

# A Brighter Future: A Brief Look at the Promising Role of LED Lighting



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In the last three years, there has been increasing excitement over the use of visible light emitting diodes (VLEDs) in general lighting. Once relegated to function as indicator lights in electronics or in mobile phones, VLEDs or LEDs have now advanced to a point where they are fast becoming an attractive alternative to conventional light sources. As global energy demands increase and a global push for implementation of greener technology gains traction, VLEDs are gearing up to take center stage as a serious contender that could revolutionize the ways in which we address our lighting needs.

So why all the buzz about LEDs?

In terms of power consumption, LEDs require less current and voltage to operate than conventional light sources and thus, less energy. For example, running a 7 watt LED for eight hours a day, every day for a year at a rate of \$0.10/kW-hour would cost \$2.04 per year. A 50 watt incandescent would cost \$17.52 per year under these same operating conditions. LEDs have long life spans of 35,000 to 50,000 hours, so they almost never have to be replaced. By comparison, incandescent bulbs typically have a lifespan between 7,500 to 10,000 hours, while compact fluorescents (CFL) last from 6,000 to 15,000 hours. For LEDs, these lifespan ratings mark the point when the brightness of an LED has reached 70% of its original value. Unlike incandescents, LEDs do not burn out, but rather dim over time. And unlike CFL bulbs that contain mercury, LEDs do not contain hazardous chemicals that can harm the environment or people.

LEDs are valued for their energy efficiency. Measured in lumens/watt, luminous efficacy is a key metric of LEDs that the Department of Energy predicts will increase to 160 lumens/watt by 2025. In regular incandescent light bulbs, roughly 90% of the energy given off is lost in the form of heat, and the light itself is emitted in all directions. LED's, however, generate comparably less heat and emit light in a specific direction.

But just how practical is LED technology today and how is it being used? Chances are good that many of the outdoor lights and traffic signals in the city you live in have been outfitted with LEDs. Working together under the LED City program, government entities and corporations are promoting the rapid deployment of LEDs in cities worldwide. According to the LED City Web site ([www.ledcity.org](http://www.ledcity.org)), installing LED lighting could save cities 40% to 70% of the electricity used in certain applications, such as parking lots and street lighting. Cities including Los Angeles, Ann Arbor, Toronto, Austin, and Torrance, Italy are just some of the cities across the globe signing up for the program.

Many cities like San Jose and Los Angeles have already replaced the majority of high pressure sodium vapor lights used in street lamps with LEDs. This has the potential to reduce the energy costs for these cities by up to 80% and ensure a quick return on investment in just two years.

Even the Pentagon has gone green. In January of this year, it was revealed that the Department of Defense ordered more than 4,000 LED fixtures to be installed in one of its wings. These fixtures will reduce power consumption by 22% and pay for themselves in four years.

As a relative newcomer to the general lighting industry, LEDs' biggest hurdle to becoming the de facto lighting technology of choice is cost. But as the cost of manufacturing LEDs comes down over time, the technology is continuously improving, making them more affordable and even more energy efficient. In many cases, the high initial cost of purchasing LEDs is more than offset by the savings in electricity reaped over time.

LEDs may appeal to our pocketbooks, but the technology also helps to lessen our impact on the environment. Approximately 70% of the electricity generated in this country comes from coal-fired power plants, which produces large amounts of green house gas emissions. With no guidelines in place to limit green house gas emissions, U.S. CO2 emissions are expected to increase from estimated levels of 5,991 million metric tons in 2007 to 6,414 million metric tons in 2030,

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according to the U.S. Department of Energy's Annual Energy Outlook for 2009. When you consider that roughly 20% of the electricity generated in this country is used for lighting, switching to LEDs can help reduce up to 258 million metric tons of carbon emissions, according to an estimate by the Department of Energy. With efficient sources of lighting like LEDs readily available, the continued widespread use of conventional lighting seems less and less sound.

Many countries contain rural or isolated areas that have no electrical infrastructure; this is one aspect where LEDs may have great potential. Royal Philips Electronics is supplying a handheld, solar-powered LED reading light in Africa that provides a reliable and inexpensive means of illumination. In Africa, where an estimated 500 million people have no electricity in their homes, any activity requiring light ceases when the sun goes down. With no access to the electrical grid, this means that children with homework must rely on illumination provided by candles or oil-based lamps, which pose a significant fire risk and health hazard. With the help of innovative companies, LEDs have the potential to improve the quality of life for many more people around the globe.

The future of LEDs seems – pardon the pun – very bright indeed. Ultimately, the success of the technology rests upon us, the consumer, who must decide if the initial cost of investment is worth the long term savings. Continuous improvements in brightness, efficiency and design, in tandem with lowering production costs, will allow LEDs to sustain our energy needs in a world where energy costs and environmentally sound decisions must compete for our continuous attention.

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