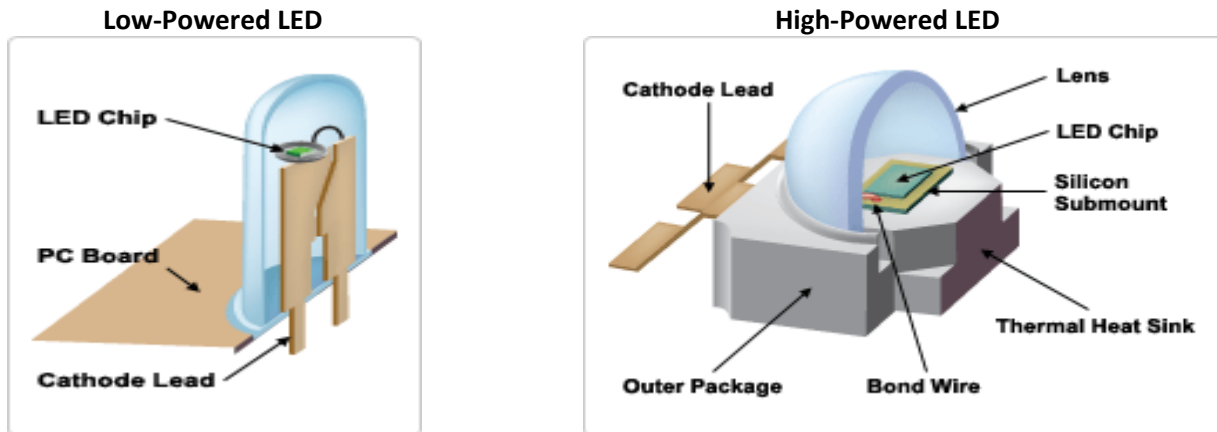


Light-Emitting Diode (LED) Overview - DRAFT

LED Overview

LEDs are small light sources that become illuminated by the movement of electrons through a semiconductor material. LEDs can be integrated into many products to provide white and colored light, such as flashlights, light bulbs, and integrated light fixtures. Low-Powered LEDs are used to draw attention to something, such as an exit sign, a green power button on a computer, or a red blinking light on a video camera. High-Powered LEDs are used to illuminate an area. Energy Star LED lighting uses multiple illuminator LEDs inside a fixture to produce white light.



Advantages of LEDs over other lights

- Directional light emission: Because LEDs are mounted on a flat surface, they emit light hemispherically, rather than spherically, reducing wasted light and enabling light to be “aimed.”



- Near monochromatic light: An individual LED chip emits light in a specific wavelength, which makes them efficient for colored light applications.
- Size: LED lights can be very compact and low profile, an advantage where space is at a premium.
- Breakage resistance: LEDs use no breakable glass or filaments, so they are resistant to vibration and well suited to locations where breakage is an issue.
- Cold temperature operation: LED performance actually increases as operating temperatures drop.
- Rapid cycling capability: Traditional light sources will burn out sooner if switched on and off frequently, but LED life and lumen maintenance is unaffected by rapid cycling.
- Controllability: Some LEDs are compatible with electronic controls to change light levels and color characteristics.
- LEDs do not emit infrared or ultraviolet radiation, and do not contain mercury.
- LEDs turn on instantly without run-up time or re-strike delay.

Energy Star Certification Requires for LEDs

- Brightness is equal to or greater than existing lighting technologies (incandescent or fluorescent) and light is well distributed over the area lighted by the fixture.

- Light output remains constant over time, only decreasing towards the end of the rated lifetime (at least 25,000 hours or 22 years based on use of 3 hours per day).
- Excellent color quality. The shade of white light appears clear and consistent over time.
- Efficiency is as good as or better than fluorescent lighting.
- Light comes on instantly when turned on.
- No flicker when dimmed.
- No off-state power draw. The fixture does not use power when it is turned off, with the exception of external controls, whose power should not exceed 0.5 watts in the off state.

For additional [LED Overview information](#) visit Energy Star.

ComEd’s Smart Ideas for Your Business Program

ComEd’s Smart Ideas for Your Business program has defined specifications that LED lights must meet to be eligible for incentives. These specifications are detailed on the application form. All LEDs must be tested to IESNA LM-79-08, which is an industry standardized test procedure that measures the performance qualities of LED luminaires and integral lamps by a third-party DOE-accredited lab and carry a warranty on the light source and power supplies of three years or more.

	ComEd’s Business Instant Lighting Discount Program	ComEd’s Prescriptive Incentives Program
LED Product	Lamps	Fixtures
Incentive	Applied directly by distributor	Requires ComEd Application
Certification / Qualification	IESNA LM-79-08	IESNA LM-79-08 & DLC

ComEd’s Business Instant Lighting Discount (BILD) Program

ComEd offers incentives on energy-efficient lamp types through participating electrical distributor trade allies. Incentives are available on reduced wattage lamps that can be installed as a direct replacement for standard lamps without having to rewire the fixture.

LED Lamp Categories

Category	Lamp Types	Product Warranty	Lumens / Watt	CRI	Other
Specialty	Candelabras, Globes, MR Lamps	3 Years	>= 40	>= 80	
Medium Based Products	A Lamp, PAR Lamp, R Lamp	3 Years	>= 52	>= 80	Meets Energy Star performance requirements
Trim Kit	Any retrofit trim kit to convert a recessed down-light from incandescent to LED using an Edison base socket	3 Years	>= 40	>= 40	

Participating Distributors

The following is a current list of ComEd approved distributors in Chicago. New distributors are added on a regular basis so check [ComEd’s site](#) for an up-to-date list.

Store	Address	City	State	Zip
Active Electric	4240 W. Lawrence	Chicago	IL	60630
Advance Electric	263 N. Oakley	Chicago	IL	60612
Bright Electrical Supply	217 N. Western	Chicago	IL	60612
Brook Electrical Supply	3423 N. Drake	Chicago	IL	60618
E. Sam Jones	6226 S. Oak Park	Chicago	IL	60638
Evergreen Supply Company	9901 S. Torrence	Chicago	IL	60617

Store	Address	City	State	Zip
Evergreen Oak	3300 N. Sheffield	Chicago	IL	60657
Graybar	539 W. 14 th Place	Chicago	IL	60607
Grainger	6450 S. Austin	Chicago	IL	60638
Grainger	2356 S. Ashland	Chicago	IL	60608
Grainger	2221 N. Elston	Chicago	IL	60614
LED Light Energy	207 E. Ohio St., Ste. 304	Chicago	IL	60611
Modern Lighting Technologies	1751 W. Grand	Chicago	IL	60622
Steiner	2415 W. 19 th Street	Chicago	IL	60608

ComEd's Prescriptive Incentives Program

DesignLights Consortium

All LED fixtures available for ComEd Prescriptive Incentives Program are DesignLights Consortium (DLC) qualified. The DesignLights Consortium (DLC) Qualified Products List (QPL) Members, who are utilities and energy-efficiency programs throughout the United States, have been asked by customers and suppliers to provide incentives for solid-state lighting fixtures, most of which are not Energy Star labeled. These Members are interested in providing incentives for high-performing LED products that meet individual sponsor criteria, since 2009. DLC QPL Members intend to ensure that only high-quality, high-performance, tested and verified LED products will be eligible for rebate participating programs.

For a product to receive a ComEd incentive it must be listed on [DesignLights™ Consortium Qualified Products list](#).

ComEd's Indoor LED Lighting Incentives

ComEd Indoor LED Lighting Retrofit Scenario	Incentive Amount
High-bay, Low-bay, and Aisle LED Fixtures Replacing ≤175W HID Baseline	\$20 / fixture
High-bay, Low-bay, and Aisle LED Fixtures Replacing 176-250W HID Baseline	\$30 / fixture
High-bay, Low-bay, and Aisle LED Fixtures Replacing 251-350W HID Baseline	\$50 / fixture
High-bay, Low-bay, and Aisle LED Fixtures Replacing >350W HID Baseline	\$75 / fixture
Wall-wash LED Luminaire	\$15 / fixture
LED, T-1 or Electroluminescent Exit Signs	\$20 / fixture
LED Refrigerated Display Case Lighting (Closed Cases)	\$30 / door
LED Refrigerated Display Case Lighting (Open Cases)	\$10 / linear foot of case
LED "Open" Sign	\$40 / sign
LED Channel Sign <2 feet Interior	\$12 / letter
LED Channel Sign >2 feet Interior	\$30 / letter

Reference [ComEd's Indoor Lighting Incentive Worksheet](#) for additional details.

ComEd's Outdoor LED Lighting Incentives

Area	ComEd Outdoor LED Lighting Retrofit Scenario	Incentive Amount
Pole/Arm-Mounted Decorative LED Luminaires	Replacing ≤175W HID Baseline	\$45 / fixture
	Replacing 176-250W HID Baseline	\$60 / fixture
	Replacing 251-400W HID Baseline	\$90 / fixture
	Replacing >400W HID Baseline	\$125 / fixture
Pole/Arm-Mounted Decorative LED Luminaires	Replacing ≤175W HID Baseline	\$45 / fixture
	Replacing 176-250W HID Baseline	\$60 / fixture
	Replacing 251-400W HID Baseline	\$90 / fixture
Parking Garage LED Luminaires	Replacing ≤175W HID Baseline	\$45 / fixture

Area	ComEd Outdoor LED Lighting Retrofit Scenario	Incentive Amount
	Replacing 176-250W HID Baseline	\$60 / fixture
	Replacing 251-400W HID Baseline	\$90 / fixture
Other Outdoor and Garage Lighting	Canopy LED Luminaire	\$50 / fixture
	Outdoor Wall-Mounted Area LED Luminaire	\$45 / fixture
	LED Bollard	\$15 / fixture
LED Signage	Outdoor LED Channel Sign ≤2 feet	\$12 / letter
	Outdoor LED Channel Sign >2 feet	\$30 / letter

Reference [ComEd's Outdoor Lighting Incentive Worksheet](#) for additional details.

LED Exit Signs

- LED exit signs use ~44 kWh of energy per year; fluorescents ~140 kWh; incandescent bulbs ~350 kWh.
- LED exit signs also increases safety since LEDs allow for signs with higher lumen output and greater contrast against backgrounds than conventional exit signs.
- Requires less maintenance, as the lifespan of LEDs is 50,000 hours, or around six years, when operated 24/7. This compares with a lifespan of about a year for fluorescent lamps and less than a year for incandescent lamps.

Retrofit Exit Signs with LEDs³

For a typical 600-bed hospital with 300 exit signs, replacing traditional 36 W signs with 5 W LED signs results in an **annual savings of about \$14,755**.
 Project Total Cost: \$17,100, (\$57 per sign)
Payback: 1.15 years

Read the US DOE's publication for additional [Energy-Efficient Hospital Lighting Strategies](#)

LED's in Patient Exam Rooms

- TBD

LED Surgical Lamps

- Based on a [Pacific Northwest National Laboratory study](#), switching to LED surgical lamps from halogen surgical lamps could yield an estimated 49% average reduction in connected load.
- Additional study information: According to the American Hospital Association, there are approximately 49,141 operating rooms and 163,803 surgical lamps in the United States. John D'Angelo of the Cleveland Clinic estimates that surgical lamps operate at roughly 2,150 hours/year. The Pacific Northwest National Laboratory reviewed the major surgical luminaires and found that the average rated initial efficacy is 1848 lx/W for LED, versus 699 lx/W for halogen. These values should be scaled by 70% and 95% for LED and halogen, respectively, for apples-to-apples comparison of maintained efficacy.