

SHOWCASE PROJECT: CITY OF ORLANDO: AMWAY CENTER

SOLUTION OVERVIEW

The Amway Center, home to the Orlando Magic and Orlando Solar Bears, opened October 1, 2010. It was the first NBA facility in the United States to earn a LEED Gold certification for new construction from the U.S. Green Building Council. Recent innovations in interior and sports LED lighting technology created an opportunity to further decrease the environmental impact of facility operations. Amway Center is being renovated with LED lighting fixtures throughout the facility as part of the City of Orlando's Greenworks Program, via funding from a municipal bond.

The facility seats 20,000 and was designed to use 20 percent less energy and 40 percent less water than venues of comparable size. Original design features include 32 Founders Suites, 28 Presidents Suites, 68 Loge Boxes, two Legends Suites (161 seats in each suite), 1,428 club seats, five large concourses, and three retail stores.

Green features include:

- High-efficiency heating and cooling systems
- Ultra-low-flow toilets
- Reflective and insulated roof that reduces cooling costs
- High-tech monitoring systems that shut off the lights when a room is empty
- Systems to treat storm runoff before it can pollute nearby lakes
- Recycling bins for fans and concertgoers
- Bicycle racks, showers, and changing rooms for workers who bike to work
- Preferred parking for hybrids and other energy-efficient vehicles

Green construction features include:

- 15 percent of the facility's building materials are recycled
- 20 percent of the building materials come from a local source
- 83 percent of the construction waste was recycled instead of being sent to landfill

SECTOR TYPE

Commercial, Local Government

LOCATION

Orlando, Florida

PROJECT SIZE

875,000 sq. ft.

FINANCIAL OVERVIEW

\$1,994,000

SOLUTIONS

The retrofit of Amway Center is taking place in three separate phases: first, the sports and main venue lighting; second, the back of house lighting, front of house lighting, concourses, and the exterior of the venue; and third, HVAC equipment replacement. The sports lighting replacement will account for a demand reduction of 380 kW, while the second phase of renovation will account for a 220 kW demand reduction.

The lighting retrofit called for replacement of 454 lighting fixtures with 196 LED fixtures on the catwalk (sports lighting), a one-for-one LED lighting upgrade for 7,784 existing non-sports lighting fixtures throughout the building's interior, and 535 fixtures for the building's exterior.

It is a challenge to effectively control the indoor ambient relative humidity and temperature of a space as versatile as the Amway Center due to its transient loads. Phase three of the retrofit calls for replacing the constant volume supply fans with a VFD fan array in four dedicated outside air units (20,000 CFM each). This will improve the efficiency of arena dehumidification and cooling, while reducing points of failure. The new fan array system also reduces maintenance costs. The original fan motors have failed prematurely due to rust from condensation and excessive run time- the fan arrays will prevent this.

Savings Measure	Cost	Annual Expected Savings	Notes
Bowl and Practice Court Lighting	\$734,254	\$89,000	Includes all lighting for the sports court areas, which are also used for concerts and events. The payback on this portion is 8.3 years.
Non-Sports Lighting	\$834,647	\$186,000	Includes back of house lighting, front of house lighting, offices, and the concourses. The payback on this portion is 4.5 years
Replacing Dedicated Outside Air Units with Fan Walls	\$300,000	\$550,000	Replacing constant volume supply fans with VFD fan walls in four dedicated outside air units (20,000 CFM each)
Re-Commissioning HVAC System	\$125,000	\$135,000	To be completed

OTHER BENEFITS

The recently completed LED sports lighting phase, which has been certified by the NBA and NHL, produces enhanced lighting for the players and the audience. The lighting is also rated for high definition sports photography and videography, allowing for a better viewing experience for fans at

home.

Another unique benefit of retrofitting the bowl lighting with LEDs is that they provide a resolution for re-strike delay. With the existing fixtures, it was necessary to turn the lights on early in the day and leave them on to ensure they were warmed up. With LEDs, there is no re-strike delay. The lights can be turned on closer to the event and provide more versatility for event production, elevating the audience experience. Additionally, should a power disruption occur, the lights can turn back on almost instantly. The potential exists to power all the bowl lighting from backup power with the same generator that previously powered only primary systems, due to reduced demand.

Prior to beginning the second phase of the lighting renovation, some back of house areas and offices were dimly lit and the existing lighting fixtures cast shadows on working surfaces. For employees in these areas, the new LED lighting will provide noticeably brighter and more consistent lighting. Studies show that a brighter work area increases productivity among employees.

A significant portion of savings can be attributed to reduced maintenance costs. Many Amway Center events are televised, which forced a two-year cycle for replacing every single bulb to overcome the barely perceptible, but real degradation that occurs over time. The maintenance budget for replacing bulbs was significant, estimated to be \$89,650 annually for both the bowl and non-sports lighting. Not included in this cost is the risk/liability associated with performing this work at the catwalk level (risk of going over the rail). With LEDs in place, less degradation occurs and the service life is significantly longer. Technology allows for slight overdriving of the LED as it ages, resulting in a more consistent performance over a much longer period of time.

Additionally, all metal halide lights and shutters have been eliminated, reducing maintenance. Equally important was the removal of 258 light fixtures during the re-design. Since the LED fixtures can be controlled more precisely, they eliminated the need for specialty fixtures during specific events.

Annual Energy Use

(Source EUI)

Baseline(2013)
296 kBtu/sq. ft.

Expected(2018)
222 kBtu/sq. ft.

Actual()
Coming soon

Energy Savings

25%

Annual Energy Cost

Baseline(2013)
\$3,812,000

Expected(2018)
\$2,852,000

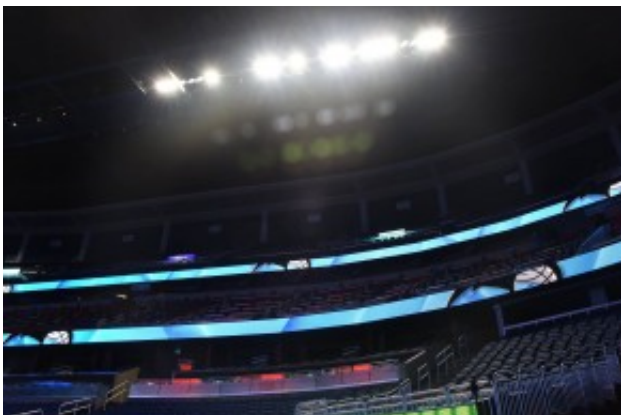
Actual()
Coming soon

Cost Savings

\$960,000



Amway Center Exterior



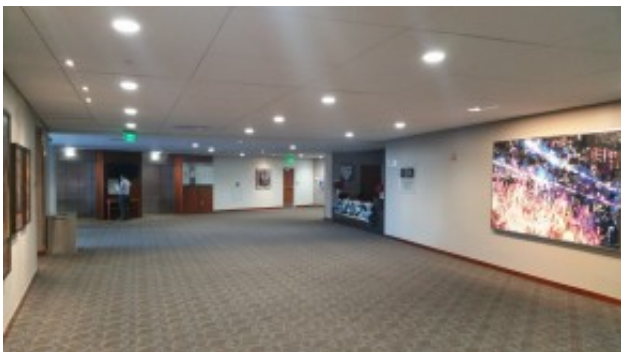
New LED sports lighting from center court



New LED sports lighting fixtures



City Facilities Energy Project Manager demonstrating the dramatic difference in operating temperature of the new sports lighting



New LED lighting in a back of house area