

Let There Be Light



In the beginning there was darkness and then came fire. It took until the 19th century to move beyond this and create artificial light. Now we may be seeing the next step in lighting development, signalling the end for incandescent light bulbs.



The incandescent light bulb is accredited to Thomas Edison. Invented in the 1880's it has ruled the night ever since. Incandescent bulbs are used in the home, on the roads, in flashlights and car headlights, and let us not forget Christmas lights.

The mechanics are quite simple. Light is produced by heating a filament wire to a high temperature until it glows. The wire is encased in a glass vacuum containing an inert gas to prevent oxidation. The heating energy comes from an electrical

current that is fed through embedded wires. The light emitted depends on the voltage rating of the bulb. The success of the humble light bulb can be attributed to this simplicity and a number of other factors. The manufacturing costs are low, and incandescent bulbs require very little external technical support. They work equally well on either alternating current or direct current. On the down side, however, incandescent bulbs are inefficient, with most bulbs converting less than 10% of the energy consumed



into visible light. The remaining 90% instead becomes heat, useful in hatcheries and growing lamps, but less productive in the bulb's common applications. It is this inefficiency that is driving the incandescent bulbs demise. The incandescent light bulb has been deemed too inefficient for widespread use, with environmental concerns taking precedence. Not only does moving to more efficient lighting reduce electricity use and greenhouse gases, but it will also generate household savings in lower utility bills, and it does all of this with minimal transfer costs.

Governments around the world have passed measures to improve the energy efficiency of light bulbs used in homes and businesses. In the UK, the phasing out of old light bulbs started as a



voluntary initiative in 2007 and European Union bans on the manufacture and import of 100 watt and frosted incandescent light bulbs came into force in 2009. This ban is to be extended to all incandescent light bulbs this year and the United States is following suit, phasing the bulbs off the U.S. market under a new energy law just approved by Congress.

One alternative is Compact Fluorescent Lamps (CFLs). These energy efficient bulbs have long been touted as the solution but have failed to deliver on their promise. The cost of a CFL bulb is significantly higher than regular bulbs and they take a long time to warm up. The resulting light is considered to be low quality and there are environmental concerns over the disposal of the bulbs which contain mercury.

This is where technology has stepped in with a new breed of hi-tech light based in the light-emitting diode (LED). Small LED lights are found in everything from remote controls and digital alarm clocks to bicycle lights. Supporters assert that LED technology signals the finale for incandescent light bulbs.

LED light bulbs at their simplest are semiconductor devices that make electrons jump from one material to the

other. This jump makes the electrons emit photons in the form of visible light. The advantage is that they contain no mercury and turn on instantly. The bulb lifetime is unaffected by cycling on and off and they are mechanically robust. LED sources are compact and have longer life expectancy and higher efficiency than other lighting. There are no glass tubes to break and they are resistant to vibration and impact.

Already LED's are being used in places where changing bulbs is inconvenient or expensive. This includes industrial applications such as traffic signals, airport runways and large buildings. The Louvre museum in Paris is currently replacing 4,500 bulbs with LED equivalents, a change that is expected to result in a 73% reduction in energy consumption. By the start of the Olympic Games the 25-year-old lighting system that illuminates Tower Bridge will be replaced with 1800 LED lights.

LED's are not yet widely used in household applications, but this could just be a matter of time. With more development and consumer interest in the LED's, the cost, which is the main deterrent, is likely to drop, signalling a cost effective, environmentally friendly efficient new lighting solution.