LED Exterior Lighting vs. Metal Halide

1 LED OUTSHINES METAL HALIDE

When it comes to lumen output; all lumens are not distributed equally.

If you compare the raw lumen output of metal halides with the lumen output of LED lighting fixtures, it often seems that LED fixtures come up short. Such comparisons, however, are inaccurate and misleading, as they fail to account for the significant amount of wasted light in HID/metal halide lighting solutions.

According to 'The LED Lighting Explained' book, by Phillips, "lumen output is a poor measure of the suitability of a lighting fixture for a given task. A better measure is delivered light — how much light a fixture delivers to a surface or area, as measured in lux (lx) or foot candles (fc). You can make accurate comparisons between metal halide and LED lighting fixtures on the basis of delivered light, as it measures how much of a light source's raw lumen output reaches a surface or area you want to illuminate. "

To determine how much of a conventional lamp's raw lumen output reaches a task area, you must discount any light lost in the fixture housing (often over 30%), as well as any light lost as a result of lensing, shading, and filtering.

There's even a new BUG standard published by the Illuminating Engineering Society to address this issue. BUG stands for "Backlight", "Uplight" and "Glare." "B" stands for backlight, or the light directed in back of the mounting pole. "U" stands for uplight, or the light directed above the horizontal plane of the luminaire, and "G" stands for glare, or the amount of light emitted from the luminaire at angles known to cause glare.

Since metal halide lamps emit light in all directions, you must further discount any light emitted in a direction away from the target area (i.e. BUG).

And since LEDs are inherently directional, they emit almost all of their light output in the desired direction, rather than dispersing it in all directions.

"Think of the LED as a flat plate", said Richard Pounds, SE Regional Sales Manager Eiko Global LLC. "The light is all from the bottom end. It's all focused on the work plane with no fixture losses."

In other words, that's how a 30,000 lumen rated 400W HID source is equaled by a 12,000 lumen 130W LED.

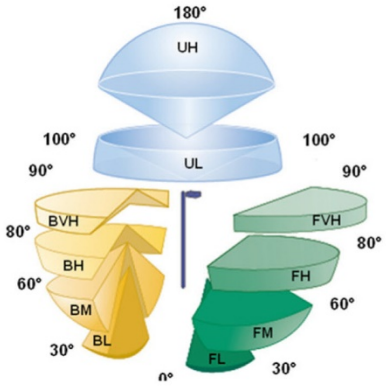


Figure 1: the revised outdoor luminaire distribution measuring system from TM-15-07 (revised) *

After reviewing hundreds of candidate luminaires, the MLO task force established the three composite (BUG) ratings based on TM-15-07 (revised):

Backlight, which creates light trespass onto adjacent sites. The B rating takes into account the amount of ligwht in the BL, BM, BH and BVH zones, which are direction of the luminaire OPPOSITE from the area intended to be lighted.

Uplight, which causes artificial sky glow. Lower uplight (zone UL) causes the most sky glow and negatively affects professional and academic astronomy. Upper uplight (UH) is mostly energy waste. The U rating accounts the amount of light into the upper hemisphere with greater concern for the lower uplight angles in UL.

Glare, which can be annoying or visually disabling. The G rating takes into account the amount of frontlight in the FH and FVH zones as well as BH and BVH zones.

2 WHEN IT COMES TO ENERGY USAGE, LEDS OUTSAVE METAL HALIDE

Replacing metal halides in a commercial setting with LEDs is very easy to justify, especially as the installed costs of LEDs have come down just in the last few years, while their efficiencies have improved.

Metal halide lamps start out with fairly high lumen output, but depreciate in output quite quickly. In fact, the lighting output begins to decline just as soon as you turn on the power to the new bulb. When it gets to 40% of its rated life, the metal halide has lost somewhere in the range of 30-40% of light output, and as low as 40% of its initial lumens by the end of lamp life.

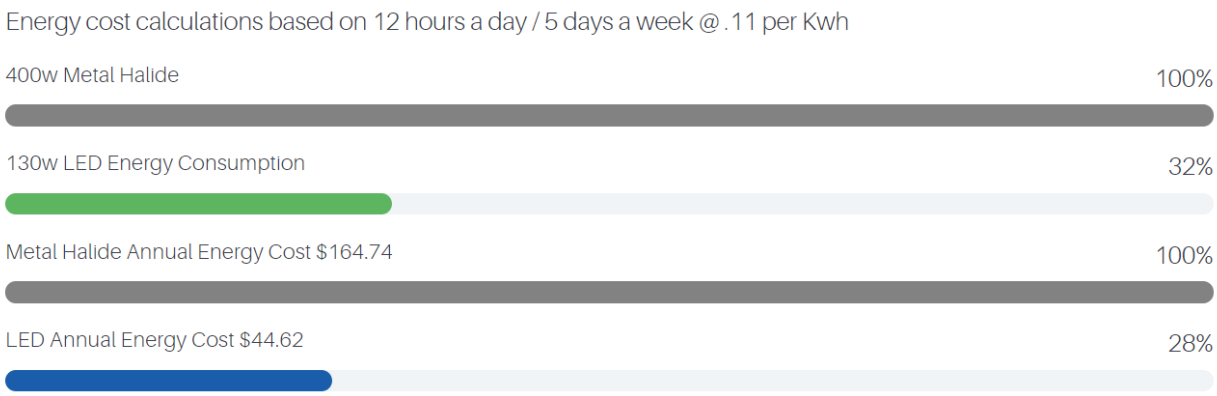
According to Pounds, “The trick for design engineers with metal halides is not to measure around initial lumens, but at that 65% which is commonly called design lumens.

By contrast, LED sources fade very slowly over time. Well-designed LED lighting fixtures can retain 70% of their initial output up to 100,000 hours, depending on operating conditions and other factors. At 24 hours per day of continuous use, such fixtures can deliver useful light for eleven years or longer — five times as long as metal halide sources.

Combine that with the fact that there are no lumen fixture losses with directional LEDs (as opposed to up to 30% with metal halides), and it’s easy to see why specifiers can replace an equivalent 400W metal halide with an energy-efficient 130W LED.

The benefits of this are obvious, especially as commercial energy costs are not coming down anytime soon. By eliminating two thirds of the energy usage and doing the same with 130 watts as 400 watts, that savings would add up pretty quickly.

Auto Dealership Metal Halide vs LED



3 Summary

The advantages of the LED retrofit approach were numerous:

- Energy Savings: Up to 65% reduction in energy usage.
- Long life: Average Lamp Life of 120 watt LED is 100,000 hours, while 400 watt metal halide lamp life is only 18-20,000 hrs.
- Lumen output: LED lamps do not degrade over time. Although the initial lumen output of a metal halide fixture may be quite high, metal halide fixtures are known for their poor lumen maintenance. The average 400 watt metal halide fixture emits only 65% of its initial lumens by the time it hits mean lamp life, and as low as 40% of its initial lumens by the end of lamp life.
- Lower Maintenance: long life LED minimizes replacement and maintenance costs, as well as safety concerns associated with employees having accidents while on lifts or ladders.

- Excellent Color Rendering: LED clear, crisp, UV free light and even beam distribution provides better illumination and fewer shadows for employees who are stocking shelves or working in aisles.
- Cold Start: LED operates from a cold start, enabling energy efficiency when coupled with occupancy sensors. Metal halides require a warm up period, making it inconvenient to use frequent on-offs to achieve energy savings.