



ENERGY STAR Certified Homes

Top Builder Tips for Choosing LED Lighting

July 13, 2017



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- Dial in and enter your access code
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The screenshot shows the GoToWebinar toolbar with several panels. At the top left, there are three buttons: a double arrow pointing right, a square, and a hand with a green checkmark. The main toolbar area contains a 'File View Help' menu, an 'Attendee List (2 | Max 1001)' panel, and an 'Audio' panel. The 'Audio' panel has 'Audio Mode' with two radio buttons: 'Use Telephone' (selected) and 'Use Mic & Speakers'. Below this are fields for 'Dial:', 'Access Code:', and 'Audio PIN:'. There are also microphone and speaker icons with '000000000' next to them, and a blue 'Audio Setup' link. Below the audio panel is a 'Questions' panel with a 'Questions Log' showing 'Q: I have a question', a 'TYPE HERE' input field, and a 'Send' button. At the bottom, it says 'Practice Webinar' and 'Webinar ID: 239-044-248' with the 'GoToWebinar' logo.

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Everyone will be muted, but you can type in questions at any time and we'll answer them at the end of the presentation.



Learning Objectives

- Discuss technological advances and market changes that are making integration of LED technology easier.
- Learn how the ENERGY STAR label can help you identify high-performing LED lighting products.
- Review the key factors to consider when selecting LED lighting and lighting controls.
- Get your questions answered!



Agenda

2:00 **Welcome**

2:05 **ENERGY STAR Lighting**
Taylor Jantz-Sell, EPA



2:10 **Choosing LED Lighting**
Jim McCarthy, Eaton



2:40 **Choosing Lighting Controls**
Michael Smith, Lutron



2:50 **Q&A**

ENERGY STAR Certified Homes

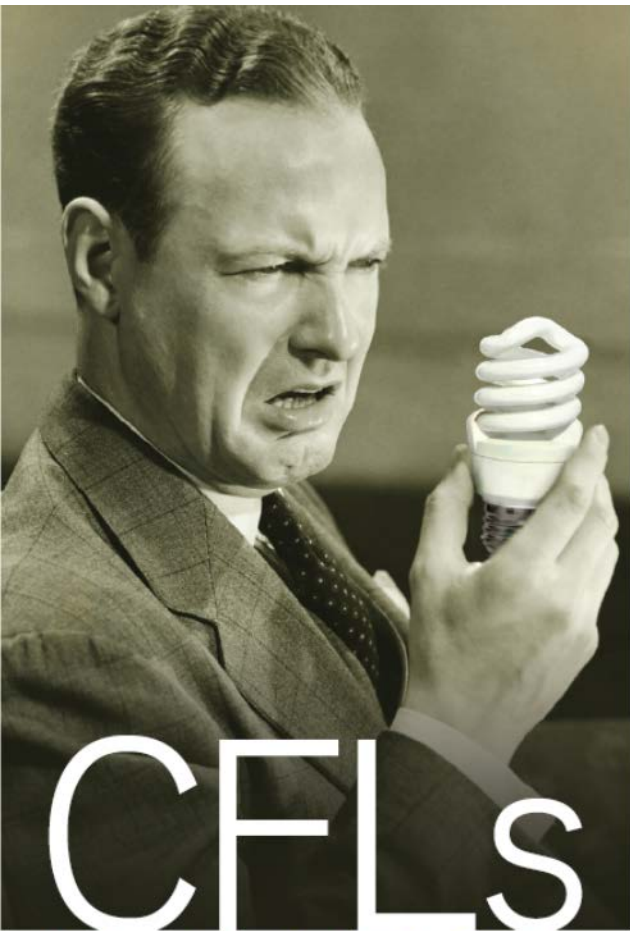
- Created by EPA to find the best ways to save energy
- Active for over 20 years with nearly 90% brand awareness
- 3rd-party verified to ensure quality
- Technical tools
- Marketing resources
- [More info on Partnering with ENERGY STAR](#)



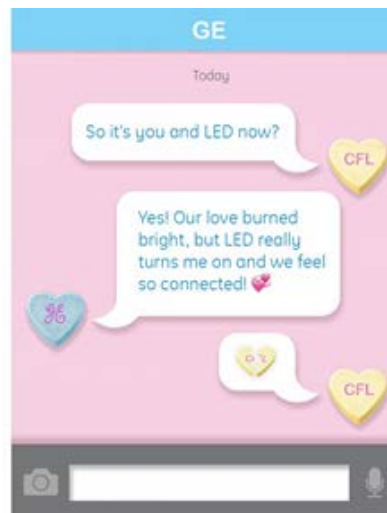
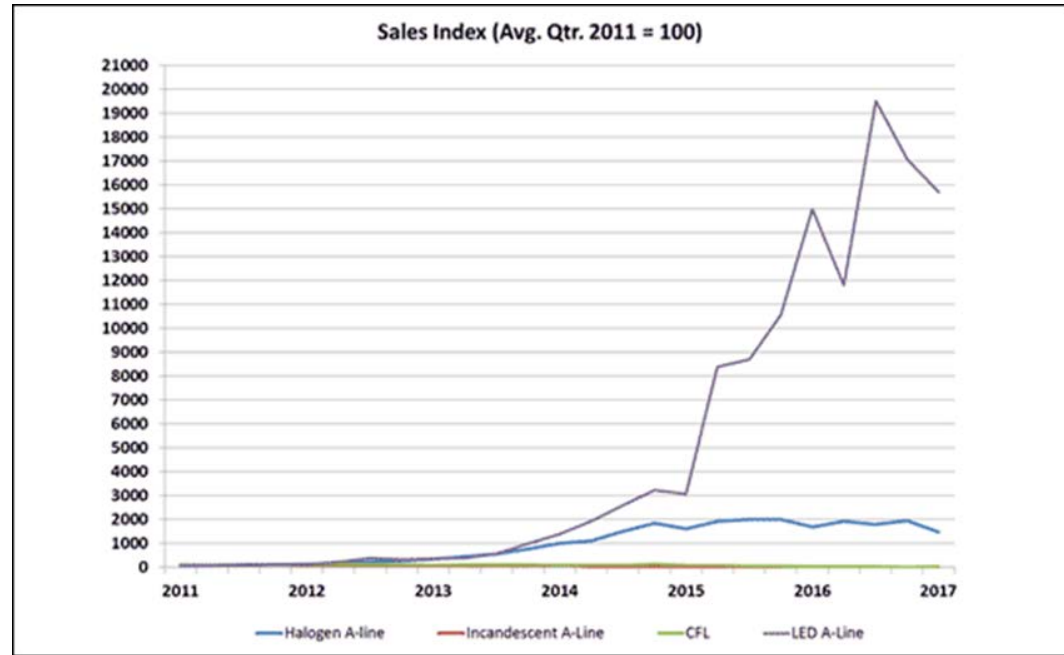
Why Choose ENERGY STAR certified Lighting



Taylor Jantz-Sell, LC
ENERGY STAR Lighting Program Manager



CFLS IN AMERICA: LESSONS LEARNED ON THE WAY TO MARKET



GE Will Stop Making CFL Lightbulbs Because LEDs Are Better

Michael Ruzer
2016-03-08 · Filed to: LEDs ...



GE just announced that it no longer make or sell compact fluorescent lamp (CFL) lightbulbs in the US. The company will wind down the manufacturing of CFL bulbs by the end of 2016, and it will begin to shift its focus on making the energy and more energy efficient lightbulbs.

Bulbs: Market Trends

- The price of the most common LED bulbs has plummeted
 - \$3 or less ENERGY STAR certified LED light bulbs to replace 60W incandescent
 - sub-\$1 with rebates
 - \$6.50 for ENERGY STAR certified flood lights
 - Sub \$3 with rebates
- Vintage filament style LED bulbs match the look and top the efficiency charts
- Smart bulbs allow users to control, dim, change colors and more



ENERGY STAR Certification for Lighting Products

- Designed to ensure quality and performance consumers expect:
 - Minimum warranty requirement
 - 6 different requirements for color to ensure quality up front & over time
 - Light output and distribution requirements
 - Size and shape requirements for light bulbs
 - Long term high heat testing and temperature testing of critical components
 - ENERGY STAR third-party **certification and verification testing** help confirm **delivery on performance**



Color at Time = 0 hrs



Color at Time = 1000 hrs



Test Methods – not kidding



7 METHODS OF MEASUREMENT AND REFERENCE DOCUMENTS

Organization	Identifier	Description
ANSI	C78.376-2001	Specifications for the Chromaticity of Fluorescent Lamps
ANSI/NEMA/ANSLG	C78.377-2011	Specifications for the Chromaticity of Solid State Lighting Products
ANSI	C78.5-2003	Specifications for Performance of Self-ballasted Compact Fluorescent Lamps
ANSI/ANSLG	C78.81-2010	Double-Capped Fluorescent Lamps—Dimensional and Electrical Characteristics
ANSI	C78.901-2014	Single-Based Fluorescent Lamps—Dimensional and Electrical Characteristics
ANSI/ANSLG	C81.61-2009	Specifications for Bases (Caps) for Electric Lamps
ANSI/ANSLG	C81.62-2009	Lampholders for Electric Lamps
ANSI	C82.11-2011	High-Frequency Fluorescent Lamp Ballasts
ANSI/ANSLG	C82.16-2015 (anticipated)	Light Emitting Diode Drivers—Methods of Measurement
ANSI	C82.2-2002	Method of Measurement of Fluorescent Lamp Ballasts
ANSI	C82.77-10-2014	Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment
ANSI/IEEE	C62.41.1-2002	IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits
ANSI/IEEE	C62.41.2-2002	IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000V and Less) AC Power Circuits
ANSI/UL	153-2002	Standard for Safety of Portable Electric Luminaires
ANSI/UL	935-2009	Standard for Safety of Fluorescent-Lamp Ballasts
ANSI/UL	1310-2010	Standard for Safety of Class 2 Power Units
ANSI/UL	1574-2004	Standard for Safety of Track Lighting Systems
ANSI/UL	1588-2008	Standard for Safety of Luminaires
ANSI/UL	1598C	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
ANSI/UL	1598B-2010	Standard for Supplemental Requirements for Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires
ANSI/UL	1993-2009	Standard for Safety of Self-Ballasted Lamps and Lamp Adapters
ANSI/UL	2108-2004	Standard for Low-Voltage Lighting Systems
ANSI/UL	8750-2009	Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products
ASTM	E263-04	Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
CIE	Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
CIE	Pub. No. 15-2004	Colorimetry
EU	Directive 2002/95/EC	Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment
FCC	CFR Title 47 Part 15	Radio Frequency Devices
FCC	CFR Title 47 Part 18	Industrial, Scientific, and Medical Equipment
IEC	60061-1 (2012)	Lamp Caps and Holders Together with Gauges for the Control of Interchangeability and Safety – Part 1: Lamp Caps
IEC	60081 Amend 4 Ed 5.0 (2010)	Double-capped Fluorescent Lamps - Performance Specifications
IEC	60901 (2011)	Single-capped Fluorescent Lamps - Performance Specifications
IEC	62301 Ed. 2.0 B:2011	Household electrical appliances - Measurement of standby power
IEC	61347-2-3-am2 ed1.0 B:2011	Amendment 2 - Lamp Control Gear - Part 2-3: Particular Requirements for A.C. Supplied Electronic Ballasts for Fluorescent Lamps
IEC	62321 Ed. 1.0	Electrotechnical Products - Determination of Levels of Six Regulated Substances (lead, mercury, cadmium, hexavalent chromium, polybrominated diphenyls, polybrominated diphenyl ethers)
IEEE	PAR1789	IEEE Recommending Practices for Modulating Current in High Brightness LEDs for Mitigating Health Risks to Viewers
IES	LM-9-02	Electric and Photometric Measurements of Fluorescent Lamps
IES	LM-10-96 or LM-10-XX	Photometric Testing of Outdoor Fluorescent Luminaires (2015 update anticipated)
IES	LM-31-95	Photometric Testing of Roadway Luminaires Using Incandescent Filament and High Intensity Discharge (HID) Lamps
IES	LM-40-10	Life Testing of Fluorescent Lamps
IES	LM-41-14	Approved Method for Photometric Testing of Indoor Fluorescent Luminaires
IES	LM-46-04	Photometric Testing of Indoor Luminaires Using High Intensity Discharge or Incandescent Filament Lamps
IES	LM-49-12	Life Testing of Incandescent Filament Lamps
IES	LM-59-13	Method for Spectroradiometric Measurement Methods for Light Sources
IES	LM-65-14	Life Testing of Compact Fluorescent Lamps
IES	LM-66-14	Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps
IES	LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products
IES	LM-80-08	Measuring Lumen Maintenance of LED Light Sources
IES	LM-82-12	Method for the Characterization of LED Light Engines and Integrated LED Lamps for Electrical and Photometric Properties as a Function of Temperature
IES	LM-84-14	Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires
IES	RP-16-10	Nomenclature and Definitions for Illuminating Engineering
IES	TM-21-11	Projecting Long Term Lumen Maintenance of LED Sources
IES	TM-28-14	Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaires
NEMA	LL 9-2009	Dimming of T8 Fluorescent Lighting Systems
NEMA	LSD 45-2009	Recommendations for Solid State Lighting Sub-Assembly Interfaces for Luminaires
NEMA	SSI 7A-2013	Phase Cut Dimming for Solid State Lighting: Basic Compatibility



Resources available www.energystar.gov/lighting



LIGHTING MADE EASY Just Look for the ENERGY STAR®

Only bulbs that have earned the ENERGY STAR label have been independently certified and undergone extensive testing to assure that they will save energy and perform as promised.



- ★ Use 70-90% less energy than incandescent bulbs
- ★ Save you \$30 to \$80 in energy bills
- ★ Provide the same brightness (lumens) with less energy (watts)
- ★ Last 10 to 25 times longer than incandescent bulbs
- ★ Help protect the environment and prevent climate change

BULB TYPES	
TABLE OR FLOOR LAMPS	SPHAL A SHAPE
PENDANT FIXTURES	SPHAL A SHAPE GLOBE MR16 CANDLE
CERILING FIXTURES	SPHAL A SHAPE CANDLE
CERILING FANS	SPHAL A SHAPE CANDLE
WALL SCONCES	SPHAL A SHAPE GLOBE CANDLE
RECESSED CANS	MR16 SPOT FLOOD
ACCENT LIGHTING	MR16 SPOT

ENERGY STAR certified CFL and LED bulbs are available in a variety of shapes and sizes for any application—including recessed cans, track lighting, table lamps, and more. You can even find certified bulbs that are dimmable. Use this chart as a guide to finding the right ENERGY STAR certified bulb for your light fixture and remember to always check the packaging for proper use.

BRIGHTNESS

For brightness, look for lumens, not watts. Lumens indicate light output. Watts indicate energy consumed. ENERGY STAR certified bulbs provide the same brightness (lumens) with less energy (watts). Use this chart to determine how many lumens you need to match the brightness of your old incandescent bulbs.

Old Incandescent Bulbs (Watts)	ENERGY STAR Bulb Brightness (Minimum Lumens)
40	450
60	800
75	1,100
100	1,600
150	2,600

COLOR/APPEARANCE

ENERGY STAR certified bulbs are available in a wide range of colors. Light color, or appearance, matches a temperature on the Kelvin scale (K). Lower K means warmer, yellowish light, while higher K means cooler, bluer light.

2700K	3000K	3500K	4100K	5000K	6500K
WARM		COOL			
<p>Warm White, Soft White Standard color of incandescent bulbs.</p>		<p>Cool White, Natural White Good for kitchens and work spaces.</p>		<p>Natural or Daylight (think blue sky at noon) Good for reading.</p>	



THREE SIMPLE TIPS FOR BETTER LED DIMMING

1

Look for the ENERGY STAR.
Every dimmable ENERGY STAR LED bulb will have the word "dimmable" right on the front of the package.

2

Be prepared to try different dimmable bulbs.
Not every bulb works well with every dimmer switch. If you don't find a good match with your current dimmer, consider changing the switch, or you can return the bulb and try a different one.

3

Choose the right dimmer/bulb combination.
If you are putting in a new dimmer switch, check the website listed on the bulb package for recommended dimmers.

ENERGY STAR Best Value Finder



ENERGY STAR Certified Light Bulbs

Light bulbs that have earned the ENERGY STAR offer value because they save you money on your energy bills. Use the list below to find the best value in terms of purchase price.



Get the best deals when you buy in multi-packs. See more Buying Guidance.

Disclaimer



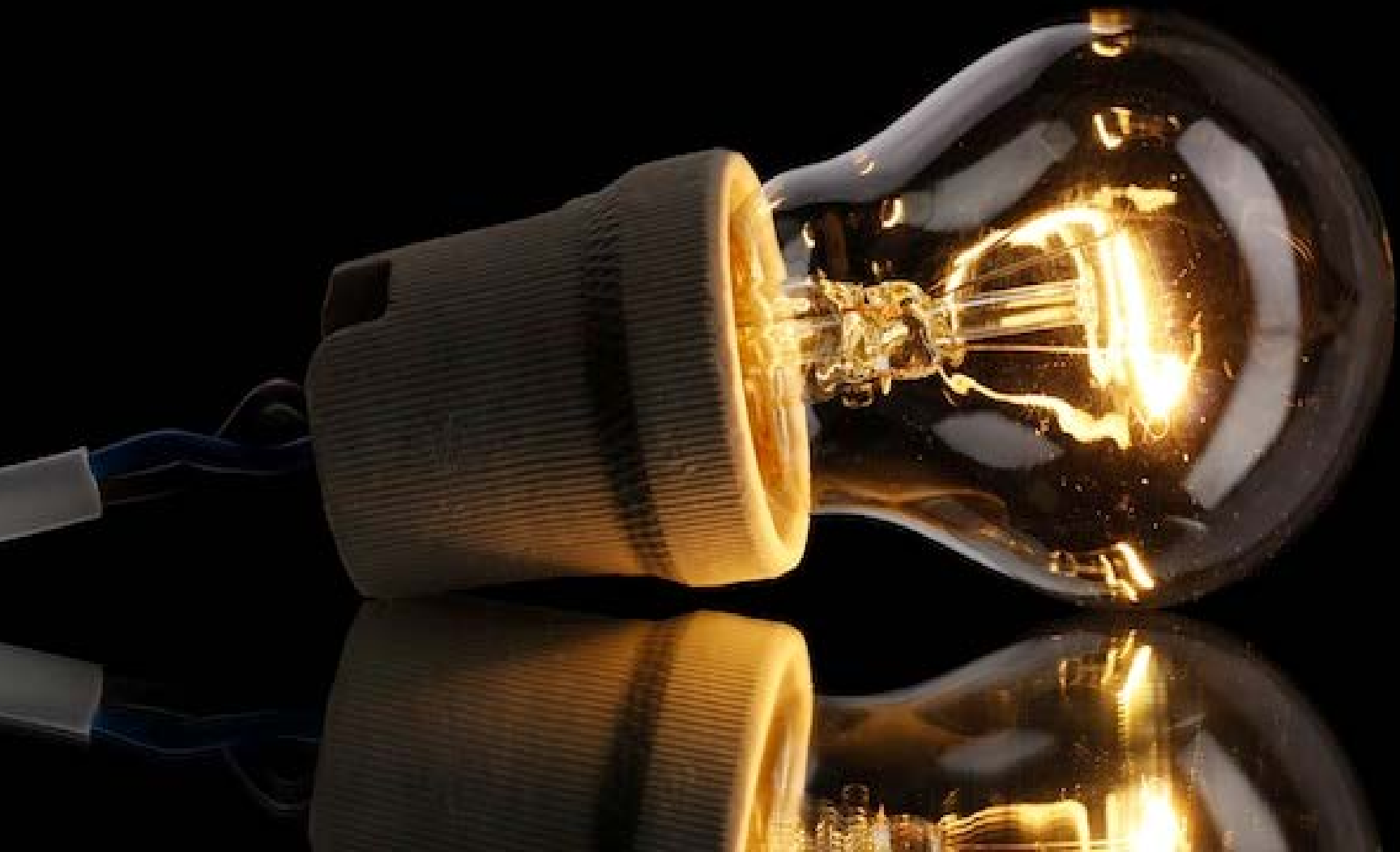
Top Builder Tips for Choosing LED Lighting

EPA ENERGY STAR® Certified Homes Webinar
Thursday, July 13th

James McCarthy, LC, CLC, IES
SOURCE Senior Market Specialist
Eaton

TheSource@Eaton.com







CAUTION
Voltage

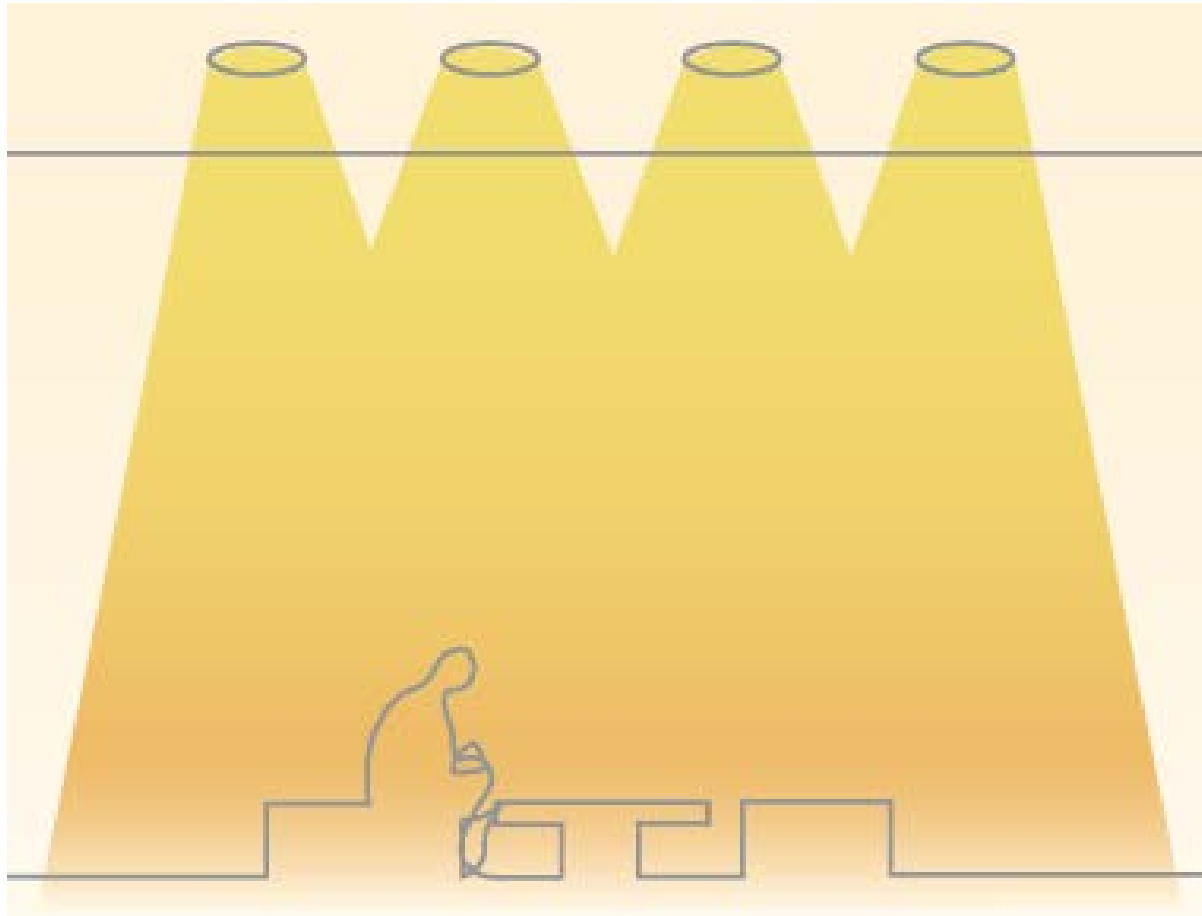
- Light Levels and Application Considerations
- Color Temperature
- Light Quality
- Product Lifetime and Durability
- Serviceability and Warranty
- Installation Considerations
- Cost

What Type of Lighting Effects Can We Achieve



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Ambient / General Lighting



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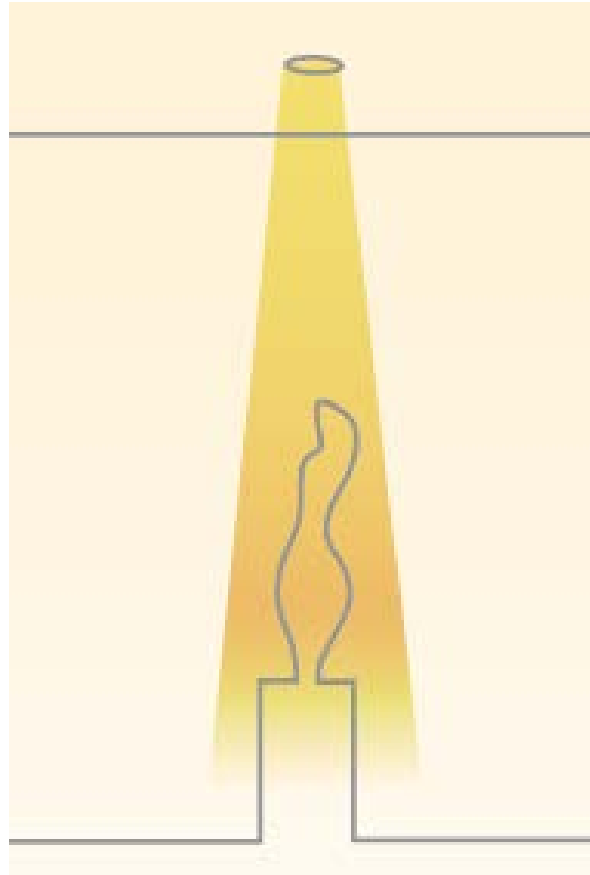


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Accent Lighting



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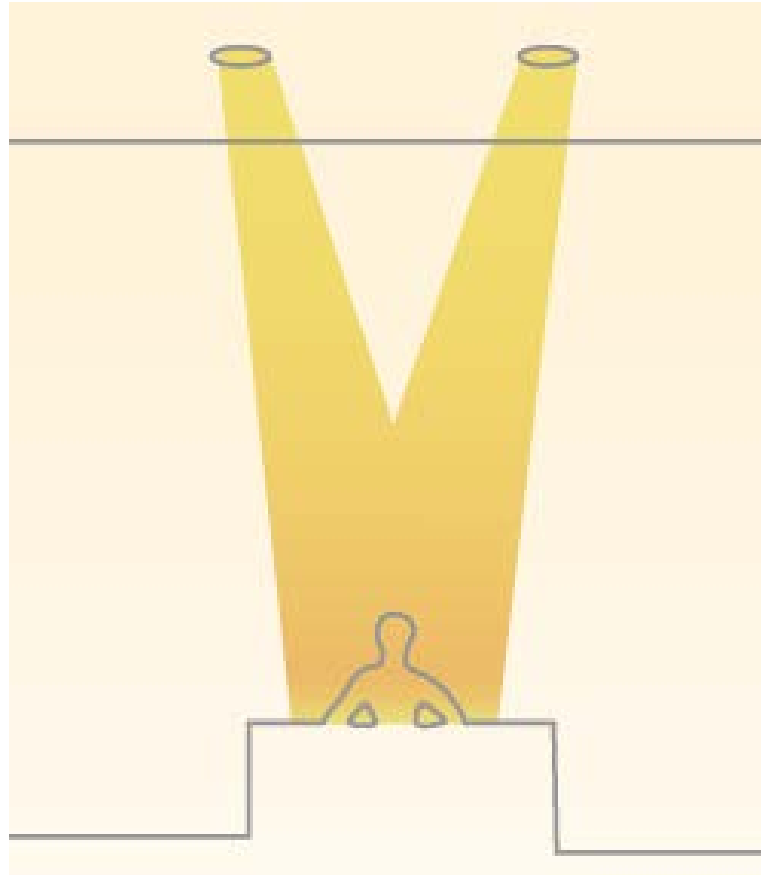


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Task Lighting



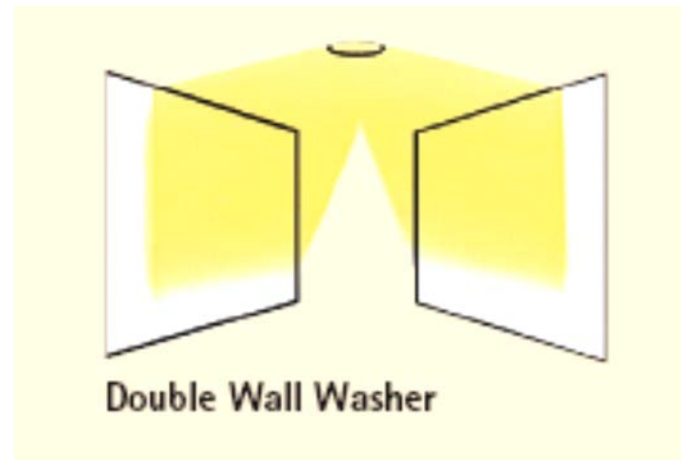
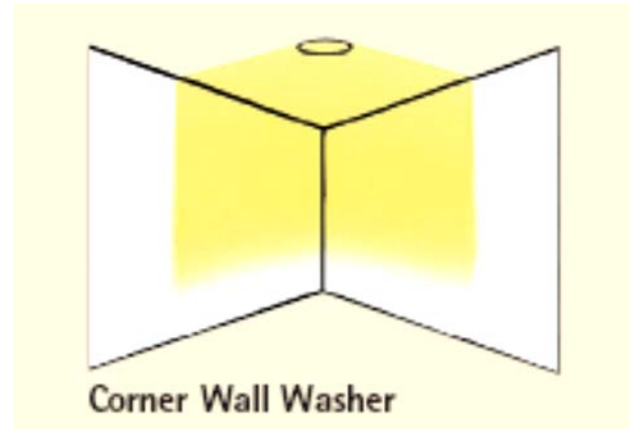
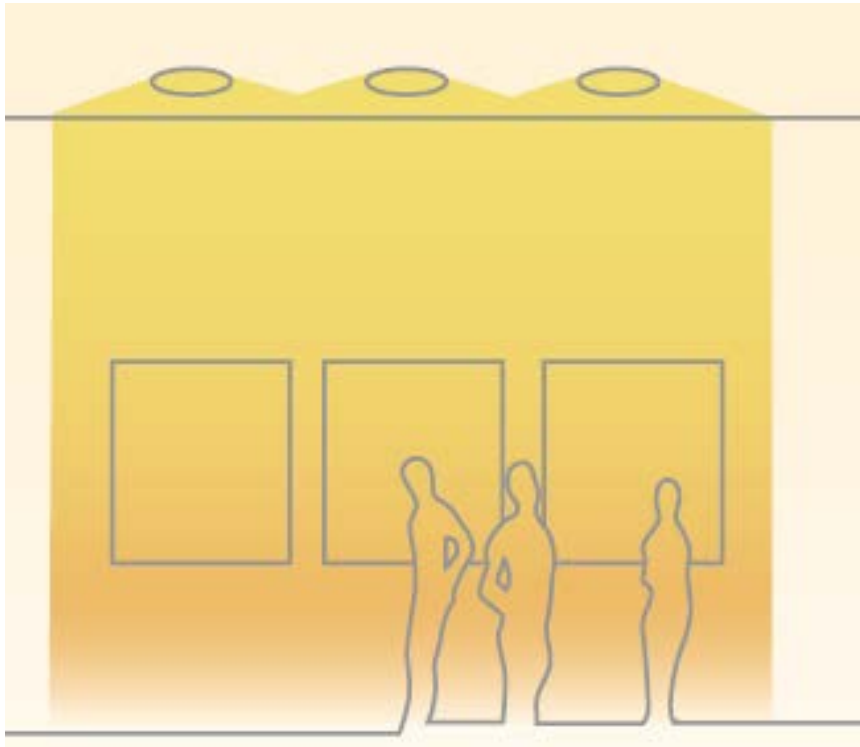


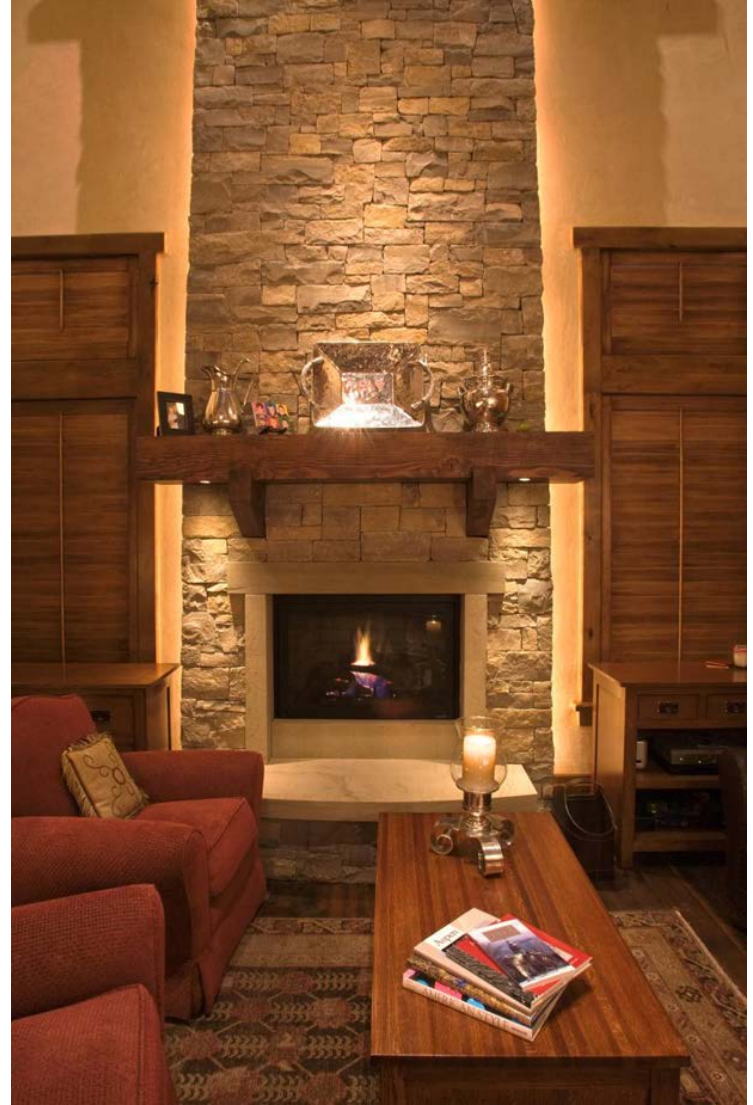
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Wall Washing

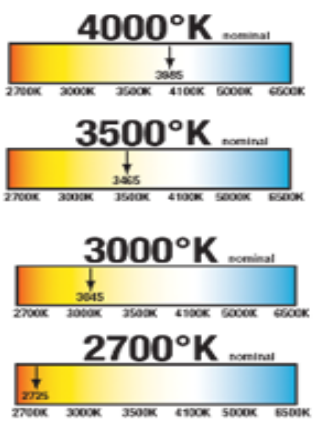
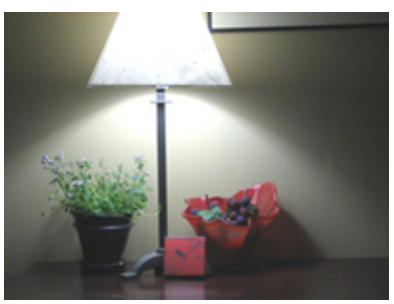
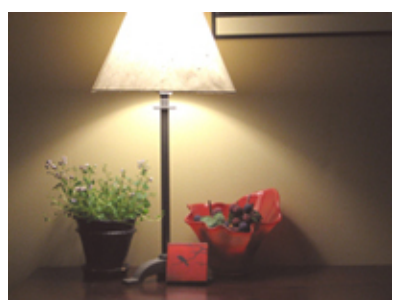




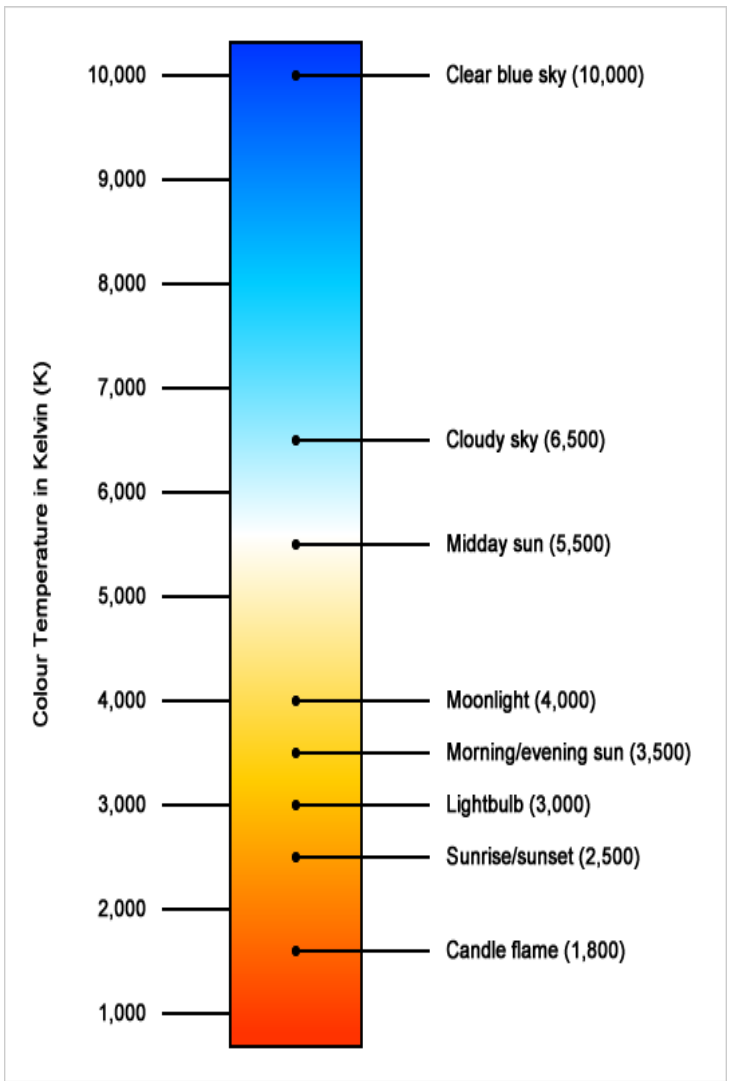
What is Color Temperature? CCT

Correlated Color Temperature

CCT is the warmth or coolness of a light source; measured in degrees kelvin (K)



***2700K-3000K are preferred residentially**



The Quality of Light (CRI)

The ability for a light to render a color or show the color hue is CRI (color rendering index)



- Scale of 0-100
- The higher the CRI the better color rendering
- IES recommends a CRI of 80 or better for home environments and 90's in areas where color is more important.

What Color Temperature and CRI is best?

	Kitchen	Bathroom	Hallway	Living room	Dining	Bedroom	Utility / Laundry	Game / Task	Outdoor
Color Temp (k)	2700 3000 3500	2700 3000	2700 3000	2700 3000	2700 3000	2700 3000	3000 3500	3000 3500	3500+
CRI	90	90	>80	>80	>80	>80	90	>80	n/a
Fixture type	Recessed Track Surface Under Cab Suspended	Recessed Surface Sconce	Recessed Chandelier Suspended	Recessed Table lamp Track Surface	Recessed Chandelier Sconces	Recessed Sconces Table lamp	Recessed Surface	Recessed Track Suspended	Recessed Surface

- Color temperature preferences are subjective and vary by person and activity
- Certain color temperatures are more applicable than others by location and task
- For instance, the aging population generally prefers higher color temperatures (3500K+)

Features That Can be Found in LED Lighting

1. Flexible Kelvin Temperature
2. High Color Rendering
3. Long Operational Time Expectations - >50,000 hours
4. Energy Efficiency - Lighting & HVAC
5. Ecologically Friendly - No Mercury - 100% Recyclable
6. No UV Emissions - No Fading of Artwork or Fabric
7. Flexibility in Lighting Design
8. Instant Lighting – No Warm Up Time
9. Improved Visual Acuity (aging population)
10. Improved Safety & Security
11. Easily Controlled
12. Adds Value to the Installed Area

Integrated Products- Ideal Solution for the Builder



Integrated LED:

- Insulated Ceiling (IC)
- Air Tight features
- Wet location approved
- Visual Comfort

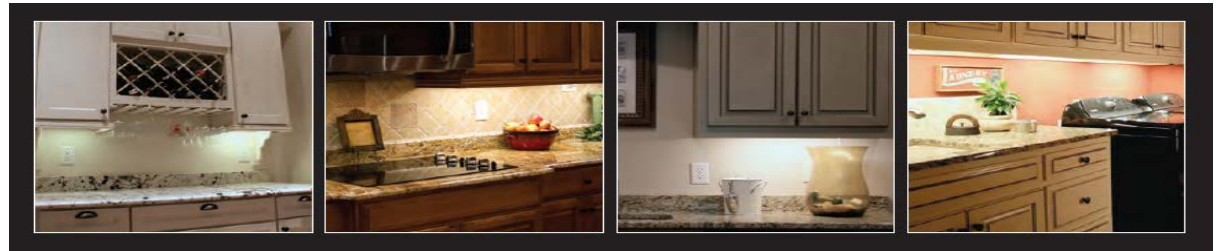


Integrated Products - Ideal Solution for the Builder

Integrated LED products that save time, labor, and cost

Under Cabinet Lighting:

- Integrated drivers
- Dimmable
- Mountable
- Connectable



Application Considerations



Screw in CFLs (Self-Ballasted)

- Dimmable and non-Dimmable versions- check for conditions of use
- Dimming compatibility- check for approved dimmers
- Airflow required to meet lifetime, air-tight housing can affect life / light output
- Wet location listed housing & trim required for wet location- check for enclosed fixture rating
- **Rated lifetime is a function of 50% bulb failure**



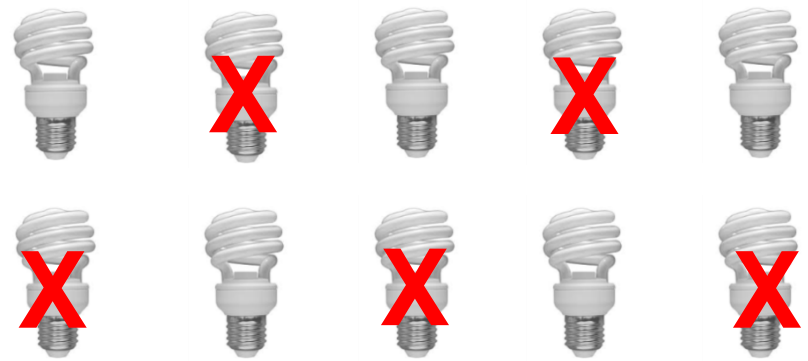
Integrated LED Solutions

- All-in-one lamp & trim
- Dimmable with LED dimming controls, from 1% to 10%
- Many wet location listed units [shower rated] some even IP66
- ENERGY STAR requires test validation of performance
- AIR-TITE Features reduces HVAC use
- Range of Kelvin Temperature & CRI options
- Extended lifetime LM70/50000
- **Rated lifetime is a function of % light loss, not failure**

Product Lifetime & Durability

CFLs (Self-Ballasted)

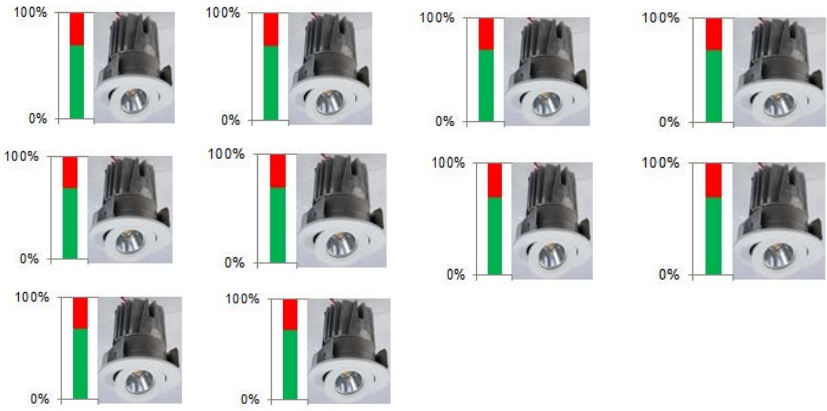
- Reported Life: AVG. 10,000hrs
 - Defined as Mean-time between failures or when 50% of the bulbs fail at 25 degrees Celsius open air



Breakdown	CFL	LED Integrated Solution
Lifetime Hours	10,000	50,000
Hours Per Day	6	6
Total Years	5	23

Integrated LED Luminaires

- Reported Life: 50,000hrs
 - Defined as the time when 70% of the lumens at rated ambient temperature in the luminaire



Breakdown	CFL	LED Bulbs	LED Fixtures	Halo Integrated LED Solution Warranty
ENERGY STAR Warranty	2 years	3 years	3 years	5 years

Installation Considerations

IC and Air Tight housing

YES NO

Choose ICAT housing



What is ICAT

- IC = Insulated Ceiling where insulation can be in direct contact with housing
- AT = Airtight per ASTM E283 test standard, restricts airflow from conditioned space into unconditioned space
- Look for the ASTM E283 certified label

Benefits

- Save energy \$\$
- Reduced heating and AC loss through the ceiling
- Prevent moisture damage to insulation & ceiling structure
- Eliminate drafts
- Reduced sound transmission
- Code compliant



Cost & Energy Savings

CFL Phase Out



- An increasing number of manufacturers and retailers are discontinuing CFLs
- CFL shipments are down by 28% since 2016

CFL Management

- Horror stories with CFL's burning out prior to product lifetime
- Unhappy homeowners and homebuilders
- CFL Cleanup



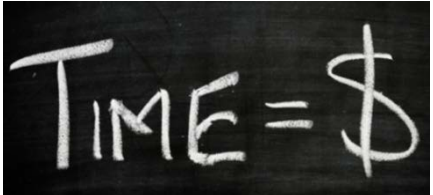
The LED Revolution



- Homeowners are making the shift to all LED households
- LED's are saving homeowners energy, time and money

LED Installation

- LED Installation requires no additional expertise
- Installation can be faster with LED's than other types of lighting



Making the switch from CFL's to LED's



Vs.



Compact Fluorescent Lamp (CFL)

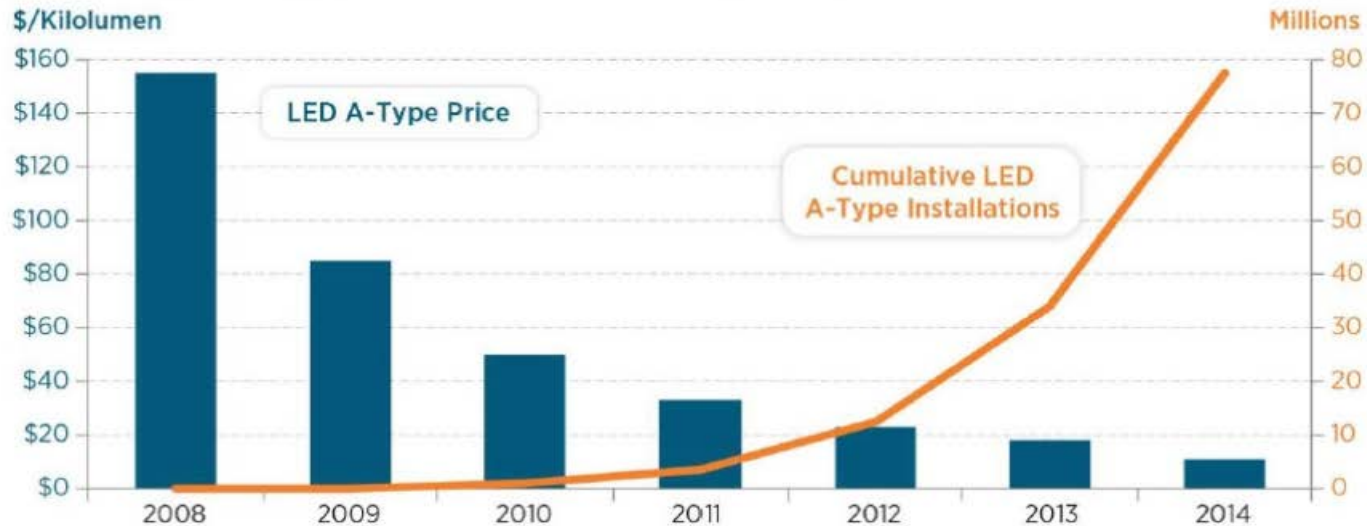
- Glass tubes contains both Argon and Mercury vapor
- Uses 70% less energy than Incandescent bulbs
- Takes a few minutes to warm up and reach its full brightness
- Sensitive to cold temperatures
- 10,000 hours
- Dimmable concerns

Integrated LED Solution

- Reliable, instantaneous, and dimmable
- Uses 90% less energy than incandescent bulbs and 50% less than CFLs
- Not sensitive to typical temperature extremes
- Integrated LED solutions can last 50,000 hours (up to five times longer than CFL's)

The Revolution of LED's

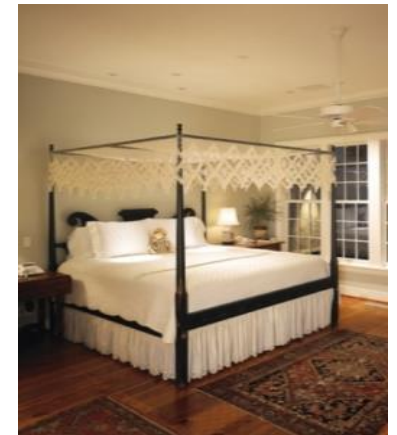
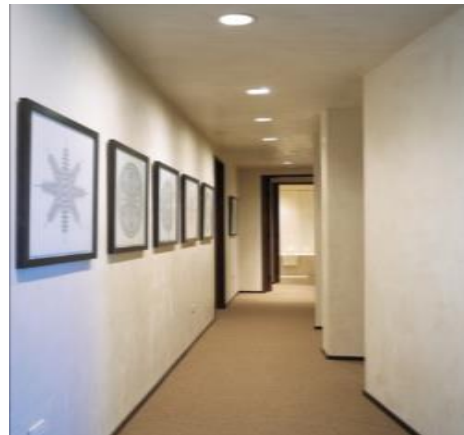
LED Lighting



Note: Kilolumen is a measure of visible light output by a source. Price data is in nominal dollars. Via DOE.

- The cost of LED lighting has decreased by 90% since 2008
- In addition to lower costs, utility rebates are available at retailers and distributors across the country for ENERGY STAR certified lighting products
- <https://www.energystar.gov/rebate-finder>

Increase the value of the home with LED light



Health & Well-being / Safety / Energy Savings



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Thank you for attending!

For more information please contact TheSource@Eaton.com





Creating the Perfect Environment at Home Starts with LEDs Paired with the Right Controls

Michael Smith, Vice President - Sales

Taking Control of LEDs – The Opportunity

- There are numerous lifestyle trends that are keeping people home more often – and in their homes longer.
- Home lighting needs to be versatile enough to accommodate every member of the household and every task or activity.



Taking Control of LEDs – The Opportunity

- To differentiate yourself in the marketplace, standardize Dimmers in key areas, like the Kitchen, Family Room, and Bedroom. Use Occupancy Sensors in the Closets and the Laundry Room.
- Making the switch to dimmable LEDs allows you to market your homes differently and appeal to people's desire to save energy and money while creating the right environment for any activity.



Avoid the Pitfalls

Making the switch to LEDs and dimmers can be a smooth process once you follow these simple steps.

1. Not all LEDs are created equal – *Do Your Homework!*
 - Dimmer/LED compatibility will make or break the experience – just because a bulb says it's dimmable doesn't mean you will have the smooth dimming experience that you are expecting.
 - An incompatible bulb/dimmer combo could cause flicker and/or lights to pop on and off suddenly.



Avoid the Pitfalls

2. Rely on the Experts

- Lutron has tested thousands of LEDs to ensure compatibility with our products and created a tool to simplify the dimmer/bulb pairing process and guarantee compatibility.

3. Contact Lutron's LED Center of Excellence

- A free resource for builders, contractors, and homeowners to make the right choice for LED and control compatibility.

www.Lutron.com/dimLEDs



Take Control of LEDs – The Smart Home

- Standardize with reliable, affordable, smart lighting systems, which provides remote access of lights from any mobile device and works with a variety of smart home devices.
- These systems provide convenient access to lights, shades and temperature from anywhere. You never have to enter a dark house again!



Take Control of LEDs – The Smart Home

- Builders are now standardizing on good performance LEDs, Controls and IOT Connected Devices.
- We are living in a connected world where new homebuyers are expecting control of everything in their home, including their lights!





Thank you!

Michael Smith, Vice President



Q&A

The screenshot shows a GoToWebinar interface with the following elements:

- Window title: File View Help
- Attendee List: (2 | Max 1001)
- Audio Mode: Use Telephone, Use Mic & Speakers
- Dial: [input field]
- Access Code: [input field]
- Audio PIN: [input field]
- Text: If you're already on the call, press #97# now.
- Questions Log: Q: I have a question
- Send button
- Practice Webinar, Webinar ID: 239-044-248
- GoToWebinar™ logo





ENERGY STAR Certified Homes

Web:

Main: www.energystar.gov/newhomespartners
Technical: www.energystar.gov/newhomesguidelines
Training: www.energystar.gov/newhomestraining
Lighting: www.energystar.gov/products/lighting_fans

Email:

energystarhomes@energystar.gov

Contacts:

Brice Lang

EPA
Partner Support
ENERGY STAR Certified
Homes
Lang.Brice@epa.gov

Taylor Jantz-Sell

EPA
Program Manager
ENERGY STAR Lighting
Program
Jantz-Sell.Taylor@epa.gov

Social Media:



@energystarhomes



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