

# Municipal Solid-State Street Lighting Consortium

2014 Building Technologies Office Peer Review



*Day Burners in  
Detroit,  
December 2013*

# Project Summary

## Timeline:

Start date: April, 2010

Planned end date: FY19

## Key Milestones

1. Detroit joining MSSLC and deciding to pursue an LED-based system, November, 2013
2. Model Controls Specification V2.0 released; April, 2014
3. Street Lighting Controls Demonstration Established, April, 2014

## Budget:

Total DOE \$ to date: \$1.87M

Total future DOE \$: \$1.5M

## Target Market/Audience:

Municipalities, utilities and all other owners and users of street lights.

## Key Partners:

<b>261 Municipalities</b>
<b>70 Utilities</b>
<b>53 Muni-Owned Utilities</b>
<b>55 Non-Muni Government Orgs</b>

## Project Goal:

Help users/owners make better informed decisions regarding LED street lighting technology. MSSLC facilitates:

- More rapid learning about the technology and its proper implementation
- Better selection of products; less wasted money; more energy savings
- Early identification of issues of most importance to members, e.g., controls

# Purpose and Objectives

**Problem Statement:** Assessment of ARRA grants to cities revealed numerous applicants intended to invest in LED street lighting.<sup>1</sup> However, LED lighting technology is fundamentally different than incumbent technologies, requiring proper selection and implementation to achieve full potential. Expert help is needed to provide critical education and assistance and improve the success of the large public and private investments being undertaken.

## Target Market and Audience:

- All street lighting owners and users
- Estimated U.S. electricity use in 2010 was 51 TWh
- MSSLC membership currently includes more than 430 organizations
  - Represents more than 1,000 participants
  - Most major U.S. cities are members

*Los Angeles, pre LED-retrofit*



# Impact of Project (Intended)

1. Intended impact is an educated street and area lighting community, with no practical obstacles to appropriate implementation of SSL products.
2. Obstacles tend to arise from two general sources:
  - Continued unfamiliarity with the technology
  - Financial constraints or conflicts
    - Perceived inability to finance first costs
    - Lack of LED-based utility tariffs
3. MSSLC provides information and tools to facilitate the transition. Critical questions and issues are identified, and then addressed through the most appropriate means (i.e., specifications, case studies, etc.).
4. Energy savings (typically 50%+) result from appropriately designed, cost-effective implementation.

*Los Angeles during LED-retrofit, 63% average energy savings per unit*



# Impact continued

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5. MSSLC judges progress towards the goal through related metrics:

- Reported use of the MSSLC Specifications
- Growth in MSSLC membership
- Growth in LED outdoor market share
- MSSLC website statistics
- All above metrics used for short, intermediate, and long term impact measurement

# Approach

- ID major information gaps and project needs via workshops & comm. mtgs.
- Prepare information, tools, and projects
  - Focus on priority issues, e.g., controls, side-by-side comparisons with advanced conventional sources
  - Specifications, e.g., luminaire and controls
  - Computer tools, e.g., financial analysis tools
- Share/Network/Educate
  - Regional workshops (typically ~100 attendees)
  - Webcasts (typically ~500 attendees and sometimes many more)
  - Presentations at many other venues
    - IES Street and Area Lighting Conference
    - Strategies in Light, LightFair International, National League of Cities
    - DOE SSL Workshops
- Solve member problems, e.g., provide analyses and advice

# Key Issues

- Most owners still new to the technology and not ready to implement without assistance.
  - E.g., the City of Detroit benefited greatly from MSSLC input
- Widespread availability of controls systems on the market is well ahead of any system-wide adoptions.
  - Street lighting controls are fundamentally new to most owners; traditionally, a conservative bunch.
- Municipalities resist third-party financing of system capital costs.
  - MSSLC believes this is primarily due to misperception of the overall economics.
- These issues result in lost opportunities for energy savings
  - Includes below achievable results from use of products inadequately suited for the intended application.

# Distinctive Characteristics

- MSSLC is first and foremost a users group.
  - Commercial organizations are not eligible for membership, thus freeing MSSLC of any underlying profit motivation or allegiance.
  - Manufacturers nevertheless show great interest in working with MSSLC; products such as the Model Luminaire Specification have achieved widespread manufacturer buy-in.
- MSSLC representatives are regularly invited to participate in manufacturer technical groups
  - e.g., the Philips-led TALQ Consortium
- MSSLC technical competence is backed up by the deep expertise within the DOE Solid-State Lighting Program.

# Progress

## Lessons Learned

- Munis consider third-party financing only as a last resort
  - Bond measures and grants are always preferred first
- Though cities require lighting levels recommended by IES (e.g., in RP-8), many of their streets do not meet those levels.
- Owners of large (20K+?) street lighting systems rarely possess an accurate count of how many street lights are actually in their system.
  - Occasionally entire neighborhoods are discovered to be “off the books.”
- Interaction with MSSLC thus not only helps owners learn about LEDs, but also more about their existing systems.
  - The advent of controls technology is expected to resolve much of these kinds of uncertainty.

# Accomplishments

- MSSLC directly influenced the Detroit Public Lighting Authority's decision (November, 2013) to use LED products.
- An earlier MSSLC demonstration on one Philadelphia street caused such marked reductions in crime activity that merchants on neighboring streets convinced the city council to install LED street lighting on their streets too (2013).
- Various sections of the Model Control Specification are being considered for essentially verbatim use as the backbones for one or more new ANSI C136.x standards.
- MSSLC launched the LED Street Lighting Program Financing Guidance for LED Street Lighting Programs webpage, to introduce members to additional means of financing LED retrofit programs.
- Rhode Island and National Grid have jointly requested MSSLC to manage a pilot demonstration to help resolve ongoing legal negotiations concerning recently mandated tariffs for LED street lighting and controls (pending legal approval).
- Widespread use of Model Luminaire Specification (see slide 12)

# Market Impacts

- Transition to LED street lighting typically results in 50%+ energy savings (without considering controls).
- Detroit's decision to go LED resulted in an RFP award for 47,000 street lights.
- New Orleans used the Model Luminaire Specification in 2013 and has since installed more than 15,000 street lights.
- New York City, an active MSSLC member (and member of the Executive Committee), recently announced the planned retrofit of 250,000 street lights throughout the city; an RFP for the first 60,000 covering Brooklyn was issued February 19, 2014.
- Manufacturers report handing out the Model Luminaire Specification themselves to both U.S. and international customers.

# Market Impacts

- Partial list of reported use of Model Luminaire Specification:

Seattle City Light

State of Wisconsin

State of Colorado

State of Minnesota

City of Independence, MO

City of Kansas City, MO

City of Portland, OR

State of Hawaii

Central Hudson Gas & Electric (NY)

City of Naperville, IL

Iowa Association of Municipal Utilities

City of Philadelphia, PA

City of Sacramento, CA

Puerto Rico (PREPA)

City of New Orleans, LA

City of Detroit, MI

North Carolina Department of Transportation

Illinois Department of Transportation

- Growth in MSSLC membership, currently totaling more than 1000 individuals in 430+ organizations (see slide 15)
- Growth in LED outdoor market share, jumping from 2% in 2012 (LED Adoption Assessment Report) to 5.8% in 2013 (Source: Navigant)
- MSSLC website statistics: more than 45,500 page views over the last 12 months. 1715 downloads of the Luminaire Spec and 563 downloads of the Controls Spec over the same period

# Awards/Recognition:

- Michael Macklin, President of Applied Power and Controls, Inc. (**lead engineering contractor for Detroit**), March 4, 2014: *“There is no way we would have received the quality and quantity of bids from the various manufacturers without your advice, insight and help with the model spec.”*
- Mark McClear, **VP Applications Engineering, Cree**, Jan. 10, 2014: *“I can tell you first hand that there’s nothing else like MSSLC in any of the worldwide regions we do business in. This is a great program, having huge impact. Congratulations on your vision, leadership and implementation of MSSLC.”*
- Unsolicited observation following the 2013 IES Street and Area Lighting Conference, September 25, 2013 : *“..It wasn’t just a nod to MSSLC, it was a love fest. It seemed like every doggone speaker had to refer to the helpful financial calculator and the specification, and the information exchange, and support...”*
- Sean Tippett, **Silver Spring Networks**, March 7, 2013, following MSSLC Controls Presentation at Strategies in Light: *“...Excellent presentation...If you are game, I’d love to have you present this to our street light core team and have the opportunity to ask questions / talk through this.”*

# Project Integration and Collaboration

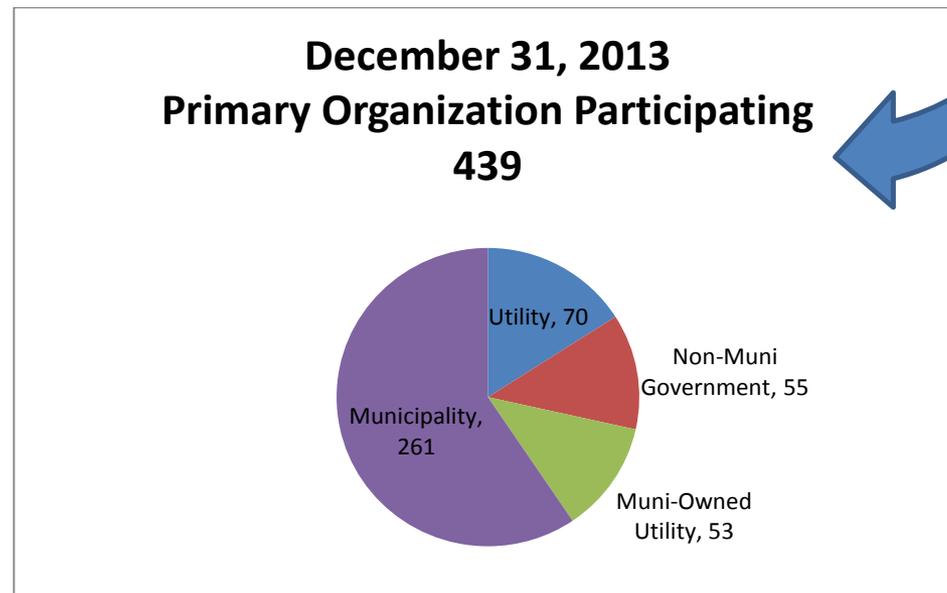
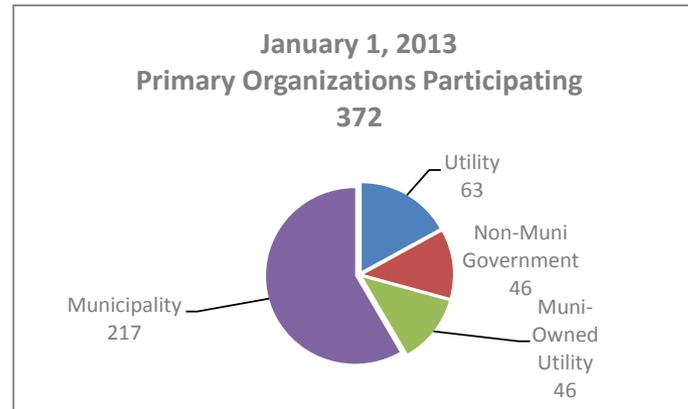
- MSSLC participates in numerous workshops and conferences of the street lighting community.
- The larger DOE SSL program interacts directly with the SSL industry at virtually every event.
- Numerous manufacturers and other non-member stakeholders are on requested distribution for program communications.
- The LED and street lighting communities initiate many queries and invitations to MSSLC.
- Combined, these venues provide ample opportunity for feedback on existing work products and suggestions for new products, proposed demonstrations, education and other collaborative activities.



*LightFair International, 2013*

# Partners, Subcontractors, and Collaborators

- Seattle City Light; contractor for MSSLC Director
- In 2013, added:
  - 44 municipalities
  - 7 municipally-owned utilities
  - 7 investor-owned utilities
  - 9 non-municipal governments
  - 321 new Consortium delegates, now more than 1000 in total



# Communications

- **Participation<sup>1</sup> in recent MSSLC webinars:**

FY13 MSSLC Webinar Events	Date	Attendees
US DOE LED Street Lighting Consortium Webcast: Successful Selection of LED Streetlight Luminaires	3/6/2013	490
Successful Selection of LED Streetlight Luminaires: Optimizing Illumination and Economic Performance	5/8/2013	482
Member Case Study - City of Los Angeles - LED Street Lighting Program	9/25/2013	563
Maintenance Practices and Lessons Learned – Three Municipal Case Studies	4/14/2014	601 <sup>2</sup>

<sup>1</sup> These public venues include nonmembers from the U.S. and internationally.

<sup>2</sup> Registered to participate as of March 31, 2014.

- **Non-DOE Workshop Presentations (2013):**

- IES LightFair, International, 2013
- National League of Cities Annual Congress of Cities, November 2013, Seattle
- IES Street and Area Lighting Conference, 2013
- Bi-Monthly Member Newsletter “The Light Post”

# Next Steps

Continue to address major issues/deficiencies in available information:

- IOUs control large component of the national streetlight inventory
  - Either by owning outright or selling power
  - IOUs are conservative LED adopters. The RI/National Grid pilot should lead to an LED-based tariff and establish a precedent for IOUs nationwide
- Controls offer the next major technological step
  - MSSLC is providing technical expertise to address barriers to the use of controls systems.
- NCDOT is using the Model Luminaire Specification for a state-wide roadway lighting retrofit, and financing the transition via ESCO.
  - Documentation of this project will provide an excellent case study and possibly ease others' reluctance with this approach.
- MSSLC will continue documentation of Detroit's ongoing street lighting renovation.
  - Financial, infrastructural, and other conditions of the City present a convincing case study
- Considering scope expansion to other municipal lighting uses.

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# REFERENCE SLIDES

# Project Budget

**Project Budget:** The MSSLC originated mid-FY2010 with ARRA funding, which carried through FY2011. In FY2012 it was moved under general appropriation.

**Variations:** None. The original plan was to fund as much work as possible through ARRA and then continue under general appropriation if available. MSSLC has kept to the original plan.

**Cost to Date:** Approximately \$1.6 million through March, 2014.

**Additional Funding:** Original ARRA funding (FY2010-11) amounted to \$795K.

## Budget History

FY2011– FY2013 (past)		FY2014 (current)		FY2015 – FY2019 (planned)	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
\$1.4M	\$795K	\$400K	TBD	\$1.5M	TBD

# Project Plan and Schedule

- Project initiated FY2010: Project planned completion FY2019

Project Schedule												
Project Start: FY09	Completed Work											
Projected End: FY19	Active Task (in progress work)											
	◆ Milestone/Deliverable (Originally Planned)											
	◆ Milestone/Deliverable (Actual)											
	FY2013				FY2014				FY2015			
Task	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)
<b>Past Work</b>												
Q1 Milestone: MSSLC Model Controls Specification, V1.0		◆	◆									
Q2 Milestone: Kansas City Streelighting Report			◆	◆								
Q3 Milestone: Financing Strategies Website Section		◆	◆	◆								
Q4 Milestone: MSSLC Webcasts		◆	◆	◆								
<b>Current/Future Work</b>												
Q1 Milestone: Detroit joins MSSLC, selects LED tech					◆				◆			
Q2 Milestone: MSSLC Model Controls Spec., V2.0						◆						
Q4 Milestone: MSSLC Webcasts							◆	◆	◆			◆
Q4 Milestone: Detroit Streetlighting Report									◆			

# Task and Schedule Challenges

- No contractual arrangement between project team members
  - Much of project direction/participation outside of MSSLC control
  - Subject to external variables in agency funding, politics, motivations of principals involved, legal proceedings, etc.
  - Leverage on volunteers is limited; sometimes planned activities do not advance at all
- Critical progress may rely on the establishment of consensus standards, which can be difficult to predict
  - E.g., ANSI C136.41 – 2013 *For Roadway and Area Lighting Equipment – Dimming Control Between an External Locking Type Photocontrol and Ballast or Driver*. (Published Feb. 2014) ; **5+ years in the making**

