

Energy Efficient LEDs Take Off at Airports

By Michael Winegard



Our nation's nearly 3,000 airports in the Federal Aviation Administration system are some of the largest and most visible public users of energy. The enormous size and complexity of airport facilities provide an excellent opportunity for finding common solutions to complex problems such as the environmental impact and operating expenses from unnecessary energy use.

Energy is most often the second largest operating expense at an airport, exceeded only by personnel. As energy costs increase, airport operations and maintenance costs increase, too. There is tremendous pressure on airport facility managers to reduce operational costs to help lower the bottom line for their airline tenants. Fortunately, energy is a very controllable operating expense; by prudent, energy efficiency investments, airports can readily reduce operating costs from 10 to 30 percent annually.¹

Some of the largest airports are aggressively implementing green measures to save energy costs and to generate favorable impressions among travelers. One key to making day-to-day operations more energy efficient and more sustainable is through the installation of exterior LED luminaires.



After: T.F. Green Airport, Warwick, R.I., upgraded its roadway lighting, reducing energy consumption by more than 50 percent.



I was surprised to read in an article this summer “Green Airports—Providing Energy Efficiency in Airport Terminals”² that the concept of green airports was actually introduced more than 10 years ago by a non-profit organization, Clean Airport Partnership. The group envisioned the greening of U.S. airport terminals which, back then, seemed like an overly ambitious concept. Today, airports that are implementing sustainable practices not only aid in improving environmental quality but are operating favorably as well, at reduced costs in terms of energy efficiency.

LED Luminaires Lead the Way

Recent innovation and continuous improvements in lighting technology have given rise to tremendous energy-saving opportunities. Typically, LEDs were thought about only for aesthetic uses. But engineering and technological advances have improved LED luminaires’ performance and it is possible to use high-efficiency LED lighting for commercial applications. Additionally, with their compact size, LEDs can be used in places unreachable with conventional lighting and arranged in a number of different array configurations.

LED Background

LEDs have been around for over 40 years. The small solid state devices can be used to produce millions of different colors and brightness levels of light but they have the potential to use significantly less energy than traditional lighting methods.

Within the past few years LED technology has advanced to the level where LED luminaires can match or outperform high intensity discharge (HID)

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luminaires, particularly when performance is evaluated at the application level. Previously, conventional approaches to developing general illumination LEDs often involved retrofitting existing fixtures to house new LED technology. Many early attempts simply incorporated LEDs into traditional luminaire designs, resulting in poor lighting performance, energy waste and excessive product failures. Be wary of this approach and look for products specifically designed around LEDs.

LED Advantages

Due to their potential for long life, LEDs can provide maintenance and energy savings beyond what is currently possible with tradition lighting solutions. LEDs also re-strike instantly after a power interruption and can be controlled with occupancy sensors to offer even greater energy savings. Additionally, an LED does not burn out like a standard light source. Instead, they gradually produce lower out-put levels over a very long time. In fact, well designed fixtures can last over 100,000 hours before reaching 70 percent of initial output.

The Department of Energy (DOE) has conducted studies on LED lumen output and concluded that once the lumen output has declined by 30 percent from its initial output, the human eye can detect decreases in light levels more than this percentage difference. The DOE expresses this value as “L70,” meaning “when lumen output has fallen to 70 percent of initial output.”³

Many LED luminaires don’t require any special equipment or drivers to deal with a wide range of temperature conditions; numerous products can operate down to temperatures less than negative 40 degrees Celsius.

In real world applications, well designed LED luminaires have the potential to outlast traditional metal halide luminaires. This longevity alone translates

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into significantly reduced maintenance. Additionally, LED lighting for general outdoor use provides:

- **Durability:** LEDs are solid state devices containing no moving parts, no filaments or fragile glass to break, eliminating the risk of damage during transportation, installation and operation, even in the toughest environments. And unlike conventional light sources, LEDs are not subject to sudden failure or burnout.
- **Longer life span:** an LED lasts vastly longer than incandescent, fluorescent or HID lamp sources.
- **Green:** LEDs are considered sustainable because they decrease the need for additional power plants that cause the release of CO₂ into the atmosphere.

The DOE has heralded LEDs as the future of lighting because LEDs have an extremely long life span when compared to incandescent lighting—in many cases lasting 20 times longer. In addition, LEDs consume considerably less energy and are clean burning, thus reducing carbon emissions significantly.

Just recently, the U.S. Secretary of Energy, Steven Chu, said in a statement, “Energy efficiency isn’t just low-hanging fruit; it’s fruit lying on the ground.”⁴

To that end, the DOE started a \$450 million program⁵ to fire up large-scale retrofit programs to bring greater energy efficiency to businesses (and households). By upgrading energy nationwide, about \$100 million could be saved each year in power costs, according to the DOE.

TF Green Airport

T.F. Green is a state-owned airport located in Warwick, RI., and is operated by the Rhode Island Airport Corporation. The airport has become a vital transportation alternative to Boston’s Logan Airport for air travelers in southern New England, serving 4.5 million passengers annually and 200 daily operations.

Like many organizations and businesses, the Airport Corporation looks for ways to reduce energy consumption and costs, as well as lessen maintenance expenses. The airport conducted an overall energy audit with ConEdison Solutions to determine current usage and then identified opportunities for efficiency and reduction as part of an Energy

Saving Performance contract. The project budget has \$5 million for energy conservation measures and various energy saving improvements.

Through an Energy Performance Contracting project, customers replace old, inefficient, high-maintenance equipment with new state-of-the-art energy-efficient equipment. The costs associated with this type of project are offset by using savings guaranteed by the contractor.

One area that was identified as needing efficiency upgrading was the airport’s arrival roadway. Originally, this roadway had 150 75W metal halide fixtures. These lights were wall mounted but directed straight across, providing little light on the roadway. A decision was made to explore the testing of LED luminaires installed by RISE Engineering with funding support through rebate subsidies from National Grid, the local utility, and ConEdison financial incentives.

Fifty-eight LED luminaires were installed, reducing energy consumption by more than 50 percent. These fixtures, fewer than half the number than was originally used, have dramatically greater output than the previously installed metal halide lights and produce a brighter, whiter light for the arrival roadway.

An evaluation of the fixtures’ lifespan and reduction of lighting maintenance, combined with funding and utility rebate subsidies available, will allow the Airport Corporation to determine if additional LED luminaires will be installed in exterior areas such as the airport parking lots. ↩

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¹Transportation Research Board, “Model for Improving Energy Use in U.S. Airport Facilities”

²Article by Ciel S. Cantoria, published Jul 31, 2009 <http://www.brighthub.com/environment/green-living/articles/44449.aspx>

³ <http://starrynightlights.com/blog/2009/06/04/the-lighting-facts-of-led-lighting/>

⁴ www.greenerbuildings.com/news/2009/09/17/doe-launches-450m-program-ramp-energy-efficiency-retrofits

⁵ Ibid