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

Public Street and Area Lighting Inventory Phase 1: Survey Results

Municipal Solid-State Street Lighting Consortium

Prepared for the U.S. Department of Energy

September 2014

The Municipal Solid-State Street Lighting Consortium Public Outdoor Lighting Inventory:

Phase 1: Survey Results

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September 2014

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the U.S. Department of Energy
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Preface

This document presents the results of a voluntary web-based inventory survey of public street and area lighting across the United States undertaken during the latter half of 2013. The results are compiled and reported largely as they were provided by survey respondents, with minimal correction only where there was an obvious typographical error or where so many portions of a response were blank it was unusable. On average, ~240 responses were received for each question and these responses comprise most of underlying data for this report (though the responses to any individual question may have been higher or lower). Although some follow-up was pursued for clarification of individual responses, resource limitations precluded doing so in every instance and the data has thereby been largely accepted as given. Public street and area lighting is provided by thousands of jurisdictions across the nation, with a variety of ownership, maintenance, and operation structures. There is no central or comprehensive source of data on the number, type, age, distribution, or usage of public street and area lights. This survey attempts to access this information in a "bottom-up" manner, going directly to owners and operators. Adding to previous "top-down" estimates, the survey is intended to improve understanding of the role of public outdoor lighting in national energy use.

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Introduction

There is limited understanding of aggregate quantities and characteristics of public street and area lighting installations across the United States, despite the fact that associated expenditures on electricity can be a significant component of municipal energy budgets, frequently accounting for up to or even exceeding half (e.g., see Figure 1.) Nevertheless, a growing number of municipalities and other government agencies are recognizing high performance street and outdoor lighting as a means to save energy and money, and reduce associated carbon emissions.[1]

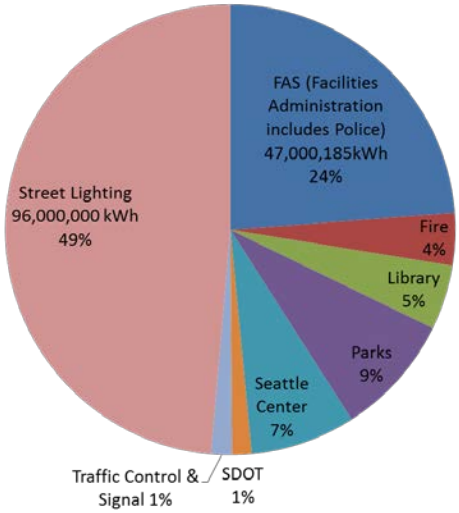

Figure 1. Energy budget for Seattle, pre-LED program.

The Municipal Solid-State Street Lighting Consortium (MSSLC) had noted the insufficient availability of data on public exterior lighting in 2013, and in response conducted a voluntary inventory survey of owners/operators of publicly funded street and area lighting to develop an improved picture of the technologies and ownership and maintenance models used. Target facilities included lights owned and operated by publicly and privately held utilities; incorporated municipalities; federal, state, and local governments; and other publicly funded outdoor lights. The responses received through December 2013 comprise the initial sample presented in this report.

Previous estimates have contained widely varying ranges of street and roadway lights in the United States.[2] Some variations are due to the categories included. Street and roadway lights may be counted separately from outdoor area (such as parking lot) lighting; some estimates combine public and privately owned lighting, while others address only public lighting. Typically, these estimates are produced using means other than a direct survey of lighting owners. In contrast, the relatively large sample of the MSSLC inventory survey was specifically designed to produce a more robust estimate of the national total. (Statistically extrapolated estimates of the national totals will be the focus of the second phase of this effort, as discussed later in this document.)

[1] For example, see the White House announcement of the High Performance Outdoor Lighting Accelerator, about one-third of the way down this page: http://www.whitehouse.gov/the-press-office/2014/05/09/fact-sheet-president-obama-announces-commitments-and-executive-actions-a.

[2] For example, the "2010 U.S. Lighting Market Characterization" report (http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/2010-lmc-final-jan-2012.pdf) from January 2012 estimated the street and roadway lighting population at about 45 million, whereas the "Energy Savings Estimates of Light Emitting Diodes in Niche Lighting Applications," October 2008, report (http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/nichefinalreport_october2008.pdf) listed an estimated installed base of 34.7 million street lighting fixtures. The latter report also estimated a total installed base of street and area lights in the United States (including privately owned) of about 131 million.

Inventory Goals

- Establish a more data-based estimate of the size and makeup of the nation's publically funded street and area lighting inventory
- Develop a clearer picture of street lighting ownership models used among public and private stakeholders
- Develop an improved estimate of national energy use in street and outdoor area lighting.

Methodology

The MSSLC had attempted to conduct an earlier inventory survey that requested very detailed information (e.g., installed quantities divided by source type and wattage) from its membership. The survey was circulated as a spreadsheet that members were asked to fill out. The response rate to this first attempt was very low. The current, second attempt consolidated and simplified questions and improved the ease of responding so that inputs could largely be provided quickly with data readily at hand (e.g., from aggregate billing data and generalized knowledge about the lighting system). Although losing some specific detail from the original survey was unfortunate, it was deemed worthwhile because a much greater response was expected.

A voluntary online questionnaire was designed, comprising about 20 questions that pertained to various aspects of the outdoor lighting systems (see Appendix A: Inventory Questionnaire Template). Interested respondents were directed to the survey website, where they input information regarding the public exterior lighting that their organization owns, operates, and/or maintains. Responses were accepted over a 6-month period between July and December 2013, and were solicited directly and indirectly through phone calls, emails, and personal communication. Professional associations such as the American Public Power Association, Institute of Transportation Engineers, and state and city leagues assisted these efforts by distributing the inventory to their respective members.

Results

The second survey received more than 330 responses, although not all were complete or usable for various reasons. Overall, usable inputs from an average of about 240 organizations underlie the results reported in the inventory, with the precise number of responses varying in the case of any individual question.

Respondents

The breakdown of these ~240 responses include inputs from about 148 municipalities, 14 counties, 34 state departments of transportation (DOTs), 17 investor-owned utilities (IOUs), 32 municipally owned utilities (MOUs), and 1 categorized as "Other"[3] (see Figure 2). Although the respondents were self-selected and therefore do not represent a random sample, responses were received from across the country (Figure 3) and encompass small, medium, and large populations and utility service territories. The total human population represented by just the 147 municipalities responding to the survey amounts to nearly 50 million, corresponding to more than 25% of the total municipal (non-rural) population in the United States in 2010. Coincidentally, the number of customers represented by the combined IOU service territories also amounts to roughly 50 million, after subtracting the ~10% overlap between IOU survey submissions and municipalities within those territories that also responded.

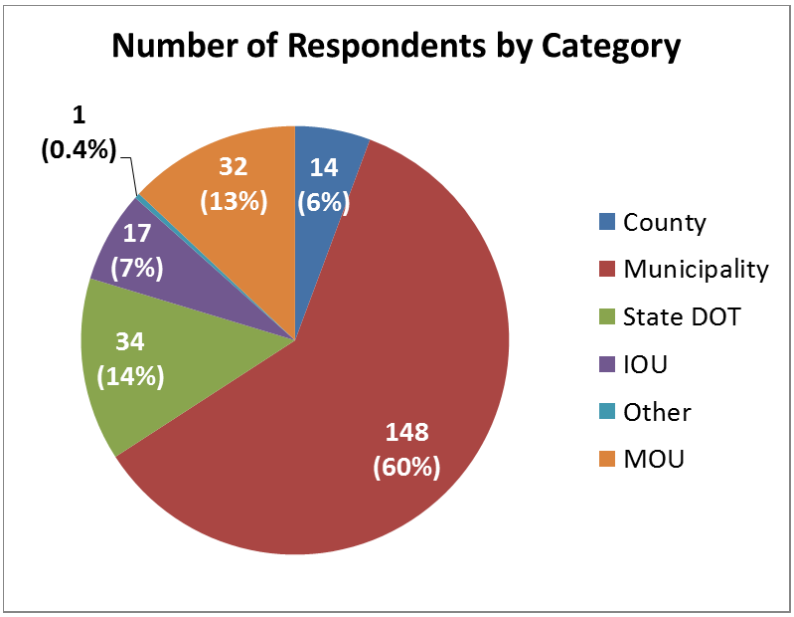

Figure 2. Breakdown of survey respondents.

[3] "Other" includes owners who felt they did not fit neatly into one of the existing categories. Originally, eight respondents classified themselves in this manner, but seven of those were incorporated into existing categories post-response. The remaining response was from a public utility district.

Figure 3. Locations of survey respondents; background shading refers to state DOT response.

Number of Luminaires

Respondents were prompted to provide the total number of public street and area luminaires within their jurisdictions. The corresponding total accounted for by the sample respondents equals about 11 million. Of this total, IOUs accounted for more than 50% and municipalities about 16%, with the balance among the other respondent categories (see Figure 4). An overlap of about 1.3 million luminaires resulted from reporting by both IOUs and municipalities located within their associated service territories; these were separated and are included under IOUs in the chart. The number of luminaires per respondent, along with their locations, are mapped in Figure 5.

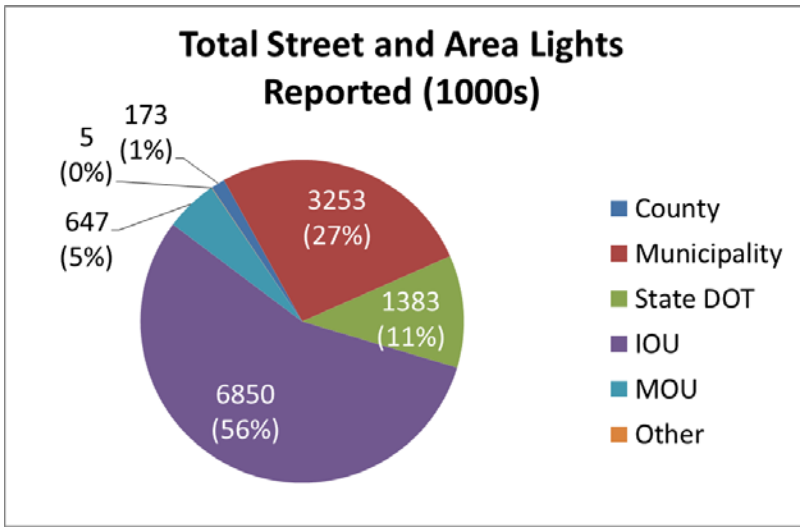

Figure 4. Numbers of street and area lights reported by category of respondent, in thousands.

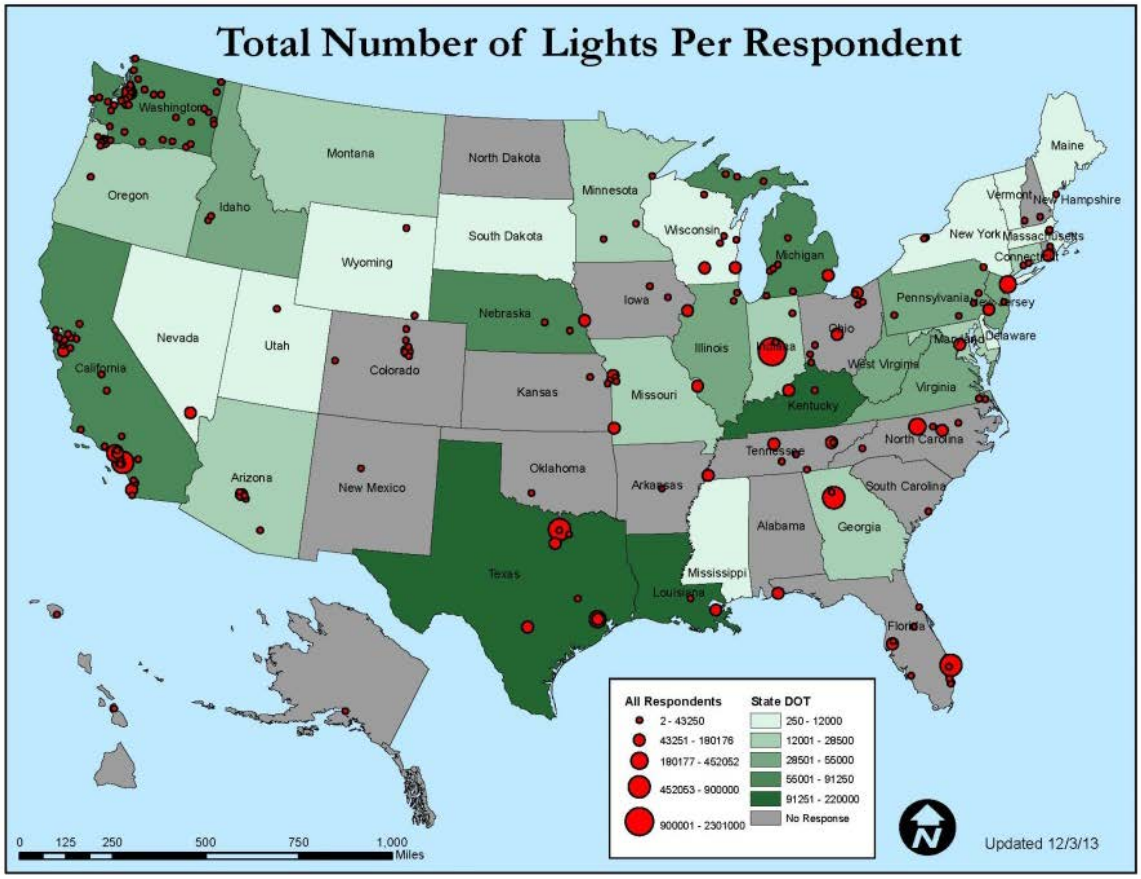

Figure 5. Total number of luminaires reported by location of respondent; background shading refers to state DOT response.

Source Technologies

Respondents were asked to provide details on the types of lighting technology currently deployed in their systems. As expected, high-pressure sodium (HPS) is the most widely used outdoor lighting technology by a significant margin, with 86% of those responding (n=247) indicating some use of HPS somewhere in their system and 82% (of n=200) indicating it is the most prominent technology. Interestingly, 62% of respondents (n=247) indicated use of light-emitting diode (LED) somewhere in their portfolio, while 8% (of n=200) even indicated LED was the most prominent and 30% (of n=187) listed it as the second most prominent technology. Table 1 provides further detail of these responses.

Table 1. Source technologies used and their prominence.

	Source Type Used? (Yes)	Most Prominent (%)*	2nd Most Prominent (%)*
High Intensity Discharge			
- High-Pressure Sodium	86%	82%	10%
- Metal Halide	51%	3%	34%
- Mercury Vapor	36%	3%	14%
- Plasma	1%	0%	1%
Low-Pressure Discharge			
- Fluorescent	11%	2%	1%
- Induction	19%	1%	4%
- Low Pressure Sodium	8%	3%	2%
Incandescent			
- Standard Incandescent	13%	0%	3%
- Halogen	3%	0%	1%
Other			
- LED	62%	8%	30%
Total number who answered question (n)	247	200	187

* Values may not sum exactly to 100% due to rounding.

An interesting finding in the results is the amount of continued operation of older source technologies. For example, 53% of participating IOUs (9 of 17 respondents) indicated ongoing use of mercury vapor (MV) lights, comprising 9.6% of the reported total inventory (specifically, about 654 thousand MV lights remaining in the total reported IOU inventory of 6.85 million), and 32% of municipalities (47 of 148 respondents) who indicated ongoing use, comprising 6.9% of the reported inventory (about 120 thousand lights out of 1.7 million reported, see Table 2). MV lights are of particular interest from a potential energy savings standpoint, being much less efficient than HPS, and the results of the survey indicate a substantial amount of energy remains to be saved by replacing MV lights with modern,

higher-performance lighting.[4] Figure 6 displays the locations and numbers of remaining MV lights, as reported in the survey.

Table 2 provides greater detail on the use of MV lights, as well as metal halide (MH) lights. These were the only two source technologies for which a detailed breakdown was collected in this survey.[5]

Table 2. Number of responses for MV and MH fixtures and quantities reported (1000s).

	Number of Responses	Total # Lights (1000 units)	Number of Responses	MV* (1000 units)	Number of Responses	MH* (1000 units)
County	14	358	2	0.4	2	0.2
Municipality	148	1737	47	120	63	72
State DOT	34	1383	19	7.4	19	17
IOU	17	6850	9	654	14	329
MOU	32	630	11	6.5	17	12
Total	**245**	**10958**	**88**	**788**	**115**	**430**

* Totals may not sum exactly due to rounding.

[4] For example, during an MSSLC webinar in April 2014, the City of Boston reported energy savings that exceeded 85% from the replacement of existing shoebox MV streetlights with LED products. See http://www1.eere.energy.gov/buildings/ssl/streetlight-maintenance-webinar_4-14-2014.html.

[5] As noted previously, an earlier attempt to collect similar estimates across all source types met with a very low response.

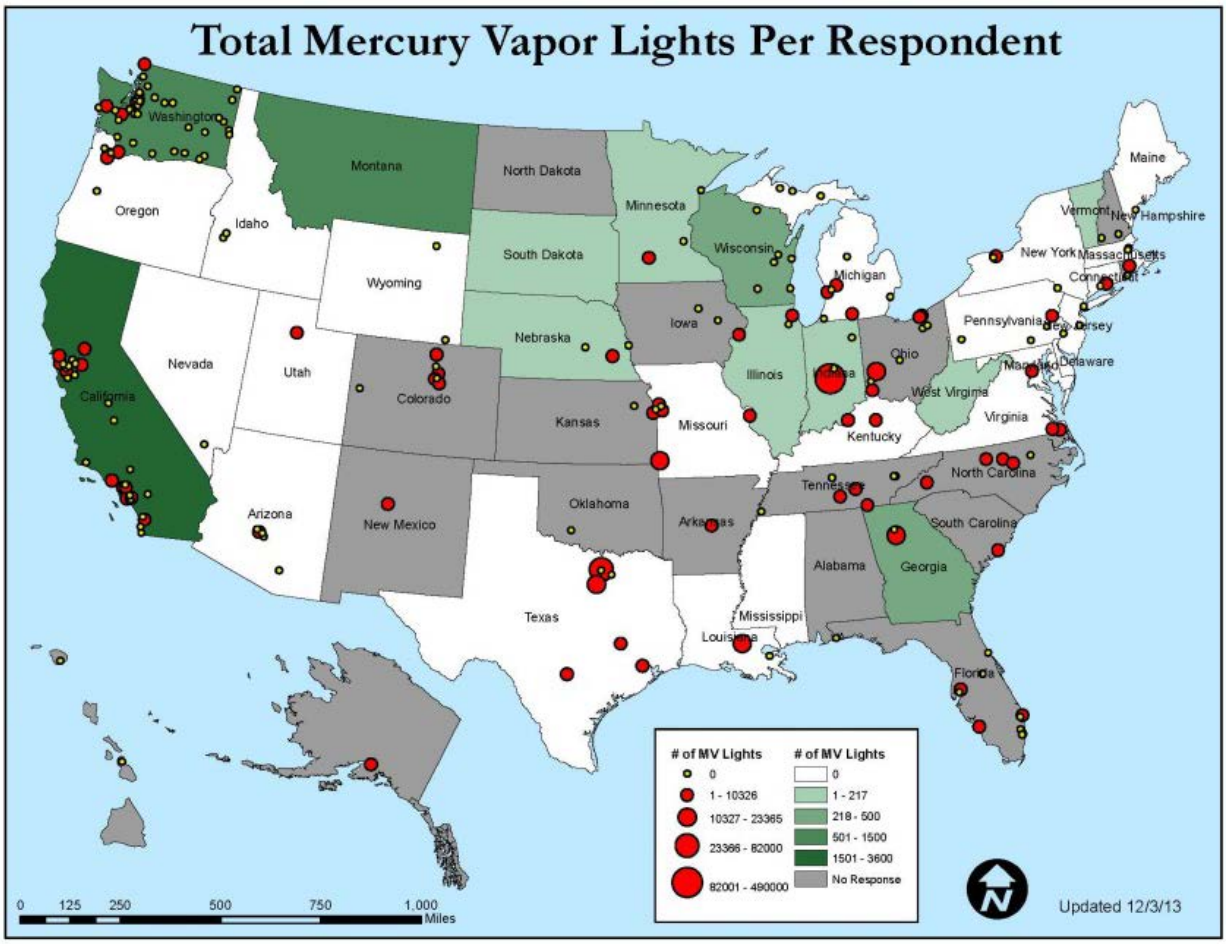

Figure 6. Mercury vapor lights reported by survey respondents; background shading refers to state DOT response.

Electricity Use and Costs

The survey requested estimates of both delivered electric energy use and system operating costs. Direct responses to the energy usage question on the inventory (n=137) amounted to 5.7 billion kWh annually. Total electricity costs estimated in the sample (n=130) exceed $330 million, while costs for operation and maintenance (n=117) are more than $220 million. Note that these numbers exclude the corresponding values from respondents who did not answer the question; no attempt has yet been made to extrapolate costs across such respondents. For those who did respond to the questions, the average reported annual costs *per light* were $96 in electricity and $72 in operations and maintenance.[6] Figure 7 displays the annual kilowatt-hours used by systems reported around the country.

[6] Averaged across all wattages, source technologies and energy rates among valid responses. Regarding the latter, a number of inputs appeared to contain order of magnitude errors and were discarded, but both average values reported here are based on more than 100 remaining responses.

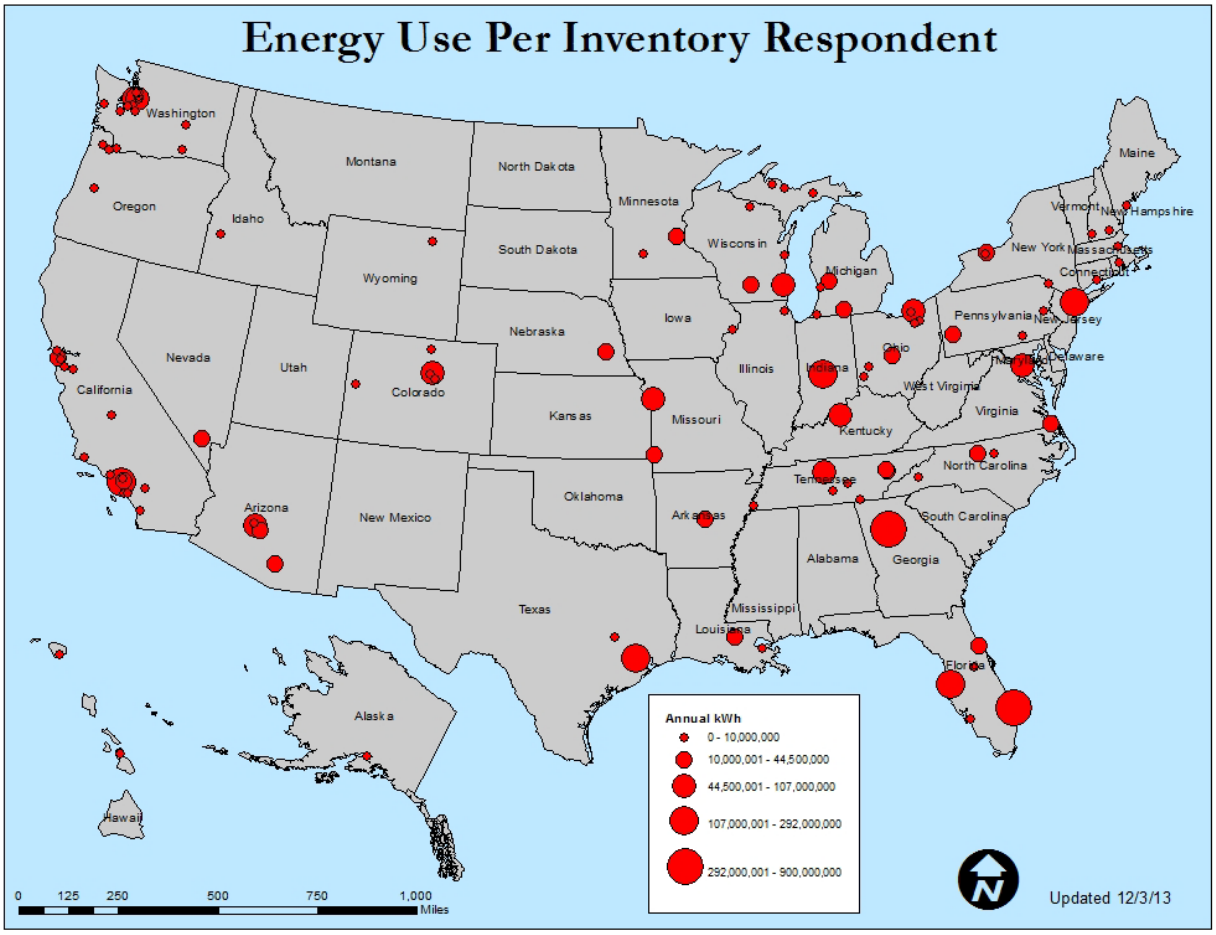

Figure 7. Annual total kilowatt-hours for street and area lights reported by respondent.

Ownership/Maintenance

Respondents were asked if their streetlights were 1) owned and 2) maintained by: a) their own organization, b) a serving utility, c) a third-party service provider, or d) a customer. Significant variability was found in the answers from municipalities and state DOT organizations, while much more uniformity appears to be the case among utilities (including both municipally owned and investor-owned). In the following graphics, MOU results are combined with those of municipalities.

The different spreads among municipally owned and maintained lighting systems and state DOT owned and maintained lighting systems are evident in Figure 8 through Figure 11. Figure 8, for example, shows that half of the responding municipalities own between 90% and 100% of their streetlights, while a third own almost none.

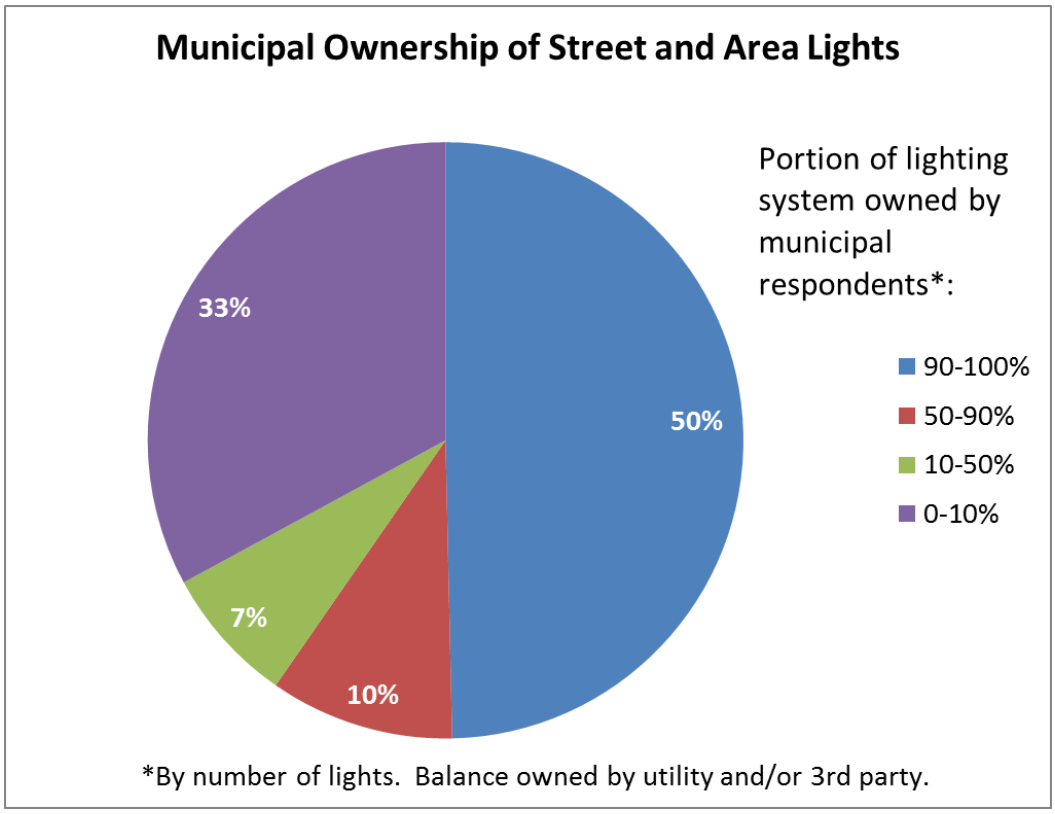

Figure 8. Ownership of street and area lighting systems reported by municipalities (n=146).

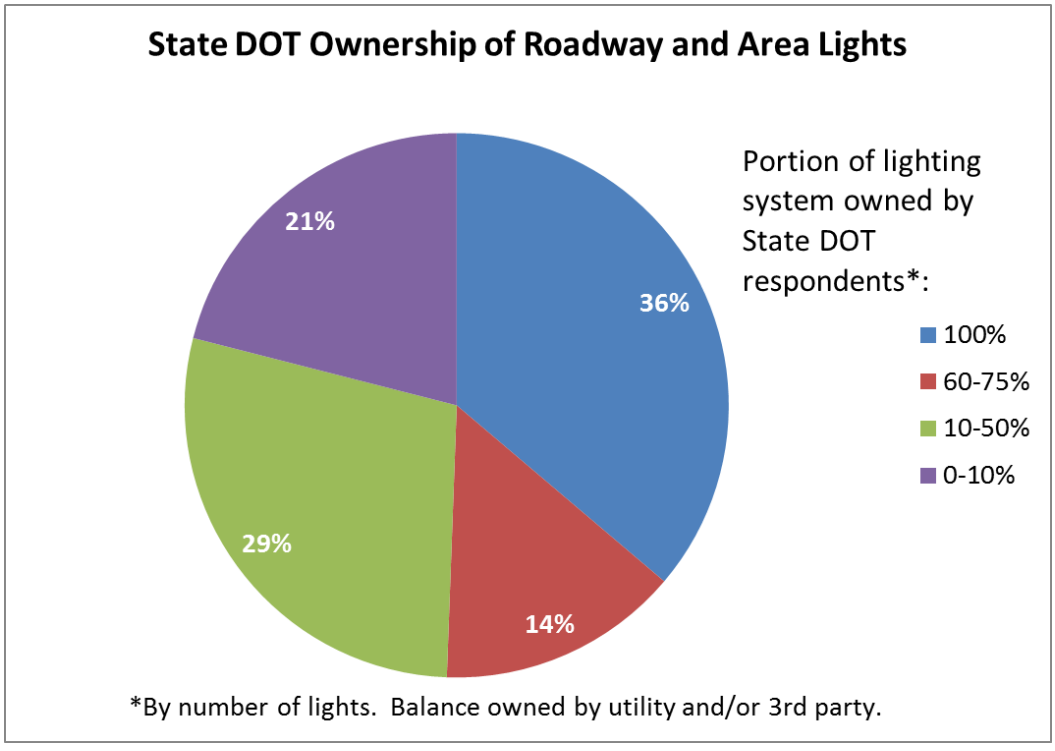

Figure 9. Ownership of roadway and area lighting systems reported by state DOTs (n=34)

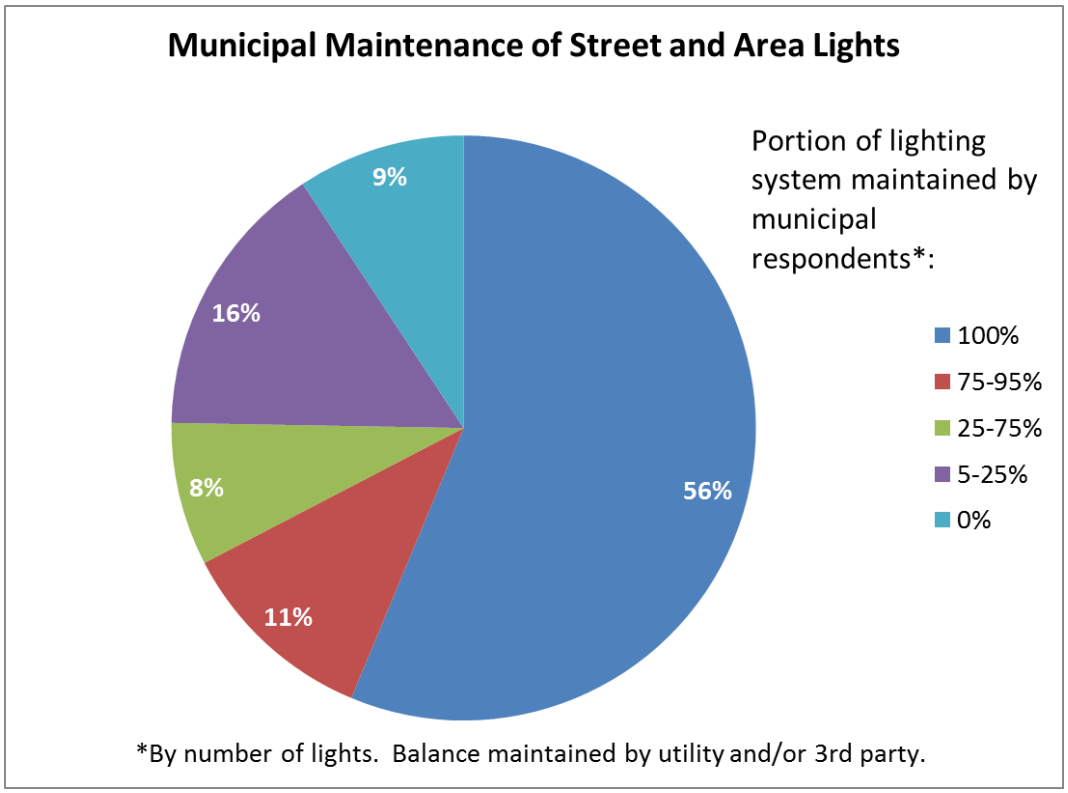

Figure 10. Maintenance of street and area lighting reported by municipalities (n=146).

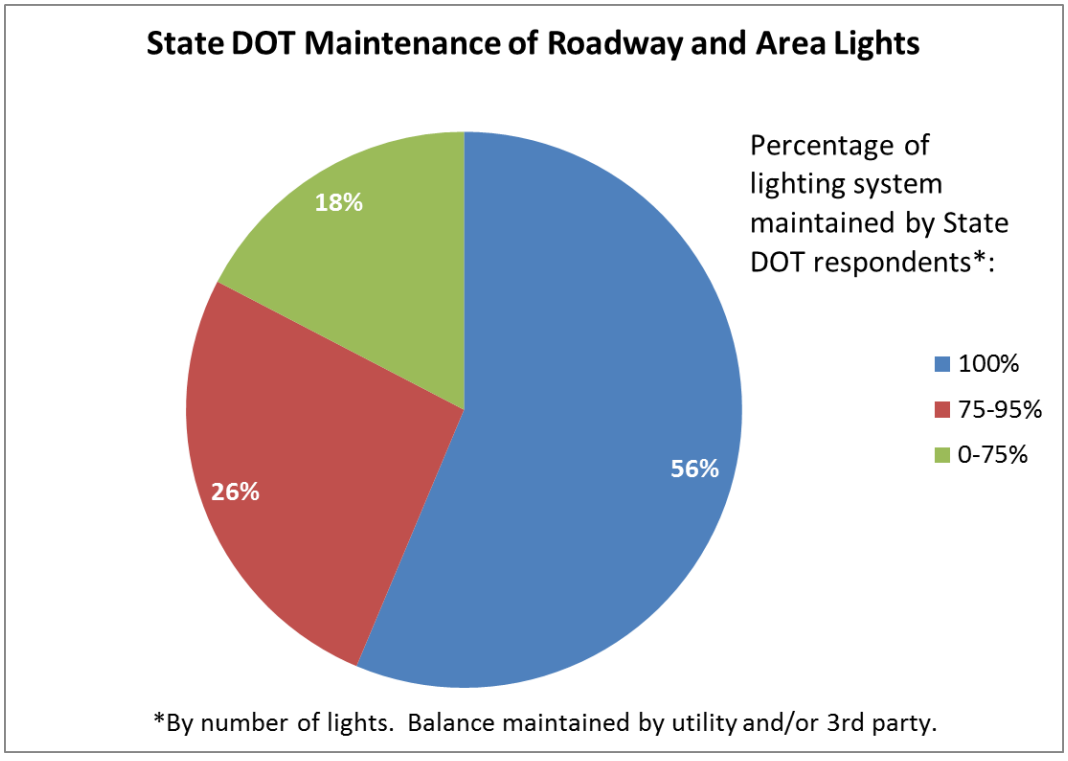

Figure 11. Maintenance of roadway and area lighting reported by state DOTs (n=34).

As noted in each chart, the reported percentages are weighted using the total number of luminaires that fall into each category rather than by number of respondents.

In contrast to the municipal and state situations, relatively few investor-owned utilities responding to the survey owned and maintained less than 75% of the lights in their system, with the substantial majority owning and maintaining 100% (Figure 12 and Figure 13). Furthermore, based on evidence independent of this survey, maintenance of lights owned by others appears to be a situation that utilities are trending away from.[7]

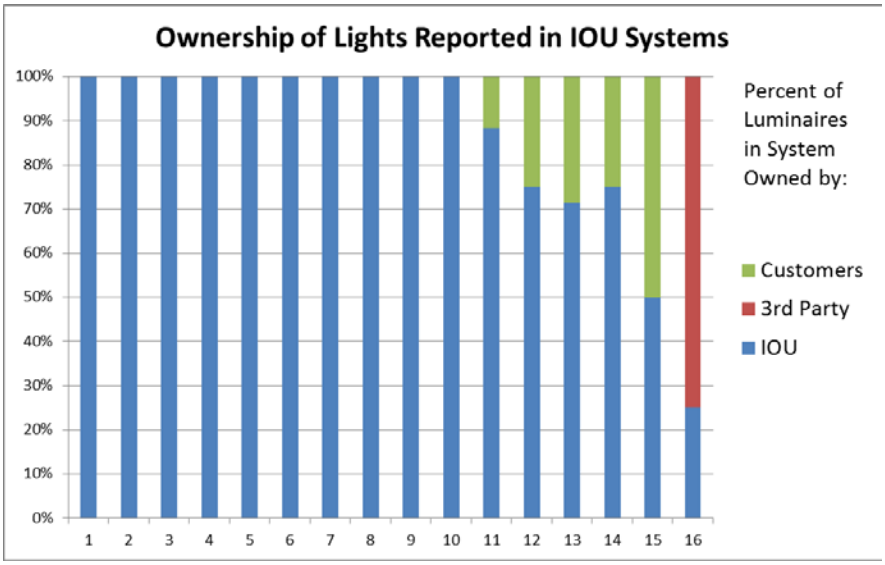

Figure 12. Ownership of IOU reported systems (n=16).

[7] For example, DTE Energy has closed this option to new customers since 2009. See the DTE Rate Book (https://www2.dteenergy.com/wps/wcm/connect/2ab3cd68-cf7b-4946-9a14-f9a8d62a20de/detroitEdisonTariff.pdf?MOD=AJPERES), page D-50. Portland General Electric has not offered maintenance on customer-owned equipment for some time, e.g., see the Schedule 91, Street and Highway Lighting Standard Service, http://www.portlandgeneral.com/our_company/corporate_info/regulatory_documents/pdfs/schedules/Sched_091.pdf), page 4.

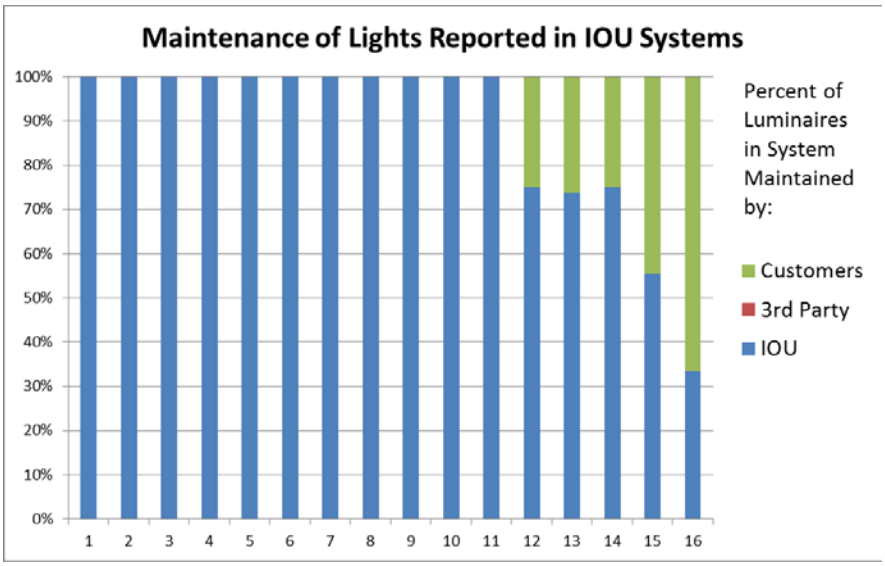

Figure 13. Maintenance of IOU reported systems (n=16).

Age of Luminaires

The age of a lighting system impacts light performance, energy usage, and maintenance requirements. Inventory data indicates that the average age of luminaires (weighted by number of luminaires) in the sample was 15.3 years and varies minimally between the different organization types, at least as reported. State DOTs reported the highest weighted average age among all responses, at 17.6 years. Figure 14 provides some detail on estimated system age by location.

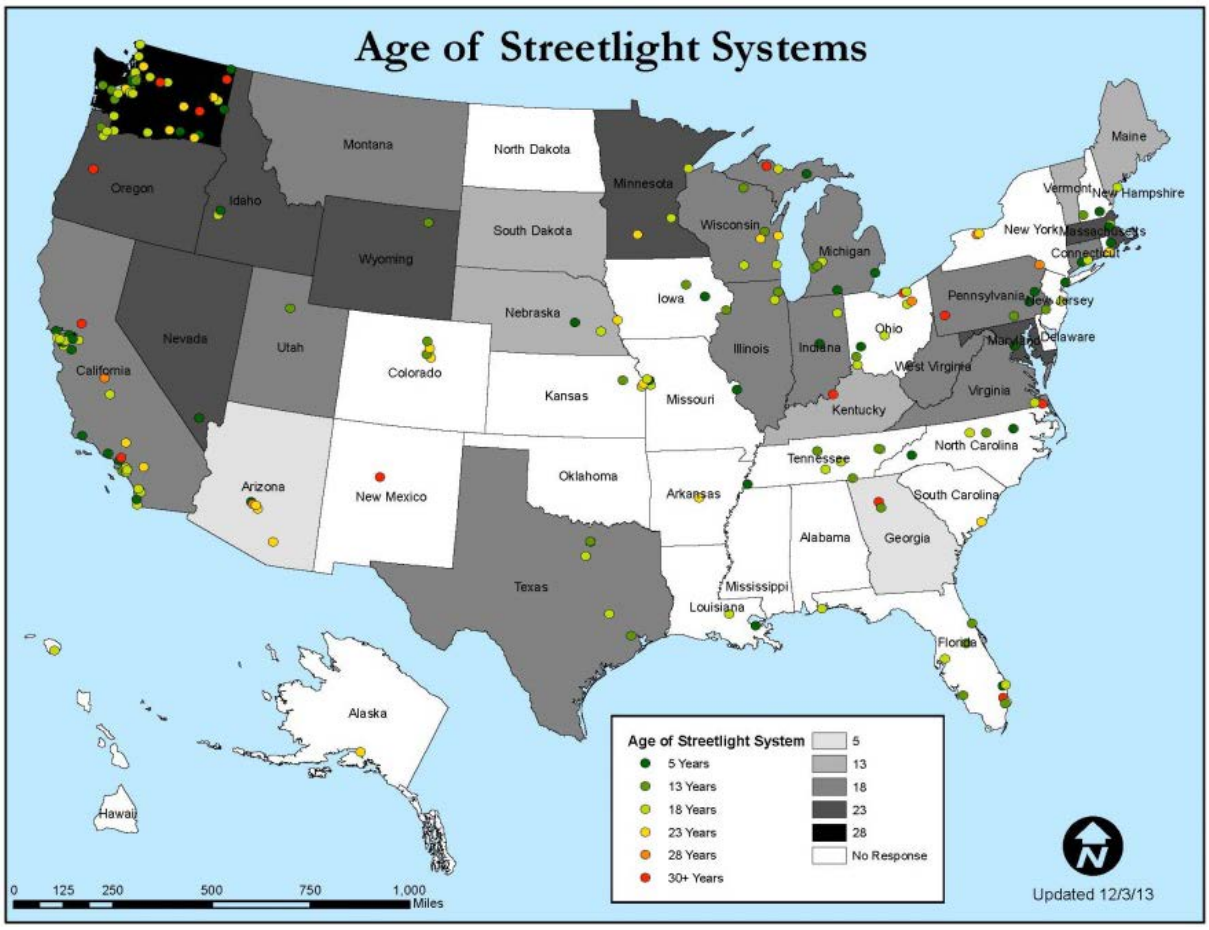

Figure 14. Reported average age of luminaires in streetlight systems; background shading refers to state DOT response.

Lighting Controls

Lighting controls enable varying degrees of functional management over the operation of lighting systems. Controls can vary in complexity from simple dusk-to-dawn timers or photoelectric sensors that simply turn an individual light off or on at a fixed setting, to expansive networked systems enabling adaptive control and remote monitoring of system operation. Whereas the simpler devices have been used for decades, more advanced controls (such as those enabling adaptive lighting, or communication with various accompanying sensors) are relatively recent and are not yet in widespread use. The corresponding deployment of various controls systems by survey respondents is illustrated in Figure 15. Use (or non-use) of each system is relatively consistent across organizational type. However, as the survey did not request further detail on level of use, the difference between a site conducting a small pilot of an advanced controls system versus a sitewide deployment of that system cannot be ascertained from the responses.

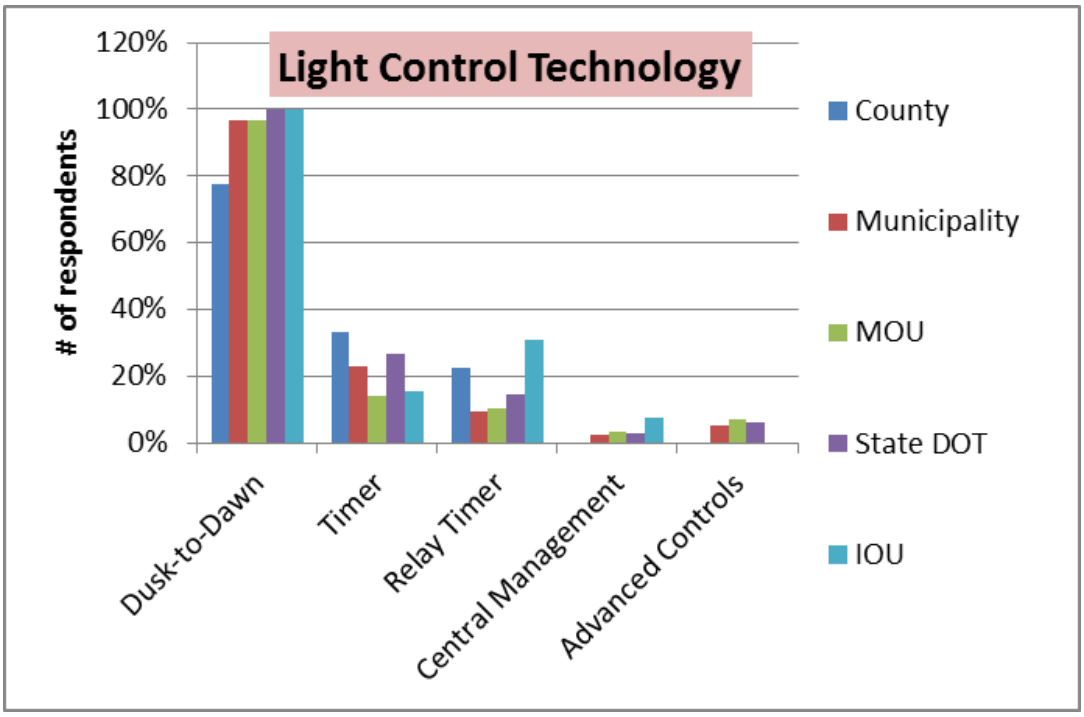

Figure 15. Reported use of various controls in street and area lighting systems (n=230).

Perhaps more telling with respect to the use of advanced controls, in particular, was the follow-up question pertaining to related future plans of the organization. Table 2 provides the corresponding responses.

Table 3. Current plans for future deployment of advanced controls.

If advanced outdoor lighting controls are planned, when do you plan to deploy?		
Answer Options	**Response Percent**	**Response Count**
Not Planned	64.8%	147
6-12 months	5.7%	13
1-3 years	15.9%	36
4-5 years	4.8%	11
5+ years	8.8%	20
	answered question	**227**

These responses are more subjective compared with other questions in the survey, but suggest a need for additional documentation/education on the benefits of advanced controls before their widespread implementation will commence.

Discussion and Data Assessment

The survey resulsts reveal a number of interesting facts. From an energy efficiency standpoint, perhaps the most notable is the significant remaining population of MV fixtures, a source technology that was invented more than 100 years ago.[8] Also interesting is the number of respondents indicating the average age of the luminaires in their system exceeds 30 years (indicated as red dots in Figure 14), many of which likely correspond to MV. As noted, the City of Boston demonstrated energy use reductions of more than 85% by replacing some of these older fixtures, so those remaining elsewhere are of particular interest for replacement.

The situation varies considerably around the country, however. Perhaps just as surprising were the 8% (of 200 respondents to the particular question) indicating that LED products are already the most prominent source technology in their street and area lighting inventory. Other large variations in the characteristics of ownership and maintenance of public lighting systems are also evident.

As previously noted, the ultimate intent of the survey is to produce a more "bottom-up" picture of the public street and area lighting inventory around the nation. Along these lines, some basic calculations and statistical analysis were performed on the survey data to investigate the robustness of the values obtained. Some of this was done early on to quickly identify outliers, such as calculated values that fell orders of magnitude outside of the norm (e.g., one useful check being the reported total annual kilowatt-hours divided by number of luminaires). In such cases, if an obvious data entry error was not present or could not be corrected through contact with the respondent, the values were excluded from further calculations.

A second, more illustrative check involved obtaining municipal population data from the 2010 census to determine how well the various reported data correlate with population. As it turns out, quite well: the data appear to be very linearly related (correlation = 0.9) with an R-squared value of 0.81, meaning that 81% of the variability in the number of reported luminaires is explained by the 2010 population. This level of correlation was a bit unexpected and further helps to identify outliers among the responses. Figure 16 plots the reported numbers of street and area lights for each responding municipality against its 2010 population according to Census records. A couple of quick observations are useful:

1. The solid gray line in the graphic represents a 1:1 ratio line, whereas the red line shows a linear model fit with error bands (reflecting 95% confidence intervals) and the blue is a LOESS smoothed fit, also with error bands. The smoothed line is very nearly linear, meaning that the relationship between municipal population and number of luminaires really does appear to be linear and is not significantly improved by using a smoothed fit.

2. There appears to be greater variability in towns with populations of less than a few thousand, suggesting that other variables begin to markedly influence the number of luminaires below some threshold.

[8] The more "modern" form still in use in exterior lighting was developed in the 1930s.

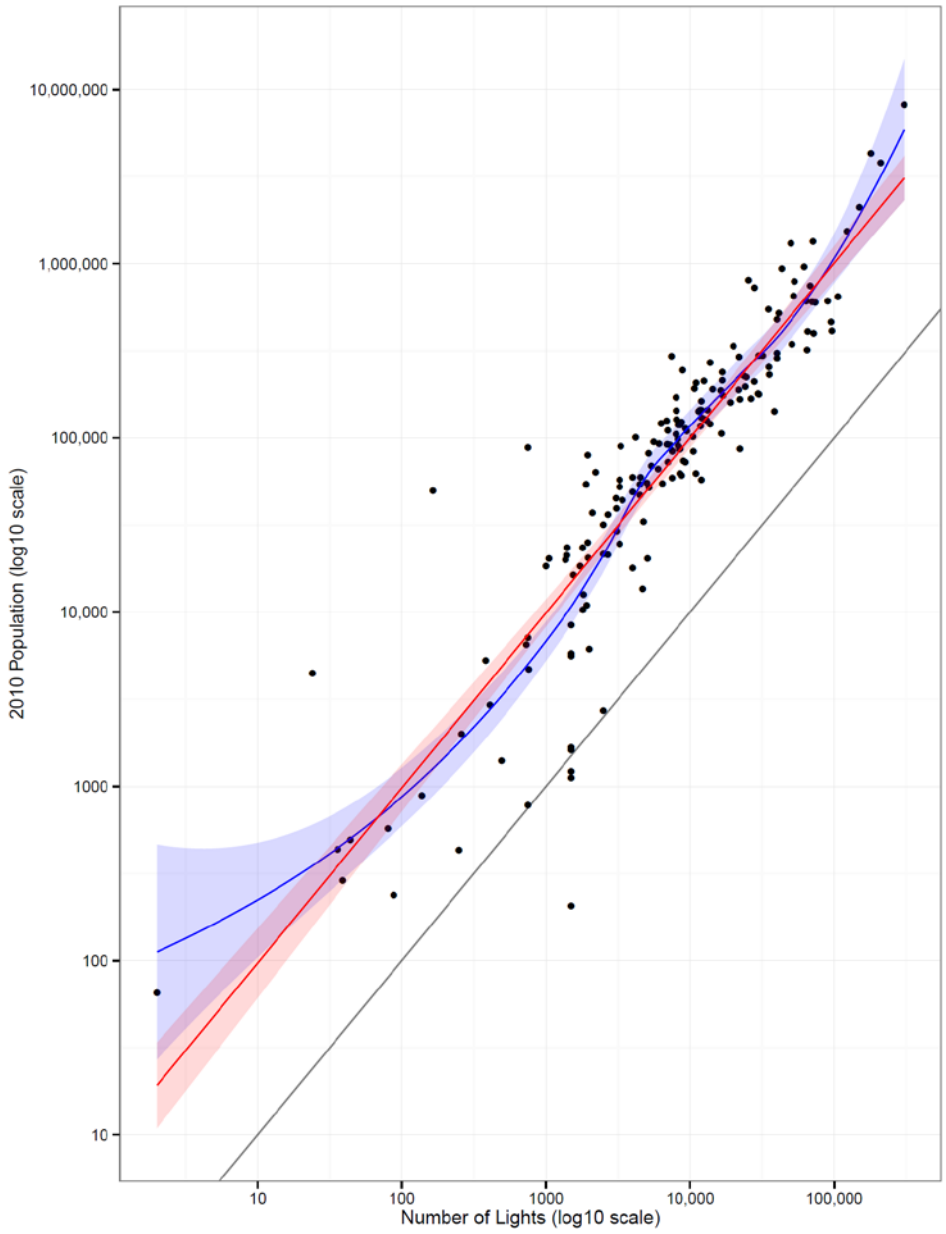

Figure 16. 2010 population of reporting municipalities vs. number of reported luminaires.

Figure 17 presents a histogram of the number of luminaires per capita, that again is surprisingly tight and normally distributed. Better understanding of this distribution may allow its potential use for estimating numbers of luminaires in similar municipalities (in terms of population density and other relevant factors) where that value is not known or at least not otherwise available.

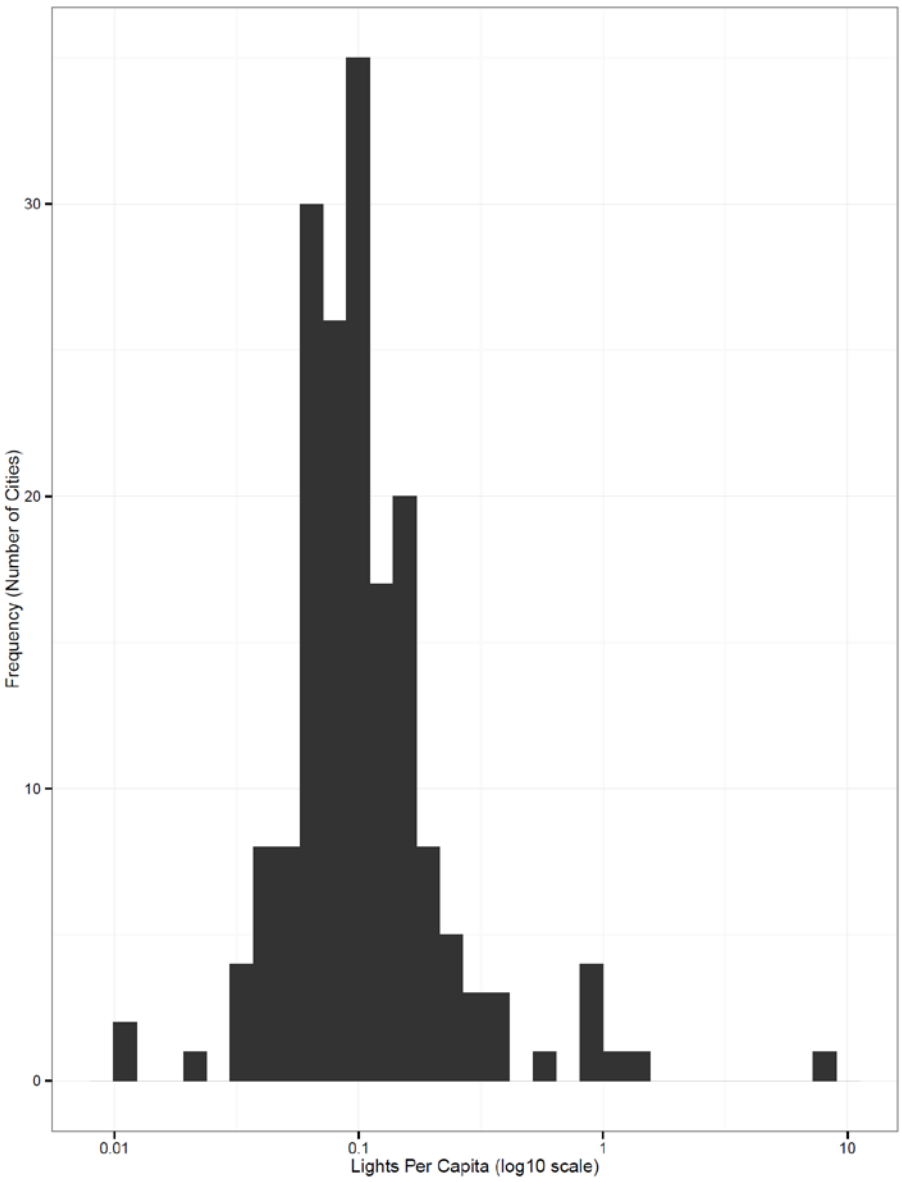

Figure 17. Reported lights per capita exhibits a well-defined normal distribution on a logarithmic scale.

Future Work

This first phase of the inventory study presents data that was directly reported by survey respondents and all results presented herein pertain directly to that data. Although the responding agencies represent a significant component of the U.S. population (approximately 49 million in the municipal component and about 50 million more in the combined customer base reported by the IOUs), many regions of the country are still absent from the information reported, including large regions containing major population centers, rural areas, and more than two-thirds of the U.S. population.

The next investigation planned is to determine whether extrapolation of the reported data is feasible to estimate some or all of the larger national inventory of public street and area lighting. Tremendous value could be derived from the ability to accurately predict such inventory in a region based on its human population and other relevant factors. Determining just which factors or combinations of them are relevant will be an important component of this effort. Particularly, as one moves beyond the municipal core, for example, factors such as population- and vehicle-density probably dominate in terms of how far street and area lighting extend outward (and thus also the associated quantity of luminaires under the given circumstances). These densities, in turn, must be highly influenced by the municipality's physical location, either within a larger metropolitan area or in a comparatively isolated region. At a more aggregate level, luminaire quantities in states with relatively low overall population densities may be driven more by highway-lane miles than by population, or by additional factors yet to be determined.

The favorable correlations and apparent robustness of much of the data obtained to this point suggest its use in such a predictive capacity is feasible and offers some significant potential benefit, if these other important correlating factors can be adequately quantified.

Appendix A: Inventory Questionnaire Template

National Street Lighting Inventory

The Municipal Solid-State Street Lighting Consortium (MSSLC) is currently developing an inventory of the nation's street and highway lighting systems, enabling the development of national and local policies and programs to support the implementation of LED streetlights, which will contribute to the nation's conservation efforts and energy security while providing financial benefits to end users. It is estimated the nation's streetlights consume the energy equivalent of 1.9 million households and cost $6-8 billion annually for energy and maintenance, yet conservation efforts in this segment have been limited. Participation by municipalities, utilities and other system owners in this inventory effort will help provide benchmark information needed to form national and local policies which could make local conversion to LED street lighting more attainable.

Current estimates indicate there are about 52.6 million public roadway lights nationwide, which includes 26.5 million streetlights and 26.1 million highway lights. MSSLC seeks to clarify the details of this number through this inventory to help identify the major opportunities for conservation efforts. In 2012, the U.S. Conference of Mayors recognized the conservation potential in this segment and adopted a resolution endorsing the nationwide use of LED street lighting. The national street lighting inventory hopes to capitalize on this momentum.

Inventory Goals

- To establish a more reliable number of the nation's street lighting inventory
- To develop a clearer picture of street lighting ownership models use among public and private owners
- To develop a clearer picture of how much energy the nation's streetlights use

Inventory Purpose - To determine the number of PUBLICLY FUNDED street, highway, and area lights that exist within the U.S. These are defined as:

- **Roadway Lights** - are divided into street lights and highway lights. Streetlights are considered those lights that illuminate local and collector roads, while highway lights illuminate interstates, freeways, and expressways.
- **Area Lights** - are those lights that illuminate various outdoor areas such as landscapes, walkways and common spaces. These areas may include parks, publicly funded parking lots and other outdoor areas.

Thank you for your assistance in providing your street lighting information for this effort. There are 20 total questions, with four of them being demographics. It is estimated this will take 12-15 minutes.

U.S. DOE Municipal Solid-State Street Lighting Consortium
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MSSLC@seattle.gov | www.ssl.energy.gov/consortium.html

National Street Lighting Inventory

*1. City/Utility/Organization Information (Respondent)

*Company:

Address:

Address 2:

*City/Town:

*State:

ZIP:

*2. Please Choose Organization Type

Other (please specify)

3. Are you a Consortium Member?

- Yes
- No

*4. Contact Information (Person Completing Survey)

*Name:

*City/Town:

*State:

ZIP:

Country:

*Email Address:

Phone Number:

5. Has LED street lighting been installed in your city/town or be installed in the future?

- Yes
- No

Tell us About the Publically Funded Street, Roadway and Area Lights in your...

6. Name of power provider (if not respondent)

7. Number of Publicly Funded Lights owned/responsible for in your jurisdiction/service territory? (The lighting system) Do not use decimals (.), commas (,) or non-numeric characters ($+-/#@%). Example, "140,000" should be entered as "140000"

Street/Roadway Lights	
Area Lights	

8. If not certain about #7 above, can an estimate of the number of lights in the lighting system be provided?

	Street/Roadway Lights	Area Lights
Please choose estimate range from drop-down menu		

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

	100%	75%	60%	50%	40%	30%	25%	10%	Less than 10%	None
Your Organization (Respondent)										
Serving Utility - (If not respondent)										
3rd Party Service Provider										
Customer (if not respondent - municipal/county/state/other)										

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

	100%	75%	60%	50%	40%	30%	25%	10%	Less than 10%	None
Your Organization (Respondent)										
Serving Utility - (If not respondent)										
3rd Party Service Provider										
Customer (if not respondent - municipal/county/state/other)										

11. What is the total annual energy consumption (in kWh) of the lighting system? Do not use decimals (.), commas (,) or non-numeric characters ($+-/#@%).

Annual kWh	

12. What is the average age of the luminaires in the lighting system?

- 1-10 years
- 11-15 years
- 16-20 years
- 20-25 years
- 25-30 years
- 30 years or older

Tell Us About the Technology Used in the Lighting System

13. What types of lighting technology are currently deployed?

	Type Used (Choose all that apply)	Select Prominent Type Used (choose one)	Select Second Most Used (choose one)
High Pressure Sodium	☐	☐	☐
Metal Halide	☐	☐	☐
Induction	☐	☐	☐
LED	☐	☐	☐
Fluorescent	☐	☐	☐
Mercury Vapor	☐	☐	☐
Incandescent	☐	☐	☐
Plasma	☐	☐	☐
Low pressure Sodium	☐	☐	☐
Halogen	☐	☐	☐

14. How many MV and MH lights are in the lighting system? Do not use decimals (.), commas (,) or non-numeric characters ($+-/#@%).

Mercury Vapor (MV)	
Metal Halide (MH)	

Tell Us How You Control the Lighting Functions

15. What technology is used to control the lights? (Check all that apply)

- ☐ Dusk-to-dawn photoelectric control (PE cell)
- ☐ Timer(s)
- ☐ Relay timer(s) with a combination of the above
- ☐ Central management system (on/off/monitor only)
- ☐ Advanced lighting control (i.e., adaptive lighing levels, energy monitoring, etc.)

16. If advanced outdoor lighting controls are planned, when do you plan to deploy?

◯ Not Planned ◯ 6-12 months ◯ 1-3 years ◯ 4-5 years ◯ 5+ years

The following questions will help determine total cost of national street l...

If you have this information, it will help to provide a more thorough analysis

17. Please provide the street light energy rate (For example, for 11 cents/kWh -> enter 0.11 or for 9 cents/kWh-> enter 0.09)

18. Total annual energy cost of the lighting system to jurisdiction? Do not use decimals (.), commas (,) or non-numeric characters ($+-/#@%).

Total Energy Cost $

19. Total annual operating and maintenance (O&M) cost of the lighting system to jurisdiction? Do not use decimals (.), commas (,) or non-numeric characters ($+-/#@%).

Total O&M Cost $

20. Can we contact you if clarification is needed?

- ◯ Yes, you may contact me
- ◯ No, thank you

Thank You! This Completes Our Survey

Thank you for providing your street lighting information to the Consortium's national inventory development effort. Again, this effort will help to enable the development of national and local policies and programs to support the implementation of LED streetlights by municipalities and utilities and other system owners, contributing to the nation's conservation efforts and energy security while providing financial benefits to end users.