NEEP LED Street Lighting Webinar

12/4/17

Carolyn Sarno Goldthwaite
John Balfe

Today's Webinar:

- DVRPC Regional Streetlight Program
- DOE Outdoor Lighting Accelerator Toolkit
- MAPC Street Light Retrofit Lessons Learned
- Question and Answer
- Short Takes

Northeast Energy Efficiency Partnerships

"Assisting the Northeast & Mid-Atlantic Region in Reducing Total Carbon Emissions 80% by 2050"

Mission

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

Vision

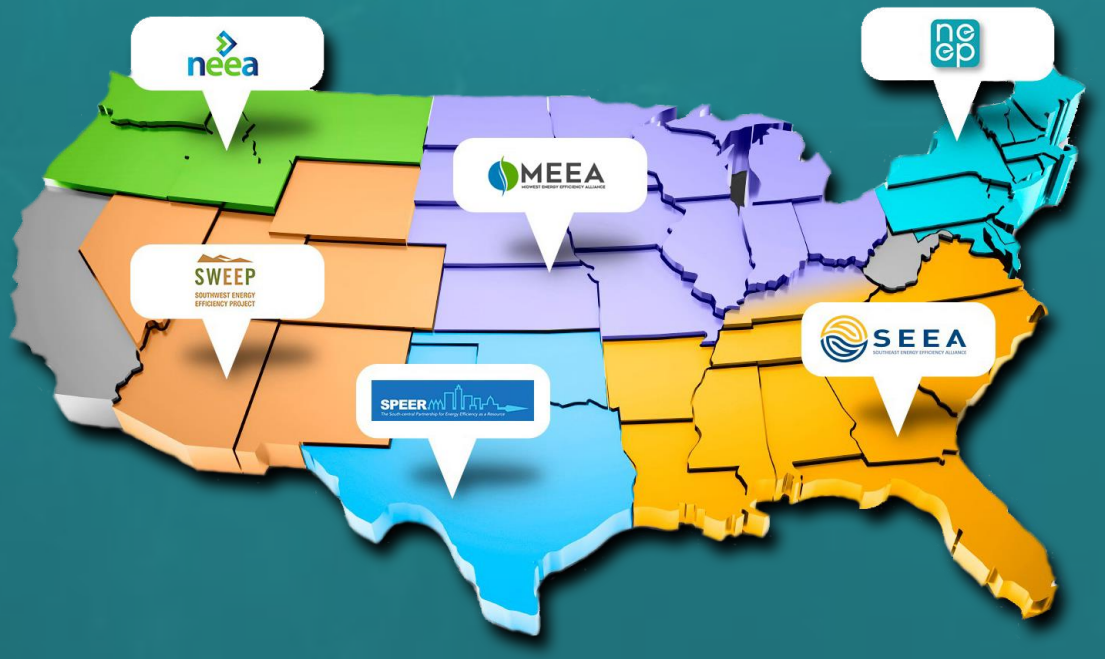
That the region embraces next generation energy efficiency as a core strategy to meet energy needs in a carbon-constrained world

Approach

Overcome barriers and transform markets through *Collaboration, Education, and Enterprise*

About NEEP

A Regional Energy Efficiency Organization



One of six REEOs funded in-part by U.S. DOE to support state and local efficiency policies and programs.

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Regional Streetlight Procurement Program

Liz Compitello
Senior Research Analyst
Office of Smart Growth

11/16/17

Delaware Valley Regional Planning Commission (DVRPC)

Metropolitan Planning Organization for Greater Philadelphia Region

Bi-state, nine counties surrounding and including Philadelphia.

5.6 million residents

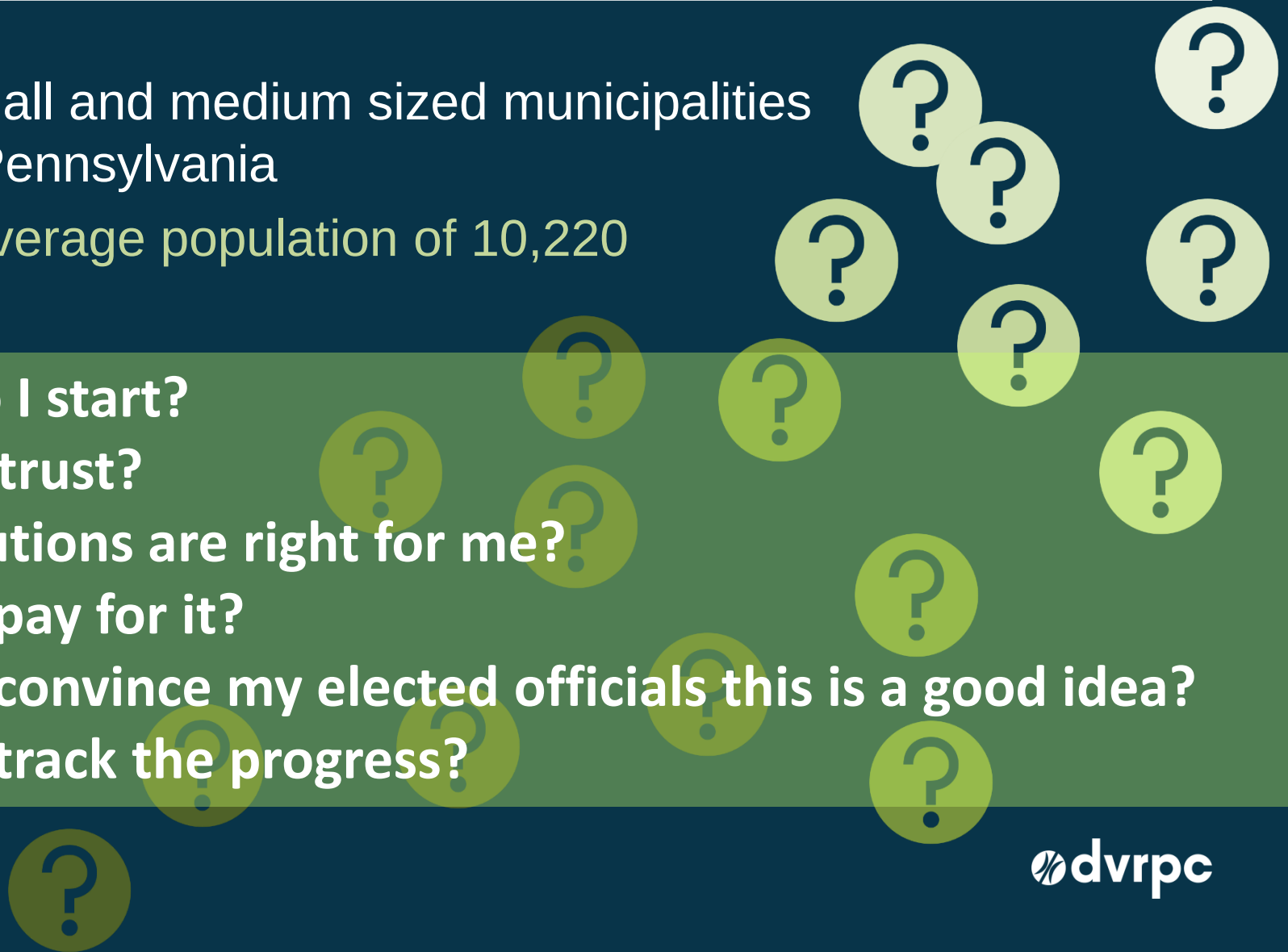
Planning areas

Transportation Planning, Air Quality, Smart Growth Planning, Environmental Planning, Housing and Economic Development, Population and Employment forecasts, Long Range Planning, *Energy Planning*

Challenges for Municipal Energy Management

238 small and medium sized municipalities in SE Pennsylvania

- average population of 10,220



Where do I start?
Who do I trust?
What solutions are right for me?
How do I pay for it?
How do I convince my elected officials this is a good idea?
How do I track the progress?

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The Perfect Storm for a Retrofit

Technological

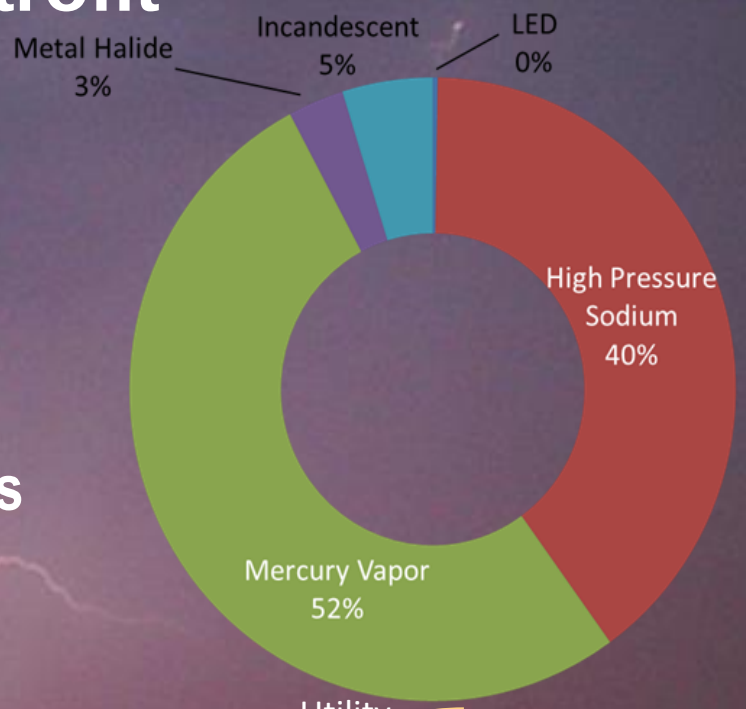
- LED performance improvements
- Successful pilots in the region

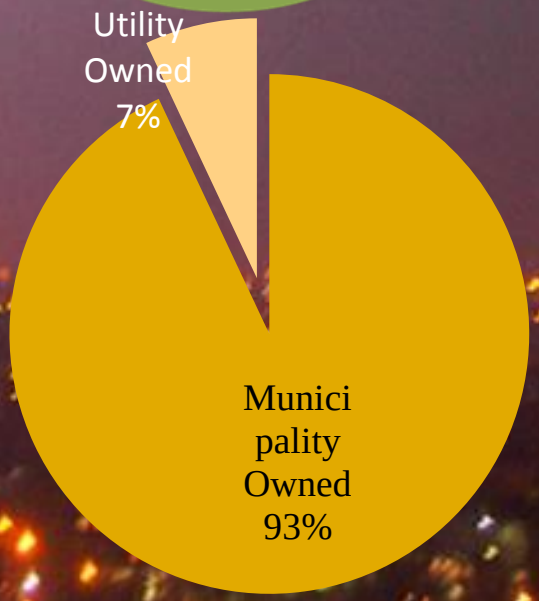
Regulatory

- Municipal ownership of streetlights
- Utility recognition of LEDs

Financial

- LED costs dropping
- Pennsylvania Sustainable Energy Finance (PennSEF) Program





Regional Streetlight Procurement Program

35 municipalities in southeastern PA pooled their decision making and purchasing power to access energy performance contracting, finance, and technical assistance to convert their entire street lighting systems to LED.

>26,000 streetlights, etc, converted to LED

$16 million net savings over 20 years

10.6 million kWh saved annually

5,500 metric tons of CO2e reduced annually

Improved lighting quality improves safety

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Program Partners

DVRPC

- Program manager and lead

Keystone Lighting Solutions (KLS)

- Program “unbiased” technical partner, assisted with RFP, design and procurement oversight, and overall program design.
- Owners agent for 16/35 municipalities

Pennsylvania Sustainable Energy Finance Program (PennSEF)

- Provided standardized program documentation (RFP, Guaranteed Savings Agreements), and legal and technical guidance on the energy performance contracting process in PA.
- Arranged a pool of financing

Municipal Steering Committee

ESO – Johnson Controls Inc.

PECO – Investor Owned Utility

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Municipal Participants

35 municipalities

- Each had their own contract “Guaranteed Savings Agreement”, but benefitted from pooling power
- 35 proceeded with contract out of 45
- 32 owned lights, 3 purchased from the utility
- Cobrahead, decorative, exterior, traffic signals converted. One implemented wireless network controls
- Range of project sizes:
  - Outdoor Lighting Systems ranged in size from 60 fixtures - 3500 fixtures, average 765.
  - Project cost ranged from $24K - $2.2M
  - 24 municipalities utilized financing, 11 paid using internal funds
- Payback ranged from 3-20 years, 10.4 average.
  - 3 municipalities purchased their lights from the utility. (average payback 6.3 years)

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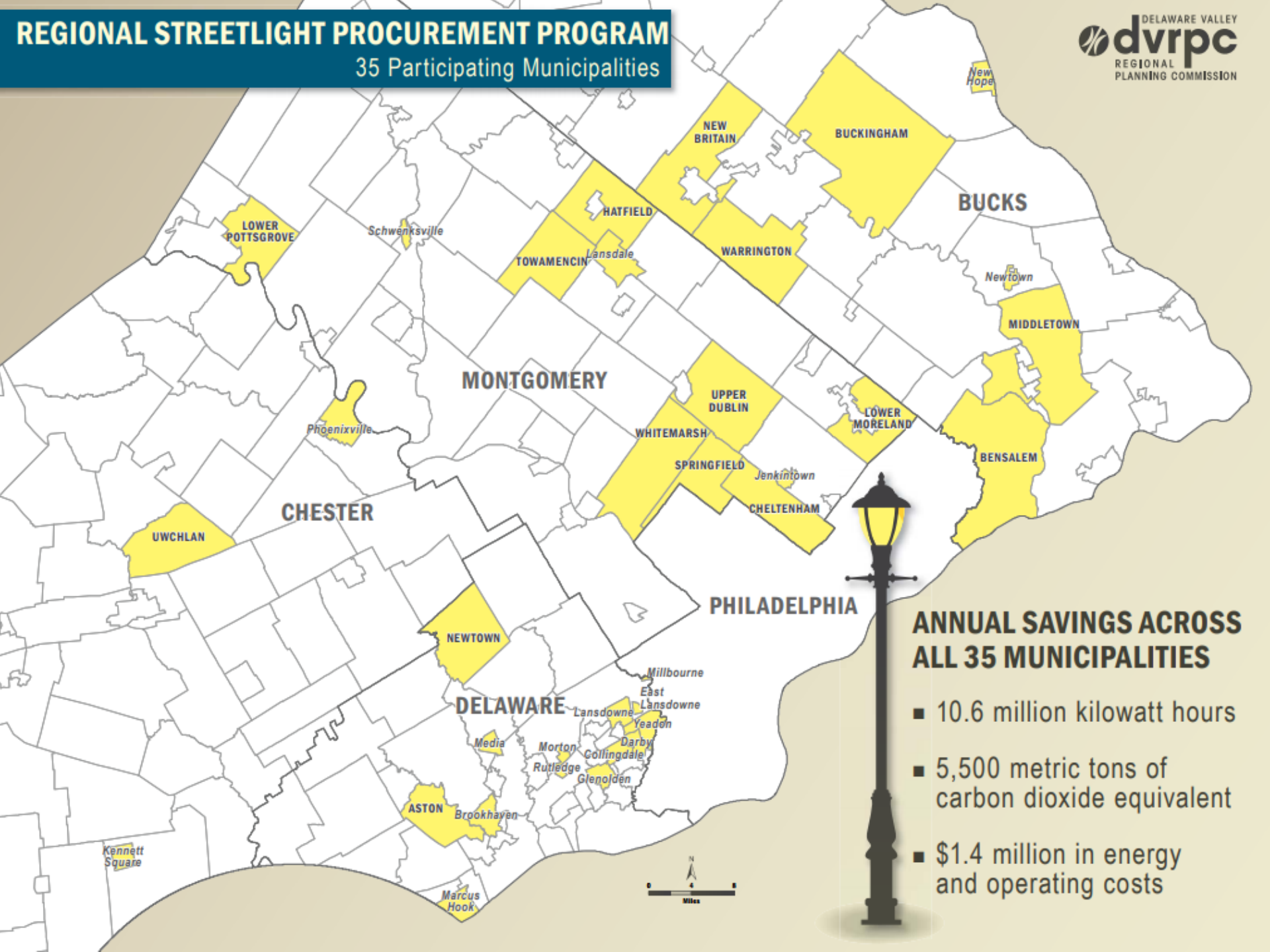
REGIONAL STREETLIGHT PROCUREMENT PROGRAM

35 Participating Municipalities

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION



ANNUAL SAVINGS ACROSS ALL 35 MUNICIPALITIES

- 10.6 million kilowatt hours
- 5,500 metric tons of carbon dioxide equivalent
- $1.4 million in energy and operating costs

Common Program Timeline

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Common Program Timeline

- RFP is one of the most important steps to the process
- Issued by DVRPC on behalf of 45 Municipalities
- Developed by DVRPC, KLS, Municipal Steering Committee, and PennSEF.
- Technical specification and Design and Pricing Plan
- A steering committee of municipalities, with guidance, selected a single ESCO for the program

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RFP: Key Considerations

- **RFP is a significant tool to guide design and lock in pricing**
- **RSLPP LED Streetlight Specification**
  - Started w/DOE MSSLC “System Specification”, Modified by KLS RSLPP needs
  - Created (5) Five lighting application scenarios 70W HPS, 100W HPS, 150W HPS, 200W HPS, 400WHPS
  - Applied the IES RP-8 system performance requirements and intent to existing single fixture applications
- **Streetlight Design and Pricing Plan**
  - Evaluate Respondents on the quality of LED street lighting design
  - Allows for apples to apples comparison
  - **Serve as the baseline fixture and labor prices**
    1. Photometric Submittals
    2. Spec Sheet submittals
    3. Product and Pricing Worksheet
    4. Narrative: unique approach to negotiating prices

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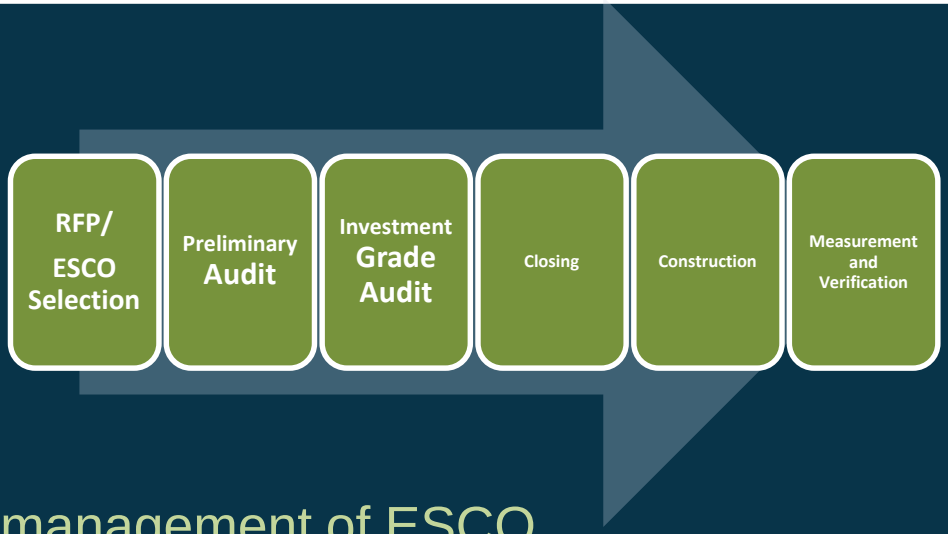
Supplemental Efforts



- Program management of ESCO
- On-call to municipalities
- Workshops and Webinars:
  - Program steps and process expectations
  - Networked controls
  - AMA Blue Light Response
  - Tracking Operations and Maintenance Savings
- Trial installations
- Utility Engagement

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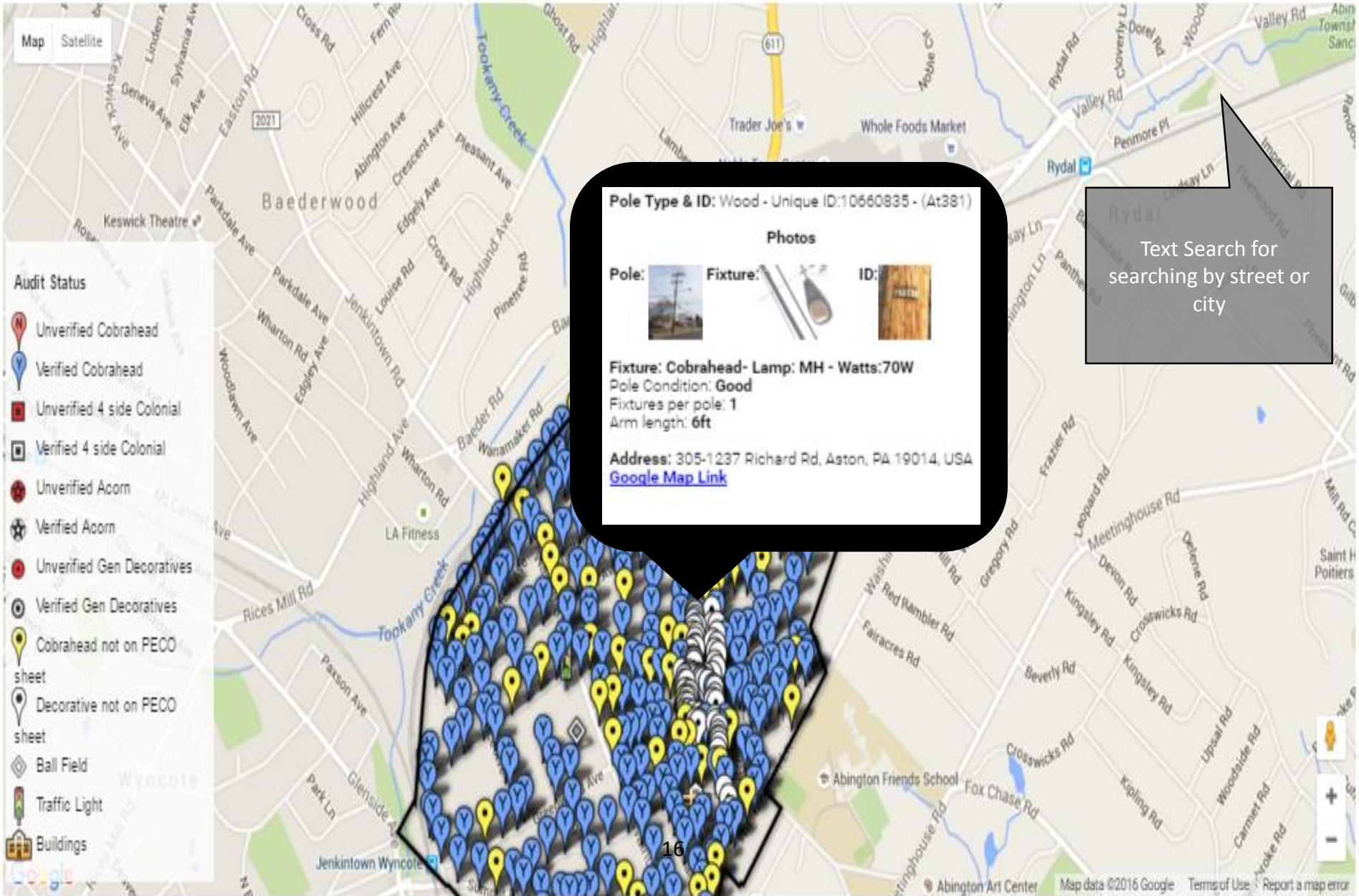
Street Light Audit Portal
Jenkintown Borough

Back

Search



Key RSLPP Program Elements

Energy Performance Contracting

Allows public entities to execute projects with no upfront cost.

Savings guarantee boosts confidence in Decision Making Process

Turnkey….

Pooled Procurement and Financing

Pooling allowed municipalities, regardless of size, to access EPCs and Financing

Price of labor and equipment below market value

Third party Product and Design Vetting

Program included a common specification (MSSLC based) for all equipment and reviewed design solutions throughout project.

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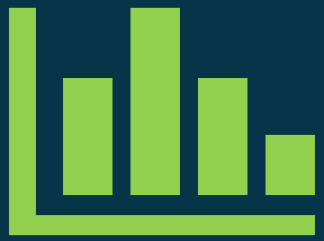
Key RSLPP Program Elements

Transparency & Standardization

Transparency was sought on everything - from ESCO service costs to all products and pricing.

Standard documents facilitated decision making.



Data

As a result of M&V, the program will have significant data on O&M savings, as well as metered energy savings.

Utility Engagement

Municipalities can engage the utility as a coalition.

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What We Achieved

- Development of process for thoughtful and holistic conversion of municipal streetlighting systems
- Building confidence in Energy Performance Contracting, accessing finance
- Partnership building – and regional cooperation
- Creating a replicable program concept for other types of municipal and public facilities

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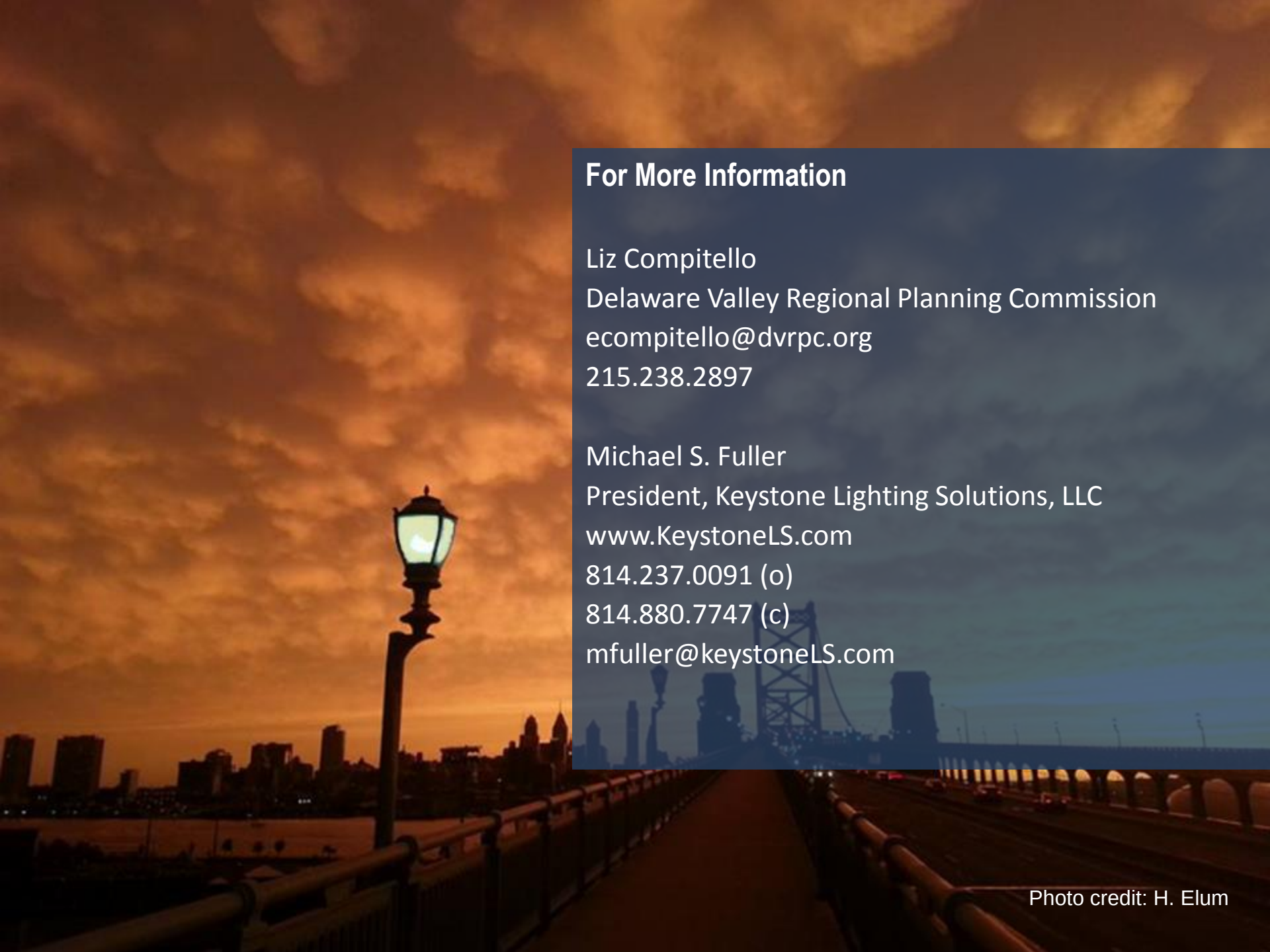

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Photo credit: H. Elum

NEEP LED Street Lighting Webinar

December 4, 2017

Crystal McDonald, Policy Advisor
Office of Energy Efficiency and Renewable Energy (EERE)
Partnerships & Technical Assistance Team

Better Buildings®

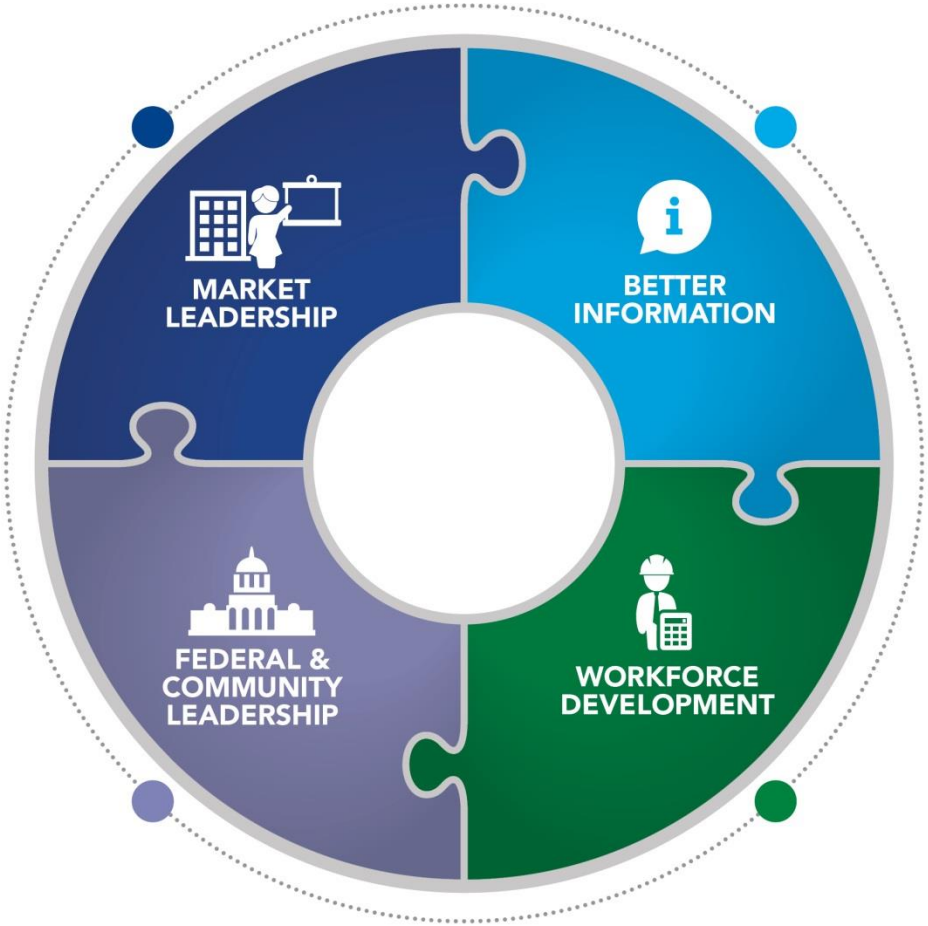
U.S. DEPARTMENT OF ENERGY

Developing Innovative, Replicable Solutions with Market Leaders

- Better Buildings Challenge
- Better Buildings Alliance
- Better Buildings, Better Plants
- Better Buildings Accelerators
- Better Buildings Residential
- Superior Energy Performance

State, Local, and Federal Governments Leading by Example

- Better Communities Alliance
- Performance Contracting



Making Energy Efficiency Investment Easier

- Better Buildings Solution Center
- Financing Navigator
- Improved Data Consistency and Access
- Tools to Assess the Efficiency of Buildings/Homes
- Tools for Energy Management

Expanding the Workforce

- Better Buildings Workforce Guidelines
- Industrial Energy Management Workforce

Overview

1. DOE Outdoor Lighting Initiatives
2. LED Scale Up for US Cities
   a. Better Buildings Outdoor Lighting Accelerator (OLA) Focus Areas
   b. OLA Partnerships
   c. Approach to Barrier Resolution: Financial
   d. Approach to Barrier Resolution: Regulatory
   e. Approach to Barrier Resolution: Technical
3. Outdoor Lighting Toolkit
4. Technical Assistance
   a. Northeast Energy Efficiency Partnerships (NEEP) Outdoor Lighting Resources
   b. Technical Resources
5. Next Steps and Opportunities

1. DOE Energy Efficiency Lighting Initiatives

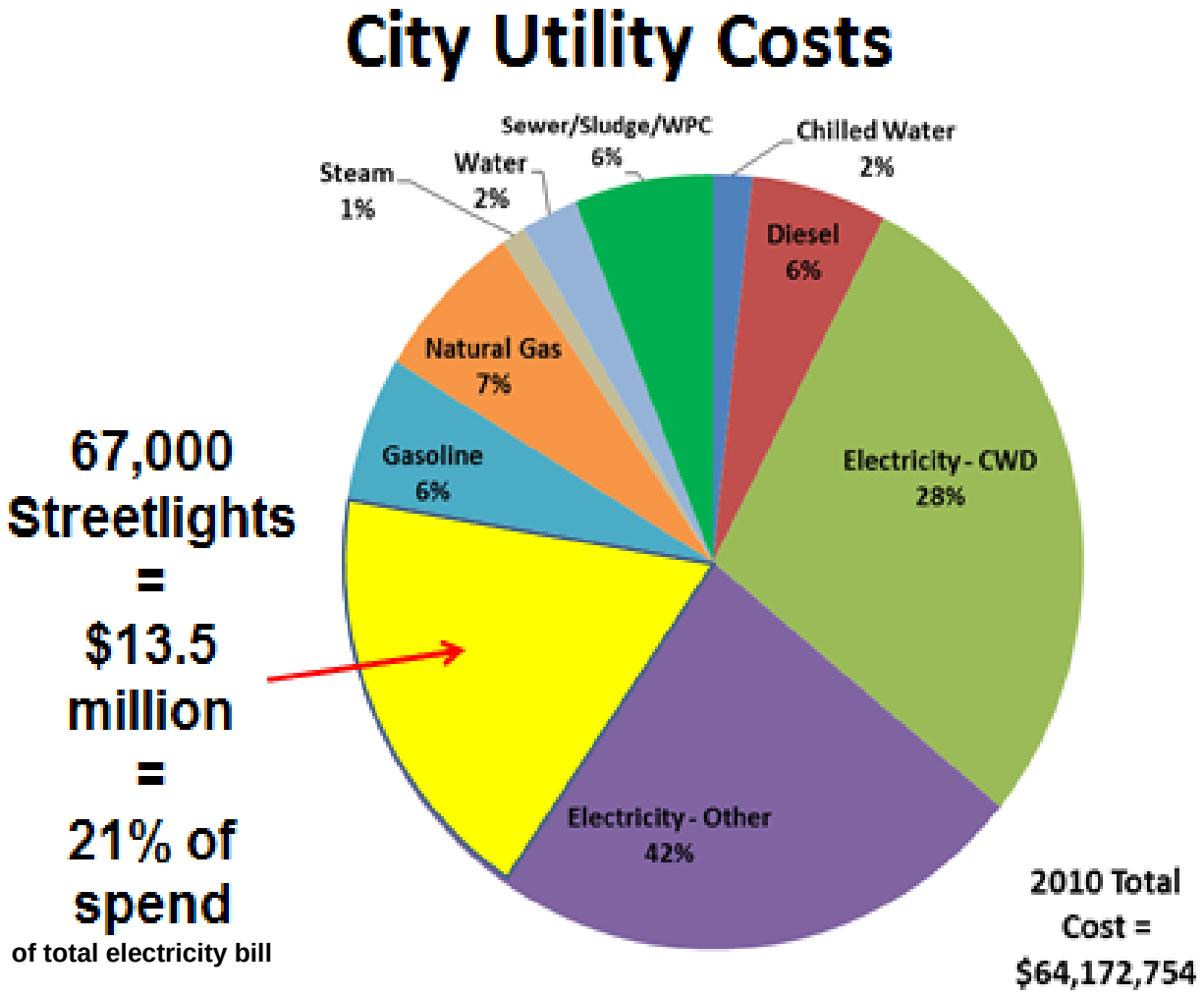
- Better Buildings Outdoor Lighting Accelerator (OLA)
  - OLA is designed to accelerate the adoption and use of high efficiency outdoor lighting in the public sector, replacing over 1,500,000 poles over the next two years starting in May 2014, while developing best practice approaches to municipal system-wide replacement for this period and the longer term.
  - It applies to all categories of outdoor lighting for which local governments or states pay the energy bills (i.e., street/roadway, parking facility, and parks and recreation lighting) and will focus on addressing issues that limit investment in high-efficiency technologies such as financing and metering/utility tariff-rates. A state or region may also join in a collaborative and supportive role, working with three or more cities in their state/region.

- Municipal Solid-State Street Lighting Consortium (MSSLC)
  - The DOE MSSLC shares technical information and experiences related to LED street and area lighting demonstrations and serves as an objective resource for evaluating new products on the market intended for those applications. The goal is to build a repository of valuable field experience and data that will significantly accelerate the learning curve for buying and implementing high-quality, energy-efficient LED lighting.

- Lighting Energy Efficiency in Parking (LEEP) Campaign
  - The LEEP Campaign offers free guidance and recognition for installing high-performance, cost-saving lighting in parking lots and garages. Joining gives you access to tools and expertise to lower new and existing parking facilities' operating costs as well as technical expertise of the Department of Energy.
  - As of September 2015, LEEP members saved over 120 million kilowatt-hours and over $10 million annually. That's equivalent to saving the electricity consumed by 11,000 homes each year! So far, LEEP participants have improved 430 million square feet of high-performance lighting. And we've set a goal of embracing at least 750 million square feet of parking by May 1, 2016.

- Interior Lighting Campaign (ILC)
  - The ILC is a recognition and guidance program designed to help facility owners and managers take advantage of savings opportunities from high efficiency interior lighting solutions. The initial campaign focus is on troffer lighting, with a goal of documenting the completed or planned replacements (or newly installing for new construction) of 1 million standard troffers with high efficiency troffer solutions by May 2016.

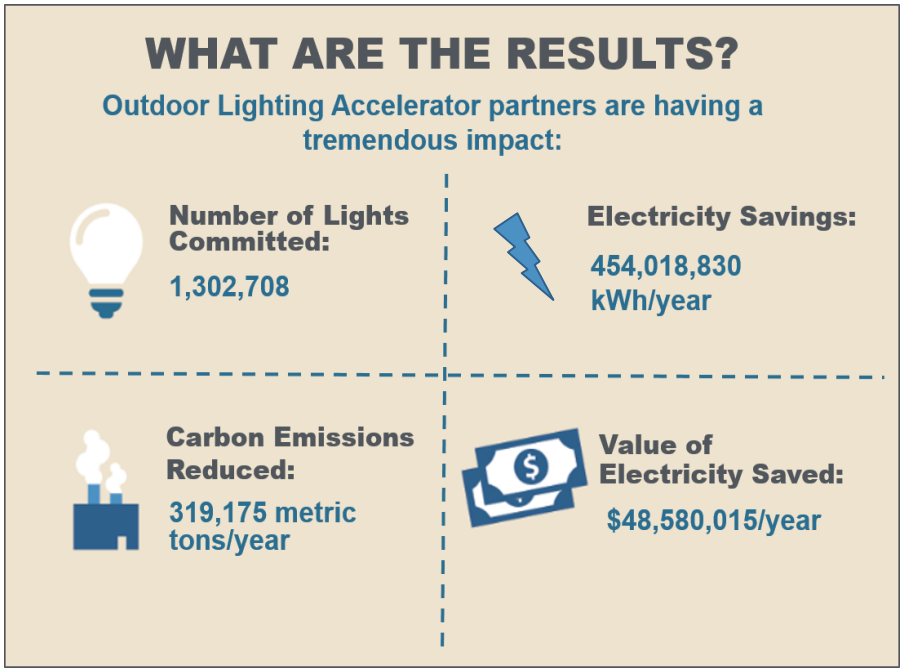
Municipal Expenditures



50%

2. LED Scale Up for US Cities

- Garnered a commitment of 1.3 million lights toward the goal of 1.5 million from 25 partners. Inspired other municipalities to action in response to success of OLA partners.
- Made the strategic case for LED Street Lighting due to partners sharing data and lessons learned.
- Developed user friendly resources to assess energy and cost savings opportunities.
- Updated the equipment specifications to address mandatory versus optional criteria for equipment procurement strategies.
- Opened the conversation with utility commissions to understand conditions slowing the removal of tariff-related barriers to scaling up projects.



2a. Outdoor Lighting Accelerator (OLA) Key Focus Areas

Financial

- Identifying funding sources
- Understanding appropriateness of available mechanisms- QECBs, RLFs, ESPCs, ratepayer programs, etc.
- Supportive policy environment (tax breaks, incentives, subsidies, etc.)

Regulatory

- Utility rate structures
- Ownership and maintenance models
- Non-metered energy billing
- Outdated public utility regulations

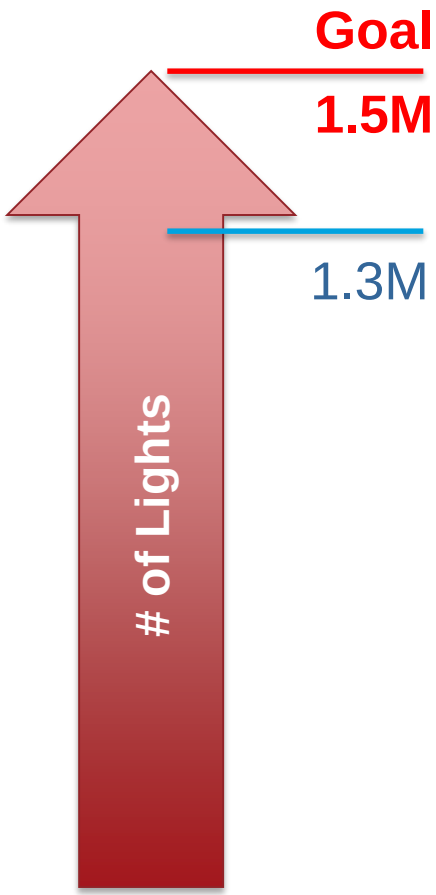
Technical

- Access to proven technology information
- Pilot program results
- Technology selection for different applications
- Lack of information about network control systems

2b. Outdoor Lighting Accelerator (OLA) Partners

Accelerator sunset December 2016. Currently have **25** signed partners:

- 3 states
  - Rhode Island
  - Tennessee
  - Washington
- 6 regional energy networks
  - California Street Light Association
  - Delaware Valley Regional Planning Council (Philadelphia metro)
  - Garfield Clean Energy Collaborative (Colorado)
  - Mid-America Regional Council (Kansas City metro);
  - Southeast Michigan Regional Energy Office (Detroit metro);
  - Southern California Regional Energy Network (Los Angeles metro)
- 16 cities
  - Albany, NY
  - Anchorage, AK
  - Chicago, IL
  - Dearborn, MI
  - Deerfield Beach, FL
  - Detroit, MI
  - Flint, MI
  - Huntington Beach, CA
  - Little Rock, AR
  - Los Angeles, CA
  - Portland, ME
  - Racine, WI
  - San Diego, CA
  - St. Petersburg, FL
  - Takoma Park, MD
  - West Palm Beach, FL



2c. Approach to Barrier Resolution: Financial

Obstacle	OLA Solution
• **Quick Assessment of Opportunities** • **Procurement strategy** • **Technology price ranges**	• Quick Start Guide for the Street and Parking Facility Lighting Retrofit Financial Analysis Tool • Assist with model development--Delaware Valley Regional Streetlight Replacement • Compile pricing data shared by partners (declining cost curve)

2d. Approach to Barrier Resolution: Regulatory

Obstacle	OLA Solution
• **Understanding LED Tariff Offerings and Ratemaking Process** • **Buyback options and total cost consideration, undepreciated value of equipment, stranded assets (also applicable to Financial barriers)**	• Brief: *Regulatory Barriers and Solution Pathways for Municipal LED Street Lighting Conversions* • Brief*: Adopting Energy-efficient Technologies for Street Lighting: Overcoming Challenges for Utilities* • LBNL Comparison Tool for Municipally-owned vs. Utility-owned Street Lights (under development)

2e. Approach to Barrier Resolution: Technical

Obstacle	OLA Solution

• **Technology standardization**
• **How to include controls for adaptive lighting, dimming, smart cities,**
• **Health and environmental concerns, blue light issues**
	• Description of specifications, codes and standards for recommended practices
	• Webinar: *Lessons Learned From Outdoor Connected Lighting System Installations*
	• Links to DOE Solid State Lighting Program - Blue Light Guidance
	  • Report - *An Investigation of LED Street Lighting's Impact on Sky Glow*
	  • Webinar series on key variables regarding sky glow

3. OLA Toolkit

Home | Partner Results | Resources | Better Buildings Outdoor Lighting Accelerator

Home » Outdoor Lighting Accelerator Home

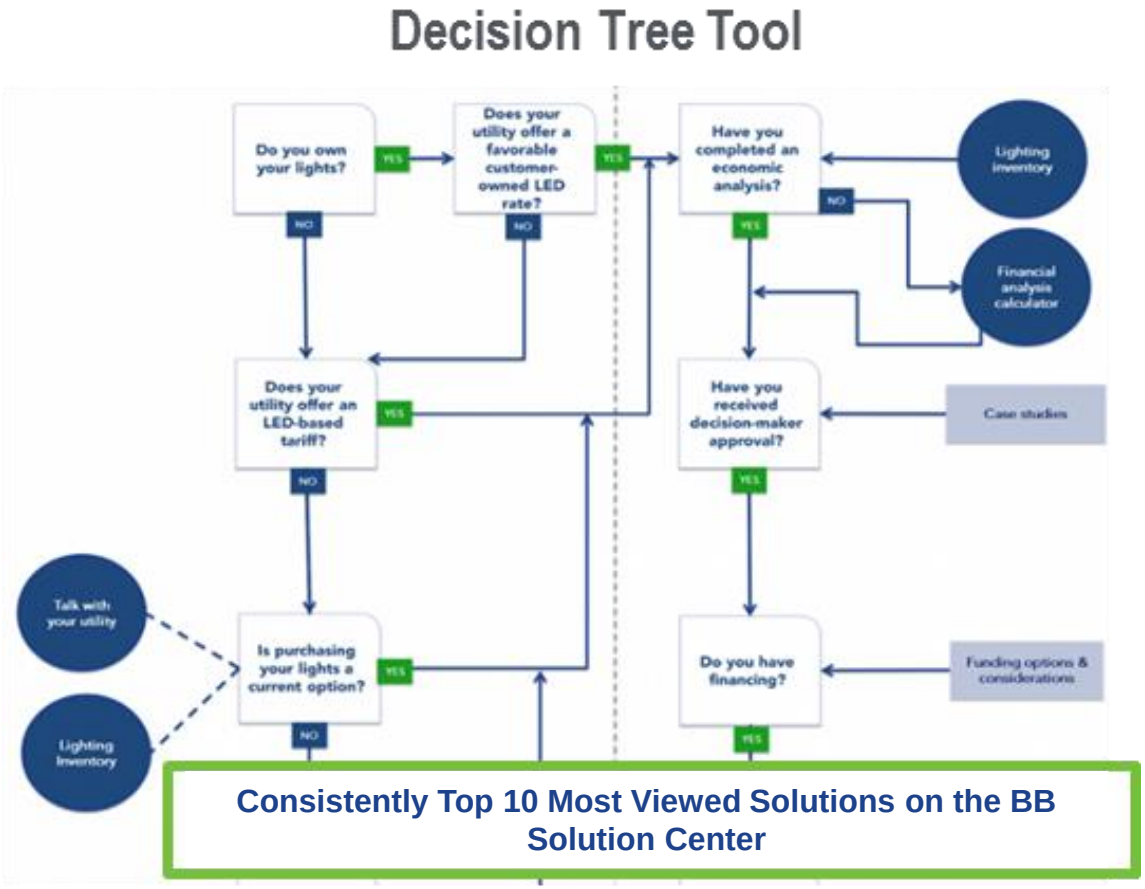
Outdoor Lighting Accelerator Home

In 2014 the Department of Energy established the Better Buildings Outdoor Lighting Accelerator (OLA) as a means of providing technical assistance to municipalities and other public agencies, in order to overcome the particular set of barriers each faced in upgrading their street lights to modern, high-performance systems. Partners included states, cities, and regional energy networks that have upgraded street lighting systems or at minimum assessed the feasibility of a conversion project.

The goal of the OLA was to work collaboratively with partners and other stakeholders to mitigate or remove technical, financial, and regulatory or utility tariff barriers to broad scale deployment of the preferred high performance technology using light emitting diode (LED) street lighting systems and controls. Numerous municipalities have already converted and their results are bearing out the technology's claimed advantages. However, while many others are similarly interested, a variety of barriers impede their moving forward. A compendium of tools and resources to help municipalities with street lighting conversion planning and implementation can be found in the OLA Toolkit.

The OLA concluded in December 2016, and these partner profiles briefly describe conversion experience and reports on the progress of these efforts to date. A summary of the OLA Accomplishments describe what partners were able to achieve during the OLA period and a more detailed assessment of barriers have been captured in The Outdoor Lighting Accelerator: Lighting the Way Forward.

Toolkit: Outdoor Lighting Decision Tree Tool



The Outdoor Lighting Decision Tree Tool is an interactive, visual representation of the decisions needed when upgrading a public, outdoor lighting system.

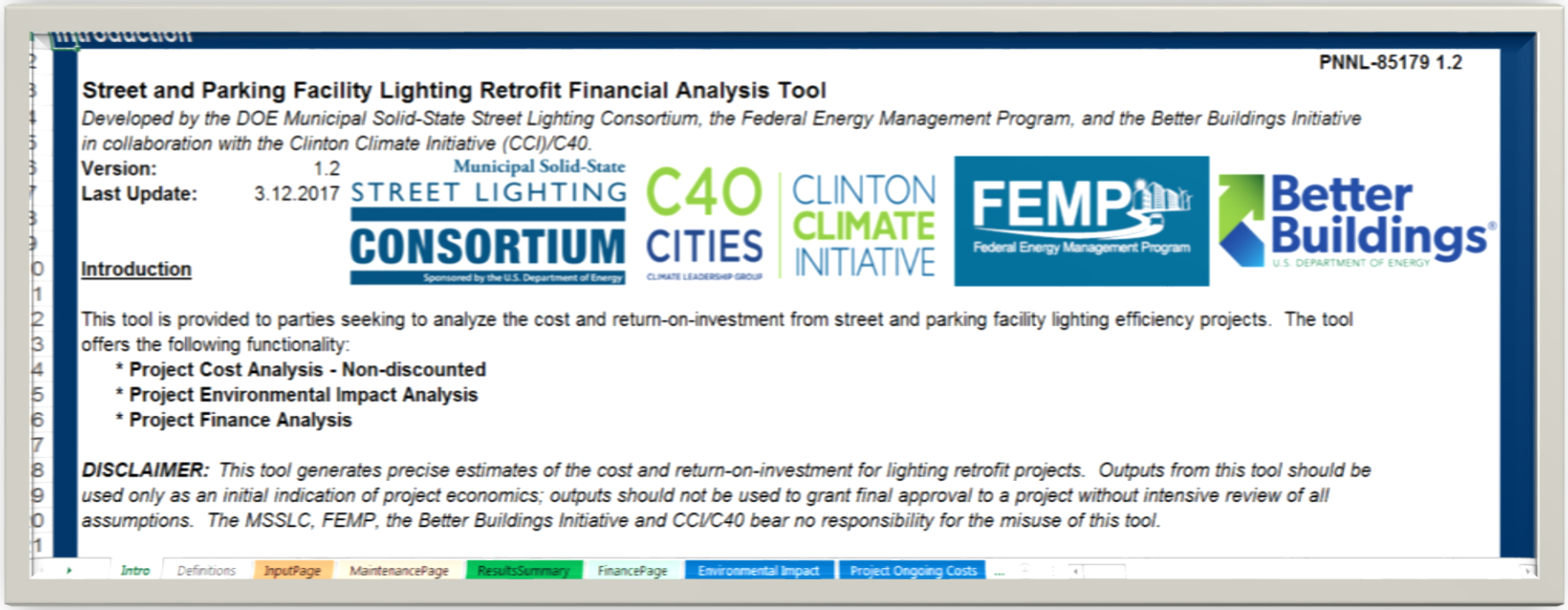
Toolkit: Partner Outcomes

This is How They Did It: Pathways to Energy Savings with Street Lights

Characteristics of your street lighting project environment	Municipally-owned, municipally-maintained	Utility-owned, utility-maintained
Evaluating economies of scale, project scope, and technical preferences	State of Tennessee, Garfield Clean Energy Collaborative (CO)	Southern California Regional Energy Network (SoCalREN)
Justifying "smart city" street light elements such as controls, adaptive lighting, and dimming	Los Angeles, CA	San Diego, CA
Managing multiple street light owners using LED controls		Anchorage, AK
Financing street light upgrades	Mid-America Regional Council (MARC), KS*	West Palm Beach, FL*
Acquiring ownership of your street lights	Huntington Beach, CA*	Portland, ME
Assessing a utility master sales agreement		Takoma Park, MD
Designing a regional bonding authority or joint purchasing program	Delaware Valley Regional Planning Council (DVRPC), PA	Detroit, MI

More details can be found in the The Outdoor Lighting Accelerator: Lighting the Way Forward FINAL REPORT

Toolkit: Financial – Retrofit Financial Analysis



Introduction

PNNL-85179 1.2

Street and Parking Facility Lighting Retrofit Financial Analysis Tool

Developed by the DOE Municipal Solid-State Street Lighting Consortium, the Federal Energy Management Program, and the Better Buildings Initiative in collaboration with the Clinton Climate Initiative (CCI)/C40.

Version: 1.2
Last Update: 3.12.2017

Municipal Solid-State STREET LIGHTING CONSORTIUM
Sponsored by the U.S. Department of Energy

C40 CITIES CLIMATE LEADERSHIP GROUP

CLINTON CLIMATE INITIATIVE

FEMP Federal Energy Management Program

Better Buildings U.S. DEPARTMENT OF ENERGY

Introduction

This tool is provided to parties seeking to analyze the cost and return-on-investment from street and parking facility lighting efficiency projects. The tool offers the following functionality:

* **Project Cost Analysis - Non-discounted**
* **Project Environmental Impact Analysis**
* **Project Finance Analysis**

DISCLAIMER: *This tool generates precise estimates of the cost and return-on-investment for lighting retrofit projects. Outputs from this tool should be used only as an initial indication of project economics; outputs should not be used to grant final approval to a project without intensive review of all assumptions. The MSSLC, FEMP, the Better Buildings Initiative and CCI/C40 bear no responsibility for the misuse of this tool.*

Intro | Definitions | InputPage | MaintenancePage | ResultsSummary | FinancePage | Environmental Impact | Project Ongoing Costs | ...

Toolkit: Policy & Regulation- Enabling State Legislation

- The State of Massachusetts passed legislation in 1997 that required municipalities to have the right to purchase and own their street lights. This legislation included a buy-back calculation (price of new fixture minus depreciation). As a result more than 75 municipalities purchased their street lights and more than half of those have converted to LEDs, resulting in nearly 28,000 MWh of savings over a period of three years.

- State of North Carolina: North Carolina Utility Commission — 2014 mandate, supported by the North Carolina Municipal League, that Duke Energy Carolinas provide an LED rate for replacement of HPS and MH lighting. The mandate further stipulates that the energy consumption and cost data used in developing the LED offering is to be made publicly available. A companion proposal to require that the utility offer a customer ownership option was denied.

- The State of Rhode Island enacted the Municipal Streetlights Investment Act in 2013 establishing formal procedures for municipalities to purchase their utility-owned outdoor lighting systems and directing electric distribution companies to file a tariff incorporating rates for customer-owned dimmable lighting. State of Rhode Island General Assembly News: 'RI first in nation with utility tariff so municipalities can own streetlights' — A state media brief announcing that Rhode Island will be the first in the nation with a utility tariff that offers street lighting controls as an option to all municipal customers.

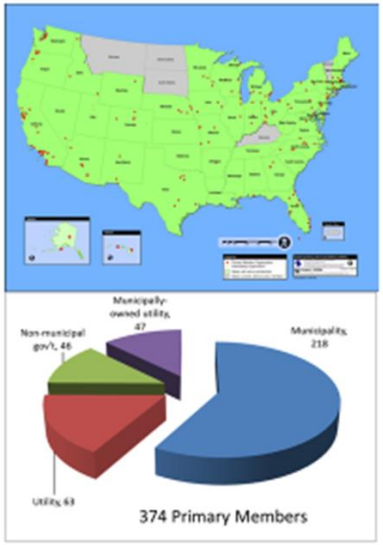
4. Technical Assistance

Municipal Solid-State STREET LIGHTING CONSORTIUM

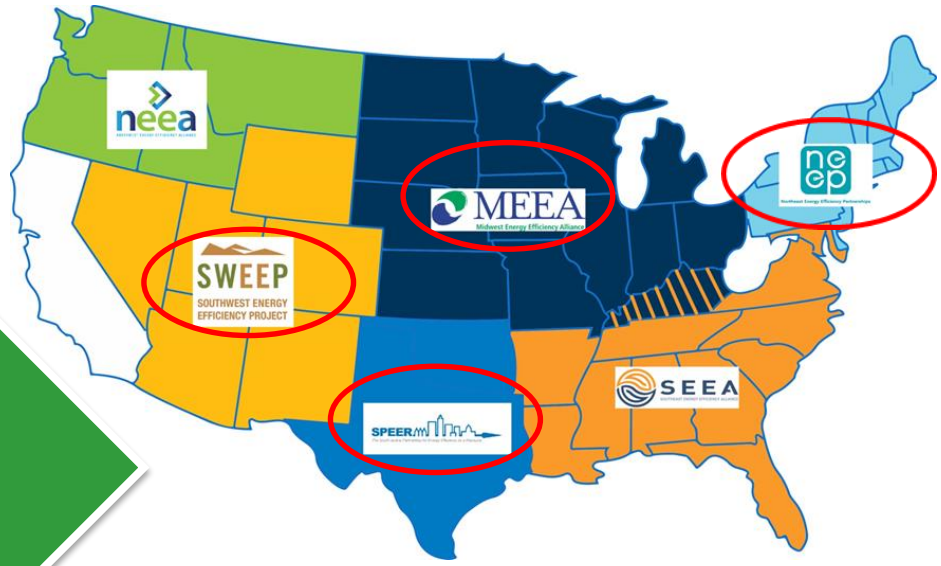
U.S. Department of Energy

Who We Are

- The MSSLC:
  - 374 member orgs
  - User-focused
  - Purpose is sharing information and tools
  - Membership is free but not required for access to most materials



Municipal Solid State Street Lighting Consortium (MSSLC)



Regional Energy Efficiency Organizations (REEOs)

Better Buildings U.S. DEPARTMENT OF ENERGY

U.S. DEPARTMENT OF ENERGY

4a. NEEP Outdoor Lighting Resources

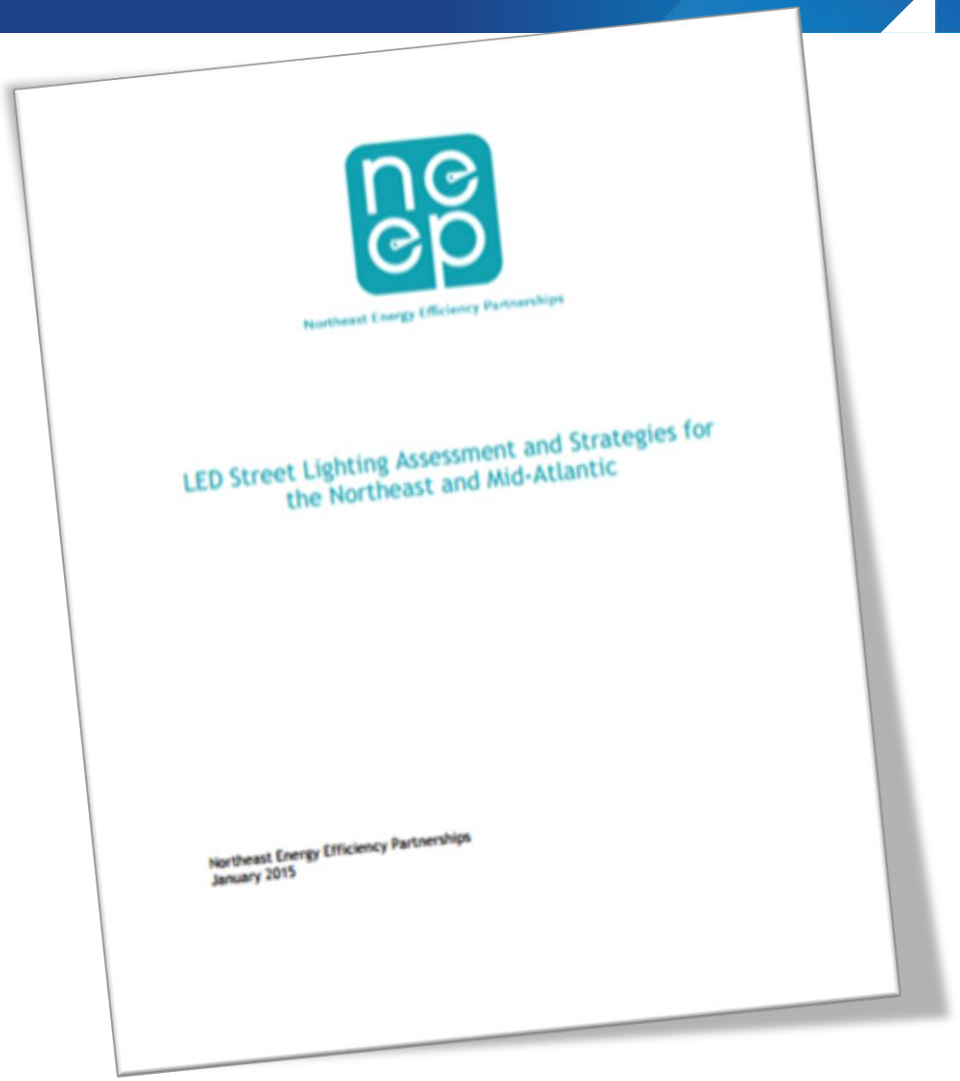
- Report:

  LED Street Lighting Assessment and Strategies for the Northeast and Mid-Atlantic

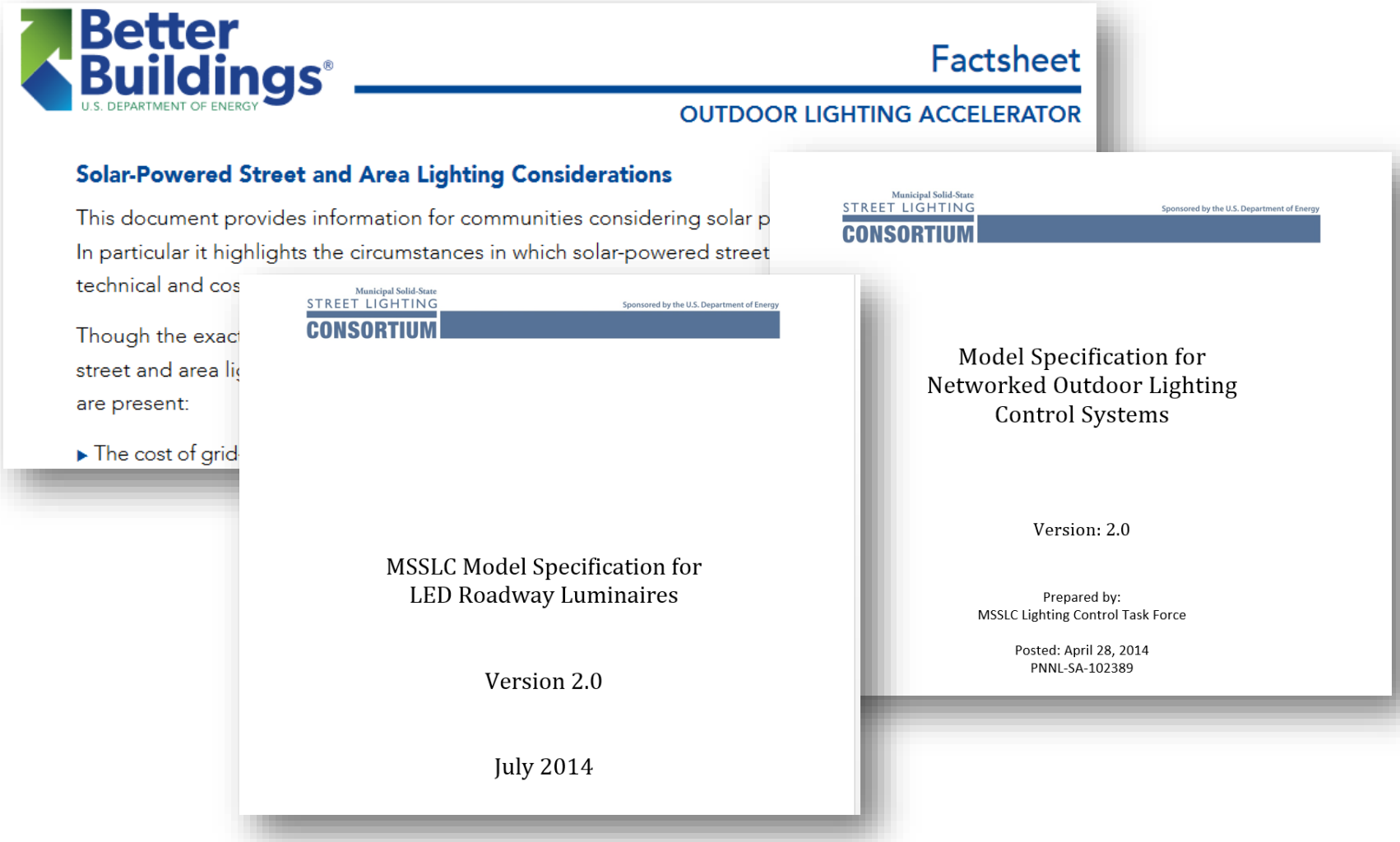
- Webinar:

  Street Lighting: The High-Up, Low-Hanging Fruit

- NEEP.org



4b. Technical Resources



5. Next Steps and Opportunities

- **Monitor** how cities and utilities are addressing localized risks such as infrastructure stabilization (pole and wiring repairs) and costs, stranded lighting assets, and city-wide lighting networks with mixed ownership, and connected lighting platforms for smart city technologies.

- **Communicate** the benefits of properly implemented high quality LED street lighting to overcome public perceptions based on sky glow and blue light critiques.

- **Collaborate** with partners and stakeholder groups to promote ideal LED tariff assumptions used in the rate making process (i.e., participating in forums, serve on panels, share our resources, etc.)

For More Information

Better Buildings Outdoor Lighting Toolkit:
https://betterbuildingssolutioncenter.energy.gov/outdoor-lighting

Better Buildings Initiatives:
https://betterbuildingssolutioncenter.energy.gov/

State and Local Government Engagement:
https://energy.gov/eere/slsc/state-and-local-solution-center

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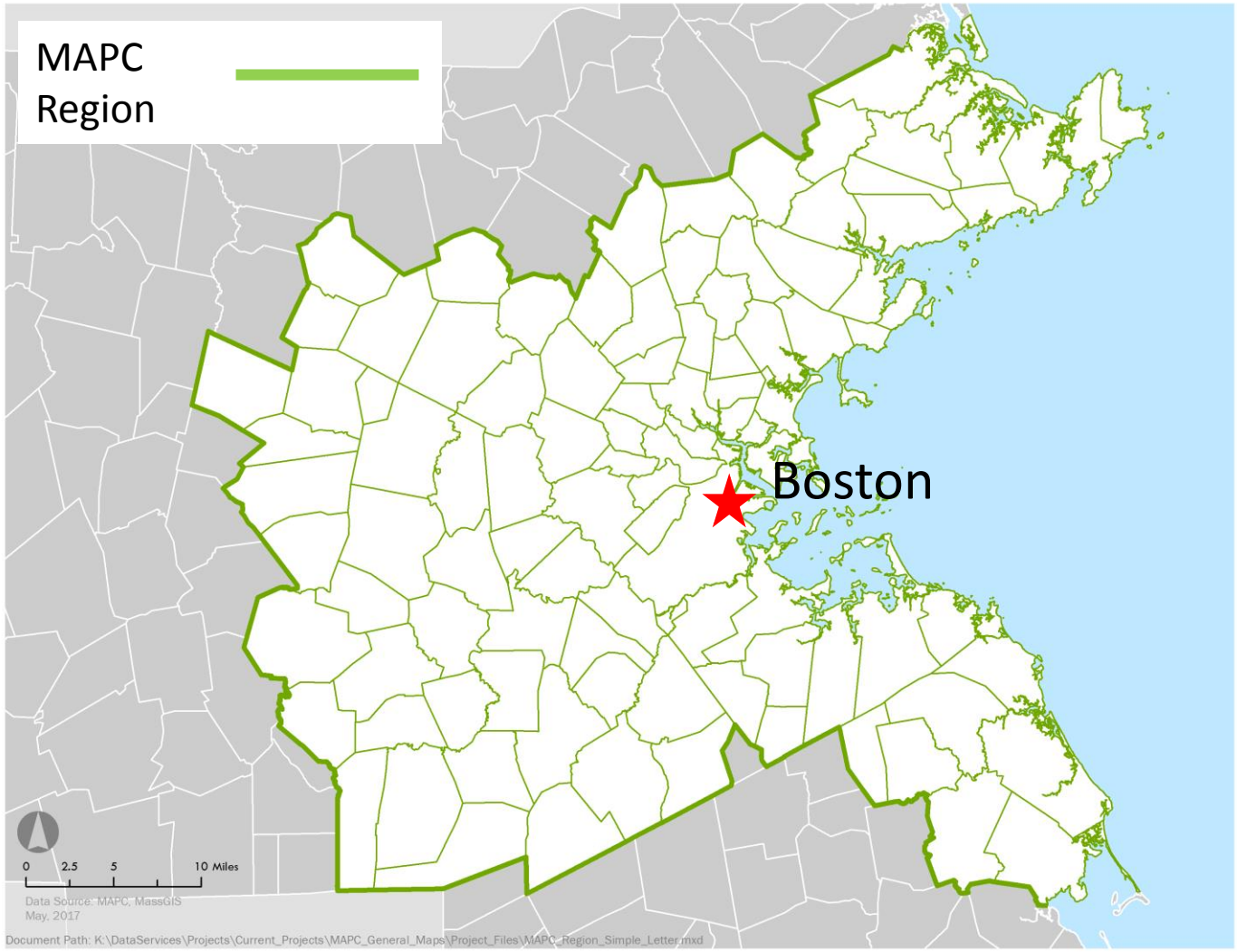
Streetlight Retrofit Lessons Learned

Patrick Roche

Energy Strategist & Procurement Specialist

Metropolitan Area Planning Council



MAPC is the regional planning agency for the greater Boston region

Serving 101 cities and towns

MAPC

MAPC & Streetlight Retrofits

2013 – 2016	Provided technical and organized collective procurements to help over 30 municipalities retrofit 60,000 streetlights
2017 - Present	Currently working across Massachusetts with an additional 45 municipalities to retrofit 75,000 streetlights

Annual Savings:	30,000 MWh 12,000 MT GHGs $6 Million USD

MAPC

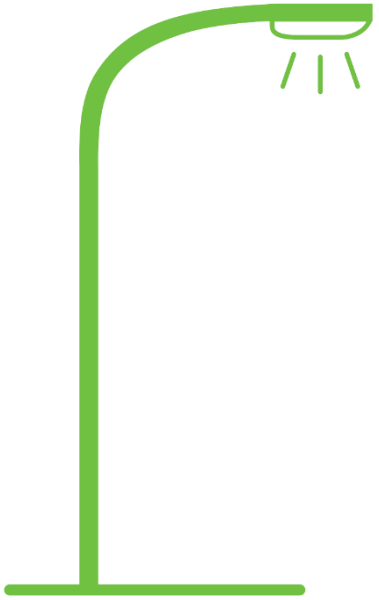
Taking Municipal Ownership of Lights

- May need legislation to enable this
- Advocate for simple and fair pricing policy
- Advocate for reasonable requirements in licensing agreements
- Get an audit
- Be aware of potential expensive restrictions, like installing new handholds for underground fed lights

MAPC

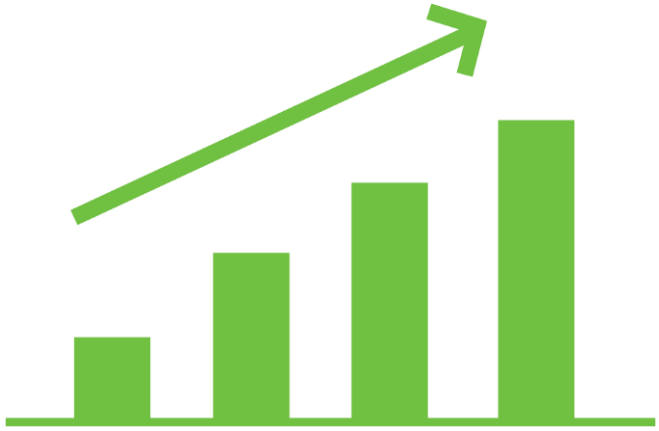
Retrofit Barriers for Municipalities

- Despite short paybacks, comprehensive retrofits require massive upfront funding
- Responsibilities after buy-back can be daunting
- Lighting decisions will have impacts for 10-20+ years
- Existing staff likely has little to no familiarity with LED streetlights



MAPC

Breaking Through Barriers

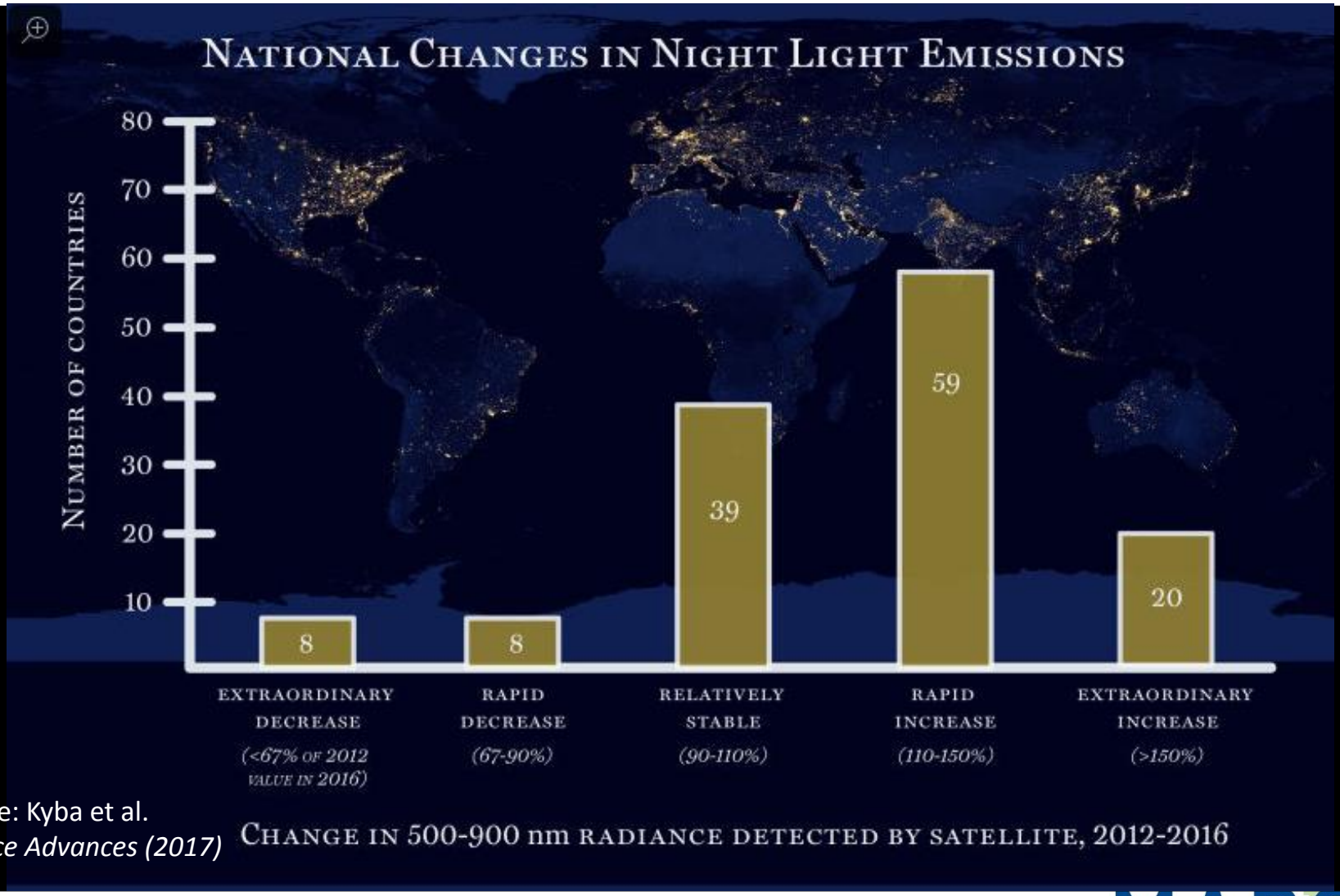


- A non-biased third-party can be necessary to educate and catalyze action
- An aggregator (like Regional Planning Agency (RPA) can help accelerate the process for many municipalities at once
- A skilled consultant is valuable to help municipality or RPA design replacement scheme

MAPC

Design Considerations: Lumens & Controls

MAPC



Source: Kyba et al.
Science Advances (2017)

Choose the Right Lumens

50 watt High Pressure Sodium: ~4,000 lumens

In MA, these are being replaced with LEDs like:

- 17w, 3000 K fixture with 2,077 lumens
- 14w, 3000 K fixture with 1,900 lumens

During design, look at the average, max and min lumen levels (IES RP8 standards)

Utilize wireless controls or at least have "control-ready" fixtures

MAPC

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Type your question into the chat box

Short Takes

John Balfe, NEEP

New Exemplar

Delaware Valley Regional Planning Commission (DVRPC)

LED Streetlight Procurement

"The Regional Streetlight Procurement Program exemplifies an innovative model of intergovernmental cooperation. Municipalities were able to pool their buying power to achieve a common goal. By working together, each municipality was able to access guaranteed savings agreements and technical expertise to convert its entire outdoor lighting systems to more energy efficient LEDs at no upfront cost."

- Stephanie Teoli Kuhls, Manager of Middletown Township (Bucks County)

QUICK FACTS

The Delaware Valley Regional Planning Commission (DVRPC) is the Metropolitan Planning Organization for the nine-county Greater Philadelphia region (covering Pennsylvania and New Jersey).

Number of municipalities covered: 35

Number of municipalities able to access utility rebates: 35

Number of streetlights candidate for retrofit: 24,000

Annual guaranteed energy savings: 10,600,333.50 kWh

March 2015
DVRPC began engaging stakeholders

July 2015
Letters of intent were secured from 45 municipalities

October 2015
An RFP was issued by DVRPC on behalf of the 45 municipalities

December 2015
An ESCO (Johnson Controls Inc.) was selected

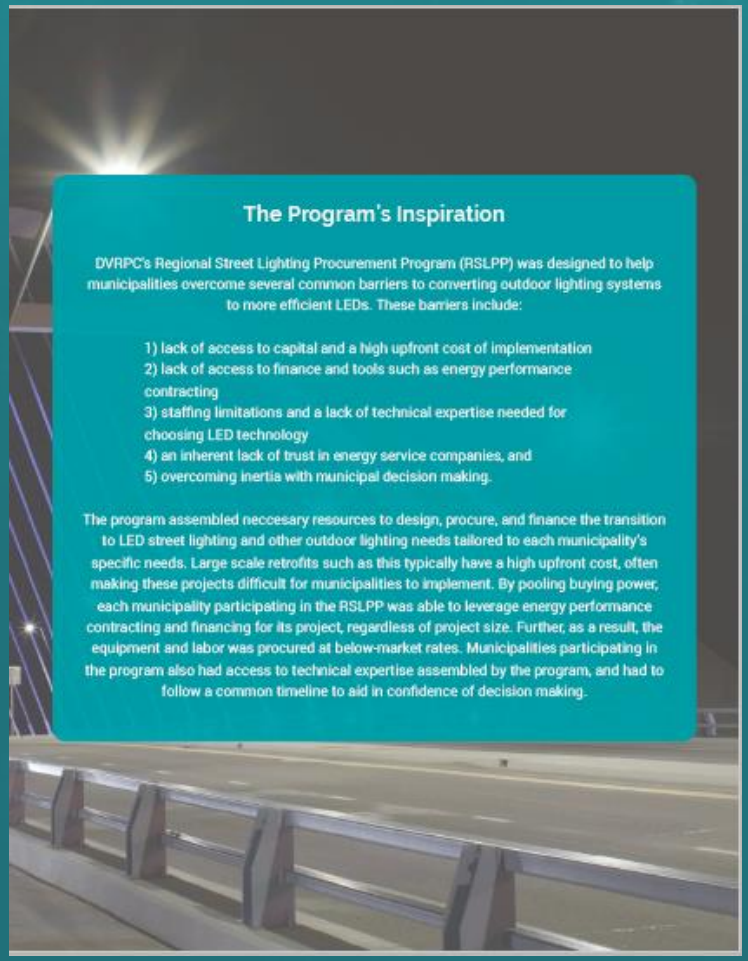
January – April 2016
Preliminary Audit Phase

May – October 2016
Investment Grade Audit Phase (35 municipalities proceeded)

November 2016 – February 2017:
Financing was arranged

March 2017
Construction began. Expected to be completed by the end of 2017

March – May 2017
Procurement occurred



States Invited to Select Nominees for U.S. Department of Education Green Ribbon Schools 2018

1. Reduce environmental impact and costs;
2. Improve the health and wellness of schools, students, and staff; and
3. Provide effective environmental and sustainability education.

Upcoming Events

NEEP webinars:

- Advanced M&V Software Products Overview - Dec 11
- Smart Energy Homes Virtual Workshop - Dec 13

Industry events:

- AESP Annual Conference – February 19-22
- GLOBALCON – March 21-22
- Getting to Zero Forum – April 17-19
- Maine IAQ and Energy 2018 Conference – May 1-2

THANK YOU!

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