



LED lighting....it's here to stay!

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Osseo case study conclusions:

- LED was the correct choice (performance and financial)
 - recommended light levels achieved from half the energy of metal halide lamping
 - predicted LED life provides substantial maintenance savings
 - achieved the predicted long-term cost savings
 - light levels are being maintained as predicted (better than conventional metal halide lamping)
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Osseo actual performance



Parameter	Minimum	Maximum
Calculated values	0.3 FC	2.7 FC
Measured values October 2009	0.6 FC	2.6 FC
Measured values October 2013	0.6 FC	2.8 FC
Measured values October 2014	0.5 FC	2.5 FC
*Approximately 22,000 hours burn time		

Estimated yearly energy savings: \$10,059

Actual yearly energy savings: \$9,936*

Maintenance: Virtually none required

* Estimated based on limited data points

how far has LED come? where is it going?

- lighting performance sufficient for most applications
 - rated life ranges from 70,000 hours to 100,000+ hours due to technical advances
 - installed cost still somewhat more than conventional HID lamping (but coming down)
 - energy and maintenance savings is significant
 - “controllability” greatly exceeds that of conventional lamping
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LED lighting performance

- lumens-per-watt matches or exceeds that of conventional lamping
 - LED generally has better “deliverability” than conventional (less light lost)
 - LED has better lumen maintenance (better retention of lumens throughout rated life)
 - Color temperature: 2,700K to 6,500K available
 - these factors are why LED is now being employed for most applications
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significant maintenance advantage!



- typical life span now 100,000 hours or more by most major manufacturers (laboratory results)
- 25 years of service if used 4,000 hours per year
- life can be further extended with dimming control
- heat dissipation is key – the cooler they run, the longer they last



- LED still has “first cost” premium compared to conventional lamping
 - When built, the per fixture premium for Osseo was \$500, with projected payback of 6.6 years
 - for acorn globes similar to Osseo project, that cost is presently about \$300 per fixture
 - If built today, city of Osseo would realize project payback in four years
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Alexandria, MN: relighting Broadway Avenue

- construction completed Oct. 2014
- new traditional appearance post top, 80W, dual globes 16 feet high
- lighted street width of 80 feet (twice the width of Osseo project)
- pre-project average light level: 1.3 FC. Post-project: 1.5 FC
- energy use cut in half
- simple payback projected to be 4.8 years versus predecessor



what about high-output applications?

- several manufacturers have industrial “high-bay” lighting products (ambient temperature an issue?)
 - MNDOT using LED for freeway lighting at 40-plus-foot mounting heights
 - based on product availability for high-bay applications, high-mast freeway lighting may soon follow
 - some manufacturers offer luminaires designed for auto sales lots, which require high-light levels
 - manufacturer Musco advertises LED lighting for Twickenham Stadium in the UK
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what does future hold?

- capital costs continue to decrease with increasing sales volume
- energy and maintenance savings will continue improvement, but less dramatically than recently
- economic attractiveness will increase
- based on these observations, future of lighting will be predominated by LED



Next....

