

Understanding LED



Light Emitting Diode
A solid state semiconductor
device that converts electrical
energy directly into light.

Introduction

LED technology is advancing quickly. Sometimes, there is confusion regarding the information about LED. By comparing LEDs with other common used light sources, this brochure helps you to achieve a better understanding of the realities of LED lighting.

Comparisons

General Comparison

	LED (MP LED72)		Compact Fluorescent Lamp (GE 13W CFL)	Halogen Lamp (Philips MR16 50W EXN 36°)	Incandescent Lamp
	Cool White	Warm White			
Energy Use	12W	12W	13W	50W	60W
Efficacy	100 lm/W	80 lm/W	63 lm/W	16 lm/W	14 lm/W
Life Time in Hours	50,000	50,000	8,000	3,500	1,000
Life Time in Years [◇]	17.1	17.1	2.7	1.2	0.3
Use of Electricity in 50,000 Hours	12W x 50,000h = 600kwh	12W x 50,000h = 600kwh	13W x 50,000h = 650kwh	50W x 50,000h = 2,500kwh	60W x 50,000h = 3,000kwh
Cost of Electricity in 50,000 Hours [†]	600kwh x \$0.14/kwh = \$84	600kwh x \$0.14/kwh = \$84	650kwh x \$0.14/kwh = \$91	2,500kwh x \$0.14/kwh = \$350	3,000kwh x \$0.14/kwh = \$420
Maintenance Labor Cost in 50,000 Hours [‡]	0	0	1.67 x 5 lamps = \$8.35	1.67 x 13 lamps = \$21.71	1.67 x 49 lamps = \$81.83

[◇]Based on the usage of 8 hours/day

[†]Electricity rate \$0.14/kwh.

[‡]Labor cost is \$1.67 per lamp, which is based on 4min re-lamping time per track light.

Aspects Comparison

LEDs to Fluorescent Lamps

	LED	Fluorescent
Dimmable	Yes	Yes (Color shifting to cooler light temperature)
Compact Light Source	Yes	No
Blink and Flutter Problems	No	Yes
UV Radiation	No	Yes
Mercury Pollution	No	Yes
Breakage	No	Yes

Rail system with 6, 50W MR16 Halogen Lamps vs. rail system with 6, 12W MP LED72

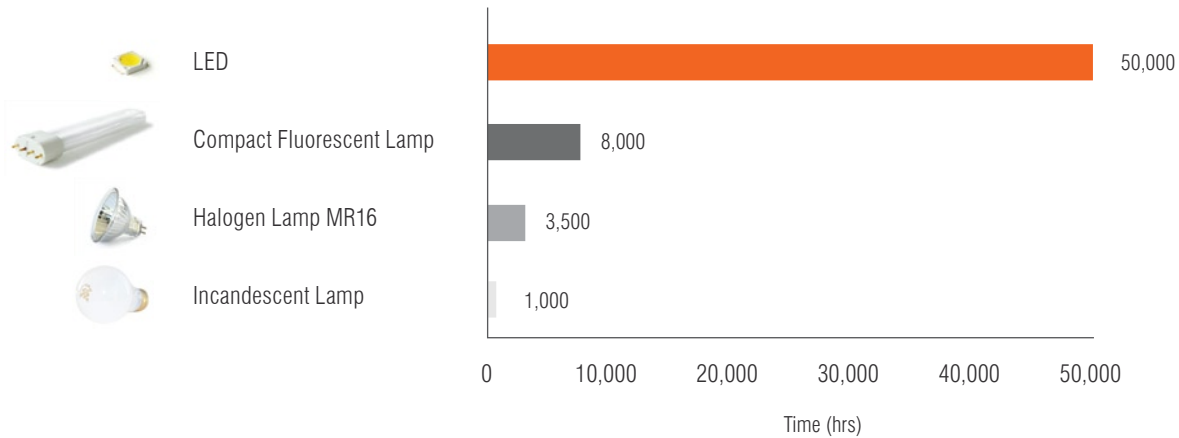


	50W MR16 x 6	12W MP LED72 x 6	
		Cool White	Warm White
Total Lumens	5100 lm	5400 lm	4320 lm
Total Energy Use*	300W	72W	72W
Cost of Electricity in 3,500 Hours	\$108.15	\$35.28	\$35.28

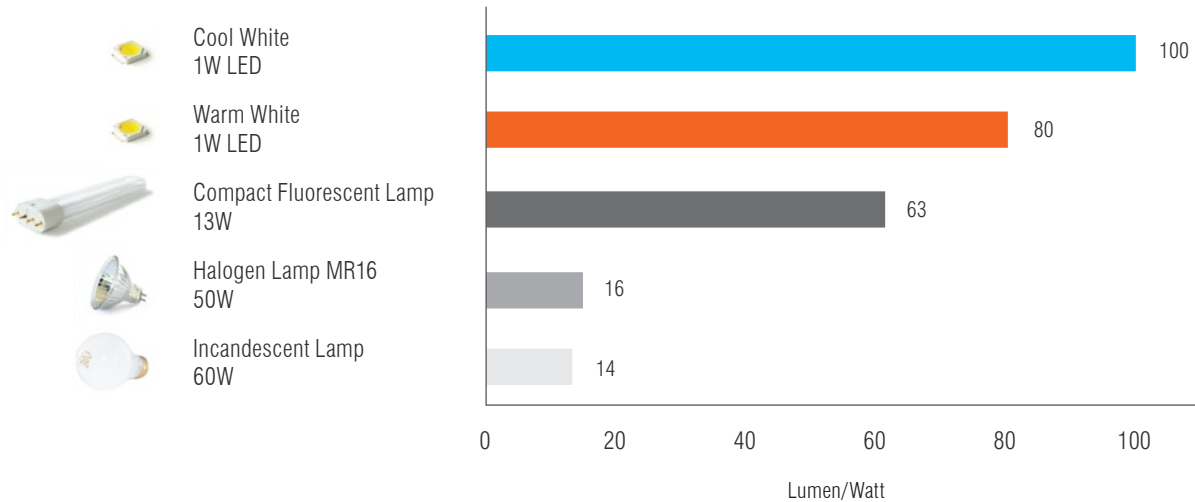
*Fixture consumption only

Product Life Time Comparison

(70% lumen maintenance)



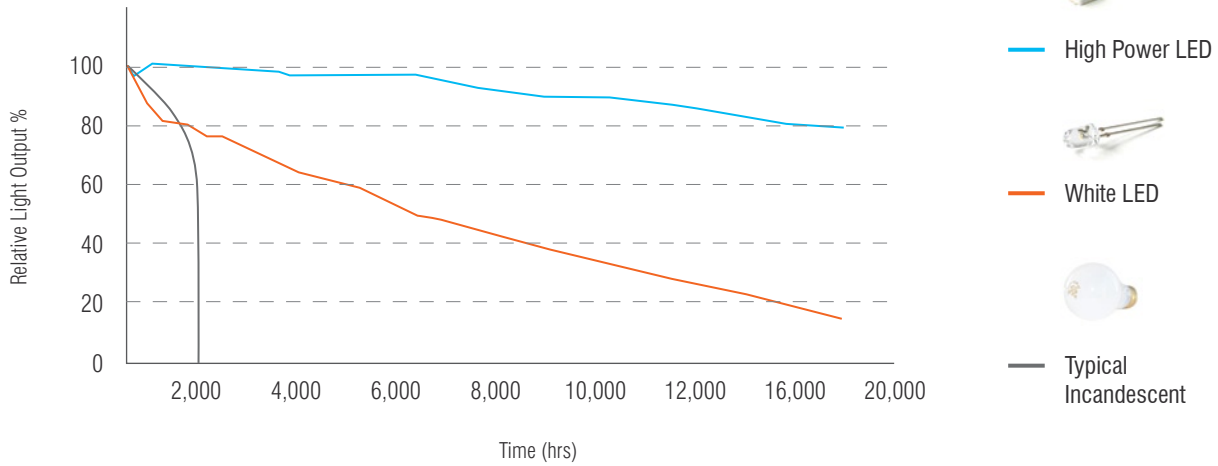
Efficiency Comparison



Light Output Comparison

(Information partially provided by Philips Lighting)

Unlike typical conventional light sources, LEDs do not dramatically burn out and cease to function.



Color Rendering Index (CRI) Comparison

CRI is a rating from 0 - 100, describes how a light source makes the color of an object appear to human eyes and how well subtle variations in color shades are revealed. The higher the CRI rating is, the better its color rendering ability.

Below is a comparison between depiction with high CRI (left) and low CRI (right).

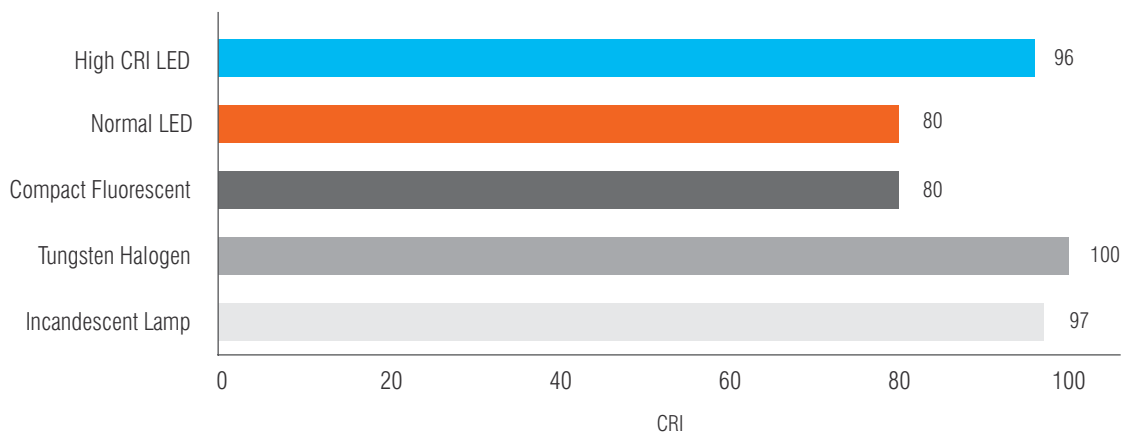
High CRI



Low CRI



*For illustration purposes only.



High CRI LED has higher CRI than compact fluorescent lamp.

(Information is partially provided by NRC-IRC)

Environmental Impact

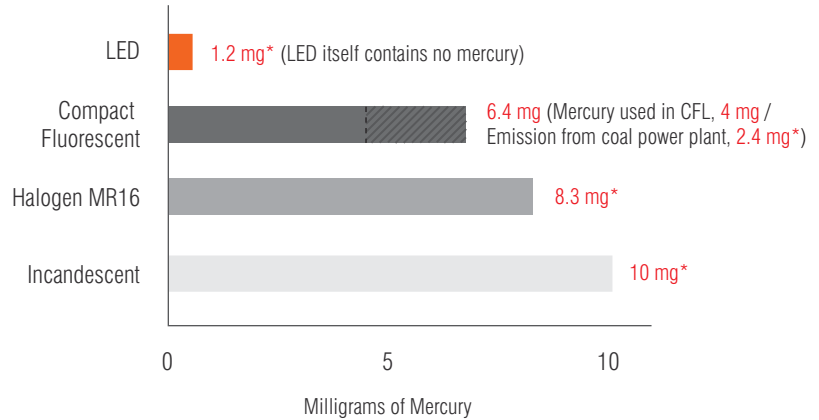
Mercury Emissions by Light Source

(Evaluated over a five-year life)

Since coal power in the United States accounts for approximately 50% of all power production, by using the electricity generated from coal, there is an emission of mercury as well.

**By using the electricity that is generated from coal-burning power plants.*

(Information is partially provided by USEPA, June 2002)

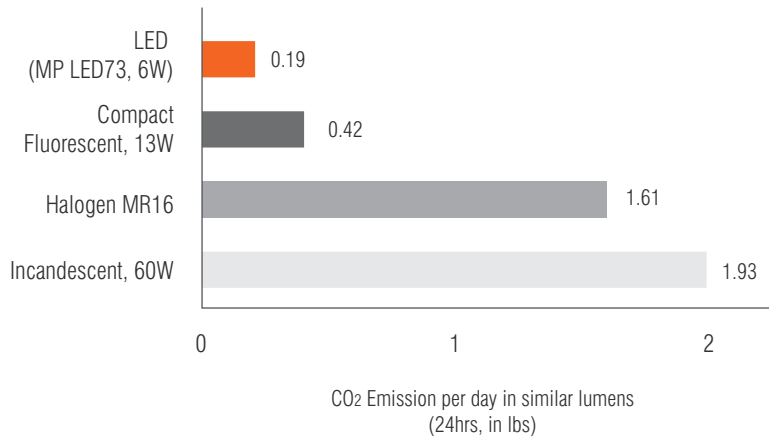


CO₂ Emission Comparison

(Based on the national average 1.34lbs/k Wh)

Most of our electrical power supplies come from burning fossil fuels, especially coal, a huge CO₂ culprit. By using such electricity, there is an emission of CO₂.

(Information is partially provided by National Geographic Society-Green Guide)



Summary

Besides the long product life and the reduced maintenance cost, LED is energy efficient, it delivers more lumens per watt over other light sources. Also, there is no mercury contained in LEDs. By using less energy, LEDs not only save money, but also limit negative impact on the environment. All in all, LED is a cost effective, reliable and clean light source.



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