Northeast Energy Efficiency Partnerships

REGIONAL LED STREET LIGHTING ASSESSMENT AND STRATREGIES

Northeast Energy Efficiency Partnerships (NEEP)

Wednesday, March 11, 2015

1:30-3pm

PRESENTATION SUMMARY

1. Regional LED Street Lighting Assessment and Strategies

   Brian Buckley, Northeast Energy Efficiency Partnerships
   Policy Research and Analysis Associate

2. Cities Leading the Way: Pittsburgh, PA

   Jim Sloss, Energy and Utilities Manager
   Pittsburgh Office of Sustainability and Energy Efficiency

3. Cities Leading the Way: Baltimore, MD

   Ted Atwood, Energy Division Chief
   Baltimore Department of General Services

NORTHEAST ENERGY EFFICIENCY PARTNERSHIPS

"Accelerating Energy Efficiency"

MISSION

Accelerate the efficient use of energy in the Northeast and Mid-Atlantic Regions

APPROACH

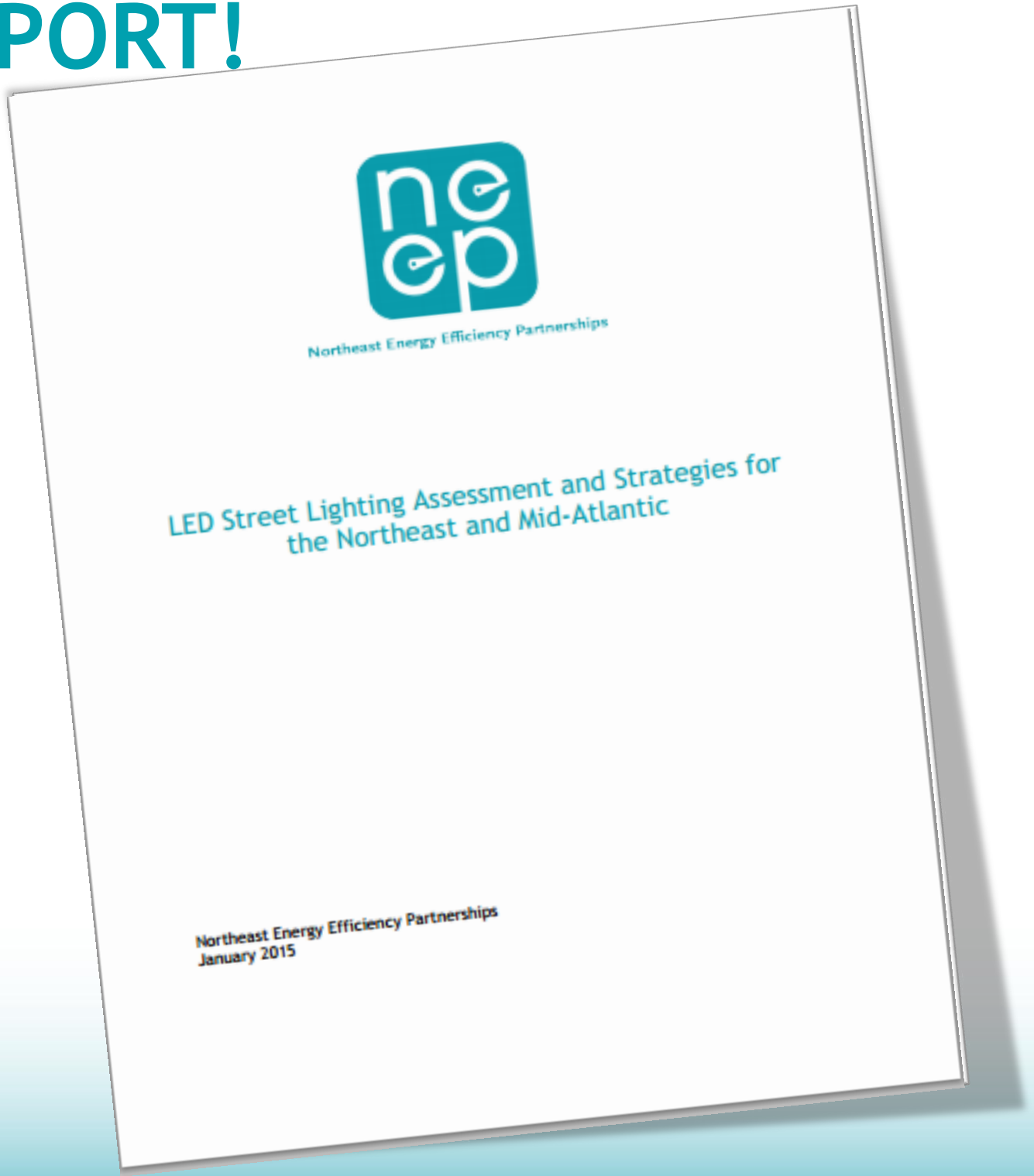
Overcome barriers to efficiency through
Collaboration, Education & Advocacy

VISION

Transform the way we think about
and use energy in the world around us.

One of six Regional Energy Efficiency Organizations (REEOs) designated by U.S. Dept. of Energy to work collaboratively with them in linking regions to DOE guidance, products

NEW REPORT!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LED Street Lighting Assessment and Strategies for the Northeast and Mid-Atlantic
Northeast Energy Efficiency Partnerships
January 2015

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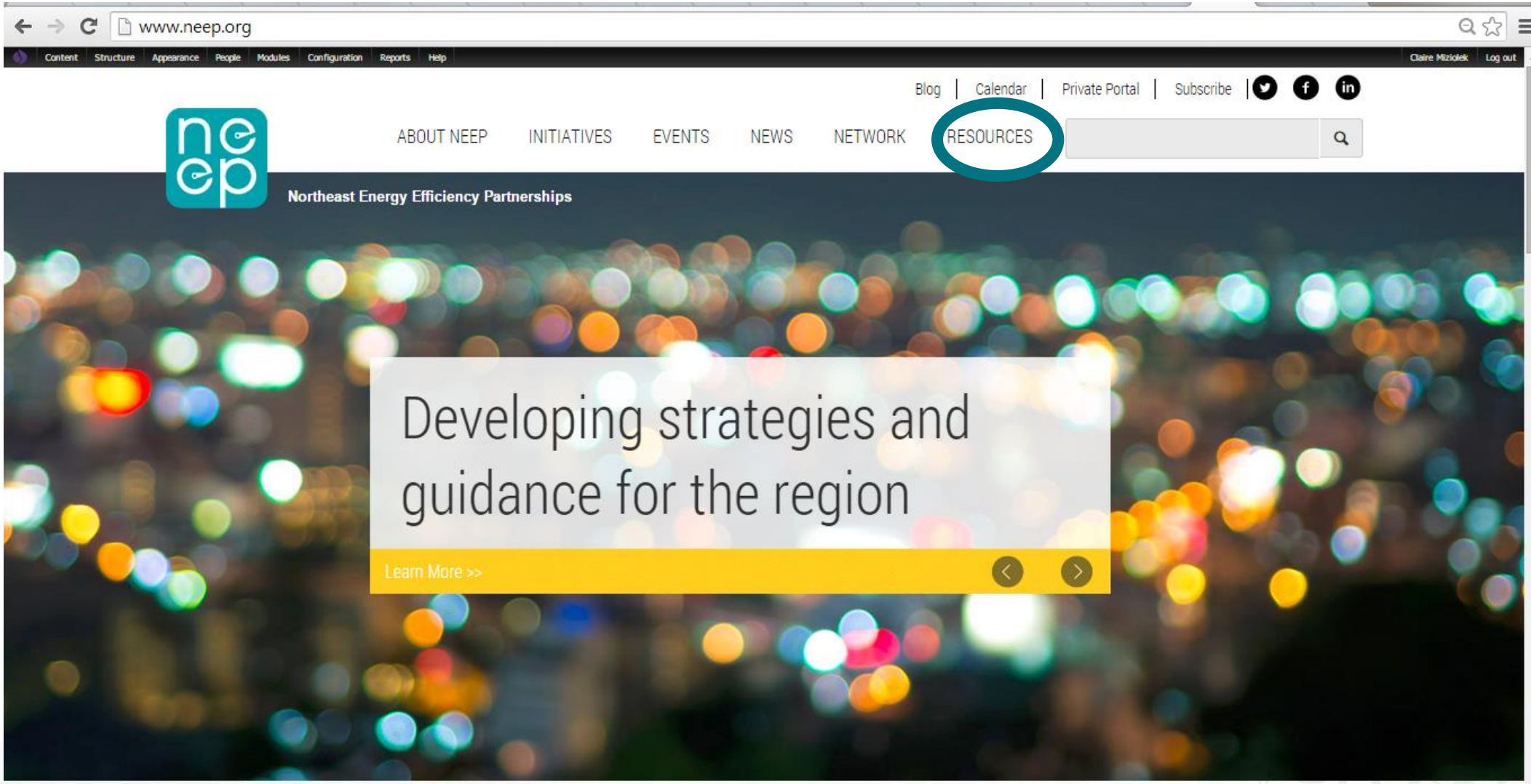
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Northeast Energy Efficiency Partnerships
Developing strategies and guidance for the region
Learn More >>

AGENDA

1. Opportunities
    1. Forest through the Trees
    2. The Basics
    3. Cost Savings
    4. Additional Benefits
    5. Advanced Controls
2. Conversion Considerations
    1. Technical
    2. Regulatory
    3. Financial
3. Regional Analysis
    1. Past/Future
    2. Qualitative Estimates
    3. Actions in the Region
4. Regional Strategy
    1. Provide Publicly Accessible Solutions
    2. Engage and Support Stakeholders
    3. Make Progress Visible
5. Resources

OPPORTUNITIES: FOREST THROUGH THE TREES…

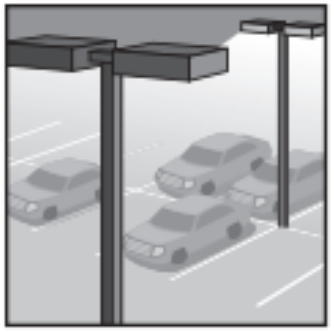
OPPORTUNITIES: THE BASICS

FIXTURE HOUSING TYPES

Photo Credits: Efficiency Vermont, NYSERDA


Cobrahead


Flood Light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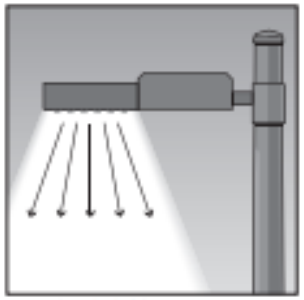

LED Street Light

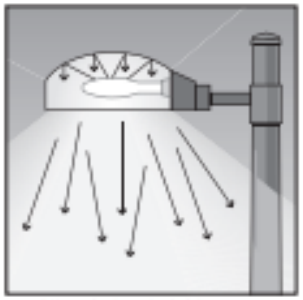

Traditional Street Light

Table 2-5. Retrofit/Replacement Projects: Current Expected LED Street Light Simple Paybacks[a]

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

[a] 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[24]

LED Street Light Cost Reductions over 4-Year Period					
	2009	2010	2011	2012	2013
Seattle (Purchases of 2,000+ Units)	$369	$288	$239	$204	$179
Los Angeles	$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

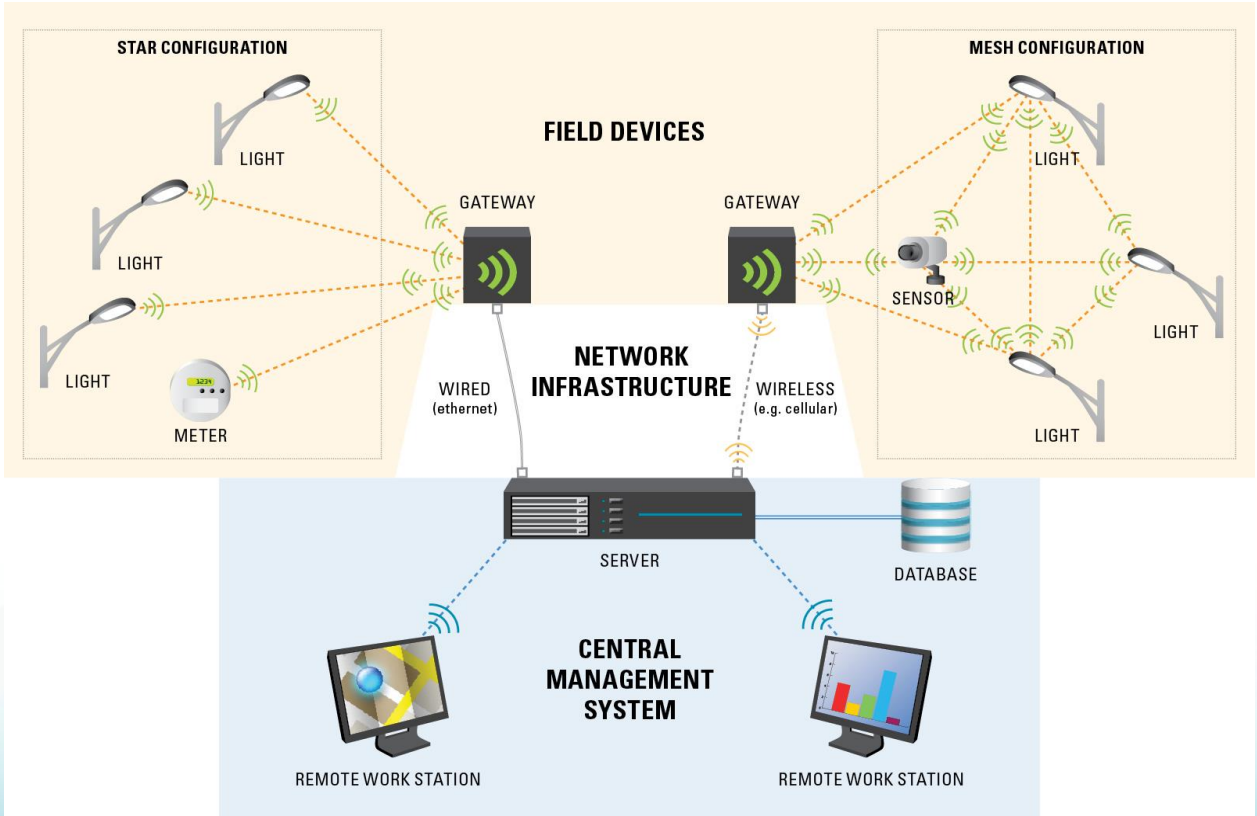
OPPORTUNITIES: ADVANCED CONTROLS

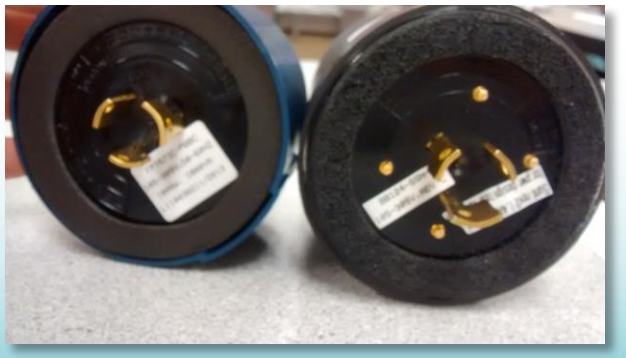
Traditional Controls

- 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





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

NAVIGATING BARRIERS

NAVIGATING BARRIERS: COMPANY-OWNED TARIFFS

Table A7: Central Maine Power HPS/LED Rate Comparison

Central Maine Power (Maine)[68]							
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: Unitil HPS/LED Rate Comparison

Unitil (Massachusetts)[93]			
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

REGIONAL ANALYSIS: WHERE HAVE WE BEEN?

Can our Region Lead the Nation on Street Lighting?

REGIONAL ANALYSIS: WHERE HAVE WE BEEN?

Region Led the Nation in Street Lighting Advancements

Philadelphia, 1751
Ben Franklin advocates
for street lighting, designs
four pane fixture

Baltimore, 1817
first gas street lights
in the country

NYC's Broadway, 1880
Electric Arc Lamp

REGIONAL ANALYSIS: WHERE ARE WE HEADED?

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

42% of cities using EECBG funding installed street lights

Boston has already converted 2/3 of street lights

NYC commits to full conversion by 2017

Rhode Island OER and Portland, M.E. already partners

REGIONAL ANALYSIS: QUANTITATIVE ESTIMATES

Table 1: Northeast and Mid-Atlantic Potential Savings and Cost Estimates

Measure	Annual Energy Savings (MWh)	Annual Energy Cost Savings ($ Million)	Annual Maintenance Savings ($ Million)	Total Annual Cost Savings ($ Million)	Total Installed Cost ($ Million)	Simple Payback Period (years)
LED Retrofit	1,622,036	$123.43	$247.86	$371.3	$1,392.96	3.75
Advanced Controls	141,035	$10.79	---	$10.79	$148.71	13.78
Retrofit and Controls	1,763,071	$134.22	$247.86	$382.09	$1,541.07	4.03

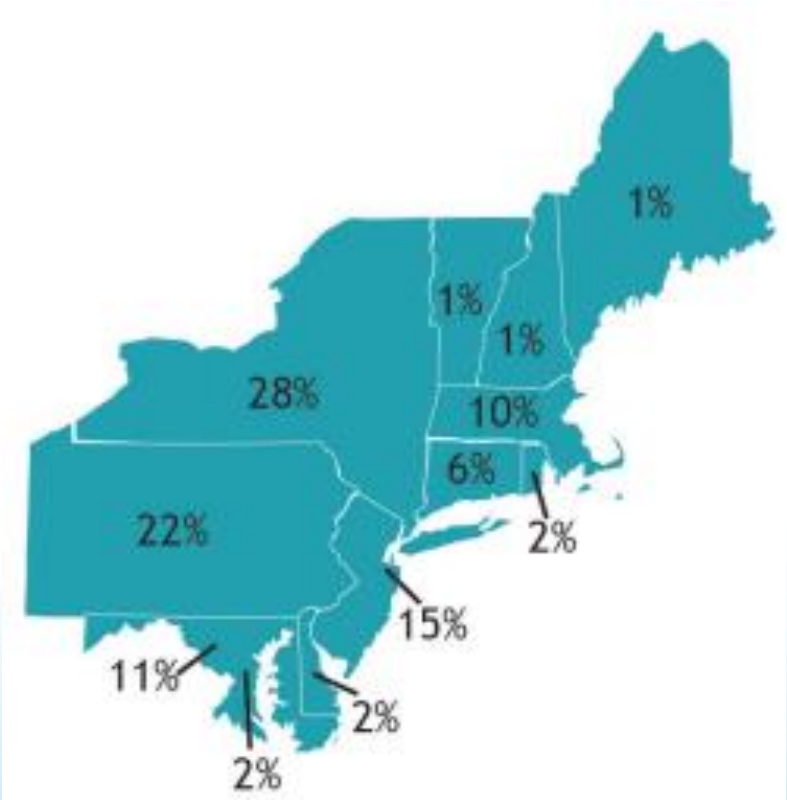


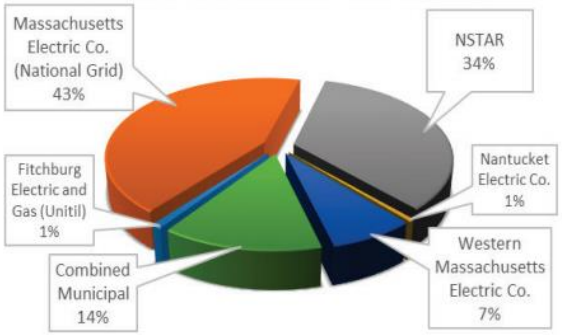
Table 2: State-by-State Savings and Cost Estimates

State	Number of Municipal Street Lights	Annual MWh Savings (LED Retrofits & Controls)	Annual Energy Cost Savings ($ Million)	Annual Maintenance Savings ($ Million)	Total Annual Cost Savings ($ Million)	Total Installed Cost ($ Million)
New York	1,386,000	566,111	$36.8	$69.30	$106.1	$431.05
Pennsylvania	1,070,109	358,674	$25.1	$53.50	$78.61	$332.80
Connecticut	312,140	104,621	$12.56	$15.60	$28.16	$97.08
New Jersey	763,137	255,784	$21.74	$38.16	$59.9	$237.34
Maryland	527,237	176,716	$10.6	$26.36	$36.96	$163.97
Massachusetts	496,000	166,247	$14.96	$24.80	$39.76	$154.26
Rhode Island	91,363	30,623	$2.76	$4.56	$7.32	$28.41
Delaware	77,940	26,124	$2.35	$3.90	$6.25	$24.24
District of Columbia	71,000	23,797	$1.9	$3.55	$5.45	$22.08
Maine	65,887	22,084	$2.03	$3.29	$5.50	$20.49
New Hampshire	65,297	21,886	$2.19	$3.26	$5.45	$20.3
Vermont	31,037	10,403	$1.04	$1.55	$2.59	$9.65

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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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		

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[94]
Fitchburg	March 2014	Considering Conversion[95]
Holyoke	December 2013	Completed Second Year of Three Phase Project to Convert all Street lights to LED[96]
Greenfield	May 2013	Invitation to Bid for Conversion of 416 Fixtures to LED[97]
Newton	May 2013	26 pilot lights converted with plan to convert all 8,400[98]

REGIONAL ANALYSIS:
LEADING THE PACK AND MOVING AHEAD

LEADING THE PACK

Vermont
- 2011 law requires all investor owned utilities to offer a utility-owned LED tariff

Massachusetts
- MAPC facilitating RFQ process, DOER targeting street lighting for energy savings

MOVING AHEAD

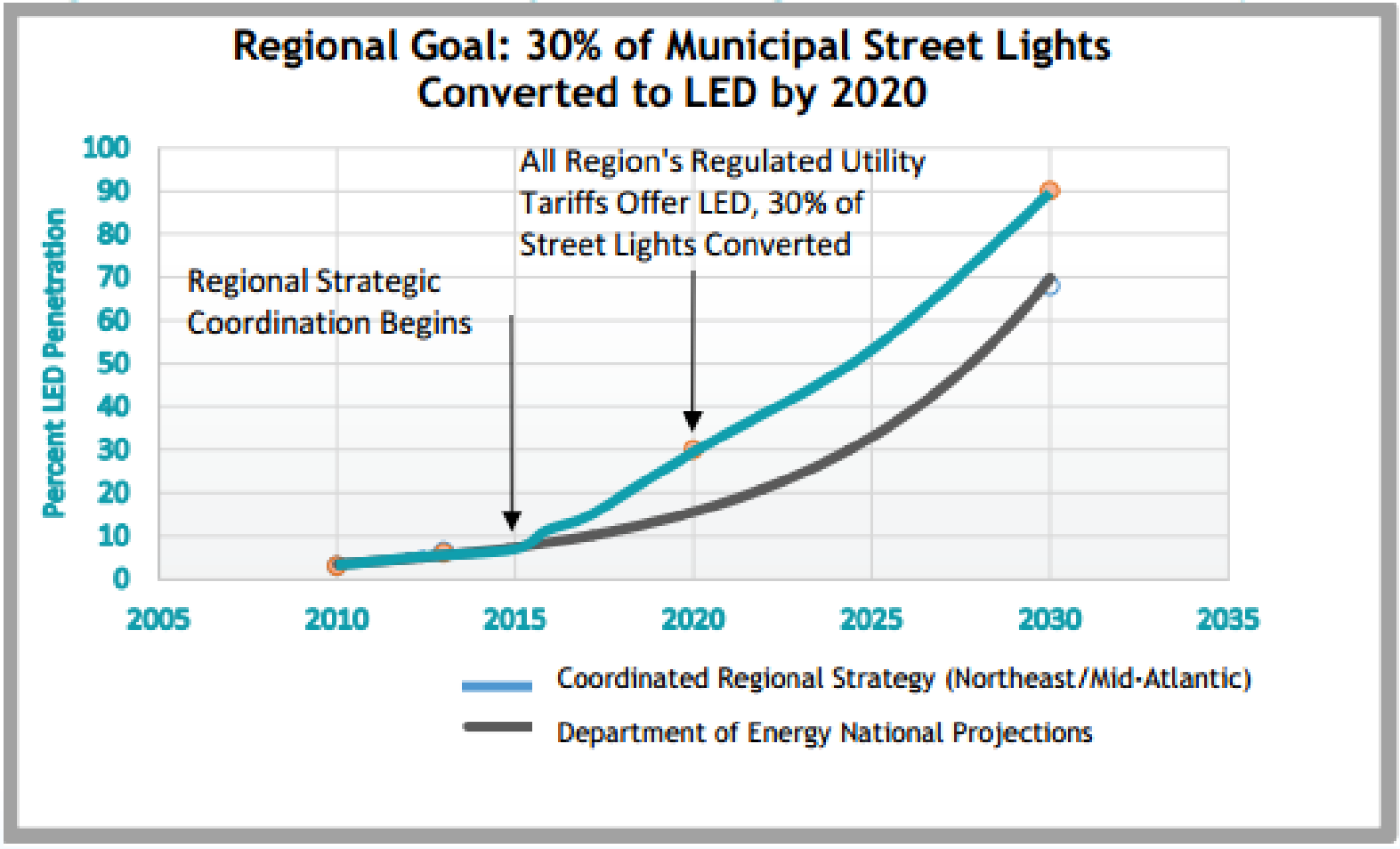
Connecticut
- 2014 Conference of Municipalities RFQ for purchase assistance, LED conversion, maintenance management services

Rhode Island
- 2013 legislation requires dimmable LED tariff and sets up conversion process- regulatory proceedings are still pending

New Hampshire
- City of Manchester intervention gains advantageous PSNH LED tariff
- Customer Contributed Rate EOL

COORDINATED REGIONAL STRATEGY

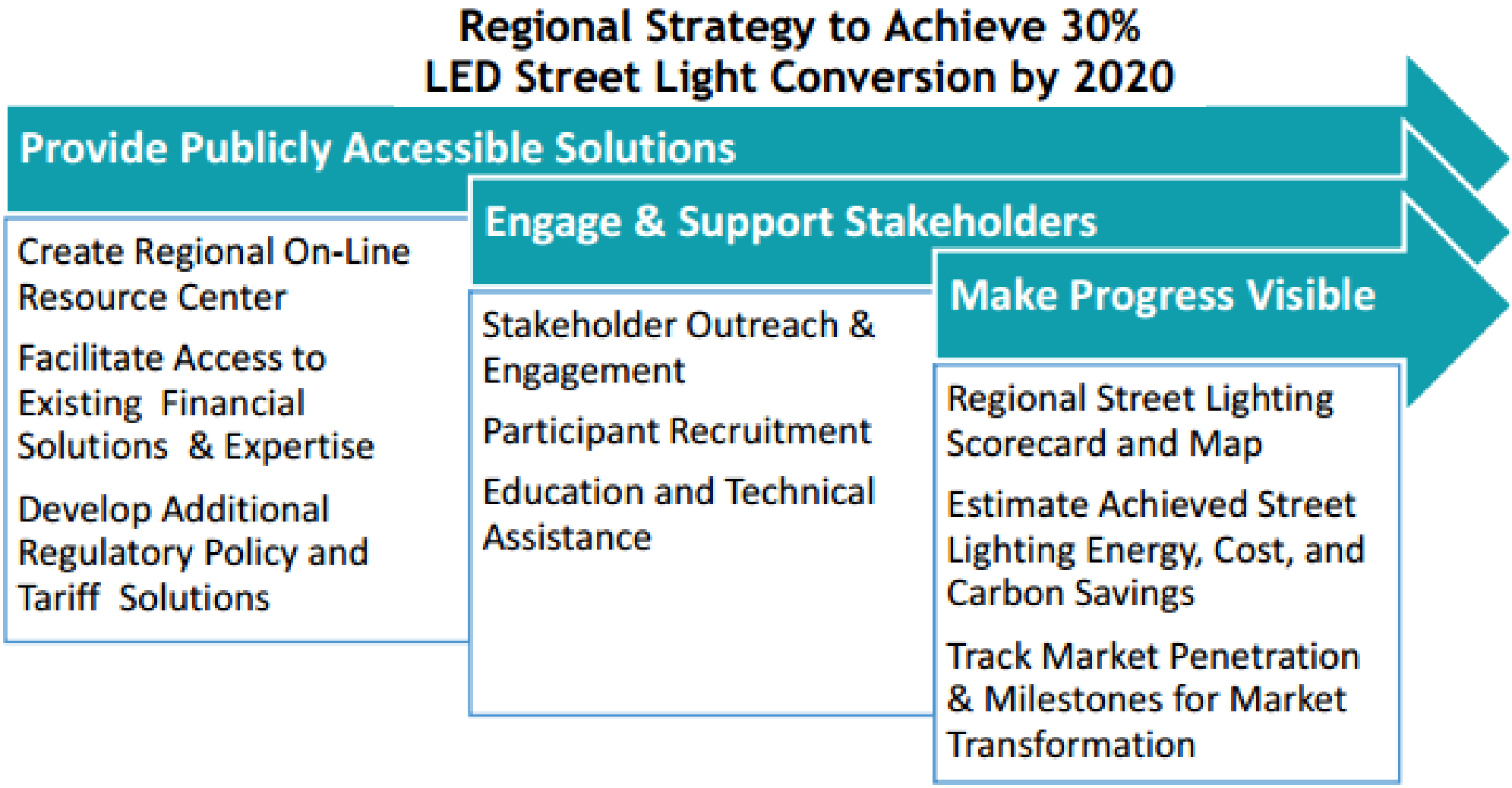
COMPARED TO US DOE PROJECTIONS



REQUIRES COMMITMENT TO CONVERSION PROGRAM BY 30 MAJOR AND 50 MEDIUM CITIES IN NEXT FIVE YEARS

COORDINATED REGIONAL STRATEGY

OVERVIEW



COORDINATED REGIONAL STRATEGY

EXISTING RESOURCES/STAKEHOLDER INITIATIVES

US Department of Energy Better Buildings Challenge

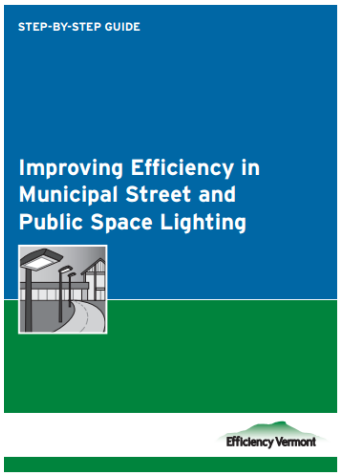
In exchange for technical assistance and strategic partnership with financial institutions (et.al.), partners agree to **reduce portfolio energy usage by 20% over the next 10 years.**

- **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



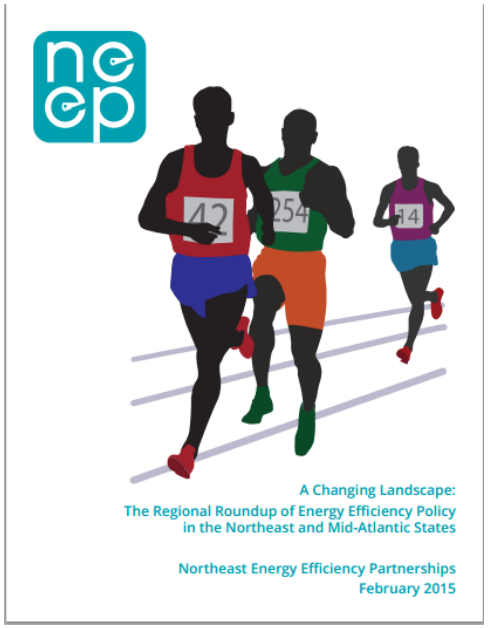
Municipal Solid State Street Lighting Consortium (MSSSLC)

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.

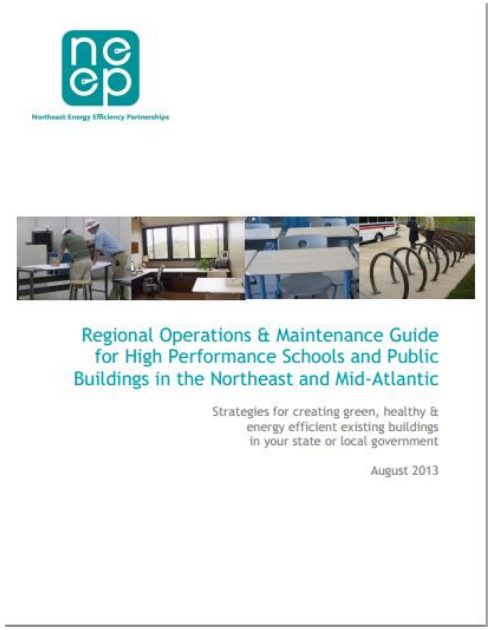
MODEL TOOLS AND SPECIFICATIONS

- 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

NEEP RESOURCES… AND MORE



[Regional Roundup]



[Public Building Operation and Maintenance Guide]

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INNOVATION & PERFORMANCE

LED Streetlights

Jim Sloss – Deputy Director of Administration
City of Pittsburgh

City of Pittsburgh LED Conversion

- PGH owns roughly 40,000 streetlights
  a) In 2010 these fixtures consumed roughly 2,300,000 kWh per month.
  b) The City was paying nearly .07 cents/kWh

Mission

- **Replace all HPS Streetlights with a more efficient LED fixture.**

Phase 1 Breakdown

Pittsburgh Business Districts

- 6,000 HPS

Funding

- $900,000 in state grants
- Green Trust Fund

Price per kWh

- .045

Phase 2 Breakdown

Pittsburgh Neighborhoods

- 34,000 HPS Cobraheads

Funding

- Estimated cost of 15-20 million
- GESA
- State and Federal Grants
- Green Trust Fund

Project Scope

- Fixtures
- Installation
- Controls

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

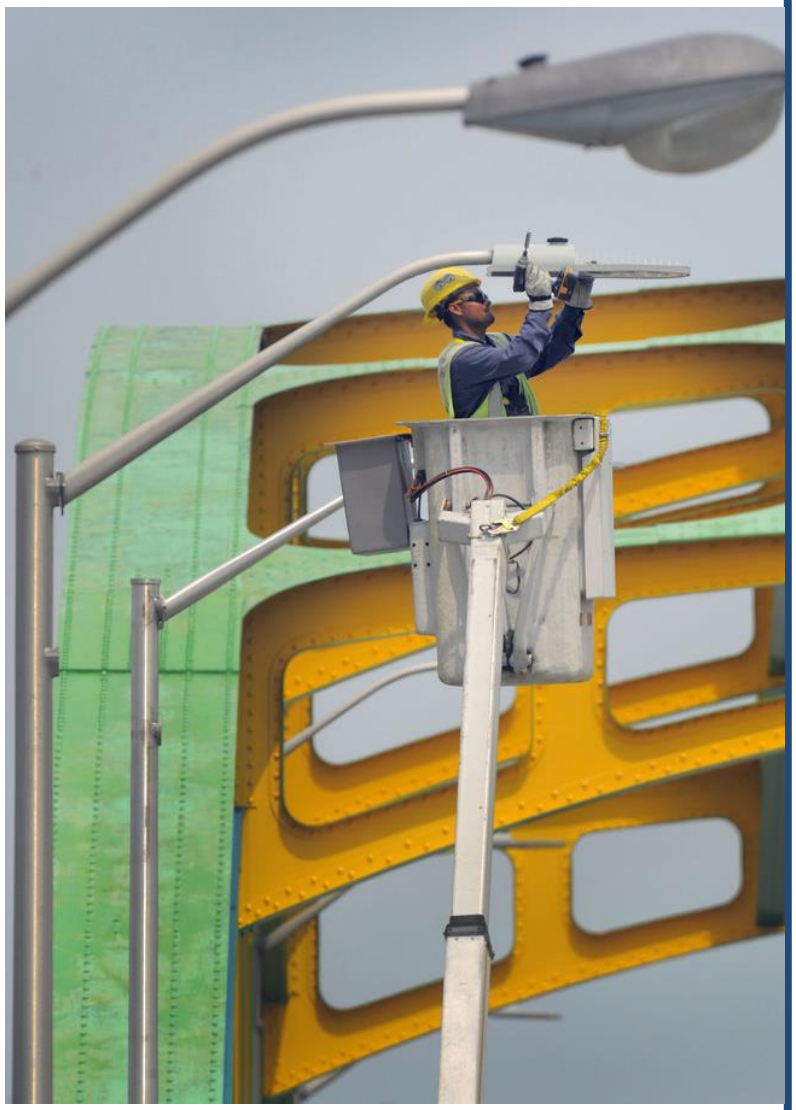
Thank you

Baltimore City
Baltimore's Lighting Projects

STEPHANIE
RAWLINGS-BLAKE
MAYOR

BALTIMORE CITY
DPW
DEPARTMENT OF PUBLIC WORKS

RUDOLPH S. CHOW, P. E.
DIRECTOR



MAYOR

DIRECTOR

Department of Public Works
Office of Sustainable Energy

Use Less

Buy Smart

Generate Your Own

Lighting Projects

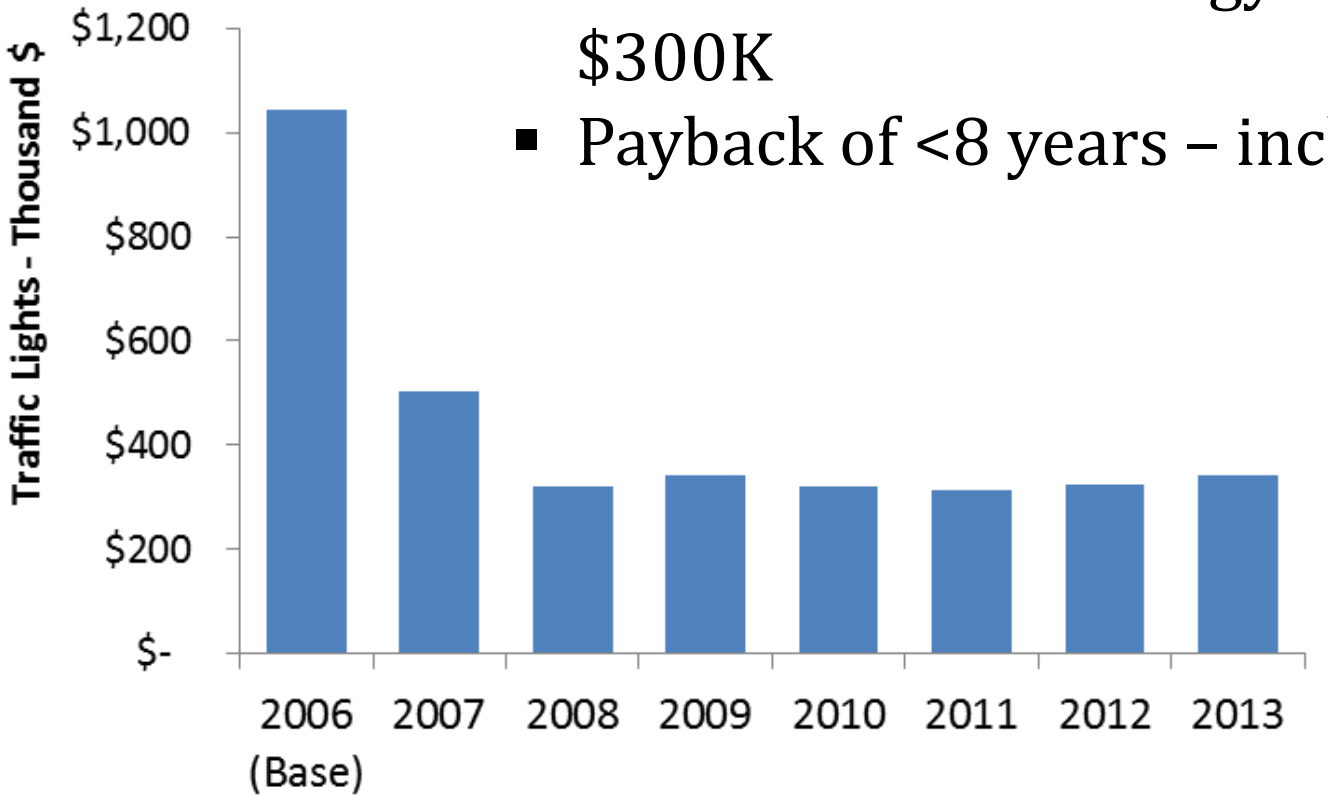
Since 2006 - retrofitted or replaced:

- **37,083** traffic light fixtures with LEDs
- **11,115** street lights with LEDs
- **>130** fire stations, parking garages, administrative buildings, courthouses, and police stations with more efficient lighting solutions

Traffic Lights: Completed in 2006

Replaced **37,083** traffic light fixtures with LEDs

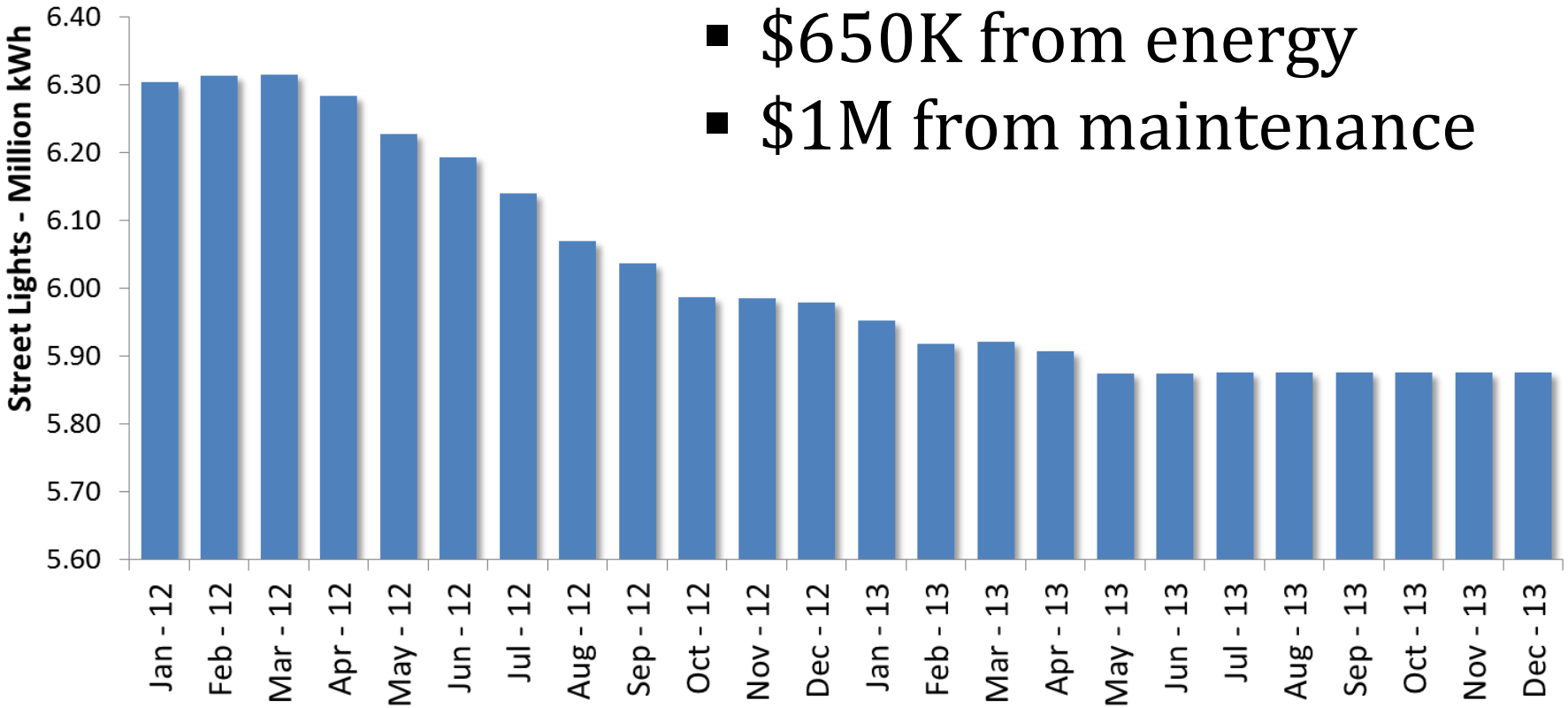
- Reduced annual energy bill from >$1M to $300K
- Payback of <8 years – including all costs



Street Lights:
Completed in 2013

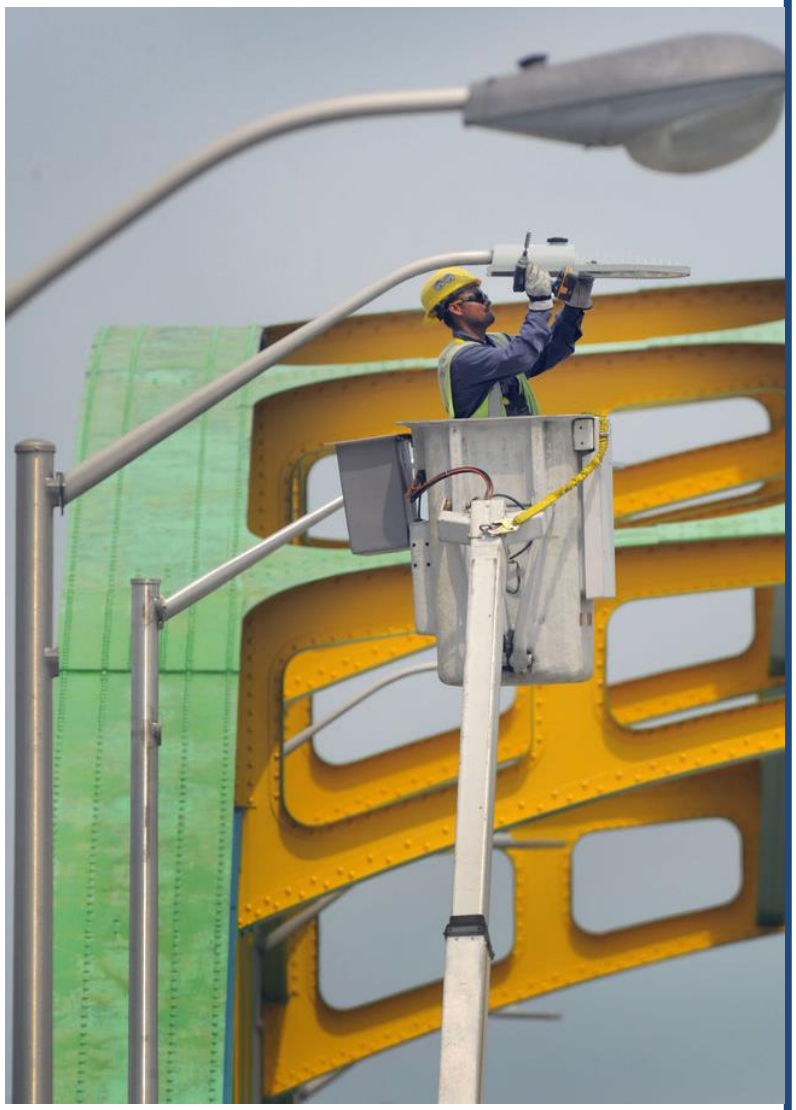
Replaced **11,115** street lights with LEDs

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



What's Next

- 6,500 street light replacement
  - Focus on high crime areas
  - Increase brightness without increasing cost with LEDs



Lessons Learned

- Working with the public utility
- Lower overhead, better competition, and save sales tax by financing the project without an ESCO

Questions

Questions/Comments?