

LED lighting

What's the big deal with these things anyway?!

Light Emitting Diodes (LEDs) are the latest and most exciting technological advancement in the lighting industry since the invention of the electric light bulb. Often referred to as “solid state lighting,” LEDs are a compact, rugged, long-lasting and extremely energy-efficient lighting source. There are many reasons why LEDs are far superior to older generation lighting technologies; let's explore a few of LED's benefits here.

Efficiency

LED lights are amazingly efficient, consuming up to **90%** less energy than their incandescent equivalents. This means two important things. One, it takes only a fraction of the energy for LEDs to produce the same amount of lumens (light output) as a comparable incandescent or fluorescent bulb. Two, LEDs run much cooler in temperature than other lighting sources because less energy is wasted as heat. The result is a lighting source that is much more economical and safer to operate than other current lighting technologies on the market.

Save Money

LED lights are the most cost-effective lighting you can use in your home. Here is a yearly cost comparison of running three different types of equivalent output light bulbs for eight hours per day at current average electricity rates:

| <u>Lightbulb Type</u> | <u>Yearly Cost (at 8 hrs/day)</u> |
|-----------------------|-----------------------------------|
| Incandescent | \$38.55/yr |
| Compact Fluorescent | \$10.28/yr |
| LED | \$5.15/yr |

With LED lighting, additional savings in energy costs can be easily achieved by using a dimmer switch. The more the light is dimmed, the less energy it uses!

Longevity

Currently, most LEDs have a rated lifespan of 80,000 hours or more. If used for eight hours per day, that is a 27-year lifespan! Compare that to a 1,000 hour lifespan for incandescent or 8,000 hour lifespan for fluorescent, and it is easy to see why LEDs are so cost effective. They significantly lower maintenance and long-term operational costs associated with lighting.

Durability

An LED light is a tiny semiconductor chip encapsulated in an epoxy resin enclosure. This solid state construction makes LEDs more robust than traditional incandescent or fluorescent tubes full of gas. Since LEDs are constructed without fragile components such as glass tubes and filaments, LEDs are able to withstand shock, vibration, and extreme temperature far better than older technologies.

Safety

LED lights generate much less heat than older lighting technology and can be left on for extended

periods of time with reduced consequence if touched. In comparison, incandescent lighting expels 98% of the energy consumed **as heat**, making the bulbs hot to the touch (this is why they cook your brownies in Easy-Bake ovens!). LEDs reduce the potential for safety risks such as burns and fires. Additionally, LED's rugged construction reduce the risk of injuries from broken glass, and their longevity means less time on ladders and lifts to replace bulbs, reducing the risk of trips and falls.

Environmental

Aside from the obvious environmental benefits of using less energy to operate LED lighting; most LEDs are made from non-toxic materials (RoHS certified). Older lighting technologies such as fluorescent, neon, high pressure sodium, metal halide, mercury vapor and mercury arc lighting contain various forms of mercury which pose a serious danger to the environment and human health. LED's can (and should) be recycled at the end of life to recapture the materials for re-use.

Lighting Color

A significant benefit of LED technology is the near endless color options they offer. They are available in every color temperature (warm white to daylight) and in millions of color/hue variations (red, blue, green, yellow, etc.). "Tunable" LEDs allow the user to choose any color and color temperature all with a single fixture. LEDs can provide a more accurate rendering of colors in the space they illuminate, which creates an environment that feels more "natural" and comfortable than other lighting sources. Additionally, LEDs do not emit UV radiation (unless they are designed to, in the case of grow-lights), which makes them the ideal choice for environments where UV radiation can be harmful, such as museums, historical spaces, and archival spaces.

Control Options

LED technology not only revolutionized the lighting industry but also the lighting *controls* industry as well. An LED fixture is essentially a digital device operated by a built-in computer chip and can be interconnected with other fixtures to form a lighting network. In such a network, each fixture can be controlled individually or set up into groups (e.g. rooms) and can be controlled by a switch on the wall and/or by a centrally-located control hub (computer or smartphone). These LED fixtures can also be automatically controlled in a multitude of ways with the addition of various sensors. Daylight sensors monitor ambient light and respond by ramping the LED fixtures up or down depending on how much light is needed in that space. Occupancy sensors will keep the fixture on when someone is occupying the space, and turn off or dim down the light when the space is empty.

These are just a few of the many current benefits of LED lighting and, as this technology continues to advance, additional uses and benefits become clear. There is significant research around the negative effects of artificial lighting on human health and wellbeing; LED lighting technologies have shown promising results in minimizing these adverse effects due largely to the more "natural" spectrum of light LEDs emit**. Cost savings, energy savings, reduced maintenance time and expenses, improved safety, and seemingly endless lighting options... LED lighting is the lighting solution that makes the most sense.

**Caution is advised with the use of blue-spectrum LED lighting at bedtime as this spectrum of light may disrupt sleep patterns.