

Making the Switch *from* Incandescent and/or Fluorescent Bulbs *to* LED Bulbs

Information From: <http://www.cleanenergyresourceteams.org/lighting/guide>

Frequently Asked Questions

Q What are the advantages of switching to LEDs?

LEDs use much less electricity than other bulbs, have extremely long-rated lives, produce very little heat, do not emit UV or infrared, contain no mercury, are resistant to shock and vibration, and can operate effectively in extremely cold environments.

Q How do I get a bulb to fit my fixture?

Bring the bulb that you are replacing with you to the store to match the size to be sure that your new bulb will fit in the fixture when you get home. Also, some recessed fixtures have tabs that allow you to adjust how deeply the socket is set – be sure to turn power off to the lights before making any such adjustments.

Q How could I prioritize upgrading my bulbs?

If you want to buy more efficient bulbs over time to reduce the cost of buying a whole home's bulbs at once, you can replace bulbs in high use areas first. If you leave porch lights on overnight, these bulbs could be upgraded to LED bulbs immediately – the savings could be significant if you're using incandescent bulbs presently and they work better in the cold too! Next, look around your home to see which spaces you use the most, and therefore use the lights the most in those areas. Do you like to leave the light on over the kitchen sink most of the evening? Is the dining or living room a favorite hangout for the family in the evenings? Do you work from home and have a desk lamp or office light on much of a working day? If you said yes to any of these, then they would all be great places to changeout first. One of the last places to change are bulbs located where lights are used very few hours and turned on and off frequently (for example, closets).

Q Do I need to recycle LEDs?

No, but you can. LED light bulbs do not contain hazardous material and so these bulbs can be placed in the garbage. There are electronics in the base of an LED light bulb (a circuit board), and so you can recycle LED light bulbs at some locations. Use the [CERTs Right Light Recycler](#) to find locations near you.



Where can I recycle CFLs?

County hazardous waste drop-off sites as well as stores like Menards, Home Depot, Ace Hardware, Lowes, Batteries Plus. Use the [CERTs Right Light Recycler](#) to find locations near you.



How much do LEDs cost?

Most are between \$10 and \$25. At Home Depot, Menards, Ace Hardware, Hardware Hank, Batteries Plus, and other locations in Xcel Energy service territory, prices on LED and CFL bulbs reflect the utility rebate, making them slightly less expensive than elsewhere in the state. Find stores in Xcel Energy service territory at <http://responsiblebynature.com>.



Are LEDs and/or CFLs dimmable?

Most LEDs are dimmable using most dimmers—be sure to check lighting packaging labels. Some CFLs are dimmable, but they must be labeled as dimmable bulbs. LEDs dim more fully (nearly the full range of 0-100%) and more smoothly than CFLs (even if the CFL is labeled as dimmable). If your dimmer switch is more than 30 years old and/or gets very hot, you should replace your switch, regardless of what style of bulb you use. Older dimmer switches may cause flickering or a dim that is not very smooth dim. Upgrading to a new dimmer switch is easy and inexpensive. Choose a “universal” style, avoid dimmers that say “incandescent-only” on them. You can also opt for a dimmer that is specifically for LED or CFLs, but this is not necessary, and pay attention to the maximum wattage specified for the new dimmer switch to be sure it is enough to accommodate the sum of current and future light bulb wattages on that switch.



What makes dimming a dimmable LED/CFL bulb different than dimming an incandescent bulb?

Dimmable LED/CFL bulbs contain electronic circuitry not present in incandescent bulbs. Therefore, it is difficult to achieve the same smooth start and complete dimming range as one sees with incandescent bulbs. Universal Dimmers are designed to interact with the electronic circuitry, providing smooth low level dimming on the majority of bulbs by the major manufacturers.



Can I use an incandescent-ONLY dimmer switch on dimmable LED/CFL bulbs?

A standard incandescent dimmer can be used to dim dimmable LED/CFL bulbs; however performance may vary. In some instances, it will work perfectly and in others you may experience issues such as flickering, reduced dimming range and fluttering. The Universal Dimmers are a better option because they are specifically designed to optimize performance when paired with dimmable LED and dimmable CFL bulbs.



Can LEDs and/or CFLs work in 3-way fixtures?

Only when labeled as such. A non-3-way CFL or LED bulb will work in a fixture with a 3-way switch, but only at the highest light output level.



Can I use LEDs and/or CFLs in enclosed fixtures?

All light bulbs will have their lives shortened by being in enclosed fixtures, including incandescent, CFL, and LEDs. LEDs being the bulbs that produce the least amount of waste heat are the best choice in enclosed fixtures, but be aware they may not last as long as they are rated. Many new LED bulbs specifically say on the packaging that they are safe for enclosed fixtures.

Early bulb failure is the only danger here, not safety. On the other hand especially incandescent and to a lesser extent CFLs used in a fully enclosed fixture can present a fire hazard as well as early failure. Many fixtures that seem to be fully enclosed are not actually fully enclosed – Inspect closely for ventilation holes often at the top.

More detail: Most CFLs are A-line bulbs. These can be used in a variety of places, but Dept of Energy recommends using CFLs packaged as ellipsoidal reflectors (type-ER) in recessed fixtures. Use reflector (type-R) or parabolic reflector (type-PAR) CFLs for flood and spotlighting.



Do LEDs work outside?

Yes, LED bulbs work great outside. Unlike CFLs, which take a long time to come on in the cold and can be dimmer or bluish in color, LEDs come on instantly and create the same light level at any temperature.



Do CFLs or LEDs cause fires?

Unfortunately, sensationalized stories have scared many off from the use of high efficiency lighting. CFLs and LEDs are far safer than incandescent and halogen bulbs. 20% of home fires originate from lighting- typically when a flammable item (fabric, dead bugs, wall or ceiling features, etc.) comes in contact with high temperatures from any bulb or when the filament in a halogen or incandescent bulb breaks and causes a spark that ignites flammable vapors or materials. Halogen bulbs present the highest risk, as they have the highest operating temperature, followed by incandescent, followed by the much lower risk of CFLs. Aside from the extremely rare fire from manufacturing defect (8 total fires reported), LEDs present basically no fire risk. (National Fire Protection Association)



My CFLs never last the 10 years they're supposed to. Why is that?

It could be a number of reasons. The most common reason is that the bulbs are not very high quality and/ or they are operating at too high of temperatures because of being partially or fully enclosed. Look for ENERGY STAR labeled bulbs, which tend to last longer and be of higher quality. Also, CFLs should not be used with

dimmers unless designated as such. CFLs life span will also shorten somewhat if you turn them on and off frequently, but don't let that stop you from turning the light off!



Does the mercury used in CFLs outweigh the environmental good from their use?

The average CFL contains 5 mg of mercury, of which less than 1 mg is released if broken. Even considering this, because electricity generation is also a source of mercury pollution and CFLs use much less electricity, operating a CFL bulb results in a third of the total mercury pollution as powering an incandescent bulb.

Light Bulb Pros (+) and Cons (-)

LEDs

- + Saves 85% on energy costs over incandescent
- + Lasts 25 times longer than incandescent
- + Great for dimmed, recessed and enclosed fixtures (low bulb heat)
- + Performs well in cold temperatures
- + Instantly turns on at full brightness
- + Dimmable from 10-100
- Contains electronics that make recycling a good idea, though not required by law
- Higher bulb cost

CFLs

- + Saves 75% on energy costs over incandescent
- + Lasts 10 times longer than incandescent
- Short warm-up period to full brightness (do not turn on instantly)
- Contains mercury (recycling required by law; there may be a recycling cost)
- Bulb breakage in home requires careful clean-up due to mercury content
- Only dimmable if labeled as such
- Performs poorly in cold temperatures
- Recessed and enclosed fixtures reduce bulb life
- Less dimmable range of 20-100
- Do not dim as smoothly as LED or incandescent
- CFLs strobe/flicker near the end of their life

Detailed Cost Calculations

Assumptions	Units	LED	CFL	Incand	<i>Notes</i>
Residential Electric Rate	\$/kilowatt-hour	\$0.1135	\$0.1135	\$0.1135	1
Daily Lighting Use	hours/day	3	3	3	2
Cost Comparison Period	years	20	20	20	3
Replacement Time Cost	\$/replacement	\$5.00	\$5.00	\$5.00	4
Bulb Lifetime	hours	25,000	10,000	1,000	5
Inputs					
Inputs	Units	LED	CFL	Incand	<i>Notes</i>
Power Consumption	watts	10	13	60	6
Product Cost per Bulb	\$	\$16.00	\$3.00	\$0.75	7
Background Calculations using Assumption and Inputs					
Background Calculations using Assumption and Inputs	Units	LED	CFL	Incand	<i>Notes</i>
Annual Energy Costs	\$/year	\$1.24	\$1.62	\$7.46	8
Bulb Lifetime	years	22.83	9.13	0.91	9
Number of Bulb Replacements during 20-yr Period		0	2	21	10
Over 20 years					
Over 20 years	Units	LED	CFL	Incand	<i>Notes</i>
Initial and Replacement Bulb Costs	\$	\$16.00	\$9.00	\$16.50	11
Replacement Time Costs	\$	\$0	\$10.00	\$105.00	12
Energy Costs	\$	\$24.86	\$32.31	\$149.14	13
Total Costs		\$40.86	\$51.31	\$270.64	14