

let's take this OUTSIDE

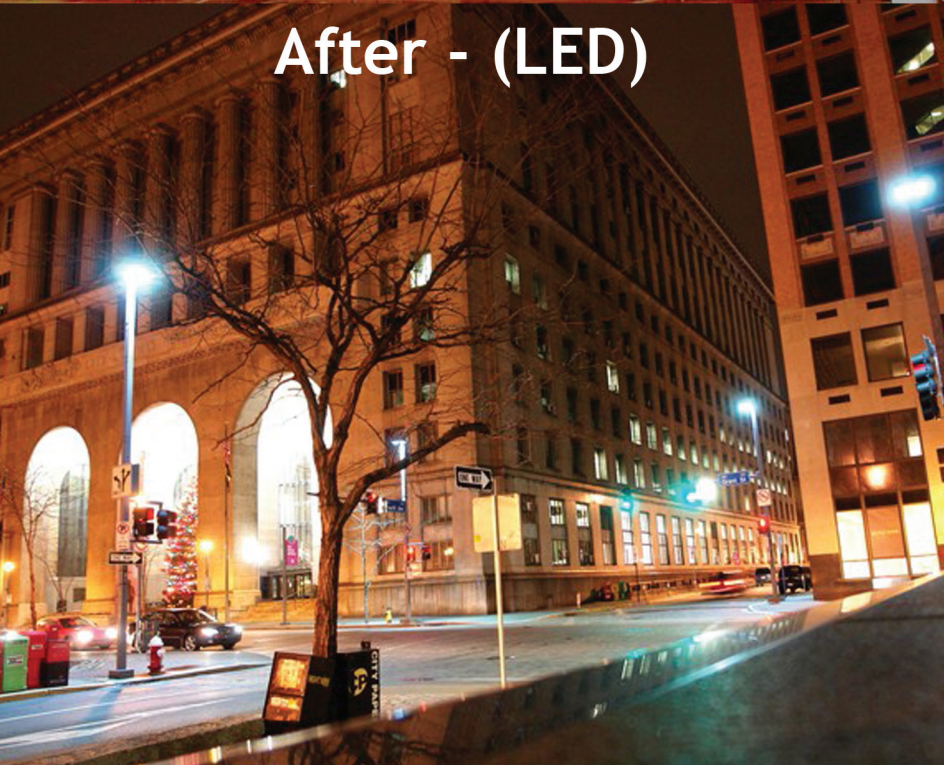
Shedding light on the new trend of outdoor area lighting.

BY TED STOUCH

Before - (HID)



After - (LED)



Today's advancements in Light Emitting Diode (LED) technology have resulted in a new alternative for outdoor area lighting — advancing over conventional HID lighting typically found in street lighting situations.

Outdoor area lighting can be defined as streets, roadways, parking lots and walkways. These applications have been subjected by conventional lighting technologies such as high-intensity discharge (HID) lamps and fixtures. Today's advancements in Light Emitting Diode (LED) technology have resulted in a new alternative for outdoor area lighting — advancing over existing conventional lighting.



STOUCH

Unlike HID lighting, LEDs do not have a filament to burn out or break, making them extremely durable. Instead a very small semiconductor chip runs electric current through the diode, which in turn drastically increases the longevity of the light source. Because there are no filaments to heat up, LEDs are “instant on.” LED product quality can differ among manufacturers. Therefore, when choosing LED lighting, due diligence should be applied for an appropriate selection in achieving the best lighting quality and greatest energy efficiency for the associated cost. Interested users should research and compare manufacturers' technical data and information on various LED products, performances, qualities and lifetimes.

DESIGN AND SPECIFICATION CONSIDERATIONS

Several dynamics go into the design and specification requirements for outdoor area lighting. Energy efficiency is a priority in these applications due to the long operating hours and comparatively high wattages that are typically associated with conventional lighting. Operating temperature data and verification of data relating to luminaire efficacy and lumen depreciation is important to review when choosing quality LED fixtures. Other essential deciding factors that are linked to the overall quality of the lighting fixtures are: energy efficiency, durability, color quality, longevity, maintenance, light distribution and pollution, as well as initial costs.

ENVIRONMENTAL AND ENERGY-EFFICIENT QUALITIES

LEDs contain no mercury content, lead or other known hazardous materials that are often associated with conventional outdoor area lighting, while, in addition, using less power to distribute more light. The reduction in energy consumption also decreases the carbon emissions associated with powering the existing conventional lighting. This environmental benefit also eliminates any costs associated with proper disposal at the end of its useful life. Although LEDs require less energy to operate, they often have a higher initial cost than HID lighting. Energy and cost savings that correlate with the use of LED outdoor area lighting have been estimated to be 50% to 80%, depending on the LED product.

A municipality in Ellwood City, Allegheny County, Pennsylvania,

converted its streetlights from HID to LED. The existing wattage was reduced from 205W with HID lighting (including ballast) to 66W with LED lighting. Reduction increases an additional 75% between 2:00 a.m. and dawn because of scheduled power down during off-peak hours. In addition, light levels increased due to the lack of lumen depreciation that occurs with conventional HID fixture(s). The municipality realized an 80% decrease in wattage and its annual savings on utility expenses decreased from \$86,000 a year to \$8,000 a year.

COLOR

LED outdoor area lights have been designed to produce a cool, white, light that ranges from 85 to 90 (on a scale of 100) on the color rendering index (CRI). Compared to conventional HID lighting, there is a 20% improvement in an observer's ability to discern color difference in objects. The most efficient white LEDs at this time emit light between 4500K and 6500K correlated color temperatures (CCT). The color index and temperature produced is beneficial for security lighting. LEDs produce a direct point of light with the ability to adjust to the target area. There is often no glare or blurred images on security cameras as the light does not aim at the camera. Therefore, it is not reflecting off of the lens and distorting the images.

LIFE AND LUMEN MAINTENANCE

Many LEDs may last more than 10 years, saving the purchaser on the maintenance costs associated with replacing and relamping bulbs and fixtures on a regular cycle that occur with conventional lighting. The failure rate for most electronic components will double for every 10 degrees Celsius increase in temperature. This is true for both the LEDs and of the power supply. LED manufacturers have demonstrated that at an LED junction temperature of 135 degrees Celsius one can expect to get 50,000 hours of operation before the light output will have degraded by approximately 30%. The above "10 degrees Celsius" rule suggests that if one operates the LED at 85 degrees Celsius, it will extend the 30% light-degradation interval out to about 16 x 50,000 hours, or about 800,000 hours.

LIGHT DISTRIBUTION AND GLARE

Light pollution is light that is generated in excess of what is needed to reach lighting goals. Examples include skyglow, light trespass and glare. Skyglow is caused by inadequately designed, unshielded and improperly aimed fixtures, creating a "dome" of wasted light, making it difficult to see the night sky. Light trespass is when light is not aimed properly or shielded effectively and spills onto areas that are not included in the lighting goals for a property. For example: a parking lot light from a shopping center illuminates a neighboring backyard. Glare refers to visual discomfort caused by excessive brightness.

As America becomes more conscientious of the side effects and negative consequences of outdoor area lighting, we attempt to replace the orange glow of the cities and streets to the night skies that once existed. Academic studies performed over the last several years have contradicted the myth that "more light is better." When selecting lighting for outdoor area lighting, consider the use of LED lighting but make sure the LED lighting fixtures properly direct light toward surfaces intended to be lit. This provides more effective use of the light and limits the light pollution often associated with conventional lighting.

LED luminaires use different optics than HID lighting. Each LED diode is, in effect, a direct point of light. Effective luminaire engineering utilizes the directional characteristics of LED light emission, in turn decreasing optical losses while increasing luminaire efficacy and providing more uniform light distribution across a targeted area.

CHOOSING LED OUTDOOR AREA LIGHTING

The Department of Energy's new label for LED lighting products looks like a food nutrition label. It was created to give a quick summary of performance data — such as light output and color. Ideally it is to prevent poor quality products from destroying the growing LED market. Accurate and consistent reporting of product performance is a foundation for product quality and will increase consumer satisfaction and accelerate market adoption.

The Lighting Facts label provides the basis for buyer evaluation of product quality, establishing the manufacturer's commitment to disclosing product performance in support of high quality products. Since the agency launched its "Lighting Facts" program in December 2008, some LED manufacturers have been making false claims and using the label. But all label claims can be verified with the list on the DOE Web site.

The government's well established Energy Star label, which can also appear on LED packaging, indicates that a product has met the program's minimum requirements. The Lighting Facts label is different, however, in that it provides a consistent way to see how products measure up against each other. Anyone looking to buy LEDs should review this information.

When verifying the quality of the LED product, also evaluate the lighting economic payback, based on wattage, energy use, maintenance savings, operating hours and operating costs for the application. **RFB**

Ted Stouch is president and CEO of Aston, Pennsylvania-based Action Services Group.