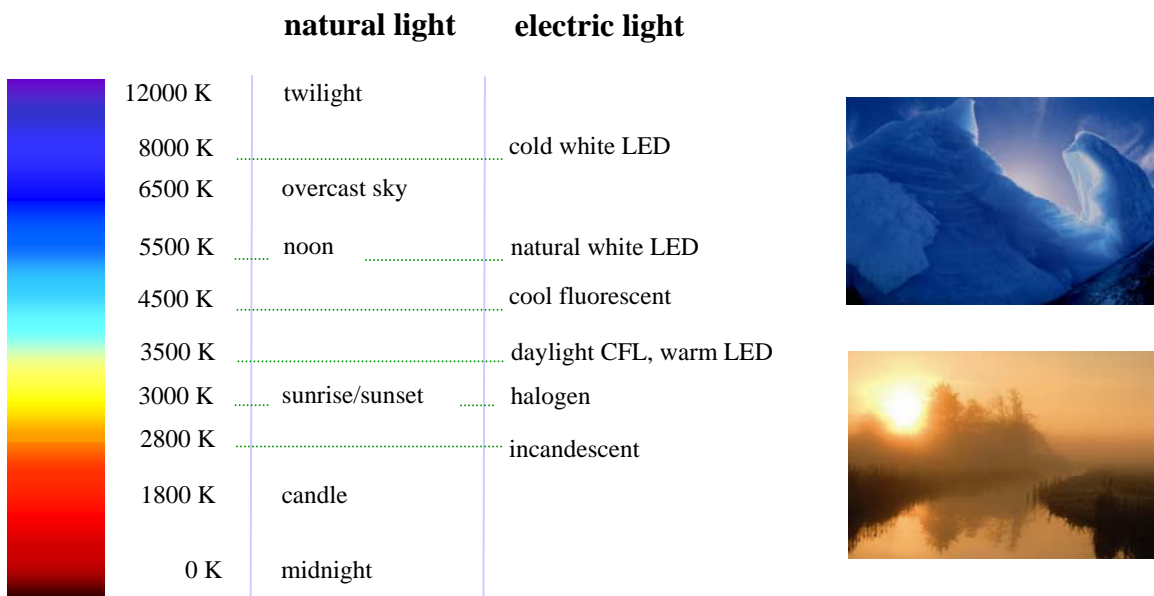
www.nema.org/media/pr/20100825a.cfm

† Navigant Consulting. Lighting Mrkt characterization. Technical report, U.S. Department of Energy, 09/02. Tables 5-4, 5-6, & A-1.

New lamp option challenges

- not enough light
- color shift of fabrics and finishes
- lights not turning on or taking time to reach full intensity
- lights turning off unexpectedly
- reduced dimming range

Color Temperatures



Color Rendering Index (CRI)

- A measure of how true a color is represented under a light source
- Incandescent 100
- Halogen ~100
- Warm LED ~80
- Daylight CFL ~80
- Cool Fluorescent ~65



High CRI



Low CRI

Challenges of Dimming CFL and LED Bulbs

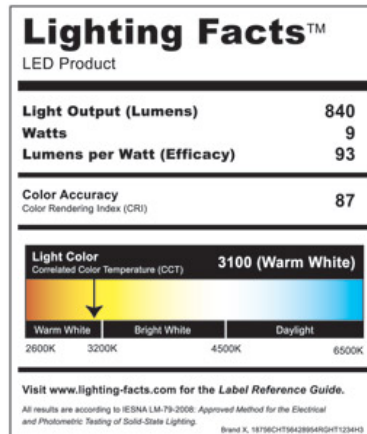
- Standard screw-in CFL and LED bulbs are NOT dimmable
- Only bulbs that have been designed and marked as dimmable should be dimmed
- Dimming range varies greatly and is specific to the bulb not the dimmer
- Incandescent dimmers were designed (and UL listed) for incandescent/halogen bulbs
- Dimming dimmable CFL and LED bulbs with an incandescent dimmer has proven to be very problematic

How does the dimming range effect the space?

- There is a difference between measured and perceived light
- Measured light: the amount of light as shown on a light meter
- Perceived light: the amount of light that your eye interprets due to dilation
- 20% measured = 45% perceived

LED Lighting facts label

- Standard method in which to communicate key elements of the LED performance
- Light output
- Power consumed
- CRI
- Color Temperature



What type of LED am I using?

- LED Bulbs
 - Designed to replace standard incandescent or screw-in CFL bulbs
 - Edison base sockets
 - Integral drivers which determine dimming performance (if dimmable)
- LED Fixtures
 - cove lights, down lights, 2x2, etc.
 - Usually have an external driver
 - may have multiple driver option dim vs. non-dim, 0-10V

CFL Lighting facts label

- No Standard method in which to communicate key elements of the CFL performance
- Light output
- Power consumed
- CRI
- Color Temperature

What type of Fluorescent lamp am I using?

- CFL Bulbs
 - Designed to replace standard incandescent
 - Edison base sockets
 - Integral ballasts which determine dimming performance (if dimmable)
- Fluorescent Fixtures
 - cove lights, down lights, 2x2, etc.
 - Usually have an external ballast
 - may have multiple control options dim vs. non-dim, 0-10V

Manufacturer Approved CFL & LED Bulb List

- Bulbs must be tested to confirm compatibility with the dimmers
- Compatible bulb info is then sent to UL for proper listing
- Only bulbs on the list should be used with the dimmer
- Bulb lists are updated as new bulbs are tested and approved

Selection Recap

- decide what type of bulb you want to use
 - halogen, compact fluorescent (CFL), LED
 - can you get replacements
- ensure the light created by the bulb matches your needs
 - color of the light
 - the color the light makes the room
- if you want to dim the source
 - can it be dimmed
 - how far can it be dimmed
 - has the dimmer manufacturer tested the bulb

Steps for a successful installation

- What type of product should I use?
- Do you want to dim it or just switch it on and off?
- What is the dimming range and dimming performance?
- Confirm with the dimming manufacturer
 - How many fixtures/lamps can be connected to one dimmer?
 - What type of dimmer is needed?
- Mock-up design and show client if desired

Additional Resources

- American Lighting Association www.americanlightingassoc.com
- Department of Energy LED Lighting Facts www.lightingfacts.com
- International Association of Lighting Designers www.iald.org
- National Electrical Manufacturers Assoc. www.nema.org
- Lutron Electronics www.lutron.com
- LED dimming compatibility chart www.lutron.com/LED
- Lutron Technical Support (24/7) **1-800-523-9466**