

LED Basics and Comparisons



SUSTAINABLE
BUSINESS PROGRAM

About SAGE

The *Save. Act. Grow. Earn.* (SAGE) Sustainable Business Program is your "one-stop-shop" for business sustainability. SAGE provides FREE and confidential advice, assistance, and resources that integrate sustainability into your business practices to help you identify and act on relevant economic, environmental, and social opportunities

BENEFITS



Save Money

Cut costs through operational efficiency



Gain Recognition

Responsible practices benefit customer and employee relations



Reduce Footprint

Minimize use of critical resources to benefit human health and the environment

LED Overview

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 Comparison

This chart breaks down common light bulb types by their energy consumption. For example, a 4W LED bulb is equal to a 6W CLF.

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

LED Types

LED Diode



Screw-In



Recessed Can



Troffer






Exterior Wall Pack



Lighting 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. 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.

Bulbs

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





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Exterior Lighting

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

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Tubes

Type	Varieties	Percent more efficient than T12	Lifespan (hours)	Efficient Alternative	Example
LED	Tube Troffer	up to 85%	25,000-50,000		
T5	Tube Troffer	40-75%	20,000-30,000	LED	
T8	Tube Troffer	20-45%	15,000-25,000	LED	
T12	Tube Troffer	0%	7,500-20,000	LED T8	

Exit Signs

Exit Sign Lighting Technology	Annual Energy Use	Annual Energy Cost	Lamp Service Life
LED	44kWh	\$4	10+ years
Fluorescent/CFL	140kWh	\$11	11 months
Incandescent	350 kWh	\$28	2.8 months

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LED Purchasing

Purchasing Factors

Consider each of these factors when selecting LEDs

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

Purchasing Locations

LED lighting can be found commonly at hardware, home improvement, home good stores, lamp and lighting, electronics, and large retail stores. It is recommended to do a web search to find the retailer that best fits your needs and carries your desired lighting fixtures. Below is a list of suggested retailers in the Westminster Area:

- Lamps Plus, Batteries Plus Bulbs, and LED Lighting Specialists
- ACE Hardware, The Home Depot, and Lowe's
- At Home, Target, Hobby Lobby, and Walmart

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Financing and Rebates

Xcel Energy provides many rebates on most common LED lighting fixtures. Your business can get [LED Instant Rebates](#) on select LED screw-in bulbs and LED retrofit fixtures when you purchase them from a participating distributor. For more detailed information on rebates and financial incentives see the [SAGE Website](#) and/or Xcel Energy's [LED Lighting Rebate Guide](#) and [website](#).

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
Boulder County Hazardous Materials Management Facility	1901 63rd St.	Boulder	(720) 564- 2251
Home Depot	7125 W 88th Ave	Westminster	(303) 420-2498
Home Depot	12171 Sheridan Boulevard	Broomfield	(303) 410-0861
Ace Hardware (Standley Shores)	9979 Wadsworth Pkwy #200	Westminster	(720) 443-5800
Mile High Ace Hardware and Garden	2700 W 104th Ave	Westminster	(303) 531-2370
Sheridan Ace Hardware	5017 W 64th Ave	Arvada	(303) 426-1035
Lowe's	5600 W 88th Ave	Westminster	(720) 540-9334
Lowe's	13650 Orchard Pkwy	Westminster	(303) 453-8040
Batteries Plus Bulbs	10339 N Federal Blvd Suite #400	Westminster	(303) 438-0009

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