

Are LEDs the Future of Lighting?

"The potential of the technology is real—LEDs will become one of the most important light sources of the future."

—Steve Johnson, CTO, Integrated Lighting Solutions, Inc., formerly group leader for the Lighting Research Group at Lawrence Berkeley National Laboratory





Photo courtesy of J.R. Krausz

Few times in the history of electric lighting has a light source attracted so much interest and hope. According to the U.S. Department of Energy (DOE), which is investing in developing light-emitting diode (LED) technology, applications and standards, LEDs may rival the efficiency of the most efficient white-light conventional light sources by 2010. If LEDs achieve their full potential and displace conventional light sources, such as the ubiquitous fluorescent lamp, in general lighting applications, the United States will reduce its energy consumption due to lighting by nearly 50 percent and total energy consumption by an estimated 10 percent or more.

The promise of LEDs has led one manufacturer, Color Kinetics, to predict that at least 75 percent of commercial lighting will be LED-based by 2030. "The efficiency of LEDs continues to increase from 20 lumens per watt five years ago to more than 70 lumens per watt today, and it is expected to continue to improve to over 100 lumens per watt within the next five years," says Steve Johnson, CTO of Integrated Lighting Solutions, Inc. Before joining Integrated Lighting Solutions to lead the technical development of LED products, he was group leader for the Lighting Research Group at Lawrence Berkeley National Laboratory.

Besides efficiency, LEDs also offer a number of other benefits. They offer programmable color-changing capability, enabling "architainment" applications, such as dynamic and experiential retail environments. Very small, they can be used in highly compact light fixtures and inspire entirely new forms of lighting. They are easily dimmed,

which not only saves energy and increases flexibility, but extends the life of the LEDs and increases efficiency. They produce no infrared (IR) or ultraviolet (UV) energy. And they contain zero mercury.

Every year, manufacturers announce new records across a range of performance metrics, leading lighting practitioners and businesses alike to repeatedly ask, "Are we there yet?" The short answer is: LEDs are a proven technology for some applications, while other applications are still developing—particularly in regards to general lighting in commercial buildings.

LED systems have proven effective in applications where color, brightness and long life are critical, such as for exit signs, traffic lights and indicator lights. In commercial-building applications, these attributes align with market interest in smaller, dynamic products that can create colorful ambience. Most LED products sold are colored LEDs. There is a proven market for colored LEDs, but in architectural applications, the market may be limited. White LEDs, however, have begun to make inroads in niche applications, such as outdoor and small, confined indoor spaces. Architectural applications for white LEDs now include cove lighting; wall washing; facade lighting; signage; and under-cabinet, display and shelf lighting.

As the market develops, however, building owners should proceed with caution. Because LEDs are considered the next big thing in lighting, the technology has attracted many manufacturers, resulting in a surge in product introductions often accompanied by bold performance claims about these products and

Above: At The Pier Shops at Caesars in Atlantic City, Focus Lighting strung 2,000 color-changing LED nodes on aircraft cable to create a sparkling star field.

Left: On the restaurant promenade, Focus integrated 90 wave projectors into size columns to fill the blue preformed canopies with moving water images.