



Northeast Energy Efficiency Partnerships

# LED STREET LIGHTING: OPPORTUNITIES AND EMERGING STRATEGIES

Northeast Energy Efficiency Partnerships (NEEP)  
Monday, September 21, 2015

ACEEE Energy Efficiency as a Resource Conference  
Little Rock, Arkansas

# About NEEP

## Mission

Accelerate energy efficiency as an essential part of demand-side solutions that enable a sustainable regional energy system

## Vision

Region embraces **next generation energy efficiency** as a core strategy to meet energy needs in a carbon-constrained world

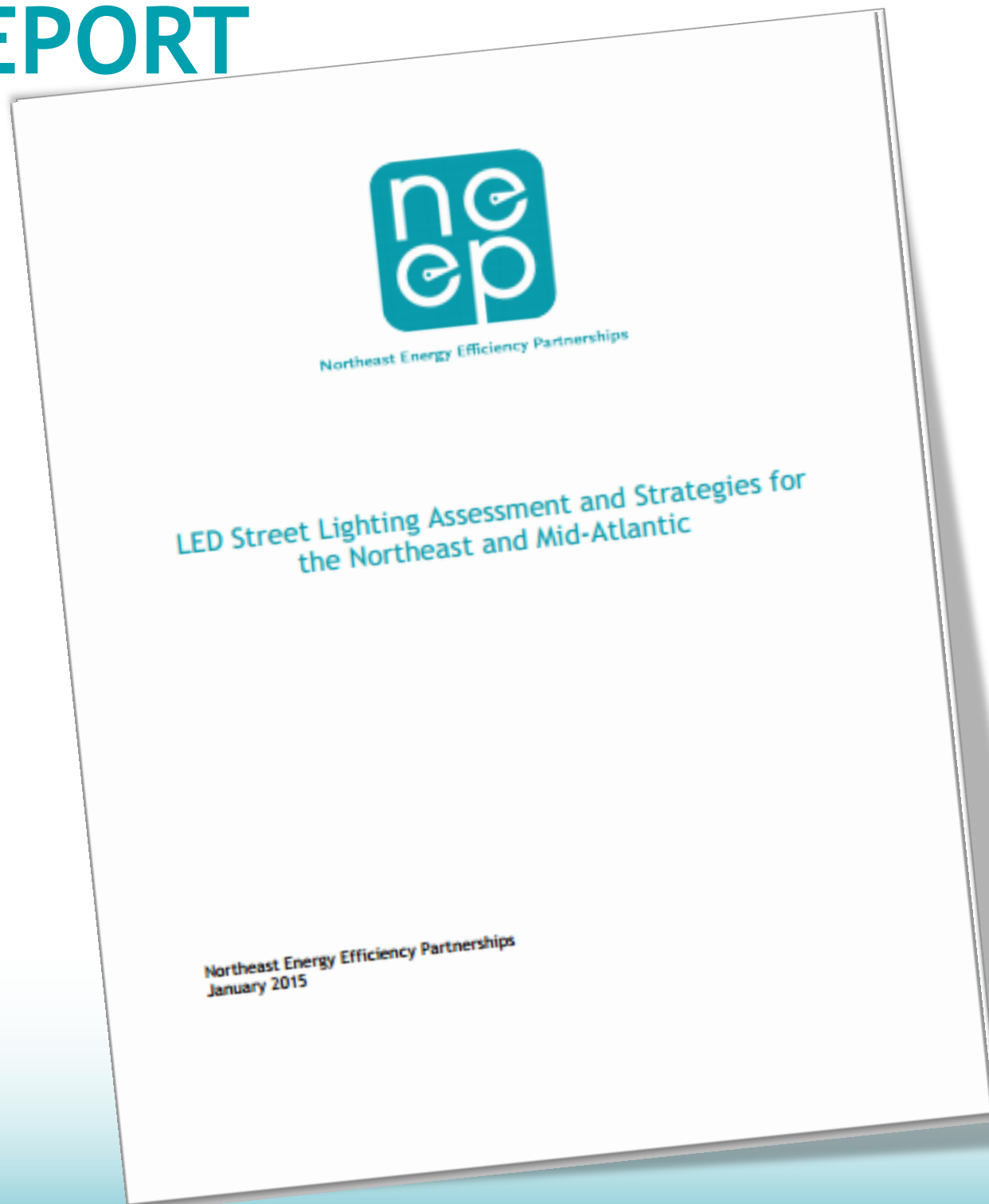
## Approach

Overcome markets and transform markets via  
***Collaboration, Education and Enterprise***



*One of six regional energy efficiency organizations (REEOs) funded by the US Department of Energy (US DOE) to link regions to US DOE guidance, products and programs*

# NEEP REPORT





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Northeast Energy Efficiency Partnerships

Developing strategies and  
guidance for the region

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# AGENDA



## 1. Opportunities

1. The Basics
2. Cost Savings
3. Additional Benefits
4. Advanced Controls

## 2. Conversion Considerations

1. Technical
2. Regulatory
3. Financial

## 3. Case studies

1. Pittsburgh, PA
2. Baltimore, MD

## 4. Resources

1. Better Buildings Accelerator (Presidential Challenge)
2. Municipal Solid-State Street Lighting Consortium (MSSLC)





# OPPORTUNITIES: THE BASICS



## FIXTURE HOUSING TYPES

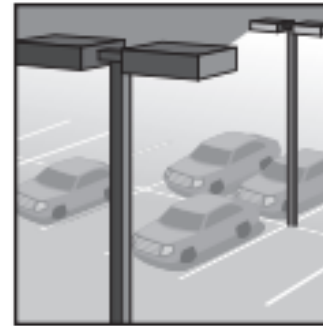
Photo Credits: Efficiency Vermont, NYSERDA



Cobrahead



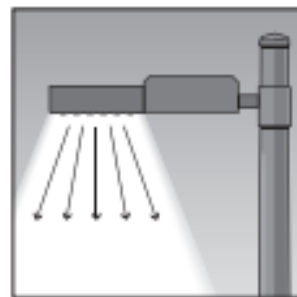
Flood Light



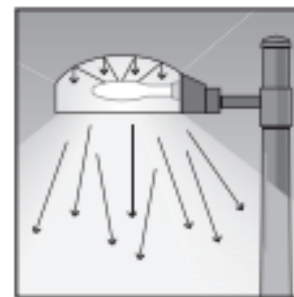
Shoebbox



Post-Top



LED Street Light



Traditional Street Light

**Table 2-5. Retrofit/Replacement Projects: Current Expected LED Street Light Simple Paybacks<sup>a</sup>**

Fixture Type	Light Output					
	Low (<50W)		Medium (50W-100W)		High (>100W)	
	Min	Max	Min	Max	Min	Max
Decorative	14.2	20.2	14.1	21.3	12.5	18.6
Decorative kit	9.7	15.1	10.7	17.0	8.9	16.0
Cobrahead	3.6	5.6	4.0	7.7	3.9	7.7

<sup>a</sup> Assumes no program administrator incentives. Does not account for cost of money.

# OPPORTUNITIES: COST SAVINGS



## Cost Savings

- Street Lighting accounts for 20-40% of a municipality's electric utility costs
- Energy Cost-Savings (reduces consumption by 50%+)
- Maintenance Cost-Savings (~\$50/lamp/year)



Table 4: SCL Example of LED Street Light Cost Reduction over 4-Year Period<sup>24</sup>

LED Street Light Cost Reductions over 4-Year Period					
	2009	2010	2011	2012	2013
<b>Seattle</b> (Purchases of 2,000+ Units)	\$369	\$288	\$239	\$204	\$179
<b>Los Angeles</b>	\$432	\$298	\$285	\$245	\$141

# OPPORTUNITIES: ADDITIONAL BENEFITS



## Additional Benefits



- Reduced Light Pollution at Night
- Lighting Quality
- Great Perceived Security



- Extended Lifecycle
- Reduced Carbon Emissions
- Can Incorporate Advanced Controls
- Gateway to the “Smart City”



# OPPORTUNITIES: ADVANCED CONTROLS

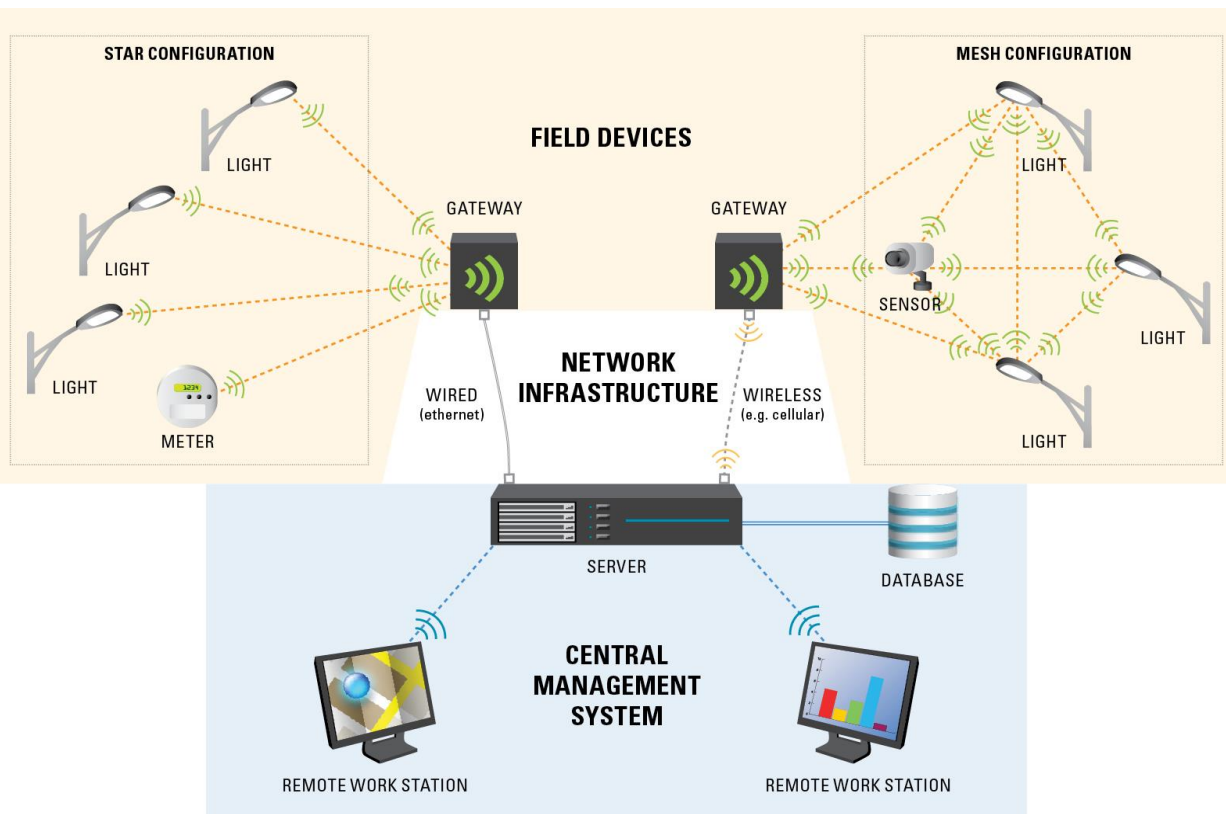


## Traditional Controls

- Three-prong
- Photocell
- Unmetered
- Fail in the “on” position
- Do not offer dimming

## Advanced Controls

- Seven-prong
- Contain a meter
- Allow for dimming
- Potentially act as wireless hotspots
- Can alert to failed lamps
- Emergency Alert
- CO<sub>2</sub>, Traffic, Decibel sensors embedded



(Image Credit: California Lighting Technology Center, UC Davis)

# CONVERSION CONSIDERATIONS: NAVIGATING BARRIERS

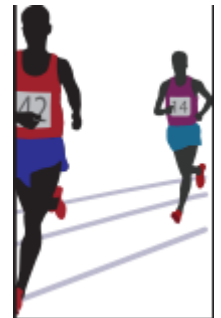


# NAVIGATING BARRIERS: COMPANY-OWNED TARIFFS



Table A7: Central Maine Power HPS/LED Rate Comparison

Central Maine Power (Maine) <sup>68</sup>							
HPS Rate				LED Rate			
Lumen Rating	Watts (Nominal)	Input Watts	Annual Rate Per Light	Lumens Rating	Watts (Nominal)	Input Watts	Annual Rate Per Light
3,600	50W	65	\$131.88	4190	50	50	\$248.64
5,670	70W	95	\$130.68				
8,550	100W	130	\$140.04				
14,400	150W	195	\$166.32				
25,600	250W	300	\$228.96				
45,000	400W	465	\$290.76				



Distribution Charge Difference  
\$118

Table A12: Until HPS/LED Rate Comparison

Unitil (Massachusetts) <sup>93</sup>			
HPS Rate		LED Rate	
Lumen Rating	Annual Rate Per Light	Lumen Rating	Annual Rate Per Light
3,300	\$117.48	3,850	\$101.64
9,500	\$139.80	6,100	\$120.48
20,000	\$208.20	10,680	\$150.96
50,000	\$295.92	20,000	\$243.24
140,000	\$607.08		



Energy Savings  
\$0.08/kWh  
4200 hrs  
\$24/ lamp



# APPENDIX A EXAMPLE: MASSACHUSETTS



## Massachusetts Street Light Summary

Number of Street Lights:	496,000
Percent Region's Total Street Lights:	10 percent
Annual Street light Energy Usage:	305 GWh
Annual Potential Energy Savings:	152.5 GWh
Annual Potential Energy-Cost Savings:	\$13.7 Million
Annual Potential Maintenance Cost-Savings:	\$24.8 Million
LED Conversion Installed Costs:	\$139.4 Million
Annual Potential Lighting Controls Energy Savings:	13.7 GWh
Annual Potential Lighting Controls Cost Savings:	\$1.2 Million
Lighting Controls Installed Cost:	\$13.9 Million

Massachusetts Utilities by Percent Residential Customers

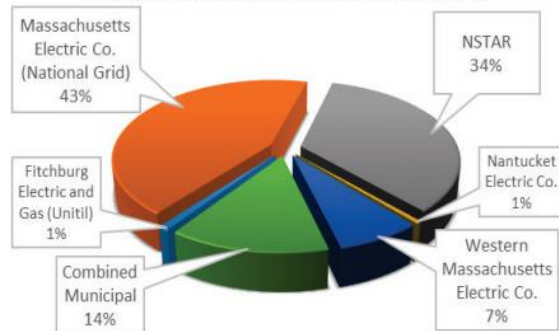


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140,000	\$607.08		

Table A13: Notable Conversion Projects (Massachusetts)

Massachusetts LED Street Light Projects and Prospective Projects		
Municipality	Date	Details
Cape Light Compact	Present	Has Coordinated the Conversion of 15,000 Street lights in 20 municipalities including: Hyannis, Dennis, Harwich, Chilmark, Chatham, Orleans, Brewster, Wellfleet, Truro, Provincetown, Mashpee, Cotuit, Edgartown, Oak Bluffs, Barnstable, Sandwich, W. Barnstable, Yarmouth, Falmouth, and Bourne. Conversions planned in: C-O-MM FD, Tisbury, and West Tisbury
Metropolitan Area Planning Council (MAPC)	Present	Has Coordinated the conversion or Pending Conversion of 58,000 Street lights in 21 municipalities including: Arlington, Chelsea, Natick, Woburn, Somerville, Sharon, Winchester, Swampscott, Winthrop, Gloucester, Hamilton, Melrose, Wenham, Beverly, Northampton, Salem, Lowell, Chicopee, Westfield, Malden, Brockton
Cambridge	Present	Replacing all street, park, and decorative lights with LED Fixtures, plus wireless controls for street lights <sup>94</sup>
Fitchburg	March 2014	Considering Conversion <sup>95</sup>
Holyoke	December 2013	Completed Second Year of Three Phase Project to Convert all Street lights to LED <sup>96</sup>
Greenfield	May 2013	Invitation to Bid for Conversion of 416 Fixtures to LED <sup>97</sup>
Newton	May 2013	26 pilot lights converted with plan to convert all 8,400 <sup>98</sup>

# City of Pittsburgh Projected Savings



## kWh

- Projected savings nearly 14 million kWh per year

## Maintenance

- Reduce yearly maintenance contract by 90%

## Savings

- kWh = \$1,000,000
- Maintenance = \$1,100,000

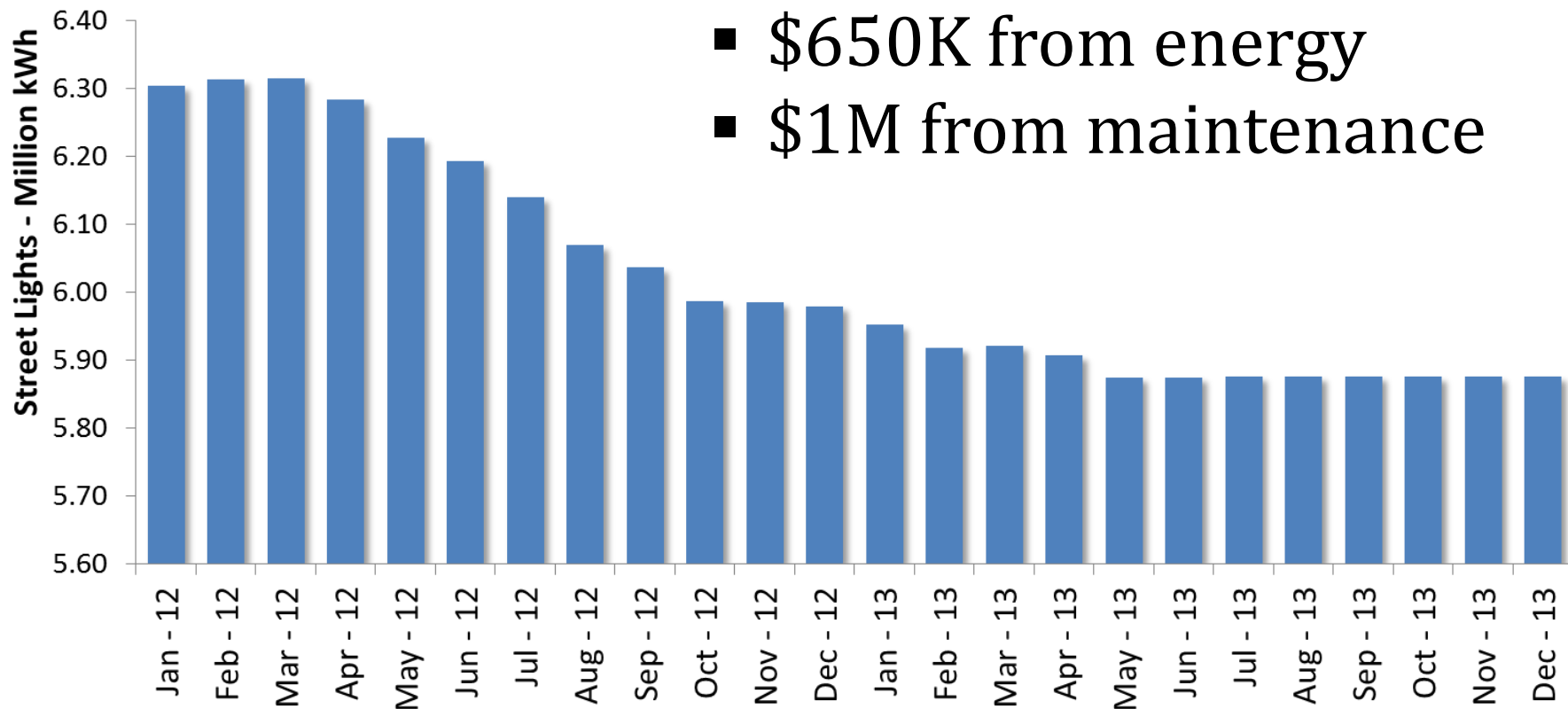




# City of Baltimore Street Lights: Completed in 2013

Replaced **11,115** street lights with LEDs

- Annual savings:
  - \$650K from energy
  - \$1M from maintenance



**Baltimore City Department of Public Works**



# RESOURCES

## EXISTING RESOURCES/STAKEHOLDER INITIATIVES



### [US Department of Energy Better Buildings Challenge](#)

In exchange for technical assistance and strategic partnership with financial institutions (et.al.), partners agree to **reduce portfolio energy usage by 20% over the next 10 years.**

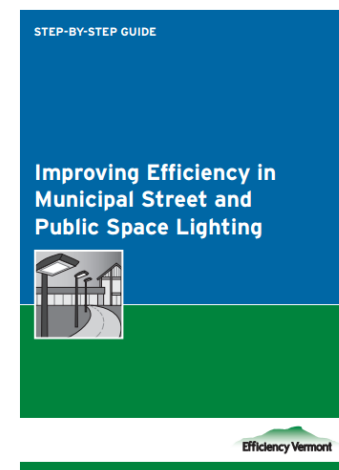
- [Outdoor Lighting Accelerator](#)

The US Department of Energy's Outdoor Lighting Accelerator program provides municipalities with the tools and guidance necessary to complete a goal of replacing all lights system-wide within two years.



### [Efficiency Vermont Conversion Guide](#)

Step by step Guide for improving Efficiency in Municipal Street and Public Space Lighting

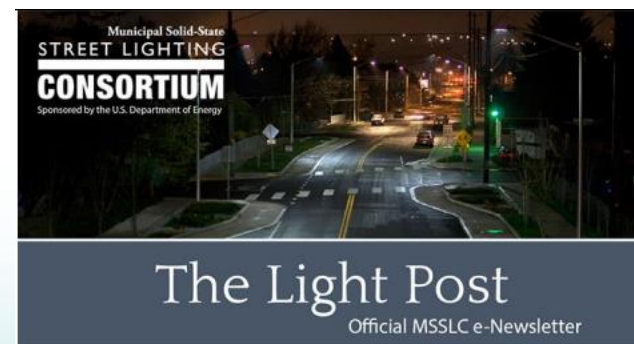


### [Municipal Solid State Street Lighting Consortium \(MSSSLC\)](#)

Shares technical information and experiences related to LED street and area lighting demonstrations, standing as an objective resource for evaluating new products on the market intended for those applications.

#### MODEL TOOLS AND SPECIFICATIONS

- [Streetlight retrofit financial analysis tool](#) to help municipalities determine cost-savings of a potential conversion
- [Model Specification for LED Roadway Luminaires, V2.0](#)
- [Model Specification for Networked Outdoor Lighting Control Systems V2.0](#)





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