



Your Guide to a Commercial Lighting Retrofit Project

CLS Facility Services
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Introduction: It's Time for Savings

The rising costs of energy have many companies searching everywhere to find possible ways to reduce their facility management budgets.

As a result, many companies have turned to LED lighting retrofits to significantly reduce their energy costs.

As a facility manager, service vendor, or other related professional, reducing costs and energy utilization is likely high on your list of priorities, and for good reason.

With energy prices continuing to rise, there has never been a better time to upgrade your lighting assets across all of your locations to reap the benefits of:

- Reduced energy expenses
- Improved energy management
- More controllable energy usage
- Significant utility rebates
- Stronger equipment warranties
- Lighting technology improvements
- Reduced lighting equipment costs
- Improved customer experiences
- Higher employee satisfaction

In addition to impactful energy savings, large maintenance and material savings will result from the installation of new lighting technologies — with anywhere from three to 10 times the lifespan of the outdated lighting systems they replace.

On top of energy and maintenance savings, many companies today are laser-focused on achieving sustainability objectives — yours likely among them. Upgrading lighting systems (along with other assets) can help you make meaningful, measurable progress toward these goals.

In this guide, we'll explore the advantages of LED in sustainability, cost savings, and more while also providing key considerations for both interior and exterior retrofit projects.

Let's get started!

The Sustainability Benefits of Retrofitting

The environmental impact of converting to more energy efficient lighting technologies is significant.

Older, inefficient, and yet still used lighting technologies such as T12 lamps and ballasts along with high-wattage halogen and high-intensity discharge (HID) lighting contain large amounts of mercury in comparison to new modern lighting technologies. While eliminating mercury is important, reducing overall energy consumption is vital.

LEDs (light emitting diodes) have set the standard for lighting efficiency. Referred to as LEDs because of the small energy-efficient diodes that produce a large amount of concentrated light, the term LED refers to lamps, fixtures, diodes, and even the technology itself. LEDs operate without the use of a ballast and offer numerous benefits:

- Significant energy savings ranging from 50% up to 90%.
- Ongoing maintenance savings due to longer product lifespan.
- A higher lumen output for brighter and safer environments.
- Improved light spread and improved lighting uniformity.
- Reduced landfill waste through improved recycling processes.
- Reduced cooling costs through heat load reduction.
- Significant reduction in carbon dioxide emissions.

Though newer technologies offer considerable energy and maintenance savings, the ongoing push for more sustainable products and technologies has created an extremely competitive business landscape. This competition has led to new and sometimes untested technologies. When considering lighting retrofits, it's imperative for facility management leaders to consider products from manufacturers with a proven track record, who also provide strong warranties on their products.

Lighting retrofits are a superb opportunity for businesses to reap thousands of dollars in energy and maintenance savings, while benefiting from well-lit facilities. Remember, when it comes to lighting retrofits, nothing is more expensive than the cost of waiting.



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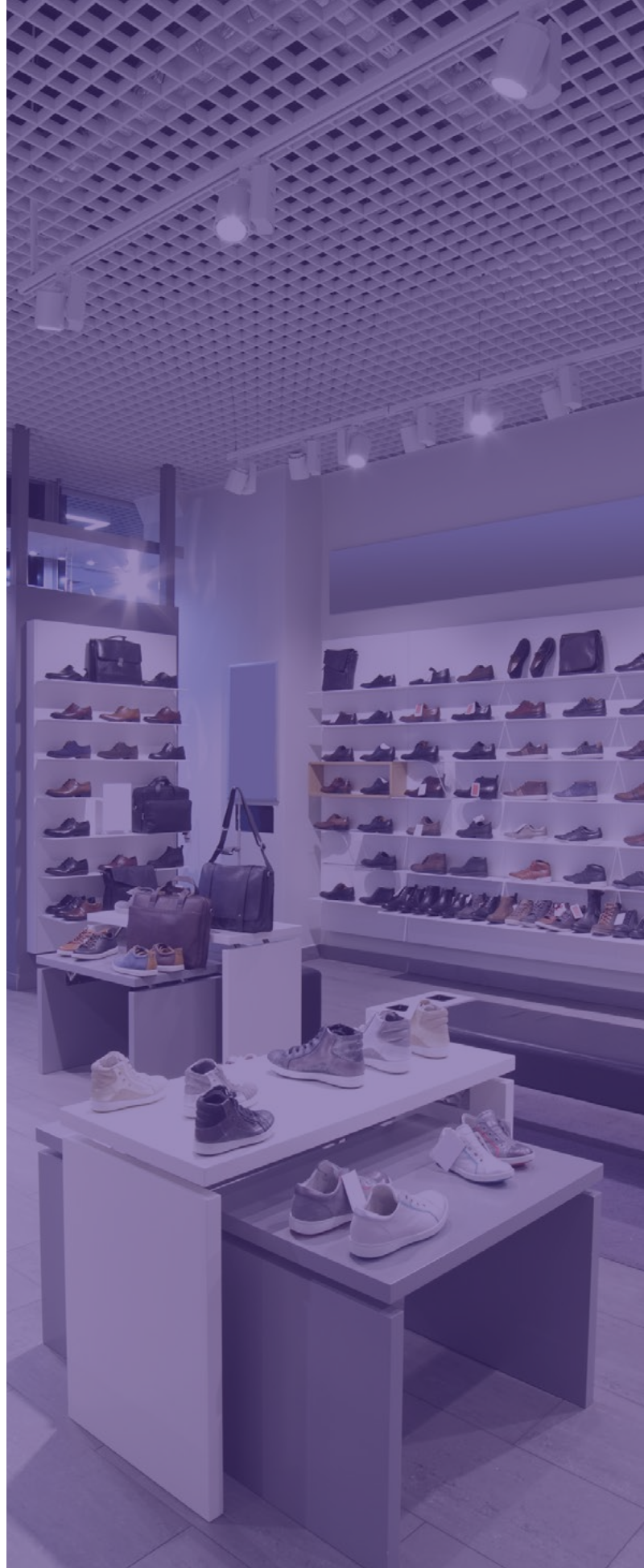
Maximizing Return on Investment (ROI)

For facility management leaders and financial analysts, ROI is the key metric used to gauge the merits of a potential investment.

ROI is a quantitative measure — it's a bottom-line number that serves an important decision-making purpose. As a facility management leader, you're likely focused on proving out ROI across numerous asset classes and efforts. But ROI likely isn't the only measure you're using. Lighting retrofit projects are a prime example of this.

Lighting retrofit ROI is calculated by dividing the total cost of a project by the annual energy savings it creates. Often, the energy savings achieved through a lighting retrofit is significant enough to justify the project. Yet energy savings is just one of many benefits that lighting retrofits offer. When you add all of them up, we think it makes a compelling case.

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Whether your facility is an office complex, warehouse, industrial facility, retail store, school or parking garage, consider your lighting and all of the elements involved, and ask yourself:

- Is your facility's interior and exterior lighting as energy efficient as it can be?
- Are occupancy sensors installed to turn off lamps that only require use during a small percentage of the day?
- Is exterior lighting on a timer or photocell so that it is only illuminated when necessary?
- How much is being spent in materials and maintenance to change burned-out lamps and ballasts over the course of a year? Over five years?
- Are you currently paying to replace four lamps in an area where two lamps could adequately illuminate the space?
- How much did it cost to rent that lift to change three lamps in your parking lot last year?
- How much is being spent to recycle old lamps and ballasts with mercury? Are you even recycling them in accordance with the law?
- Did you take advantage of the utility rebate like the business up the street that performed a lighting retrofit, which by itself paid for 30% of the project?
- Are all exit signs LED at your facility? These offer the greatest savings of all, since they are on 24/7/365.

Just by asking these questions and analyzing your answers, we think you'll realize that the financial benefits of lighting retrofits go far beyond simple energy savings. No matter the size of your business, hundreds — oftentimes thousands — of dollars are being spent on materials and maintenance to change the lamps and ballasts at your facilities every year.

Did you know that most new lighting technologies last three to 10 times longer than their outdated predecessors? In addition to energy savings ranging from 20–80% with a lighting retrofit project, imagine the maintenance and material savings over a five-year span, when new technologies are under warranty following a successful lighting retrofit project.

Here are a few hints to help you maximize your ROI for a lighting retrofit project:

- Consider all methods of lighting-related energy conservation: wattage reduction, occupancy sensors, and de-lamping.
- Don't forget to retrofit exterior lighting! For many businesses, exterior lighting has the longest burn time.
- Take advantage of all utility rebates and EPA incentives. These can help to offset a large portion of lighting retrofit project costs.
- Make sure to utilize technology with a long-rated life, which can equate to significant maintenance and material savings.
- Don't underestimate the incredible impact that a more well-lit facility can have on your business: better employee morale, increased work efficiency, a more aesthetically-pleasing facility, a safer work environment, and fewer maintenance issues that impact employees and the operation of your business.

Interior Lighting Retrofits

When it comes to interior lighting retrofits, remember our earlier statement: nothing is more expensive than the cost of waiting.

Relying on outdated technologies will continue to cost you more money each day. Converting older systems to LED helps to make your facilities EPA compliant, but the benefits don't end there. Consider:

- 20–80% energy savings.
- Utility rebates that help to offset the cost of the projects.
- Three to 10 times the life of their predecessors, which can lead to significant maintenance savings over time.
- Material savings, since new lamps have greater life and are under warranty.
- Increased color rendering and lighting uniformity throughout a facility.
- Improved spread of light.
- A higher percentage of light levels maintained throughout a light's lifespan.
- Improvement in the overall image and aesthetic appearance of your facility, which can help boost marketing and sales efforts, as well as employee morale.

Note that utility rebates may only be available for a limited time. As lighting retrofit projects become increasingly popular, rebate allocations do have their limits. While rebates can sometimes help to pay for 10%, 20%, or even 50% of a project, energy and maintenance savings are the ultimate motive.

For example, a \$50,000 lighting retrofit project may yield \$12,000 in annual energy savings, but the rebate opportunities, maintenance and material savings, and the vast improvement in the quality of light are the added benefits of these projects.

Here are a few tips to consider when considering interior lighting retrofits for your facility:

- Select lighting technologies with strong rated life and good warranties.
- All lamp specs should have the same color temperature, so that lighting is uniform throughout a facility.
- Lighting retrofits offer more light! Therefore, consider de-lamping or removing fixtures in areas where light levels are strong in order to maximize energy savings.
- Retrofit all lighting when you execute a project: exit signs, restrooms, and cove lighting offer significant savings, too.
- Never underestimate the positive impact that better lighting will have on employee morale and the aesthetic image of your facilities.

Exterior Lighting Retrofits

Many facility leaders view retrofits as *interior* projects, overlooking their exterior opportunities. In many respects, things should be reversed.

For proof, consider the primary interior lighting requirements at an office facility: traditionally, they're Monday through Friday, from 8 a.m. to 5 p.m. Meanwhile, the exterior lighting requirements at that same office are Monday through Sunday, from 7 p.m. to 6 a.m.

Exterior lighting is a seven-day, 11-hour proposition, while interior lighting is primarily five days, and 10 hours per day.

While interior retrofit energy savings are significant, exterior lighting retrofits offer energy savings as well given the increased usage and importance of exterior lighting. Accordingly, converting metal halide and high-pressure sodium technologies to LED offers superb benefits:

- Energy savings ranging from 30–80%.
- Significant improvement in the output, spread, forward throw, and color uniformity of light.
- Large maintenance savings, as LED and induction lighting offers three to 10 times the lifespan of HIDs. To put this in perspective, think about how much your company spends each year to bring in a lift to change out a handful of parking lot fixtures (the numbers add up quickly).
- Increased security and safety due to more powerful lighting output.



Once again, utility rebates can play a large role in helping to offset the cost of exterior lighting retrofit projects. While many states no longer offer rebates for interior T8 retrofits, most utility companies offer more in-depth rebate opportunities for LED and exterior lighting projects.

Many companies may pursue exterior lighting retrofits to garner energy and maintenance savings, yet the hidden benefit is the impressive aesthetic improvements that result from upgrading your exterior lighting.

We'd like to offer a few pointers when planning an exterior lighting retrofit project at your facility or facilities:

- Consider photocells, which save energy by only illuminating light fixtures during dark conditions.
- Pursue technologies with extended life spans and strong manufacturer warranties.
- Retrofit all exterior lighting. Wall packs, flag lights, and ground mounted fixtures consume loads of energy.
- Pursue utility rebate opportunities to help offset the cost of these projects.



Going Beyond the Energy Savings

Many of the benefits of LED retrofit projects are often overlooked.

Though energy savings will always be the driving force behind lighting retrofit projects, additional benefits are numerous and substantial:

- Significant maintenance and material savings that results from the extended life of new technologies.
- Better-lit facilities, which improve your business' aesthetic appearance. Lighting retrofits help businesses shine — literally.
- Increased light levels, which promote safety and help to boost security in and around your facility.
- Potentially higher employee morale and efficiency, thanks to a more professional looking, better-lit facility.

In summary, consider some of the primary reasons to initiate a lighting retrofit project now:

- "The cost of waiting" only delays energy savings, oftentimes in excess of \$1,000 per month.
- Utility rebate programs, if available in your area, will only remain available for a relatively short time.
- Large annual maintenance and materials costs associated with constantly replacing lamps and ballasts can be greatly reduced or eliminated altogether.
- Well-lit facilities project a positive image for your business and can help boost employee morale and efficiency.



About CLS Facility Services

CLS Facility Services is a nationwide facility asset management organization that partners with service providers across multiple disciplines and industries.

We pride ourselves on the technical expertise of our service professionals, many of whom have been with us for more than a decade. Our team has a comprehensive knowledge of turnkey LED retrofits, lighting maintenance, electrical maintenance, and other related services that can help you maximize performance and savings from these assets.

As an aggregator, we do not self-perform our maintenance services. Instead, **we partner with commercial service vendors** across the country to ensure you have the right support exactly where your facilities are located. This helps consolidate service vendors for your team and reduces your administrative workload. **Every vendor has been rigorously vetted** and has an average relationship length of more than 12 years — giving you peace of mind in knowing that your facility assets are in good hands.

Here's why you should work with us for your LED retrofit or lighting maintenance program:

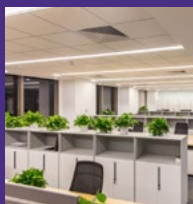
- Complete maintenance coverage across the U.S.
- Asset maintenance support for 50 to 500 locations
- Experienced and service-focused account team
- Ability to work on multiple work order systems
- Accessible online asset management portal
- We build a complete list of all lighting/electrical assets
- CapEx budgeting and strategic planning support
- Your account manager is your emergency contact
- Extensive capabilities beyond LED retrofits and maintenance
- Relentless focus on customer service at all times

Connect with us today to learn more about LED retrofits and preventive maintenance solutions for your organization.



LED Retrofit Project Case Studies

Learn how CLS has helped companies nationwide achieve energy and maintenance savings and other goals through LED lighting retrofits.



Turnkey LED Retrofit Pilot Program Yields Immediate Dividends for Investment Firm

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Providing Nationwide Coverage for Retail-Based LED Retrofit Management Needs

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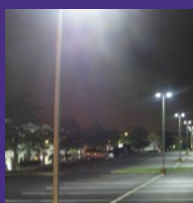
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Commercial Lighting Retrofit Glossary

Average Rated Life: A rating (in hours) that indicates when 50% of a specific group of lamps has failed.

Ballast: The device that provides power to the lamp in a luminaire.

Ballast Factor: There are varying types of ballasts (low, normal, and high) that can be utilized in a luminaire. These difference levels impact the amount of lumens a fixture produces, in addition to the energy it emits.

Color Rendering Index (CRI): The ability of a light source to accurately render all frequencies of its color spectrum when compared to a perfect reference light of a similar type. When analyzing CRI on a cut sheet, the higher the CRI, the higher the quality of the light source.

Compact Fluorescent (CFL): A fluorescent lamp that has been compressed into the size of a standard incandescent one. CFLs generally last 5-10 longer than incandescent lamps, while utilizing less energy. Note that CFLs are slowly being phased out in the United States.

Cut Sheet: The sheet that displays statistics, data, and performance characteristics of a lamp, ballast, or luminaire. It's a good idea to ask for product cut sheets when analyzing a lighting retrofit project.

Daylight Sensor: A special sensor — often attached to a light fixture — that turns off the fixture when daylight is present. These sensors are commonly used on parking lot lighting, exterior wall packs, and interior lighting near windows.

Efficacy: A measure displayed in lumens per watt, that judges the overall efficiency of a luminaire.

Environmental Protection Agency (EPA): An organization that has had a significant impact on lighting, due to the phasing out of energy-deficient technologies, including T12 fluorescents and highwatt forms of halogen and HID lamps and ballasts.

Foot Candle (FC): A unit of measure for the density of light as it reaches the surface — (1) FC = (1) lumen per square foot.

High Bay Lighting: A fixture used in many warehouse, storage, or industrial applications, generally recognized for use above a 20-foot mounting height.

High Intensity Discharge (HID): Lamps that typically require ballasts for operation, but give off large amounts of light. Many HID lamps are now being replaced by LED and induction solutions that are more energy efficient and exhibit three to 10 times the life of an HID.

High Pressure Sodium (HPS): Similar to a metal halide in energy consumption, but commonly being replaced (see HID). HPS lamps tend to give off an orange tint and fail to bring out the natural color of the spaces they illuminate. For this reason, metal halides, LEDs, and induction technologies are preferred aesthetically as well.

Induction: A very energy-efficient lighting technology with three to 10 times the lifespan and 30 to 80% more energy efficiency than HID. Induction lighting is often compared to LED because it operates with a driver, not a ballast.

Initial Lumens: A number that represents the initial amount of light (measured in lumens) that a lamp projects. Lumens will decline throughout the burn life of a lamp, though excellent lamp specs have strong lumen retention.

Input Watts: Also referred to as “system wattage,” this term stands for the total number of watts that a specific luminaire emits. It is important to remember that input watts include the lamp and the ballast.

Instant Start Ballast: These ballasts are used for “instant on” applications at the flick of a switch. Instant start ballasts will have a longer life when fixtures are turned on and off minimally, as too many on/off cycles shorten ballast life.

Kelvin Temperature: See Color Temperature, which refers to the color tones that a lamp produces. Kelvin temperatures can have a profound impact on the appearance of the items that light illuminates.

Kilowatt Hour (kWh): A unit of energy equivalent to one kilowatt (1 kW) of power expended for one hour (1 h) of time. When analyzing kWh savings, hours of operation and potential wattage reduction are large factors.

Lamp: In lighting terms, it is important to remember the correct term lamps and not bulbs.

Light Emitting Diode (LED): LEDs (light emitting diodes) have set the standard for lighting efficiency. Referred to as LEDs because of the small energy efficient diodes which produce a large amount of concentrated light, the term LED refers to lamps, fixtures, the diodes, and even the technology itself. LEDs operate without the use of a ballast.

Lens: The protective covering of a fixture or luminaire. A lens can be prismatic (plastic), parabolic (cubes), or even tinted. Keeping lenses clean is important, as dirty lenses can reduce light output.

Low-Bay Lighting: A luminaire designed for applications, generally below a 15 to 20- foot mount height.

Lumen: A measurement judging the total amount of visible light in a specific beam or angle.

Lumen Depreciation: This refers to the amount and rate of lumens (light output) that a lamp will lose over its lifespan.

Lumen Maintenance: The ability of a lamp to maintain its light levels throughout its lifespan. High quality lamps have better lumen maintenance and their light levels will not drop off dramatically over time.

Luminaire: Common term for a complete light fixture (lamp, ballast/driver, housing, etc).

Metal Halide (MH): A common form of HID lamp that provides high levels of light, but exhibits poor energy efficiency. Many metal halides are now being replaced by fluorescent, LED, and induction solutions.

Occupancy Sensor: A mechanism that senses movement in order to determine when a lamp/ fixture will illuminate. Occupancy sensors can be mounted directly to fixtures or mounted separately and control multiple fixtures simultaneously. These sensors are an excellent method of gaining increased energy efficiency.

Phosphors: The substances which are utilized to coat the inside of fluorescent lamps. These substances are a natural resource, whose price continues to increase dramatically.

Return on Investment (ROI): When calculating ROI for lighting, it is imperative to evaluate cost of project, energy savings, in addition to the maintenance and material savings that result from installing extended-life technologies.

Spread: Refers to the coverage of light that a fixture illuminates in a given area. New technologies offer dramatic increases in the overall spread of light, in addition to increased lumen levels.

System Wattage: The total watts that a given fixture emits. Wattage cannot be judged merely by the wattage of a lamp, but must also include the wattage of the ballast (or driver in an LED). For example, a 400-watt HID normally has a system wattage of 450–460 watts, after factoring in the ballast.

T5 / T8 / T12: Types of fluorescent lamp technologies. T stands for tubular, while the number refers to the diameter of the lamp. Generally speaking, the smaller the number, the more energy efficient the lamp and the newer the technology. T12 lamps were phased out by the EPA due to poor energy efficiency and large levels of mercury.

Throw: Refers to the outward reach or throw of light that a fixture gives off. LED wall packs tend to have greater forward throw than HID fixtures.

Troffer: A recessed luminaire — with a trough-like design — which contains lighting to illuminate a room or office space.

Utility Rebates: Many areas of the country offer lucrative utility rebate opportunities, which can help offset a portion of the cost of lighting retrofit projects.

U-Lamp: Common type of lamp utilized in Troffers, usually 2'x2' fixtures in office/hallway settings.

Voltage: Facilities have varying voltage, ranging from 120 to 277 to 480 volts. It is extremely important to know voltage when it comes to lighting, because various ballasts and technologies are constructed for specific voltages.

Wall Pack: Type of lighting commonly used to illuminate the exterior of a building. Converting from HID to LED or Induction wall packs can lead to massive energy and maintenance savings, along with a large boost in lighting output.

Wattage Reduction: Term referring to the total watts saved when converting to a more energy efficient lighting system.