

Understanding Clever Lighting*

*(or how I learned to stop the insanity of cutting prices in the race to the bottom)

Executive Overview

After years of incandescent, fluorescent, high-intensity discharge (HID), and induction lighting, LEDs have rapidly become the new standard for the lighting industry. For manufacturers, wholesalers, installers, architects, and other construction and building professionals, LEDs have revolutionized illumination. LEDs are economical to install, less expensive to operate, and offer a longer operating life than any other type of lighting solution so LED lighting can pay for itself many times over.

Of course, no single solution is perfect. There are challenges with LEDs, especially non-technical issues that are making LED lighting a more difficult choice for some manufacturers. For example, LEDs require different and more extensive certifications (e.g. ENERGY STAR® and Design Lighting Consortium), and variations in CCT color temperature can make consistency of light difficult. Perhaps the biggest challenge is that LEDs present a lower barrier to entry for new lighting manufacturers, which increases competition and lowers margins throughout the industry.

Manufacturers continue to apply newer, less expensive manufacturing techniques to commoditize LEDs for lighting. Most LED makers offer little market differentiation beyond cost of manufacture, and as prices keep dropping the industry finds itself in a commodities race to deliver the cheapest lighting solutions possible, which erodes profit margins for the industry as a whole. This pressure too often results in reduced overall lighting product quality; even though LED is a better technology, it becomes bad luminaires.

No one wins this race to the bottom. Instead, the LED lighting industry needs to offer solutions that are cost-effective, high quality, and offer more options to customers. It's time to consider a new market segment for LEDs – clever lighting.

What is ENERGY STAR®?



Created by the EPA and Department of Energy, the ENERGY STAR program sets international standards for energy efficiency. ENERGY STAR certified LEDs use at least 75% less energy than incandescent, last longer, and produce less heat.

What is DLC®?



The DLC is a group of regional energy programs that promotes energy-efficient lighting through common standards, incentives, and education. Products on the DLC Qualified Product List achieve high standards for efficiency.

The Race to the Bottom

The cost of manufacturing LED luminaires is relatively low, and an abundance of low cost LED chip suppliers is currently feeding a boom in luminaire manufacturers, many of whom have recently arrived to the business from other electronic manufacturing markets. Competition is creating artificially low prices as the manufacturers vie for market share. For example, consumer LED luminaires that once sold for \$30 sell for less than \$20 a year later so vendors can increase sales volume. As a result, sales are up and profits are down.

At the same time, large commercial manufacturers are seeing more business from companies reselling white box LED products. Both the name manufacturers and the white box resellers are selling the same LED components with little technical or market differentiation. Their only competitive advantage seems to be price and we end up with all the suppliers playing LED limbo – “How low can you go?” More and more LED luminaire manufacturers are finding it increasingly difficult to compete on price and still make an adequate profit, so as prices continue to plummet more companies are going out of business. There are no winners in this race to the bottom.

Clever Lighting Fills a Gap in the LED Market

Industry analysts agree that LED lighting sales are dominated by commodity luminaires, sometimes referred to as “cheap, dumb light”; lighting solutions that deliver a specified number of lumens, switch on and off, and last to just beyond their warranty date. Analysts say that the worldwide LED lighting market could reach \$22.0 to 30.5 billion in 2016 and that at least 80 percent of sales will consist of this commodity lighting.

At the other end of the market, about 4 percent of sales are expected to come from Smart Lighting. Smart Lighting offers a means for vendors to differentiate their products with specialty LED lighting products bundled or integrated with lighting control systems. Smart lighting combines automated controls with LED lighting to promote energy efficiency. For example, smart lighting controls are being equipped with sensors to detect the amount of daylight, motion, heat, sound, and other conditions in a room, and modify the lighting as appropriate. Smart lights also can be controlled remotely, including over the web. Many LED emergency lighting products also can be categorized as smart lighting.

This leaves 14 to 15 percent of the LED market somewhere between the extremes of commodity lighting and smart lighting. This represents a \$2.4 billion to \$3 billion (2017) opportunity for a category of LED products that offer innovation and interesting new features at competitive prices. These new lights may not be

LED Market

SMART 4%



CLEVER 14-15%



as sophisticated as smart lighting, but they will offer unique capabilities beyond dumb lighting, presenting LED companies with a growth market where they can differentiate their lighting products.

We have dubbed this emerging product category clever lighting, and it's expected to grow at double-digit rates for the foreseeable future.

Clever Lighting Products Solve Real Customer Issues

Clever lighting products feature capabilities designed into LED lighting products, making them ideal for application-specific luminaire designs. These integrated features also are enabling new types of LED lighting fixtures to meet specific industry needs. Here are just a few examples of clever lighting capabilities we have been seeing:

- **Low inrush current** – Every light fixture has an inrush current that increases the load demand for power when the luminaire is turned on. The inrush current for newer LED drivers can create a problem for LED luminaires. Lower inrush current can save significantly on installation costs and materials, since having a means to regulate and reduce current inrush makes it easier to wire more luminaires on the same circuit. One of the clever lighting innovations is designing LED luminaires with low inrush current to give end users greater design versatility for both new wiring and retrofits.
- **Dim-to-off** – Most dimmable LED drivers vary the input voltage to control light intensity, however these drivers only reduce incoming voltage to low levels that make the LEDs appear to be off. In fact, there is still power flowing through the luminaire, and even a minute amount of continuous power consumption can have a significant impact on net energy usage. This is starting to be addressed by State and Federal Regulators, seeking to reduce overall power usage of devices in standby mode. Using clever lighting design, LED luminaire manufacturers are now creating new dimmable devices and fixtures that go into standby mode with zero power consumption.
- **NTC thermistors** – LEDs generate heat, and the more heat they generate, the shorter their useful life. In fact, excessive heat can either burn out the LED or the driver, or cause it to color shift, changing its CCT color, both of which means added expense for replacement parts and labor. Negative temperature coefficient (NTC) thermistors can be designed into LED lighting to protect the LEDs from overheating. The NTC thermistors deliver thermal feedback to the LED drivers so as the temperatures rise the LEDs dim to protect them from overheating, thus extending the life of the driver and the LED.

What is Clever LED Lighting?

Products that add value by providing luminaire manufacturers increased flexibility, energy-efficiency, reliability, and emergency lighting capability.

- **Class P drivers** –Most LED lighting installations tend to use a single driver manufacturer to ensure consistent lighting. Class P certified drivers offer flexibility by providing a standard to make it easy to replace a driver with any other manufacturer’s equivalent driver, since Class P drivers are certified by UL to ensure compatibility. Third-party LED driver compatibility is becoming an increasingly important issue since LED manufacturers tend to reengineer LED driver designs more frequently, so finding identical replacement parts becomes increasing difficult over time.
- **Certified components** – By using a combination of components already certified by UL, DLC, and ENERGY STAR, vendors can be sure of driver and light source compatibility and ENERGY STAR and/or DLC rebate compliance. Using pre-certified components shortens time to market for new LED products with less investment in R&D and certification testing.
- **Step and programmable dimming curves** – Not all LED luminaires dim at the same rate, which can create a problem for building lighting, especially for retrofits. One manufacturer’s 50 percent light intensity will be different from another manufacturer’s, so dimming light intensity can vary with each manufacturer. To provide consistent lighting you need programmable dimming curves to change the dimming profile of the LED luminaire when it’s installed so it provides the right illumination.
- **Incorporate emergency lighting** – City and state regulations are increasingly requiring that new lighting installations and lighting retrofits be equipped with emergency lighting to provide a lighted safe path for egress in the event of an emergency. LED luminaires can be designed to include emergency lighting systems with separate emergency drivers and isolated battery power sources for emergency lighting. Even with retrofits in which fluorescent tubes are replaced with LED tubes, it’s a relatively simple matter to add the necessary emergency lighting components without having to replace the luminaire.

These are just some common examples of clever LED lighting functionality. Built-in luminaire features such as embedded sensors and integrated controls provide more control over LED illumination than is possible with fluorescents or incandescents. LEDs open possibilities for an entire category of smart fixtures and clever lighting solutions that meet unique market and customer needs. At the same time, these LED solutions help manufacturers differentiate their lighting products, generating acceptable profit margins on innovative product designs.

Clever lighting products provide a new value proposition to customers. Rather than racing with competitors to the lowest price of the market, clever lighting products appeal to a substantial percent of customers. These customers seek vendors who have added unique value through features and design, rather than cost alone.

Common Features of Clever Lighting Products

- 1 Low inrush current**
Allows more luminaires on a circuit
- 2 Dim-to-off**
Reduces energy consumption
- 3 NTC thermistors**
Extends product life
- 4 Class P drivers**
Increases compatibility
- 5 Certified components**
Reduces testing costs
- 6 Programmable dimming curves**
Increases compatibility
- 7 Emergency lighting capability**
Meets local emergency regulations

Clever Partners Needed to Capitalize on Clever Lighting

Developing clever LED lighting products requires clever partners. You need lighting subsystem manufacturers that understand LED technology and can provide the right LED drivers, light sources, and optics, including the ability to design and differentiate the unique capabilities LED illumination offers. The path to clever lighting profits is finding these clever lighting partners who can help you create value-added lighting products that excite customers and often true value-add.

The clever lighting revolution is happening, and lighting vendors who understand the market opportunity and are prepared to embrace it will emerge the winners. It's up to the lighting industry at large to educate customers about the potential offered by clever lighting products.

The time for clever lighting is now. Just as other industries have found ways to differentiate everything from bottled water to coffee, the time has come for lighting to shine with this new category of clever LED lighting products.

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