



MUSKEGON COUNTY, MICHIGAN ADVANCED LIGHTING TECHNOLOGY DEMONSTRATION

RETROFITTING EXISTING LIGHT FIXTURES WITH LED TECHNOLOGY

This report is intended to provide a case study example with relevant guidance for municipalities and/or businesses considering a lighting upgrade for improved performance and energy efficiency. In late 2011, the County of Muskegon was a beneficiary of an Advanced Lighting Technology Demonstration (ALTD) grant from the Michigan Energy Office (MEO). This grant program was funded by the American Recovery and Reinvestment Act (ARRA), Energy Efficiency Conservation Block Grant (EECBG).

Muskegon County identified Heritage Landing, a waterfront park and festival site located in downtown Muskegon for this demonstration project. Eighty-eight (88) existing fixtures were identified for retrofit with advanced Light Emitting Diode (LED) technology.

There are many benefits to retrofitting existing High Intensity Discharge (HID) fixtures with (LED) or other advanced lighting technology. In the case of Muskegon County, the majority of the 88 fixtures in the project were retrofitted from a 150 Watt HID to a 45 Watt LED—a 70 percent reduction in electricity consumption. Furthermore, with an adequate heat sink (known in the lighting industry as “thermal management”) incorporated into design of the retrofit, an LED may last as long as 10-15 years. With design and thermal management improvements achieved almost daily, the life expectancy and cost competitiveness of LED lighting has not been fully realized. Another benefit to the longevity of LED technology is that it can all but eliminate maintenance costs for 10+ years when a high-quality, tested LED product has been installed.

Below is an outline of some basic steps for exploring, defining and implementing an LED retrofit project.

1. INVENTORY & DEFINE

- a) Count the number of fixtures within your project scope
 - i. Make note if there different types/sizes (i.e. post top vs. wall pack, etc.).
- b) Determine type of bulb and existing wattage(s) in use
- c) Identify the manufacturer of your fixture

- i. Contact your fixture manufacturer/supplier and ask if they have a “turnkey” LED retrofit product specifically designed for your fixture and that has been fully tested and listed with a nationally recognized testing laboratory (i.e. UL listed or otherwise). This may or may not exist in your application.
 - ii. Locate/obtain all applicable fixture specifications and manufacturers drawings to determine features and internal size available for retrofit kits.
- d) Measure/define your current or desired lumen/footcandle output, that is to say the light level on the ground.

2. PERFORMANCE SPECIFICATION

- a) If your fixture manufacturer does not offer an LED retrofit intended for your fixture, or you are interested in exploring alternative LED retrofit solutions, you may want to develop a performance specification to bid or source your retrofit project.

Specifications to consider are:

- i. Desired color temperature range
 - 1. LED light color is measured in Kelvin (K) temperature and *generally* ranges from (Note, lumen output tends to diminish with reduced color temperature):
 - a. Warm (Amber) in the 3,000-4000K range
 - b. Neutral (White) in the 4,000-5,000K range
 - c. Cool (Blue) in the 5,000-6,000K range
 - ii. Full Replacement Warranty Coverage
 - iii. Minimum Rated Hours (life expectancy)
 - iv. UL listed (or “Tested and Listed by a Nationally Recognized Testing Laboratory”)
 - v. L70 Lifetime, LM-79 and LM-80 data for LED assembly
 - vi. Advanced thermal management incorporated into LED retrofit design
 - vii. Minimum lumen output/footcandle delivery on the ground
 - viii. Consider Buy American
http://www1.eere.energy.gov/recovery/buy_american_provision.html
- b) It is advised that you contact your local Electrical Inspector to get his/her input on your project/specifications to identify any concerns in advance. This is particularly beneficial in the case where a fixture manufacturer does not offer a fully tested and listed retrofit product, or you are pursuing other retrofit options.

3. ENERGY & EMISSIONS REDUCTIONS + ENERGY REBATES & INCENTIVES

- a) Michigan Energy Office (MEO) developed a very useful Lighting Calculator to project energy and emissions reductions. The calculator has been made available with this case study for anyone to calculate savings and emissions reductions on a project under consideration. You will need to know your electric utility rate (¢/kWh), the wattage of your current bulbs, the number of hours in operation and the wattage of the proposed

advanced lighting retrofit solution. The results of Muskegon County's savings and emissions reductions are summarized on the last page of this report.

- b) You should also contact your electric utility provider regarding available rebates and/or visit the Database of State Incentives for Renewables and Efficiency for a complete listing of energy efficiency incentives available in Michigan: <http://www.dsireusa.org/>.

4. SOURCING/BIDDING & CONTRACTING INSTALLATION (SAMPLE RFP)

- a) Muskegon County's full bid package and performance specification is available for review at the Michigan Intergovernmental Trade Network, www.mitn.com. Look under "Closed Bids" for Muskegon County, search by title "Advanced Lighting Retrofit."

5. ADDITIONAL ADVANCED LIGHTING TECHNOLOGY RESOURCES:

- a) Michigan Energy Office:
<http://www.michigan.gov/mdcd/0,1607,7-122-25676---,00.html>
- b) MEO Advanced Lighting Technology Directory:
http://www.michigan.gov/documents/mdcd/ALT_Directory_366403_7.pdf
- c) Oakland University Outdoor Lighting Pilot Project:
<http://www.oakland.edu/lighting>
- d) Michigan Solid State Lighting Association:
<http://www.mssla.org/>



Projected Savings & Emissions Reductions

Muskegon County DPW (MEO-11-70)	Replacement 1		Replacement 2	
	Existing Fixture	New Fixture	Existing Fixture	New Fixture
Description of existing lights: (Metal halide/ High pressure sodium)				
Number of Bulbs/ fixtures	78	78	10	10
Wattage of each Bulb/ fixture	Watts	150	45	50
Avg. hours of operation per week	Hours	84	84	84
Number of weeks per year	Weeks	52	52	52
ENERGY SAVINGS CALCULATIONS				
Kilowatt hours (kWh)/yr of energy saved	kWh	35,992.32		
Electricity Cost/ kWh	\$\$/kWh	\$ 0.13		
\$\$ saved/ year	\$\$/yr	\$ 4,679.00		
Green House Gas (GHG) emissions reduced per year	Metric Ton	26.95		
Particulate emissions reduced per year	Metric Ton	0.16		