



# Getting Smart about Retail Lighting with LEDs

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When it comes to retail operating costs, energy is one of the top three expenses. Lighting is of course a component of this, accounting for 50% of energy costs for non-food retailers. Each square foot of a typical retail store costs roughly \$0.71/SF/year – a cost that quickly adds up at the store and chain level.<sup>1, 2, 3</sup>

However, the lighting world has undergone a seismic shift in the past six years. LED technologies are now economically viable, and quickly replacing metal halide, fluorescent, and halogen technologies in many businesses. LEDs are five- to 10-times more efficient than halogen lighting, and LED fixtures can be 1.2- to 1.4-times more efficient than HID and fluorescent fixtures. This translates to big energy savings. Target, for example, has achieved a more than 25% energy reduction in lighting replacing fluorescent fixtures with new LED fixtures and LED retrofit kits. As more and more companies choose LEDs, the technology continues to improve and equipment prices continue to plummet.

LED options exist for virtually every lighting application, and many manufacturers are starting to discontinue non-LED equipment. As the market commits even further to LEDs, new opportunities are emerging to harness the benefits inherent to this technology and leading retailers are sharing their strategies and solutions through the Department of Energy's Better Buildings Initiative and its Interior Lighting Campaign (ILC).

## **Leveraging LED Technology**

The benefits of LED technology go beyond energy cost reduction. LEDs, which are relatively easy to install or retrofit, can enable dynamic new color-tuning options, reduced cooling costs, and in-store smart communication with customers.

## **Color Options**

The light from early LEDs was cold and stark, but color options have advanced significantly. LEDs now provide richer color options than fluorescent sources and can draw out blues and purples more than halogen lights, allowing retailers to highlight those colors in their merchandise.

Beyond richer color options, LEDs allow for dynamic color shifts, known as color tuning. For example, a store could have warm white light in the morning, and cool white light in the evening, using the same fixture to modulate the color.

## **Smart Communications**

Retailers can leverage their LED lighting systems to tap into the Internet of Things (IoT). Visible Light Communication, also known as LiFi, works like WiFi for computers, but instead of using radio signals, light signals that are imperceptible to humans are broadcast by the LEDs and picked up by customers' phones, providing connections at just the right time and place. For example, LiFi can be used to share a coupon directly to a customer's phone when they walk by a display.

This new lighting benefit is not yet regularly monetized by retailers, but if incorporated, has the potential to increase revenue enough to help offset the cost of installation.

## **Cooler Lighting**

Because all electrical devices, including lighting, produce heat when they operate, more efficient lighting results in a reduced cooling load. As a rule of thumb, every three watts of lighting reduction offers a one-watt reduction in cooling loads, further increasing energy savings on top of the reduced lighting costs. In the best-case scenario, retailers can downsize or even eliminate some heating and cooling equipment because of the additional load reduction. Leading organizations implementing these strategies systematically across their portfolios have been recognized by DOE's Advanced Rooftop Unit Campaign (ARC) (<http://www.advancedrtu.org/>).

## **More Options for Retrofits**

In new construction, dedicated LED fixtures are an easy and cost-effective option. For retrofits, however, the labor costs of installing new fixtures can be cost prohibitive, so LED replacement lamps and kits are more often a better solution.

There are many available retrofit options that allow for improved optical design and the potential use of controls or communications. In some cases, LED lamps can be installed as direct replacements for incandescent lamps with virtually no additional labor costs above a typical lamp replacement. For fluorescent lamps, tubular LEDs (TLEDs) may be an alternative. Although TLEDs may have lower upfront costs, they may also have greater lifetime costs because certain TLEDs operate on fluorescent ballasts and in time, those ballasts will fail requiring a replacement. Retrofit kits have the advantage of allowing retailers to achieve energy savings while still managing the depreciation of the larger capital investment in the original fixture.

## **Success Stories**

The Interior Lighting Campaign (ILC), part of the U.S. Department of Energy's Better Buildings Initiative, is designed to help facility owners and managers take advantage of savings opportunities from high efficiency interior lighting solutions. It provides resources for businesses, including technical lighting specifications, case studies, utility incentive lists, and educational webinars to help building owners make sound lighting decisions.

The ILC had an initial, aggressive goal to support the upgrade or installation of 1 million high-efficiency troffer lights, which could achieve annual cost savings of close to \$20.6 million and energy savings of 200 million kWh, the equivalent of the annual electricity use in 18,500 homes. Going forward, the ILC may build on this success and expand beyond just troffers to other include other luminaire types.

Retail and quick-service restaurant partners in the ILC saw big savings, and some were awarded for exemplary performance in the first year. CKE Restaurant Holdings reduced lighting energy use by 64% in a Tennessee restaurant. T-Mobile underwent lighting upgrades at its retail centers and corporate facilities. At its Oakland call center, these upgrades saved 56% of their lighting energy.

Target replaced 120,000 59 watt troffers across 100 stores, resulting in 15 million kWh saved annually, or \$1.5 million in electricity savings. Target won the ILC's "Largest Portfolio-wide Annual Absolute Energy Savings" award in 2016.

Other large corporations have achieved significant energy savings by adopting LEDs across their portfolios, for both interior and exterior applications.

- Walmart implemented 100% LED lighting in their South Euclid, Ohio store, which was paired with space conditioning innovations, helping the location achieve a 37% reduction in source energy use over a code-compliant new store.

- Staples upgraded the lighting in distribution centers and office space, as well as the exterior parking, contributing to an 11% portfolio-wide reduction in energy use intensity.

For more details on the retail lighting successes and strategies of leading organizations, visit the Interior Lighting Campaign webpage at [Interiorlightingcampaign.com](http://www.interiorlightingcampaign.com) (<http://www.interiorlightingcampaign.com/>). The resources available on the ILC's website include technical specifications and calculation tools, as well as awardee case studies and reports. You can also join the campaign, either as a participant (building owners, operators and managers) or as a supporter (utilities, manufacturers, designers).

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[http://resourceadvisor.com/assets/a\\_3\\_billion\\_opportunity\\_energy\\_management\\_in\\_retail\\_operations.pdf](http://resourceadvisor.com/assets/a_3_billion_opportunity_energy_management_in_retail_operations.pdf)

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[3] [https://www.eia.gov/electricity/monthly/epm\\_table\\_grapher.cfm?t=epmt\\_5\\_6\\_a](https://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_6_a)