

LIFETIME AND RELIABILITY COMPARISONS

With an excess of information available touting LED products as immortal, the "Building Technologies Program, Solid-State Lighting Technology Fact Sheet" is a recent report from the US Department of Energy (DOE) that helps separate fact from myth. When compared to other lighting technologies, the main argument in favor of LEDs is the long life. This technical brief illustrates data-driven comparisons of life cycle and reliability for LED and advanced metal halide lighting.

Venture Lighting International, a leading manufacturer of advanced metal halide lighting systems, strives to share accurate comparisons of competing lighting technologies.

Product Failure METAL HALIDE FAILURE

Most users of outdoor metal halide lighting are familiar with lamp median life ratings (approximately 20,000 hours or five years) and occasionally the failure of the magnetic ballast (10%-20% over ten years), but users seldom experience the failure of the entire fixture.

Indoor metal halide applications show similar data, but this is dependent on the usage specifications. It is not unusual for an indoor metal halide fixture to last 15 years (approximately 100,000 hours) with possibly 3-4 lamp changes and 10-20% of ballasts being changed during that time.

Venture's 100 Series Systems deliver 100 lumens per system watt and provide superior reliability compared with competing LED systems.



Venture's SPL product, with a 40,000 hour rated life comparable to LED systems



LEDs have a rated useful life of 30,000 to 50,000 hours?



Key Points

- Replacing the power supply in an LED fixture is exponentially more difficult and expensive than simply replacing the lamp in a metal halide fixture
- MTBF of 100,000 hours means that over a 10-year (continuous) useful life period, 87.6% of the units will likely fail and need to be replaced!
- Simply replacing a lamp is not nearly as costly or difficult as replacing an entire LED fixture

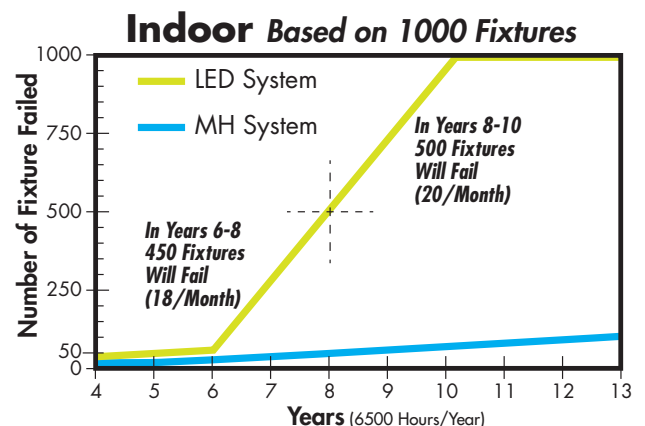
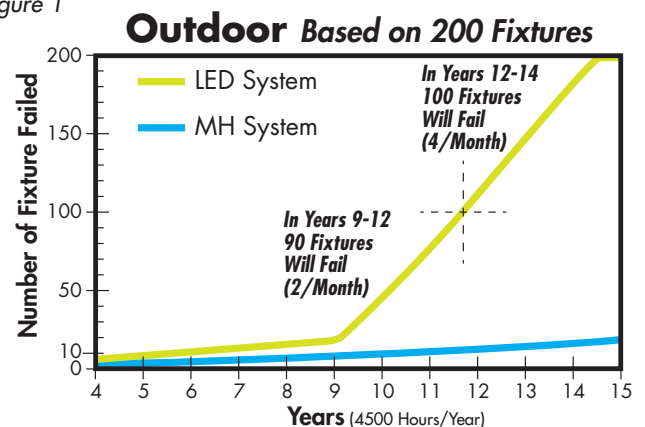
LED FAILURE

According to the DOE report, "the failure of any LED system component, not just the array of LED packages, but also the electronics, thermal management, optics, wires, connectors, seals, or other weatherproofing, can directly or indirectly lead to product failure."¹

As shown in Figure 1, both indoor and outdoor LED applications experience dramatic increases in failure rates later in the life cycle. While LED technology is often thought of as everlasting, the graphs clearly argue against this myth. Many LED manufacturers offer five or ten-year fixture warranties, but these product replacement guarantees do not include the high cost of labor. Also, "significant depreciation" is usually excluded as a failure mode. Therefore, if an LED fixture loses 70% of its light output during the

warranty period, the end-user is left in the dark.

Figure 1



Component Failure Comparisons

Defined in the DOE fact sheet, "reliability is a different statistical measure of performance that, in principal, describes the ability of a product to perform its intended functions under a specific set of conditions for a specific period of time."¹

Figure 2 highlights the differences between failures in the components of a metal halide fixture and an LED fixture. This DOE data for LED component failures speaks to the little-known differences between LED lifetime and LED reliability of components. While an LED package may have long life, the graph shows that the majority of LED component failures are the power supplies, while the majority of metal halide component failures are the lamp. Replacing the power supply in an LED fixture is exponentially more difficult and expensive than simply replacing the lamp in a metal halide fixture.

This often-confused difference is explained in further detail in the DOE report. "Note that while both lifetime and mean time between failures (MTBF) are typically reported in hours or years, the latter is actually an average failure rate metric rendering a direct comparison between the two ratings meaningless and cause for misguided conclusions. For example, while a lifetime of 100,000 hours might be considered excellent, a ballast or driver MTBF of 100,000 hours means that over a 10-year (continuous) useful life period, 87.6% of the units will likely fail and need to be replaced."¹

Venture Lighting Technology Solutions

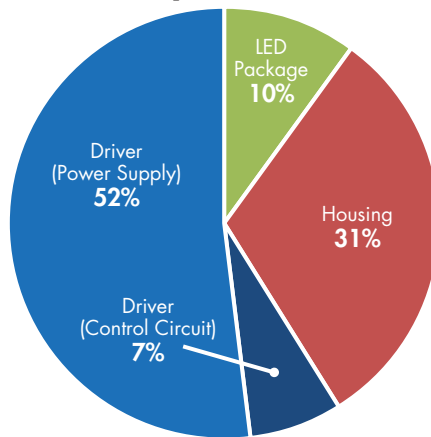
Venture Lighting offers a large variety of energy efficient, advanced metal halide lighting solutions that surpass LED technology in fixture lifetime, reliability, life cycle cost and ease of maintenance. With 100 lumens per system watt and up to 90% mean lumens, the efficiency of the 100 Series Systems is unparalleled. The 100 Series Systems includes Venture's Super Pulse Start Long Life (SPL) lamps with 40,000 hours rated life and LeafNut™ Wireless Lighting Control System that increases energy savings and life span through dimming.

All metal halide lamp manufacturers recommend group re-lamping at about 75% of rated life to maintain optimum light levels and achieve economical replacement. It appears that group re-fixturing should be recommended at 7-10 years for LED systems. Simply replacing a lamp is not nearly as costly or difficult as replacing an entire LED fixture.

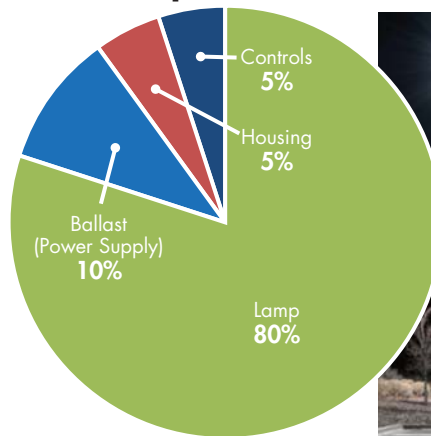


Figure 2

LED Component Failures



MH Component Failures



For more information about Venture's efficient lighting systems, visit:
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Footnotes:
 1 U.S. Department of Energy, "Building Technologies Program Solid-State Lighting Technology Fact Sheet: Lifetime and Reliability"
 2 U.S. Department of Energy, "LED Frequently Asked Questions"



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