

RESIDENTIAL POOL LIGHT HOURS SURVEY

ET11SCE4050 Report



Prepared by:

*Design & Engineering Services
Customer Service Business Unit
Southern California Edison*

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Southern California Edison's Design & Engineering Services (DES) group is responsible for this project. It was developed as part of Southern California Edison's Emerging Technology program under internal project number ET11SCE4050. DES project manager Yun Han conducted this technology evaluation with overall guidance and management from Edwin Hornquist. For more information on this project, contact yun.han@sce.com.

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ABBREVIATIONS AND ACRONYMS

CAB	Customer Advisory Board
D&ES	Design & Engineering Services
ET	Emerging Technology
LED	Light Emitting Diode
MBS	Market Behavior Study
SCE	Southern California Edison

EXECUTIVE SUMMARY

This Emerging Technology (ET) project focuses on gathering operating hour data for underwater pool lighting usage in the residential sector. The project falls under the ET Market Behavior Study (MBS) subprogram. An earlier Light Emitting Diode (LED) pool lighting project¹ confirmed the technology is viable and will save energy when it replaces incandescent lighting in pools. However, to quantify the savings, it is important to know the operating hours of pool lighting. Coupled with the results of this study and the earlier LED pool lighting project, energy savings can be determined for residential pool lighting if the incumbent incandescent lighting is replaced with LED.

The objective of this study is to determine how long Southern California Edison (SCE) residential customers use their underwater pool lights in a year. To gather the pool light operating data, a 10-minute survey was conducted over the internet using the SCE Customer Advisory Board (CAB – see Appendix B). The qualifying SCE CAB members were required to have a swimming pool or a spa/hot tub with underwater lights to participate in the survey.

One hundred and ninety-eight interviews were conducted where 105 participants answered questions about spa lights. In addition, 189 responded to questions about swimming pool lights. As expected, more people operate their pools and spas during the summer months. Figure 1 shows a monthly breakdown of how many minutes the lights are used. A small series of questions about the type and wattage of their lights and age of their pool/spa also followed.

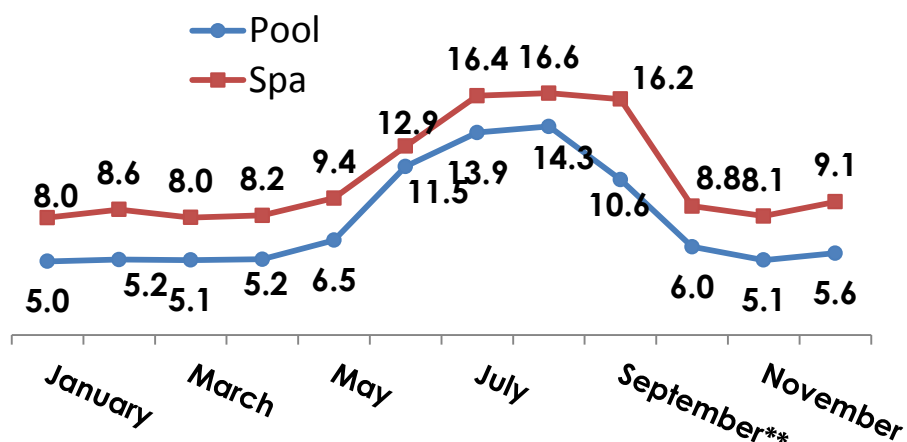


FIGURE 1. AVERAGE NUMBER OF MINUTES PER DAY LIGHTS USED BY MONTH

Cumulatively, on average, pool lights are on 7.8 minutes per day and spa lights for 10.9 minutes per day. This equals to 47.7 hours per year for pools and 66.0 hours per year for spas. With less than one percent of hours in a year when SCE residential customers light their pool/spa, there is not enough operating hours for residential customers to switch to energy efficient LED pool lights and expect a reasonable payback. The only benefit to switching to an LED pool light for residential customers may be added aesthetics. It is recommended that any Energy Efficiency incentive program for residential customers to switch from incandescent to LED for pool/spa lighting be based on data gathered from this study.

INTRODUCTION

This Emerging Technology (ET) Market Behavior Study (MBS) project surveyed Southern California Edison's (SCE) residential customers who own swimming pools and spas. A previous ET Assessment project, ET10SCE1130 – LED Pool Lighting, completed in December 2010, already established the technology application as viable with confirmed energy savings for commercial customers. However, residential customers' pool light operating hours were not logged due to assumptions of huge variances in usage and cost effectiveness to log many homes for data. SCE initiated this survey to gather how many hours SCE customers were operating their pool lights.

OBJECTIVES AND METHODOLOGY

OBJECTIVES

The objectives of this project are:

- To determine how long SCE residential customers who are responsible for the usage of a pool at their owned or rented home leave their pool and spa lights on during an average day
- To gather enough data to use in SCE's LED Pool Lighting work paper that claims energy savings from replacing traditional lights with LED pool lights
- To have an "average day" figure for the whole year, but also in seasonal "average days", with defined seasons as:
 - Summer: July – September 2011
 - Spring: March – June 2011
 - Winter: December 2010 – February 2011
 - Fall: October – November 2011

METHODOLOGY

To gather the pool light operating hours, a 10-minute survey was conducted over the internet using the SCE Customer Advisory Board (see Appendix B). SCE Customer Advisory Board members, identified as living in stand-alone homes with pool pumps, were invited to participate in the screening questionnaire.

Qualified respondents had to have either a working in-ground swimming pool or a spa/hot tub, which is normally attached to an in-ground pool. The underwater lights associated with the pool/spa had to be in working order, but the actual use of their lights was not a requirement.

A total of 198 interviews were conducted where 189 respondents answered questions about working swimming pool lights, and 105 respondents answered questions about working spa/hot tub lights (see Appendix A). Respondents went through a battery of questions about their monthly usage of pool/spa/hot tub lights, separately. Specifically, they were asked:

- Did they use the lights at all in each of the months of October 2010 – September 2011?
 - For each month that they used the lights, how many days during that month were they on, even for a brief time?
 - For a typical day in each month when the lights were in use, how many minutes were they on, if even for a brief time?

Respondents with both a pool and spa/hot tub were asked to think separately about each. A small series of questions about the type and wattage of their lights and age of their pool/spa followed.

PROJECT FINDINGS 1: OPERATING TIME

On average throughout a full year, pool owners report they kept their pool lights on just less than 8 minutes a day between October 2010 and September 2011. Hot tub/spa owners kept lights on a little longer on average, almost 11 minutes a day during the same time frame as shown in Figure 2. It is important to note that all averages include the days when no lights were on.

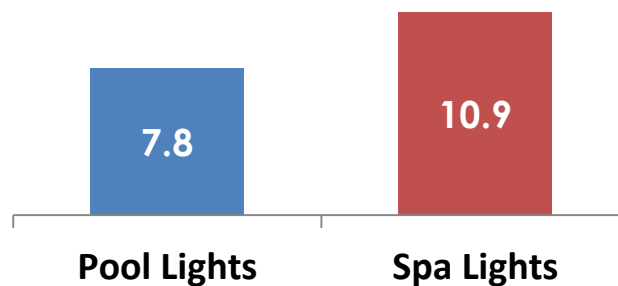


FIGURE 2. OVERALL AVERAGE DAILY MINUTES USAGE OVER A ONE YEAR PERIOD *

*Average number of minutes per day, including days reported as '0', across all respondents, for all 12 months combined.

Computations of means for September used 18 days for the month, since interviewing occurred just after the middle of the month

Not surprisingly, pool and spa lights tend to be used on more days during the summer and on fewer days in the fall and winter. Averaged across a full year, pool and spa lights were on about two days per month, with spa lights tending to have been on somewhat more often than pool lights.

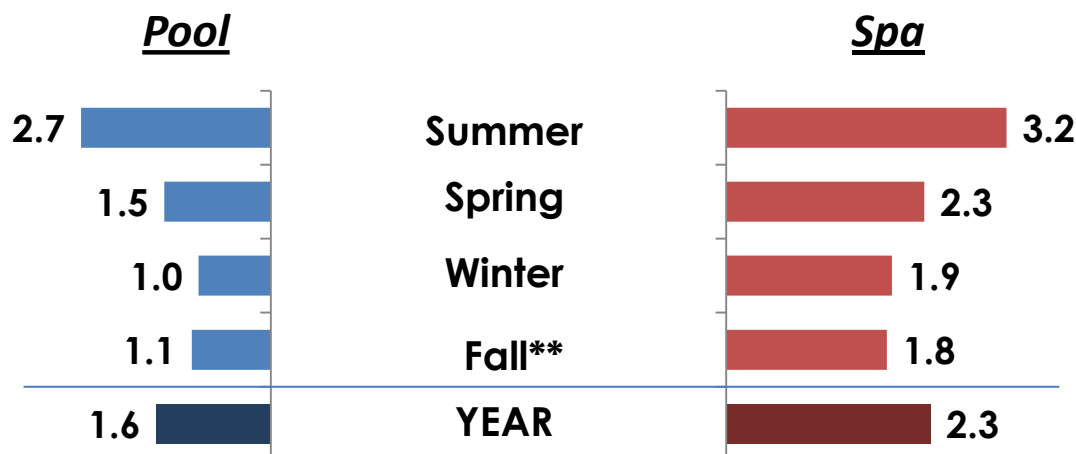


FIGURE 3. AVERAGE NUMBER OF DAYS LIGHTS USED BY SEASON*

* Average number of days per month, per season, across all respondents, including days reported as '0'.

** For the month of September, this was asked: "... for September 2011 so far."

Figure 4 shows a monthly breakdown of Figure 3. Both pool and spa lights tend to be on more often during the day in the summer and less in the winter. Again, all averages include days when no lights are on.

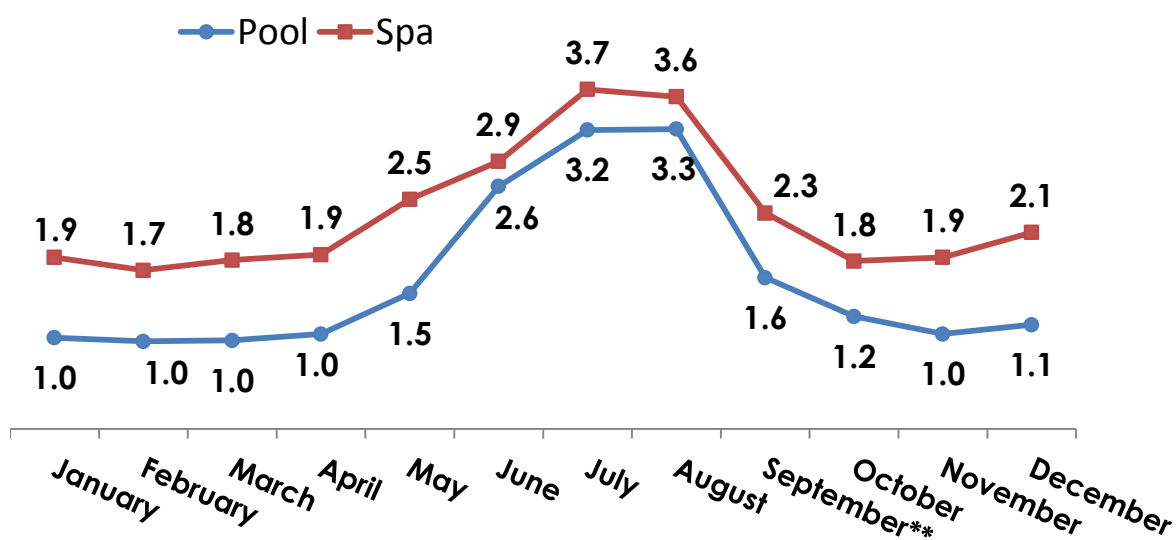


FIGURE 4. AVERAGE NUMBER OF DAYS LIGHTS USED BY MONTH

*Average number of days per month, across all respondents, including days reported as '0'.

**For the month of September, this was asked: "... for September 2011 so far."

Figure 5 further breaks down the average usage of the pool lights into minutes per day they are used by seasons. Again, all averages include days when no lights are on.

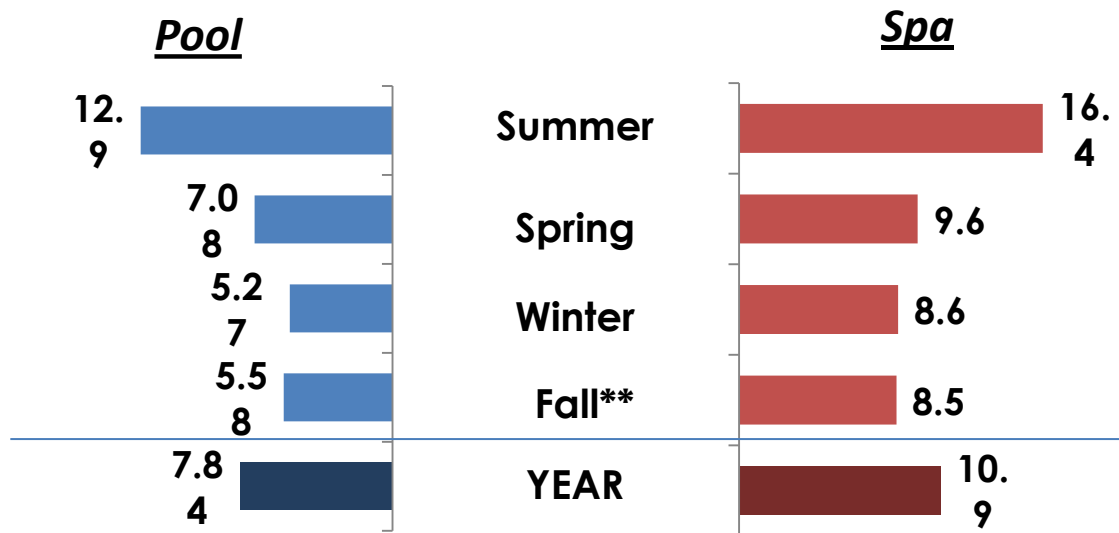


FIGURE 5. AVERAGE NUMBER OF MINUTES PER DAY LIGHTS USED BY SEASON

*Average number of minutes per day, per season, across all respondents, including days reported as '0'.

**For the month of September, this was asked: "... for September 2011 so far." (18 is used for calculation of mean)

Figure 6 shows a monthly breakdown of Figure 5. All data consistently shows longer operation during the summer months.

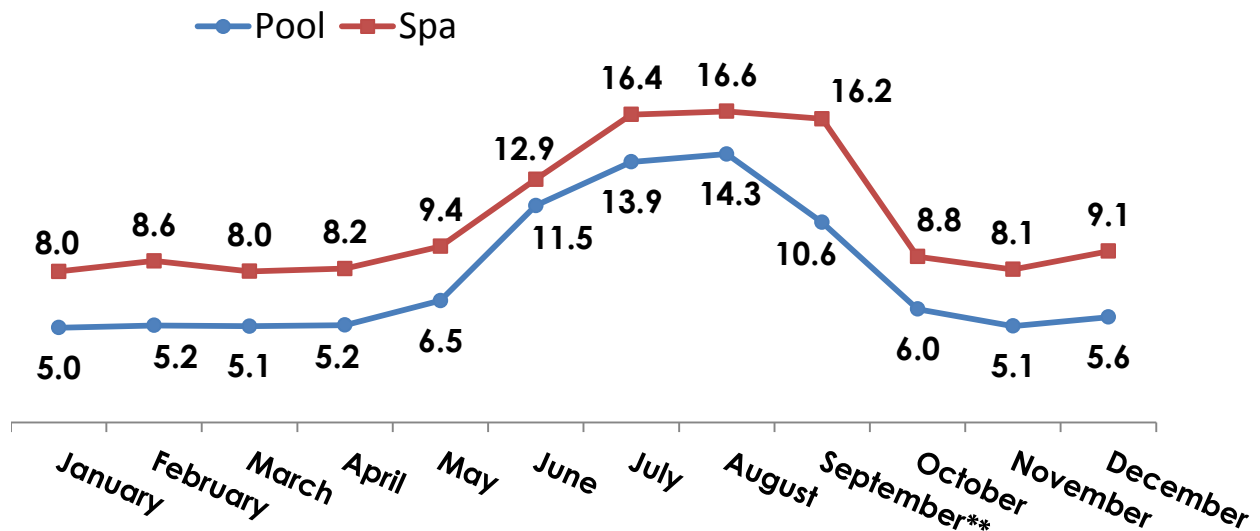


FIGURE 6. AVERAGE NUMBER OF MINUTES PER DAY LIGHTS USED BY MONTH

*Average number of minutes per day for each month, across all respondents, including days reported as '0'.

**For the month of September, this was asked: "... for September 2011 so far." (18 is used for calculation of mean)

PROJECT FINDINGS 2: TYPES OF LIGHTING USED

About three in ten surveyed report using incandescent lighting in their pool/spa. However, half do not know the type of lighting used. While the vast majority of pool and spa owners surveyed do not know the wattage of their underwater lighting, the largest percentage of those giving a response believe their lighting is under 300 Watts, as shown in Figure 8.

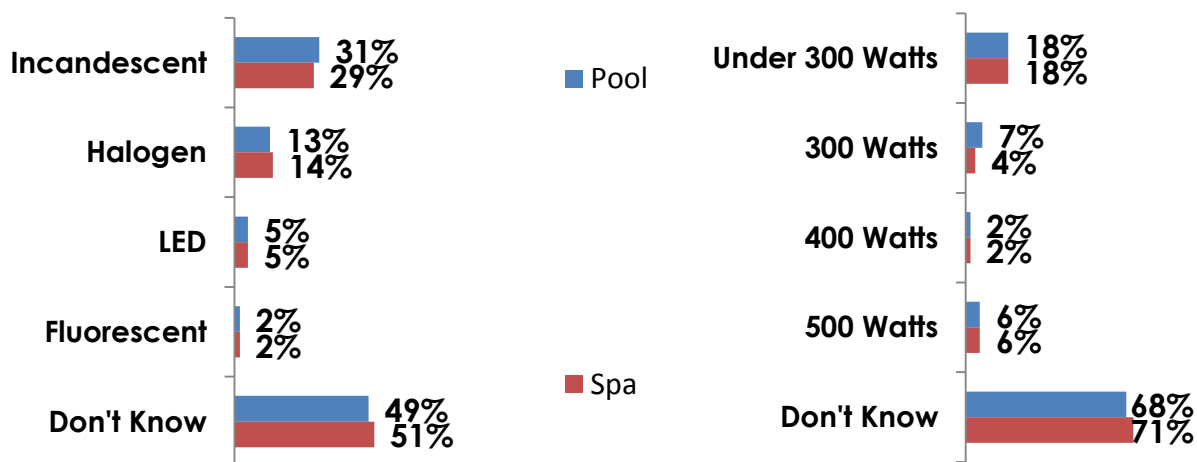


FIGURE 7. TYPES OF LIGHTING CURRENTLY USED IN RESPONDENT POOLS *

*Although reported by pool and spa respondents separately, these data are not directly tied to a pool or spa, specifically.

The majority of pool and spa owners report their pool/spa was built or remodeled 5 or more years ago. Figure 8 shows about half of the pools/ spas are 10+ years old.



FIGURE 8. WHEN POOL AND SPA WERE BUILT OR REMODELED

*Although reported by pool and spa respondents separately, these data are not directly tied to a pool or spa, specifically.

CONCLUSIONS AND RECOMMENDATIONS

In general, residential SCE customer's use of pool lighting is quite low, with usage of less than two days per month, on average, and less than 8 minutes per day usage throughout a year. Spa lighting usage is somewhat higher, but is still under 11 minutes per day usage. This totals to 47.7 hours/year for pools and 66.0 hours/year for spas.

Survey findings are to be used in conjunction with another project that quantifies energy savings resulting from replacing incandescent lighting in pools with a more efficient source, such as LED. Therefore, there are no specific recommendations from this survey other than to use the results as the best estimates available for SCE residential customer pool/ spa lighting usage. Any Energy Efficiency program incentives should be based on the data gathered from this study.

APPENDIX A: RESPONDENT DEMOGRAPHIC OVERVIEW

Survey participants are evenly split by gender, tend to be middle-aged, and are relatively affluent.

	Pool Owners (189) %	Spa/Hot Tub Owners (105) %
Gender		
Male	51	50
Female	49	51
Age		
25-34	6	6
35-44	14	15
45-54	32	38
55-64	29	24
65 or over	19	17
Average Age	54.0	52.9
HH Income		
Average (\$000)	\$111.3K	\$119.2K

APPENDIX B: SCE CUSTOMER ADVISORY PANEL INFORMATION

- As is the case with most online panels, the SCE Customer Advisory Board is not designed to be representative of the SCE customer base. However, when inviting panelists to specific surveys, a sample may be selected to be demographically similar to what is used in telephone-based surveys with SCE customers.
- This is determined on a case-by-case basis, depending on the research objectives.
- The Customer Advisory Board is an online panel of SCE customers who were recruited via a variety of sources.
- A randomly selected subset of SCE customers who had signed up for “My Account” access were recruited to the panel via an email invitation from Decision Analyst.
 - Panelists were also recruited via telephone calls, postcards, and letters in order to encourage participation among SCE customers who are less likely to respond to online solicitations.
 - However, as this is an online panel, it does encompass SCE customers who are online in some capacity.
 - As such, the panel is under-representative of some ethnicities and those with very low incomes.
- Recruiting for the panel is ongoing, with invitations provided via other customer touch-points (e.g., telephone customer satisfaction surveys, customer workshops, the SCE.com website, etc.).

REFERENCES

¹ ET10SCE1130 – LED Pool Lighting study