



## Start of the New Lighting Era



THE PROGRESSIVE REVOLUTION  
EFFICIENT FOR A NEW ERA



SAVE MONEY  
+ SAVE ENERGY

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In 2007, the United States Congress passed the bipartisan Energy Independence and Security Act (EISA) establishing a 25% reduction in lighting energy use nationwide and requiring the use of bulbs that meet the new efficiency standards beginning in 2012 and in use by the end of 2014. Due to these new standards, replacements for the previous common light bulbs sold in the USA now use about 25% to 80% less energy than the traditional incandescent bulbs. This new lighting era has introduced energy efficient light bulbs such as halogen incandescent bulbs, compact fluorescent lamps (CFLs), and light emitting diodes (LEDs) as the choice of lighting alternatives for general, residential, commercial, and industrial use. These lighting choices are not all equal as reflected in the above percentage of range for energy use.

Although all three of the above save energy, their use, life span, cost efficiency, safety, and disposal are very different. The halogen incandescent bulbs are initially

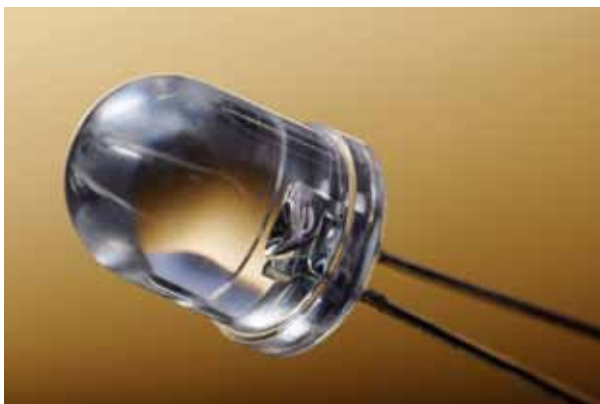
**LED bulbs are close to a perfect technology and are called a 'solid state lighting' technology or SSL**

inexpensive. They look and function similar to traditional incandescent bulbs. Overall, their energy efficiency is only about 25% better than traditional outdated bulbs and that percentage of energy efficiency enables them to barely meet the EISA standards. Their life span is slightly longer than traditional incandescent bulbs and general recycling is the sustainable end to their replacement which occurs almost as often as replacing traditional bulbs.

CFLs are small curly versions of the long tubular fluorescents to which we are accustomed that often illumine our work spaces, office environments, commercial, educational, industrial, and medical facilities. Being initially inexpensive to purchase, CFLs use about one quarter less electricity than traditional incandescent bulbs and last about ten times longer. That same CFL has about one third of the energy usage of a similar light output halogen incandescent bulb. However, CFLs contain a small amount of toxic mercury which is released if the bulb breaks. Because of this potential hazard, all CFLs should be handled and disposed of carefully with a special recycle program specific to their mercury content. CFLs take a few seconds to 'warm up' to full light potential, whereas halogen and LEDs are immediately illuminated once the light is switched to on. Switching CFLs on and off quickly can cause the bulbs to burn out. Some people claim that CFLs produce an unpleasant color thus creating headaches with long exposure to that lighting. Also, like traditional incandescent bulbs, CFLs get hot to the touch and emit heat that can alter room temperature and affect air conditioning and heating function. This heat creates wasted energy that consumers simply throw away. Although CFLs are energy savers, they have served their purpose as a buffer between the past and the future needs of lighting. LEDs are the lights blazing the roadways and illuminating our world into the future.



In the past, LEDs have been used in digital clocks, holiday lights, flashlights, traffic signals, and the alert light in cell phones signaling a new voicemail message. The potential technology contained within these light-emitting diodes (LEDs) has exploded into a range of use that offers the least use of energy, the safest form of lighting, and the longest lifespan of light provision. LEDs use about one-sixth the energy of a traditional incandescent bulb. Research has indicated that LED light bulbs are close to a perfect technology and are called a “solid state lighting” technology or SSL. Instead of emitting light in the format of a vacuum, as in a traditional incandescent light, or in the format of a gas, as in a CFL light, an SSL is able to emit light from a piece of solid matter which is also a semiconductor and produces light when electrons move around that semiconductor structure. This process creates reduced energy usage, produces less heat, and is more efficient than the vacuum filament method of incandescent bulbs and CFLs plasma tube design. LED lighting provides immediate illumination, the bulbs stay cool to touch, and they emit far less heat while in use.



LEDs are a more stable light source that lasts far longer than other light bulbs. They often last 75,000 hours over the CFLs 10,000 maximum hours of lifespan, thus requiring less replacement. LEDs are environmentally safe to use, dispose, and recycle, because they are made of aluminum and do not contain any toxic elements. Depending on usage, LEDs can last for 20 years once installed. Therefore, replacement and recycling are minimized. The reduced kilowatt hours using just one LED bulb versus a traditional incandescent bulb can reduce hundreds of pounds of carbon dioxide emission and create a healthier future environment. LED lighting can be adjusted to a full spectrum of color for consumer use.

Because LEDs are potentially electronic components, they are programmable and can be connected efficiently with radio and sensor chips to create wide span wireless networks. Wi-Fi connected LEDs can be operated using a smart phone. The development of this technology is not only ecologically and environmentally safe, it also opens multiple possibilities for use that includes monitoring crime, power outages, water main breaks, and coordination for disaster relief. In some installations, LEDs can be computer monitored instead of being manually checked, thus further reducing maintenance costs. Finally, because LEDs produce more light per watt and last longer than CFLs and traditional incandescent lighting, they also provide savings of 30% to 70% in the cost of electricity use annually. LEDs have the capacity to be dimmed down. Because of the intense bright light that they are designed to provide, dimming is often unnoticed. This feature provides the advantage of further cost savings in reduced electricity usage.



**LEDs produce more light per watt and last longer than CFLs and traditional incandescent lighting = 30 to 70% savings in electricity costs annually.**

LEDs come with longer warranties than the two prior lighting systems and usually last far longer than the warranty, therefore saving replacement costs. Although LED lighting may cost more initially, rebate and incentive programs can assist consumers. Over long term use, the



reduced energy, replacement, and maintenance costs, as well as the increased ecological and environmental benefits, demonstrate that using LED lighting is not only a wise decision, it is economically the most effective and efficient solution to today's lighting needs.



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