Guide To LED Conversion For **Real Estate Organizations**

A Step-by-Step Tutorial That Will Save You Money Through Reduced Energy and Maintenance Costs

01
Introduction

Companies are looking for ways to reduce expenditures and improve services around their buildings and the larger properties surrounding them.

Real Estate Organizations around the United States are looking for ways to reduce expenditures and improve services around their buildings and the larger property surrounding them. One of the most promising opportunities for improvement is the rapid advancement of Light Emitting Diode (LED) technology.

LEDs are particularly relevant for organizations that manage interior and exterior lighting (such as parking lots) in large or small facilities because they can significantly reduce costs by lowering energy expenditures and reducing the burden of recurring maintenance. This guide is intended to help those individuals and organizations responsible for managing lighting for commercial, education, retail, and industrial facilities and properties by providing an easy-to-understand and step-by-step discussion of the basics.

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Overview

The cost of an LED retrofit must be weighed against the expected savings down the road.

Typically the most pressing issue facing decision makers considering an LED retrofit is the cost of implementation weighed against the expected savings down the road. LED lighting is very much a long-term investment.

On the downside: The purchase price for LED technology is still fairly high when compared to legacy lighting. For example, many parking lot lights and other outdoor applications utilize high pressure sodium (HPS), metal halide (MH), or mercury-vapor lamps. These lights are relatively cheap to purchase compared to LED.

On the upside: The lifespan of many LED lights is 4-5 times as long as the lights they're replacing (including the HPS or mercury vapor lights mentioned above). Only having to purchase lamps or fixtures once provides a significant savings both in the lifetime purchase costs as well as in the hassle and expense of labor spent replacing bulbs and ballasts. That is not even to mention the significant energy savings achieved with LED as compared to every other light on the market, even HPS bulbs (previously the lighting industry leader in energy efficiency, and thus a big reason they were chosen as the predominant street light in America).

03
History

Most lighting in the United States has historically come from filament and/or gas discharge styles. These products generate visible light by burning some type of fuel.

To get a baseline understanding of lighting in the United States, we recommend you read our short article detailing the Evolution of Lighting. This will provide you with a solid understanding of where we have been, which lighting technology has historically been used, how long it has been in use, and the evolution that is currently taking place in 21st century lighting. If you don't have time to read the article, here is the most important takeaway: most lighting in the United States (and the world for that matter) has historically come from filament and/or gas-discharge style lights.

All of these products generate visible light via burning some type of fuel. Accordingly, when the fuel eventually runs out, the light fails. LEDs are different. Among the well known categories of lights that meet the general description of "fuel-based light" are traditional incandescent bulbs (which burn a filament), fluorescent, high pressure sodium (HPS), metal halide, and mercury vapor lights, all of which are gas- or high-intensity discharge lights (HID). HID is just a generic term used to characterize different lights that operate according to similar principles (HPS, mercury-vapor, metal halide etc.).

Outdoor Lighting: Historically, the three most relevant types of HID light for outdoor use have been mercury vapor (prevalent in the 1950's and 1960's) and to a much larger extent, Metal Halide and High Pressure Sodium (dominant since the 1970s as a street and parking lot light). HPS lights are the monochromatic yellow lights you've probably seen hundreds of times on the roadways and neighborhoods in your area. They are the longest lasting of the conventional outdoor lighting and they produce a strong yellow light that has a very low color rendering index.

04
History

The three most relevant types of HID light for outdoor use have been mercury vapor, metal halide and high pressure sodium.

Indoor Lighting (Lower Ceiling Applications):
Historically, the two most relevant types of indoor lighting for low ceiling applications are your standard incandescent bulb and fluorescent or compact fluorescent lights (CFLs). Incandescent lights are extremely cheap to purchase, readily available, and extremely common in residential applications. Fluorescent lights are more common for office buildings, common areas such as hallways, stairwells, and office/retail space.

High Ceiling Indoor and High Performance Lighting:
Large facilities that require high intensity white light have traditionally used bulbs like metal halide. Common applications are Highbay fixtures in warehouses, distribution centers and sports facilities. For example these are the lamps at stadiums that increase in intensity as they warm-up over the course of 20 minutes.

For various reasons, LED lights are now making all of these different bulbs in all of their different applications obsolete. As you might expect, real estate organizations around the country are converting their existing legacy lighting systems to modern LEDs. This is significantly reducing energy costs, drastically reducing maintenance and replacement costs, and in many cases, noticeably improving the quality of light. For direct comparisons read here:

- LED vs High Intensity Discharge (HID)
- LED vs Fluorescent & CFL

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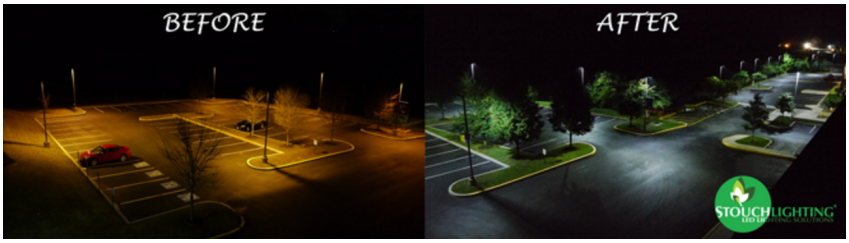
Does LED Make Sense For My Project?

Some of the benefits of LED are they improve visiblity. Additionally, they produce a light that renders color almost infinitely better than high pressure sodium lights.

One of the significant advantages that real estate organizations considering an LED retrofit enjoy is the fact that so many LED retrofit projects have already been accomplished. A lot of organizations have made the change and many more are expected to join them in the near future. Although most corporate data is proprietary, there is actual performance data and anecdotal evidence to draw on by speaking with public entities such as cities that have already implemented LED lights. A good place to see some of these results is the Municipal Solid State Street Lighting Consortium. Some of the performance trends that we have seen for LEDs when compared to the HID technology currently in place are as follows:

Significantly improved night-time visibility. LEDs produce a light that renders color almost infinitely better than high pressure sodium lights. Typical Color Rendering Index (CRI) for an LED lamp or fixture is around 80 or better (with the best rating being 100 which is thought of as "natural light"). By comparison, many of the lights being used in exterior applications (such as HPS lights) have the worst CRI of any light on the market (approximately 0-25). You can see this in practice when you look at the grass in a parking lot illuminated by HPS lights. The grass almost looks black. In the same parking lot illuminated by LED you will see the normal colors you are used to during the day.



Energy savings up to 80%. Most LED retrofit projects will return at least 50% in direct energy consumption savings while others can produce nearly twice that much. As you might expect, the exact numbers depend on the bulbs you are transitioning from and the specific LED lighting you are installing.

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Does LED Make Sense For My Project?

Most LED retrofit projects will return at least fifty percent in direct energy consumption savings.

Maintenance savings up to 80%. Although energy efficiency is the most common catch phrase surrounding LED lighting, perhaps the most significant benefit to end users is the reduction in maintenance costs when managing LED lighting in their purview. LED lighting functions at a high level for 50,000 to 100,000 hours plus. The best HID bulbs, by comparison, last around 25,000 hours. That means you'll typically have to replace an HID bulb 2-4 times before ever needing to purchase another LED. This is a monster saving both in terms of the hassle and expense of labor as well as the repeat purchase costs associated with replacement lights. Although energy savings are significant, maintenance is where you'll really see your LED investment pay you back.

Stouch Lighting specializes in Steps 4 through 10, and as a manufacturer-neutral LED distributor, can help you find the right LED solution for the particular needs of your project or application.

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Audit Your Current Lighting Situation

It makes sense to approach an LED retrofit differently depending on the size of the project.

It makes sense to approach an LED retrofit differently depending on the size of the project. Smaller projects typically benefit by completing the project all at once while much larger projects may need to complete the project in stages. Before getting into the weeds, we suggest you take a look at our preliminary ROI calculator. We will ask you a few general questions that will help us use our experience to gauge the scope and suggested focus areas for your project.

We suggest you start by categorizing your lighting according to the table below. Take note of the luminaire, the style and type of light, the lighting characteristics of the bulb, and any patterns of use (e.g. hours of operation) within your facility.

Location	Style of Luminaire	Type Of Lamp	# Of Bulbs	Lamps per fixture	Hours Per Day In Operation	Color Temperature (CCT)	Height of Fixture
Building Interior	Recessed Troffer	F40T12 Fluorescent	1500	4	12	4000	10'
	Ceiling-Mounted	30w CFL Spiral	30	1	12	4000	10'
	Suspended	PAR30 FL 39w CMH	20	1	6	5500	25'
	Highbay	HPS 400w	10	1	3	2700	7'
	Track Mounted	60w A Lamp	100	1	6	2700	8'
Building Exterior	Pole Mounted	HPS 400w	30	1	12	2200	25'
	Pole Mounted (Decorative Post Top)	HPS 100w	15	1	12	2200	10'
	Facade	MH 100w	10	1	12	4000	Ground
	Wall Pack	MH 175w	20	1	12	4500	12'
	Walkway Luminaire	HPS 70w	12	1	12	2200	Ground

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Audit Your Current Lighting Situation

If you are able to catalogue other types of information about your project definitely do that.

Interior
Examples of luminaire styles for indoor lights include:

- Suspended or Ceiling-Mounted
- Track-Mounted
- Wall-mounted & Wall-Recessed
- Recessed Cans
- Recessed Troffers
- Highbay & Lowbay

Exterior
Examples of luminaire styles for exterior lights include:

- Pole-Mounted
- Wall-Mounted
- Canopy - Surface Mounted or Recessed
- Decorative Post Top
- Step or Walkway Luminaires
- Facade Luminaires
- Building Mounted

If you are able to catalogue other types of information definitely do so. Examples include the approximate height of the fixture, spacing between fixture, area dimensions, and location of lights (e.g. GPS coordinates are useful if available for large projects with numerous outdoor lighting fixtures being replaced).

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Develop The Scope of Work

Stouch Lighting can provide customers with the specific products that they need. Or they can provide a complete turnkey solution.

Once you have audited your lighting situation, determine whether you would like to purchase the lights from a distributor and use internal staff to complete the labor, or if you are looking for a “turnkey” solution (both products and retrofit management/installation).

Stouch Lighting provides both options to its customers and can be involved as much or as little as you require.

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Develop A Luminaire Specification Sheet

There is an overwhelming variety of LED lighting solutions to choose from when considering replacement lights for your organization.

There is an overwhelming variety of LED lighting solutions to choose from when considering replacement lights for your organization. In order to make sense of the available options, it is useful to get fairly specific with your requirements. Here is a ten-step specification checklist to narrow down the options:

1. Mechanical & Electrical Reliability Requirements And Lighting Standards:

Interior & Exterior Lighting: If utility rebates are a priority, ensure that lights are listed on the Design Lights Consortium's "Qualified Products List" or are Energy Stars certified. Both organizations publish information on light output (lumens), luminous efficacy, CRI, CCT, and watts required for operation and add data about the lamp or fixtures lifetime, warranty, any controls or dimming capability, and harmonic distortion.

Exterior Lighting: Ensure that mechanical limits for poles that mount luminaires in the outdoors are met, ensure the Effective Projected Area (EPA) of the new luminaire is less than or equal to that of the luminaire being replaced or ensure that the luminaire has an EPA less than or equal to the rating of the pole it will be fixed to.

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Make sure that new fixtures subjected to outdoor or corrosive enviroments have passed ASTM B117 salt and fog testing.

Interior & Exterior Lighting: Ensure the lamps or fixtures meets the relevant vibration standards established by the American National Standards Institute and the state for your particular installation (e.g. California Department of Transportation for roadway and bridge lighting in California).

- ANSI C136.31-2001 Normal Applications Vibration Standards
- ANSI C136.31-2001 Bridge & Overpass Vibration Standards
- CALTrans 611 Vibration Testing

Ensure that the lamp or luminaire and the light will mount to the current/standard connections (or ensure that your supplier is taking into account the possible modifications or accessories needed to mount to the existing mounting application)

Exterior Lighting: Ensure new fixtures subjected to outdoor or corrosive environments have passed ASTM B117 salt fog or salt spray testing. In environments near the ocean (such as Florida for example) this is particularly relevant to prevent corrosion of metal or coated metal fixtures and early degradation of the light.

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Develop A Luminaire Specification Sheet

Ensure that the light meets the relevant surge protective zone category for voltage surges.

Interior & Exterior Lighting: Ensure that the lights used meet Electromagnetic Interference (EMI) standards established by Title 47 Part 15 of the Code of Federal Regulations (47 CFR 15). 47 CFR 15 covers spurious or unlicensed low power emissions. Virtually all lights sold from retailers in the United States have been examined according to 47 CFR 15. Due diligence is more of an issue with lighting distributors using overseas manufacturers that do not typically retail products in the United States.

Interior & Exterior Lighting: Ensure that the light meets the relevant surge protective zone category for voltage surges according to ANSI/IEEE C62.41.2. Two major sources of electrical surges to be concerned about are lightning and switching surges from the power source itself.

Exterior Lighting: Outdoor lighting is category C.

Interior Lighting: Indoor lighting falls into one of two categories (A and B). The principal difference between category A and category B is the distance from the power source disconnect circuit breaker (often called the "service entrance disconnect breaker") and the distance from other outlets that are closer to the service entrance disconnect breaker.

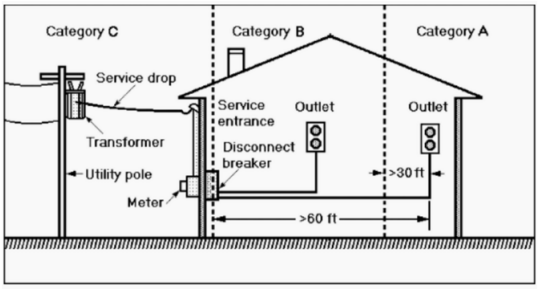

Figure 1 - Surge protective operating environments as defined by ANSI/IEEE C62.41

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Develop A Luminaire Specification Sheet

It is important to establish a desired color temperature that you would like for your lighting application.

Light Quality:

Interior & Exterior Lighting: Establish a desired color temperature. For example, "replacement lights should have a Correlated Color Temperature (CCT) of (example - 4000K +/- 500K)." Color temperature describes the character of light. "Warm" color temperatures (around 2200K) have a strong yellow to orange glow while "cool" color temperatures (around 5500K) have a brighter white to light blue glow.

Interior & Exterior Lighting: Establish a desired measurement for CRI. CRI stands for Color Rendering Index and describes the light's ability to show colors relative to natural light (which has the highest CRI value of 100). Lights with high values for CRI (80+) render color very well while lights with low CRI (such as traditional, yellow HPS street or parking lot lights) render color very poorly.

Interior & Exterior Lighting: If required, ensure that zero light is emitted above the horizontal plane. This is sometimes called "0 above 90°." It simply means that the bulb shouldn't direct light into the ceiling (for indoor lights) or up into the sky (for outdoor lights). LED lighting is directional, meaning that it only emits light for 180°. Virtually every type of legacy bulb other than LED is omnidirectional (meaning it emits light for 360°). Omnidirectional lighting requires reflectors and tends to be lower efficiency than directional lighting for this reason alone because there are losses when you try to redirect light.

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Energy Efficiency

Most LED projects have seen a reduced total watt consumption by more than 50%.

Interior & Exterior Lighting: Specify a desired reduction in energy consumption. Most LED projects we have seen reduce total watt (energy/time) consumption by more than 50%. This is a reasonable expectation when converting from something like conventional incandescent or T12 Fluorescent lights to LED. The most important measurement when trying to determine the actual efficiency of the light in the actual operating environment is known as "foot candles" (sometimes called "useful lumens").

Foot candles describe the amount of light emitted over a specific target area. Even more specifically, you want to know the foot-candles (fc) per unit of power (Watts, W) used to produce them. Therefore, the most important measurement for energy efficiency in lighting is lm/W ft2 (foot candles per unit of power). Do not confuse this measurement with the much more commonly reported luminous efficacy (lm/W). The major deficiency with luminous efficacy is that it doesn't account for the effects of optically focusing light (i.e. it tells you how much light is emitted in general but not how much light is concentrated and/or actually reaches the area where it is specifically desired).

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Maintenance

When considering using a company's lighting products consider the manufacturer's experience and the amount of time their company has been in business.

Interior & Exterior Lighting: Manufacturers should provide a minimum warranty of 5 years. Many LED lighting manufacturers will provide an extended warranty up to 10 years. We recommend that you consider the manufacturer's experience and the amount of time their company has been in business as an indication of the warranty's quality and their ability to service faulty products.

Interior & Exterior Lighting: Specify a desired lifetime for the particular light. LEDs are solid state lights (SSL) that last significantly longer (in many cases 100,000+ operating hours) than the lights they are replacing (most of which last 10,000-25,000 hours at best). Consider the fact that the longer lifespan of the particular light, the less you will have to spend both on replacement parts, but more significantly, on the labor required to change them out routinely.

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Ask Your Lighting Solution Provider

Stouch Lighting is a manufacturer neutral lighting distributor and provides a host of different products that will fit your project requirements.

Most major LED installations will come from one of a core group of LED manufacturers. Major producers include Hubbell, Cree, Philips, Cooper, Holophane, and LSI. That said, new products are coming out onto the market every day and your particular project requirements might necessitate a niche product from a smaller supplier. This is one of many reasons Stouch Lighting provides manufacturer-neutral product sourcing and retrofit services.

Most real estate organizations looking to complete an LED lighting retrofit are doing so for one of three reasons: to lower energy consumption, to lower maintenance costs, or to improve lighting quality. We typically focus our lighting solutions around the most important of these three needs for our particular customer.

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Test The Desired Solution

Many manufacturers will provide a photometric layout or analysis of a proposed product in a specific application.

Once you have identified viable solutions, test them against the established specifications. Look at the visible quality of the product, the history of the manufacturer, and proximity to the desired goals for the project. Also consider the expected implementation costs and the time from start to completion.

Many manufacturers will provide a photometric layout or analysis of a proposed product in a specific application . This is an outstanding way to inspect the proposed solution of your project before paying for the full implementation. If you take the time to evaluate a layout or analysis prior to full-scale implementation you will want to calculate Photometric Data and compare/contrast the information across the lights you are evaluating and against the manufacturer's data. It is also useful to document watts consumed in order to achieve the desired illumination. The most relevant measurement to evaluate is foot-candles/watt (essentially the amount of light in the area you care about divided by the amount of energy per second required to achieve it). This is a different figure than simply lumens/watt (which is typically advertised by the manufacturer). Note that many lights tend to degrade over time. One of the advantages of LEDs is that they degrade less than most other lighting technologies. Lastly, take note of the subjective opinions of stakeholders. Do you like the way the light looks, or is there something about it that just doesn't feel right?

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Award The Project

A great way to start your project is to have a meeting with the contractor and or manufacturer's representative soon after awarding the project.

Award the project once you arrive at a solution. Specify the number or quantity of the particular lights, fixtures, and luminaires you have chosen for the project and place your order with the winning bid. You may wish to place separate Requests For Proposal (RFP) for the products themselves and the installation labor, or you might bid the project with a single quote.

Implement The Project

A good way to start your project is to have a meeting with the contractor and/or manufacturer's representative soon after awarding the project. A realistic schedule for delivery of new products should be established and a timeline for installation discussed once they arrive.

Develop An On-Going Maintenance Program

One of the major advantages of LED lighting is the longevity of the bulbs themselves. Traditional HID lamps burn out and significantly degrade over time. While LEDs will also degrade over time, it is not as significant as HID degradation. LEDs get a little dimmer over time but many will still produce the vast majority (>80%)of their rated output even after 100,000 hours of operation. Because LEDs last so long, it only makes sense to plan for individual replacement in the event of an isolated failure and routine cleaning due to dirt and dust accumulation.

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Summary

Stouch Lighting can help your real estate organization select the right products and services for your next lighting retrofit project.

To conclude, real estate organizations have a lot to gain from implementing an LED retrofit on projects large and small. The benefits of LED Lighting technology are significant, and they will continue to improve...making almost every other light on the market obsolete. While the initial cost might be intimidating, the true benefits of a retrofit will become abundantly apparent over time in your energy and maintenance costs savings. With Stouch Lighting to guide you through the process, you can be assured that your real estate organization is making the best decision possible for your lighting needs. Contact us today!

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