

White Paper

Using LED Lighting as a Cost Savings Strategy to Reduce Warehouse Expenses



Effectively managing a warehouse demands that the operator drive profitability by, in part, controlling costs. Rent, wages, insurance, maintenance and many other costs are almost beyond a warehouse operator's ability to control and generally rise year over year. But a simple way to reduce your operating cost is staring you in the face; that is, if you are looking up. Lighting is the largest portion of warehouse energy cost (National Average Utility Cost Breakdown). Lighting represents up to 60% of warehouse electricity consumption and is one of the easiest areas for cost reduction. It can be as simple as changing to a LED light bulb.

For decades many warehouses have used old metal halide (MH) or high pressure sodium (HPS) bulbs that are slow to start up, quick to lose brightness, fast to burn out, and guzzle electricity. This old technology lighting is currently in use in nearly 3 billion square feet of warehouse and storage facilities throughout the United States. (U.S. Energy Information Administration (EIA); Table B44 May 2016). A simple and economical solution to reduce costs of operation is to implement a lighting upgrade to LED. LED's have gained in popularity since they deliver better light output and quality while using less energy. And due to a long life cycle, they are easier and less costly to maintain. Upgrading your lamps alone or both lamps and fixtures will significantly reduce your warehouse's electrical expense.

The ABC's of Today's Lighting Jargon Made Easy

If you are looking back fondly to the "good old days" in lighting when you went to the store and purchased a 100w incandescent bulb and knew exactly what you were buying without any further information about the bulb, those days are truly in the past. But don't despair. Today's lighting is not that complicated. There are just a few concepts to keep in mind when looking to upgrade your warehouse lighting.

Wattage is part of the lighting story. Wattage refers to the energy demanded by the bulb (actually called a lamp) to produce light. The old MH or HPS lamps still used in many warehouses typically require 400W of energy to produce light. An equivalent LED lamp will use between 170W to 210W to produce equivalent brightness and better light quality. Some higher ceiling warehouses use 1000W MH lamps and the equivalent LED lamp uses under 500W.

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“Lumen” is the standard measurement of how much light is being produced; i.e., the brightness of the lamp’s light. You want to determine the brightness level (lumens) of the LED lamp you are considering. For example, a 210W LED lamp produces 24,000 lumens, or about 114 lumens per watt. This light is directed mainly down to the floor where needed and saves about 50% of the energy used by MH or HPS lamps. A typical 400W MH or HPS lamp might initial produce 35,000 lumens, but it is scattered over 360 degrees and unlike LED’s, these lamps experience rapid lumen depreciation of up to 50% over their short life cycle.

Also, the quality of light produced by MH and HPS lamps is inferior to that of LED’s. Light quality is partially the “color rendering” of the light produced which is measured by an index known as CRI. The higher the CRI, the better the light quality will be; objects appear clearer and sharper, and colors look truer. The typical MH lamp is at <65 CRI. The 210W LED lamp referred to above has a CRI of 84.

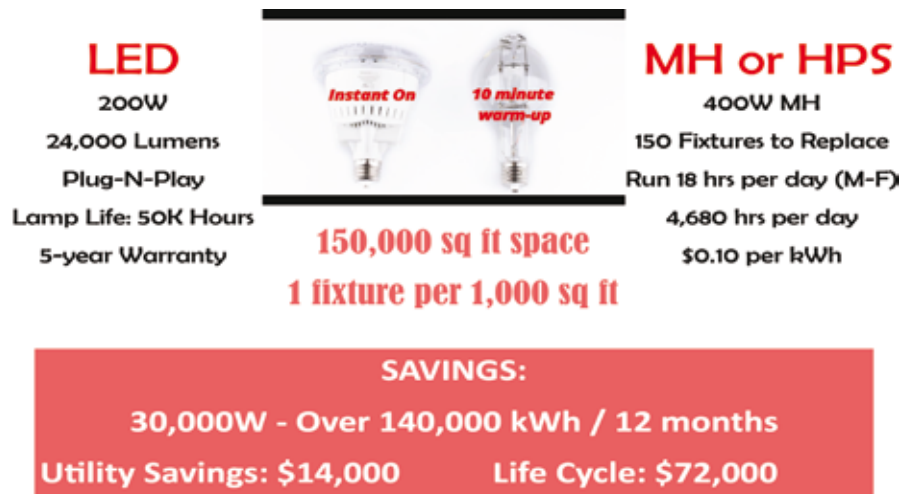
You will also want to know what light color temperature is desired. Kelvin (K) is the scale used to describe color temperature. The typical household lamp is generally at 3000K which is a warmer white light. In warehouse and other commercial lighting the prevalent selection is 5000K which delivers a brighter, daylight look.

Now that you are a warehouse lighting expert, let’s take a look at how you can save on your electrical costs.

A TYPICAL CASE STUDY AFTER A LED SYSTEM UPGRADE

Upgrading to an LED System traditionally meant that you would have to replace your entire warehouse lighting with new LED fixtures and controls. With today’s innovative technology, there are new solutions that provide Facility Managers with more cost-effective options. Now you can eliminate fixture replacement costs by re-purposing the existing fixtures by simply replacing the MH or HPS lamp with a compatible plug and play LED lamp. The plug-in-play technology enables you to utilize the existing magnetic ballast versus replacing the entire fixture or ballast, or by-passing the ballast which takes labor. In the time it takes to screw in a new lamp you have converted your inefficient old technology system to LED and can begin realizing substantial cost savings.

Here is a typical scenario: XYZ warehouse is 150,000 sq. ft. The average light grid for warehouses is 1 fixture per 1,000 sq. ft., so this warehouse has 150 CWA Metal Halide fixtures that burn 400W MH lamps. This warehouse uses the lighting 18 hours per day, Monday through Friday with no weekend operations (4,680 hours per year). And the local utility company blended rate including demand charges and such is \$0.10 per kilowatt hour. Being a smart operator the Facilities Manager decides to switch his MH lamps out for a 200W, 24,000 lumen plug and play LED lamp. By doing so, this manager is saving 30,000W, or over 140,000 kWh for a 12-month period. Based on the utility rate, the savings is over \$14,000 annually. Since the lamps have a 5-year warranty, the savings over the lamp life cycle is \$72,000.



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IMPROVE LIGHT LEVELS

Warehouse lighting should create an environment for safety, optimum productivity and ease of navigation. Identify the ideal LED solution that provides you with both light output and performance. Today's Facility Manager should compare the existing or planned lighting power density (W/sf) of their space with the maximum recommendations found in the ASHRAE Advanced Energy Design Guide for Small Warehouses. For bulky or self-storage areas – they indicate to limit lighting to 0.6W/sf, for fine storage 0.85W/sf and for office areas 0.9W/sf.

Lumen output and optics vary by application and where the light is desired or required. For aisles and rack areas where ceiling heights are 20ft and higher, a 400W LED equivalent solution could serve the needs ideally with a downlight or uplight / downlight option. For higher ceilings of 35ft and above, a 1000W solution should be considered.



BALLAST REPLACEMENT – THERE ARE OTHER OPTIONS...

Ballast Management is part of every lighting system and as ballasts in existing HID fixtures need replacement, owners now have multiple options. A bad ballast would need to be replaced whether it was a Metal Halide or LED but owners now have a more cost effective option to not replace the ballast, but replace the fixture.

LED high-bay fixtures serve as a cost-efficient alternative to ballast replacement. If you factor in ballast replacement as part of your annual maintenance, the ROI of upgrading to an LED fixture is still extremely attractive vs. any other alternative. The LED high-bay fixture solution delivers a lightweight, yet powerful alternative to replacing a bad ballast. The fixture is constructed with a high efficiency LED electronic driver and available in a broad choice of lumen packages.



REDUCE INSTALLATION AND MAINTENANCE COSTS

Ease of installation is a key element in upgrading to an LED system. Lamp replacement involves replacing the existing lamp with an LED lamp - No re-wiring or new fixture required. Replacing an HID fixture with an LED fixture involves removal of the old fixture and mounting and connecting the new LED electronic driver fixture. Once installed, the savings will be there.

Additional savings from maintenance costs are made possible with these new technologies since they last significantly longer than their HID predecessor. This longevity drives down maintenance costs as crews can spend their time servicing other equipment within the warehouse.

IMPLEMENT A CONTROLS STRATEGY

The use of lighting control strategies such as scheduling, occupancy sensors, daylight harvesting, bi-level switching to turn lights off or down when not needed all can provide additional energy savings. Managers should calculate how many hours per day the lights are on and identify areas that would benefit from having an LED fixture paired with a sensor. These additional steps to control lighting, when and where it is needed, can provide additional energy savings for your warehouse.

MITIGATE COSTS WITH REBATES

To further drive the transition to LED, there are numerous government-backed initiatives to encourage their use. Groups such as the U.S. Department of Energy continue to endorse and embrace LED technology as the future of lighting. There are active rebate programs in every state to help mitigate the up-front cost and drive pay-back periods down. A complete listing of state by state rebates is available at <http://energy.gov/savings>.

By implementing these changes and suggestions, energy efficient warehouse lighting can be achieved without the purchase of totally new equipment and the expense of a lighting redesign. These simple changes of upgrading your lighting to LED can reduce energy consumption by more than 50% with a typical ROI in less than 12 months.

Today you do not have to make a choice of lighting quality vs energy savings -- You can have both.

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About ForeverLamp

Foreverlamp is an LED Lighting manufacturer that specializes in Big Lumen™ plug-n-play technology. Foreverlamp designs, engineers and manufactures LED lamps and fixtures specifically for replacing HID high bay lighting. Our products are designed for life, delivering the highest quality when it comes to luminance, light temperature, energy saving, longevity, dimming possibilities and aesthetics.

With beautifully designed and reliable products, Foreverlamp offers long lasting and energy-saving lighting solutions that stand the test of time. Foreverlamp LED products save up to 50% of the energy used by other types of HID lamps, while providing many more features such as instant on/off and better quality of light. Our products are the ideal retrofit solution for companies of all sizes and operations that are concerned with energy savings and facility maintenance. Our products can be found in big box national retail stores, sound studios, warehouses, auto dealerships, gymnasiums and many more facilities across the country helping to lower facility operating costs, positively impact employee productivity and achieve sustainability goals.

Founded in 2010 by Peter S. Shen, former president of Philips Lighting and Electronics Group, Foreverlamp is headquartered in Torrance, CA. with regional offices in Beijing, Taipei and Tokyo. Foreverlamp has quickly become a leader in the LED retrofit and high-bay luminaire market and is the first lighting company to offer a plug and play 24,000 lumen LED lamp as a replacement for a 400w metal halide bulb and the first company to offer a 42,000 lumen LED lamp as a replacement for 1000W metal halide. No re-wiring or ballast by-pass is required. Saving energy is as easy as changing a light bulb when using Foreverlamp products.

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