

# LED Basics and Comparisons



There are many choices when it comes to lighting. Due to technological advancements and federal regulations, inefficient lighting is being phased-out and replaced with more efficient alternatives.

LEDs, or light emitting diodes become illuminated by the movement of electrons through a semiconductor material. LEDs have transformed the lighting industry, providing increased energy efficiency in a multitude of applications. They can be integrated into all sorts of products to provide white and colored light.

## LED Benefits

- **Energy efficient**—use up to 75% less energy than incandescents
- **Emit almost no heat**—potentially reducing cooling costs
- **Longer life**—last up to 25 times longer than incandescent light bulbs, resulting in lower maintenance and replacement costs
- **Quick start-up**—consistent turning bulbs on and off does not reduce their lifespan. They work great when paired with occupancy sensors and dimmers, which can further reduce utility bills.
- **Good color rendering properties**—colors under LEDs look similar to natural sunlight
- **No mercury**
- **Potential one-to-one replacement of traditional light sources**
- **Directional**—LEDs emit light in a specific direction, reducing the need to reflect and diffuse light

## Bulb Energy Consumption





LED	CFL	Halogen	Incandescent
4W	6W	18W	25W
6W	9W	28W	40W
10W	12W	42W	60W
13W	15W	53W	75W
18W	20W	70W	100W

## Lighting Comparisons

The following tables can be used to compare bulb, tube and exterior lighting. As displayed, LEDs are the most efficient lighting choice and are now available in every lighting application. Consider working with a lighting contractor to determine the best lighting applications for your business' needs.


### Bulbs

	Varieties	Percent more efficient than incandescent	Lifespan (hours)	Efficient Alternative
<b>LED</b>	MR16 PAR Traditional	350%-750%	25,000-50,000	
<b>CFL</b>	PAR Traditional	300-350%	10,000-12,000	LED
<b>Halogen</b>	MR16 PAR	0-30%	2,000-5,000	LED
<b>Incandescent</b>	MR16 PAR Traditional	0%	750-1,500	LED


# Exterior Lighting

	Varieties	Percent more efficient than Halogen	Lifespan (hours)	Efficient Alternative
<b>LED</b>	Pole Mount Wall Pack Soffit	120%-550%	25,000-50,000	
<b>High Pressure Sodium</b>	Pole Mount Wall Pack Soffit	150-350%	20,000-30,000	LED
<b>Metal Halide</b>	Pole Mount Wall Pack Soffit	200-250%	7,500-20,000	LED
<b>Halogen</b>	Pole Mount Wall Pack Soffit	0%	2,000-5,000	LED



# Tubes

	Varieties	Percent more efficient than Halogen	Lifespan (hours)	Efficient Alternative
<b>LED</b>	Tube Troffer	Up to 85%	25,000-50,000	
<b>T5</b>	Tube Troffer	40-75%	20,000-30,000	LED
<b>T8</b>	Tube Troffer	20-45%	15,000-25,000	LED
<b>T12</b>	Tube Troffer	0%	7,500-20,000	LED T8



# LED Purchasing

Consider each of these factors when selecting LEDs

<b>Fit</b>	Match Bulb with fixture base
	Position LEDs in properly ventilated fixture (may require changing driver or fixture)
<b>Shape</b>	Can impact light distribution
<b>Wattage</b>	Generally, a 10W LED = 60W traditional bulb
<b>Life Span</b>	The time period the bulb lasts for
<b>Dimming/ Photo Sensors</b>	Saves energy
	Extends lifespan
	Lights run cooler
<b>Lighting Temperature</b>	The lower the number, the warmer the light (measured in kelvin or 'k')
<b>Brightness</b>	The higher the number, the brighter the bulb (in lumens, 'lm')

# LED Types

- 
LED Diode
- 
Screw-In
- 
Recessed Can
- 
Troffer
- 
Exterior Wall Pack

## Recycling

Recycling CFLs and fluorescent bulbs helps prevent the release of mercury into the environment and allows materials in the bulbs to be reused. The following table includes locations that accept spent CFLs and fluorescent bulbs.

Business	Address	City	Phone
Larimer County Household Hazardous Waste Facility	5887 S. Taft Hill Road	Fort Collins	970-498-5773
Lowe's	4227 Corbett Dr.	Fort Collins	970-663-9910
	2910 Arapahoe Rd.	Loveland	303-524-8159
Ace Hardware	1001 E harmony Rd B	Fort Collins	970-223-9273
	215 S College	Fort Collins	970-224-4437
	269 E 29 <sup>th</sup> St	Loveland	970-663-2230
Batteries Plus	1439 N Denver Ave	Loveland	970-776-1515
	1107 W. Drake Suite E3	Fort Collins	970-206-0206
Home Depot	4502 John F Kennedy Pkwy	Fort Collins	970-206-0774