

LightFair 2013 Philadelphia

A Tour Through the Municipal Solid-State Streetlighting Consortium Resources

April 21 & 24, 2013

Edward Smalley

Director, Municipal Solid-State Street Lighting Consortium
Seattle City Light | Government and Legislative Affairs

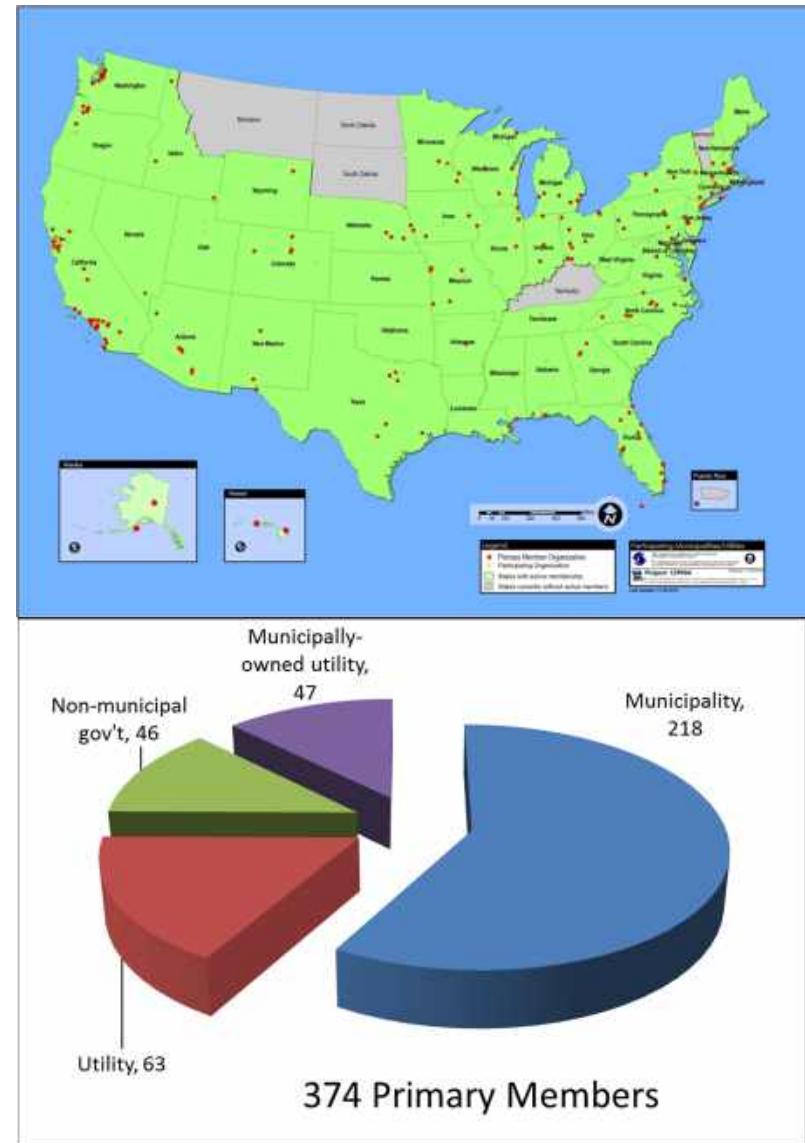


Quick Facts

- Street lights in the U.S.: 26.5 million
- Energy Consumption Equivalent: 1.9 million households
- Greenhouse Gas Emissions Equivalent: 2.6 million cars.
- Energy Only Costs (estimated): **\$2 billion/year**
- Operation and Maintenance Costs (estimated): ***\$4-6 billion/year***
- Funding: 90% taxation | 10% Coops/other
- Ownership: 60%+ private Investor Owned Utilities

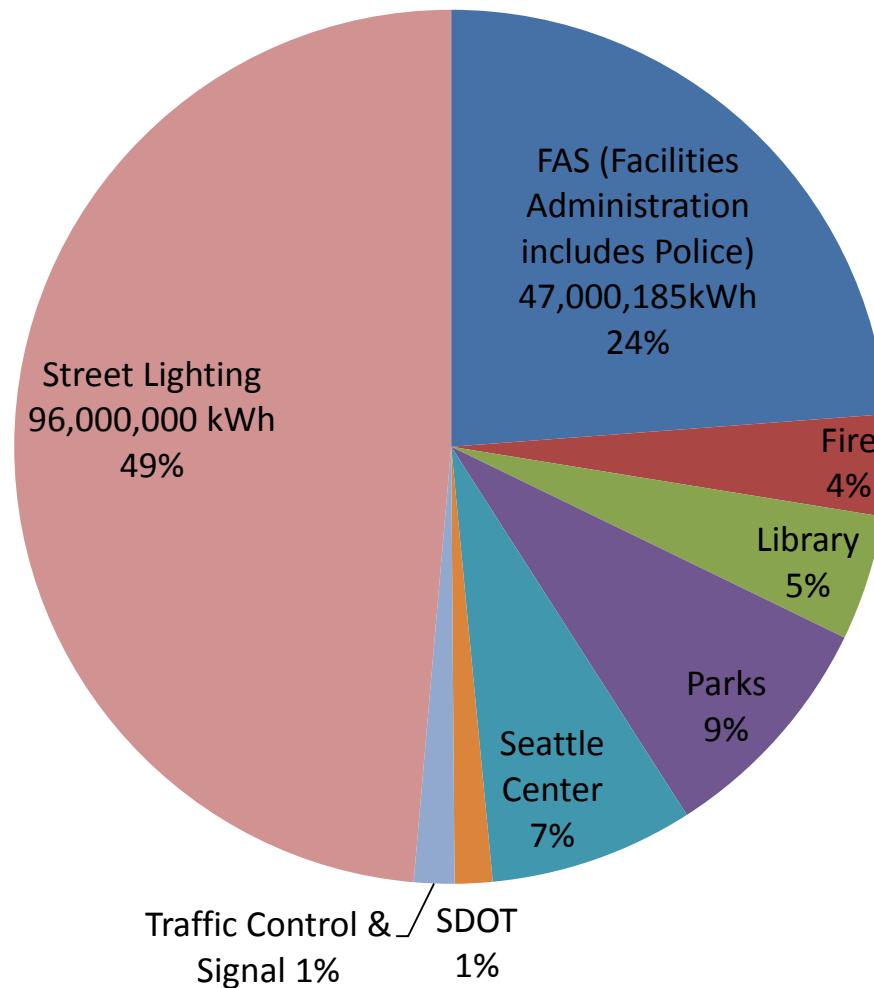
Who We Are

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



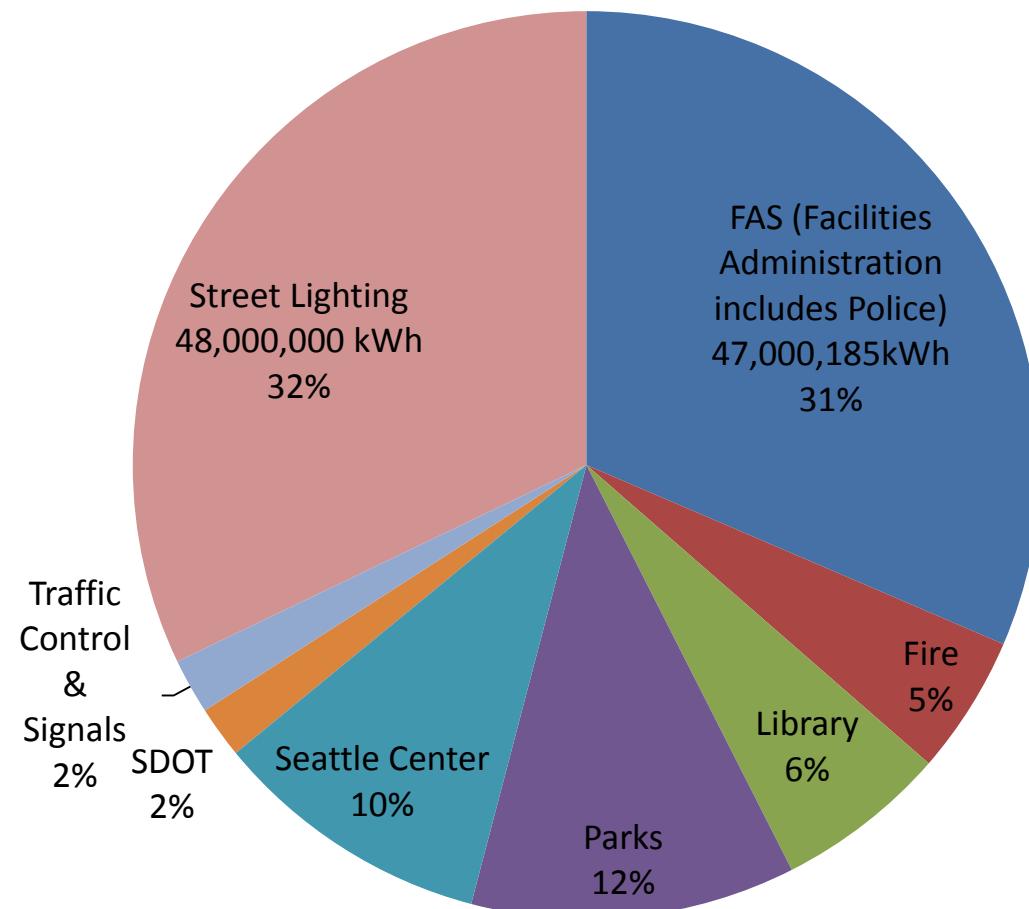
Why We Exist

City of Seattle – GF Municipal Electricity Use
Pre-LED Street Lighting Program – 197,409,782 kWh



Why We Exist

City of Seattle – GF Municipal Electricity Use
Post-LED Street Lighting Program – 149,409,782 kWh



Membership

Membership

Primary membership is solicited from among interested cities, power providers, and other lighting owners and stake-holders.

Advisory members include organizations with a known history for promoting quality lighting and power efficiency.

Guests include individual employees of organizations that meet the requirements for membership

Current Activities - Demonstrations

Kansas City



- Nine products on nine streets
- 100W, 150W, 250W & 400W sample replacements
- Tight adherence to earlier design criteria provides a very consistent baseline for product comparisons
- Provided preliminary feedback for the Luminaire Spec

Current Activities - Demonstrations

West Seattle Bridge Freeway

Photo: ABKJ, Inc.



- Vertical clearance: 140' above water
- Span: 2 miles
- Products Evaluated: 4
- Installation: June 2013

Resources – Model Luminaire Spec

Model Specification for LED Roadway Luminaires

Scope

- Municipalities, utilities, large public spaces, etc.
- Streets, roadways, and nearby pedestrian ways
- Initial and maintained quality and quantity of illumination
- Warranty coverage
- Input power, electrical immunity, housing finish, vibration, etc.
- Drivers, including lighting controls interface
- Photocontrol receptacles



Model Specification for
LED Roadway Luminaires

Version 1.0

October 2011

Download: <http://www1.eere.energy.gov/buildings/ssl/specification.html>

Resources – Model Luminaire Spec

The template is composed of two separate documents:

- 1) The body of the specification and appendices A-E.
- 2) The Editor may choose ONE of two versions of Appendix A, depending on available information.
 - System Specification (application efficacy), which characterizes luminaire performance based on site characteristics such as mounting height, pole spacing, number of drive lanes, input power, and required light levels and uniformity.
 - Material Specification (luminaire efficacy), which characterizes luminaire performance without consideration of site characteristics.

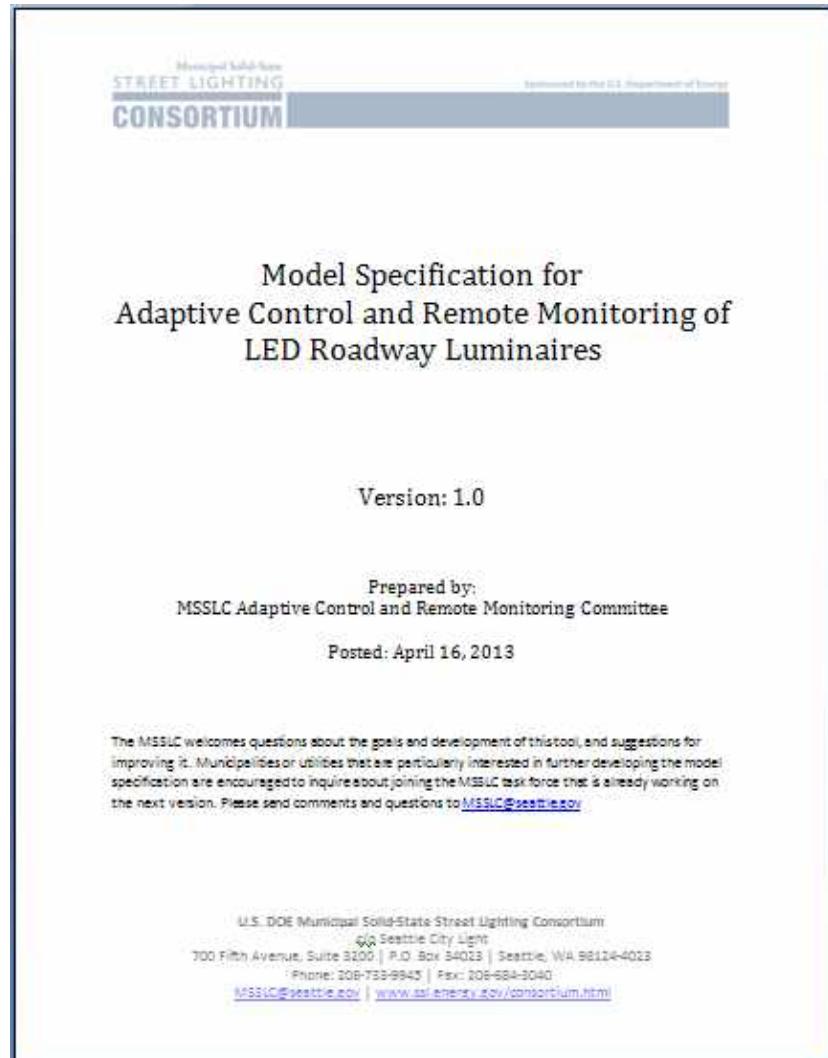
Resources - Model Controls Spec

Model Specification for Adaptive Control and Remote Monitoring of LED Roadway Luminaires

Released: April 16, 2013 – V 1.0

Download at:

www.ssl.energy.gov/consortium.html



The cover page features the MSSLC logo at the top left, followed by the title "Model Specification for Adaptive Control and Remote Monitoring of LED Roadway Luminaires" in large, bold, black font. Below the title, it says "Version: 1.0". Further down, it states "Prepared by: MSSLC Adaptive Control and Remote Monitoring Committee" and "Posted: April 16, 2013". At the bottom, there is a note about comments and a contact email address.

Comments
The MSSLC welcomes questions about the goals and development of this tool, and suggestions for improving it. Municipalities or utilities that are particularly interested in further developing the model specification are encouraged to inquire about joining the MSSLC task force that is already working on the next version. Please send comments and questions to MSSLC@seattle.gov.

U.S. DOE Municipal Solid-State Street Lighting Consortium
c/o Seattle City Light
700 Fifth Avenue, Suite 3200 | P.O. Box 34023 | Seattle, WA 98124-4023
Phone: 206-733-6945 | Fax: 206-684-3040
MSSLC@seattle.gov | www.ssl.energy.gov/consortium.html

Resources - Model Controls Spec

- Motivation
 - Developed in response to demand from Consortium members and others
 - Potential to improve service and further conserve energy
 - Useful-to-all does not mean one-size-fits all
- Purpose
 - To compile experience gained by members
 - To establish a common language and framework
 - To serve as a checklist to minimize errors/omissions
 - To serve as a living document, undergoing continual revision
 - To allow for customization by each adopting entity

Resources – Model Controls Specification

What is a streetlight control system?

- 1) Control Node | 2) Gateway | 3) Central Management System

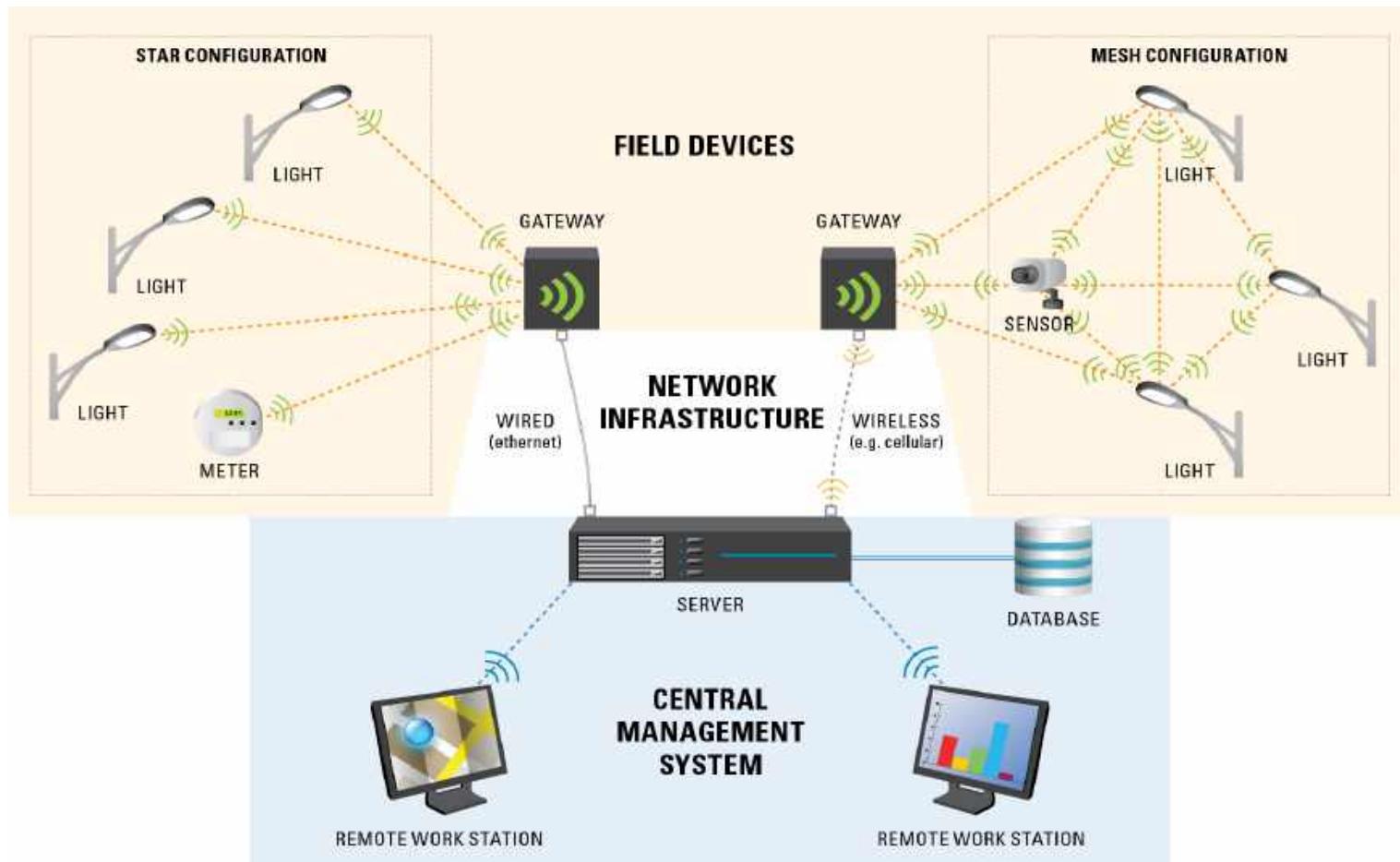
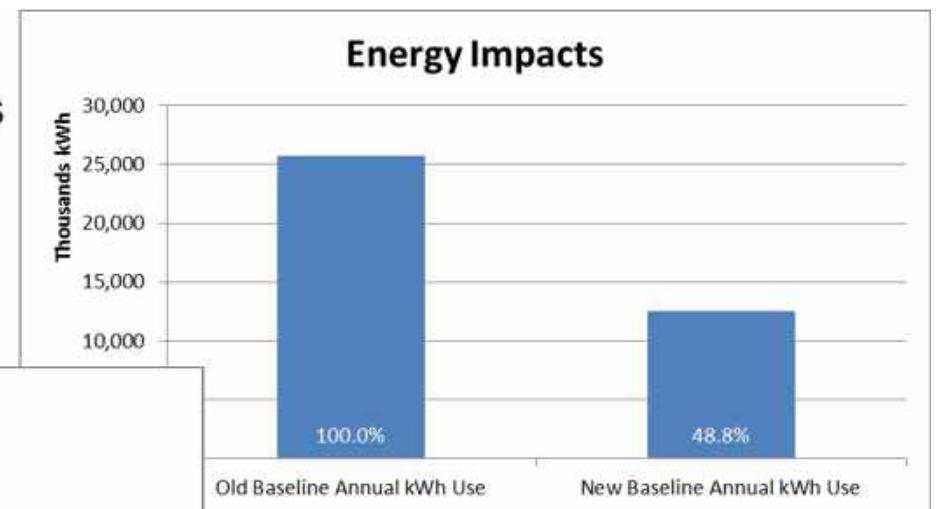
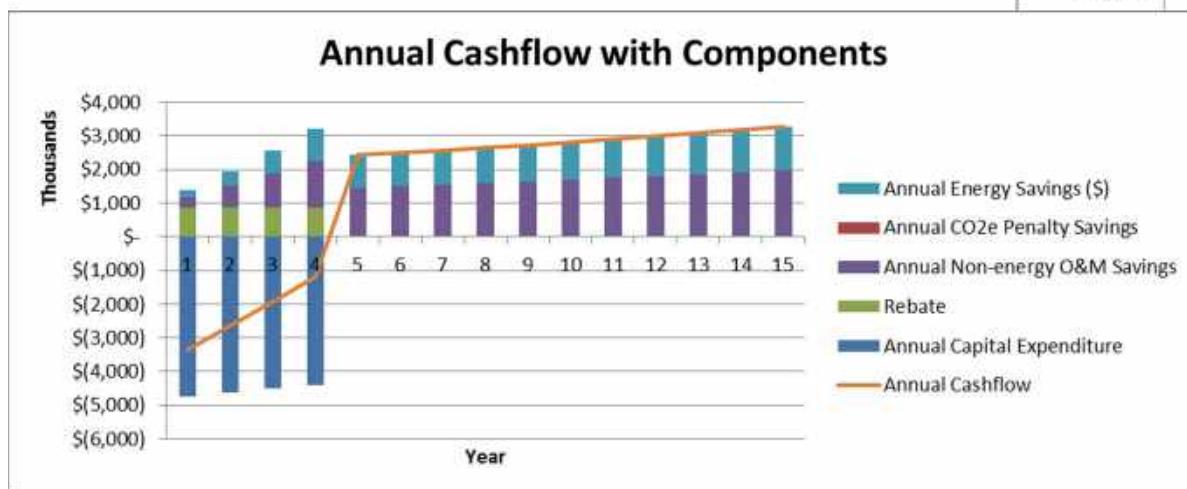


Image Credit: California Lighting Technology Center, UC Davis

Resources – Financial Analysis Tool

Retrofit Financial Analysis Tool

- Evaluates costs and benefits of LED conversion
- Performs detailed analysis and provides numerous outputs, including:
 - Annual energy and energy-cost savings
 - Annual maintenance savings
 - Annual greenhouse gas reductions
 - Simple payback, IRR
 - Net present value



Resources – Financial Analysis Tool

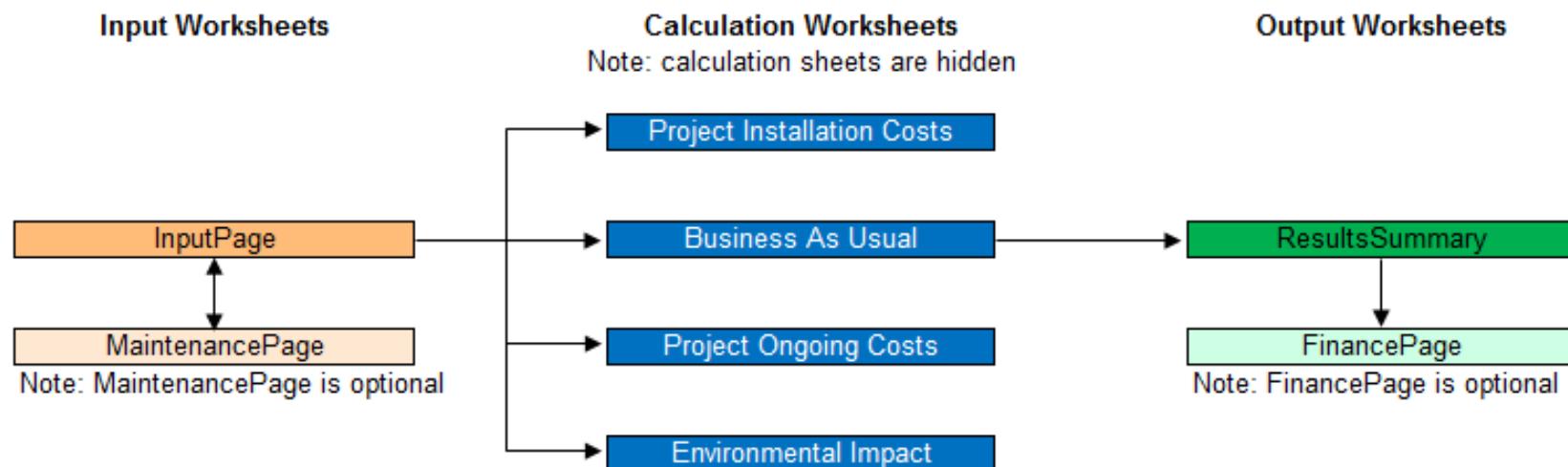
Structure and flow of tool

Input page

Maintenance page (optional)

Results summary

Finance page (optional)



Resources – Financial Analysis Tool

Contains all assumptions for project, except optional finance and detailed maintenance cost assumptions

Four sections:

- 1) Global project inputs affecting all analyzed fixtures
 - Includes discount rate, sales tax rate, electricity rate, installation labor and vehicle rates, GHG emissions factor, and project overhead costs
- 2) Technology-specific inputs – section one
 - Input data for all fixtures/technologies, both old and new
 - Includes lamp and system watts, operating hours, fixture costs, disposal costs, rebates, and maintenance costs
- 3) Technology-specific inputs – section two
 - Impacted fixtures only; select fixture types and quantities to be removed and installed
- 4) User notes and scratchpad

Maintenance page (optional)

- ✓ Used to derive maintenance costs, if not known on a \$/unit/month basis
- ✓ Provides ability to obtain very detailed estimate of maintenance costs for each technology or fixture type examined
- ✓ Captures labor, vehicle and equipment costs
- ✓ Scheduled maintenance
 - Lamp
 - Controls
 - Fixture
 - Cleaning
- ✓ Emergency (unplanned) maintenance
 - Lamp
 - Controls
 - Fixture

Resources – Financial Analysis Tool

Results summary: positive NPV

# of Fixtures Installed	41,000
Implementation Period (years)	4

Analysis Period	15
-----------------	----

Simple Payback (years)	6.0
15-Year Unlevered IRR	28.01%
15-Year Unlevered NPV (\$)	\$ 20,945,750
15-Year Capital Expenditure (\$)	\$ 19,006,083
15-Year Cap. Ex. \$/kWh Saved	\$ 0.1067
15-Year Cap. Ex. \$/ton CO ₂ e Saved	\$ 181.8635

Annual kWh Savings	13,199,130
Annual Energy Cost Savings (\$)	\$ 857,943
Annual GHG Savings (tCO ₂ e)	7,741
Old Baseline Annual kWh Use	25,769,730
Old Baseline Annual Energy Cost (\$)	\$ 1,675,032
Old Baseline Annual GHGs (tCO ₂ e)	15,114
New Baseline Annual kWh Use	12,570,600
New Baseline Annual Energy Cost (\$)	\$ 817,089
New Baseline Annual GHGs (tCO ₂ e)	7,373

First-Year Avg. Capital Expend. per Unit (\$)	\$ 481
First-Year Avg. Material Cost per Unit (\$)	\$ 300
First-Year Avg. Labor Cost per Unit (\$)	\$ 107
First-Year Avg. Vehicle Cost per Unit (\$)	\$ 40
First-Year Avg. Disposal Cost per Unit (\$)	\$ 5
First-Year Avg. Overhead Cost per Unit (\$)	\$ 29

Over 15 years, NPV of nearly \$21M

Simple payback of 6.0 years



Savings and “New Baseline” values in this section are at time of full implementation of the project (4 years, in this example’s case)

Resources – Newsletter, Case Studies



THE LIGHT POST
Official MSSLC E-Newsletter

March, 2013 Volume 2, Number 3

In This Issue

- Director's Update
- LED Street Lighting in Vermont
- Consortium Webcast Re-cap
- LED Street Lighting in the News
- Upcoming Consortium Events
- Consortium Director: Edward Smalley, Seattle City Light
- To have your LED project featured in THE LIGHT POST contact us at: MSSLC@Seattle.gov
- Committees:
- Executive Committee: Edward Smalley, Seattle City Light; Ghaneshwar Patel, New York City Street Lighting Division; Tad Ruckman, Portland Ore. Traffic Signal & Street Lighting; Michael Stevens, Georgia Power; Ed Ibrahimian, Los Angeles Bureau of

Top of The Light Post-Director's Update

While the Consortium's central focus is to provide technical assistance to municipalities, status and utilization as LED street lighting programs are considered, most LED street lighting installations have occurred at the municipal level. It is encouraging to hear that there is significant activity at the state level to convert the roadway luminaires of state highways to LED. The most recent examples include the California Department of Transportation's (CALTRANS) purchase and installation of 42,000 roadway LED units, the Washington State Department of Transportation's (WSDOT) announcement of an LED roadway project on U.S. Highway 101, the Florida Department of Transportation's (FDOT) LED installation on U.S. Highway 98, the Colorado Department of Transportation closed its bid process on March 12 for the purchase of approximately 10,000 LED streetlight fixtures for installation over the next three years, and the Alaska Department of Transportation has plans to install 800 LED streetlights in Fairbanks by this summer.

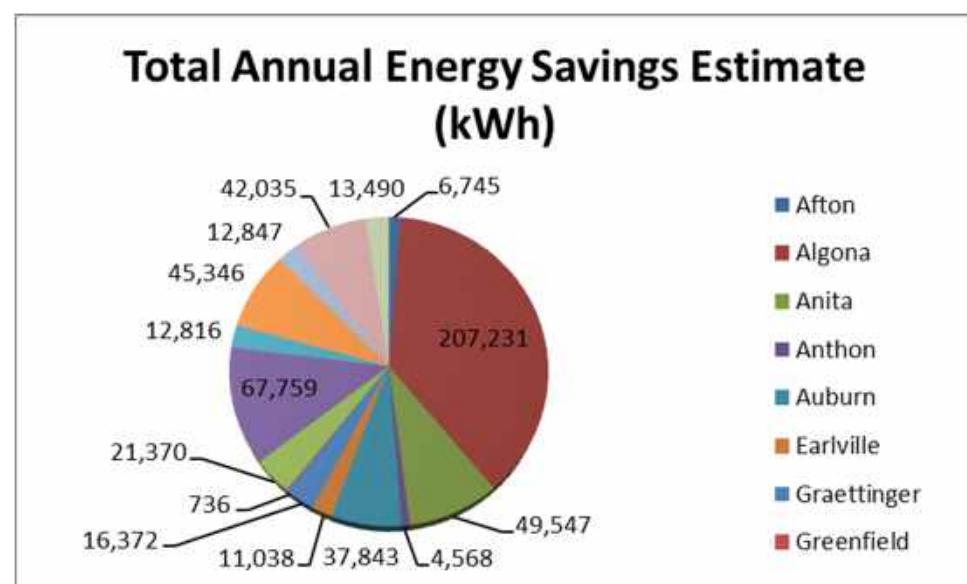
WSDOT plans to install 88 LED roadway luminaires on the Black Lake Boulevard interchange in Olympia with estimated annual energy savings of 1.7 million kWh and \$75,000 in annual operation and maintenance costs. The Florida Department of Transportation has partnered with Santa Rosa County to install approximately 800 LED roadway luminaires on U.S. Highway 98. Read more about the WSDOT and FDOT programs below in "LED Street Lighting in the News."

Also, in April 2012, CALTRANS began its program of converting 67,000 fixtures to LED roadway luminaires over a two-year period with estimated energy savings of 50 percent.

The earliest of state highway installations was the I-35W Bridge in Minneapolis, Minnesota that featured LED roadway lighting on the main span of this interstate. Phase 1 of this project went online in 2008 and provided the first glimpse of how effective this technology could be in that highly challenging environment. Phase 2, involving long-term monitoring of the LED lighting is expected to yield valuable information on lumen depreciation, physical effects, and performance impacts over time. Look for updates on this installation later this year.

Together, these projects illustrate how the slow initial adoption at the state level is starting to rapidly resemble what's happening on the municipal level. As technology improves, fixture cost continues to decrease and state governments continue to identify efficiencies, perhaps other states will follow the lead of California, Washington, Florida, Colorado, Minnesota and Alaska and state-level installations will gain the momentum experienced on the municipal level.

Case Study: Iowa Association of Municipal Utilities Energy Savings Estimate



2013 Events

Webinars:

1. March 6, 2013 - Successful Selection of LED Streetlight Luminaire: Optimizing Illumination and Economic Performance
2. May 8, 2013 – Member Case Studies: LED Street Lighting Programs
 - Algona (IA), Asheville (NC), Boston (MA)
3. Adaptive Street Lighting Controls
 - June 11, 2013 – Part 1: Experiences and Benefits
 - June 12, 2013 – Part 2: Reviewing the Consortium’s Model Specification
4. July 24, 2013 – Adapting the MSSLC Specification for LED Roadway Luminaires
5. September 18, 2013 – City of Los Angeles Case Study – over 140,000 converted!
6. TBD - Investor Owned Utilities and LED Street Lighting: Making the Case
7. TBD - Maintenance Practices: Lessons Learned From the Field

Download past events presentation: www.ssl.energy.gov/consortium.html

Upcoming Activities - Inventory

U.S. National Street Lighting Inventory

- Quantify size of U.S. street lighting system
- Document energy usage
- Identify ownership & maintenance models
- Establish benchmarks
- Provide basis for national and local fiscal evaluation

National Street Lighting Inventory
 Tell us About the Publicly Funded Street, Roadway and Area Lights in your System

5. Name of power provider (if not respondent)

6. Number of Publicly Funded Lights owned/responsible for in your jurisdiction/service territory? (The lighting system)
 Street/Roadway Lights
 Area Lights

7. If not certain about #6 above, can an estimate of the number of lights in the lighting system be provided?
 Street/Roadway Lights
 Please choose estimate range from drop-down menu

8. What percentage of the lighting system is MAINTAINED by the following?

Your Organization (Respondent)	<input type="radio"/> 100%	<input type="radio"/> 75%	<input type="radio"/> 50%	<input type="radio"/> 25%	<input type="radio"/> 0%
Serving Utility - (If not respondent)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3rd Party Service Provider	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer (If not respondent - municipal/city/county/state/other)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. What percentage of the lighting system is OWNED by the following?

Your Organization (Respondent)	<input type="radio"/> 100%	<input type="radio"/> 75%	<input type="radio"/> 50%	<input type="radio"/> 25%	<input type="radio"/> 0%
Serving Utility - (If not respondent)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3rd Party Service Provider	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer (If not respondent - municipal/city/county/state/other)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. What is the total annual energy consumption (in kWh) of the lighting system?
 Annual kWh

11. What is the average age of the luminaires in the lighting system?
 1-10 years
 11-15 years
 16-20 years
 21-25 years

Upcoming Events

2013 Annual Meeting – September 11, 2013, Phoenix, AZ

To be held in conjunction with the IES 2013 Street and Area Lighting Conference

- City of Phoenix Case Study
- NYC Future of Lighting
- Consortium Tools Tutorial

<http://www.ies.org/salc/>



The screenshot shows the IES website with a yellow header bar. The header includes the IES logo, the Illuminating Engineering Society name, a 'Become a member' button, a 'Member login' field, and a search bar. Below the header, there's a navigation menu with links for About, Education, Bookstore, Awards, Members, and a search bar. The main content area features a banner for the '2013 IES Street and Area Lighting Conference' at the 'Marriott Desert Ridge Hotel Phoenix, AZ' from 'September 8 - 11, 2013'. To the right of the banner is a cartoon lizard. Below the banner, there's a 'Welcome to the SALC Conference Website' message and information about the conference. On the left side of the main content area, there's a sidebar with sections for 'Announcements' and 'Meetings Schedule'. The 'Meetings Schedule' section includes a link to the '2013 LIGHTFAIR International Committee Meetings Schedule'.



More information

Questions...?

www.ssl.energy.gov/consortium.html

MSSL@Seattle.gov | Office: 206-733-9945

Municipal Solid-State
STREET LIGHTING
CONSORTIUM

Join Us
for those buying, using,
or considering LED
street and area lighting

Participate
for those manufacturing
or distributing LED street
and area lighting products

[Main Consortium Page](#)

[Join the Consortium](#) 

[Outdoor Lighting Resources](#)

[Consortium Charter](#) 

[Consortium Fact Sheet](#) 

[Guidelines for Manufacturers and
Distributors](#)

[Consortium Participant List](#) 



THE LIGHT POST
The Official MSSL Consortium

Volume 1, Number 4

In This Issue

- Director's Message
- The LED Streetlight Consortium in Iowa
- Have you used Consortium Resources? We Want to Hear From You!
- Practical Planning and Identification Workshops
- LEDs in the News

Consortium Director
Edward Gossney
Seattle City Light

To have your LED project featured in THE LIGHT POST contact matts@sslenergy.org

Consortium Committees

- Executive Committee
- Edward Gossney, Seattle City Light
 - Michael R. Bialek, New York City Board of Education
 - Mike Doherty, Northeast Utilities
 - Mike Farnsworth, Oregon Power
 - Ed Grullien, Long Island Power Authority
 - Michael Johnson, Center for Infrastructure Based Safety Research
 - Bill Kuchman, IEEE
 - Michael Litzkow, Philips Electronics
 - Paul McNamee, E.ON Energy Research Center
 - Steve O'Neil, GE
 - Bill Wilson, PECI Group

Consultants

- Matt Williams, E.ON Energy Research Center
- Michael P. O'Neil, GE

Top of The Light Post—Director's Update

The results from the LED (E3) GATEWAY demonstration in Philadelphia have been released! The results from the demonstration show that the energy savings from E3 LED streetlights—each demonstration site features a different set of conditions.

The Consortium is dedicated to increasing general market level of knowledge in the proper selection and application of LED streetlights and to providing a forum where buyers and manufacturers can share information and learn from the experiences of others. In this sense, the Consortium is a learning organization. One way the Consortium continues to gather knowledge and data is through the GATEWAY demonstration sites. The Consortium has selected four sites to demonstrate one LED product with the resultant technology in that location in an effort to provide the necessary technical information to assist in the evaluation of LEDs for a particular application. A number of GATEWAY projects have convened during Spring/Summer.

In fact, the Philadelphia demonstration found that the lumens efficiency (LPE) of the LED luminaires was higher than that of the HPS units they replaced. Furthermore, all of the LED luminaires had reduced color rendering and offered a higher CCT. The LED luminaires initially matched the delivered illumination levels of the baseline HPS units while producing fewer lumens to their target areas per unit of power consumed, achieving 40% to 45% less power use while providing more uniform illumination.

Unfortunately, savings cost savings for the demonstration cannot yet be calculated, as the City of Philadelphia has yet to reach an agreement with the local utility as to a new tariff for LED street lighting. Preliminary calculations indicate that it is unlikely that energy cost savings alone would result in a reasonable payback period; however, savings in maintenance costs and labor costs could make the LED solution cost effective. To read about the Philadelphia demonstration and all other GATEWAY demonstrations in greater detail, click [here](#).

Draft Model Specification for Adaptive Control and Remote Monitoring of LED Streetlight Luminaires
The public comment period for the Consortium's Draft Model Specification for Adaptive Control concluded on October 26. Thank you to all who took the time to provide comments to help make the Model Specification a high-quality document. In the coming months, stay tuned for updates on the development of the Model Specification.

Kind regards,

Edward Gossney
Director, Municipal Solid-State Street Lighting Consortium