



**C10: CT SBEA
Data Mining Report**

Final

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Executive Summary

Connecticut Light & Power and United Illuminating offer the Small Business Energy Advantage (SBEA) Program that provides an energy audit and incentives to small business owners to improve the energy efficiency of their buildings. The program provides direct installation of lighting upgrades and controls, air conditioning equipment tune-ups, and automated controls for refrigeration equipment.

The SBEA Data Mining Research aimed to help program administrators make more informed decisions about how to garner deeper and more comprehensive energy savings by examining what has and has not been accomplished through the SBEA from 2007 through 2012. The research consisted of analysis of the SBEA program databases and the utility customer databases to characterize the program and the participants, and compare the population of eligible customers to those who participated in the program.

Research Objectives

The objectives of the research were to assess and report from a third-party the following.

- Assess the representation of various market sectors among the SBEA participants over the last five years, which sectors were underrepresented and which were missing.
- Determine how the market sector distribution of program participants compared to those of nonparticipants.
- Characterize the mix of measures installed in the program, including an examination of the nature and frequency at which measures beyond lighting were installed.
- Explore the levels of savings tracked by sector.

Data

APPRISE requested a complete download of SBEA program data from CL&P and UI for projects that were undertaken between 2007 and 2012. The data received included information on program dates; project cost, incentives and financing; business type; measures installed; and usage and demand savings.

APPRISE requested customer data from CL&P and UI to merge with the program data and to provide analysis of customers who were eligible and who did and did not participate in the SBEA. The data received included business type, usage, and demand.

There was no new data collected by this study. The study never planned to generate new data. The only dataset outside of the utilities would have been if purchasing an outside vendor dataset would help in the comparison. The original plan was to purchase a dataset of businesses from

Dunn & Bradstreet that would best fit the SBEA-eligible population as best could be requested given data available in the Dunn & Bradstreet database. It was discovered that CL&P had been pulling its entire commercial and industrial (C&I) customer billing data for aggregate analyses. This data could include demand, kW, estimates which would allow an extraction to be made of the SBEA-eligible customer base to compare with SBEA participants. Utility data within a similar data format was then requested to use as the comparison dataset.

Program Data Analysis

Key findings from the program data analysis were as follows.

- *Projects:* From 2007 through 2012 there were nearly 6,300 CL&P SBEA projects installed and nearly 2,000 UI SBEA projects installed. The peak year for the SBEA installations was 2010 for CL&P and 2009 for UI.
- *Business Type:* The most common types of participants were offices, retail, auto-related, and restaurants, making up half of the projects.
- *Usage Intensity:* Restaurant and food establishments had the greatest energy usage intensity. While 74 percent of this facility type had over 30 kWh per square foot of facility space, other establishment types were most likely to use less than 10 kWh per square foot of space.
- *Demand:* Mean average demand was 31 kW, but 25 percent had average demand over 33 kW. College/school, manufacturing and restaurants/food participants were most likely to have average demand over 50 kW.
- *Contractors:* The top two contractors completed 25 percent of the SBEA jobs and the top six contractors completed more than half of the jobs. While 42 contractors participated, 15 completed fewer than 20 jobs each over the six years studied.
- *Measures:* While 72 percent of projects were lighting only, 16 percent had lighting and refrigeration measures installed, ten percent had lighting and custom measures installed, and three percent had lighting and cooling, heating, or domestic hot water measures installed.
- *Costs and Incentives:* Mean project costs were approximately \$14,000 and incentives covered approximately 40 percent of the costs on average.
- *Financing:* Approximately 90 percent of the SBEA projects used financing. Colleges and schools were least likely to use program financing and government was also less likely to use financing than most of the other facility types.
- *Savings:* Projected average annual savings were 22,197 kWh per CL&P SBEA project and 18,899 kWh per UI SBEA project. Colleges/schools had the greatest mean savings by far, followed by the entertainment/gym category. Projects with other measures in addition to lighting had much higher savings.

- *Savings per Square Foot:* Higher savings for colleges and schools followed by entertainment and gym facilities was related to their larger facility size. Restaurant/food stores, parking, and retail establishments had the greatest savings per square foot.
- *Percent Savings:* Warehouses and parking facilities had the highest average savings as a percentage of pre-treatment usage.
- *Demand Reduction:* Mean annual kW savings in the program database were estimated as 5.7 kW per project. Colleges/schools had the greatest projected savings.

Comparison to Eligible Population

Participants and eligible customers were distributed similarly across business segments and corporate structures. Eligible customers had somewhat higher usage and demand than the post-program usage and demand of SBEA participants, but the differences were approximately equal to the projected reductions, indicating that these customers may have had similar usage and demand prior to program participation.

Overall Summary

There were two primary findings of import from this research. The first is that the program appears to be doing a good job of serving all customer segments. SBEA participation is a very good representation of Connecticut businesses of this size (by kW usage). Therefore, there does not seem to be underserved business segments that need to be targeted and no change is recommended regarding a change of market target.

To target particular segments would move SBEA away from its equal level of service to the C&I customers. If greater savings or higher cost-effectiveness is desired and viewed as having greater value than providing services equally to the C&I customer segments, then targeting colleges/schools followed by entertainment/gym should aid these alternative goals as these sectors have the highest savings per participant and program dollar.

The second important finding from this independent third-party research is that SBEA participants appear to have on-average saved 24% off their prior demand usage. The SBEA program tracking data does not contain the participant's usage. Matching the billing data to the program data allowed an estimate of the average percent of demand savings expected from the program tracking estimates and customer usage. Comparison of demand usage for the SBEA-eligible population to the SBEA participants over the 2007-2012 period generally supports the program estimates of savings since the difference between the two groups is close to that savings level.¹

¹ This also provides secondary support to the SBEA Impact Evaluation that found relatively high realization rates within the impact evaluation of the 2011 program year.

There were a limited number of contractors who have worked on the program. The utilities have worked to develop these relationships and expand contractor reach in the program. Another potential avenue for increased participation is to increase the contractor participation base.

We have seen the analysis of contractor data by CL&P and the efforts to leverage detailed contractor knowledge to aid in obtaining more savings efficiently. Both program administrators (PAs) are working to expand their relationship with the SBEA contractors. We have no recommendation to change that.

Colleges/schools, followed by entertainment/gym had the greatest mean savings, and are good potential targets for the program to increase savings per participant or cost-effectiveness. The decision to target specific sectors for greater cost-effectiveness would reduce the close representativeness of the SBEA program seen in 2007-2012. The desire for greater cost-effectiveness may outweigh the desire to have the program exactly match its target population. Another alternative mentioned by the utilities during comments on the draft report is that colleges and schools may be better served by energy efficiency efforts other than SBEA.

Given the fact that 72 percent of projects were lighting only and that projects with measures in addition to lighting had much higher savings, increasing the percent of projects with additional measure categories appears to be one of the surest ways to increase program savings. But we know that the PAs have already been undertaking activities to obtain more savings from a broader number of measures in 2013 and 2014. We have no recommendation to change that.

This research study did not involve any new data collection. However, it did involve analysis of existing data that, in our experience, PAs do not usually undertake on their own. We would recommend that future research and evaluation activities have an initial task that involves interviews with PAs to ensure that the research is valuable to the PAs. Undertaking research that relies on data already available to the utilities and being undertaken for outside parties to either have knowledge from this data, or as analysis from an independent third-party, should be carefully assessed for its need and be very explicit about what information from the utility data needs to be produced or assessed by an independent third-party.

I. Introduction

Connecticut Light & Power and United Illuminating offer the Small Business Energy Advantage (SBEA) Program that provides an energy audit and incentives to small business owners to improve the energy efficiency of their buildings. The program provides direct installation of lighting upgrades and controls, air conditioning equipment tune-ups, and automated controls for refrigeration equipment.

The SBEA Data Mining Research aims to help program administrators make more informed decisions about how to garner deeper and more comprehensive energy savings by examining what has and has not been accomplished through the SBEA over the years. The research consisted of analysis of the SBEA program databases and the utility customer databases to characterize the program and the participants, and compare the population of eligible customers to those who have chosen to participate in the program.

This report provides the following information in four sections following this introduction.

- Section II – Methodology: Provides a summary of the data that were obtained and the analyses that were conducted.
- Section III – Program Data Analysis: Provides data and information on the participating customers, contractors, measures, and projected savings from the program.
- Section IV – Comparison to Eligible Population: Compares the full database of utility customers who are potentially eligible for the SBEA to the customers who participated and assesses whether there may be opportunities for targeted outreach to particular market segments.
- Section V – Summary of Findings: Provides a summary of findings from the analysis and recommendations for potentially reaching a larger population of eligible customers.

APPRISE prepared this report under subcontract to DNV KEMA. The utilities facilitated this research by furnishing program and customer data to APPRISE. Any errors or omissions in this report are the responsibility of APPRISE. Further, the statements, findings, conclusions, and recommendations are solely those of analysts from APPRISE and do not necessarily reflect the views of the utilities.

II. Methodology

This section describes the research objectives and the data that were utilized in the analyses.

A. Research Objectives

The primary objective of this evaluation was to help program administrators make more informed decisions about how to garner deeper and more comprehensive energy savings through an examination of what has and has not been accomplished through the SBEA program over the years. The analysis focused on the following.

- Assessed the representation of various market sectors among the SBEA participants over the last five years, which sectors were underrepresented and which were missing.
- Determined how the market sector distribution of program participants compared to those of nonparticipants.
- Characterized the mix of measures installed in the program, including an examination of the nature and frequency at which measures beyond lighting were installed.
- Explored the levels of savings tracked by sector.

B. Program Data

APPRISE requested a complete download of SBEA program data from CL&P and UI for projects that were undertaken between 2007 and 2012. The data included the following types of information.

Project Level Data

- Project Identification
- Key Program Participation Dates – Data availability varied by utility, but generally included the project create date, site visit date, approved project date, installation date, inspection date, and payment date
- Payment Status
- Contractor Name
- Financing Data – An indicator for whether financing was approved and accepted (UI only)
- Building Data – Square footage
- Facility Type – Type of business
- Cost Data – Customer cost, material cost, labor cost, electric incentive amount, gas incentive amount
- Savings – Annual and lifetime kWh savings; annual, summer, and winter kW savings; annual and lifetime ccf savings

Measure Level Data

- Project Identification
- Measure Category - Cooling, Heating, Lighting, Custom, High-Performance Lighting, Refrigeration
- Measure Life
- Replaced Type and Size – Type and watts of replaced item
- Cost Data – Customer cost, material cost, labor cost, incentive amount+
- Savings – Annual and lifetime kWh savings; annual, summer, and winter kW savings; annual and lifetime ccf savings

C. Customer Data

APPRISE requested customer data from CL&P and UI to merge with the program data and to provide analysis of customers who were eligible and who did and did not participate in the SBEA. The requested data included identification information, building data, business type data, and energy usage and demand. The following data were received.

- Customer Identification
- Business Type
- Usage and Demand

III. Program Data Analysis

This section provides an analysis of the SBEA program data provided by CL&P and UI. The following types of analyses are presented.

- Projects by Year
- Facility Type
- Building Type
- Usage and Demand
- Contractors
- Measures Installed
- Project Costs and Incentives
- Financing
- Projected Savings

A. *Projects and Time Period Studied*

This section provides an analysis of the number of projects by time period. Table III-1 shows that from 2007 through 2012, there were nearly 6,300 CL&P SBEA projects installed and nearly 2,000 UI SBEA projects installed. The peak year for the SBEA installations was 2010 for CL&P and 2009 for UI.

**Table III-1
Number of Projects by Installation Year**

	CL&P	UI	Both Utilities
2007	109	20	129
2008	1,088	491	1,579
2009	773	549	1,322
2010	1,640	330	1,970
2011	1,443	303	1,746
2012	1,227	259	1,486
TOTAL	6,280	1,952	8,232

*Source: Project level data file.

Figure III-1 displays the number of projects installed by year for CL&P and UI.

Figure III-1

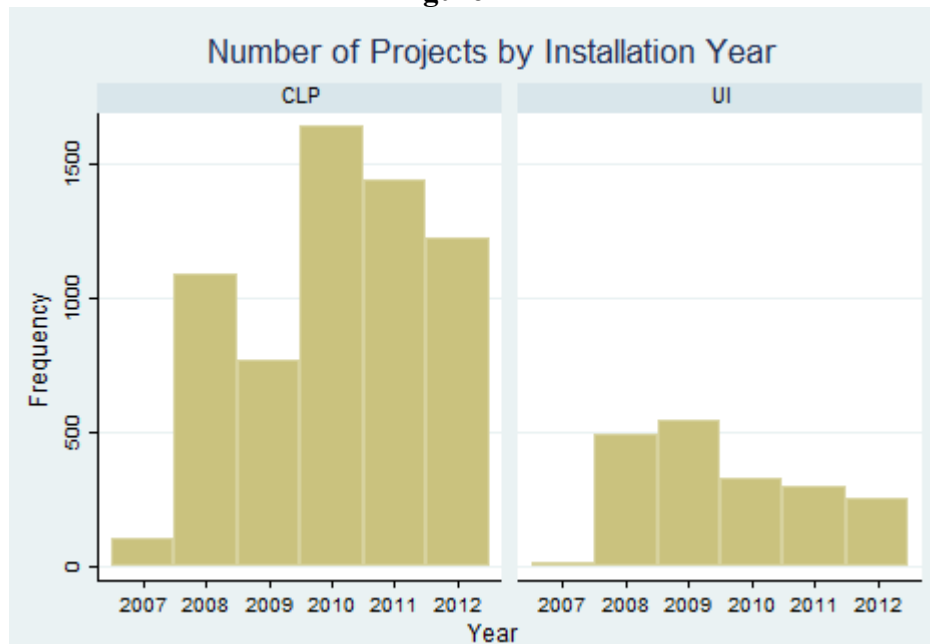


Figure III-2 displays a map of the projects that were completed through the SBEA between 2007 and 2012.

Figure III-2
Geography of SBEA Projects, 2007-2013

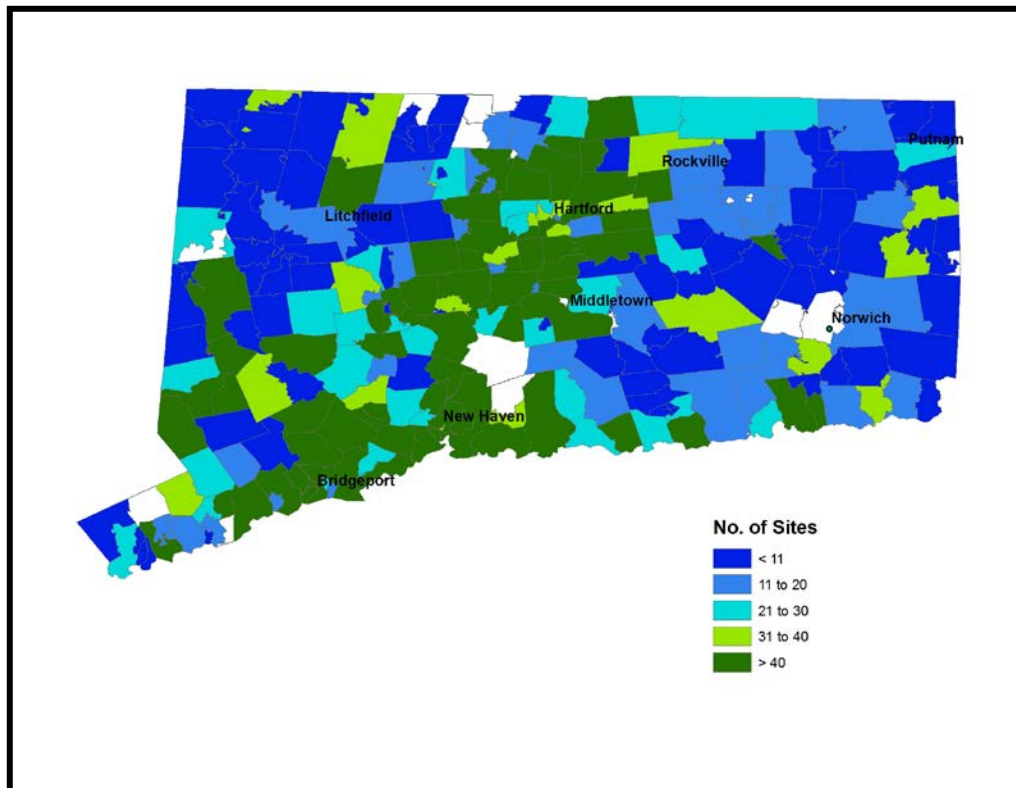


Table III-2 displays the earliest, mean, and latest project start date, signature date, installation date and end date. The table shows that CL&P projects in the database extract began as early as 2006 and ended through the end of 2012. UI projects began as early as 2005 and also ended by the end of 2012.

**Table III-2
Project Level Dates**

		CL&P	UI	Both Utilities
Number of Projects		6,280	1,952	8,232
Missing Observations		3	186	189
Projects Included in Analysis		6,277	1,766	8,043
Start Date	Min	2/6/2006	1/20/2005	1/20/2005
	Mean	3/20/2010	11/20/2009	2/20/2010
	Max	10/20/2012	9/20/2012	10/20/2012
Signature Date	Min	2/20/2007	1/20/2007	1/20/2007
	Mean	5/20/2010	1/20/2010	4/20/2010
	Max	11/20/2012	11/20/2012	11/20/2012
Installation Date	Min	1/20/2007	5/20/2007	1/20/2007
	Mean	8/20/2010	2/20/2010	7/20/2010
	Max	11/20/2012	12/20/2012	12/20/2012
End Date	Min	1/20/2008	1/20/2008	1/20/2008
	Mean	9/20/2010	3/20/2010	8/20/2010
	Max	12/20/2012	12/20/2012	12/20/2012

*Source: Project level data file.

*Three cases from the UI data had start date after end and were excluded from the analysis.

*One case from the CL&P data had signature date as 2/28/1980 and was excluded from the analysis.

*For the CL&P data, the latest of three variables, Pay Invoice Date, Process Invoice Date and Invoice Project Date, was chosen to populate End Date. In all but 18 cases, Pay Invoice Date was used.

Table III-3A displays data on the number of days from the start to the end of the project. The table shows that the mean number of days was 189 across both utilities. While 25 percent of projects were completed within about 3.5 months, 25 percent took almost eight months or more.

**Table III-3A
Days from Start to End of Project**

	CL&P	UI	Both Utilities
Projects	6,280	1,952	8,232
Missing Observations	1	179	180
Projects Included in Analysis	6,279	1,773	8,052

	CL&P	UI	Both Utilities
Mean	202	141	189
25 th Percentile	122	77	111
Median	175	120	164
75 th Percentile	249	190	237

*Source: Project level data file.

Table III-3B displays the distribution of the project length. The table shows that approximately 30 percent of projects took less than four months, almost half took four to eight months, and about 25 percent took more than eight months. While CL&P projects were most likely to take four to eight months, UI projects were most likely to take less than four months.

Table III-3B
Range of Days from Start to End of Project

	CL&P		UI		Both Utilities	
	Number	Percent	Number	Percent	Number	Percent
Projects	6,280	---	1,952	---	8,232	---
Missing Observations	1	---	179	---	180	---
Projects Included in Analysis	6,279	100.0%	1,773	100.0%	8,052	100.0%
<4 months	1,516	24.1%	882	49.8%	2,398	29.8%
4-<8 months	3,024	48.2%	689	38.9%	3,713	46.1%
8-<12 months	1,242	19.8%	151	8.5%	1,393	17.3%
1 year or more	497	7.9%	51	2.9%	548	6.8%

*Source: Project level data file.

Table III-3C displays the project length range by year for UI and CL&P. The table shows that the utilities appear to have been successful in reducing the time to completion. While 25 percent of projects took eight months to one year and 21 percent took one year or more to complete in 2007, 13 percent took eight months to one year and only two percent took one year or more in 2012. (There are also participant and project changes that could affect the change in these averages.)²

² This is not a process evaluation of the SBEA program. We do not have information on why some projects took longer than others. Some of the difference may be due to the type of project or the type of customer and their decision-making process. Differences between the utilities could be due to differences between types of projects, customer decision-making, the operation of the SBEA program at that utility, or other factors.

**Table III-3C
Project Length by Year for Both Utilities**

	2007	2008	2009	2010	2011	2012
<4 months	10.7%	25.8%	37.6%	33.7%	21.9%	32.5%
4-<8 months	42.6%	41.0%	43.8%	41.5%	52.4%	52.5%
8-<12 months	25.4%	22.8%	14.2%	16.5%	18.8%	13.0%
1 year or more	21.3%	10.4%	4.4%	8.2%	6.9%	2.1%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

*Source: Project level data file.

B. Types of Facilities and Businesses

This section provides information on the types of facilities and businesses that participated in the SBEA. Table III-4 shows that the most common facility types were offices, retail, auto-related, and restaurants, making up more than half of the projects. Other common types were manufacturing, colleges, and residential.

**Table III-4
Facility Type**

	CL&P	UI	Both Utilities	
			Number	Percent
Office	1,341	460	1,801	21.9%
Retail	1,223	374	1,597	19.4%
Auto-Related	616	171	787	9.6%
Restaurant/Food Store	505	253	758	9.2%
Manufacturing/Industrial/Workshop	492	163	655	8.0%
College/School	354	73	427	5.2%
Residential	273	151	424	5.2%
Warehouse	157	115	272	3.3%
Religious	199	55	254	3.1%
Entertainment/Gym	175	52	227	2.8%
Hospitals/Health	157	24	181	2.2%
Government	163	2	165	2.0%
Parking	148	17	165	2.0%
Other	477	42	519	6.3%
TOTAL	6,280	1,952	8,232	100.0%

*Source: Project level data file.

Office includes Medical Offices and Office. *Retail* includes Retail and Small Services. *Restaurant/Food Store* includes Bakery, Convenience Stores, Food Stores and Restaurant. *College/School* includes College-Cafeteria, College-Classes/Administrative, College-Dormitory, College-Other and School. *Residential* includes Lodging, Lodging (Hotels/Motels), Nursing Homes and Residential. *Warehouse* includes Refrigerated

Warehouse, Warehouse and Warehouse (Not Refrigerated). *Entertainment/Gym* includes Convention Center, Entertainment, Exercise Center, Gymnasium, Motion Picture Theatre, Museum, Performing Arts Theatre, Recreation and Sports Arena. *Government* includes Court House, Fire Station (unmanned), Library, Police/Fires Stations (24 hr), Post Office and Town Hall. *Parking* includes Parking and Parking Garages & Lots. **Other* includes Banks, Financial Centers, Laundry/Laundromat, Mall Concourse, Marina, Miscellaneous, Non-Building, Penitentiary, Pump Stations, Transportation and Waste Water Treatment Plant.

Table III-5 displays the facility type by installation year. For the most part, the distribution of facility type remained fairly constant from 2007 through 2012. However, the share of retail facilities increased from about ten percent to about 20 percent between 2008 and 2009, and then remained at the higher level.

Table III-5
Facility Type by Installation Year (Both Utilities)

	2007		2008		2009		2010		2011		2012	
	#	%	#	%	#	%	#	%	#	%	#	%
Office	11	8.5%	319	20.2%	334	25.3%	447	22.7%	390	22.3%	300	20.2%
Retail	14	10.9%	167	10.6%	265	20.1%	413	21.0%	406	23.3%	332	22.3%
Auto-Related	15	11.6%	130	8.2%	120	9.1%	216	11.0%	141	8.1%	165	11.1%
Restaurant/ Food Store	9	7.0%	133	8.4%	108	8.2%	181	9.2%	142	8.1%	185	12.5%
Manufacturing/ Industrial/ Workshop	10	7.8%	120	7.6%	106	8.0%	163	8.3%	148	8.5%	108	7.3%
College/School	4	3.1%	71	4.5%	78	5.9%	128	6.5%	99	5.7%	47	3.2%
Residential	4	3.1%	99	6.3%	58	4.4%	54	2.7%	106	6.1%	103	6.9%
Warehouse	2	1.6%	41	2.6%	51	3.9%	75	3.8%	64	3.7%	39	2.6%
Religious	3	2.3%	49	3.1%	34	2.6%	72	3.7%	65	3.7%	31	2.1%
Entertainment/ Gym	1	0.8%	52	3.3%	40	3.0%	44	2.2%	35	2.0%	55	3.7%
Hospitals/ Health	1	0.8%	4	0.3%	58	4.4%	56	2.8%	47	2.7%	15	1.0%
Government	0	0.0%	9	0.6%	34	2.6%	57	2.9%	39	2.2%	26	1.8%
Parking	1	0.8%	6	0.4%	9	0.7%	54	2.7%	56	3.2%	39	2.6%
Other	54	41.9%	379	24.0%	27	2.0%	10	0.5%	8	0.5%	41	2.8%
TOTAL	129	100%	1,579	100%	1,322	100%	1,970	100%	1,746	100%	1,486	100%

*Source: Project level data file.

Table III-6 examines the project time range by facility type. The table shows that college/school projects were more likely to take eight months or more, longer than the other project types, perhaps due to greater levels of oversight that must provide approval in these types of organizations. Government projects were next most likely to take one year or more to complete.

Table III-6
Project Time Range by Facility Type for Both Utilities

	<4 Months	4- <8 Months	8- <12 Months	≥1 Year	Total
Office	31.2%	46.4%	14.9%	7.5%	100.0%
Retail	40.3%	44.0%	12.5%	3.2%	100.0%
Auto-Related	41.2%	40.7%	15.3%	2.8%	100.0%
Restaurant/Food Store	21.5%	54.8%	18.5%	5.1%	100.0%
Manufacturing/Industrial/Workshop	34.1%	49.1%	12.5%	4.2%	100.0%
College/School	6.2%	41.9%	31.3%	20.7%	100.0%
Residential	15.9%	53.6%	23.8%	6.7%	100.0%
Warehouse	53.7%	37.8%	4.3%	4.3%	100.0%
Religious	15.6%	54.0%	24.8%	5.6%	100.0%
Entertainment/Gym	30.5%	40.3%	22.1%	7.1%	100.0%
Hospitals/Health	27.1%	39.2%	21.0%	12.7%	100.0%
Government	12.7%	43.0%	27.3%	17.0%	100.0%
Parking	13.7%	54.0%	24.2%	8.1%	100.0%
Other	18.0%	44.6%	25.2%	12.2%	100.0%

*Source: Project level data file.

C. Building Characteristics

This section examines the building square footage of participating businesses. Table III-7A shows that the mean square footage of participating businesses was approximately 10,000 square feet and was larger for CL&P businesses than for UI businesses. Both utilities, however, had about half of their participating buildings under 4,000 square feet and about half above that (the median square footage). The largest buildings drove up the average square footage. While 60 CL&P customers and 3 UI customers had square footage over 100,000, 17 CL&P customers had square footage over 200,000 square feet.

Table III-7A
Building Square Footage

	CL&P	UI	Both Utilities
Projects	6,280	1,952	8,232
Missing Observations	788	0	788
Zero Value Observations	393	1,223	1,616
Outlier Observations†	12	42	54
Projects Included in Analysis	5,087	687	5,774
Mean	10,967	8,527	10,677
25 th Percentile	2,000	1,500	1,900

	CL&P	UI	Both Utilities
Median	4,000	3,000	4,000
75 th Percentile	10,000	8,333	10,000

*Source: Project level data file.

†12 observations in CL&P and 42 observations in UI had building square feet values under 100. These cases were excluded from this analysis.

Table III-7B displays statistics on square footage by facility type. The table shows that college/schools were the largest buildings. Other large building types were warehouses, entertainment/gym, hospitals/health care, and parking. Restaurants and retail participants had the smallest facilities among SBEA participants.

Table III-7B
Building Square Footage by Facility Type for Both Utilities

	Observations	Mean	25 th Percentile	Median	75 th Percentile
Office	1,335	9,057	1,500	3,000	10,000
Retail	1,251	5,736	1,500	2,500	5,000
Auto-Related	572	6,103	2,000	3,350	6,250
Restaurant/Food Store	533	3,844	1,500	2,500	5,000
Manufacturing/Industrial/Workshop	471	13,048	3,500	8,000	16,000
College/School	324	36,727	6,225	21,000	48,644
Residential	247	11,481	1,000	2,228	10,000
Warehouse	182	17,141	4,800	10,000	20,000
Religious	191	13,668	3,600	8,000	15,000
Entertainment/Gym	160	17,793	3,000	8,000	20,000
Hospitals/Health	158	17,978	1,960	3,900	20,000
Government	156	11,531	3,500	7,000	15,000
Parking	129	18,314	1,000	5,000	15,000
Other	65	5,850	1,500	3,000	7,442
TOTAL	5,774	10,677	1,900	4,000	10,000

*Source: Project level data file.

*12 observations in CL&P and 42 observations in UI had building square feet values under 100. These cases were excluded from this analysis.

The more the mean is above the median indicates a greater influence of the larger projects on the average size. There are a few cases where the mean is above the 75th percentile, indicating that those business types have a small number of very large buildings that drive up the average size. This is the case for retail, residential, and parking type businesses.

D. Usage and Demand

Usage and demand data were provided in the customer data file, but are analyzed in this section only for businesses that participated in the SBEA from 2005 through 2012. Data from the customer file were merged with data from the SBEA participant file to analyze

usage for participants. These data were obtained in 2014, and represent post-treatment usage for SBEA participants. Table III-8A shows that 32 percent of CL&P and 13 percent of UI participants did not merge with the customer file and therefore do not have usage data for analysis. While mean usage for CL&P customers was over 121,000 kWh annually, mean usage for UI customers was over 90,000 kWh annually.

Table III-8A
Annual Usage (kWh)

	CL&P	UI	Both Utilities
Observations	6,280	1,952	8,232
Missing Observations	1,984	259	2,243
Zero or Negative Value Observations	0	4	4
Projects Included in Analysis	4,296	1,689	5,985
Mean	121,121	90,469	112,471
25 th Percentile	17,762	14,741	16,832
Median	42,519	34,649	40,400
75 th Percentile	120,080	86,998	110,320

*Source: Customer data file.

Table III-8B displays the distribution of annual usage. The table shows that nearly one third of the participants had post participation annual usage of less than 20,000 kWh, and nearly one quarter had usage over 120,000 kWh.

Table III-8B
Annual Usage Distribution (kWh)

Annual Usage (kWh)	CL&P	UI	Both Utilities
<20,000	28%	34%	30%
20,000 - <40,000	20%	20%	20%
40,000 - <60,000	12%	11%	11%
60,000 - <80,000	7%	9%	7%
80,000 - <100,000	5%	5%	5%
100,000 - 120,000	4%	3%	4%
>120,000	25%	19%	23%
TOTAL	100%	100%	100%

†Cases with negative and zero annual kWh usage were excluded from this analysis.

Table III-9A displays average kW demand over the one-year period from is November 1, 2011 through October 31, 2012 for SBEA participants. The table shows that mean average demand was 31 kW, but that 25 percent had average demand over 33 kW.

Table III-9A
Average Demand (kW)

	CL&P	UI	Both Utilities
Projects	6,280	1,952	8,232
Missing Observations	2,003	259	2,262
Zero/Negative Value Observations	0	201	201
Projects Included in Analysis	4,277	1,492	5,769
Mean	32	29	31
25 th Percentile	8	9	8
Median	15	16	15
75 th Percentile	33	33	33

*Source: Customer data file.

Table III-9B displays the distribution of average demand for SBEA participants. The table shows that one third of the participants had average demand of less than 10 kW, and 17 percent had average demand greater than 50 kW.

Table III-9B
Average Demand Distribution (kW)

Average Demand (kW)	CL&P	UI	Both Utilities
0	0%	12%	3%
1-<10	34%	27%	32%
10 - <20	27%	26%	27%
20 - <30	12%	11%	12%
30 - <40	6%	6%	6%
40 - 50	4%	3%	3%
> 50	17%	15%	17%
TOTAL	100%	100%	100%

†Cases with negative average demand were excluded from this analysis.

Table III-10A displays the distribution of annual usage for the most common types of facilities that participated in the SBEA. The table shows that college/school, restaurants/food, and manufacturing were most likely to have annual usage over 100,000 kWh.

Table III-10A
Annual Usage Distribution (kWh) by Facility Type for Both Utilities

	Office	Retail	Auto	Restaurant/ Food	Manufacturing	College/ School	Workshop
Obs	1,441	1,325	627	601	351	280	150
<20,000	41%	35%	40%	3%	18%	9%	33%
20,000 - <40,000	23%	22%	26%	10%	15%	11%	23%
40,000 - <60,000	11%	13%	9%	12%	11%	10%	14%
60,000 - <80,000	6%	8%	4%	12%	10%	8%	6%
80,000 - <100,000	4%	4%	3%	9%	6%	4%	3%
100,000 - <200,000	7%	10%	10%	23%	14%	14%	12%
200,000 - < 400,000	5%	5%	6%	18%	13%	18%	5%
≥400,000	4%	4%	2%	13%	13%	27%	5%
TOTAL	100%	100%	100%	100%	100%	100%	100%

†Cases with negative and zero annual kWh usage were excluded from this analysis.

Table III-10B displays the distribution of annual usage per square foot for the most common types of facilities that participated in the SBEA. The table shows that energy usage intensity is less than 10 kWh per square foot of space for the majority of office, auto, manufacturing, colleges and schools, and workshops. Restaurant and food establishments are likely to have greater energy usage intensity, as 74 percent use more than 30 kWh per square foot of space.

Table III-10B
Annual Usage per Square Foot by Facility Type for Both Utilities

Annual Usage per Square Foot (kWh)	Office	Retail	Auto	Restaurant/ Food	Manufacturing	College/ School	Workshop
Obs	1,167	1,108	523	477	289	240	116
<10	58%	42%	61%	6%	56%	56%	69%
10 - <20	26%	23%	23%	9%	25%	24%	15%
20 - <30	7%	12%	6%	11%	5%	6%	5%
≥ 30	9%	23%	10%	74%	14%	14%	11%
TOTAL	100%	100%	100%	100%	100%	100%	100%

†Cases with negative and zero annual kWh usage, building square foot values under 100, missing or zero square feet values were excluded from this analysis.

Table III-10C displays the distribution of average demand for the most common types of facilities that participated in the SBEA. The table shows that college/school, manufacturing, and restaurants/food were most likely to have average demand over 50 kW.

Table III-10C
Average Demand (kW) by Facility Type for Both Utilities

Average Demand (kW)	Office	Retail	Auto	Restaurant/ Food	Manufacturing	College/ School	Workshop
Obs	1,366	1,258	599	600	349	278	141
<10	45%	38%	47%	11%	18%	11%	31%
10 - <20	28%	35%	25%	27%	16%	13%	29%
20 - <30	10%	12%	8%	16%	17%	13%	11%
30 - <40	5%	4%	5%	14%	8%	6%	7%
40 - 50	2%	3%	2%	5%	6%	7%	3%
> 50	10%	8%	12%	27%	35%	50%	18%
TOTAL	100%	100%	100%	100%	100%	100%	100%

†Cases with negative and zero annual kWh usage were excluded from this analysis.

Table III-10D displays the distribution of average demand per square foot for the most common types of facilities that participated in the SBEA. The table shows that most of the facility types had the majority with average demand per square foot of one to less than five kW. However, restaurant and food establishments were most likely to have average demand of more than 10 kW per square foot.

Table III-10D
Average Demand per Square Foot by Facility Type for Both Utilities

Average Demand (0.001kW) per Square Foot	Office	Retail	Auto	Restaurant/ Food	Manufacturing	College/ School	Workshop
Obs	1,134	1,084	516	477	287	238	114
<1	13%	5%	5%	1%	11%	10%	11%
1 - <5	55%	46%	68%	12%	53%	63%	58%
5 - <10	23%	29%	16%	26%	23%	15%	18%
≥ 10	9%	20%	11%	62%	13%	13%	13%
TOTAL	100%	100%	100%	100%	100%	100%	100%

†Cases with negative and zero average demand, building square foot values under 100, missing or zero square feet values were excluded from this analysis.

E. Contractors

This section provides data on the contractors that provided services through the SBEA. Table III-11A shows that the top two contractors completed 25 percent of the SBEA jobs and the top six contractors completed more than half of the jobs. There were 42 contractors overall, and fifteen completed fewer than 20 jobs.

**Table III-11A
Number of Jobs by Contractor**

	CL&P		UI		Both Utilities	
	Number	Percent	Number	Percent	Number	Percent
Contractor 1	1,022	16.3%	78	4.1%	1,100	13.4%
Contractor 2	584	9.3%	376	19.6%	960	11.7%
Contractor 3	555	8.8%	73	3.8%	628	7.7%
Contractor 4	494	7.9%	85	4.4%	579	7.1%
Contractor 5	533	8.5%	31	1.6%	564	6.9%
Contractor 6	312	5.0%	250	13.0%	562	6.9%
Contractor 7	396	6.3%	107	5.6%	503	6.1%
Contractor 8	0	0.0%	391	20.4%	391	4.8%
Contractor 9	373	5.9%	0	0.0%	373	4.6%
Contractor 10	311	5.0%	22	1.2%	333	4.1%
Contractor 11	231	3.7%	36	1.9%	267	3.3%
Contractor 12	231	3.7%	4	0.2%	235	2.9%
Contractor 13	213	3.4%	0	0.0%	213	2.6%
Contractor 14	208	3.3%	0	0.0%	208	2.5%
Contractor 15	0	0.0%	182	9.5%	182	2.2%
Contractor 16	172	2.7%	5	0.3%	177	2.2%
Contractor 17	99	1.6%	60	3.1%	159	1.9%
Contractor 18	152	2.4%	0	0.0%	152	1.9%
Contractor 19	113	1.8%	0	0.0%	113	1.4%
Contractor 20	72	1.2%	15	0.8%	87	1.1%
Contractor 21	83	1.3%	0	0.0%	83	1.0%
Contractor 22	0	0.0%	57	3.0%	57	0.7%
Contractor 23	46	0.7%	0	0.0%	46	0.6%
Contractor 24	0	0.0%	39	2.0%	39	0.5%
Contractor 25	26	0.4%	4	0.2%	30	0.4%
Contractor 26	0	0.0%	24	1.3%	24	0.3%
Contractor 27	18	0.3%	0	0.0%	18	0.2%
Contractor 28	0	0.0%	17	0.9%	17	0.2%
Contractor 29	17	0.3%	0	0.0%	17	0.2%
Contractor 30	0	0.0%	16	0.8%	16	0.2%
Contractor 31	0	0.0%	13	0.7%	13	0.2%
Contractor 32	12	0.2%	0	0.0%	12	0.2%
Contractor 33	0	0.0%	12	0.6%	12	0.2%
Contractor 34	0	0.0%	7	0.4%	7	0.1%
Contractor 35	5	0.1%	0	0.0%	5	0.1%

	CL&P		UI		Both Utilities	
	Number	Percent	Number	Percent	Number	Percent
Contractor 36	0	0.0%	5	0.3%	5	0.1%
Contractor 37	0	0.0%	4	0.2%	4	0.1%
Contractor 38	0	0.0%	4	0.2%	4	0.1%
Contractor 39	2	<0.1%	1	0.1%	3	<0.1%
Contractor 40	0	0.0%	1	0.1%	1	<0.1%
Contractor 41	0	0.0%	1	0.1%	1	<0.1%
TOTAL	6,280	100.0%	1,920	100.0%	8,200	100.0%

*Source: Project level data file

*32 UI cases which did not have contractor names were excluded from this analysis.

Contractor 1 in Table III-11A is the same firm as Contractor 1 in Table III-11B.

Table III-11B displays the percentage of jobs completed by year and contractor for the 14 highest producing contractors with more than 200 jobs over the time period studied. While the two most productive contractors dropped off their production in 2012, some of the contractors began participating in 2010 or became more productive in 2011 and 2012.

Table III-11B
Percentage of Jobs by Year and by Contractor

	2007	2008	2009	2010	2011	2012
Observations	129	1,579	1,322	1,970	1,717	1,483
Contractor 1						
Number of Jobs	13	292	169	221	249	156
Percent of All Jobs That Year	10%	18%	13%	11%	15%	11%
Contractor 2						
Number of Jobs	22	245	170	199	198	126
Percent of All Jobs That Year	17%	16%	13%	10%	12%	9%
Contractor 3						
Number of Jobs	27	136	139	125	94	107
Percent of All Jobs That Year	21%	9%	11%	6%	5%	7%
Contractor 4						
Number of Jobs	0	14	17	157	170	221
Percent of All Jobs That Year	0%	1%	1%	8%	10%	15%
Contractor 5						
Number of Jobs	34	265	100	112	52	1
Percent of All Jobs That Year	26%	17%	8%	6%	3%	<1%
Contractor 6						
Number of Jobs	2	79	127	151	90	113
Percent of All Jobs That Year	2%	5%	10%	8%	5%	8%

	2007	2008	2009	2010	2011	2012
Contractor 7						
Number of Jobs	3	114	57	78	126	125
Percent of All Jobs That Year	2%	7%	4%	4%	7%	8%
Contractor 8						
Number of Jobs	3	131	113	62	41	41
Percent of All Jobs That Year	2%	8%	9%	3%	2%	3%
Contractor 9						
Number of Jobs	5	73	65	93	88	49
Percent of All Jobs That Year	4%	5%	5%	5%	5%	3%
Contractor 10						
Number of Jobs	5	45	67	116	64	36
Percent of All Jobs That Year	4%	3%	5%	6%	4%	2%
Contractor 11						
Number of Jobs	8	43	64	80	40	32
Percent of All Jobs That Year	6%	3%	5%	4%	2%	2%
Contractor 12						
Number of Jobs	0	0	0	85	69	81
Percent of All Jobs That Year	0%	0%	0%	4%	4%	5%
Contractor 13						
Number of Jobs	0	0	0	59	97	57
Percent of All Jobs That Year	0%	0%	0%	3%	6%	4%
Contractor 14						
Number of Jobs	0	0	3	73	67	65
Percent of All Jobs That Year	0%	0%	<1%	4%	4%	4%

* Source: Project level data file

* 32 UI cases which did not have contractor names were excluded from this analysis.

Contractor 1 in Table III-11A is the same firm as Contractor 1 in Table III-11B.

F. Installed Measures

This section examines the measures that were installed through the SBEA. Table III-12A shows that while almost all projects installed lighting, 17 percent had refrigeration measures, 11 percent had custom measures, and three percent had cooling, heating, or hot water measures.

Table III-12A
Percent of Projects with At Least One Measure in Measure Category

	CL&P	UI	Both Utilities
Observations	6,280	1,952	8,232
Lighting	99%	98%	99%
Refrigeration	17%	18%	17%
Custom	14%	1%	11%
Cooling/Heating/Domestic Hot Water	4%	1%	3%

*Source: Measure level data file.

Table III-12B displays the percent of projects with each measure type by year. The table shows that CL&P projects were less likely to have refrigeration measures in 2008 than in the other years. They had an increase in custom measures beginning in 2010. UI projects began to include custom measures in 2011 and increased in 2012. UI also expanded to cooling, heating, and hot water measures in 2012.

Table III-12B
Percent of Projects with At Least One Measure in Measure Category
by Year

		2007	2008	2009	2010	2011	2012
CL&P	Observations	109	1,088	773	1,640	1,443	1,227
	Lighting	97%	98%	98%	99%	99%	99%
	Refrigeration	23%	12%	21%	17%	17%	18%
	Custom	5%	5%	8%	17%	20%	16%
	Cooling/Heating/Domestic Hot Water	2%	3%	2%	4%	5%	3%
UI	Observations	20	491	549	330	303	259
	Lighting	100%	98%	98%	99%	97%	98%
	Refrigeration	15%	20%	18%	19%	15%	19%
	Custom	0%	0%	0%	0%	2%	6%
	Cooling/Heating/Domestic Hot Water	0%	<1%	<1%	0%	0%	7%
CL&P & UI	Observations	129	1,579	1,322	1,970	1,746	1,486
	Lighting	98%	98%	98%	99%	99%	99%
	Refrigeration	22%	14%	20%	18%	17%	18%
	Custom	4%	4%	4%	14%	17%	15%
	Cooling/Heating/Domestic Hot Water	2%	2%	1%	3%	4%	4%

*Source: Measure level data file.

Table III-12 shows that while 72 percent of projects were lighting only, 16 percent had lighting and refrigeration measures installed, ten percent had lighting and custom measures

installed, and three percent had lighting and cooling, heating, or domestic hot water measures installed.

**Table III-12C
Installed Measures Combinations**

	Lighting Only	Lighting and Refrigeration	Lighting and Custom	Lighting and Cooling/Heating/ Domestic Hot Water
Projects	6,185	1,354	880	221
Percent of Projects	72%	16%	10%	3%

Figure III-3 displays the percent over time of SBEA projects that had measures other than lighting. The graph shows the gradual increase in projects with non-lighting measures from about 18 percent in 2008 to 28 percent in 2011.

Figure III-3

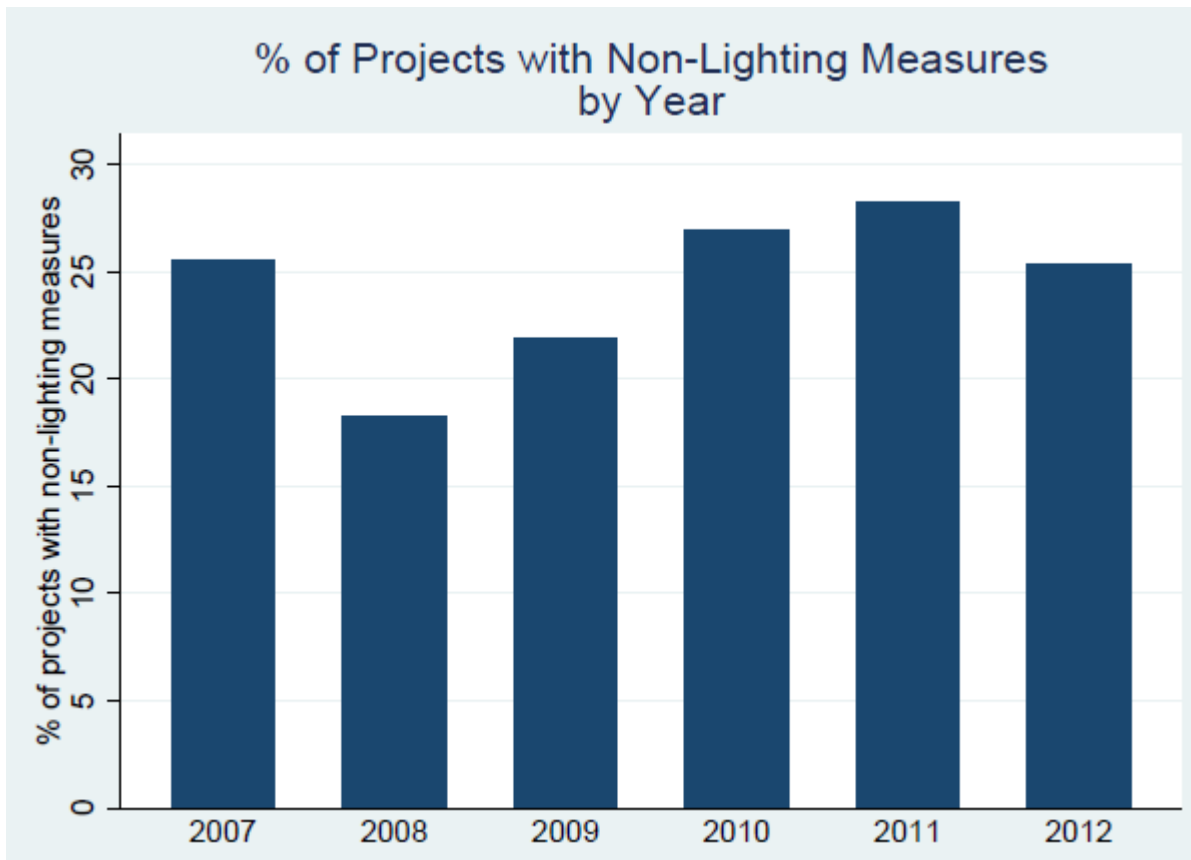


Table III-12D displays the types of measures by facility type. As expected, restaurant/food stores were most likely to have refrigeration measures, followed by retail and entertainment/gym. Government and restaurant/food stores were most likely to have custom measures.

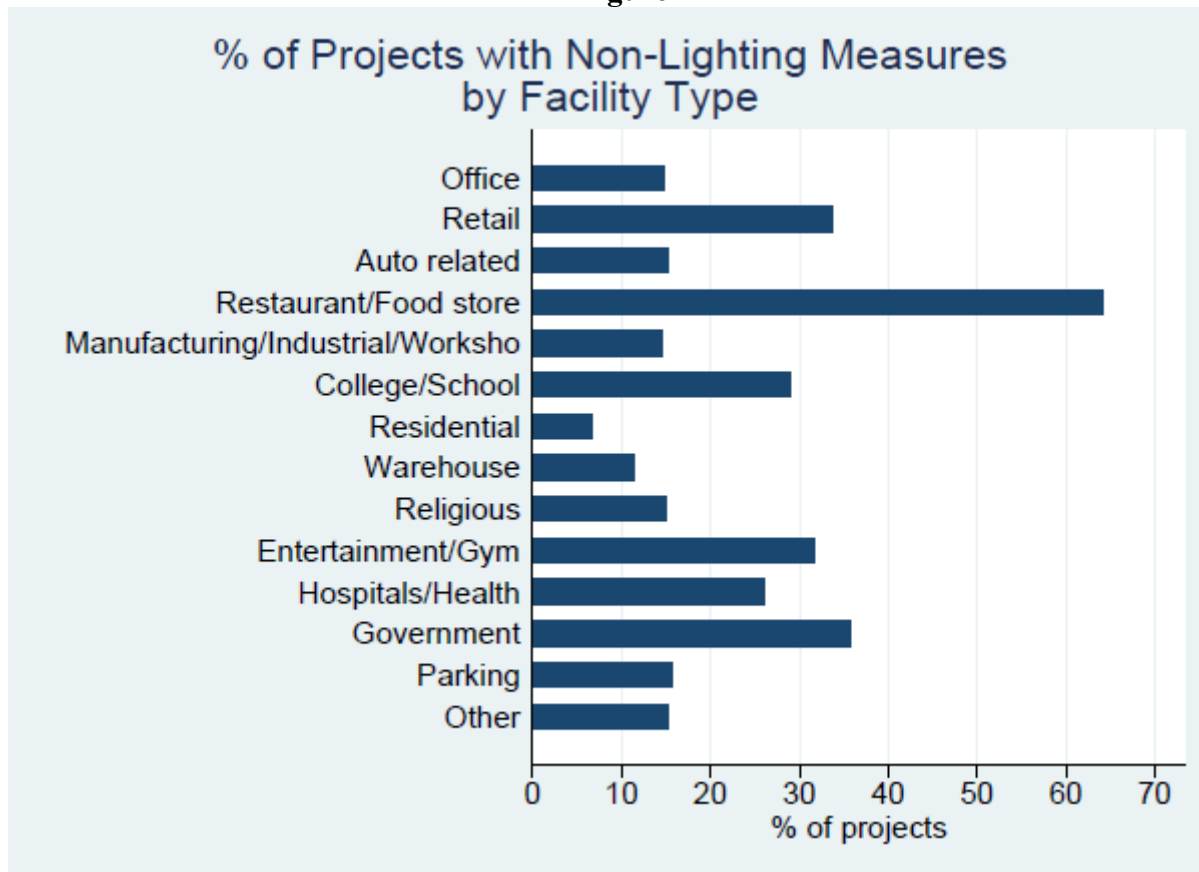
Table III-12D
Percent of Projects with At Least One Measure in Measure Category
By Facility Type for Both Utilities

	Observations	Lighting	Refrigeration	Custom	Cooling/Heating/ Domestic Hot Water
Office	1,801	99%	6%	8%	4%
Retail	1,597	98%	29%	13%	3%
Auto-Related	787	99%	10%	7%	1%
Restaurant/Food Store	758	96%	61%	24%	8%
Manufacturing/Industrial/Workshop	655	99%	9%	7%	1%
College/School	427	99%	13%	19%	1%
Residential	424	99%	4%	3%	1%
Warehouse	272	98%	6%	6%	1%
Religious	254	99%	6%	9%	3%
Entertainment/Gym	227	98%	21%	13%	5%
Hospitals/Health	181	100%	14%	11%	6%
Government	165	99%	12%	27%	5%
Parking	165	100%	1%	15%	0%
Other	519	98%	11%	4%	2%
TOTAL	8,232	99%	17%	11%	3%

*Source: Measure level data file.

Figure III-4 displays the percent of projects with non-lighting measures by facility type. The graph clearly shows that restaurants and food stores were much more likely than the other facility types to install additional measures beyond lighting.

Figure III-4



G. Project Costs and Incentives

This section examines the project costs and incentives. Table III-13 displays the mean project, material, and labor costs. Mean project costs were approximately \$14,000.

**Table III-13
Mean Project, Material, and Labor Cost**

	CL&P	UI	Both Utilities
Projects	6,280	1,952	8,232
Zero Value Observations	5	32	37
Projects Included in Analysis	6,275	1,920	8,195
Mean Project Cost	\$14,414	\$12,231	\$13,903
Mean Material Cost	\$9,221	\$7,700	\$8,865
Mean Labor Cost	\$5,193	\$4,531	\$5,038

*Source: Measure level data file.

*CL&P data from the project level file, and UI data from the measure level file.

Table III-14A displays the customer cost, incentive, total cost, and percent of project cost covered by the incentive. The table shows that the mean percent of the project cost covered by the incentive was 41 percent for CL&P jobs and 34 percent for UI jobs.

Table III-14A
Customer Cost, Incentive, and Total Project Cost

		CL&P	UI	Both Utilities
Projects†		6,280	1,952	8,232
Zero Value Observations		0	3	3
Outliers		1	22	23
Projects Included in Analysis		6,279	1,927	8,206
Project Customer Cost	Mean	\$8,965	\$7,950	\$8,726
	25 th Percentile	\$1,922	\$1,673	\$1,863
	Median	\$4,130	\$3,771	\$4,046
	75 th Percentile	\$9,462	\$8,797	\$9,215
Project Incentive	Mean	\$6,014	\$4,272	\$5,605
	25 th Percentile	\$1,193	\$810	\$1,096
	Median	\$2,620	\$1,747	\$2,377
	75 th Percentile	\$6,123	\$4,240	\$5,689
Total Project Cost	Mean	\$14,431	\$12,222	\$13,912
	25 th Percentile	\$3,030	\$2,596	\$2,901
	Median	\$6,602	\$5,558	\$6,322
	75 th Percentile	\$15,182	\$13,088	\$14,625
Percentage of Project Cost Covered by Incentive	Mean	41%	34%	39%
	25 th Percentile	35%	27%	32%
	Median	41%	32%	40%
	75 th Percentile	49%	40%	46%

*Source: The project level CL&P data file was used for all CL&P variables. The measure level UI data file was used to determine customer cost and total cost, while the project level UI data file was used to determine project incentive.

†One CL&P case was excluded from the statistics because the percentage of the Project Cost covered by the Incentive exceeded 100%. In this case the incentive covered 331% of the project cost.

‡22 UI cases were excluded from the statistics because the Customer Cost (calculated as Total Project Cost – Project Incentive) was negative.

Table III-14B displays the distribution of the percent of project costs covered by the incentive. The table shows that most projects had between 30 and 50 percent of the costs covered. While 17 percent had less than 30 percent of the project costs covered, 17 percent had more than 50 percent covered.

Table III-14B
Percent of Project Costs Covered by Incentive

Percent of Project Cost Covered by Incentive	CL&P	UI	Both Utilities
≤20%	2%	5%	3%
21% - 30%	7%	36%	14%
31% - 40%	33%	40%	35%
41% - 50%	36%	16%	31%
51% - 60%	22%	3%	17%
61% - 80%	<1%	<1%	<1%
81% - 100%	<1%	<1%	<1%
TOTAL	100%	100%	100%

†Cases with negative and zero annual kWh usage were excluded from this analysis.

Table III-14C displays the percent of the project cost covered by the incentive by year of installation. The table does not show a trend in the mean coverage rate, but that they have fluctuated over time, ranging from a low of 35 percent in 2009 to a high of 49 percent in 2007.

Table III-14C
Percent of Project Cost Covered by Incentive
by Year

	2007	2008	2009	2010	2011	2012
Projects	129	1,578	1,322	1,969	1,725	1,483
Mean	49%	42%	35%	44%	36%	36%
25 th Percentile	49%	37%	30%	40%	30%	31%
Median	50%	42%	32%	43%	35%	37%
75 th Percentile	51%	50%	40%	51%	43%	39%

*Source: The project level CL&P data file was used for all CL&P variables. The measure level UI data file was used to determine customer cost and total cost, while the project level UI data file was used to determine project incentive.

*One CL&P case was excluded because the percentage of the project cost covered by the incentive exceeded 100%.

Table III-14D displays the percent of the project cost covered by the program incentive by facility type. The lowest mean percent covered was 36 percent for residential facility types and the highest was 46 percent for “other”. Most of the facility types had mean coverage rates of 37 to 39 percent.

Table III-14D
Percent of Project Cost Covered by Incentive
By Facility Type for Both Utilities

	Observations	Mean	25th Percentile	Median	75th Percentile
Office	1,795	38%	32%	39%	43%
Retail	1,593	39%	32%	40%	45%
Auto-Related	786	39%	32%	40%	45%
Restaurant/Food Store	753	42%	36%	41%	50%
Manufacturing/Industrial /Workshop	653	38%	31%	38%	45%
College/School	425	39%	32%	40%	43%
Residential	421	36%	29%	37%	42%
Warehouse	271	37%	30%	37%	42%
Religious	253	37%	30%	39%	43%
Entertainment/Gym	227	38%	31%	39%	43%
Hospitals/Health	181	39%	32%	40%	44%
Government	165	38%	31%	40%	43%
Parking	165	38%	31%	40%	47%
Other	518	46%	41%	48%	51%
TOTAL	8,206	39%	32%	40%	46%

*Source: The project level CL&P data file was used for all CL&P variables. The measure level UI data file was used to determine customer cost and total cost, while the project level UI data file was used to determine project incentive.

*One CL&P case was excluded because the percentage of the project cost exceeded 100%.

Table III-14E displays the percent of project cost covered by the combination of measures installed. The table shows that projects with custom measures had somewhat higher coverage rates.

Table III-14E
Percent of Project Cost Covered by Incentive
By Measure Category

	Lighting Only	Lighting and Refrigeration	Lighting and Custom	Lighting and Cooling/Heating/Domestic Hot Water
Projects	6,185	1,354	880	221
Mean	39%	41%	43%	41%
25 th Percentile	32%	35%	37%	34%
Median	40%	41%	44%	43%
75 th Percentile	43%	50%	50%	50%

*Source: The project level CL&P data file was used for all CL&P variables. The measure level UI data file was used to determine customer cost and total cost, while the project level UI data file was used to determine project incentive.

*One CL&P case was excluded from the statistics because the percentage of the Project Cost covered by the Incentive exceeded 100%. In this case the incentive covered 331% of the project cost, so an error in one of the numbers is very likely.

H. Financing

CL&P provided data on whether financing was approved and whether it was accepted, and UI provided data on whether financing was used to support the project. Table III-15A shows that 93 percent of CL&P projects had financing approved and 88 percent accepted financing, while 95 percent of UI projects use financing.

Table III-15A
Financing

	CL&P		UI		Both Utilities	
	Number	Percent	Number	Percent	Number	Percent
Projects	6,280	---	1,952	---	8,232	---
Missing Observations	2	---	0	---	2	---
Projects Included in Analysis	6,278	100.0%	1,952	100.0%	8,230	100.0%
Finance Approved	5,823	92.8%	---	---	---	---
Finance Accepted	5,512	87.8%	1,856	95.1%	7,368	89.5%

*Source: Project level data file.

Table III-15B displays the approval and use of financing by facility type. The table shows that colleges and schools were least likely to use program financing. Government was also less likely to use financing than most of the other facility types.

**Table III-15B
Financing by Facility Type**

	CL&P			UI		Both Utilities	
	Obs.	Financing Approved	Financing Accepted	Obs.	Financing Accepted	Obs.	Financing Accepted
Office	1,341	93.1%	88.5%	460	95.9%	1,801	90.4%
Retail	1,223	95.5%	92.2%	374	94.1%	1,597	92.7%
Auto-Related	616	93.0%	90.4%	171	95.9%	787	91.6%
Restaurant/Food Store	505	96.2%	91.9%	253	96.1%	758	93.3%
Manufacturing/ Industrial/Workshop	491	87.6%	83.5%	163	96.3%	654	86.7%
College/School	354	85.6%	64.7%	73	93.2%	427	69.6%
Residential	273	93.4%	90.5%	151	90.7%	424	90.6%
Warehouse	157	93.0%	92.4%	115	96.5%	272	94.1%
Religious	199	97.5%	95.0%	55	90.9%	254	94.1%
Entertainment/Gym	175	94.3%	88.0%	52	98.1%	227	90.3%
Hospitals/Health	157	93.0%	89.2%	24	95.8%	181	90.1%
Government	163	92.0%	80.4%	2	100.0%	165	80.6%
Parking	148	93.9%	88.5%	17	94.1%	165	89.1%
Other	476	88.2%	84.0%	42	97.6%	518	85.1%
TOTAL	6,278	92.8%	87.8%	1,952	95.1%	8,230	89.5%

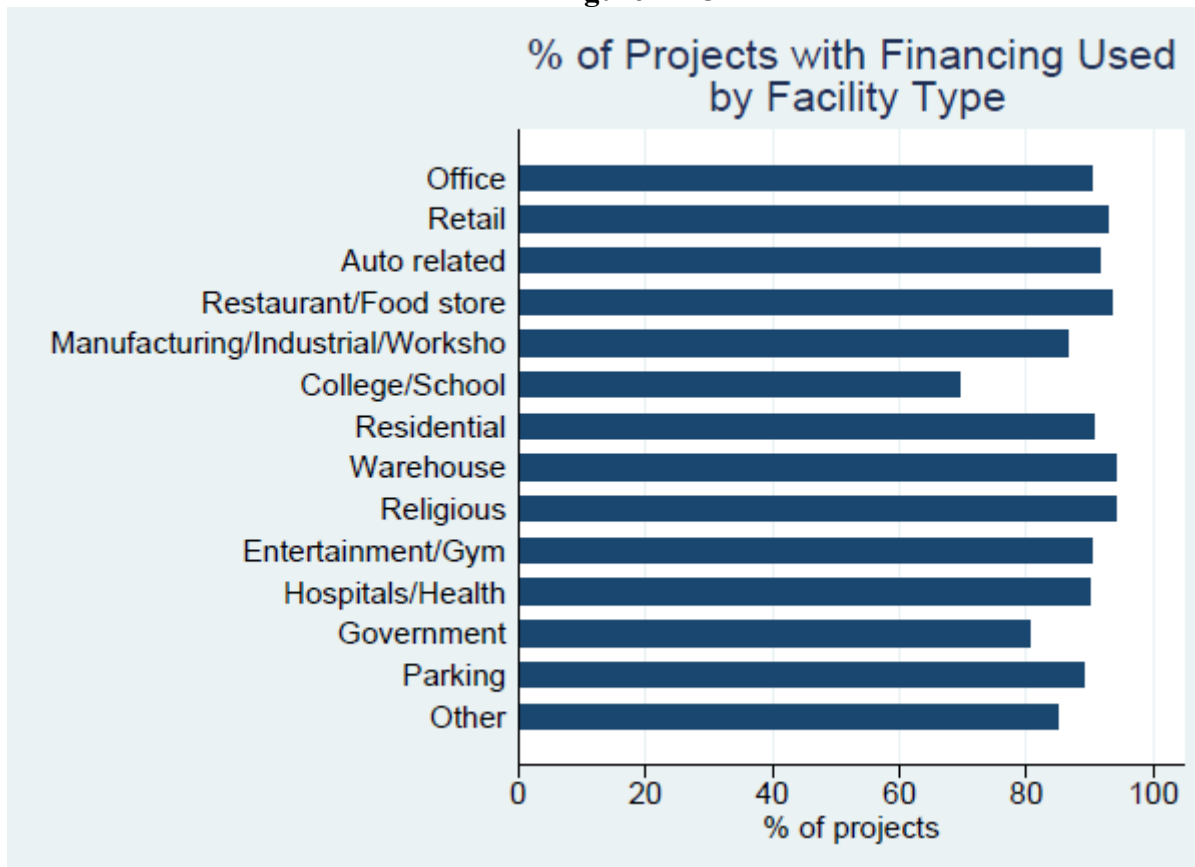
*Source: Project level data file and Measure level data file

*The variable determining whether finance was accepted for UI was contained in the measure level data file and for CL&P in the project level data file.

*Only cases with non-missing values for both “finance approved” (when available) and “finance accepted” were included in these statistics.

Figure III-5 displays the percent of projects that used financing by facility type. The chart clearly shows that colleges and schools are the outlier as the least likely facility type to make use of financing.

Figure III-5



I. Tracked Savings

This section examines the tracked savings and demand reduction due to the SBEA. Table III-16A examines data availability and mean annual and lifetime savings. Mean annual savings were projected to be 21,416 kWh and mean lifetime savings were projected to be 260,111 kWh.

**Table III-16A
Project Level Savings (kWh)**

	CL&P	UI	Both Utilities
Projects	6,280	1,952	8,232
Annual kWh Savings			
Number Missing	0	1	1
Number Zero	0	1	1
Projects Included in Analysis	6,280	1,950	8,230
Mean Annual kWh Savings	22,197	18,899	21,416
Lifetime kWh Savings			
Number Missing	0	2	2

	CL&P	UI	Both Utilities
Number Zero	0	6	6
Projects Included in Analysis	6,280	1,944	8,224
Mean Lifetime kWh Savings	272,068	221,483	260,111

* Source: Project level data file except for UI Mean Lifetime kWh Savings, from the measure level data file.

Table III-16B examines mean and total annual savings by year. The table shows that mean savings over both utilities were highest in the earlier years of this analysis (2007 through 2009) and declined in 2010 to 2012.

Table III-16B
Project Level Annual Savings (kWh)
by Year

	CL&P		UI		Both Utilities	
	Mean	Total	Mean	Total	Mean	Total
2007	21,717	2,367,182	25,773	515,460	22,346	2,882,642
2008	27,256	29,654,638	19,186	9,400,954	24,750	39,055,592
2009	29,786	23,024,233	13,889	7,624,994	23,184	30,649,227
2010	19,367	31,762,293	23,800	7,854,010	20,110	39,616,303
2011	20,855	30,093,139	17,630	5,324,273	20,297	35,417,412
2012	18,336	22,498,710	23,682	6,133,683	19,268	28,632,393
TOTAL	22,197	139,400,195	18,899	36,853,374	21,416	176,253,569

* Source: Project level data file except for UI Mean Lifetime kWh Savings, from the measure level data file.

* 1 negative value for Annual kWh Savings in the UI data file was not included.

Table III-16C examines annual savings by facility type. College/schools had the greatest mean savings by far, followed by the entertainment/gym category. Office, auto-related, and religious facility types had lower savings.

Table III-16C
Project Level Annual Savings (kWh)
By Facility Type

	CL&P		UI		Both Utilities	
	Mean	Total	Mean	Total	Mean	Total
Office	17,381	23,308,156	13,113	6,032,022	16,291	29,340,178
Retail	21,959	26,855,840	14,929	5,553,627	20,319	32,409,467
Auto-Related	15,938	9,817,718	15,164	2,592,988	15,770	12,410,706
Restaurant/ Food Store	26,883	13,575,839	21,586	5,461,294	25,115	19,037,133
Manufacturing/ Industrial /Workshop	24,210	11,911,515	22,218	3,621,510	23,715	15,533,025

	CL&P		UI		Both Utilities	
College/ School	43,189	15,289,060	46,604	3,402,122	43,773	18,691,182
Residential	18,743	5,116,753	17,581	2,654,765	18,329	7,771,518
Warehouse	22,248	3,492,971	23,539	2,706,966	22,794	6,199,937
Religious	14,226	2,830,969	18,386	1,011,250	15,127	3,842,219
Entertainment/Gym	28,597	5,004,508	44,293	2,303,226	32,193	7,307,734
Hospitals/ Health	28,552	4,482,740	16,542	397,008	26,960	4,879,748
Government	21,156	3,448,369	5,990	11,980	20,972	3,460,349
Parking	28,878	4,273,884	30,460	517,824	29,041	4,791,708
Other	20,947	9,991,873	13,971	586,792	20,383	10,578,665
TOTAL	22,197	139,400,195	18,899	36,853,374	21,416	176,253,569

*Source: Project level data file except for UI Mean Lifetime kWh Savings, which came from the measure level data file.

*1 negative value for Annual kWh Savings in the UI data file was not included

Table III-16D displays project level annual savings per square foot by facility type. While the previous table shows that colleges/schools followed by entertainment/gym had the highest savings, the table below shows that these types of facilities had lower than average savings per square foot. The higher savings for these facilities are related to their larger facility size. The table shows that restaurant/food stores, parking, and retail establishments had the greatest savings per square foot.

Table III-16D
Project Level Annual Savings (kWh) per Square Foot
By Facility Type

	CL&P		UI		Both Utilities	
	Mean	Total	Mean	Total	Mean	Total
Office	3.2	3,738	3.4	538	3.2	4,276
Retail	6.3	7,042	5.0	643	6.1	7,685
Auto-Related	3.8	1,946	5.5	298	3.9	2,244
Restaurant/ Food Store	8.7	3,755	9.6	984	8.9	4,739
Manufacturing/ Industrial /Workshop	2.5	1,031	4.9	268	2.8	1,299
College/ School	3.0	857	3.2	115	3.0	973
Residential	3.7	727	5.2	264	4.0	991
Warehouse	1.9	287	3.0	101	2.1	389
Religious	2.0	326	2.9	73	2.1	399
Entertainment/Gym	4.2	603	4.8	73	4.2	676
Hospitals/ Health	3.4	510	4.6	28	3.4	538
Government	5.3	819	0.2	<1	5.3	819
Parking	7.8	947	13.4	94	8.1	1,041

	CL&P		UI		Both Utilities	
Other	3.6	188	4.1	53	3.7	242
TOTAL	4.5	22,779	5.1	3,533	4.6	26,311

*Source: Project level data file

*Cases with negative Annual kWh Savings and square foot under 100 (including 0) or missing were not included

Figure III-4 shows the cost per kWh saved by year. While the cost was somewhat higher in the more recent program years, the cost only ranged from about \$0.60 in 2007 to \$0.95 in 2011.

Figure III-6

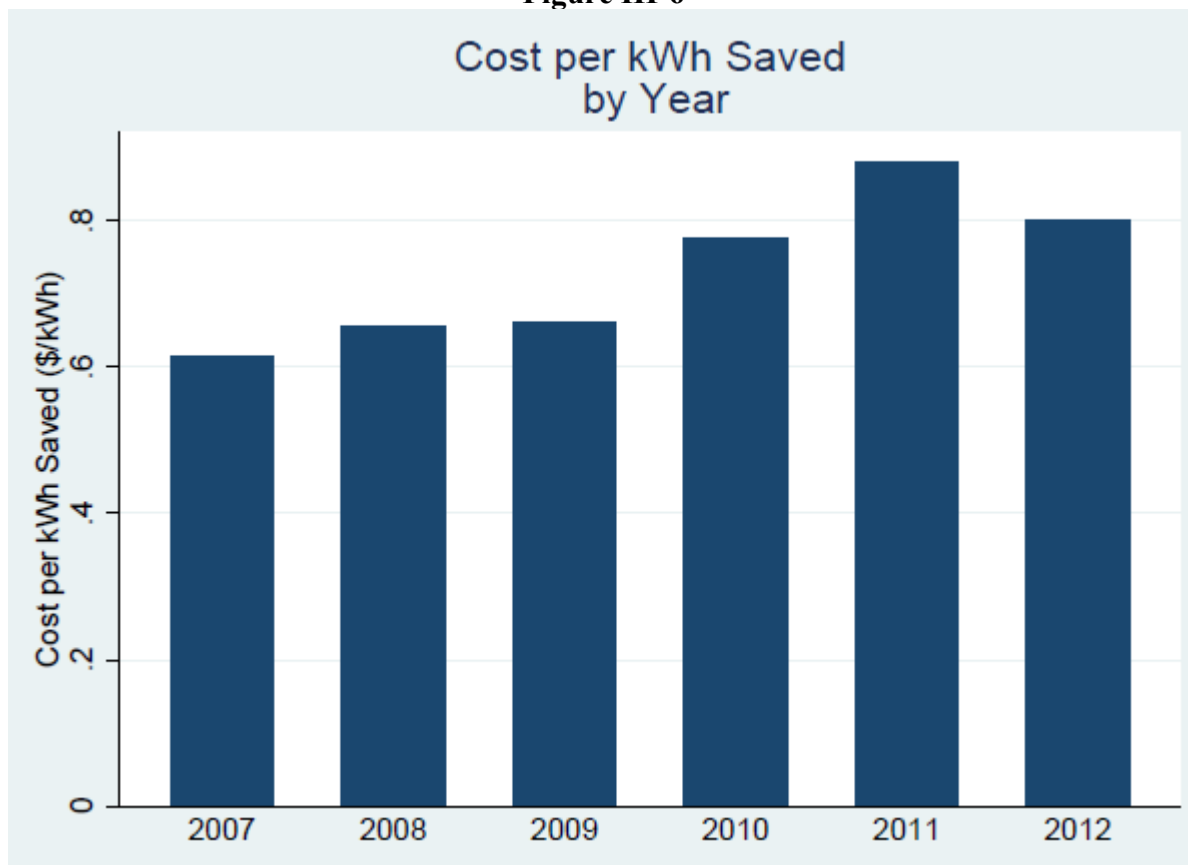


Table III-16E examines annual savings by measure categories. Projects with other measures in addition to lighting had much higher savings.

Table III-16E
Project Level Annual kWh Savings
By Measure Category

	Lighting Only	Lighting and Refrigeration	Lighting and Custom	Lighting and Cooling/Heating/Domestic Hot Water
Projects	6,208	1,354	880	221
Mean	16,071	40,406	43,515	40,723
25 th Percentile	3,676	12,336	11,550	8,205
Median	7,444	24,482	24,874	18,151
75 th Percentile	16,531	48,385	52,872	60,522

Table III-17A displays peak savings and gross annual kW savings. The table shows that mean peak savings for UI were 4 kW. Mean annual kW savings were estimated to be 5.7.

Table III-17A
Project Level Peak and Annual Average kW Savings

	Peak kW Savings	Annual Average kW Savings		
	UI	CL&P	UI	Both Utilities
Projects	1,952	6,280	1,952	8,232
Number Negative or Outlier [†]	5	22	1	23
Number Zero	76	244	1	245
Projects Included In Analysis	1,871	6,014	1,950	7,964
Mean Savings	4.0	5.6	6.0	5.7

*Source: Project level data file

[†]6 values greater than 900 kW in the CL&P data file for annual kW savings were defined as outliers.

Table III-17B shows that the peak savings were higher in 2007 and lower in 2009, but averaged around 4 to 5 kW in the other program years. Mean annual average kW savings ranged from 5 to 7 kW over the years included in the analysis.

Table III-17B
Project Level Peak and Annual Average kW Savings
by Year

	UI Mean Peak Savings (kW)	Annual Average kW Savings					
		CL&P		UI		Both Utilities	
		Mean	Total	Mean	Total	Mean	Total
2007	6.8	5.9	646	8.0	161	6.3	807
2008	4.3	7.9	8,614	6.2	3,019	7.4	11,633

	UI Mean Peak Savings (kW)	Annual Average kW Savings					
		CL&P		UI		Both Utilities	
2009	2.8	7.5	5,739	4.4	2,434	6.2	8,173
2010	5.0	4.7	7,322	6.9	2,278	5.1	9,600
2011	4.1	4.7	6,164	6.2	1,885	5.0	8,049
2012	4.3	4.4	5,308	7.6	1,965	5.0	7,273
TOTAL	4.0	5.6	33,792	6.0	11,743	5.7	45,535

*Source: Project level data file

*Peak savings was only available for UI. *5 negative values for peak kW savings were not included.

*1 negative value in the UI data file and 16 negative values in the CL&P data file for annual kW savings were not included.

* 6 values greater than 900 kW in the CL&P data file for annual kW savings were not included.

Table III-17C displays peak and annual kW savings by facility type. The table shows that colleges/schools, followed by entertainment/gym had the highest mean peak savings and college/school had the highest mean annual kW savings.

Table III-17C
Project Level Annual Average kW Savings
By Facility Type

Facility Type	UI Mean Peak Savings (kW)	Annual Average kW Savings					
		CL&P		UI		Both Utilities	
		Mean	Total	Mean	Total	Mean	Total
Office	3.5	4.8	6,337	5.1	2,362	4.9	8,699
Retail	3.1	4.1	4,970	4.5	1,692	4.2	6,662
Auto-Related	2.1	4.1	2,490	4.6	785	4.2	3,275
Restaurant/Food Store	3.1	4.2	2,104	5.3	1,330	4.6	3,434
Manufacturing/Industrial/Workshop	5.4	7.0	3,414	7.8	1,279	7.2	4,693
College/School	10.6	13.6	4,095	15.1	1,101	13.9	5,196
Residential	3.1	3.8	928	4.5	674	4.1	1,603
Warehouse	6.0	7.0	1,089	8.2	940	7.5	2,028
Religious	6.3	7.5	1,455	10.6	584	8.2	2,038
Entertainment/Gym	7.9	7.6	1,271	10.9	569	8.4	1,840
Hospitals/Health	3.8	6.7	1,031	5.2	125	6.5	1,156
Government	4.1	5.9	917	5.4	11	5.9	927
Parking	0.6	7.4	516	7.6	130	7.4	645
Other	2.4	6.7	3,176	3.9	163	6.5	3,339
TOTAL	4.0	5.6	33,792	6.0	11,743	5.7	45,535

*Source: Project level data file

*Peak savings were only available for UI. *5 negative values for peak kW savings were set to missing in the UI data file.

*1 negative value in the UI data file and 16 negative values in the CL&P data file for annual kW savings were set to missing.

* 6 values greater than 900 kW in the CL&P data file for annual kW savings were not included.

Table III-17D displays annual kW savings by measures installed. The table shows that projects with lighting and custom measures had the greatest peak annual kW savings.

Table III-17D
Project Level Annual Average kW Savings
By Measure Category

	Lighting Only	Lighting and Refrigeration	Lighting and Custom	Lighting and Cooling/Heating/Domestic Hot Water
Projects	6,015	1,344	821	212
Mean	5.0	7.8	9.2	8.5
25 th Percentile	1.3	2.0	2.1	1.9
Median	2.6	4.0	4.4	4.4
75 th Percentile	5.5	8.5	9.7	8.6

Seasonal savings were available in CL&P's SBEA database and were defined as gross summer kW savings and gross winter kW savings. Table III-18A shows that mean summer savings were projected to be 5.1 kW and mean winter savings were projected to be 4.1 kW. Projected net savings were about ten percent lower.

Table III-18A
CL&P Project Level Mean Seasonal Savings (kW)

	CL&P kW Savings			
	Summer	Winter	Net Summer	Net Winter
Projects (6280)				
Number Missing	0	0	0	0
Number Zero	289	204	290	205
Projects Included in Analysis	5,991	6,076	5,990	6,075
Mean kW Savings	5.1	4.1	4.6	3.7

*Source: Project level data file.

Table III-18B displays CL&P mean seasonal savings by year. The table shows that savings were highest in 2008 and then declined through 2012. We do not have information as to whether the estimation methodology changed over the period analyzed.

Table III-18B
CL&P Project Level Seasonal Savings (kW)
By Year

	CL&P					
	2007	2008	2009	2010	2011	2012
Mean Summer kW Savings	5.9	7.9	6.5	4.3	4.4	3.1
Mean Winter kW Savings	5.9	7.8	5.4	3.0	3.0	2.4
Mean Summer kW Net Savings	5.9	7.9	6.4	3.8	3.6	2.5
Mean Winter kW Net Savings	5.9	7.8	5.3	2.5	2.3	1.9

*Source: Project level data file.

Table III-18C displays projected seasonal savings by facility type. The table shows that college/school facilities have the greatest savings, followed by the other category.

Table III-18C
CL&P Project Level Seasonal Savings (kW)
By Facility Type

	CL&P Mean kW Savings			
	Summer	Winter	Net Summer	Net Winter
Office	4.6	3.4	4.1	3.1
Retail	4.1	3.3	3.6	2.9
Auto-Related	2.5	2.5	2.3	2.2
Restaurant/Food Store	3.8	3.3	3.4	2.8
Manufacturing/Industrial/Workshop	6.1	4.3	5.5	3.8
College/School	12.2	9.6	11.4	8.9
Residential	4.4	3.5	4.1	3.2
Warehouse	6.4	4.5	5.5	3.8
Religious	5.2	4.5	4.8	4.1
Entertainment/Gym	5.9	4.5	5.3	4.0
Hospitals/Health	6.5	4.9	6.0	4.5
Government	5.2	3.7	4.7	3.3
Parking	4.8	4.8	4.6	4.4
Other	6.6	6.5	6.6	6.5
TOTAL	5.1	4.1	4.6	3.7

*Source: Project level data file

Table III-19A displays data on measure level savings. The table shows that mean annual measure savings were 1,213 kWh and mean measure demand savings were about 0.4 kW.

**Table III-19A
Measure Level Savings**

	CL&P	UI	Both Utilities
Number of Measures	125,910	37,207	163,117
Annual kWh Savings			
Number of Negative	1,091	367	1,458
Number of Zero	6,265	9,433	15,698
Number of Measures in Analysis	118,554	27,407	145,961
Mean Annual kWh Savings	1,181	1,351	1,213
Lifetime kWh Savings			
Number of Negative	1,090	358	1,448
Number of Zero	6,340	9,511	15,851
Number of Measures in Analysis	118,480	27,338	145,818
Mean Lifetime kWh Savings	14,482	15,824	14,734
Annual kW Savings			
Number of Outliers [†]	1,305	369	1,674
Number of Zero	24,895	9,423	34,318
Number of Measures in Analysis	99,710	27,415	127,125
Mean Annual kW Savings	0.35	0.43	0.36

*Source: Measure level data file.

[†]Negative annual demand savings and annual demand savings over 900 kW were defined as outliers in this analysis.

Table III-19B displays mean annual kWh measure savings by measure category. The table shows that lighting measures averaged 1,093 kWh annual savings, refrigeration measures averaged 4,387 kWh annual savings, custom measures averaged 12,497 kWh annual savings, and HVAC and DHW measures averaged 6,243 kWh in annual savings.

Table III-19B
Measure Level Annual kWh Savings
By Measure Category

	Lighting	Refrigeration	Custom	Cooling/Heating/ Domestic Hot Water	Missing
Number of measures included in analysis	141,626	3,669	195	322	149
Mean	1,093	4,387	12,497	6,243	10,731
Min	<1	40	49	2	30
25 th Percentile	118	1,404	969	470	600
Median	308	2,508	4,538	2,226	1,210
75 th Percentile	839	4,824	17,514	6,969	9,653
Max	298,771	133,892	89,181	92,854	199,436

Table III-19C displays annual demand savings by measure category. While lighting measures averaged .3 kW, refrigeration averaged .6 kW, custom averaged 3.6 kW, and HVAC and DHW averaged 5.0 kW.

Table III-19C
Measure Level Annual Demand Savings
By Measure Category

	Lighting	Refrigeration	Custom	Cooling/Heating/ Domestic Hot Water	Missing
Number of measures included in analysis	123,722	2,872	133	249	149
Mean	0.3	0.6	3.6	5.0	3.9
Min	<0.1	<0.1	<0.1	<0.1	<0.1
25 th Percentile	0.1	0.1	0.3	0.2	0.1
Median	0.1	0.3	1.6	0.7	0.4
75 th Percentile	0.3	0.6	4.7	3.1	4.1
Max	67.6	66.8	35.9	492.0	52.4

Table III-20A displays the percent of usage saved. The usage data was provided by the utilities for the period of November 2011 through October 2012. Therefore savings, as a percent of pre-treatment usage was calculated in the following manner.

- 2007-2011 SBEA participants
 $\% \text{ savings} = (\text{kWh Savings}) / \{(\text{kWh Savings}) + (\text{kWh usage})\} * 100$
- 2012 SBEA participants
 $\% \text{ savings} = (\text{kWh Savings}) / (\text{kWh usage}) * 100$

The table shows that mean savings was about 24 percent of pre-treatment usage for both utilities.

Table III-20A
Percent of Usage Saved

Percent of Usage Saved	CL&P	UI	Both Utilities
Project	6,280	1,952	8,232
Missing Usage	1,984	259	2,243
Missing Savings	0	1	1
Projects Included in Analysis	4,296	1,692	5,988
Mean	24%	25%	24%
25th Percentile	12%	13%	12%
Median	20%	22%	21%
75th Percentile	30%	32%	30%

Table III-20B displays the distribution of the percent of usage saved. The table shows that about 20 percent saved less than ten percent, 29 percent saved 11 to 20 percent, 26 percent saved 21 to 30 percent, 17 percent saved 31 to 40 percent, and nine percent saved more than 40 percent of their pre-treatment usage.

Table III-20B
Percent of Usage Saved Distribution

Percent of Usage Saved	CL&P	UI	Both Utilities
≤10%	20%	16%	19%
11% - 20%	29%	28%	29%
21% - 30%	26%	26%	26%
31% - 40%	16%	18%	17%
>40%	8%	12%	9%
TOTAL	100%	100%	100%

†Cases with missing usage or savings were excluded from this analysis.

Table III-20C displays the percent of usage saved by facility type. The table shows that warehouses and parking facilities had the highest average percent savings. This does not

appear to relate to some of the previous characteristics examined by facility type such as types of measures installed or energy use intensity.

Table III-20C
Percent of Usage Saved for Both Utilities
By Facility Type

Facility Type	Observations	Mean	25th Percentile	Median	75th Percentile
Office	1,441	25%	14%	22%	31%
Retail	1,324	25%	15%	24%	32%
Auto-Related	628	26%	17%	24%	31%
Restaurant/Food Store	602	15%	7%	12%	18%
Manufacturing/Industrial/Workshop	522	23%	11%	19%	28%
College/School	282	19%	9%	17%	26%
Residential	104	21%	9%	17%	28%
Warehouse	246	42%	17%	26%	35%
Religious	187	23%	14%	23%	32%
Entertainment/Gym	173	24%	12%	20%	30%
Hospitals/Health	146	21%	11%	20%	28%
Government	131	20%	11%	18%	25%
Parking	118	35%	17%	32%	48%
Other	84	21%	11%	19%	28%
TOTAL	5,988	24%	12%	21%	30%

†Cases with missing usage or savings were excluded from this analysis.

Table III-20D displays the percent of usage saved by measures installed. The table shows that projects that installed all of the measure types had approximately the same average percentage savings as the other measure groups.

Table III-20D
Percent of Usage Saved for Both Utilities
By Measures Installed

	Lighting Only	Lighting and Refrigeration	Lighting and Custom	Lighting and Cooling/Heating/ Domestic Hot Water
All Projects	6,209	1,354	880	221
Missing Usage	1,783	305	164	34
Missing Savings	1	0	0	0

	Lighting Only	Lighting and Refrigeration	Lighting and Custom	Lighting and Cooling/Heating/ Domestic Hot Water
Projects Included in Analysis	4,425	1,049	716	187
Mean	24%	22%	25%	27%
25th Percentile	12%	12%	12%	15%
Median	21%	19%	20%	23%
75th Percentile	30%	28%	31%	31%

IV. Comparison to Eligible Population

This section compares the SBEA participants in 2007 through 2012 to the eligible CL&P and UI customers. Participants are compared to all customers with usage below 200 kW and customers with usage between 10 and 200 kW as these are the eligibility requirements for the SBEA.

A. Business Segment

Information on the customer segment was available in the CL&P database. Table IV-1 compares the business segment for these three groups of customers.

1. All customers with usage below 200 kW.
2. Customers with usage between 10 and 200 kW who are eligible for the SBEA.
3. SBEA participants from 2007 through 2012.

The table shows that the participants and eligible customers were from very similar business segments. Eligible customers were somewhat more likely to be in accommodation and food services, but no large discrepancies were seen. SBEA participation is a very good representation of Connecticut businesses of this size (by kW usage).

**Table IV-1
Business Segment**

Segment	CL&P		
	All <200kW ¹	SBEA Eligible ²	SBEA Particip ³
Customers/Participants	95,463	37,584	6,280
Customers Included in Analysis	79,633	32,909	3,675
Retail Trade	14%	17%	18%
Real Estate Rental and Leasing	12%	8%	7%
Health Care and Social	7%	7%	7%
Public Administration	7%	8%	8%
Accommodation and Food Services	6%	11%	7%
Information	6%	2%	1%
Construction	5%	3%	5%
Professional, Scientific, and Technical Services	5%	3%	4%
Manufacturing	5%	7%	8%
Administrative and Support and Waste Management and Remediation Services	4%	3%	4%
Wholesale Trade	4%	4%	6%
Finance and Insurance	4%	4%	3%
Arts, Entertainment, and Recreation	3%	3%	4%

	CL&P		
Educational Services	2%	3%	2%
Transportation and Warehousing	2%	2%	1%
Utilities	1%	1%	1%
Agriculture, Forestry, Fishing and Hunting	<1%	<1%	<1%
Management of Companies and Enterprises	<1%	<1%	<1%
Mining	<1%	<1%	<1%
Other Services (except Public Administration)	12%	13%	14%
Total	100%	100%	100%

*Source: Customer data file

¹ 15,830 customers did not have segment information and were excluded from this analysis.

² 4,675 customers did not have segment information and were excluded from this analysis.

³ 2,997 customers did not have segment information and were excluded from this analysis.

Table IV-2 displays the legal classification for the three groups of customers. Again, the distribution across customer groups was very similar. All three groups were most likely to have a corporate structure.

**Table IV-2
Legal Classification**

	CL&P		
Legal Class	All under 200 kW ¹	SBEA Eligible ²	SBEA Participant ³
Customers/Participants	95,463	37,584	6,280
Customers Included in Analysis	80,857	33,461	3,690
Corporate	67%	73%	77%
LLC	14%	11%	8%
Municipal	6%	7%	9%
Sole Proprietorship	6%	3%	2%
University	3%	3%	3%
State	1%	2%	<1%
Limited Partnership	1%	<1%	<1%
Federal	<1%	1%	<1%
Nonprofit	<1%	<1%	<1%
Partnership	<1%	<1%	<1%
Trust	<1%	<1%	<1%
Miscellaneous	<1%	<1%	<1%
Total	100%	100%	100%

*Source: Customer data file

¹ 14,606 customers did not have legal class information and were excluded from this analysis.

² 4,123 customers did not have legal class information and are excluded from this analysis.

³ 2,590 customers did not have legal class information and are excluded from this analysis.

B. Usage and Demand

This section compares the usage of the three customer classes. Usage for the participants is post-treatment usage. Table IV-3 shows that mean annual usage was very similar for CL&P SBEA eligible and participant customers, but that the SBEA-eligible was skewed higher, with a significantly greater median and 75th percentile annual usage. UI eligible customers had higher mean and median usage than the participants. These differences are approximately equal to the mean annual projected savings of 21,000 kWh.

**Table IV-3
Annual Usage (kWh)**

	CL&P			UI			Both Utilities		
	All <200kW	SBEA Eligible	SBEA Particip	All <200kW	SBEA Eligible	SBEA Particip	All <200kW	SBEA Eligible	SBEA Particip
Observations	95,463	37,584	6,280	34,922	10,081	1,952	130,385	47,665	8,232
Missing Observations	0	0	1,984	0	0	259	0	0	2,243
Zero Value Observations	896	30	0	835	1	3	1,731	31	3
Outlier Observations†	5	0	0	86	0	1	91	0	1
Observations in Analysis	94,562	37,554	4,296	34,001	10,080	1,689	128,563	47,634	5,985
Mean	55,012	122,202	121,121	41,189	119,101	90,469	51,356	121,546	112,471
25 th Percentile	5,654	34,300	17,762	3,281	35,600	14,741	4,692	34,609	16,832
Median	16,445	63,120	42,519	9,746	62,720	34,649	14,620	63,000	40,400
75 th Percentile	48,160	131,920	120,080	33,240	128,140	86,998	44,200	131,116	110,320

*Source: Customer data file.

†Cases with negative annual kWh usage were defined as outliers in this analysis.

Table IV-4 compares the annual usage distribution for the three groups of customers. The table shows that SBEA participants were more likely than all eligible to have usage under 10,000 kWh and eligible customers were more likely to have usage between 40,000 and 80,000 kWh.

**Table IV-4
Annual Usage (kWh) †**

kWh	CL&P			UI			Both Utilities		
	All <200kW	SBEA Eligible	SBEA Particip	All <200kW	SBEA Eligible	SBEA Particip	All <200kW	SBEA Eligible	SBEA Particip
Observations	95,458	37,584	4,296	34,836	10,081	1,692	130,294	47,665	5,988
0	1%	<1%	0%	2%	<1%	<1%	1%	<1%	<1%
1-<10,000	37%	3%	11%	49%	1%	15%	40%	3%	13%
10,000-<20,000	18%	7%	17%	14%	7%	18%	17%	7%	17%

kWh	CL&P			UI			Both Utilities		
	All <200kW	SBEA Eligible	SBEA Particip	All <200kW	SBEA Eligible	SBEA Particip	All <200kW	SBEA Eligible	SBEA Particip
20,000-<40,000	16%	20%	20%	13%	22%	20%	15%	21%	20%
40,000-<60,000	8%	17%	12%	6%	18%	11%	7%	17%	11%
60,000-<80,000	5%	11%	7%	4%	12%	9%	4%	12%	7%
80,000-<100,000	3%	8%	5%	2%	8%	5%	3%	8%	5%
100,000-120,000	2%	5%	4%	2%	5%	3%	2%	5%	4%
>120,000	11%	28%	25%	8%	27%	19%	10%	27%	23%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

*Source: Customer data file

†The cases with missing and negative annual kWh usage were excluded from this analysis.

Table IV-5 displays data on the average demand for the three groups. The table shows that participants had somewhat lower demand than the full group of eligible customers. Again, the differences are approximately equal to the savings that were projected from program participation.

Table IV-5
Average Demand (kW)

	CL&P			UI			Both Utilities		
	All < 200kW	SBEA Eligible	SBEA Particip	All <200kW	SBEA Eligible	SBEA Particip	All <200kW	SBEA Eligible	SBEA Particip
Observations	95,463	37,584	6,280	34,922	10,081	1,952	130,385	47,665	8,232
Missing Observations	0	0	2,003	0	0	259	0	0	2,262
Zero Value Observations	872	0	0	16,905	0	200	17,777	0	200
Outlier Observations†	0	0	0	48	0	1	48	0	1
Observations in Analysis	94,591	37,584	4,277	17,969	10,081	1,492	112,560	47,665	5,769
Mean	16	33	32	21	34	29	17	33	31
25 th Percentile	3	14	8	6	14	9	4	14	8
Median	8	20	15	11	20	16	8	20	15
75 th Percentile	16	37	33	22	38	33	17	37	33

*Source: Customer data file

†Cases with negative average demand were defined as outliers in this analysis.

Table IV-6 displays the distribution of average demand for the three groups of customers. The table shows that while participants had demand under 10 kW after participating in the program, the eligible customers did not. Eligible customers were most likely to have demand between 10 and 20 kW.

Table IV-6
Average Demand (kW) †

kWh	CL&P			UI			Both Utilities		
	All <200kW	SBEA Eligible	SBEA Particip	All <200kW	SBEA Eligible	SBEA Particip	All <200kW	SBEA Eligible	SBEA Particip
Observations	95,463	37,584	4,277	34,874	10,081	1,692	130,337	47,665	5,969
0	1%	0%	0%	48%	0%	12%	14%	0%	3%
1-<10	60%	0%	34%	23%	0%	27%	50%	0%	32%
10-<20	20%	50%	27%	14%	49%	26%	18%	50%	27%
20-<30	7%	18%	12%	5%	19%	11%	7%	18%	12%
30-<40	4%	9%	6%	3%	9%	6%	3%	9%	6%
40-50	2%	5%	4%	2%	6%	3%	2%	5%	3%
>50	7%	17%	17%	5%	18%	15%	6%	17%	17%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

*Source: Customer data file

†Cases with missing and negative average demand were excluded from this analysis.

V. Findings

This section provides a summary of the findings from the data mining.

- *Projects*: From 2007 through 2012 there were nearly 6,300 CL&P SBEA projects installed and nearly 2,000 UI SBEA projects installed. The peak year for the SBEA installations was 2010 for CL&P and 2009 for UI.
- *Project Length*: Projects averaged six months from start to finish, but 25 percent were completed within about 3.5 months and 25 percent took almost eight months or more to complete. As the program matured, projects took less time to complete. Only 15 percent took eight months or more to complete in 2012.
- *Business Type*: The most common types of participants were offices, retail, auto-related, and restaurants, making up half of the projects. College/school projects were more likely to take eight months or more, longer than the other project types and government projects were next most likely to take one year or more to complete.
- *Usage*: While mean usage for CL&P SBEA participants was over 121,000 kWh annually, mean usage for UI SBEA participants was over 90,000 kWh annually. Fifty percent had annual usage under 40,000 kWh and 23 percent had annual usage over 120,000 kWh. College/school, restaurants/food, and manufacturing were most likely to have annual usage over 120,000.
- *Usage Intensity*: Restaurant and food establishments had the greatest energy usage intensity. While 74 percent of this facility type had over 30 kWh per square foot of facility space, other establishment types were most likely to use less than 10 kWh per square foot of space.
- *Demand*: Mean average demand was 31 kW, but 25 percent had average demand over 33 kW. College/school, manufacturing and restaurants/food participants were most likely to have average demand over 50 kW.
- *Contractors*: The top two contractors completed 25 percent of the SBEA jobs and the top six contractors completed more than half of the jobs. While 42 contractors participated, 15 completed fewer than 20 jobs each over the full six-year period studied. While the two most productive contractors dropped off their production in 2012, some of the contractors began participating in 2010 or became more productive in 2011 and 2012.
- *Measures*: While almost all projects installed lighting, 17 percent had refrigeration measures, 11 percent had custom measures, and three percent had cooling, heating, or hot water measures. While 72 percent of projects were lighting only, 16 percent had lighting and refrigeration measures installed, ten percent had lighting and custom measures installed, and three percent had lighting and cooling, heating, or domestic hot water measures installed. As expected, restaurant/food stores were most likely to have refrigeration measures, followed by

retail and entertainment/gym. Government and restaurant/food stores were most likely to have custom measures.

- *Costs and Incentives:* Mean project costs were approximately \$14,000 and incentives covered approximately 40 percent of the costs on average. Most projects had between 20 and 60 percent of the costs covered by the SBEA incentive. Projects with custom measures had somewhat higher coverage rates.
- *Financing:* Approximately 90 percent of the SBEA projects used financing. Colleges and schools were least likely to use program financing and government was also less likely to use financing than most of the other facility types.
- *Savings:* Projected average annual savings were 22,197 kWh per CL&P SBEA project and 18,899 kWh per UI SBEA project. Projected average lifetime savings were 272,068 kWh for CL&P and were 221,483 for UI. Colleges/schools had the greatest mean savings by far, followed by the entertainment/gym category. Projects with other measures in addition to lighting had much higher savings.
- *Savings per Square Foot:* Higher savings for colleges and schools followed by entertainment and gym facilities was related to their larger facility size. Restaurant/food stores, parking, and retail establishments had the greatest savings per square foot.
- *Percent Savings:* Warehouses and parking facilities had the highest average savings as a percentage of pre-treatment usage. This does not appear to relate to some of the previous characteristics examined by facility type such as types of measures installed or energy use intensity.
- *Demand Reduction:* Mean annual kW savings in the program database were estimated as 5.7 kW per project. Colleges/schools had the greatest projected savings.
- *Comparison to Eligible Population:* Participants and eligible customers were distributed similarly across business segments and corporate structures. Eligible customers had somewhat higher usage and demand than the post-program usage and demand of SBEA participants, but the differences were approximately equal to the projected reductions, indicating that these customers may have had similar usage and demand prior to program participation.

Overall Findings and Recommendations

There were two primary findings of import from this research. The first is that the program appears to be doing a good job of serving all customer segments. SBEA participation is a very good representation of Connecticut businesses of this size (by kW usage).

Therefore, there does not seem to be underserved business segments that need to be targeted. To target particular segments would move SBEA away from its equal level of service to the C&I customers. If greater savings or higher cost-effectiveness is desired and viewed as having

greater value than providing services equally to the C&I customer segments, then targeting colleges/schools followed by entertainment/gym should aid these alternative goals as these sectors have the highest savings per participant and program dollar.

The second important finding from this independent third-party research is that SBEA participants appear to have on-average saved 24% off their prior demand usage. The SBEA program tracking data does not contain the participant's usage. Matching the billing data to the program data allowed an estimate of the average percent of demand savings expected from the program tracking estimates and customer usage. Comparison of demand usage for the SBEA-eligible population to the SBEA participants over the 2007-2012 period generally supports the program estimates of savings since the difference between the two groups is close to that savings level.³

There were a limited number of contractors who have worked on the program. The utilities have worked to develop these relationships and expand contractor reach in the program. Another potential avenue for increased participation is to increase the contractor participation base.

We have seen the analysis of contractor data by CL&P and the efforts to leverage detailed contractor knowledge to aid in obtaining more savings efficiently. Both program administrators (PAs) are working to expand their relationship with the SBEA contractors. We have no recommendation to change that.

Colleges/schools, followed by entertainment/gym had the greatest mean savings, and are good potential targets for the program to increase savings per participant or cost-effectiveness. The decision to target specific sectors for greater cost-effectiveness would reduce the close representativeness of the SBEA program seen in 2007-2012. The desire for greater cost-effectiveness may outweigh the desire to have the program exactly match its target population. Another alternative mentioned by the utilities during comments on the draft report is that colleges and schools may be better served by energy efficiency efforts other than SBEA.

Given the fact that 72 percent of projects were lighting only and that projects with measures in addition to lighting had much higher savings, increasing the percent of projects with additional measure categories appears to be one of the surest ways to increase program savings. But we know that the PAs have already been undertaking activities to obtain more savings from a broader number of measures in 2013 and 2014. We have no recommendation to change that.

There was no new data collected by this study. The study never planned to generate new data, the only dataset outside of the utilities would have been if purchasing an outside vendor dataset would help in the comparison. The original plan was to purchase a dataset of businesses from Dunn & Bradstreet that would best fit the SBEA-eligible population as best could be requested given data available in the Dunn & Bradstreet database. It was discovered that CL&P had been pulling its entire commercial and industrial (C&I) customer billing data for aggregate analyses. This data could include demand, kW, estimates which would allow an extraction to be made of

³ This also provides secondary support to the SBEA Impact Evaluation that found relatively high realizations within the impact evaluation of the 2011 program year.

the SBEA-eligible customer base to compare with SBEA participants. Utility data within a similar data format was then requested to use as the comparison dataset.

This research study did not involve any new data collection. However, it did involve analysis of existing data that, in our experience, PAs do not usually undertake on their own. We would recommend that future research and evaluation activities have an initial task that involves interviews with PAs to ensure that the research is valuable to the PAs. Undertaking research that relies on data already available to the utilities and being undertaken for outside parties to either have knowledge from this data, or as analysis from an independent third-party, should be carefully assessed for its need and be very explicit about what information from the utility data needs to be produced or assessed by an independent third-party.