Southwestern Public Service Company

2012 Energy Efficiency and Load Management Annual Report

Prepared in Compliance with the Efficient Use of Energy Act and 17.7.2 NMAC (Energy Efficiency Rule)

August 1, 2013

Table of Contents

Glossary of Acronyms and Definition

Acronym/Defined Term	Definition
2012 Annual Report	SPS's 2012 Energy Efficiency and Load Management Annual Report
2012 Plan	SPS's 2012 Energy Efficiency and Load Management Plan
CFL	Compact Fluorescent Light bulb
Commission	New Mexico Public Regulation Commission
EE Rider	Energy Efficiency Rider
EUEA	New Mexico Efficient Use of Energy Act, as amended by Senate Bill 418 (2007), House Bill 305 (2008), and House Bill 267 (2012) §§62-17-1 through 62-17-11 NMSA 1978
Evaluator	Independent Program Evaluator, the third-party contractor that will conduct all measurement & verification of the programs
LED	Light Emitting Diode
Net Generator kW; Net Generator kWh	Demand and energy savings, respectively, measured at the generator, corrected for transmission line losses and free-rider/drivership
ICO	Interruptible Credit Option
M&V	Measurement and Verification
NEB	Non-Energy Benefits refers to benefits of the energy efficiency and load management programs that are unrelated to the generation, transmission, distribution, or cost of energy
Rule	Energy Efficiency Rule 17.7.2 NMAC (2007 version)
SPS	Southwestern Public Service Company, a New Mexico corporation
TRC	Total Resource Cost, a test of cost-effectiveness as defined in the Efficient Use of Energy Act
Xcel Energy	Xcel Energy Inc.

Document Layout
SPS's 2012 Energy Efficiency and Load Management Annual Report ("2012 Annual Report") includes the following sections:

- Section I provides the Executive Summary consisting of an Introduction, Background, and Summary of Results.
- Section II provides the reporting requirements as stated in 17.7.2.13 NMAC.
- Section III provides the program descriptions including an explanation of deviations from goal and changes during 2012, organized into the Residential, Business, and Planning & Research Segments.
- Appendix A provides the Measurement and Verification ("M&V") Report of SPS's 2012 program year prepared by ADM Associates, Inc.

Section I. Executive Summary

Introduction

In accordance with the Efficient Use of Energy Act ("EUEA"), as amended by Senate Bill 418 (2007), House Bill 305 (2008), and House Bill 267 (2013), and the New Mexico Public Regulation Commission's ("Commission") Energy Efficiency Rule ("17.7.2 NMAC", "Rule"), Southwestern Public Service Company, a New Mexico corporation ("SPS"), respectfully submits for Commission review its 2012 Annual Report. The EUEA and its associated Rule require public utilities to offer cost-effective energy efficiency and load management programs and authorizes them to receive cost recovery for qualified expenditures. Further, 17.7.2.13.B NMAC requires SPS to file with the Commission on August 1 of each year, a report on its energy efficiency and load management programs during the prior calendar year. The specific reporting requirements are discussed in Section II.

With this 2012 Annual Report, SPS provides the expenditures and savings results for 11 energy efficiency and load management direct impact programs in the Residential Segment (including Low-Income) and Business Segment (including Large Customer). In addition, the Report includes a summary of the Planning and Research Segment, which supports the direct impact programs. The M&V Report of SPS's 2012 savings is included as Appendix A.

Background

SPS filed its 2012 Energy Efficiency and Load Management Plan ("2012 Plan") on October 26, 2011 and received final approval from the Commission for its 2012 Plan on June 7, 2012 in Case No. 11-00400-UT. The Revised 2012 Plan was filed on August 6, 2012 reflecting all of the program modifications approved in the Stipulation. A budget modification affidavit for the 2012 programs was filed on May 1, 2013 and received final approval from the Commission on June 12, 2013.

Summary of Results

In compliance with 17.7.2.13 NMAC, Table 1 below, shows SPS's program goals, budgets, and TRC Test ratios as approved by the Commission on June 7, 2012, as well as those budget modifications approved by the Commission on June 12, 2013 in Case No. 11-00400-UT. The Stipulation Agreement approved June 7, 2012 included the following revisions to the originally proposed 2012 Plan: the combination of Home Energy Services and the Low-Income Program into one comprehensive Home Energy Services program, an increase in goals and budget for the Home Lighting & Recycling program, the Lighting Efficiency component of the Business Comprehensive

program, and the Small Business Lighting program. Further, the budget modifications approved on June 12, 2013 included budget decreases for the following programs: Energy Feedback Pilot, Evaporative Cooling Rebates, Home Energy Services, Refrigerator Recycling, Business Comprehensive, Interruptible Credit Option, Saver's Switch® for Business, Market Research, Measurement & Verification, Planning & Administration, and Product Development.

Table 1: 2012 SPS-NM DSM Goals and Budgets

Program	Participants	Budget	Peak Demand Savings kW	Annual Energy Savings kWh	Energy Loss Factor	Demand Loss Factor	Generator kW	Generator kWh	TRC Test
Residential Segment									
Energy Feedback Pilot	15,000	$104,914	423	5,292,807	11.80%	16.20%	505	6,000,915	1.69
Evaporative Cooling Rebates	450	$185,495	828	1,010,050	11.80%	16.20%	989	1,145,181	6.54
Home Energy Services: Residential & Low Income	2,300	$1,282,842	2,061	8,967,806	11.80%	16.20%	2,459	10,167,580	3.59
Home Lighting & Recyling	70,175	$948,506	1,223	10,234,750	11.80%	16.20%	1,460	11,604,025	4.24
Refrigerator Recycling	500	$108,176	45	422,500	11.80%	16.20%	53	479,025	1.14
Residential Saver's Switch	945	$543,199	1,710	21,600	11.80%	16.20%	2,041	24,490	5.06
School Education Kits	2,500	$162,241	14	540,992	11.80%	16.20%	16	613,370	127.91
Residential Segment Total	**91,870**	**$3,335,373**	**6,304**	**26,490,505**	**11.80%**	**16.20%**	**7,523**	**30,034,586**	**3.95**
Business Segment									
Business Comprehensive	1,219	$1,987,957	2,208	12,158,268	7.90%	11.00%	2,481	13,201,160	2.81
Interruptible Credit Option	2	$4,699	1,578	14,000	7.90%	11.00%	1,773	15,201	13.02
Saver's Switch for Business	82	$170,956	470	3,480	7.90%	11.00%	528	3,779	2.67
Small Business Lighting	99	$1,260,849	614	2,624,220	7.90%	11.00%	690	2,849,316	1.42
Business Segment Total	**1,402**	**$3,424,461**	**4,870**	**14,799,968**	**7.90%**	**11.00%**	**5,472**	**16,069,455**	**2.49**
Planning & Research Segment									
Business Education		$110,000							
Consumer Education		$151,941							
Market Research		$39,778							
Measurement & Verification		$16,121							
Planning & Administration		$170,701							
Product Development		$53,712							
Planning & Research Segment Total		**$542,253**							
2012 TOTAL	**93,272**	**$7,302,087**	**11,174**	**41,290,472**	**10.44%**	**14.01%**	**12,995**	**46,104,040**	**2.85**

Table 2 provides SPS's actual 2012 program achievements, expenditures, and TRC test ratios, verified by the Independent Program Evaluator ("Evaluator"), ADM Associates, Inc..

In 2012, SPS achieved verified electric savings of 8,636 kW and 37,123,470 kWh at the generator, at a total cost of $7,325,644 (see Table 2 below.) This equals 81% of SPS's 2012 approved energy goal, while spending slightly over 100% of the modified, approved budget. The portfolio was cost-effective with a Total Resource Cost ("TRC") test ratio of 2.65.

As shown in Tables 1 and 2, most of the direct impact energy efficiency programs were cost-effective and the overall portfolio achieved a TRC test ratio of 2.65. Four of the programs did not pass the TRC test in 2012. While each of the products listed below is discussed in more detail later in the Status Report, a summary of the primary reasons for individual programs falling below 1.0 on the TRC test follows.

- Energy Feedback Pilot: 2012 was the first year for this pilot, and despite a late start, it was nearly cost-effective at a TRC of 0.99;
- Residential Saver's Switch: In 2012, the Residential Saver's Switch program experienced lower participation than anticipated and produced lower savings per switch than expected. Switches deployed have a life expectancy of 15 years and participants remaining on the program will contribute load relief for years to come after the initial investment in hardware and installation have been absorbed. As a result, the Residential Saver's Switch program is cost-effective when considering the life-cycle savings that are applied to new switches upon installation. SPS plans to conduct an evaluation of its Residential Saver's Switch program in

2013 and 2014 and anticipates the program to exceed a TRC score of 1.0 within a couple of years.

- Interruptible Credit Option ("ICO"): ICO didn't have any participants in 2012, and therefore achieved a TRC ratio of less than 1.0. SPS believes that increasing participation will continue to be a challenge in the current economic climate but that for the small budget, the program is a valuable option for customers if economic conditions do change.
- Business Saver's Switch: In 2012, the Saver's Switch for Business program produced lower savings per switch than anticipated. Switches deployed have a life expectancy of 15 years and participants remaining on the program will contribute load relief for years to come after the initial investment in hardware and installation have been absorbed. As a result, the Business Saver's Switch program is cost-effective when considering the life-cycle savings that are applied to new switches upon installation. SPS plans to conduct an evaluation of its Saver's Switch for Business program in 2013 and 2014 and anticipates the program to exceed a TRC score of 1.0 within a couple of years.

Table 2: 2012 SPS-NM DSM Third-Party Verified Achievements and Expenditures

Program	Participants	Actual Spend	Peak Demand Savings kW	Annual Energy Savings kWh	Energy Loss Factor	Demand Loss Factor	Generator kW	Generator kWh	TRC Test
Residential Segment									
Energy Feedback Pilot	14,754	$104,914	115	1,802,360	11.80%	16.20%	137	2,043,492	0.99
Evaporative Cooling Rebates	338	$185,495	411	484,595	11.80%	16.20%	490	549,427	8.37
Home Energy Services: Residential & Low	1,677	$1,282,842	1,213	2,850,134	11.80%	16.20%	1,448	3,231,444	3.58
Home Lighting & Recyling	95,278	$1,013,451	1,470	13,194,102	11.80%	16.20%	1,754	14,959,299	5.22
Refrigerator Recycling	302	$108,176	28	252,795	11.80%	16.20%	33	286,616	1.40
Residential Saver's Switch	791	$421,335	1,265	12,427	11.80%	16.20%	1,510	14,090	0.43
School Education Kits	3,425	$153,794	20	729,897	11.80%	16.20%	24	827,548	2.93
Residential Segment Total	**116,565**	**$3,270,006**	**4,521**	**19,326,310**	**11.80%**	**16.20%**	**5,395**	**21,911,916**	**4.35**
Business Segment									
Business Comprehensive	193	$1,987,957	1,897	10,786,521	7.90%	11.00%	2,131	11,711,749	2.68
Interruptible Credit Option	0	$4,699	0	0	7.90%	11.00%	0	0	0.00
Saver's Switch for Business	38	$170,956	53	352	7.90%	11.00%	59	382	0.04
Small Business Lighting	247	$1,347,984	935	3,222,968	7.90%	11.00%	1,051	3,499,422	1.87
Business Segment Total	**478**	**$3,511,596**	**2,885**	**14,009,841**	**7.90%**	**11.00%**	**3,241**	**15,211,554**	**2.38**
Planning & Research Segment									
Business Education		$99,493							
Consumer Education		$164,236							
Market Research		$39,778							
Measurement & Verification		$16,121							
Planning & Administration		$170,701							
Product Development		$53,712							
Planning & Research Segment Total		**$544,041**							
2012 TOTAL	**117,043**	**$7,325,644**	**7,406**	**33,336,151**	**10.20%**	**14.25%**	**8,636**	**37,123,470**	**2.65**

SPS works in good faith to comply with the EUEA and to offer cost-effective energy efficiency and load management programs to all of its customers and will be evaluating each of these programs to ensure they are cost-effective in the future or removed from the portfolio.

Section II: 17.7.2.13 NMAC Reporting Requirements

This section of the Annual Report follows the reporting requirements and section headings as specified in 17.7.2.13.C NMAC.

(1) Independent Measurement and Verification Report:

17.7.2.13.C(1) requires that utilities provide an M&V Report compiled by the Evaluator every year with its Annual Report. In compliance with the reporting requirements, the M&V Report (included as Appendix A) includes:

- Expenditure documentation, at both the total portfolio and individual program levels;
- Measured and verified savings;
- Cost-effectiveness of all of SPS's energy efficiency and load management programs;
- Deemed savings assumptions and all other assumptions used by the Evaluator;
- Description of the M&V process, including confirmation that:
    - Measures were actually installed;
    - Installations meet reasonable quality standards; and
    - Measures are operating correctly and are expected to generate the predicted savings.

Section 1.5 within the 2012 M&V Report (see Appendix A) contains a summary of program recommendations provided by the Evaluator. SPS has evaluated these recommendations and will be implementing the recommended changes to its technical assumptions for the remainder of 2013.

(2) Program Expenditures Not Included in the M&V Report:

In 2012, SPS spent a total of $7,325,644 for its energy efficiency and load management programs. These expenditures included all expenses incurred by SPS to develop and implement the programs. All of these expenditures were included in the M&V Report provided by the Evaluator.

(3) Budgeted Funds Not Spent in Program Year, and
(4) Material Variances in Program Costs

SPS's 2012 forecasted budget was approved by the Commission on June 7, 2012. At that time, SPS anticipated that it would spend a total of $9,983,734. On May 1, 2013, SPS filed a motion to decrease the 2012 program budgets for several programs, pursuant to 17.7.2.14.C NMAC. Commission approval was received on June 12, 2013. With this approval, the final portfolio budget decreased to $7,302,087. In 2012, SPS had actual expenditures of $7,325,644. As presented in Table 3, below, SPS exceeded its approved budgets by $23,557, so there were no unspent funds in 2012.[1] The amount overspent from the final approved budget (less than one percent) is within the 25 percent budget flexibility allowed by 17.7.2.14.C NMAC.

[1] Please note that prior to its request for budget modification SPS had unspent funds in 2012. SPS's 2012 unspent funds totaled $2,658,090 until June 12, 2013, when the Commission approved SPS's requested budget modification in Case No. 11-00400-UT. SPS addressed the reasons for these unspent funds in the affidavit filed in its request for budget modification.

Table 3: 2012 Forecasted Budget, Actual Expenditures, and Variance by Program

Program	Budget	Actual Spend	Variance	% Variance
Residential Segment				
Energy Feedback Pilot	$104,914	$104,914	($0)	0%
Evaporative Cooling Rebates	$185,495	$185,495	($0)	0%
Home Energy Services: Residential & Lov	$1,282,842	$1,282,842	$0	0%
Home Lighting & Recyling	$948,506	$1,013,451	$64,945	7%
Refrigerator Recycling	$108,176	$108,176	($0)	0%
Residential Saver's Switch	$543,199	$421,335	($121,864)	-22%
School Education Kits	$162,241	$153,794	($8,447)	-5%
Residential Segment Total	**$3,335,373**	**$3,270,006**	**($65,367)**	**-2%**
Business Segment				
Business Comprehensive	$1,987,957	$1,987,957	$0	0%
Interruptible Credit Option	$4,699	$4,699	($0)	0%
Saver's Switch for Business	$170,956	$170,956	($0)	0%
Small Business Lighting	$1,260,849	$1,347,984	$87,135	7%
Business Segment Total	**$3,424,461**	**$3,511,596**	**$87,135**	**3%**
Planning & Research Segment				
Business Education	$110,000	$99,493	($10,507)	-10%
Consumer Education	$151,941	$164,236	$12,295	8%
Market Research	$39,778	$39,778	$0	0%
Measurement & Verification	$16,121	$16,121	($0)	0%
Planning & Administration	$170,701	$170,701	($0)	0%
Product Development	$53,712	$53,712	$0	0%
Planning & Research Segment Total	**$542,253**	**$544,041**	**$1,788**	**0%**
2012 TOTAL	**$7,302,087**	**$7,325,644**	**$23,557**	**0%**

With the approved budget modification, no programs showed a budget variance of plus or minus 25 percent or more. Explanations for variances of less than 25 percent are provided below:

1. Residential Saver's Switch – SPS installed fewer switches in the program than anticipated, which led to lower installation and rebate costs.
2. Business Education – During the latter part of 2012, the final four studies/audits of the Business Education program were conducted at oil and gas production facilities. No further funds were required.

(5) Tariff Collections

The Sixth Revised Rate No. 44 Energy Efficiency Rider ("EE Rider") (a per kWh rate) took effect on January 1, 2012[2] to collect SPS's 2011 Commission-approved energy efficiency and load management costs. In its 2012 Plan, SPS received approval to recover $8.4 million (before adjustments) in 2012 program and administrative expenses through the EE Rider. This was less than the originally approved budget of $9,983,734. The revision in the EE Rider took effect on July

[2] See Case No. 0900352-UT and Affidavit of Richard M. Luth and SPS Advice Notice No. 240 (filed December 1, 2011).

1, 2012 and was set to recover the $8.4 million in energy efficiency expenditures in 2012 reduced by the May 2012 over-recovery balance of $2,762,007 for a net 12-month recoverable amount of $5,637,993. The revised EE Rider represents approximately 1.93% of test year base rate revenue from Case No. 10-00395-UT, the most recently completed SPS rate case. On May 31, 2013, SPS filed Advice Notice No. 249 for its Eighth Revised Rate No. 44 EE Rider, which proposes to recover $6.8 million in 2013 energy efficiency costs over a 12-month period, as well as to change the EE Rider from a per kWh charge to three percent of each customer's bill, due to recent amendments to the EUEA. In their Order issued June 26, 2013, the Commission suspended the updated EE Rider rate for 180 days. SPS continues to monitor its tariff rider collection on a monthly basis and will request a revision if the balance grows beyond forecasted expenditures.

(6) Program-Specific Metrics

The following table provides SPS's 2012 program expenditures by cost category.

Table 4: 2012 SPS-NM Energy Efficiency Program Costs by Cost Category

Program	Total Incentive	Internal Admin.	Third-Party Delivery	Promotion	M&V	Total Cost
Residential Segment						
Energy Feedback Pilot	$0	$18,013	$86,900	$0	$0	$104,914
Evaporative Cooling Rebates	$70,800	$25,053	$778	$88,864	$0	$185,495
Home Energy Services: Residential & Lov	$420,432	$151,902	$639,308	$12,088	$59,112	$1,282,842
Home Lighting & Recyling	$458,523	$70,957	$143,756	$330,243	$9,973	$1,013,451
Refrigerator Recycling	$20,625	$16,926	$18,900	$51,724	$0	$108,176
Residential Saver's Switch	$84,037	$200,911	$105,816	$19,344	$11,226	$421,335
School Education Kits	$44,183	$6,143	$103,469	$0	$0	$153,794
Residential Segment Total	**$1,098,599**	**$489,906**	**$1,098,927**	**$502,263**	**$80,311**	**$3,270,006**
Business Segment						
Business Comprehensive	$1,357,310	$369,868	$108,870	$64,471	$87,438	$1,987,957
Interruptible Credit Option	$0	$4,699	$0	$0	$0	$4,699
Saver's Switch for Business	$22,930	$106,300	$26,589	$7,238	$7,898	$170,956
Small Business Lighting	$655,211	$97,762	$576,726	$3,933	$14,353	$1,347,984
Business Segment Total	**$2,035,451**	**$578,628**	**$712,186**	**$75,642**	**$109,689**	**$3,511,596**
Planning & Research Segment						
Business Education	$0	$5	$99,489	$0	$0	$99,493
Consumer Education	$0	$21,900	$0	$142,336	$0	$164,236
Market Research	$0	$39,778	$0	$0	$0	$39,778
Measurement & Verification	$0	$0	$0	$0	$16,121	$16,121
Planning & Administration	$0	$87,628	$0	$0	$83,073	$170,701
Product Development	$0	$53,712	$0	$0	$0	$53,712
Planning & Research Segment Total	**$0**	**$203,024**	**$99,489**	**$142,336**	**$99,193**	**$544,041**
2012 TOTAL	**$3,134,049**	**$1,271,558**	**$1,910,601**	**$720,242**	**$289,193**	**$7,325,644**

The following paragraphs and tables provide program-specific information in sections a) through g) which correspond to the items listed in 17.7.2.13.C(7) NMAC.

a. Comparison of forecasted savings to verified achieved savings for each of the utility's energy efficiency programs

Please refer to Tables 1 and 2 above for SPS's forecasted and achieved verified savings by program.

b. Number of program participants served by each project

Please refer to Table 2 above for the number of program participants.

c. Utility and participant costs, including M&V costs by program

Table 4, above, shows the utility costs, including M&V, broken down by program. Participant costs vary by measure and project and are not easily summarized. SPS does not typically charge customers to participate in the DSM programs, but customers often must purchase specific measures from equipment suppliers in order to qualify for rebates.

d. Total avoided supply-side costs by type of avoided cost (generation, transmission, distribution, etc.)

Table 5, below, shows the third-party verified avoided supply-side costs broken down by type of cost, including avoided generation, avoided transmission and distribution, avoided marginal energy costs, and non-electric acquisition costs.

Table 5: 2012 SPS-NM Third-Party Verified Avoided Costs by Program and Type

Program	Avoided Generation Costs (NPV)	Avoided Transmission and Distribution Costs (NPV)	Avoided Marginal Energy Costs (NPV)	Non-Electric Acquisition Costs (NPV)	Total Avoided Supply-Side Costs (NPV)
Residential Segment					
Energy Feedback Pilot	$11,229	$1,727	$91,168	$0	$104,124
Evaporative Cooling Rebates	$546,486	$84,075	$413,764	$0	$1,044,325
Home Energy Services: Residential & Lov	$1,277,044	$196,468	$1,611,180	$0	$3,084,692
Home Lighting & Recyling	$878,940	$135,221	$4,590,098	$0	$5,604,259
Refrigerator Recycling	$22,246	$3,422	$96,747	$0	$122,415
Residential Saver's Switch	$124,049	$19,085	$686	$0	$143,820
School Education Kits	$14,354	$2,208	$304,726	$0	$321,288
Residential Segment Total	**$2,874,347**	**$442,207**	**$7,108,369**	**$0**	**$10,424,923**
Business Segment					
Business Comprehensive	$1,938,727	$298,266	$7,048,389	$0	$9,285,382
Interruptible Credit Option	$0	$0	$0	$0	$0
Saver's Switch for Business	$4,961	$763	$18	$0	$5,742
Small Business Lighting	$1,123,088	$172,783	$2,478,819	$0	$3,774,690
Business Segment Total	**$3,066,776**	**$471,812**	**$9,527,226**	**$0**	**$13,065,814**
Planning & Research Segment					
Business Education	N/A	N/A	N/A	N/A	N/A
Consumer Education	N/A	N/A	N/A	N/A	N/A
Market Research	N/A	N/A	N/A	N/A	N/A
Measurement & Verification	N/A	N/A	N/A	N/A	N/A
Planning & Administration	N/A	N/A	N/A	N/A	N/A
Product Development	N/A	N/A	N/A	N/A	N/A
Planning & Research Segment Total	**$0**	**$0**	**$0**	**$0**	**$0**
2012 TOTAL	**$5,941,123**	**$914,019**	**$16,635,595**	**$0**	**$23,490,737**

e. Total cost per kWh and kW saved over the life of the measure

Table 6, below, shows the total cost per actual generator kWh and kW saved over the lifetime of the program.

Table 6: 2012 SPS-NM Third-Party Verified Lifetime Cost per Generator kW and kWh Saved

Program	Total Utility Costs	Total Lifetime Generator kWh	Cost per Generator kWh	Total Generator kW	Cost per Generator kW
Residential Segment					
Energy Feedback Pilot	$104,914	2,043,492	$0.0513	137	$768
Evaporative Cooling Rebates	$185,495	5,494,274	$0.0338	490	$378
Home Energy Services: Residential & Low	$1,282,842	48,346,086	$0.0265	1,448	$886
Home Lighting & Recyling	$1,013,451	119,674,395	$0.0085	1,754	$578
Refrigerator Recycling	$108,176	1,433,082	$0.0755	33	$3,296
Residential Saver's Switch	$421,335	14,090	$29.9040	1,510	$279
School Education Kits	$153,794	6,206,608	$0.0248	24	$6,444
Residential Segment Total	**$3,270,006**	**183,212,026**	**$0.0178**	**5,395**	**$606**
Business Segment					
Business Comprehensive	$1,987,957	147,052,126	$0.0135	2,131	$933
Interruptible Credit Option	$4,699	0	N/A	0	N/A
Saver's Switch for Business	$170,956	382	$447.3012	59	$2,882
Small Business Lighting	$1,347,984	52,491,328	$0.0257	1,051	$1,283
Business Segment Total	**$3,511,596**	**199,543,836**	**$0.0176**	**3,241**	**$1,083**
Planning & Research Segment					
Business Education	$99,493	0	N/A	0	N/A
Consumer Education	$164,236	0	N/A	0	N/A
Market Research	$39,778	0	N/A	0	N/A
Measurement & Verification	$16,121	0	N/A	0	N/A
Planning & Administration	$170,701	0	N/A	0	N/A
Product Development	$53,712	0	N/A	0	N/A
Planning & Research Segment Total	**$544,041**	**0**	**N/A**	**0**	**N/A**
2012 TOTAL	**$7,325,644**	**382,755,862**	**$0.0191**	**8,636**	**$848**

f. Total economic benefits for the reporting period, and
g. Net present value of all economic benefits for the life of the measures.

Table 7, below, provides the total economic benefits and TRC net present economic value benefits by program. The total economic benefits are calculated by dividing the total economic net benefits of each program over the lifetime of the program. At the portfolio level, the total lifetime net benefit is divided by the average lifetime of the programs, weighted on the generator kWh provided by each program.

Table 7: Third-Party Verified Total Economic Benefits Derived from SPS-NM 2012 Programs

Program	Total TRC Net Benefits (NPV)	Lifetime (Years)	Total Economic Beneifts Reporting Period
Residential Segment			
Energy Feedback Pilot	($790)	1.00	($790)
Evaporative Cooling Rebates	$919,570	10.00	$91,957
Home Energy Services: Residential & Low Inco	$2,222,282	14.96	$148,537
Home Lighting & Recyling	$4,530,579	8.00	$566,322
Refrigerator Recycling	$34,864	5.00	$6,973
Residential Saver's Switch	($193,478)	1.00	($193,478)
School Education Kits	$211,676	7.50	$28,223
Residential Segment Total	**$7,724,703**		**$647,745**
Business Segment			
Business Comprehensive	$5,819,788	11.840	$491,553
Interruptible Credit Option	$0		$0
Saver's Switch for Business	($142,284)	1.000	($142,284)
Small Business Lighting	$1,758,146	15.000	$117,210
Business Segment Total	**$7,435,650**		**$466,479**
Planning & Research Segment			
Business Education	($99,493)		($99,493)
Consumer Education	($164,236)		($164,236)
Market Research	($39,778)		($39,778)
Measurement & Verification	($16,121)		($16,121)
Planning & Administration	($170,701)		($170,701)
Product Development	($53,712)		($53,712)
Planning & Research Segment Total	**($544,041)**		**($544,041)**
2012 TOTAL	**$14,616,312**		**$570,182**

(7) Non-Energy Benefits

Non-energy benefits ("NEBs") refer to all monetary benefits of the energy efficiency and load management programs that are unrelated to the generation, transmission, distribution, or cost of energy. NEBs may include greenhouse gas emissions reductions, improvements in safety and comfort, reduced arrearages on customer bills, reduced water consumption, and reduced labor and maintenance costs, amongst others. Generally speaking, non-energy benefits are difficult to quantify. ADM did not specifically identify the value of any NEBs in the TRC Test in this Report.

The following table shows the emission reductions associated with SPS's 2012 energy efficiency portfolio. These values were estimated by applying the lifetime and annual energy savings from the 2012 program achievements to the emission rates for SPS's Cunningham Station -2 Plant[3], which is believed to be a fair proxy for the generation avoided by the 2012 energy efficiency programs.

[3] Source: Case No. 12-00298-UT, SPS's 2012 Integrated Resource Plan for New Mexico; Table 3-7: Emission Rates (p. 39).

Table 8: Greenhouse Gas Emissions Avoided With 2012 Programs

Emission Type	Avoided Electric Emissions Rate (lbs/MWh)	Annual Avoided Emissions (lbs)	Lifetime Avoided Emissions (lbs)
CO_2	1,300.000000	48,260,511	497,582,621
SO_2	0.006585	244	2,520
NOx	2.268000	84,196	868,090

The following table shows the amount of water conserved by the 2012 program achievements, due to the reduced need for energy generation. These values are estimated by applying the lifetime and annual energy savings to the water consumption rate for SPS's Cunningham Station Plant average[4], which is believed to be a fair proxy for the energy generation avoided by the energy efficiency programs.

Table 9: Water Consumption Avoided With 2012 Programs

Non-Energy Benefit Type	Avoided Water Consumption Rate (gal/MWh)	Annual Avoided Water Consumption (gal)	Lifetime Avoided Water Consumption (gal)
Water Savings	670	24,872,725	256,446,428

(8) Self-Direct Programs

The Large Customer Self-Direct product was included within the Business Comprehensive program in 2012. This product had no individual goals because it was unknown at the time of filing who might choose to participate. This program had no participants or spending in 2012.

[4] Ibid.

Section III: Segment and Program Descriptions

Residential Segment

SPS has approximately 92,000 customers in its Residential Segment in New Mexico. The service area is relatively rural, with only a few small cities, including Clovis, Roswell, and Hobbs. The climate in this part of New Mexico consists of winters with very little snow and hot, relatively dry summers.

SPS's achievements were under the goal for the Residential Segment as a whole in 2012, but showed good performance in the Home Lighting & Recycling and School Education Kits programs. While not meeting anticipated levels of savings, Home Energy Services and the Energy Feedback Pilot both made significant contributions to the portfolio. Home Lighting performed well due to increased efforts in marketing and advertising including television, radio, on-line, publication, bill inserts, community events and point of purchase displays. On the other hand, customers continued to be reluctant to retire their old, inefficient refrigerators in 2012.

The Energy Feedback Pilot and Residential Saver's Switch were not cost effective in 2012. The Energy Feedback Pilot got a late start in the calendar year and didn't have the time to gain enough traction to be cost-effective. SPS expects it will be cost-effective in 2013. Residential Saver's Switch is a relatively new program that did not get as many new customers as anticipated in 2012. However, the program will continue to yield benefits over time as the deployed switches have a life expectancy of 15 years and participants remaining on the program will continue to contribute load relief for years to come after the initial investment in hardware and installation have been absorbed. SPS has begun to investigate switch performance to ensure that the appropriate savings are being realized and expects the program to be cost-effective in the next couple of years. All other Residential programs were cost effective in 2012.

Energy Feedback Pilot (formerly Consumer Behavior Program)

The Energy Feedback Pilot will provide approximately 15,000 selected customers with a Home Energy Report by mail approximately six times per year. The report provides information on the customer's energy usage and benchmark their energy consumption behavior as compared to 100 similar customers. The program aims to produce a decrease in energy usage by inducing changes in the behavior of the end-user and an increased or earlier adoption of energy efficient technologies and energy efficient practices.

Deviations from Goal

SPS experienced delays in the program setup which meant that the first Home Energy Reports weren't sent to customers until March 2012. The program underspent its budget because fewer Home Energy Reports were sent to customers than originally forecast. The lower electric spend for 2012 reflects this delay as fewer HERs were sent to participants. This also explains why energy savings were lower than expected. The impact of receiving HERs is cumulative and fewer reports resulted in lower than expected savings. Participation is slightly below goal due to normal attrition from customer moves.

Changes in 2012
None.

Evaporative Cooling

The Evaporative Cooling Rebate Product provides a cash rebate to electric customers who purchase and permanently install high-efficiency evaporative cooling equipment for residential use in New Mexico. This tiered rebate program provides $200 or the cost of the unit, whichever is less, for Standard System (Tier 1) units. Tier 1 units blow at least 2,500 cubic feet of air per minute. A $1,000 rebate is offered for Premium System (Tier 2) units with a minimum media saturation effectiveness of 85%, a remote thermostat, and a periodic purge water control.

Deviations from Goal
The Evaporative Cooling Program did not meet the savings goal for 2012 but still remained cost-effective. Despite significant outreach, including on-line media, bill inserts, radio, print ads and retailer/trade mailers, the program fell short overall. To make the program more successful in 2013, SPS plans to: devote additional marketing and advertising dollars, roll out trade incentives, and coordinate with Wisconsin Energy Conservation Corporation to further increase participation.

Changes in 2012
None.

Home Energy Services

The Home Energy Services Program provides incentives to energy efficiency service providers for the installation of a range of upgrades that save energy and reduce costs for existing households. Qualifying customers will receive attic insulation, air infiltration reduction, duct leakage repairs, and high efficiency central air conditioners.

The primary objective of this program is to achieve cost-effective reductions in energy consumption in residential and low-income homes. Additional objectives of the program are to:

- encourage private sector delivery of energy efficiency products and services;
- utilize a whole-house approach to efficiency upgrades; and
- significantly reduce barriers to participation by streamlining program procedures.

SPS partners with qualifying third-party contractors to deliver these services to qualifying residential customers. Contractors must apply to the program and be approved in order to participate. SPS requires contractors to receive pre-approval for targeted multi-family sites prior to installation of any energy efficiency components for which an incentive will be requested.

Deviations from Goal
The Home Energy Services program nearly reached its participation goal but did not achieve its anticipated savings in 2012. SPS attributes this outcome to a decrease in deemed savings per measure early in the year by the Evaluator. The decrease in deemed savings accounts for the overall reduction in savings because each home that participated in the program yielded less savings for the same amount of work, and contractors were not able to add enough homes to make up the lost savings.

Changes in 2012
In 2012, Home Energy Services and the Low-Income Home Energy Services programs were consolidated into a single Home Energy Services program. SPS provides a status report on the Low-Income Home Energy Services program performance to the Commission Staff on a quarterly basis.

The Evaluator reduced the deemed savings for all measures included in the program.

Home Lighting and Recycling

The Home Lighting and Recycling Program helps customers save energy and money by offering energy efficient compact fluorescent light ("CFL") and light emitting diode ("LED") bulbs at a discounted price at participating retailers. SPS works with retailers and manufacturers to buy down the price of bulbs, and offer at least one CFL bulb per location for approximately $1.00 each; LED bulbs were discounted up to $10 each. This provides an inexpensive way for customers to save on their energy usage and reduce their impact on the environment.

SPS marketed the program extensively through a variety of advertising and promotions, including television, radio, on-line, publications, bill inserts, community events, and point of purchase displays. SPS also participated in many local events including the Eastern New Mexico State Fair, annual Chili Cook-Off, and the Cinco De Mayo celebration. SPS partnered with Domino's Pizza to deliver free CFLs with each pizza order for a limited time period. This was a unique promotion in that it delivered bulbs directly to customers' homes and was an extremely low-cost way to reach consumers. SPS recycled 424 CFL bulbs in 2012, an increase of 44 bulbs from 2011.

Deviations from Goal
The 2012 Home Lighting and Recycling Program surpassed its savings goal. SPS distributed and sold 50% more bulbs than projected for little additional cost. The savings achievements were reduced in the measurement and evaluation process due to market saturation.

Changes in 2012
In 2012, SPS added downlight bulbs to the Home Lighting and Recycling program.

Refrigerator Recycling

The Refrigerator Recycling Product is designed to decrease the number of inefficient secondary refrigerators in residential households. The product reduces energy usage by allowing customers to dispose of their operable, inefficient secondary refrigerators in an environmentally safe and convenient manner. Customers receive a $75 incentive and free pick up and disposal services to recycle the secondary refrigerator. This product is primarily marketed by bill inserts, direct mailers, and on-line/social media efforts.

Deviations from Goal
Despite significant outreach efforts, the Refrigerator Recycling Product did not achieve the participant or electric energy savings goal in 2012 due to customer reluctance to remove working secondary refrigerators from their home. Enhanced advertising and marketing efforts have been planned for 2013 to help promote the program offerings.

Changes in 2012
As part of the 2012 Plan Stipulation, SPS agreed to research whether primary refrigerator and freezer recycling is cost-effective, and if so, add those products to the Refrigerator Recycling program. SPS found these new measures to be cost-effective and filed a Motion on November 20, 2012 to include them in the 2013 program. This Motion was approved by the Commission on January 23, 2013.

Saver's Switch (Residential)

Saver's Switch is a demand response program that offers bill credits as an incentive for residential customers to allow SPS to control operation of customers' central air conditioners and electric water heaters on days when the SPS system is approaching its peak. This program is generally utilized on hot summer days when SPS's load is expected to reach near-peak capacity. Saver's Switch helps reduce the impact of escalating demand and price for peak electricity.

When the program is activated, a control signal is sent to interrupt the air conditioning load during peak periods, typically in the afternoons on weekdays. For air conditioners, SPS utilizes a cycling strategy in order to achieve a 50% reduction in load. For enrolled electric water heaters, the entire load is shed for the duration of the control period. Due to limitations in available paging systems, the program is currently available only in the cities of Portales, Hobbs, Clovis, Roswell, Artesia, and Carlsbad. In 2012, the program was activated on four occasions.

Deviations from Goal
In 2012, the Residential Saver's Switch program was not cost-effective due to lower than anticipated program participation. It is normal for a recently launched load management program to be below cost-effectiveness requirements in its first few years. The switches deployed have a life expectancy of 15 years and participants remaining on the program will contribute load relief for years to come after the initial investment in hardware and installation have been absorbed. SPS anticipates the Saver's Switch program to exceed a TRC score of 1.0 within a couple of years. SPS also plans to conduct field inspections of a subset of the current population to validate that:

- switches are properly installed and not subject to tampering;
- signal reception is at an acceptable level;
- switches respond appropriately upon signaling; and
- AC size and type (single stage vs. dual stage) are properly recorded.

This effort will ensure proper operation of the switches and may lead to accelerating the cost effectiveness of the program.

Changes in 2012
None.

School Education Kits

The School Education Kits program provides classroom and in-home activities that enable students and parents to install energy efficiency and water conservation products in their homes. The program is targeted to fifth grade students. A third-party contractor fully implemented the School Education Kits program, including recruiting and training teachers, providing all materials, and tracking participation by the students and teachers. Energy savings are based on the number of

measures that are installed in the homes of the students. Parents are surveyed to determine the measure installation rates.

Deviations from Goal
The product exceeded its participant and savings goals for 2012 by providing more kits than originally anticipated while coming in below budget.

Changes in 2012
None.

Business Segment

SPS has over 20,000 customers in its Business Segment in New Mexico, including commercial, industrial, and agricultural customers of all sizes.

In 2012, SPS fell short of its goals in the Business Segment. The Business Comprehensive program was slightly under goal and the ICO program provided no savings. SPS plans to improve its targeted marketing in 2013 in order to raise performance.

Small Business Lighting continued to perform above expectations and contributed significantly to the portfolio. The Custom Efficiency, Lighting Efficiency, and Motor & Drive Efficiency components of the Business Comprehensive program also made significant contributions to the segment-level savings.

The Large Customer Self-Direct component of the Business Comprehensive program and ICO program had no participation in 2012. ICO was not cost-effective due to a lack of participation. Saver's Switch for Business was also not cost-effective due to fewer participants and fewer savings per participant than anticipated. While Saver's Switch for Business was expected to take a few years to overcome initial equipment costs and become cost-effective, SPS plans to conduct field inspections to confirm proper operation of the switches and ensure future savings.

Business Comprehensive

The Business Comprehensive program bundles traditional prescriptive and custom products to provide customers with less complexity as they evaluate participation in SPS programs. This program is the combination of the Computer Efficiency, Cooling Efficiency, Custom Efficiency, Large Customer Self-Direct, Lighting Efficiency, and Motor & Drive Efficiency products. Some of the products were previously offered as stand-alone programs.

Deviations from Goal
The Business Comprehensive program fell slightly short of its goal. This was due in part to one large project that was slated for completion in 2012 but instead will finish in 2013.

Changes in 2012
For 2012, the Computer Efficiency product was added to the Business Comprehensive Program. As part of the 2012 Plan Stipulation, SPS increased the rebate levels for lighting projects to align them with the rebates offered through our Small Business Lighting program.

Interruptible Credit Option

The ICO program was developed to offer significant savings opportunities to SPS business customers who can reduce their electric demand for specific periods of time when notified. In return for participating, customers receive a monthly credit on their demand charges.

Deviations from Goal
The ICO programs did not have any participants during 2012. The ICO program is best suited for SPS's largest customers, most of whom are in the oil and gas industries. Due to the current economic conditions, most of these large customers see a financial benefit to continuing production, rather than being paid to curtail their load. SPS spent a small amount of the budget on marketing materials such as Customer ICO System Guides and Program Features and Benefits collateral. Current promotions will continue through 2013.

Changes in 2012:
None.

Saver's Switch for Business

Saver's Switch is a demand response program that offers bill credits as an incentive for commercial customers to allow SPS to control operation of their central air conditioners on days when the system is approaching its peak. This program is generally utilized on hot summer days when SPS's load is expected to reach near-peak capacity. Saver's Switch helps reduce the impact of escalating demand and price for peak electricity.

When the product is activated, a control signal is sent to interrupt the air conditioning load during peak periods, typically in the afternoon on weekdays. SPS utilizes a cycling strategy to determine how a customer's air conditioning is being operated in order to achieve a 50% reduction in load. Due to limitations in available paging systems, the program is currently available only in the cities of Portales, Hobbs, Clovis, Roswell, Artesia, and Carlsbad. In 2012, the program was activated on four occasions.

Deviations from Goal
In 2012, Saver's Switch for Business was not cost-effective due to lower than anticipated program participation. It is normal for a recently launched load management program to be below cost effectiveness requirements in its first few years. The switches deployed have a life expectancy of 15 years and participants remaining on the program will contribute load relief for years to come after the initial investment in hardware and installation have been absorbed. SPS anticipates the Saver's Switch program to exceed a TRC score of 1.0 within a couple of years. SPS also plans to conduct field inspections of a subset of the current population to validate that:

- switches are properly installed and not subject to tampering;
- signal reception is at an acceptable level;
- switches respond appropriately upon signaling; and
- AC size and type (single stage vs dual stage) are properly recorded.

This effort will ensure proper operation of the switches and may lead to accelerating the cost effectiveness of the program.

Changes in 2012
None.

Small Business Lighting

The Small Business Lighting Program offers free lighting audits, energy saving recommendations, paperwork assistance, and attractive rebates to business customers with peak demand of up to 400 kW. The program, implemented by Franklin Energy, addresses barriers that traditionally prevent small businesses from investing in energy efficiency products, including: insufficient knowledge of lighting equipment and lack of awareness of energy savings potential in lighting system upgrades, lack of time and staff to complete the necessary steps to upgrade lighting systems, lack of capital to make lighting improvements, and lack of access to quality contractors.

Small Business Lighting is marketed through numerous channels, including: direct trade outreach, customer outreach by Franklin Energy, Energy Efficiency Specialists in SPS's call centers, and general Company branded trade and customer direct mail communication. Strategies used to raise product awareness and stimulate product participation in 2012 included:

- increased staffing to meet growing program participation volume, in-person lighting audits and energy-saving recommendations by Franklin Energy's Energy Advisor;
- electrical and lighting trade outreach; and
- updated sales literature, direct mail, and Web content development.

Deviation from Goal
The Small Business Lighting program exceeded its 2012 goal for energy savings while remaining close to its original budget. This solid performance is attributable to the appeal of a free on-site lighting audit. The audit includes detailed and actionable recommendations for energy savings – including SPS's specific rebates – and Franklin Energy's assistance completing and submitting rebate paperwork on the customer's behalf.

Changes in 2012
None.

Planning & Research Segment

The Planning and Research Segment consists of internal functions (not customer-facing), which support the direct impact programs. The overall purpose of the Planning and Research Segment is to:

- provide strategic direction for SPS's energy efficiency and load management programs;
- ensure regulatory compliance with energy efficiency legislation and rules;
- guide SPS internal policy issues related to energy efficiency;
- train SPS Marketing staff for compliance and cost-effectiveness;
- evaluate program technical assumptions, program achievements, and marketing strategies;
- provide oversight of all evaluation, measurement, and verification planning and internal policy guidance;
- provide segment and target market information;
- analyze overall effects to both customers and the system of SPS's energy efficiency portfolio;
- measure customer satisfaction with SPS's energy efficiency efforts; and
- develop new conservation and load management programs.

The segment includes energy efficiency and load management-related expenses for Business Education, Consumer Education, DSM Planning & Administration, Market Research, Measurement & Verification, and Product Development. Each Planning and Research program is discussed below.

Business Education

In 2012, SPS retained an oil and gas industry expert to evaluate energy efficiency opportunities at large customer sites. Such studies provide a prioritized list of projects for customers to use to evaluate and gain internal approval for upgrades, provide technical detail necessary for energy efficiency rebate applications and analysis, and offer SPS representatives specific knowledge on the customer's operations to engage in relevant energy efficiency opportunities.

Deviations from Goal
During the latter part of 2012, four studies/audits were conducted at oil and gas production facilities. The energy saving potential for each site was identified and each customer received a report for their further evaluation. These last four studies conclude the Business Education program. By utilizing the information gathered in this program, SPS will be able to engage with other oil and gas operations to encourage energy efficiency options. Specifically, the industry expert identified fiberglass pump rods, pump-off controllers, and variable frequency drives as providing industry-wide potential savings opportunities. Where cost-effective, these technologies will be promoted to customers across the oil and gas segment of customers.

Changes in 2012
None.

Consumer Education

Consumer Education is an indirect program that focuses primarily on creating public awareness of energy efficiency while providing residential customers with information on what they can do in their daily lives to reduce their energy usage. The program also supports the various energy efficiency and load management products. SPS employs a variety of resources and channels to communicate conservation and energy efficiency messages, including: the Xcel Energy Inc. ("Xcel Energy) website, bill inserts, events, radio, print, and on-line advertising.

The Consumer Education Program is targeted to all New Mexico residential electric customers. In spreading its messages, the Consumer Education program focuses on:

- web presence on ResponsibleByNature.com;
- community-based marketing events;
- messaging through local radio stations as well as on-line advertising;
- targeted communications to address seasonal usage challenges;
- conservation messaging through Xcel Energy's newsletters and bill inserts to residential customers; and
- publication of reference education materials (in English and Spanish).

Deviations from Goal
The Consumer Education program exceeded its participation goal in 2012, while staying close to its original budget.

Changes in 2012
None.

DSM Planning & Administration

The Planning and Administration area manages all energy efficiency and load management regulatory filings (including this Annual Report), directs and carries out benefit-cost analyses, provides tracking results of energy conservation achievements and expenditures, and analyzes and prepares cost recovery reports. Planning and Administration, which includes outside legal assistance, coordinates and participates in all DSM-related rulemaking activities and litigated hearings. This area also supports the DSM component of resource planning and provides planning and internal policy guidance to meet all energy efficiency and load management regulatory requirements. These functions are needed to ensure a cohesive and high-quality energy efficiency portfolio that meets legal requirements as well as the expectations of SPS's customers, regulators, and Commission Staff.

Deviations from Goal
None.

Changes in 2012
None.

Market Research

The Market Research area spearheads energy efficiency-related research efforts that are used to inform SPS's decision-making concerning energy efficiency and load management. In 2012, the Market Research group oversaw the SPS portion of several Company-wide projects such as the Awareness, Attitude & Usage Study, the Home Use Study, E-Source Membership, and the Dun & Bradstreet list purchase.

Deviations from Goal
None.

Changes in 2012
None.

Measurement & Verification

The Measurement & Verification budget funds the internal staff from the Planning and Administration area who oversee M&V planning, data collection, and internal policy guidance. In addition, this area coordinates the day-to-day activities providing necessary information and program tracking data to the Evaluator as well as serving on the Commission's Evaluation Committee.

17.7.2.13.C(1) NMAC requires that utilities submit an M&V Report conducted by the approved Evaluator every year with its Annual Report. All New Mexico utilities have contracted with ADM Associates, Inc. as their Evaluator for 2012 programs. SPS's 2012 M&V Report is provided as Appendix A of this document. In compliance with the reporting requirements, the M&V Report includes:

- expenditure documentation, at both the total portfolio and individual program levels;
- measured and verified savings;
- evaluation of cost-effectiveness of all of SPS's energy efficiency and load management programs;
- deemed savings assumptions and all other assumptions used by the Evaluator;
- description of the M&V process, including confirmation that:
    - measures were actually installed;
    - installations meet reasonable quality standards; and
    - measures are operating correctly and are expected to generate the predicted savings.

Deviations from Goal
None.

Changes in 2012
None.

Product Development

Product Development identifies, assesses, and develops new energy efficiency and load management products and services. The product development process starts with ideas and concepts from customers, regulators, energy professionals, interest groups, and Xcel Energy staff. These ideas are then carefully screened and only ideas with the most potential are selected for the development process.

Deviations from Goal
None.

Changes in 2012
None.

Appendix A: Measurement & Verification Report:
SPS 2012 Program Year

Provided by ADM Associates, Inc., July 2013

Southwestern Public Service Company DSM Portfolio
Program Year 2012

Prepared for:

New Mexico Energy Efficiency Evaluation Committee

Final, June 2013

Prepared by:

ADM Associates, Inc.
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Table of Contents

List of Tables

List of Figures

1. Executive Summary

This report is to provide a summary of the evaluation effort of the 2012 Demand Side Management (DSM) portfolio by the Southwestern Public Service Company (SPS, a division of Xcel Energy).

1.1 Summary of SPS Energy Efficiency Programs

New Mexico Investor-Owned Utilities (IOUs) are required to develop cost-effective DSM programs, using ratepayer funds to reduce energy demand and consumption. IOUs submit their portfolios to the New Mexico Public Regulatory Commission (NMPRC) for approval. In 2012, the SPS DSM portfolio contained the following programs:

- Residential Evaporative Cooling
- Residential Home Energy Services
- Residential Low Income
- Energy Feedback Pilot
- Home Lighting & Recycling
- School Education Kits
- Residential Refrigerator Recycling
- Business Cooling Efficiency
- Business Lighting Efficiency
- Business Custom Efficiency
- Business Motor & Drive Efficiency
- Business Computer Efficiency
- Large Customer Self-Direct[1]
- Small Business Lighting Efficiency
- Residential Saver's Switch

[1] No participants in 2012

- Business Saver's Switch
- Interruptible Credit Option[2]

For 2012, ADM evaluated a subset of the portfolio. The programs evaluated for this program year include:

- Business Comprehensive[3];
- Home Energy Services;
- Home Lighting & Recycling;
- Energy Feedback Pilot
- Residential Saver's Switch; and
- Business Saver's Switch.

1.2 Evaluation Objectives

The objectives of this evaluation include:

- Development of program-specific evaluation plans;
- Design a sample allowing for 90% confidence and +/- 10% statistical precision for each program;
- Conduct onsite verification inspections, telephone surveying, and onsite metering as needed;
- Evaluate gross savings by program;
- Provide net savings totals through evaluation of free-ridership;
- Evaluate cost-effectiveness of each program using the Total Resource Cost (TRC) test; and
- Evaluate programs within the portfolio and make recommendations for amendments and improvements.

[2] No participants in 2012

[3] In this evaluation, ADM aggregated SPS business programs into Business Comprehensive in order to more efficiently spend M&V resources. This aggregation includes Business Lighting, Business Cooling, Business Motors, and Business Custom Efficiency. Savings for component programs are still reported separately.

1.3 Summary of Findings

Gross savings were estimated by engineering analysis, simulation modeling, participant surveying, and on-site monitoring where appropriate for the program and measure type. ADM then estimated free-ridership and associated net-to-gross ratios (NTGRs) for the evaluated programs Table 1-1 and 1-2 below present the gross and net impact by program. It should be noted that these tables include both evaluated and non-evaluated programs. Non-evaluated programs are shown as having 100% gross and net realization rates.

Table 1-1 Gross Impact Summary

Program	Peak Demand Savings (kW)		Annual Energy Savings, (kWh)		Lifetime Energy Savings (kWh)		Gross Realization Rate
	Expected	Realized	Expected	Realized	Expected	Realized	
Home Energy Services	1,365.1	1,279.9	3,266,856	2,973,066	49,077,329	44,476,885	91.0%
Home Lighting & Recycling	1,923.5	1,917.3	17,268,325	17,212,456	138,146,559	137,669,645	99.7%
Business Lighting	897.8	944.5	2,966,463	3,027,268	44,946,945	45,409,019	102.0%
Business Cooling	159.1	164.5	332,900	366,856	5,395,120	5,945,422	110.2%
Business Custom	117.4	105.9	394,091	390,249	6,939,965	6,882,335	99.0%
Business Motors & Drives	1,466.6	1,049.1	9,644,969	8,893,626	110,386,780	101,787,650	92.2%
Business Computers	2.0	2.0	15,334	15,334	76,670	76,670	100.0%
Small Business Lighting	1,100.2	1,100.2	3,791,727	3,791,727	56,875,898	56,875,898	100.0%
Energy Feedback Pilot	-	114.5	1,610,160	1,802,360	1,610,160	1,802,360	111.9%
Evaporative Cooling Rebates	685.0	685.0	807,658	807,658	8,076,580	8,076,580	100.0%
Low Income	23.1	23.1	85,183	85,183	1,277,745	1,277,745	100.0%
Refrigerator Recycling	42.4	42.4	388,916	388,916	1,344,578	1,344,578	100.0%
School Education Kits	20.0	20.0	729,897	729,897	5,474,228	5,474,228	100.0%
Total	7,802.2	7,448.4	41,302,479	40,484,596	429,628,557	417,099,015	98.0%

Table 1-2 Net Impact Summary

Program	Peak Demand Savings (kW)		Annual Energy Savings, (kWh)		Lifetime Energy Savings (kWh)		Net Realization Rate
	Expected	Realized	Expected	Realized	Expected	Realized	
Home Energy Services	1,269,.5	1,190.3	3,038,176	2,764,951	45,641,916	41,363,503	90.6%
Home Lighting & Recycling	1,538.8	1,469.7	13,814,660	13,194,102	110,517,279	105,552,816	95.5%
Business Lighting	718.3	753.7	2,397,170	2,415,760	35,957,550	36,236,400	100.8%
Business Cooling	127.3	145.9	226,320	325,401	4,316,096	5,273,590	143.8%
Business Custom	93.9	84.8	315,273	312,199	5,551,972	5,505,868	99.0%
Business Motors & Drives	1,173.3	910.6	7,715,975	7,719,667	95,815,725	88,351,680	100.0%
Small Business Lighting	935.1	935.1	3,222,968	3,222,968	48,344,513	48,344,513	100%
Business Computers	1.8	1.8	13,494	13,494	67,470	67,470	100%
Energy Feedback Pilot	-	114.5	1,610,160	1,802,360	1,610,160	1,802,360	111.9%
Evaporative Cooling Rebates	411.0	411.0	484,595	484,595	4,845,950	4,845,950	100%
Low Income	23.11	23.11	85,183	85,183	1,277,745	1,277,745	100%
Refrigerator Recycling	27.5	27.5	252,795	252,795	1,263,978	1,263,978	100%
School Education Kits	20.0	20.0	729,897	729,897	5,474,228	5,474,228	100%
Total	5,070,.1	6,088.1	33,906,666	33,323,372	360,684,582	345,360,101	98.3%

Additionally, ADM evaluated the Residential and Business Saver's Switch programs, providing independent verification of the per-unit kW Factor and total available demand reduction. The results of these evaluations are presented in

Table 1-3 below.

Table 1-3 Saver's Switch Evaluation Results

Sector	Peak kW Factor	# Units	Available Demand Reduction	kWh Savings
Residential	.847	1,494	1,265.0	12,427
Business	.277	191	52.8	352
Total	.782	1,685	1,317.8	12,779

The SPS portfolio exceeded net customer kWh savings targets in both residential and business sectors. The portfolio's performance against goals is summarized in Table 1-4 below.

Table 1-4 SPS Performance against Program-Year Goals

Program	Net Customer kW		Net Customer kWh		% kWh Goal Achieved	% kW Goal Achieved
	Goal	Achieved	Goal	Achieved		
HES: Residential & Low Income	1,979.3	1,213.4	9,094,436	2,850,134	31.3%	61.3%
Home Lighting & Recycling	2,116.2	1,469.7	10,379,271	13,194,102	127.1%	69.4%
Energy Feedback Pilot	434.6	114.5	5,367,545	1,802,360	33.6%	26.3%
Evaporative Cooling Rebates	851.1	411.0	1,024,312	484,595	47.3%	48.3%
Refrigerator Recycling	45.6	27.5	428,466	252,795	59.0%	60.3%
School Education Kits	13.7	20.0	548,631	729,897	133.0%	146.0%
Residential Saver's Switch	1,756.5	1,265.0	21,547	12,427	57.7%	72.0%
Residential Segment Total:	**7,197.0**	**1,469.7**	**26,864,208**	**19,326,310**	71.9%	62.8%
Business Comprehensive	2,235.1	1,896.8	12,234,625	10,786,521	88.2%	84.9%
Small Business Lighting	621.6	935.1	2,640,701	3,222,968	122.0%	150.4%
Business Saver's Switch	475.7	52.8	3,521	352	10.0%	11.1%
Interruptible Credit Option	1,597.3	0	14,088	0	0%	0.0%
Business Segment Total	**4,929.7**	**2,884.7**	**14,892,935**	**14,009,841**	**94.1%**	**58.5%**
Overall Total:	**12,126.7**	**7,405.8**	**41,757,143**	**33,336,151**	**79.8%**	**61.1%**

The SPS 2012 portfolio met 79.8% of program goals for net kWh savings. As presented in Table 1-4, the bulk of the shortfall was due to Home Energy Services and the Energy Feedback Pilot falling short of program expectations.

Finally, ADM estimated cost-effectiveness of the 2012 programs and overall portfolio using the Total Resource Cost (TRC) test and Utility Cost (UCT) test. The results are provided in Table 1-5 below.

Table 1-5 Cost Effectiveness Testing by Program

Program	NPV of TRC Benefits	NPV of UCT Benefits	NPV of TRC Costs	NPV of UCT Costs	TRC	UCT
Home Energy Services	$3,009,457	$3,009,457	$798,379	$1,214,441	3.77	2.48
Home Lighting & Recycling	$5,604,259	$5,604,259	$1,073,680	$1,013,451	5.22	5.53
Evaporative Cooling	$1,044,325	$1,044,325	$124,755	$185,495	8.37	5.63
Energy Feedback Pilot	$104,123	$104,123	$104,914	$104,914	.99	.99
Low Income	$75,236	$75,236	$64,031	$68,401	1.17	1.10
Refrigerator Recycling	$122,415	$122,415	$87,551	$108,176	1.40	1.13
School Education Kits	$321,288	$321,288	$109,612	$153,795	2.93	2.09
Business Lighting	$2,479,445	$2,479,445	$883,589	$565,261	2.81	4.39
Business Cooling	$358,546	$358,546	$172,628	$140,412	2.08	2.55
Business Custom	$297,889	$297,889	$253,815	$210,050	1.17	1.42
Business Motors & Drives	$6,145,400	$6,145,400	$2,152,896	$1,069,883	2.85	5.74
Business Computers	$4,100	$4,100	$2,666	$2,351	1.54	1.74
Small Business Lighting	$3,774,690	$3,774,690	$1,996,642	$1,347,984	1.89	2.80
Residential Saver's Switch	$143,820	$143,820	$337,298	$421,335	.43	.34
Business Saver's Switch	$5,742	$5,742	$148,026	$170,956	.04	.03
Interruptible Credit Option	-	-	$4,698	$4,698	-	-
Business Education	-	-	$99,493	$99,493	-	-
Consumer Education	-	-	$164,236	$164,236	-	-

Market Research	-	-	$39,778	$39,778	-	-
Measurement & Verification	-	-	$16,121	$16,121	-	-
Planning & Administration	-	-	$170,701	$170,701	-	-
Product Development	-	-	$53,712	$53,712	-	-
Total:	$23,490,735	$23,490,735	$8,859,221	$7,325,644	2.65	3.21

1.4 Conclusions

Based on ADM's evaluation of the subset of the 2012 SPS DSM portfolio, the following was concluded:

- **Targeted marketing efforts within the SPS business portfolio have induced participation.** In particular, the SPS business portfolio displays high engagement from their industrial sector. This has driven much of their business portfolio savings in 2012 and prior program years, and is a model that should be emulated elsewhere in New Mexico, where the industrial sectors have not been engaged to a similar degree. Further, SPS has shown consistent participation from their small business segment.
- **Home Lighting has had success with specialty CFLs and alternative delivery mechanisms.** The Home Lighting program is primarily a retail markdown program, but also has significant participation by funding direct install through other SPS programs (such as Home Energy Services and Refrigerator Recycling). Further, the direct distribution channels used by the program implementer are in many instances creative and quite effective, particularly their partnership with pizza delivery restaurants in distributing CFLs.
- **Home Energy Services consistently displays lower verified duct leakage reduction.** ADM conducted on-site testing at a sample of 78 homes installing 100 measures, and found that verified duct leakage rates were consistently lower than the measurements submitted by HES contractors.
- **Home Energy Services may face saturation issues.** The HES program has had consistently high participation in every program year; 2012 reflects a large drop-off from 2011 performance. This may be a function of saturation, as the program has reached a large share of SPS' residential customers. SPS has indicated that the program has to-date treated 20% of their residential housing stock, and have begun focused marketing efforts for the remaining 80% of homes. However, given the reliance that many HES measures have on homes having refrigerated air systems, not all of that remaining 80% would be viable for envelope measures.
- **Pump-Off Controllers are largely saturated among the large oil producers.** SPS has derived much of its business portfolio savings from POCs for large oil producers; many of their large producers have reached a saturation point, and SPS has begun targeting small independent producers instead.

- **Home Energy Reports provide lower savings in SPS territory than observed elsewhere.** In many prior studies, Home Energy Reports typically display 1.8% - 2.2% annual kWh savings. For the SPS program, savings were 0.8% over the post-delivery period. This is likely due to the large share of evaporative cooling in SPS territory, leading to customers having less discretionary usage to curtail. However, the program was still safely cost-effective.

1.5 Recommendations

After completing evaluation of the 2012 SPS DSM Portfolio, ADM has the following recommendations for technical assumption revisions:

1.5.1 Pump-Off Controllers

SPS deemed parameters use an 80% clock setting as the baseline case for POCs. Based on ADM's fieldwork, we have concluded that a base-case setting of 70% is more appropriate for SPS' New Mexico service territory. Further, it has been found that in many instances, installing contractors for POCs turn down the setting on the clock timer. This will be an area of research in 2013 to assess to what extent (if any) these installation practices produce extra savings on top of those gained by installing the POC.

1.5.2 Saltwater Discharge Pumps

In the 2011 and 2012 program years, ADM monitored five saltwater discharge pumps in conducting M&V of SPS' Motor & Drive Efficiency Program. These pumps are used to purge salinized groundwater during the oil production process. In these five projects, ADM found average savings of 3,450 kWh/HP and .400 kW/HP, compared to values of 912 kWh/HP and .204 kW/HP currently used in SPS technical assumptions. The sample size may not be sufficient to provide a firm recommendation, but this measure consistently over-performs technical assumptions when subjected to on-site metering.

1.5.3 Residential CFLs

ADM recommends applying EISA standards with a 6-month lag, to account for the sale of back-stock of incandescent bulbs. Table 1-6 summarizes the baseline changes, effective dates for M&V, and their expected impact on savings per-unit for residential CFLs.

Table 1-6 CFL Baseline Updates & Effective Dates

CFL Wattage	Baseline Wattage	New Baseline Wattage	Legal Effective Date	M&V Effective Date	% Reduction in Savings
26-30W	100W	72W	1/1/2012	7/1/2012	37.8%
18-23W	75W	53W	1/1/2013	7/1/2013	40.7%
13-15W	60W	43W	1/1/2014	7/1/2014	36.9%

9-12W	40W	29W	1/1/2014	7/1/2014	37.9%

1.5.4 NTGR

Based on the 2012 M&V, ADM has the following recommendation for NTGR adjustment:

- Business Cooling: with the shift in participation moving towards smaller customers (typically hotels and small retail), ADM recommends changing the program planned NTGR from 80% to 87.5%.

2. General Methodology

This chapter details general impact evaluation methodologies by program-type as well as data collection methods applied. This chapter will present full descriptions of:

- Gross Savings Estimation;
- Sampling Methodologies;
- Free-Ridership determination; and
- Data Collection Procedures.

2.1 Glossary of Terminology

As a first step to detailing the evaluation methodologies, ADM provides a glossary of terms to follow:

- *Ex Ante* – A program parameter or value used by implementers/sponsoring utilities in estimating savings before implementation
- *Ex Post* – A program parameter or value as verified by ADM following completion of the evaluation effort
- *Deemed Savings* – A savings estimate for homogenous measures, in which an assumed average savings across a large number of rebated units is applied (e.g., assuming 398 kWh savings for a low-flow showerhead)
- *Gross Savings* – Energy or demand savings as determined through engineering analysis and verification
- *Gross Realization Rate* – Ratio of Ex Post Savings / Ex Ante Savings (eg. If ADM verifies 300 kWh per showerhead, Gross Realization Rate = 300/398 = 75%)
- *Free-Ridership* – Percentage of participants who would have implemented the same energy efficiency measures in a similar timeframe absent the program
- *Net Savings* – Gross savings factoring off free-ridership, (eg., if Free-Ridership for low-flow showerheads = 50%, net savings = 300 kWh x 50% = 150 kWh)
- *Net-to-Gross-Ratio (NTGR)* = (1 – Free-Ridership %), also defined as Net Savings / Gross Savings
- *Ex Ante Net Savings* = Ex Ante Gross Savings x Ex Ante Free-Ridership Rate
- *Ex Post Net Savings* = Ex Post Gross Savings x Ex Post Free-Ridership Rate
- *Net Realization Rate* = Ex Post Net Savings / Ex Ante Net Savings
- *Effective Useful Life (EUL)* – The average lifetime of a measure, denominated in years

- *Gross Lifetime kWh* = Ex Post Gross Savings x EUL
- *TRC* – Total Resource Cost Test, taking the ratio of net benefits over net costs, including both participant and utility costs
- *UCT* – Utility Cost Test, taking the ratio of net benefits over net utility costs.

2.2 Overview of Methodology

ADM's methodology in the evaluation of the 2012 SPS DSM Portfolio is intended to provide:

- Net impact results at the 90% confidence and +/-10% precision level;
- Program feedback and recommendations via process evaluation; and
- Cost effectiveness testing at the program and portfolio level.

In doing so, ADM's evaluation will provide the NMPRC with verified net savings results, provide the sponsoring utilities with recommendations for program improvement, and ensure cost-effective use of ratepayer funds. By leveraging experience and lessons learned from impact evaluation of past program years, ADM has been able to expand upon the 2012 evaluation effort, in order to use the results of this impact evaluation to better inform SPS as to methods by which program and portfolio performance could be improved.

2.3 Sampling

Sampling is necessary to evaluate savings for the SPS DSM portfolio insomuch as verification of a census of program participants is typically cost-prohibitive. As per NMPRC requirements, samples are drawn in order to ensure 90% confidence at the +/-10% precision level. Programs are evaluated on one of three bases:

- Census of all participants
- Simple Random Sample
- Stratified Random Sample

2.3.1 Census of Participants

A census of participant data was used for select programs where such review is feasible. No SPS programs incorporated a census approach in their entirety, but some programs had a census approach to a subset of the analysis. For example, Residential Lighting was evaluated by reviewing the deemed savings calculations for a census of line items in the provided tracking data, ensuring that energy and demand savings for each rebated CFL were calculated appropriately.

2.3.2 Simple Random Sampling

For programs with relatively homogenous measures (largely in the residential portfolio), ADM conducted a simple random sample of participants. The sample size for verification surveys is calculated to meet 90% confidence and 10% precision (90/10). The sample size to meet 90/10 requirements is calculated based on the coefficient of variation of savings for program participants. Coefficient of Variation (CV) is defined as:

$$CV = \frac{Mean_x}{Standard\ Deviation_x}$$

Where x is the average kWh savings per participant. Without data to use as a basis for a higher value, it is typical to apply a CV of .5 in residential program evaluations. The resulting sample size is estimated at:

$$n_0 = \left(\frac{1.645 * CV}{RP}\right)^2$$

Where,

1.645 = Z Score for 90% confidence interval in a normal distribution

CV = Coefficient of Variation

RP = Required Precision, 10% in this evaluation

With 10% required precision (RP), this calls for a sample of 68 for programs with a sufficiently large population. However, in some instances, programs did not have sufficient participation to make a sample of this size cost-effective. In instances of low participation, ADM then applied a finite population correction factor, defined as:

$$n = \frac{n_0}{1 + {}^{n_0}/_N}$$

Where

n_0 = Sample Required for Large Population

N = Size of Population

n = Corrected Sample

For example, if a program were to have only 100 participants, the finite population correction would result in a final required sample size of 41. ADM applied finite population correction factors in instances of low participation in determining samples required for surveying or onsite verification.

2.3.3 Stratified Random Sampling

For the SPS business portfolio, Simple Random Sampling is not an effective sampling methodology as the CV values observed in business programs are typically very high because the distributions of savings are generally positively skewed. Often, a relatively small number of projects account for a high percentage of the estimated savings for the program.

For example, the 2012 SPS Business Comprehensive Program had a CV of 1.98 at year's end. Using the base simple random sample function, this would call for a sample of 1,060. The 2012 portfolio had 134 participating facilities, and as such, a finite population adjustment is needed. Adjusting for the population, the required simple random sample is 119, which would be prohibitively expensive.

To address this situation, we use a sample design for selecting projects for the M&V sample that takes such skewness into account. With this approach, we select a number of sites with large savings for the sample with certainty and take a random sample of the remaining sites. To further improve the precision, non-certainty sites are selected for the sample through systematic random sampling. That is, a random sample of sites remaining after the certainty sites have been selected is selected by ordering them according to the magnitude of their savings and using systematic random sampling. Sampling systematically from a list that is ordered according to the magnitude of savings ensures that any sample selected will have some units with high savings, some with moderate savings, and some with low savings. Samples cannot result that have concentrations of sites with atypically high savings or atypically low savings. As a result of this methodology, the required sample for the Business Comprehensive Program was reduced to 16, with one certainty stratum and 4 sample strata.

2.3.4 Free-Ridership

In determining ex post net savings for the SPS DSM portfolio, ADM provides estimates of free-ridership for individual programs. Free-riders are program participants that would have implemented the same energy efficiency measures at nearly the same time absent the program. Rather than apply a binary scoring (0% vs. 100% free-ridership), ADM applied a free-ridership probability to program participants, based upon four factors:

(1) Financial ability to purchase high efficiency equipment absent the rebate

(2) Importance of the rebate in the decision-making process

(3) Prior planning to purchase high efficiency equipment

(4) Demonstrated behavior in purchasing similar equipment absent a rebate

In this methodology, Part (1) is essentially a gateway value, in that if a participant does not have the financial ability to purchase energy efficient equipment absent a rebate, the other components of free-ridership become moot. As such, if they could not have

afforded the high efficiency equipment absent the rebate, free-ridership is scored at 0%. If they did have the financial capability, ADM then examines the other three components, each contributing an equal scoring of 33% to free-ridership. It should be noted that having financial ability does not necessarily imply free-ridership; it just opens the possibility that other factors could contribute. A participant that was financially able to purchase high efficiency lighting, for example, could still be scored at 0% free-ridership if it is demonstrated that:

(1) The rebate factored into their decision-making process;

(2) They did not have prior plans to install high efficiency equipment before learning of the available rebates; and

(3) They did not demonstrate prior behavior of purchasing similar equipment absent a rebate.

There are other contributing factors to free-ridership, specifically in instances of programs that provide outreach to customers. For example, if in a large commercial retrofit, a sponsoring utility provides assistance in energy efficiency measure recommendation, or in providing cost-benefit analysis of a measure to a business, these could factor into the decision-making in ways that mitigate free-ridership, in that there are cases where a participant did not need a rebate to participate, but was induced to participate by the sponsoring utility's efforts in recommending and/or evaluating energy efficiency measures for them. Additional issues such as this are addressed on a program-by-program basis in methodology sections to follow.

For residential programs, free-ridership is calculated as the average score determined for the sample of participants surveyed. For business programs, a weighted average is taken of verified kWh savings, as the free-ridership scores of high-savers contribute a larger share of the overall free-ridership rate. Once free-ridership is determined, ADM then estimates the Net-to-Gross Ratio (NTGR), calculated as:

NTGR = 1 – % Free-Ridership

2.4 Data Collection

This subsection provides descriptions of ADM's data collection procedures, including:

- Telephone Surveying;
- Residential On-Site Verification; and
- Business On-Site Verification & Metering.

2.4.1 Telephone Surveying

ADM conducted a large volume of telephone surveys in evaluating the 2012 SPS DSM portfolio. These surveys were designed to collect a variety of data needed in the evaluation effort, including:

- Verification of installation of rebated equipment;
- Parameters used in gross savings calculations (room of installation for residential CFLs, whether a refrigerator was used indoors vs. outdoors, etc.);
- Data on decision-making to be used in determining program free-ridership; and
- Feedback from participants from their experiences with the program.

Surveys with business program participants, rebate consultancies, CFL distributing agencies, and trade allies were conducted by ADM staff. Surveys with residential program participants were conducted by Research America, an experienced survey firm, with ADM performing quality control checking on the survey programming and monitoring a sample of phone calls. This ensured that interviewers were adhering to the survey script and that all questions were read correctly.

2.4.2 Onsite Surveys

On-site data collection procedures varied by program. For residential programs, site visits constituted a verification inspection of rebated equipment. For business participants, ADM conducted onsite metering at facilities where factors contributing to energy savings, including lighting schedule and motor load factors, were subject to high uncertainty.

2.5 Cost Effectiveness Testing

In evaluating the 2012 SPS DSM Portfolio, ADM performed cost-effectiveness testing at the program and portfolio levels. ADM performed the Total Resource Cost (TRC) and Utility Cost (UCT) tests.

2.5.1 Total Resource Cost Test

The TRC value is defined as:

$$TRC = \frac{\text{Electric Cost Decrease} + \text{Capacity Credit} + \text{NonElectric Cost Decrease}}{\text{Net Customer Investment} + \text{Utility Administrative Costs}}$$

The parameters for this equation are defined in Table 2-1.

Table 2-1 Parameters for TRC Testing

Parameter	Definition
UEPCD	Utility Electric Cost Decrease: The Net Present Value (NPV) of avoided production costs. Estimated by taking NPV of net kWh savings multiplied by $/kWh production costs over the life of the measure.
UGCC	Utility Generation Capacity Credit: The NPV of avoided capacity expansion costs. Estimated by taking NPV of net demand reduction multiplied by $/kW capacity expansion costs over the life of the measure.
NEACD	Non-Electric Acquisition Cost Decrease: NPV of gas savings created incidentally by electric DSM programs (from measures such as weatherization, low-flow showerheads, etc.). Estimated by taking NPV of net Therms savings multiplied by $/Therm of gas production/distribution by gas utilities serving the SPS territory.
NCI	Net Customer Investment: Net incremental costs accrued by program participants. Estimated by taking total measure-level incremental costs and multiplying by Net-to-Gross Ratio, as costs paid by free-riders would have occurred absent the program. For give-away programs, the incremental cost of equipment paid by the utility is substituted for this value as participant costs are $0 in such programs.
UAC	Utility Administrative Costs: Costs accrued by SPS for running the program. Costs include internal administration costs, marketing, and third-party implementation costs. Rebates are not considered a cost as they represent transfer payments from SPS to program participants.

2.5.2 Utility Cost Test

The UCT test is defined as:

$$UCT = \frac{\text{Electric Cost Decrease} + \text{Capacity Credit} + \text{NonElectric Cost Decrease}}{\text{Utilty Equipment Expenditures} + \text{Utility Administrative Costs}}$$

Most terms in this equation are defined and calculated in the same manner as the components of the TRC test. Where the UCT test differs, however, is in costs applied. The TRC test treats rebates as a transfer payment; it is simultaneously a cost to the utility and a benefit to the participant, and as such its impact ton TRC is neutral. The UCT is focused on the costs the sponsoring utility incurs in running a program, and as such rebate payments are included in the cost side of the equation. Net Customer Investment (NCI) is not factored in, as this cost is external to the utility. In giveaway programs, such as the School Education Kits program, Utility Equipment Expenditures (UEE) will be equal in value to NCI, as the “rebate” (100% of the measure incremental cost) is paid in full by the utility, and thus the NCI is paid by SPS.

3. Residential Saver's Switch

3.1 Program Description

The Residential Saver's Switch Program (RSSP) is a direct load control program in which participants agree to have a Smart Switch attached to their refrigerated air unit. When SPS has a system critical peak, they can send a signal to the unit that will set a cycling rate on the compressor, turning it off for an interval of time during the hottest hours of summer weekday afternoons. It is not activated on weekends or holidays, and activation is not to last longer than four hours on a given day. Participants receive a $40 incentive for their participation.

3.2 M&V Methodology

Demand reductions are evaluated metered data for a curtailed group with a baseline determined from adjusting usage on prior days. Reductions are calculated as:

$$Baseline\ kW = Mean\ kW(Baseline\ Days) * Offset\ Factor$$

Where,

Baseline Days = Three of the previous 5 non-weekend, non-holiday, non-event days displaying the highest average event-time load, and

Offset Factor = kW for the hour preceding curtailment / Average kW for this hour during baseline days

This is then translated to the entire population. What comes from these two methodologies is an "availability analysis", in which the in-season performance is multiplied by the number of installations at the end of the 2012 program year. This provides estimates of the value of the resource developed by the program implementation staff.

3.3 Impact Evaluation Results

ADM estimated the available critical peak reduction from the RSSP by analysis of metered data from the curtailment group on all event days in 2012. The analysis was conducted with a sample of 97 metered units. Monitoring equipment was deployed by contractors on behalf of SPS. The sample was drawn by ADM, and ADM staff rode along for 20 residential installations to ensure proper procedures were adhered to.

3.3.1 Residential Event Summaries

ADM calculated hourly kW reductions for all hours of all events in 2012. Table 3-1 below summarizes the average hourly per-unit kW reductions for this group by event. To save space, the column labels give the savings by event hour. The event schedule for 2012 is:

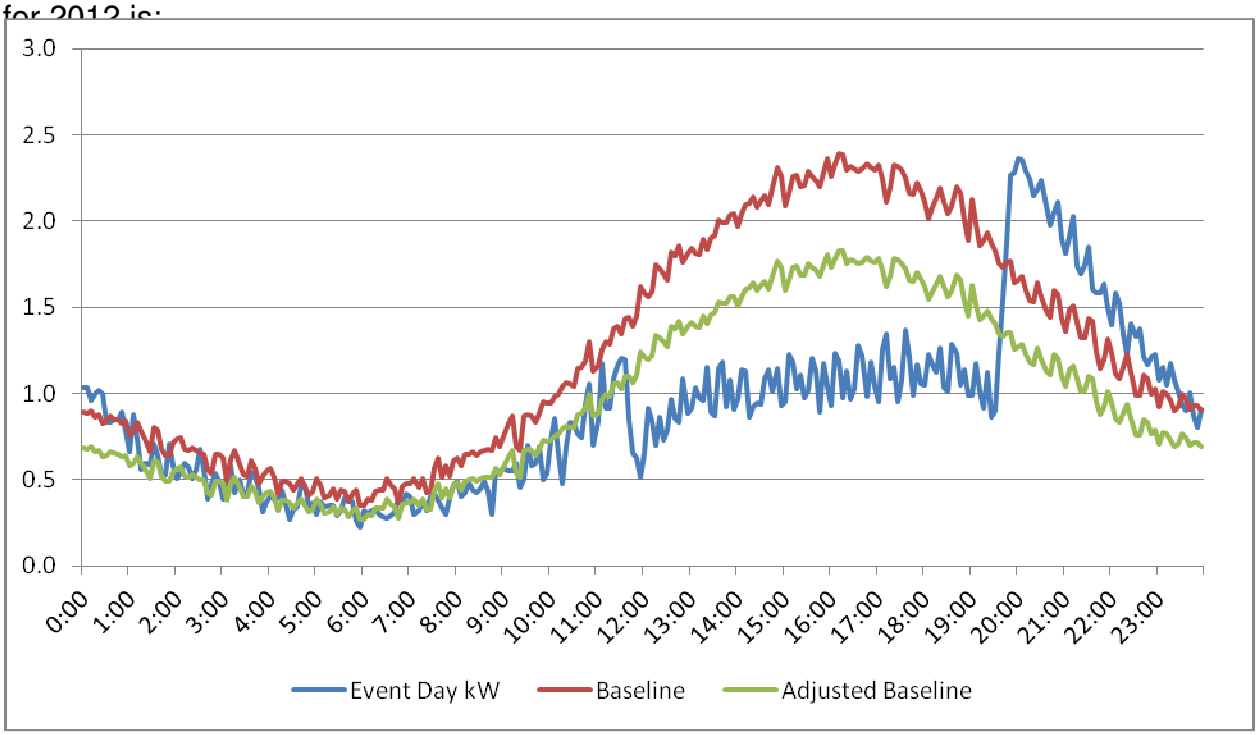

Figure *3-3* below present the load shapes for each event day for the 2012 Residential Saver's Switch Program.

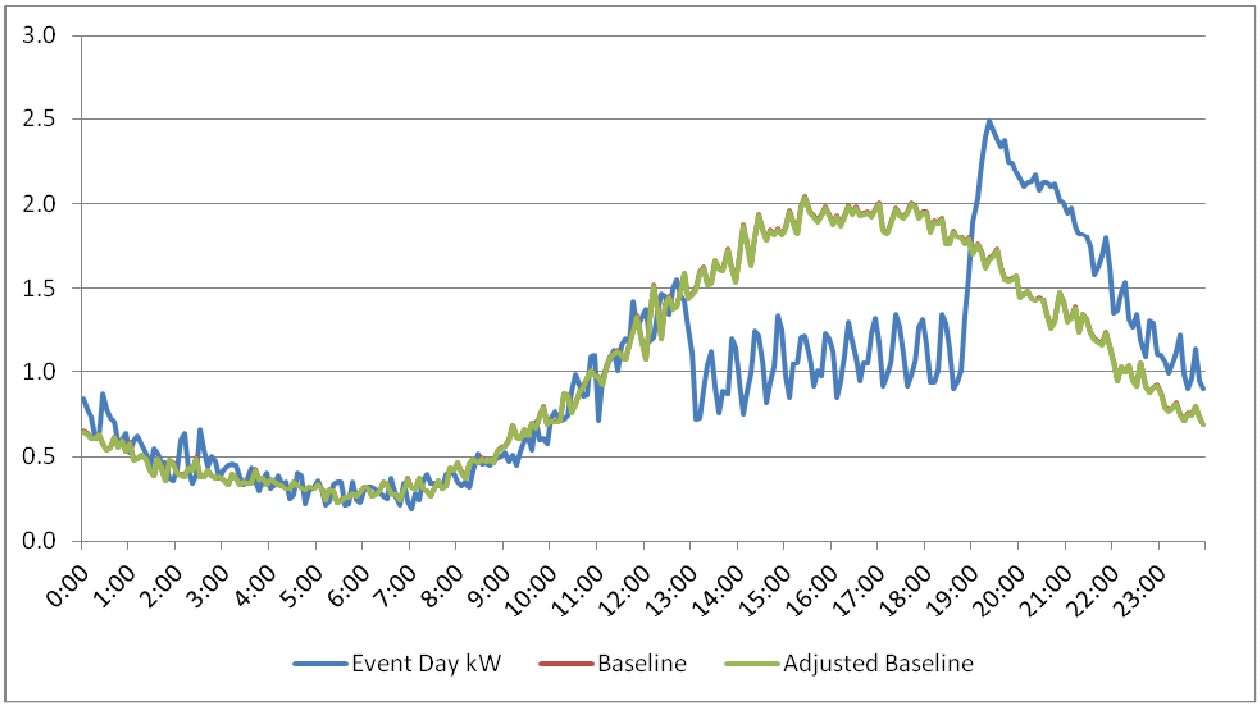

Figure 3-1 July 31st Event Residential Load Profile

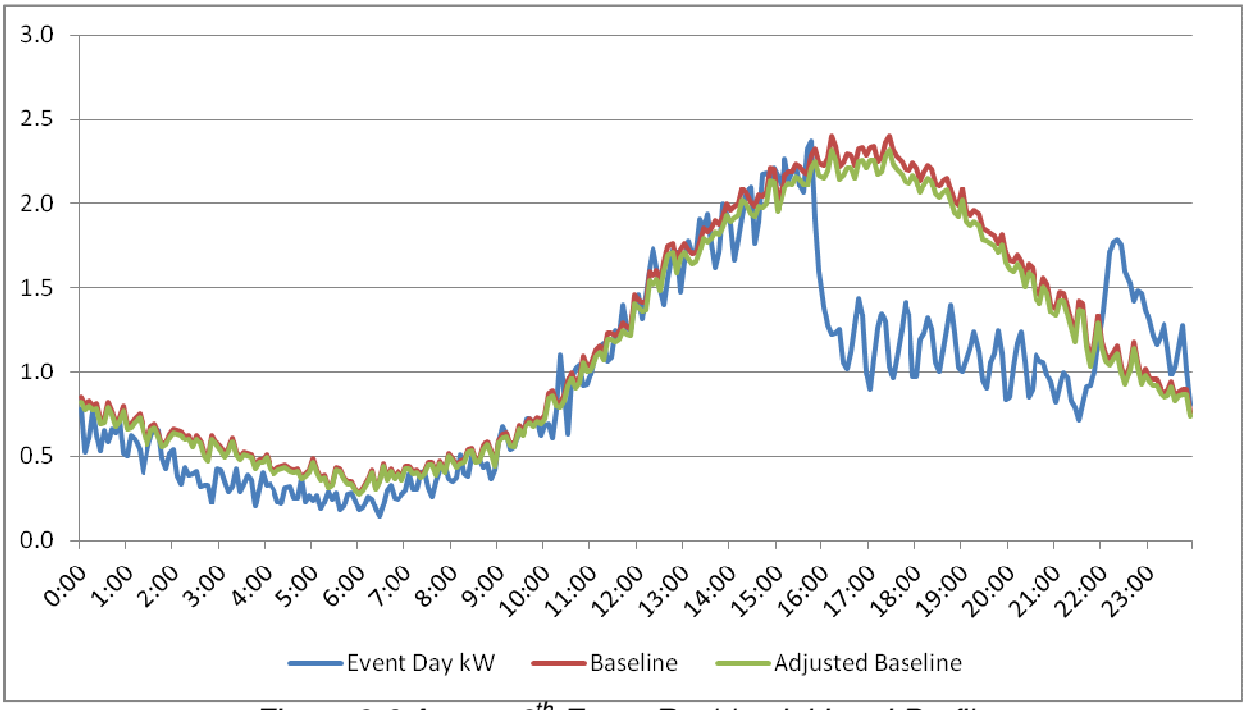

Figure 3-2 August 9th Event Residential Load Profile

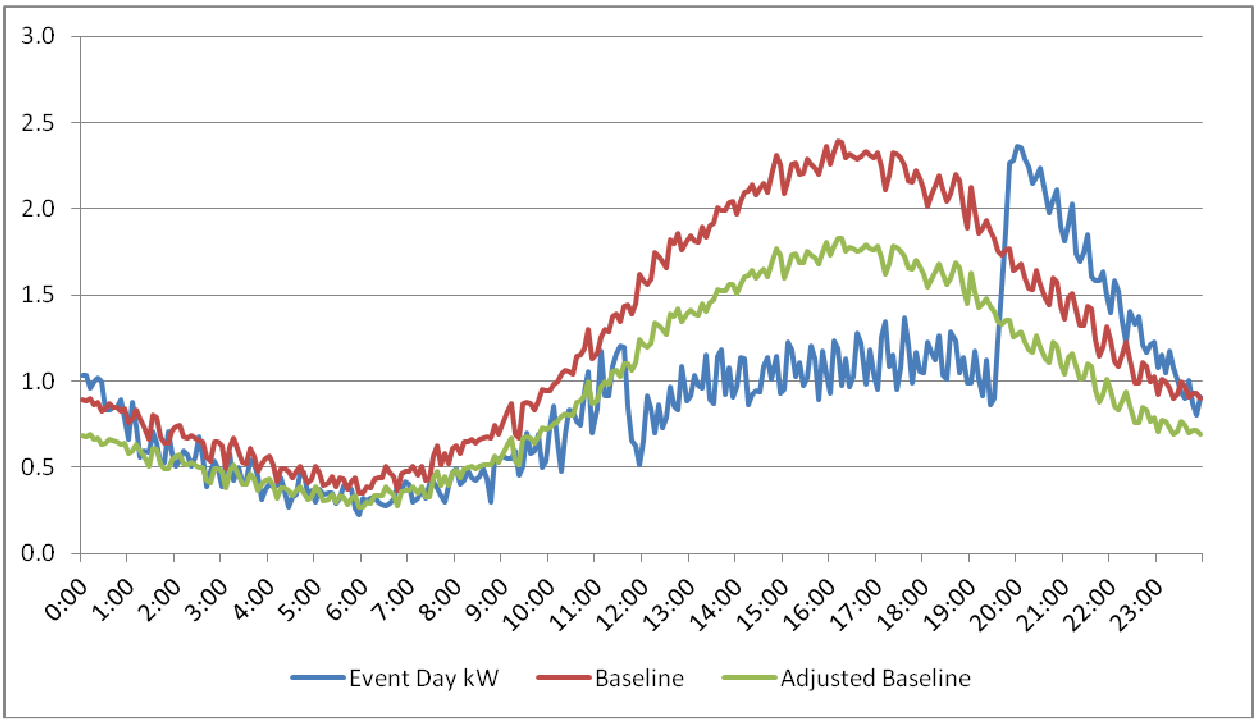

Figure 3-3 August 10th Event Residential Load Profile

3.3.2 kWh Savings

Though RSSP is a load-shifting program, it can provide overall kWh savings. To calculate savings, ADM calculated two values for each event:

(1) kW Reduction Factor; and

(2) Snapback Factor.

These factors were determined as follows:

Reduction Factor:

The Reduction Factor is taken as the sum of kW reductions across all hours of the event.

Snapback Factor:

Snapback Factors are the sum of kW differences between the baseline and event day load for the three hours following the end of a curtailment event.

These two factors are then summed to develop the kWh Factor. kWh savings for an event are then calculated as:

This is repeated for all eight events in the season. The resulting savings from each event are summarized in Table 3-2 below.

Table 3-2 Residential Saver's Switch kWh Savings

Event Date	Reduction Factor	Snapback Factor	kWh Factor	Units	kWh Savings
July 31st	4.59	-1.85	2.74	1,494	4,097
August 9th	4.54	-.78	3.76	1,494	5,618
August 10th	3.91	-2.09	1.82	1,494	2,712
				Total:	12,427

3.3.3 Residential Saver's Switch Performance Summary

To quantify the available demand reduction from the RSSP, ADM took the maximum kW reduction observed for each event and averaged these values across events. The resulting available reduction from the RSSP is presented in Table 3-3.

Table 3-3 Residential Saver's Switch Performance Results

Measure	***Value***
Average Per-Unit Peak kW Reduction	0.847
Number of Units	1,494
Peak kW Reduction	1,265
kWh Savings	12,427

4. Business Saver's Switch

4.1 Program Description

The Business Saver's Switch Program (BSSP) is analogous to the RSSP in providing incentives for the installation of direct load control devices on businesses' refrigerated air conditioning units. Businesses receive an incentive of $20 per enrolled ton of air conditioning, paid as a bill credit to their October energy bill after the close of the cooling season.

4.2 M&V Methodology

The M&V methodology for BSSP is the same as indicated for RSSP in Section 3.1.

4.3 Impact Evaluation Results

ADM estimated the available critical peak reduction from the BSSP in the same manner as for the Residential component. A sample of 50 units was developed by ADM, and though SPS contractors installed the monitoring equipment, ADM staff were present at 10 business installations in order to ensure that proper procedures were adhered to.

4.3.1 Business Event Summaries

ADM calculated hourly kW reductions for all hours of all events in 2012. Table 4-1 below summarizes the average hourly per-unit kW reductions for this group by event. The event schedule is identical to Residential Saver's Switch.

Table 4-1 Hourly kW Reductions by Event

Date	Hr 1	Hr 2	Hr3	Hr 4	Hr 5	Hr 6	Hr 7	Max
July 31st	.08	.16	.09	.16	.02	-.19		.16
August 9th	.49	.37	.27	.12	.21	.16		.49
August 10th	.15	.13	.14	.18	.17	.09	.04	.18
Average:	.24	.22	.17	.15	.13	.02	.04	.28

Figure 4-1 through Figure 4-3 below present the load shapes for each event day for the 2012 Business Saver's Switch Program.

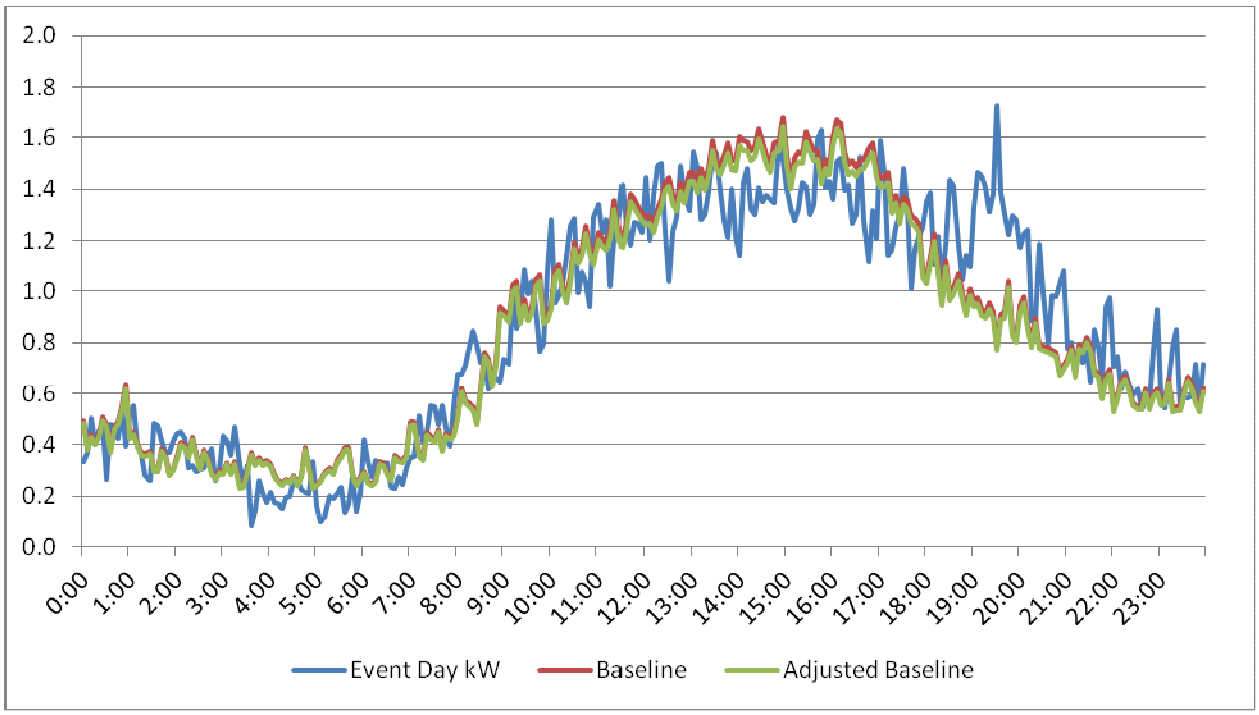

Figure 4-1 July 31st Event Business Load Profile

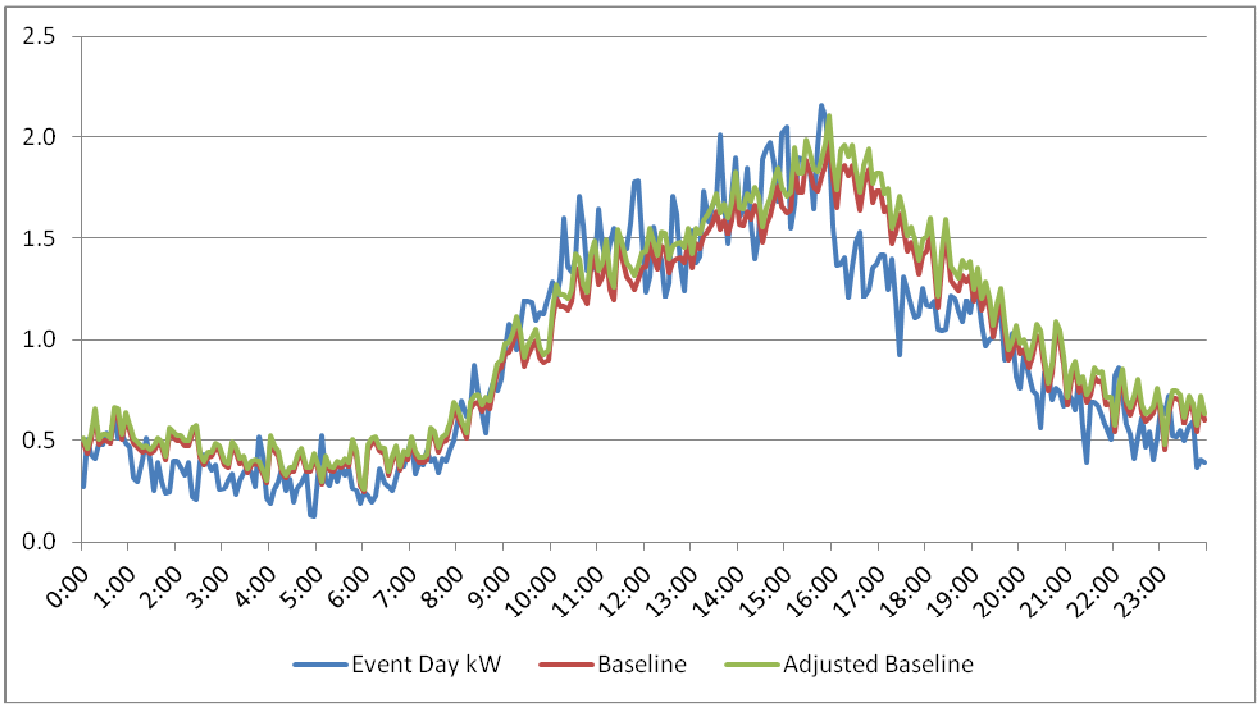

Figure 4-2 August 9th Event Business Load Profile

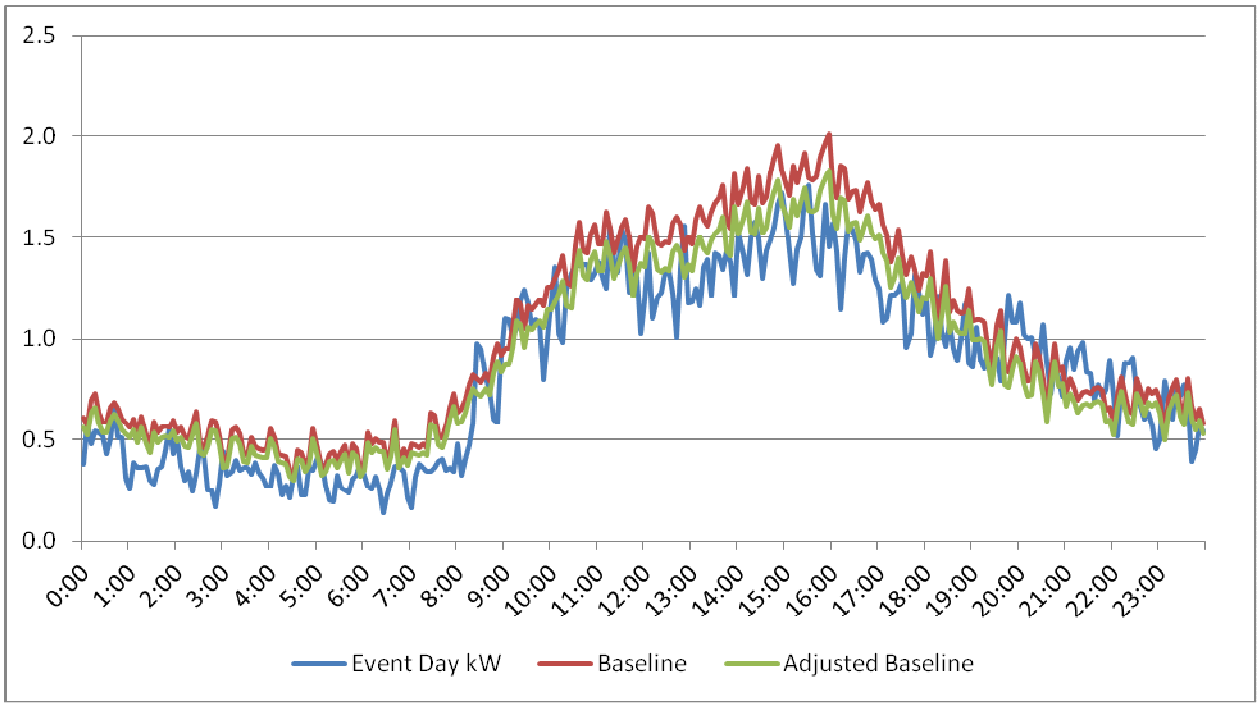

Figure 4-3 August 10th Event Business Load Profile

4.3.2 Business Saver's Switch kWh Savings

As with Residential Saver's Switch, the BSSP can provide kWh savings; they are calculated in the same manner as the Residential Saver's Switch program. The resulting savings from each event are summarized in Table 4-2 below.

Table 4-2 Business Saver's Switch kWh Savings

Event Date	Reduction Factor	Snapback Factor	kWh Factor	Units	kWh Savings
July 31st	.33	-.80	-.48	191	(91)
August 9th	1.62	.25	1.88	191	358
August 10th	.91	-.47	.44	199	85
				Total:	352

4.3.3 Business Saver's Switch Performance Summary

As with Residential Saver's Switch, to quantify the available demand reduction from the BSSP, ADM took the maximum kW reduction observed for each event and averaged these values across events. The resulting available reduction from the BSSP is presented in Table 4-3 below.

Table 4-3 Business Saver's Switch Performance Results

Measure	***Value***
Average Per-Unit Peak kW Reduction	.277
Number of Units	191
Peak kW Reduction	52.84
kWh Savings	352

5. Home Energy Services

5.1 Program Description

The Home Energy Services Program (HESP) provides incentives to energy efficiency service providers (EESPs or "contractors") to install a range of residential upgrades to existing homes that save energy and reduce energy costs. Professionally trained technicians use field tested protocols and advanced diagnostic equipment to determine the most cost-effective energy savings measures appropriate for each home. Typical upgrade services include installing insulation in the attic; stopping heat loss around windows, doors, and other infiltration points; repairing leaky ducts; and installing high efficiency central air conditioning. The main program provides services to all SPS residential customers. There is also a low income version of the program that provides a wider range of measures free of charge.

For the main HESP, the following is provided free-of-charge:

- Duct sealing;
- Infiltration improvement; and
- Low flow showerheads.

Ceiling insulation is provided with customer co-pay.

5.2 M&V Methodology

The M&V approach for the Residential Home Energy Services Program is aimed at the following:

- Verifying participation through participant surveying;
- Verifying post-retrofit duct leakage and infiltration at a sample of participants; and
- Providing estimates of net-to-gross savings and free-ridership.

Table 5-1 below summarizes the inputs needed for gross savings calculations and the source of each input.

Table 5-1 Data Sources for Gross Impact Parameters –Home Energy Services

Parameter	***Source***
Home Specifications	Tracking Data & Onsite Verification
Post-installation Duct Leakage & Infiltration	On-site Measurement

5.2.1 Review of Deemed Savings Estimates

ADM reviewed the deemed savings estimates for measures rebated through the program in 2012. The deemed savings assumptions were based upon simulation models using weather from the Texas panhandle region, incorporating various home-specific characteristics, including:

- Heating/cooling type;
- Baseline & post retrofit duct leakage;
- Home square footage & number of stories; and
- Baseline & post retrofit Air Changes per Hour (ACH).

These values were verified based upon pre- and post-retrofit billing analysis of program participants.

5.2.2 Verification of Installed Measures

Verification of the weatherization measures installed was done in two steps;

- Review of the tracking data presented;
- Surveys of customers who installed rebated equipment; and
- On-site measurement of duct leakage and infiltration

5.2.2.1 On-Site Measurement Procedures

To measure duct leakage, ADM field staff performed duct pressurization testing (using Duct Blasters®) on the ducting for central air conditioning systems. System static pressure (SSP) on the duct system was first measured, where SSP is a measurement of static pressure at the supply side plenum of the duct system when the supply fan is on and operating with registers in their normal position. This pressure is unique for each system. The ducts were then pressurized by means of a Duct Blaster® connected to the return side of the system. Total duct leakage was measured with the registers sealed and the Duct Blaster® pressurizing the duct system. Total Duct leakage at 50 Pa was then recorded.

An additional step was required to measure duct leakage to unconditioned space. A Blower Door® was set up in an exterior doorway and used to pressurize the house to the same pressure as the ducts. This prevented any leakage to other conditioned spaces within the residence; all leakage measured, once the home was pressurized, would therefore be only to unconditioned spaces. Duct leakage to unconditioned space was then measured at 25 Pa, where possible.

Finally, total home infiltration, measured in CFM, was calculated. One-time measurements of pressure differential between the conditioned and unconditioned space were taken to calculate a snap shot of total home infiltration, in CFM. However, this measurement of infiltration will not remain constant throughout the year, as it is a function of pressure differential between the interior and exterior of the home. As this pressure varies, with changing wind and outdoor temperatures, so will infiltration of the residence's envelope.

5.2.2.2 Data Review & Sampling

ADM reviewed tracking data for anomalous entries and to ensure that savings were calculated according to the methodologies outlined in SPS tech assumptions. Having validated the tracking data, we verified installation of rebated measures through telephone surveys with program participants.

The sample size for verification surveys is calculated to meet 90% confidence and 10% precision (90/10). The sample size to meet 90/10 requirements is calculated based on the coefficient of variation of savings for program participants, which is assumed at .5 based on our previous experience with residential weatherization rebate programs. This would require a sample of 68 to meet precision requirements. ADM visited a sample of 78 homes for this evaluation. The measure breakdown of this sample is presented in Table 5-2

Table 5-2 Home Energy Services Sample Summary

Measure	***# Homes***
Ceiling Insulation	24
Duct Sealing	50
Infiltration Control	26
Total Homes Visited	78
Total Measures from Site Visits Home	100

5.3 Impact Evaluation Results

To evaluate savings from the HESP, ADM used 2009 participant data along with pre- and post-retrofit billing data to develop a regression model to be used to forecast savings from 2012 participants that received duct sealing or infiltration control improvements. Program-level realization by measure category is summarized in Table 5-3 below.

Table 5-3 Home Energy Services Gross Realization Summary

Measure	Expected kWh	Verified kWh	Expected kW	Verified kW	Expected Lifetime kWh	Verified Lifetime kWh
Duct Sealing	2,409,479	2,076,971	721.96	622.33	36,142,182	34,154,561
Infiltration Control	372,286	411,004	138.71	153.14	3,722,862	4,110,039
Ceiling Insulation	436,137	436,137	504.40	504.40	8,722,745	8,722,745
Low Flow Showerhead	48,954	48,954	-	-	489,540	489,540
Total	3,266,856	2,973,066	1,365.07	1,279.87	49,077,329	44,476,885
Realization:	91.0%					

5.3.1 Home Energy Services Gross Savings Estimates

ADM evaluated gross savings estimates for each measure type installed through the 2012 HESP. Measures installed in 2012 included:

- Duct sealing;
- Infiltration control;
- Ceiling insulation; and
- Low flow showerheads.

5.3.2 Gross Savings Estimates – Duct Sealing & Infiltration Control

Gross savings estimates for duct sealing and infiltration control measures were evaluated via on-site testing at 58 residences receiving these measures, covering 87 individual applications. ADM conducted duct blast and blower door tests to verify post-retrofit measurements of Duct Leakage and Infiltration CFM@50 Pascals. The test results are presented in Table 5-4 below.

Table 5-4 Home Energy Services On-Site Testing Results

Field Work Designation	Ex Ante Duct Leakage Reduction (CFM)	Ex Post Duct Leakage Reduction (CFM)	Ex Ante Infiltration Reduction (CFM)	Ex Post Infiltration Reduction (CFM)
HES24	223	259	-	-
HES25	163	167	-	-
HES26	195	32	-	-
HES27	195	145	-	-
HES28	285	209	-	-
HES29	294	329	-	-
HES30	410	348	-	-
HES31	232	190	-	-
HES32	227	263	-	-

HES33	310	80	-	-
HES34	275	203	-	-
HES35	490	384	-	-
HES36	160	99	-	-
HES37	147	158	-	-
HES38	250	238	-	-
HES39	182	135	-	-
HES40	495	409	-	-
HES41	225	249	-	-
HES42	181	157	-	-
HES43	171	122	-	-
HES44	332	302	-	-
HES45	196	163	-	-
HES46	155	75	-	-
HES47	165	25	-	-
HES48	190	220	-	-
HES49	135	181	-	-
HES50	220	213	-	-
HES51	488	480	425	401
HES52	215	196	680	558
HES53	180	175	-	-
HES54	251	237	644	497
HES55	165	202	400	170
HES56	135	65	375	275
HES57	105	65	260	104
HES58	160	196	1100	2324
HES59	220	218	395	580
HES60	140	143	575	584
HES61	-	-	520	620
HES62	650	513	-	-
HES63	278	244	258	380
HES64	190	246	705	775
HES65	187	142	257	519
HES66	221	183	297	145
HES67	380	402	338	404
HES68	245	271	505	313
HES69	-	-	2259	1645
HES70	272	224	2013	2043
HES71	-	-	1721	1400
HES72	403	278	286	121
HES73	178	173	670	2804
HES74	188	119	575	424
HES75	208	110	463	264
HES76	396	425	587	631
HES77	-	-	780	830
HES78			481	641

Realization:	86.2%	110.4%

5.3.1 Gross Savings Estimates – Ceiling Insulation

Participation in the ceiling insulation component grew rapidly in 2012. In 2011, only 26 customers received ceiling insulation. In 2012, this increased to 528. ADM visited a sample of 24 homes that received ceiling insulation. These visits verified inputs into the savings calculation, including:

- R-value of insulation installed; and
- Heating and cooling system type.

No discrepancies were found on site to affect savings calculations for participating homes. In all site visits, insulation and heating/cooling systems matched project documentation. As a result, this component had 100% gross realization.

5.3.2 Gross Savings Estimates – Low Flow Showerheads

123 showerheads were installed through the HESP in 2012. These were deemed at 398 kWh, consistent with other programs in New Mexico. Given the low contribution of this measure to program savings, they were not explicitly subsampled, and none of the sampled homes for building envelope measures received showerheads. ADM verified that the savings were calculated according to accepted deemed protocols, and having verified that found 100% gross realization.

5.3.3 Home Energy Services Net Savings Estimates

The HESP provided training and certification to contractors to perform duct sealing and infiltration control services. Prior to the training of SPS trade allies, these services were not available within SPS service territory. To evaluate free-ridership, ADM thus took the approach of interviewing the participating contractors, in order to address whether:

- They had experience in providing these services prior to joining the program; and
- They had plans to obtain certification for these services prior to participation.

ADM interviewed four participating contractors in the HESP, and based upon these interviews, ADM has concluded that participating contractors would not have obtained the necessary certifications for duct sealing and infiltration control work absent the program. With that, ADM is applying SPS's filed ex ante NTGR of 93% for the program. This is applied in discounting program kWh, kW, and lifetime kWh savings. The resulting net savings are presented in Table 5-5 below.

Table 5-5 Home Energy Services Net Realization Summary

Measurement	***Expected Net Savings***	***Realized Net Savings***	***Net Realization Rate***
Annual Energy (kWh)	3,038,176	2,764,951	91.0%
Demand (kW)	1,269.52	1,190.28	93.8%
Lifetime Energy (kWh)	45,641,916	41,363,503	90.6%

6. Home Lighting & Recycling

6.1 Program Description

The HLRP program provides upstream incentives to retailers for the sale of CFLs. The goal of the program is to buy down the retail price to $1-2 per bulb (varying by CFL type), in an effort to drive residential customers to replace incandescent lighting with high efficiency CFLs. Additionally, the program provides a mail-order option that allows for distribution to areas that may lack a participating retailer or a specialty bulb type. This program provides benefits to both retailers and customers in that:

- Retailers can achieve a higher sales volume without a reduction in profit margin, as the lost revenue from the price reduction is absorbed by SPS; and
- Customers can save money on their electric bills as well as in replacement costs, as typical lifetime for an incandescent bulb is roughly 1,000 hours, compared to an average lifetime of 8,000 hours for CFLs sold through this program.

Further, the program has for several years provided CFLS through the following direct distribution channels:

- Distribution through pizza delivery companies. The HLRP has for several years worked with a chain of pizza delivery stores to provide a four-pack of CFLs along with pizza delivery.
- Distribution through community events.

In 2012, the program expanded scope into other distribution channels, including:

- Installation through Home Energy Services. Some budget of the HLPR was spent providing CFLs to be installed through the Home Energy Services program, through which weatherization contractors provide home improvements free-of-charge. Their activities were leveraged to provide CFLs, which were paid for and credited to the HLRP.
- Installation through the Refrigerator Recycling Program. SPS engaged their Refrigerator Recycling program implementer (ARCA) in providing direct installation of CFLs at homes at the time of pickup of old refrigerators.

The program is implemented by Wisconsin Energy Conservation Corporation (WECC).

6.2 M&V Methodology

The M&V approach for the Home Lighting & Recycling Program is aimed at the following:

- Verifying the numbers of CFLs purchased as a result of the program;

- Determining the percentage of purchased CFLs that are actually installed; and
- Estimating the extent to which installed CFLs are used.

Table 6-1 below summarizes the inputs needed for gross savings calculations and the source of each input.

Table 6-1 Sources for Gross Impact Parameters – Home Lighting & Recycling Program

Parameter	***Source***
CFL Quantities & Specifications	Program tracking data
Location of Installation	Telephone follow-up surveys with lighting purchasers
Hours of Use Per Day	California Residential Lighting Metering Study (KEMA, 2009)
CFL Installation Rate	Long-term installation rate California Residential Lighting Metering Study (KEMA, 2009) for retail; surveys of distribution customers from EPE program for giveaway CFLs.
Baseline Wattage	Manufacturer's specifications for lumen equivalence by CFL size & configuration

6.2.1 HLRP Review of Deemed Savings Estimates

ADM reviewed the deemed savings estimates used by SPS for the 2012 HLRP. Deemed assumptions required revision to ensure proper application of EISA standards for CFLs. SPS applied EISA standards as of January 1st, 2012. It was decided to apply a 6-month lag to the imposition of EISA standards. ADM has opted to mimic the approach to the EISA adopted in the Pennsylvania TRM, where EISA baselines take affect 6 months after implementation, in order to account for retailers selling through back-stock. As such, this baseline takes effect for 23-30W CFLs on and after July 1st, 2012.

Table 6-2 below summarizes the baseline changes, effective dates for M&V, and their expected impact on savings per-unit for the HLRP.

Table 6-2 CFL Baseline Updates & Effective Dates

CFL Wattage	***Baseline Wattage***	***New Baseline Wattage***	***Legal Effective Date***	***M&V Effective Date***	***% Reduction in Savings***
23-30W	100W	72W	1/1/2012	7/1/2012	37.8%
16-22W	75W	53W	1/1/2013	7/1/2013	40.7%
13-15W	60W	43W	1/1/2014	7/1/2014	36.9%
9-12W	40W	29W	1/1/2014	7/1/2014	37.9%

ADM found that SPS was calculating savings for 100W CFLs using the updated EISA standards as of January 1st. This was updated to apply the 6-month lag and used the 72W baseline to spiral CFLs sold after July 1st, 2012.

ADM also found that flood configuration CFLs were not calculated with the appropriate baseline as well; for example, 15W flood CFLs were calculated with a 60W baseline, when the actual product equivalent is 65W.

6.2.2 HLRP Verification of Installation

ADM reviewed documentation of CFL tracking data compared to invoices in verifying sales and distribution totals. Installation rates for CFLs were determined as follows:

- Retail buydown: An installation rate of 96% was applied, based on findings from the California Residential Lighting Metering Study (KEMA, 2009) which determined this as the long-term installation rate of sold CFLs.
- CFL Giveaways (pizza delivery distribution and community events): Customer information was not tracked in these giveaways. However, in the 2011 program year El Paso Electric Company distributed similar CFL packages and did track customer data. ADM is applying those survey results for installation rate to the distributed CFLs in the HLRP, for an installation rate of .83%

6.2.3 HLRP - Net Savings Estimates

Evaluation of net savings from the HLRP requires determination of free-ridership through participant surveying. ADM applies the general methodology described in Section 2.3.4, in separating free-ridership into four component parts: financial ability, prior planning, importance of the rebate in decision making, and the likelihood of installing similar equipment without a rebate. The components were addressed with questions detailed in the subsections to follow.

6.2.3.1 Prior Planning

Customers are asked as to any plans they had to purchase any CFLs, or if they had planned on purchasing fewer CFLs than they had intended to purchase after having learned of the rebate. This is addressed in the following questions:

> Question 8: Did you plan on purchasing CFLs prior to entering the store that day?
>
> Question 12: After learning of the available discount, did you purchase more CFLs than you otherwise would have? If so, how many more?

If the respondent indicates in Question 8 that they already planned on purchasing CFLs before entering the store that day, and answer “No” to Question 12, then the

respondent is considered to have been planning to purchase the same quantity of CFLs with or without the rebate and is thus a partial free-rider.

6.2.3.2 Importance of Rebate in Decision Making

Once customers learn of the rebate, it is possible that this knowledge will sway their decision making process to install incandescent vs. CFL lamps. To address this, we examined responses to the following two questions:

> Question 10: Prior to learning of the program, how many CFLs did you have in your home?
>
> Question 14: Would you purchase CFLs if they cost twice as much per bulb?

If the respondent indicates that they would not have purchased any CFLs if they cost twice as much per bulb, they are not a free-rider on this component. Additionally, if the customer had no pre-existing CFLs in their home prior to this purchase, then they are considered to be likely to have been motivated by the SPS discount.

6.2.3.3 Likelihood of Installing Similar Equipment without Rebate

Finally, customers are asked whether they would have purchased CFLs if the rebate were not available. This is addressed with a series of questions:

> Question 11: If the CFLs were not discounted through the SPS program, how likely is it that you would purchase CFLs anyway?
>
> Question 14: After learning of SPS' discount, have you since purchased any CFLs that were not rebated through the program?

If the respondent indicates in Question 11 that they "definitely would have purchased" CFLs without a rebate, then they are considered to be a free-rider on this component. If they indicate that they "probably would have purchased" CFLs, their response to Question 14 is then examined. If the respondent states that they have purchased non-rebated CFLs after having learned of the SPS discount, then this responses are used in concert with their answer to Question 11 in determining that they are a free-rider on this component.

6.3 Impact Evaluation Results

ADM estimated savings from the HLRP by applying prior-year findings of hours of use and NTGR from coupon-participant surveying for the buydown component. For distribution CFLs, savings estimates were verified as follows:

- For the direct-install component of Home Energy Services, ADM verified installation as part of the fieldwork effort associated with the weatherization

services (detailed in Section 5.3). Savings for CFLs installed in this component were calculated based on the same hours of use value used for buydown CFLs, with a 100% installation rate (as verified through fieldwork) and a 93.0% NTGR (the NTGR used for Home Energy Services).

- For the direct-install component of the Refrigerator Recycling Program, no specific fieldwork verification was conducted. However, based on the findings of fieldwork associated with the Home Energy Services installation component, an installation rate of 100% and a NTGR of 93.0% were applied.
- For distribution channels (pizza delivery and community events), ADM applied the installation rates and NTGRs associated with the distribution event survey data collection performed for EPE's 2011 CFL Distribution Program (where participation was systematically tracked). Based on this, an installation rate of 83% and a NTGR of 52.17% were applied.
- ADM was unable to find specific information from LED purchasers. For this component (less than .1% of the overall program) ADM applied 100% NTGR and installation rates.

Table 6-3 and Table 6-4 below present the gross and net realization for the 2012 Home Lighting & Recycling Program, respectively.

Table 6-3 Home Lighting Gross Realization Summary

Measurement	Expected Gross Savings	Realized Gross Savings	Gross Realization Rate
Annual Energy (kWh)	17,268,325	17,212,456	99.7%
Demand (kW)	1,923.5	1,917.3	99.7%
Lifetime Energy (kWh)	138,146,559	137,699,645	99.7%

Table 6-4 Home Lighting Net Realization Summary

Measurement	Expected Net Savings	Realized Net Savings	Net Realization Rate
Annual Energy (kWh)	13,814,660	13,194,102	99.7%
Demand (kW)	1,538.8	1,469.7	99.7%
Lifetime Energy (kWh)	110,517,279	105,552,816	99.7%

The results of ADM's evaluation effort are detailed in the subsections to follow.

6.3.1 Database Review

The program distributed a total of 267,396 CFLs via retail buy-downs, and an additional 112,967 through direct installation, and program-sponsored direct distribution. ADM first examined the tracking database for systemic entry errors for each channel, i.e., duplicate entries and/or erroneous entries (such as data entered into improper

columns). ADM found quantities and unit specifications to match manufacturer's literature when reviewing a sample of rebated CFLs. Figure 6-1 below presents a summary of CFLs sold through the buydown component 2012 HLRP.

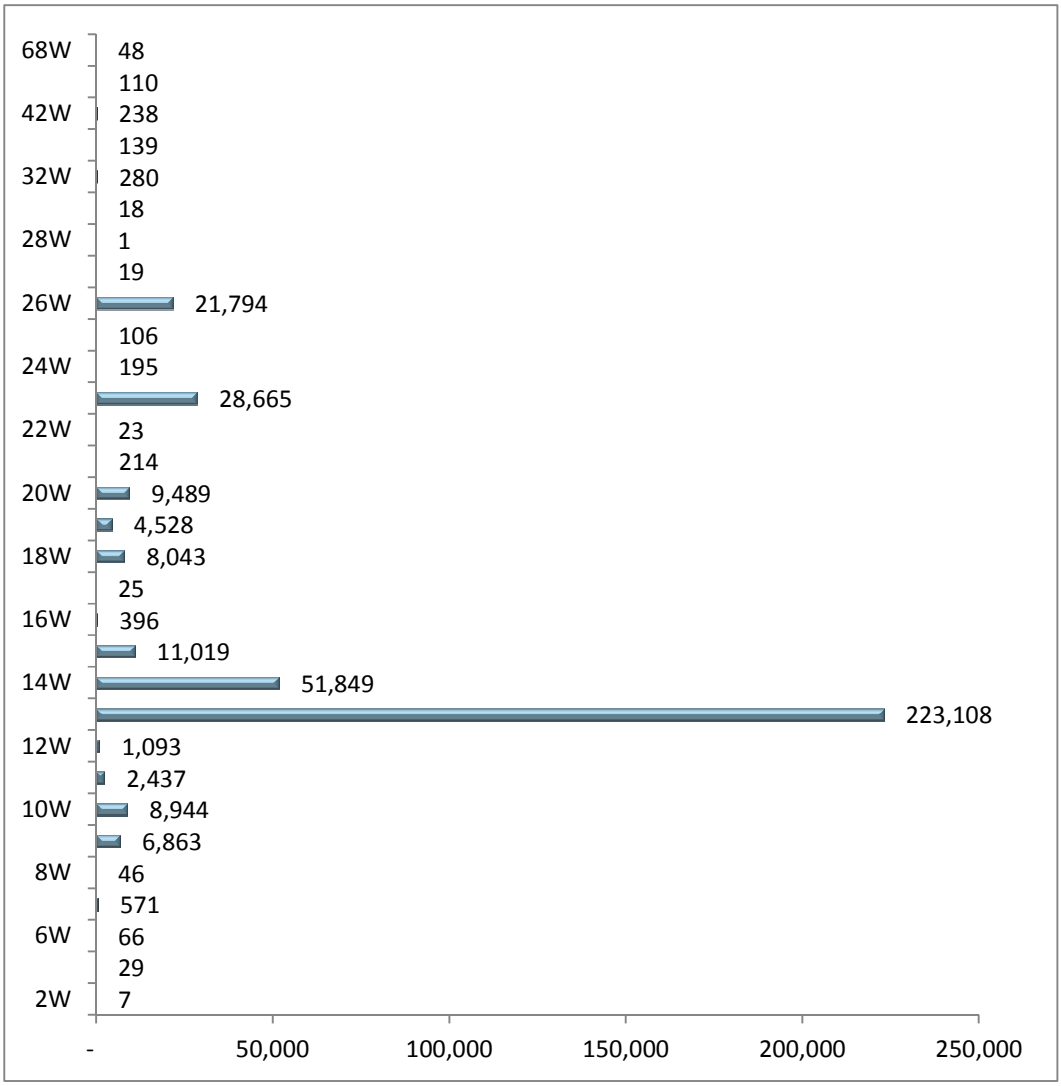

Figure 6-1 Home Lighting Summary of Distribution by Wattage

The HLRP has begun incentivizing a wider range of residential lighting types. This has included specialty CFLs (such as dimming, 3-way, and alternate configuration CFLs) as well as LEDs. Figure 6-2 summarizes the buydown participation by lighting type.

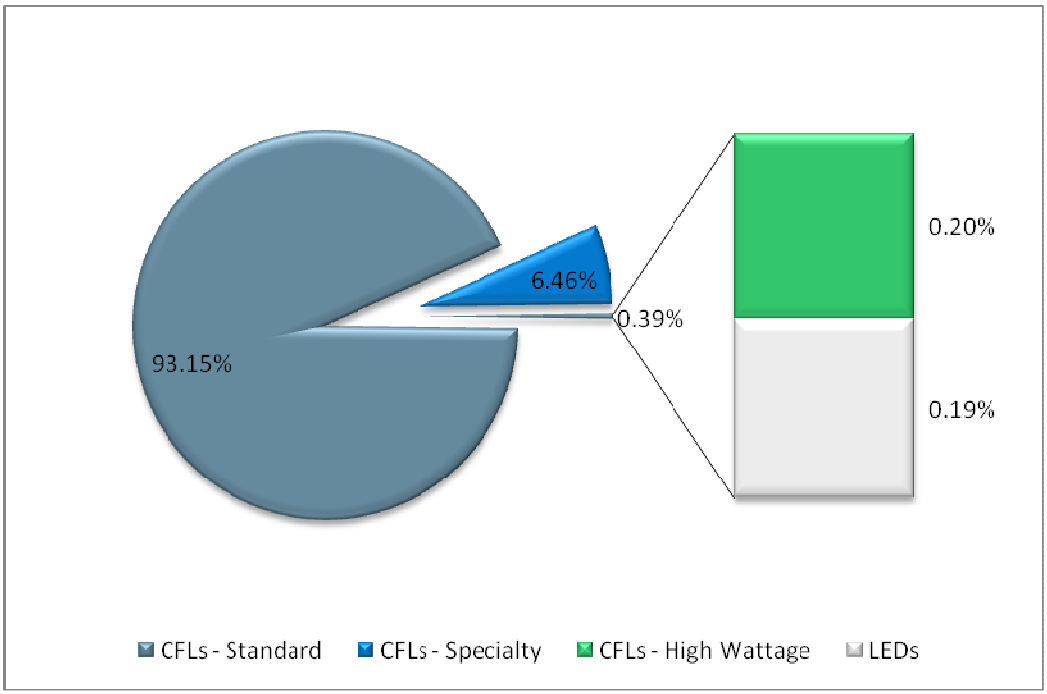

Figure 6-2 Summary of Buy-downs by Lighting Type

Standard CFLs include spiral CFLs with the lumen equivalence of incandescent lamps up to 100W. High Wattage CFLs refers to standard-configuration CFLs with a lumen equivalence to CFLs greater than 100W. The bulk of program participation is still derived from standard CFLs, though specialty participation in the buydown component is higher than in prior program years.

6.3.2 Home Lighting Gross Savings Estimates

Gross savings estimates for residential CFLs require the following parameters:

- Baseline wattage;
- Installation rate; and
- Hours of use

6.3.2.1 Baseline Wattage

Baseline wattage is dependent upon CFL wattage and configuration, i.e., spiral, flood, globe, or candelabra. ADM researched each SKU number listed in the program tracking data for residential lighting programs run by each of the three New Mexico investor-owned electric utilities to find the appropriate baseline for the model. These results are presented in Table 6-5 below.

Table 6-5 CFL Baseline Wattage Table

CFL Wattage	CFL Configuration	Ex Ante Baseline Wattage	Ex Post Baseline Wattage
7	Spiral	40	25
7	Candelabra	40	40
9	Spiral	40	40
9	A-Lamp	40	40
9	Globe	40	40
10	Spiral	40	40
11	Globe	40	40
11	Candelabra	40	40
11	Flood	40	50
12	Globe	40	60
13	Spiral	60	60
13	Candelabra	60	60
14	Spiral	60	60
14	A-Lamp	60	60
14	Flood	60	65
15	Globe	60	60
15	Spiral	60	60
15	Flood	60	65
16	Flood	60	65
18	Spiral	75	75
18	Flood	75	90
19	Spiral	75	75
20	Spiral	75	75
23	Flood	75	90
23	Spiral	72	72
24	Spiral	72	72
26	Spiral	72	72
26	Flood	100	120
27	Spiral	72	72
28	Spiral	72	72
29	Spiral	72	72
32	Spiral	150	150
40	Spiral	150	150
42	Spiral	150	150
65	Spiral Grow-Light	150	300

6.3.2.2 Installation Rate

An install rate of 96% is applied to purchased CFLs, based upon the KEMA CFL metering study. This has been the finding for long-term installation rates of retail markdown CFLs. For direct install components of the program, an installation rate of 100% was applied. For distribution events, ADM applied an installation rate of 83%, based on survey efforts of the 2011 EPE CFL distribution program.

6.3.2.3 Hours of Use

SPS determines hours of use for residential CFLs by examining:

- Number of lamps available by room type;
- Hours of use by room type; and
- Number of lamps purchased per customer

In a 2009 study of California by KEMA[4], CFL use was monitored in statistically significant samples by room type, with the resulting average daily hours of operation by room type summarized in Table 6-6 below.

Table 6-6 Daily Hours of Operation by Room Type – KEMA Study

Room Type	CFL Hours Per Day
Kitchen	3.5
Living Room	3.3
Outdoor	3.1
Family Room	2.5
Garage	2.5
Bedroom	1.6
Bathroom	1.5
Hall/Entry	1.5
Laundry Room	1.2

The hours of use by room type that SPS applied in their deemed savings estimates was based upon a DOE study conducted by Navigant[5]. The KEMA study is the more recent study and is based upon a significant amount of residential monitored lighting runtime data. However, there are room types from the Navigant study that are not covered in the KEMA study. ADM has applied hours of use from the KEMA study where available and those from Navigant for room types that the KEMA study did not cover. These hours are displayed in

Table 6-7.

Table 6-7 Daily Hours of Operation by Room Type – Navigant Study

Room Type	CFL Hours Per Day
Utility Room	2.4
Dining Room	2.3
Office	1.9
Closet	1.4
Other	1.2

[4] KEMA, "CFL Metering Study", prepared for the California Public Utilities Commission, 2009

[5] US DOE, US Lighting Market Characterization, Navigant Consulting, 2002

The results from these two studies provide an up-to-date depiction of hours of use by room type for a wide array of residential end-uses. In 2011, ADM surveyed program participants to address how many CFLs were in their home prior to participating and the room of installation, and then addressing the location of installation of purchased CFLs. From this, a weighted average hours of use value of 2.36 per day was estimated, for 861 hours annually.

6.3.2.4 Peak Demand Reduction

Peak demand reduction is dependent upon the peak coincident factor (PCF), which is defined as the percent of available peak hours in which lighting is operating. SPS' peak period is set on summer weekdays between 3:00 and 6:00 PM. Applying the KEMA CEL metering study, ADM found that the PCF defined for this period is 10.17%, which was applied in the analysis.

6.3.3 Residential Lighting Net-to-Gross Evaluation

ADM based NTGR of the 2012 HLRP off of 2011 survey results, applying the prior-year NTGR of 82% for buydown CFLs. The NTGRs for the direct install components were determined based off of the evaluation of the Home Energy Services Program, with that program's value of 93% applied to the direct installation efforts of CFLs paid by Home Lighting but distributed through Home Energy Services and Refrigerator Recycling.
The resulting net savings are presented in *Table 6-8*.

Table 6-8 Home Lighting & Recycling Net Realization Summary

Component	Net Annual kWh		Net kW		Net Lifetime kWh		Net Realization Rate
	Ex Ante	Ex Post	Ex Ante	Ex Post	Ex Ante	Ex Post	
Retail Buydown	10,005,856	10,915,985	1,114.6	1,215.9	80,046,850	87,327,877	109.1%
Pizza Delivery Distribution	3,371,602	1,835,707	375.6	204.5	26,972,817	14,685,655	54.4%
HES Direct Install	269,732	334,541	30.0	37.3	2,157,854	2,676,332	124.0%
RR Direct Install	32,604	34,441	3.6	3.8	260,831	275,526	105.6%
Community Giveaways	134,866	73,428	15.0	8.2	1,078,927	587,426	54.4%
Total	13,814,660	13,194,102	1,538.8	1,469.7	110,517,279	105,552,816	95.5%

7. Energy Feedback Pilot

The Energy Feedback Pilot is an educational program run by OPower, a third party implementer for SPS. The program provides educational materials to a sample of SPS' residential customers, in which their usage is compared against similar households. The program is designed to encourage behavioral change and program participation on the part of the recipients of the Home Energy Report.

7.1 Control Group Validity Testing

ADM tested the recipient and control group of the Home Energy Reports program for statistically significant differences in the pre-delivery period in order to ensure the validity of the comparison. This testing examined the data for a statistical difference in mean kWh usage by month. Each month has a resulting T-Stat and p-Value to check for any difference. There were no statistical differences in usage by month at the p = 0.05 (95% confidence) level. The resulting calculations are detailed in Table 7-1 below.

Table 7-1 Control Group Validity Testing Results

Month	Control kWh	Control Standard Error	Treatment kWh	Treatment Standard Error	T-Stat (Control - Trt)	PR >T
1	1901.5	8.17	1897.08	8.10	0.38	0.37
2	1868.55	9.04	1862.27	8.92	0.49	0.35
3	1310.33	6.10	1303.38	6.02	0.81	0.29
4	1017.47	3.82	1012.82	3.82	0.86	0.28
5	1126.68	4.20	1126.43	4.23	0.04	0.40
6	1597.3	5.70	1593.44	5.65	0.48	0.36
7	2045	7.01	2031.11	6.96	1.41	0.15
8	2035.85	6.53	2032.79	6.57	0.33	0.38
9	1755.38	6.52	1749.72	6.50	0.61	0.33
10	1179.07	4.67	1177.04	4.66	0.31	0.38
11	1129.73	4.35	1129.50	4.29	0.04	0.40
12	1755.79	8.16	1745.88	7.97	0.87	0.27

7.2 Data Cleaning Procedures

All screening procedures exist to reduce variability in the model and ensure an accurate savings estimate. The procedure to remove duplicate observations consists of checking for duplicate observations for each customer that appear on the same date, and ensuring only one of those observations remains. This does not remove any customers

from the sample, but will remove observations as necessary. Further, Observations with abnormally short or long meter read cycles were filtered from the model. This procedure removed observations where the meter read length was less than 10 or greater than 70 days.

7.3 Regression Model Specification & Results

ADM utilized a fixed-effects regression model to determine the change in energy consumption for program participants versus a group of matched non-participants. This involves the use of Pre/Post and Participant/Non-Participant binary variables. Weather was incorporated into the model through the use of Heating Degree Days (HDD) and Cooling Degree Days (CDD). ADM tested a variety of potential base temperatures for the HDD and CDD to maximize the coefficient T-Stats and R-Squared of the model. This resulted in a base temperature of 75 for CDD and 65 for HDD. The regression model is specified as follows:

$$kWh_{i,t} = \alpha_1 \text{Customer Fixed Effects}_i + \beta_1 HDD65_t + \beta_2 CDD75_t + \beta_3 Treatment_i + \beta_4 (Treatment_i * Post_{i,t}) + \beta_5 (CDD75_t * Post_{i,t}) + \beta_6 (HDD65_t * Post_{i,t}) + \beta_7 (Treatment_i * Post_{i,t} * HDD65_t) + \beta_8 (Treatment_i * Post_{i,t} * CDD75_t) + \varepsilon_{i,t}$$

Where the subscript i denotes variations by customer and t signifies changes through time. The variables included in the both regression models are specified in Table 7-2 below.

Table 7-2 Variables Included in Regression Model

Variable	***Description***
Fixed Effects by Customer	Unique identifier for each customer to control for any customer specific differences.
Heating Degree Days (HDD)	Heating Degree Days calculated by summing up the number of heating degree hours per day. The setpoint of 65 was used for the models.
Cooling Degree Days (CDD)	Cooling Degree Days calculated by summing up the number of cooling degree hours per day. The setpoint of 75 was used for the models.
Post	Indicator if a participant's observation is post audit (=1 if post, =0 otherwise). 0 for all control group observations.
Treatment	Indicator of whether the customer is a program participant or in the control group (=1 if program participant, 0 if in control group).
kWh	Monthly kWh per customer.

The results of the regression model are listed in Table 7-3below. The coefficients of interest are β_4, β_7, and β_6. When combined together with the Mean value of HDD65 and CDD75, program kWh savings can be calculated.

Table 7-3 Regression Coefficients & Model Details

Variable Description	***Regression Coefficients and Standard Errors***
HDD65 (β_1)	**1.771 ***
	(0.004)
CDD75 (β_2)	**3.532 ***
	(0.008)
Treatment*Post (β_3)	**-4.858**
	(8.76)
HDD65*Post (β_4)	**-0.013**
	(0.013)
CDD75*Post (β_5)	**-0.184 ***
	(0.019)
HDD65*Post*Treatment (β_6)	**-0.028**
	(0.018)
CDD75*Post*Treatment (β_7)	**-.014**
	(0.027)
Mean of dependent variable	1519.509
Sample Size	1,047,324
R-Squared	0.566
Notes: (1) The dependent variable is the Monthly kWh. (2) * denotes statistical significance at the 0.05 level. (3) Standard Errors are in parenthesis. (4) A negative value signifies savings.	

7.4 kWh Savings Results

The regression results from Table 7-3 were converted to kWh savings on a monthly basis using the mean HDD and CDD for each month of the post period in 2012.

$$Annual\ kWh\ Savings = 4.858 + 0.0283 * \mathbf{Mean(HDD65)} + 0.0137 * \mathbf{Mean(CDD75)}$$

That process was conducted for the post months (April – December) and then summed up to reach a total of 116.54 kWh savings per participant. When compared to the average usage of the participant group in 2012 over those months, the percentage savings were determined to be .89%. Using the number of 2012 program participants

(15,466), the results were scaled up to equal 1,802,360 kWh in 2012. These numbers are summarized in Table 7-4.

Table 7-4 Energy Feedback Pilot Savings Summary

2012 kWh Savings (Per Participant)	2012 Participants	Percentage Savings	2012 Program kWh Savings	kW Savings
116.54	15,466	.89%	1,802,360	114.49

In terms of percent of annual consumption, these values are lower than observed elsewhere for similar programs. It is possible that this is due to the high market share of evaporative cooling in New Mexico, which gives customers less discretionary usage to curtail in response to the home energy report. Much of the energy savings from home energy reports programs in other territories is attributable to curtailment of AC usage, and as a result it should be expected that there is a lower return in savings when a large share of customers use evaporative cooling..

8. Business Comprehensive

The Business Comprehensive Program (BCP) is the aggregation of Business Lighting, Business Cooling, Business Custom, Business Computers, and Business Motor & Drive Efficiency.

8.1 Business Comprehensive Program

SPS' business portfolio was disaggregated into separate programs by measure category. Beginning in 2012, these programs were aggregated into Business Comprehensive. As presently constituted, this aggregated the following programs:

8.1.1 Business Lighting Efficiency

SPS is offering the Lighting Efficiency to facilitate the implementation of cost-effective efficient lighting in non-residential facilities. This program is available to existing nonresidential customers as well as new construction and offers prescriptive and custom incentives.

- Prescriptive incentives are offered on a per unit basis for lamps and fixtures for the following lighting types:

– Compact fluorescent

– T8 & T5 Fluorescent

– Ceramic Metal Halide

– Pulse-Start Metal Halide

– LED exit signs

- In addition to lamp and fixtures, prescriptive incentives are offered on a per-unit basis for the following measures:

– Occupancy Sensors

– Photocells

– T8 Delamping

- Custom incentives are determined based on the estimated amount of electrical energy and peak demand savings, calculated at rates per kWh for on peak or non-peak hour time frames.

8.1.2 Business Cooling Efficiency

The Business Cooling Efficiency Program is designed to help non-residential customers reduce their energy consumption by installing high efficiency cooling equipment. SPS is offering the Business Cooling Efficiency Program in New Mexico to facilitate the

implementation of cost-effective cooling efficiency improvements in businesses. This program is available to existing nonresidential customers as well as new construction applications and offers prescriptive and custom incentives.

Prescriptive incentives are offered on a per-ton basis for common several classes of cooling equipment. These include the following:

- Condensing Units
- Split Systems
- Rooftop Units
- PTAC
- Water-Source Heat Pumps
- Chillers
- VAV Boxes

Custom incentives are available as well, and are determined based on the estimated amount of electrical energy and peak demand savings, calculated at rates per kWh for on peak or non-peak hour time frames.

8.1.3 Business Custom Efficiency

The Business Custom Efficiency Program is designed to help customers reduce their energy consumption by providing rebates for a wide variety of unique or unusual equipment and process improvements that are not covered by available prescriptive programs. This program is available to existing nonresidential customers as well as new construction applications.

The measures covered by this program fall outside of the scope of other SPS business programs; Business Lighting Efficiency, Business Cooling Efficiency, and Business Motor & Drive Efficiency each have custom components in addition to prescriptive measures, and cover a large amount of custom measures.

Businesses can receive rebates of up to $400 per kW saved. Participants must receive pre-approval for a measure before installation. In an effort to expand this program, in 2011 SPS began targeting customers with aggregated annual consumption greater than 10 GWh in order to increase awareness of the program. SPS intends to

- Increase awareness of energy conservation measures;
- Identify specific conservation opportunities;
- Drive customers to participate in existing prescriptive and customized rebate programs; and

- Drive customers to implement low-capital or short payback measures, even though they may not qualify for an implementation rebate under existing programs.

8.1.4 Business Motor Efficiency

SPS is offering the Business Motor & Drive Efficiency Program in New Mexico to facilitate the implementation of cost-effective energy efficiency improvements in businesses. This program is available to existing nonresidential customers as well as new construction applications and offers prescriptive and custom incentives.

- Prescriptive incentives are offered on a per HP or kW basis for the following measure types:

– 1-500 HP motors meeting or exceeding NEMA Premium Efficiency standards

– Variable frequency drives (VFDs)

– Constant speed motor controllers

– Energy efficient compressed air equipment upgrades

– No-loss air drains

- Custom incentives are determined based on the estimated amount of electrical energy and peak demand savings, calculated at rates per kWh for on peak or non-peak hour time frames.

Businesses participating in the Motor & Drive Efficiency Program can receive:

– Cash incentives to help alleviate the costs of installing efficient motors/controls;

– Custom measures that address customers specific needs;

– Cost reductions in electricity bills; and

– Education via a motor inventory assessment.

In addition, participants will benefit from reduced downtime due to motor failure and lower maintenance expenses as NEMA Premium Efficiency Motors are manufactured with high quality materials and standards.

8.1.5 Business Computer Efficiency

The Business Computer Efficiency Program provides incentives for high efficiency plug loads. Measures eligible for the program include:

- High efficiency desktop PCs;
- High efficiency servers; and
- Network PC management software.

8.2 M&V Methodologies

8.2.1 Business Lighting Efficiency

Evaluation of the Business Lighting Efficiency Program (BLEP) requires the following:

- Stratified random sampling, selecting large saving sites with certainty;
- Review of deemed savings parameters; and
- Onsite verification inspection, with metering in facilities where lighting runtime is uncertain;

Parameters required for evaluation of the BLEP are presented in Table 8-1.

Table 8-1 Data Sources for Gross Impact Parameters – Business Lighting Efficiency Program

Parameter	***Source***
Project Details	Program Tracking Data
Fixture Wattage Review	Manufacturer's Literature
Hours of Operation	Comparison of deemed values with CA DEER values, on-site metering for projects with uncertainty
HVAC Interactive Factors	Simulations of archetypical buildings using Roswell NM TMY weather data
Peak Coincident Factor	Review of deemed values, assignment of new values based upon facility operating hours should deemed values not provide accurate estimates
Effective Useful Life	Comparison against CA DEER values
Net-to-Gross Ratio (NTGR)	Participant Surveying

8.2.1.1 Business Lighting Efficiency Gross Savings Estimates

The 2012 BLEP encompassed lighting retrofits, occupancy sensors retrofits, and installation of high efficiency lighting as part of new construction projects. The subsections below present the savings calculation methodology for each of these measure types.

Gross Savings Methodology for High Efficiency Lighting Retrofits

To calculate annual savings from lighting retrofits, ADM applies the following equation:

$$Annual\ kWh\ Savings = (kW_{base} - kW_{post}) * Hours * HCEF$$

Parameters for this equation are defined in Table 8-2.

Table 8-2 Parameters for kWh Savings Calculation of Lighting Retrofit Measures

Parameter	Definition
kW_{base}	Total Baseline Fixtures x $W/Fixture_{base}$ / 1000W/kW
kW_{post}	Total Installed Fixtures x $W/Fixture_{post}$ / 1000W/kW
Hours	Annual Hours of Operation
HCEF	Heating/Cooling Energy Interactive Factor

Following this, ADM calculated peak kW savings. This is based upon an SPS-defined peak of 3:00 – 6:00 PM during the hottest summer weekdays. To provide the peak savings estimate for lighting, the facility's average runtime during the period of 3:00 – 6:00 PM on all summer weekdays was applied, in order to better reflect typical operation during the occurrence of a system peak. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = (kW_{base} - kW_{post}) * HCDF * PCF$$

Parameters for this equation are defined in Table 8-3.

Table 8-3 *Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures*

Parameter	Definition
kW_{base}	Total Baseline Fixtures x $W/Fixture_{base}$ / 1000W/kW
kW_{post}	Total Installed Fixtures x $W/Fixture_{post}$ / 1000W/kW
PCF	Peak Coincident Factor: % Time During Peak Period in Which Lighting is Operating
HCDF	Heating/Cooling Demand Interactive Factor

Gross Savings Methodology for High Efficiency Lighting in New Construction Applications

The 2012 BLEP provided rebates to three participating facilities for energy efficient lighting in new construction applications. These three facilities accounted for 97% of program-level savings. Calculations of savings for lighting in new construction applications differs from retrofits in that the baseline is denominated in W/ft^2 for the

space type. This is to capture the reduction in Lighting Power Density (LPD) generated by the project. Annual savings from an LPD reduction are calculated as:

$$Annual\ kWh\ Savings = \left(\frac{kW}{ft^2}_{base} - \frac{kW}{ft^2}_{post}\right) * Hours * HCEF * ft^2$$

Parameters for this equation are defined in Table 8-4.

Table 8-4 Parameters for kWh Savings Calculation of Lighting New Construction Measures

Parameter	Definition
kW/ft^2_{base}	Baseline LPD as Set by Building Code or Industry Standard
kW/ft^2_{post}	Total Installed Fixtures x $W/Fixture_{post}$ / 1000W/kW / Sq. Ft.
Hours	Annual Hours of Operation
HCEF	Heating/Cooling Energy Interactive Factor
Ft^2	Square Footage of the Facility

In a manner similar to lighting retrofits, ADM then calculates peak savings for the measure. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(\frac{kW}{ft^2}_{base} - \frac{kW}{ft^2}_{post}\right) * PCF * HCDF * ft^2$$

The parameters for this equation are defined in *Table 8-5*.

Table 8-5 Parameters for Peak Demand (kW) Savings Calculation of Lighting New Construction Measures

Parameter	Definition
kW/ft^2_{base}	Baseline LPD as Set by Building Code or Industry Standard
kW/ft^2_{post}	Total Installed Fixtures x $W/Fixture_{post}$ / 1000W/kW / Sq. Ft.
PCF	Peak Coincident Factor: % Time During Peak Period in Which Lighting is Operating
HCDF	Heating/Cooling Demand Interactive Factor
Ft^2	Square Footage of the Facility

Gross Savings Methodology for Lighting Controls in Retrofit & New Construction Applications

The methodology to be detailed encompasses ADM's gross savings methodology for all lighting control measures, including:

- Occupancy Sensors;
- Photocell Controls; and
- Daylighting Controls;

The methodology for this measure does not differ between retrofit and new construction applications as in a new construction application, the measure is considered as a retrofit to the installed lighting. Annual kWh savings from lighting controls are calculated as follows:

$$Annual\ kWh\ Savings = (Hours_{base} - Hours_{post}) * kW_{post} * HCEF$$

This captures savings attributable to a reduction in operating hours as a result of the lighting controls. In instances where controls are installed alongside a lighting retrofit, savings from occupancy sensors are calculated using the installed kW of the energy efficient lighting, in order to account for dissynergies (i.e., a simultaneous lighting retrofit and lighting control installation saves less than each of the two measures would have individually). ADM then calculated peak savings for lighting controls as:

$$Peak\ kW\ Savings = (PCF_{base} - PCF_{post}) * kW_{post} * HCDF$$

Savings from lighting controls are attributable to a reduction in the facility's Peak Coincident Factor, that is, after installation of lighting controls, the facility lighting operates for fewer hours within the 3:00 – 6:00 PM range.

8.2.1.2 Business Lighting Efficiency Net Savings Estimates

In evaluating the 2012 BLEP, ADM was tasked with providing net savings estimates. The net savings attributable to a program may differ from gross savings because of free-ridership. Free ridership impacts are the energy savings impact attributable to the installation of energy efficiency measures by participants who would have installed energy efficient lighting or lighting controls without the SPS rebate.

We used information collected through surveys of program participants to develop estimates of free-ridership. In these surveys, customers were questioned regarding their knowledge of energy efficiency, their reasons for participating, and the measure implementation decisions they would have made had they not participated in an IOU's program.

Our approach to estimating free-ridership using self-reported survey data has the following main features:

- We ask respondents two related sets of questions: (1) How much of the savings or measures would have been installed without the program, and (2) what was the likelihood that measures of the same or better efficiency would have been installed without the program. Using a combination of questions, we can derive the base value by filling in missing data with a hierarchy of responses.

- We use a variety of survey methods to help confirm the validity or consistency of responses provided to questions about free ridership. Asking related questions about the importance of incentives, prior plans to install, increases in efficiency and timing of investment allows examination of the consistency of self-reports on free ridership.

The factors are then combined to assign individuals a probability of free-ridership. The assignments are split into terciles, with respondents labeled as having a 0%, 33%, 67%, or 100% chance of free-ridership. The categories of free-ridership are detailed in the subsections to follow.

Financial Ability

For Part 1, customers were asked:

> Question 13: Would you have been able to install the measure without the financial incentive from SPS?

If the customer answered No to this, then they are assigned 0% free-ridership, as without the financial ability to purchase high efficiency lighting equipment, other factors in the decision making process cannot contribute to the decision making absent the available rebate. This value essentially serves as a free-ridership "gateway". Respondents that lacked financial ability are definitely not free-riders, but being financially able to install a measure is not sufficient to label as a free-rider.

Prior Planning

Following this, customers are asked as to any plans they had to install high efficiency lighting equipment. This is addressed in the following questions:

> Question 36: When did you learn of the lighting efficiency program?

> Question 15: Did you have plans to install the equipment before participating in the program?

If the respondent indicates that they did have prior plans, or that they had not learned of the program until after having selected the equipment, then they can be considered a partial-free rider on this component.

Importance of Rebate in Decision Making

Once customers learn of the rebate, it is possible that this knowledge will sway their decision making process to install standard vs. high efficiency lighting equipment. To address this, we examined responses to the following two questions:

> Question 5: How important was SPS' rebate in your decision to buy high efficiency lighting equipment?
>
> Question 14: Before participating in the lighting efficiency program, had you installed any equipment similar to [Equipment/Measure] at your facility?

Question directly addresses the importance of the rebate, by having the respondent weigh its importance in the decision-making process for the project. Question 14 also addresses how important the rebate was to the decision making process as if the respondent had installed the same measure elsewhere at the facility then the rebate was likely not required to induce them to install the rebated project

Likelihood of Installing Similar Equipment without Rebate

Finally, customers are asked whether they would have installed high efficiency lighting equipment if the rebate were not available. This is addressed with four questions:

> Question 19: If the financial incentive from the lighting efficiency program had not been available, how likely is it that you would have installed [Equipment/Measure] anyway?
>
> Question 20: How did availability of information and financial incentives through the lighting efficiency program affect the quantity (or number of units) of [Equipment/Measure] that you purchased and installed? Did you purchase and install more [Equipment/Measure] than you otherwise would have without the program?
>
> Question 21: How did availability of information and financial incentives through the lighting efficiency program affect the level of efficiency you chose for [Equipment/Measure] that you purchased and installed? Did you choose equipment that was more energy efficient than you otherwise would have chosen because of the program?
>
> Question 22: How did availability of information and financial incentives through the lighting efficiency program affect the timing of your purchase

and installation of [Equipment/Measure]? Did you purchase and install more [Equipment/Measure] earlier than you otherwise would have without the program?

If the respondent indicates on Question 19 that they "Probably would have installed" or "Definitely would have installed" the same equipment without the rebate, their answers to the three questions to follow are examined. Questions 20-22 address whether the project was modified due to available rebates from the program. If the respondent indicates that they did not modify the project, then they are likely a free-rider on this component. If they had modified the project, then that is an indicator that the program did affect their decision making, even if this runs counter to their response in Question 19.

Assignment of Free-Ridership and Partial Free-Ridership Scores

Based upon the answers to these four categories of questions, the respondents are placed in Free-Ridership Terciles, with scores of 0%, 33%, 67%, and 100% Free-Ridership. The scoring is based upon all possible interactions between the four questions. Part 1 of free-ridership, Financial Ability, essentially serves as a gateway; if it does not equal "Yes" then other aspects of free-ridership are irrelevant. Table 8-6 presents the associated free-ridership score for each permutation of answers in the four free-ridership components. The table provides scoring at the individual participant level. Program-level free-ridership is then derived by aggregating the participant-level scores.

Table 8-6 Free-Ridership Scoring

Financial Ability	Prior Planning	Rebate Was Important	Likely to Install w/o Rebate	Aggregated Category	Free-Ridership Score
Y	N	N	Y	YNNY	.67
Y	N	N	N	YNNN	.33
Y	N	Y	Y	YNYY	.33
Y	N	Y	N	YNYN	0
Y	Y	N	Y	YYNY	1
Y	Y	N	N	YYNN	.67
Y	Y	Y	Y	YYYY	.67
Y	Y	Y	N	YYYN	.33
N	N	N	Y	NNNY	0
N	N	N	N	NNNN	0
N	N	Y	Y	NNYY	0
N	N	Y	N	NNYN	0
N	Y	N	Y	NYNY	0
N	Y	N	N	NYNN	0
N	Y	Y	Y	NYYY	0
N	Y	Y	N	NYYN	0

8.2.2 Business Cooling Efficiency

Evaluation of the Business Cooling Efficiency Program (BCEP) requires the following:

- Stratified random sampling, selecting large saving sites with certainty;
- Review of deemed savings parameters;
- Onsite verification inspections;
- DOE-2 Simulation of large, complicated retrofits and use of Equivalent Full Load Hours (EFLH) values for smaller projects.

Parameters required for evaluation of the BCEP are presented in Table 8-7.

Table 8-7 Data Sources for Gross Impact Parameters – Business Cooling Efficiency Program

Parameter	***Source***
Project Details	Program Tracking Data
Facility Billing Data (For Calibration of Large Retrofit Simulation Models)	SPS
Equipment Specifications (Size, Efficiency, etc.)	Manufacturer's Literature
Equivalent Full-Load Hours (EFLH)	SPS Deemed values, reviewed by ADM through simulation of archetypical facilities with Roswell NM TMY Weather Data
Effective Useful Life	Comparison against CA DEER values
Net-to-Gross Ratio (NTGR)	Participant Surveying

8.2.2.1 Business Cooling Efficiency Gross Savings Estimates

As stated above, gross savings estimates for facilities participating in the 2012 BCEP are evaluated by one of two methodologies:

- Calibrated DOE-2 simulation, for large retrofits; and
- Equivalent Full Load Hour calculations for smaller retrofits.

DOE-2 Simulation Modeling

In 2012, there were no cooling projects that required simulation modeling..

EFLH Calculations

For simpler cooling measures, including Package Terminal Heat Pumps (PTHPs) and Roof Top Units (RTUs), ADM applies deemed EFLH values along with specifications of

installed capacity and efficiency in evaluating savings. The general form through which kWh savings are calculated in this manner is:

Parameters for this equation are defined in Table 8-8.

Table 8-8 Parameters for kWh Savings Calculation of HVAC Retrofits

Parameter	***Definition***
#Units	Quantity of Rebated HVAC Units
Cap	Unit Capacity (Measured in Tons)
$SEER_{base}$	Baseline SEER
$SEER_{Post}$	Installed SEER
EFLH	Equivalent Full Load Hours (Encompassing both heating and cooling hours in cases of heat pumps)

EFLH values are provided in SPS' technical assumptions for business cooling measures. ADM tests these values via DOE-2 simulation modeling of archetypical building types using Roswell NM TMY weather data, and revises EFLH by facility type where appropriate. Following this, ADM calculates peak kW savings by the following equation:

EER is used in peak demand calculations as it reflects unit efficiency during peak weather conditions.

8.2.3 Business Cooling Efficiency Net Savings Estimates

Net savings for the BCEP are estimated in the same manner as detailed in Section 8.2.1.2 for the Business Lighting Efficiency Program.

8.2.4 Business Custom Efficiency

The Business Custom Efficiency Program had no participation in 2012.

8.2.5 Business Motor & Drive Efficiency

Evaluation of the Business Motor & Drive Efficiency Program (BMEP) requires the following:

- Stratified random sampling, selecting large saving sites with certainty;
- Review of deemed savings parameters; and
- Onsite verification inspections;

Parameters required for evaluating savings from the BMEP are detailed in Table 8-9.

Table 8-9 Data Sources for Gross Impact Parameters – Business Motor & Drive Efficiency Program

Parameter	Source
Project Details	Program Tracking Data
Load Factor	SPS deemed values & one-time readings for simple applications, power metering for larger, complicated applications.
Equipment Specifications (Size, Efficiency, etc.)	Manufacturer's Literature
Equivalent Full-Load Hours for HVAC Pumps & Ventilation Fans (EFLH)	SPS Deemed values, reviewed by ADM through simulation of archetypical facilities with Roswell NM TMY Weather Data
Hours of Operation for Industrial Motors & Drives	SPS deemed values for simple applications, end-use metering & facility staff interviews for complicated applications
Effective Useful Life	Comparison against CA DEER values
Net-to-Gross Ratio (NTGR)	Participant Surveying

8.2.5.1 Business Motor & Drive Efficiency Gross Savings Estimates

The 2012 BMEP provided rebates to participating facilities for projects including:

- NEMA Premium Efficiency Motors;
- Pump-Off Controllers (POCs);
- Variable Frequency Drives (VFDs) for Air Handler Units (AHUs) in HVAC Applications; and
- VFDs in industrial pumping applications.

Gross Savings for NEMA Premium Efficiency Motors

Savings from NEMA Premium Efficiency Motors are calculated as:

$$Annual\ kWh\ Savings = HP\ x\ LF\ x .746\ {}^{kW}/_{HP} * \left(\frac{1}{Eff_{std}} - \frac{1}{Eff_{prem}}\right) * Hrs$$

Parameters for this equation are detailed in Table 8-10.

Table 8-10 Parameters for kWh Savings Calculation of Premium Efficiency Motor Retrofits

Parameter	Definition
HP	Motor Horsepower
LF	Load Factor

Eff_{std}	Efficiency Rating of a Standard Efficiency Motor of the Specified HP
Eff_{prem}	Efficiency Rating of a Premium Efficiency Motor of the Specified HP
Hrs	Hours of Operation Per Year

Following this, peak demand (kW) reduction is calculated. Peak Coincident Factors for NEMA Premium Efficiency Motors are taken from SPS technical assumptions, which ADM determined to be reasonable estimates of PCF. Demand savings are calculated as:

$$Peak\ kW\ Savings = HP\ x\ LF\ x\ .746\ {}^{kW}/_{HP} * \left(\frac{1}{Eff_{std}} - \frac{1}{Eff_{prem}}\right) * PCF$$

Gross Savings for HVAC VFDs

Savings from VFDs are calculated as:

$$Annual\ kWh\ Savings = HP\ x\ LF\ x\ .746\ {}^{kW}/_{HP} * \left(\frac{1}{Eff_{std}}\right) * Hrs * \%_{Savings}$$

Parameters for this equation are detailed in Table 8-11 below.

Table 8-11 Parameters for kWh Savings Calculation of Premium Efficiency Motor Retrofits

Parameter	***Definition***
HP	Motor Horsepower
LF	Load Factor
Eff_{std}	Efficiency Rating of a Standard Efficiency Motor of the Specified HP
Hrs	Hours of Operation Per Year
$\%_{savings}$	Average Savings Achieved by the VFD

Following this, peak demand (kW) reduction is calculated. Peak Coincident Factors for VFDs are taken from SPS technical assumptions, which ADM determined to be reasonable estimates of PCF. Demand savings are calculated as:

$$Peak\ kW\ Savings = HP\ x\ LF\ x\ .746\ {}^{kW}/_{HP} * \left(\frac{1}{Eff_{std}} -\right) * \%_{savings} * PCF$$

Gross Savings for VFDs in Industrial Applications

The 2012 BMEP had numerous participants install VFDs on industrial pumps. These applications included mining, oil pumping, and food processing. Typically, ADM treated

these projects as custom, in that savings were calculated from end-use monitoring. Such sites were large savers, and in the sample frame were certainty sites, making the analysis constitute a one-off "case study".

8.2.5.2 Business Motor & Drive Efficiency Net Savings Estimates

Net savings for the Business Motor & Drive Efficiency Program are estimated in the same manner as detailed in Section 8.2.1.2 for the Business Lighting Efficiency Program.

8.3 Impact Evaluation Results

The main features of the approach used for the impact evaluation are as follows:

- Data for the study have been collected through review of program materials, on-site inspections, and end-use metering. Based on data provided by SPS, sample designs were developed for on-site data collection for the impact evaluation. Sample sizes were determined that provide savings estimates for the program with ±10% precision at the 90% confidence level.
- On-site visits were used to collect data for savings impacts calculations. The on-site visits were used to verify installations and to determine any changes to the operating parameters since the measures were first installed. Facility staff were interviewed to determine the operating hours of the installed system and to locate any additional benefits or shortcomings with the installed system. For some sites, monitoring of lighting or HVAC equipment was conducted to obtain more accurate information on operating characteristics.

Gross savings were estimated using proven techniques, including engineering calculations using industry standards and verification of computer simulations developed by program contractors to determine energy savings. Table 8-12 summarizes the total participation in the 2012 BCP.

Table 8-12 2012 BCP Participation Summary

Program	# Projects	Expected kWh	Expected kW
Business Lighting	32	3,242,191	965.3
Business Cooling	23	322,900	527.8
Business Custom	8	394,091	81.1
Business Motors & Drives	71	9,399,241	1,399.2
Business Computers	58	15,334	2.0
Total	193	13,368,423	2,975.4

Data provided by SPS showed that during 2012, there were 193 projects in total for all program components, which were initially expected to provide gross savings of 13,368,423. The resulting overall sample is presented in Table 8-13.

Table 8-13 BCP Sample Summary

Component	# Sites in Population	Site Visit Sample Size	# Interviews	# Sites Represented in Interviews
Business Lighting	31	2	3	3
Business Cooling	23	2	2	3
Business Custom	0	0	0	0
Business Motors & Drives	72	10	5	59
Business Computers	59	0	0	0
Total	126	14	10	65

8.3.1 BCP Gross Savings Estimates

The Evaluators identified issues in stratifying strictly by expected savings for the 2012 BCP. Specifically, there were some systematic measure issues which did not extrapolate to other measure categories. As such, the sample was stratified by measure category and then by savings.

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8.3.1.1 BCP Sample Design - Motors

The motors population for BCP was divided into 4 strata. Table 8-14 summarizes the strata boundaries and sample frames for the BCP.

Table 8-14 BCP Sample Design

	Stratum 1	Stratum 2	Stratum3	Stratum 4	Totals
Strata boundaries (kWh)	<65,000	65,000 – 200,000	200,000 – 550,000	>550,000	
Number of sites	46	12	14	1	72
Total kWh savings	1,469,367	1,432,737	5,223,320	1,519,545	9,644,969
Average kWh	31,943	130,249	373,094	1,519,545	133,658
Standard deviation of kWh savings	14,222	53,737	100,588	-	217,827
Coefficient of variation	.45	.41	.27	-	1.63
Final sample	2	2	6	1	11

8.3.1.2 BCP Sample Design – Custom

The custom component had a mix of HVAC, envelope, and lighting projects. The HVAC and Lighting projects were aggregated with the Business Cooling and Business Lighting

components, respectively, in manner detailed in the subsections below. There was one building envelope project which was sampled for on-site data collection. The results of this project were not extrapolated to other projects as this was the only building envelope project in the 2012 BCP.

8.3.1.3 BCP Sample Design – Lighting

The lighting portion of the BCP had 31 sites totaling 3,066,756 kWh. ADM visited two of these 31 projects, accounting for 50.6% of lighting expected savings. In addition, there were six custom lighting projects totaling 84,591 kWh. These projects were not visited, but ADM reviewed the ex ante calculations for these projects as they were submitted to SPS and found no specific need for monitoring or a custom approach. Typically, these projects involved fixtures that were outside the standard wattage tables, rather than any custom controls schemes that would warrant M&V. As such ,the realization rate from the Business Lighting sites was extrapolated to these facilities.

8.3.1.4 BCP Sample Design – Cooling

The prescriptive cooling portion of the BCP had 23 sites totaling 322,900 kWh. ADM sampled one project from this population. The visited site was at a retail chain that implemented the same improvement in 10 projects, with those 10 projects accounting for 28% of program savings.

This was supplemented by a documentation review of kW estimates for Guest Room Energy Management (GREM) projects. The kW estimates submitted by SPS were non-coincident kW. As such, the values for GREM presented were higher than expected. For typical HVAC retrofits, typically the coincident kW comes close to full kW (under the presumption that HVAC equipment is at full load during summer peaks). ADM revised the GREM kW based on the peak coincident factor from SPS technical assumptions (.06).

8.3.1.5 Sample Design –Computers

It was decided to exclude Business Computers from the general stratification scheme and treat this component as a distinct population. This component was a very small contributor to program savings (accounting for only .14% of expected savings) and the level of effort required to conduct M&V would have been inappropriate given the size and participation level.

8.3.1.6 Site-Level Realization

Sites chosen within each stratum are visited in order to verify installation of rebated measures and to collect data needed for calculation of ex post verified savings. The realization rates for sites within each stratum are then applied to the non-sampled sites within their respective stratum. Table 8-15 presents results at the site level.

Table 8-15 Expected and Realized Savings by Project

Project ID(s)	Facility Type	Program Category	Expected kWh Savings	Realized kWh Savings
1-8E35J	Industrial	Motors	1,519,545	1,387,408
1-8E353	Industrial	Motors	479,149	421,187
1-8E35T	Industrial	Motors	473,280	405,426
1-8958V	Industrial	Motors	472,581	406,232
1-8E34V	Industrial	Motors	398,557	338,390
1-8HVVJ	Industrial	Motors	398,501	539,837
1-8HV7H	Industrial	Motors	385,054	330,231
OID1333878	Industrial	Motors	199,596	169,813
1-8HV75	Industrial	Motors	93,782	81,649
OID1333882	Industrial	Motors	30,575	26,515
OID1333893	Industrial	Motors	30,205	25,132
OID1473947	Industrial	Lighting	1,124,797	1,339,219
OID1421847	College/University	Lighting	427,471	229,007
1-898AO	Warehouse	Custom – Cool Roof	205,720	205,720
1-8E27V	Retail/Service	Cooling	10,459	11,527

From these site-level analyses, realization rates by measure category were developed. These are summarized in Table 8-16 and Table 8-17 below for kWh and kW, respectively.

Table 8-16 Gross kWh Realization by Measure Category

Program Category	Expected kWh Savings	Realized kWh Savings	Realization Rate
Lighting	1,552,268	1,568,226	101.0%
Cooling	10,459	11,527	110.2%
Motors	4,480,825	2,923,149	92.2%

Table 8-17 Gross kW Realization by Measure Category

Program Category	Expected kW Savings	Realized kW Savings	Realization Rate
Lighting	291.85	307.08	105.2%
Cooling	7.32	7.55	103.1%
Motors	659.93	334.09	71.5%

8.3.1.7 Program-Level Gross Realization

Using the realization rates presented in Table 8-16 and Table 8-17, ADM extrapolated results from sampled sites to non-sampled sites in developing program-level gross savings estimates. Table 8-18 presents results by measure.

Table 8-18 BCP Program-Level Gross Realization by Stratum

Measure	# Sites	Expected kWh Savings	Realized kWh Savings	kWh Gross Realization Rate	Expected kW Savings	Realized kW Savings	kW Gross Realization Rate
Lighting	31	2,996,463	3,027,268	101.0%	897.8	944.5	105.2%
Cooling	23	332,900	366,856	110.2%	159.1	164.5	110.2
Motors	72	9,644,969	8,893,626	92.2%	1,466.6	1,049.1	92.2%
Custom	8	394,091	390,249	99.0%	81.1	72.8	99.0%
Computers	59	15,334	15,334	100%	2.0	2.0	100%
Total	193	13,383,757	12,693,333	93.9%	2,606.6	2,232.9	94.8%

8.3.1 Business Comprehensive Net Savings Estimates

ADM estimated net savings for all SPS business programs via detailed participant surveying of a representative sample of decision makers from each program. These questionnaires were used to provide estimates of free-ridership, with a separate estimate developed for each measure category. The subsections to follow will present ADM's NTGR estimates by measure category for each program component, and the associated net savings.

With verified savings compiled by stratum and by measure, ADM then applies measure-category NTGRs to estimate program net savings. These are summarized in Table 8-19.

Table 8-19 Verified Net kWh Savings by Program

Program	NTGR	Verified Net kWh	Verified Net kW
Lighting	79.8%	2,415,760	753.7
Cooling	88.7%	325,401	145.9
Motors	86.8%	7,719,667	910.6
Custom	80%	312,199	84.8
Computers	88%	13,494	1.8
Total	80.8%	10,786,521	1,896.8

After evaluating the program components, ADM compiled net savings to provide an overall net realization rate. These results are summarized in Table 8-20.

Table 8-20 SPS Business Comprehensive Net Realization Summary

Component	Peak Demand Reduction (kW)		Annual Energy Savings (kWh)		Lifetime Energy Savings (kWh)		Net Realization Rate
	Ex Ante	Ex Post	Ex Ante	Ex Post	Ex Ante	Ex Post	
Business Lighting	718.3	753.7	2,397,170	2,415,760	35,957,550	36,236,400	100.8%
Business Cooling	127.3	145.9	226,320	325,401	4,316,096	5,273,590	143.8%
Business Custom	93.9	84.8	315,273	312,199	5,551,972	5,505,868	99.0%
Business Motors	1,173.3	910.6	7,715,975	7,719,975	95,815,725	88,351,680	100.1%
Business Computers	1.8	1.8	13,494	13,494	67,470	67,470	100.0%
Total	2,435.9	2,012.6	10,668,232	10,786,829	141,708,813	135,435,008	101.1%

8.4 Process Evaluation Findings

This chapter presents the results of the process evaluation of the Business Comprehensive Program[6]. The process evaluation focuses on aspects of program policies and organization, as well as the program delivery framework.

The process chapter begins with a discussion of the overall progress of the program and potential for meeting its goals. The chapter also includes discussion relating to certain issues that are critical to the future success of the program. This discussion is followed by an analysis of strategic planning and process recommendations, and concludes by highlighting key findings from the surveys of trade allies and customer participants.

8.4.1 Overall Program Success

The SPS business portfolio had a record year in terms of expected kWh savings. As in 2011, much of this was driven by the Business Motors & Drive Efficiency program accounting for 58.8% of business-sector expected savings). .

As demonstrated in Table 8-21 below, participation has climbed across almost all segments[7]. The only exceptions are Business Cooling and Business Custom, which tends to have relatively low claimed savings as well as volatile participation levels. The SPS portfolio is distinguished in the low percentage of savings provided by lighting. In many business rebate programs, it is not uncommon to see lighting account for 70% or more of expected savings. In 2012, lighting accounted for only 39.5% of expected

[6] "Business Comprehensive" is an aggregation of Business Lighting, Business Cooling, Business Custom, and Business Motors & Drives programs.

[7] This table includes Small Business Lighting for purposes of business portfolio-level comparison, though SBL is not part of Business Comprehensive.

savings for SPS. This diversity of participation will help ensure consistent savings from the portfolio in coming program years.

Table 8-21 Business Program Expected kWh Savings by Year

Program	Program Year			
	2009	2010	2011	2012
Business Lighting	3,536,871	1,094,577	1,891,656	3,066,756
Business Cooling	32,932	449,141	799,665	262,607
Business Custom	-	165,846	629,507	-
Business Motors & Drives	337,643	443,888	8,347,683	9,644,969
Small Business Lighting	370,995	1,480,114	3,325,800	3,408,297
Business Computers	-	-	-	15,443
Total kWh Savings	4,278,441	3,633,596	14,994,311	16,398,072

The Business Comprehensive program (excluding Business Computer Efficiency and Small Business Lighting) had 134 participating facilities in 2012. Figure 8-1 presents the distribution of participants by facility type.

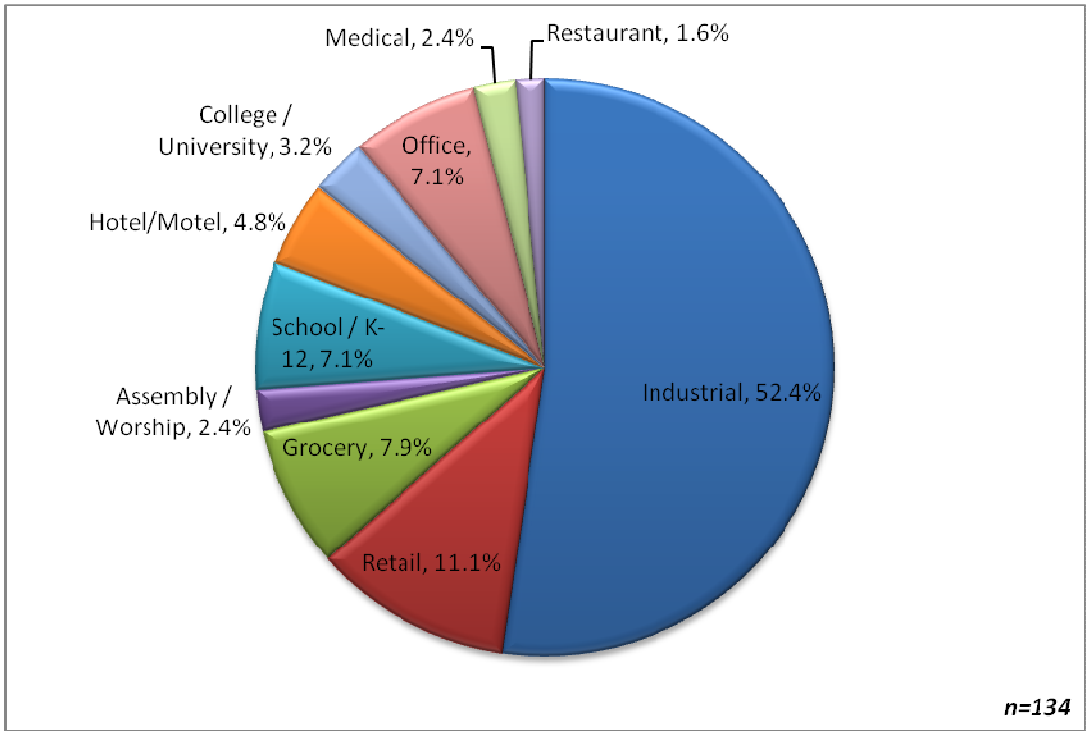

Figure 8-1 Business Comprehensive Distribution of Participants by Facility Type

The distribution of savings did not match the distribution of facilities, in that Retail/Service facilities were typically low savers. In many cases, however, a retail chain would be responsible for the retrofitting of several locations, and in aggregate these facilities accounted for a sizable amount of savings. Figure 8-2 summarizes the distribution of expected savings by facility type.

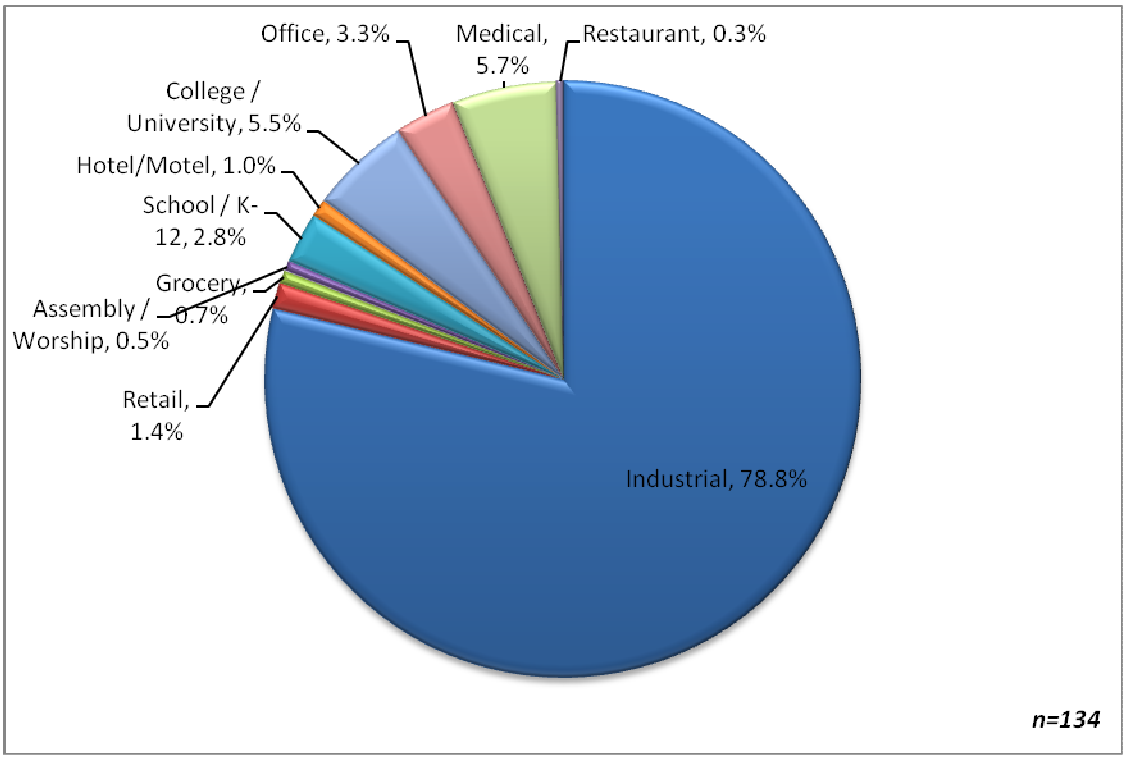

Figure 8-2 Business Comprehensive Distribution of Expected Savings by Facility Type

8.4.2 Customer Outcomes

SPS utilizes multiple marketing strategies to make customers aware of its programs. The program partners with trade allies such as lighting contractors, motor vendors, HVAC companies, engineering firms and others who promote programs with their customers. SPS has a website where customers can learn about various measures and obtain forms. Additionally, SPS began funding "Business Education", which covers a range of channels such as direct business marketing and the funding of site audits for larger customers.

A survey was conducted to collect data about customer decision-making, preferences, and perspective of the Business Comprehensive Program. In total, 2 decision makers responded to the survey, representing 79 facilities. Because some decision makers represent more than one facility, such as with retail chains, responses for each of the 79 locations will be considered individually for the purposes of aggregation.

8.4.2.1 How Customers Learn About the Program

Table 8-22 displays the customer responses to how they learned about the program. The percentages are the percentages of respondents. A large volume of respondents indicated either word of mouth or an SPS account rep. Facility managers in this industry communicate often and as such this information is disseminated informally.

Table 8-22 How Customer Decision Makers Learned about the Program

	Percent of Respondents
An equipment vendor or building contractor	3.1%
A SPS representative mentioned it	15.4%
Friends or colleagues (i.e., word of mouth)	76.9%
Don't Know	4.6%
N	65

An important question is when respondents learned about the program. As shown in

Table 8-23, 14% of the customers learned about the program before they planned equipment replacements, and 43% learned about it during planning equipment replacement. 43% respondents indicated that they had learned about the program after the equipment had been specified and/or installed.

Table 8-23 When Customer Decision Makers Learned about the Program

When did you learn of the Business Comprehensive Program?	Percent of Respondents
Before planning for replacing the equipment began	76.9%
During your planning to replace the equipment	23.1%
Once equipment had been specified but not yet installed	0%
After equipment was installed	0%
Don't know	0%
N	79

8.4.2.2 Customer's Attitudes, Behaviors and Decision Making with Respect to Energy Efficiency

Customers were asked about the importance of energy efficiency in facility operational planning as compared with other factors. As shown in Table 8-24, 82% of the customer respondents reported that compared to other factors energy efficiency was a very important factor in planning their operations.

Table 8-24 Importance of Energy Efficiency Compared to Other Factors

Importance	Percent of Respondents
Very important	81.5%
Somewhat important	15.4%
Only slightly important	3.1%
Not important at all	0%
N	65

Respondents were given a list of factors, shown in Table 8-25, and asked how important each of the factors was in their decision to participate. The highest percentage of customer respondents rated past experience with energy efficient equipment as "very important" (47%), followed by the incentive payment from SPS (92%).

Table 8-25 Percent Rating Factors Influencing the Decision to Participate

Energy Efficiency Decision Making Factor	Very Important	Somewhat Important	Only Slightly Important	Not Important At All	Don't Know	N
Incentive payments from SPS	100%	0%	0%	0%	0%	65
Past experience with energy efficient equipment	7.7%	89.2%	0%	0%	3.1%	65
Organization's policies	7.7%	0%	3.1%	89.2%	0%	65
Advice and/or recommendations received from SPS	21.5%	4.6%	0%	73.8%	0%	65
Advice and/or recommendations received from Contractor	18.5%	7.7%	0%	73.8%	0%	65

Much of the participation is driven by large industrial customers that have technical capability. As such, their motivations to participate were in large part not driven by information or technical assistance. It was found in the interviews that their priority in participating was to have predictable incentives and an easy application process, so as to make their participation worth the time and effort, relative to other possible uses of budget and staff.

8.4.2.3 Where Decision Makers get Their Information

Respondents were asked whom they rely on for information about energy efficient equipment, materials and design features. Respondents could provide multiple responses and the percentages are percentages of firms, and so the total shown in Table 8-26 does not equal 100%.

Table 8-26 Who Respondents Rely on for Information

Information Source	Percent of Respondents
Equipment vendors or building contractors	84.2%
Friends and colleagues	7.7%
Trade journals or magazines	7.7%
Brochures or advertisements	10.8%
Trade associations or business groups you belong to	7.7%
Trade Shows	4.6%
The SPS website	10.8%
A SPS Account Representative	26.2%
Other	
N	65

* Customer could make multiple responses. The percentages are based on the number of respondents rather than the number of responses. Thus, the total exceeds 100%.

8.4.2.4 Satisfaction with the Program

Respondents were asked about their levels of satisfaction with selected aspects of the program on a scale of 1 to 5 where 1 is very dissatisfied and 5 is very satisfied. Table 8-27 shows the results. Satisfaction was high across all components, with no one respondents scoring any component less than 3.

Table 8-27 Customer Decision Maker Satisfaction with Selected Elements Program Experience

Element of Program Experience	Percent of Respondents						
	Very Dissatisfied	Somewhat Dissatisfied	Neither Satisfied nor Dissatisfied	Somewhat Satisfied	Very Satisfied	Don't Know	Mean Score
Performance of the equipment installed	0%	0%	0%	3.1%	96.9%	0%	4.97
Savings on monthly bill	0%	0%	4.6%	0%	80.0%	15.4%	4.89
Incentive Amount	0%	0%	4.6%	0%	95.4%	0%	4.91
The effort required for the application process	0%	0%	4.6%	0%	95.4%	0%	4.91
Information provided by your contractor	0%	0%	20%	0%	80%	0%	4.60
Quality of work by your contractor	0%	0%	0%	0%	100%	0%	5.00
Information from SPS account rep	0%	0%	4.6%	0%	95.4%	0%	4.91
Overall program experience	0%	0%	4.6%	0%	95.4%	0%	4.91
The elapsed time until you received the incentive	0%	0%	4.6%	0%	95.4%	0%	4.91

8.4.3 Future Program development

The BCP has derived much of its program savings from SPS' industrial sector, with particular emphasis on the oil industry. There has been significant success in the BCP encouraging uptake of oil well pump-off controllers, and in 2012 this measure accounted for more than 51% of program expected savings. From interviews with SPS staff, ADM found that it is the program staff's belief that the large oil producers have been for the most part saturated. Given this, program staff are now moving to target small independent oil producers with their marketing efforts. However, it is anticipated that this segment will reach saturation during the 2014 program year.

SPS staff have taken steps in anticipation of this. For example, they have contacted to an outside engineering firm to conduct a measure pilot study for a motor control that could further reduce consumption on pumps used by oil producers. Other activities include the development of savings values and incentives for business plug loads, though to-date these have had no uptake.

Further, SPS has in the participant pipeline a fair number of large-saving custom projects with long M&V periods. Many of these projects are expected to close in 2013, and for the time being, the business portfolio does not seem to be at risk of falling short of performance goals in aggregate. Though some components (specifically Business

Lighting an Business Cooling) consistently underperform, this is generally overcome by over-performance by Business Motors and Small Business Lighting.

9. Appendix A: Site Reports

This appendix contains the site reports for evaluation of the SPS 2012 Business Portfolio.

Project Number OID1421847
Program Business Lighting Efficiency

Project Summary

The participant is a university campus that received incentives from SPS for implementing energy efficient lighting. On-site, ADM verified the participant had installed:

- (284) 4' 3-lamp T8 fixtures, replacing 4' 4-lamp T12 fixtures;
- (632) 4' 3-lamp T8 fixtures, replacing 4' 3-lamp T12 fixtures;
- (6) 4' 2-lamp T5 fixtures, replacing 4' 2-lamp T12 fixtures;
- (1) 4' 1-lamp T5 fixture, replacing a 4' 1-lamp T12 fixture;
- (88) 4' 1-lamp T5HO fixtures, replacing 4' 2-lamp T12 fixtures;
- (28) 4' 2-lamp T5HO fixtures, replacing 175W Metal Halide fixtures;
- (56) 4' 5-lamp T5HO fixtures, replacing 400W Metal Halide fixtures;
- (41) 50W LED Exterior fixtures, replacing 175W Metal Halide fixtures;
- (45) 2W LED Exit Signs, replacing 40W Incandescent Exit Signs;
-

M&V Methodology

ADM confirmed installation of all fixtures listed in the project application. Savings were then calculated using logged data from the site, from which hours of use and a Peak Coincident Factor (PCF) were determined. Heating Cooling Energy Factor (HCEF) and Heating Cooling Demand Factor (HCDF) were determined using local weather data and SPS peak parameters. The values used in calculating savings are presented in the table below.

Savings Parameters

Building Type	*Monitored Space Name*	*Annual Hours*	*HCEF*	*HCDF*	*PCF*
University Campus	Maintenance Shop	1879	1.172	1.479	0.71
University Campus	Welding Shop	1470	1.172	1.479	0.48
University Campus	Multi-purpose room/Gym	401	1.172	1.479	0.09
University Campus	Manufacturing class room	375	1.172	1.479	0.09
University Campus	Library	2745	1.172	1.479	0.81
University Campus	Classroom 210	500	1.172	1.479	0.17
University Campus	Administrative Office	2279	1.172	1.479	0.85
University Campus	Student Services Office	2224	1.000	1.000	0.84
University Campus	Lecture Hall - Room 153	201	1.172	1.479	0.07
University Campus	Classroom 154	633	1.172	1.479	0.11

Savings Calculations

Using values from the table above data, ADM calculated lighting savings as follows:

$$Annual\ kWh\ Savings = (kW_{base} * Hours_{base} - kW_{post} * Hours_{post}) * HCEF$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
$Hours_{base}$	Annual Hours of Operation of Baseline Fixtures
$Hours_{post}$	Annual Hours of Operation of Installed Fixtures
HCEF	Heating/Cooling Energy Interactive Factor

Following this, ADM calculated peak kW savings. This is based upon a SPS-defined peak of 3:00 – 6:00 PM during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = (kW_{base} - kW_{post}) * HCDF * PCF$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
PCF	Peak Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
HCDF	Heating Cooling Demand Interactive Factor

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Lighting Retrofit kWh Savings Calculations

Measure	Quantity (Fixtures)		Wattage		Hours		Expected kWh Savings	Realized kWh Savings	HCEF	Realization Rate
	Base	Post	Base	Post	Base	Post				
4' 4L T12 to 4' 3L T8	284	284	188	89	2,032	2,032		66,935	1.172	
4' 3L T12 to 4' 3L T8	632	632	151	89	2,032	2,032		93,284	1.172	
4' 2L T12 to 4' 2L T5 28W	6	6	94	61	2,387	2,387		554	1.172	
4' 1L T12 to 4' 1L T5 28W	1	1	57	31	2,387	2,387		73	1.172	
4' 2L T12 to 4' 1L T5HO	88	88	94	59	2,387	2,387		8,613	1.172	
175W MH to 4' 2L T5HO	28	28	215	117	375	375		1,205	1.172	
400W MH to 4' 5L T5HO	56	56	458	294	1,211	1,211		13,031	1.172	
175W MH to 50W LED Exterior	41	41	215	58	4,313	4,313		27,761	1.000	
40W Inc. Exit to 2W LED Exit	45	45	40	2	8,760	8,760		17,551	1.172	
Total							**427,471**	**229,007**		**54%**

Lighting Retrofit kW Savings Calculations

Measure	Quantity (Fixtures)		Wattage		PCF		Expected kW Savings	Realized kW Savings	HCDF	Realization Rate
	Base	Post	Base	Post	Base	Post				
4' 4L T12 to 4' 3L T8	284	284	188	89	0.70	0.70		29.10	1.479	
4' 3L T12 to 4' 3L T8	632	632	151	89	0.70	0.70		40.56	1.479	
4' 2L T12 to 4' 2L T5 28W	6	6	94	61	0.71	0.71		0.21	1.479	
4' 1L T12 to 4' 1L T5 28W	1	1	57	31	0.71	0.71		0.03	1.479	
4' 2L T12 to 4' 1L T5HO	88	88	94	59	0.71	0.71		3.21	1.479	
175W MH to 4' 2L T5HO	28	28	215	117	0.09	0.09		0.37	1.479	
400W MH to 4' 5L T5HO	56	56	458	294	0.41	0.41		5.57	1.479	
175W MH to 50W LED Exterior	41	41	215	58	0.00	0.00		0.00	1.000	
40W Inc. Exit to 2W LED Exit	45	45	40	2	1.00	1.00		2.53	1.479	
Total							**101.63**	**81.58**		**80%**

Results

Energy saved is lower than expected values due to the fixtures being turned on for fewer hours per year than the deemed values would have predicted.

Verified Gross Savings & Realization Rates

Measure	Verified			
	kWh Savings	kW Savings	kWh Realization Rate	kW Realization Rate
4' 4L T12 to 4' 3L T8	66,935	29.10		
4' 3L T12 to 4' 3L T8	93,284	40.56		
4' 2L T12 to 4' 2L T5 28W	554	0.21		
4' 1L T12 to 4' 1L T5 28W	73	0.03		
4' 2L T12 to 4' 1L T5HO	8,613	3.21		
175W MH to 4' 2L T5HO	1,205	0.37		
400W MH to 4' 5L T5HO	13,031	5.57		
175W MH to 50W LED Exterior	27,761	0.00		
40W Inc. Exit to 2W LED Exit	17,551	2.53		
Total	**160,218**	**69.67**	**54%**	**80%**

Project Number OID1473947
Program Business Lighting Efficiency

Project Summary

The participant is an industrial facility that received incentives from SPS for implementing energy efficient lighting. On-site, ADM verified the participant had installed:

- (4) 4' 2-lamp RLO T8 fixtures, replacing 4' 2-lamp T12 fixtures;
- (81) 4' 2-lamp RLO T8 fixtures, replacing 4' 3-lamp T12 fixtures;
- (48) 4' 2-lamp RLO T8 fixtures, replacing 4' 4-lamp T12 fixtures;
- (797) 4' 2-lamp RLO T8 fixtures, replacing 8' 2-lamp T12HO fixtures;
- (223) 4' 2-lamp RLO T8 fixtures, replacing 4' 3-lamp T12 fixtures;
- (103) 4' 2-lamp RLO T8 fixtures, replacing 4' 3-lamp T8 fixtures;
- (483) 4' 8-lamp T8 fixtures, replacing 400W Metal Halide fixtures;

The facility is undergoing a renovation in anticipation of a new tenant. As a result, ADM opted to apply the stipulated hours for the facility type as the facility was not scheduled to be occupied until the middle of 2013.

M&V Methodology

ADM confirmed installation of all fixtures listed in the project application. Savings were then calculated using stipulated hours of 5,913 per year, representing the along with a stipulated Peak Coincident Factor (PCF), Heating Cooling Energy Factor (HCEF) and Heating Cooling Demand Factor (HCDF) determined using local weather data and SPS peak parameters. The deemed values used in calculating savings are presented in the table below.

Deemed Savings Parameters

CA DEER 2008 Building Type	CA DEER 2008 Space Type	Annual Hours	HCEF	HCDF	PCF
Light Industrial	Comm/Ind Work Area (Conditioned)	5,913	1.082	1.338	0.83

Savings Calculations

Using deemed values from the table above data, ADM calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * Hours_{base} - kW_{post} * Hours_{post}\right) * HCEF$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
$Hours_{base}$	Annual Hours of Operation of Baseline Fixtures
$Hours_{post}$	Annual Hours of Operation of Installed Fixtures
HCEF	Heating/Cooling Energy Interactive Factor

Following this, ADM calculated peak kW savings. This is based upon a SPS-defined peak of 3:00 – 6:00 PM during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * HCDF * PCF$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
PCF	Peak Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
HCDF	Heating Cooling Demand Interactive Factor

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Lighting Retrofit kWh Savings Calculations

Measure	Quantity (Fixtures)		Wattage		Hours		Expected kWh Savings	Realized kWh Savings	HCEF	Realization Rate
	Base	Post	Base	Post	Base	Post				
4' 2L T12 to 4' 2L T8 RLO	4	4	94	52	5,913	5,913		1,101	1.082	
4' 3L T12 to 4' 2L T8 RLO	81	81	151	52	5,913	5,913		52,570	1.082	
4' 4L T12 to 4' 2L T8 RLO	48	38	188	52	5,913	5,913		46,205	1.082	
8' 2L T12HO to 4' 2L T8 RLO	797	797	257	52	5,913	5,913		1,071,103	1.082	
4' 3L T8 to 4' 2L T8 RLO	223	223	89	52	5,913	5,913		54,091	1.082	
4' 4L T8 to 4' 2L T8 RLO	103	103	112	52	5,913	5,913		40,514	1.082	

400W MH to 4' 8L T8	48	48	458	224	5,913	5,913		73,634	1.082	
						Total	**1,124,797**	**1,339,219**	**-**	**120%**

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*PCF*		*Expected kW Savings*	*Realized kW Savings*	*HCDF*	*Realization Rate*
	Base	*Post*	*Base*	*Post*	*Base*	*Post*				
4' 2L T12 to 4' 2L T8 RLO	4	4	94	52	3,141	3,141		0.19	1.348	
4' 3L T12 to 4' 2L T8 RLO	81	81	151	52	3,141	3,141		8.97	1.348	
4' 4L T12 to 4' 2L T8 RLO	48	38	188	52	3,141	3,141		7.89	1.348	
8' 2L T12HO to 4' 2L T8 RLO	797	797	257	52	3,141	3,141		182.79	1.348	
4' 3L T8 to 4' 2L T8 RLO	223	223	89	52	3,141	3,141		9.23	1.348	
4' 4L T8 to 4' 2L T8 RLO	103	103	112	52	3,141	3,141		6.91	1.348	
400W MH to 4' 8L T8	48	48	458	224	3,141	3,141		12.57	1.348	
						Total	**190.22**	**228.54**		**119%**

Results

The kWh realization rate for OID1473947 is 119%. Savings estimates are higher than expected due to a revision in post-retrofit wattage for the delamping component. The delamps had a higher delta wattage than used in ex ante calculations.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
4' 2L T12 to 4' 2L T8 RLO	1,101	0.19		
4' 3L T12 to 4' 2L T8 RLO	52,570	8.97		
4' 4L T12 to 4' 2L T8 RLO	46,205	7.89		
8' 2L T12HO to 4' 2L T8 RLO	1,071,103	182.79		
4' 3L T8 to 4' 2L T8 RLO	54,091	9.23		
4' 4L T8 to 4' 2L T8 RLO	40,514	6.91		
400W MH to 4' 8L T8	73,634	12.57		
Total	**1,339,219**	**228.54**	**199%**	**120%**

Project Number 1-8E34V
Program Business Motor & Drive Efficiency

Project Summary

The participant is an oil company that received incentives from SPS for the installation of Pump-Off Controllers (POC) on above ground oil well pumps. On-site, ADM verified the participant had installed:

- (2) POC's on 10 HP 1200 RPM Lufkin pumps;
- (3) POC's on 15 HP 1200 RPM Lufkin pumps;
- (1) POC on a 20 HP 1200 RPM Lufkin pump;
- (1) POC on a 25 HP 1200 RPM Lufkin pump;
- (2) POC's on 40 HP 1200 RPM Lufkin pumps;
- (5) POC's on 50 HP 1200 RPM Lufkin pumps; and
- (1) POC on a 75 HP 1200 RPM Lufkin pump.

M&V Methodology

ADM verified the installation of the POC's on 10 HP to 75 HP pumps used to extract oil from the ground. The POC is designed to allow the oil depth of the well to reach an optimum depth before allowing the pump to start. Once the pump has been engage the controller only allows pumping if the oil depth is above the optimum pumping depth and once the level falls below this depth the pump is shut off. The original control strategy involved the use of an adjustable timer that would simply turn the pump on and off based on the set position of the timer.

Savings Calculations

ADM used SPS's deemed POC calculator to determine the annual energy savings of the installed POC's. The calculator was developed as a joint venture between ADM and SPS, which is informed by extensive monitoring performed by ADM at an earlier date. The deemed calculator uses the following equation:

$$kWh_{Savings} = \left(\frac{Hp \times .746 \times LF}{Eff \times Mech}\right) \times \left(\left[8{,}760 \times \left\{8.366 + .956 \times Pump_{eff} \times TC \times 100\right\}\right] - \left[8{,}760 * TC\right]\right)$$

Parameters for kWh Savings Calculation of POC

$kWh_{Savings}$	Annual kWh Savings for the installation of a POC
Hp	Motor Horsepower
LF	Motor Load Factor
Eff	Motor Efficiency
Mech	Mechanical Efficiency of the pump jack.
$Pump_{eff}$	Volumetric pump efficiency
TC	Time Clock setting observed during the site visit

The summary of ADM's findings can be found in the following table:

Ex-Post POC Calculated Savings

Unit Type	Motor Enclosure	HP	RPM	Motor Eff	Pump Eff	Baseline Time Clock	kWh Savings	Peak kW Reduction
Conventional	TEFC	50	1200	89.9%	80%	70%	7,745	0.88
Conventional	TEFC	50	1200	89.9%	13%	70%	50,630	5.78
Conventional	TEFC	40	1200	89.7%	12%	70%	41,107	4.69
Conventional	ODP	25	1200	88.9%	31%	70%	19,774	2.26
Conventional	ODP	20	1200	88.1%	62%	70%	7,864	0.90
Conventional	ODP	15	1200	87.2%	38%	70%	10,710	1.22
Conventional	TEFC	10	1200	86.3%	51%	70%	5,481	0.63
Conventional	ODP	40	1200	89.7%	14%	70%	40,081	4.58
Conventional	TEFC	50	1200	89.9%	43%	70%	31,428	3.59
Conventional	TEFC	15	1200	87.2%	19%	70%	14,471	1.65
Conventional	TEFC	15	1200	87.2%	42%	70%	9,918	1.13
Conventional	TEFC	10	1200	86.3%	33%	70%	7,881	0.90
Conventional	TEFC	50	1200	89.9%	16%	70%	48,710	5.56
Conventional	ODP	75	1200	90.9%	79%	70%	12,440	1.42
Conventional	ODP	50	1200	89.9%	45%	70%	30,148	3.44
Total							338,390	38.63

Results

It was calculated that the installation of the POC's, decreases annual energy consumption by 338,390 kWh and a demand reduction of 38.63 kW resulting in a realization rate of 85%.

ADM attributes the low realization rate to SPS assuming an average baseline time clock setting of 80%. ADM used a recommended baseline time clock setting of 70%.

Verified Gross Savings & Realization Rates

Type	Claimed		Verified			
	kWh Savings	kW Savings	kWh Savings	kW Savings	Realization Rate kWh	Realization Rate kW
POC's	398,557	56.87	338,390	38.63	85%	68%
Total	**398,557**	**56.87**	**338,390**	**38.63**	**85%**	**68%**

Project Number 1-8E35T
Program Business Motor & Drive Efficiency

Project Summary

The participant is an oil company that received incentives from SPS for the installation of Pump-Off Controllers (POC) on above ground oil well pumps. On-site, ADM verified the participant had installed:

- (2) POC's on 10 HP 1200 RPM Lufkin pumps;
- (6) POC's on 40 HP 1200 RPM Lufkin pumps;
- (4) POC's on 50 HP 1200 RPM Lufkin pumps; and
- (3) POC's on 60 HP 1200 RPM Lufkin pumps.

M&V Methodology

ADM verified the installation of the POC's on 10 HP to 60 HP pumps used to extract oil from the ground. The POC is designed to allow the oil depth of the well to reach an optimum depth before allowing the pump to start. Once the pump has been engage the controller only allows pumping if the oil depth is above the optimum pumping depth and once the level falls below this depth the pump is shut off. The original control strategy involved the use of an adjustable timer that would simply turn the pump on and off based on the set position of the timer.

Savings Calculations

ADM used SPS's deemed POC calculator to determine the annual energy savings of the installed POC's. The calculator was developed as a joint venture between ADM and SPS, which is informed by extensive monitoring performed by ADM at an earlier date. The deemed calculator uses the following equation:

$$kWh_{Savings} = \left(\frac{Hp \times .746 \times LF}{Eff \times Mech}\right) \times \left(\left[8{,}760 \times \left\{8.366 + .956 \times Pump_{eff} \times TC \times 100\right\}\right] - \left[8{,}760 * TC\right]\right)$$

Parameters for kWh Savings Calculation of POC

$kWh_{Savings}$	Annual kWh Savings for the installation of a POC
Hp	Motor Horsepower
LF	Motor Load Factor
Eff	Motor Efficiency
Mech	Mechanical Efficiency of the pump jack.
$Pump_{eff}$	Volumetric pump efficiency
TC	Time Clock setting observed during the site visit

The summary of ADM's findings can be found in the following table:

Ex-Post POC Calculated Savings

Unit Type	Motor Enclosure	HP	RPM	Motor Eff	Pump Eff	Baseline Time Clock	kWh Savings	Peak kW Reduction
Conventional	ODP	40	1200	93.0%	64%	70%	13,910	1.588
Conventional	ODP	40	1200	89.7%	51%	70%	21,093	2.408
Conventional	TEFC	50	1200	94.1%	51%	70%	25,133	2.869
Conventional	TEFC	50	1200	89.9%	56%	70%	23,107	2.638
Conventional	ODP	40	1200	89.7%	21%	70%	36,489	4.165
Conventional	ODP	10	1200	86.3%	44%	70%	6,414	0.732
Conventional	ODP	40	1200	93.0%	31%	70%	30,244	3.453
Conventional	ODP	60	1200	90.4%	29%	70%	48,199	5.502
Conventional	TEFC	60	1200	89.5%	68%	70%	18,594	2.123
Conventional	ODP	50	1200	89.5%	28%	70%	41,212	4.705
Conventional	TEFC	50	1200	89.5%	12%	70%	51,499	5.879
Conventional	TEFC	10	1200	86.3%	11%	70%	10,815	1.235
Conventional	TEFC	50	1200	87.5%	78%	70%	9,273	1.059
Conventional	ODP	40	1200	89.7%	21%	70%	36,489	4.165
Conventional	TEFC	60	1200	94.5%	47%	70%	32,955	3.762
Total							405,426	46.28

Results

It was calculated that the installation of the POC's, decreases annual energy consumption by 405,426 kWh and a demand reduction of 46.28 kW resulting in a realization rate of 86%.

ADM attributes the low realization rate to SPS assuming an average baseline time clock setting of 80%. ADM used a recommended baseline time clock setting of 70%.

Verified Gross Savings & Realization Rates

Type	Claimed		Verified			
	kWh Savings	kW Savings	kWh Savings	kW Savings	Realization Rate kWh	Realization Rate kW
POC's	473,280	67.53	405,426	46.28	86%	69%
Total	**473,280**	**67.53**	**405,426**	**46.28**	**86%**	**69%**

Project Number 1-8E353
Program Business Motor & Drive Efficiency

Project Summary

The participant is an oil company that received incentives from SPS for the installation of Pump-Off Controllers (POC) on above ground oil well pumps. On-site, ADM verified the participant had installed:

- (2) POC's on 40 HP 1200 RPM Lufkin pumps;
- (1) POC on a 75 HP 1200 RPM Lufkin pump;
- (6) POC's on 50 HP 1200 RPM Lufkin pumps;
- (1) POC on a 30 HP 1200 RPM Lufkin pump;
- (1) POC on a 25 HP 1200 RPM Lufkin pump; and
- (2) POC's on 60 HP 1200 RPM Lufkin pumps.

M&V Methodology

ADM verified the installation of the POC's on 25 HP to 75 HP pumps used to extract oil from the ground. The POC is designed to allow the oil depth of the well to reach an optimum depth before allowing the pump to start. Once the pump has been engage the controller only allows pumping if the oil depth is above the optimum pumping depth and once the level falls below this depth the pump is shut off. The original control strategy involved the use of an adjustable timer that would simply turn the pump on and off based on the set position of the timer.

Savings Calculations

ADM used SPS's deemed POC calculator to determine the annual energy savings of the installed POC's. The calculator was developed as a joint venture between ADM and SPS, which is informed by extensive monitoring performed by ADM at an earlier date. The deemed calculator uses the following equation:

$$kWh_{Savings} = \left(\frac{Hp \times .746 \times LF}{Eff \times Mech}\right) \times \left(\left[8{,}760 \times \left\{8.366 + .956 \times Pump_{eff} \times TC \times 100\right\}\right] - \left[8{,}760 * TC\right]\right)$$

Parameters for kWh Savings Calculation of POC

$kWh_{Savings}$	Annual kWh Savings for the installation of a POC
Hp	Motor Horsepower
LF	Motor Load Factor
Eff	Motor Efficiency
Mech	Mechanical Efficiency of the pump jack.
$Pump_{eff}$	Volumetric pump efficiency
TC	Time Clock setting observed during the site visit

The summary of ADM's findings can be found in the following table:

Ex-Post POC Calculated Savings

Unit Type	Motor Enclosure	HP	RPM	Motor Eff	Pump Eff	Baseline Time Clock	kWh Savings	Peak kW Reduction
Conventional	ODP	40	1200	93.0%	80%	70%	5,990	0.684
Conventional	TEFC	75	1200	90.9%	80%	70%	11,490	1.312
Conventional	ODP	50	1200	89.9%	10%	70%	52,550	5.999
Conventional	TEFC	40	1200	89.7%	55%	70%	19,040	2.174
Conventional	TEFC	50	1200	89.9%	10%	70%	52,550	5.999
Conventional	TEFC	30	1200	88.0%	28%	70%	25,149	2.871
Conventional	ODP	50	1200	87.5%	15%	70%	50,703	5.788
Conventional	TEFC	50	1200	89.9%	27%	70%	41,669	4.757
Conventional	TEFC	50	1200	89.9%	80%	70%	7,745	0.884
Conventional	TEFC	25	1200	88.9%	71%	70%	6,829	0.780
Conventional	ODP	60	1200	90.4%	34%	70%	44,379	5.066
Conventional	TEFC	50	1200	89.9%	30%	70%	39,749	4.538
Conventional	ODP	60	1200	89.5%	10%	70%	63,342	7.231
Total							421,187	48.08

Results

It was calculated that the installation of the POC's, decreases annual energy consumption by 421,187 kWh and a demand reduction of 48.08 kW resulting in a realization rate of 88%.

ADM attributes the low realization rate to SPS assuming an average baseline time clock setting of 80%. ADM used a recommended baseline time clock setting of 70%.

Verified Gross Savings & Realization Rates

	Claimed		Verified			
Type	kWh Savings	kW Savings	kWh Savings	kW Savings	Realization Rate kWh	Realization Rate kW
POC's	479,149	68.37	421,187	48.08	88%	70%
Total	**479,149**	**68.37**	**421,187**	**48.08**	**88%**	**70%**

Project Number 1-8E535J
Program Business Motor and Drive Efficiency

Project Summary

The participant is an oil company that received incentives from SPS for the installation of Pump-Off Controllers (POC) on above ground oil well pumps. On site ADM verified the participant installed:

- (1) POC on a 10 HP 1200 RPM pump;
- (2) POC's on 15 HP 1200 RPM pumps;
- (8) POC's on 20 HP 1200 RPM pumps;
- (4) POC's on 25 HP 1200 RPM pumps;
- (8) POC's on 30 HP 1200 RPM pumps;
- (4) POC's on 40 HP 1200 RPM pumps;
- (10) POC's on 50 HP 1200 RPM pumps;
- (5) POC's on 60 HP 1200 RPM pumps; and
- (1) POC on a 75 HP 1200 RPM pump.

M&V Methodology

ADM verified the installation of the POC's on the pumps used to extract oil from the ground. The POC is designed to allow the oil depth of the well to reach an optimum depth before allowing the pump to start. Once the pump has been engage the controller only allows pumping if the oil depth is above the optimum pumping depth and once the level falls below this depth the pump is shut off. The original control strategy involved the use of an adjustable timer that would simply turn the pump on and off based on the set position of the timer.

Savings Calculations

ADM used SPS's deemed POC calculator to determine the annual energy savings of the installed POC's. The calculator was developed as a joint venture between ADM and SPS, which is informed by extensive monitoring performed by ADM at an earlier date. The deemed calculator uses the following equation:

$$kWh_{Savings} = \left(\frac{Hp \times .746 \times LF}{Eff \times Mech}\right) \times \left([8{,}760 \times \{8.366 + .956 \times Pump_{eff} \times TC \times 100\}] - [8{,}760 * TC]\right)$$

Parameters for kWh Savings Calculation of POC

$kWh_{Savings}$	Annual kWh Savings for the installation of a POC
Hp	Motor Horsepower
LF	Motor Load Factor
Eff	Motor Efficiency
Mech	Mechanical Efficiency of the pump jack.
$Pump_{eff}$	Volumetric pump efficiency
TC	Time Clock setting observed during the site visit

The summary of ADM's findings can be found in the following table:

Ex-Post POC Calculated Savings

Unit Type	Motor Enclosure	HP	RPM	Motor Eff	Pump Eff	Baseline Time Clock	kWh Savings	Peak kW Reduction
Conventional	ODP	40	1200	93.0%	71%	70%	10,445	1.19
Conventional	ODP	50	1200	89.9%	10%	70%	52,550	6.00
Conventional	TEFC	30	1200	89.4%	10%	70%	31,706	3.62
Conventional	TEFC	40	1200	89.7%	10%	70%	42,134	4.81
Conventional	ODP	60	1200	89.5%	54%	70%	29,395	3.36
Conventional	ODP	20	1200	88.1%	14%	70%	20,405	2.33
Conventional	ODP	25	1200	88.9%	10%	70%	26,571	3.03
Conventional	ODP	25	1200	93.0%	13%	70%	24,471	2.79
Conventional	TEFC	15	1200	87.2%	15%	70%	15,263	1.74
Conventional	TEFC	20	1200	88.1%	15%	70%	20,143	2.30
Conventional	TEFC	50	1200	89.0%	21%	70%	45,970	5.25
Conventional	ODP	20	1200	87.5%	12%	70%	21,071	2.41
Conventional	ODP	20	1200	92.4%	10%	70%	20,451	2.33
Conventional	ODP	20	1200	87.5%	10%	70%	21,597	2.47
Conventional	TEFC	50	1200	89.9%	15%	70%	49,350	5.63
Conventional	TEFC	30	1200	89.4%	11%	70%	31,320	3.58
Conventional	TEFC	50	1200	87.5%	23%	70%	45,442	5.19
Conventional	TEFC	50	1200	89.9%	13%	70%	50,630	5.78
Conventional	ODP	50	1200	89.5%	16%	70%	48,927	5.59
Conventional	ODP	50	1200	89.9%	80%	70%	7,745	0.88
Conventional	TEFC	60	1200	90.4%	28%	70%	48,962	5.59
Conventional	ODP	50	1200	89.9%	11%	70%	51,910	5.93
Conventional	TEFC	30	1200	85.0%	41%	70%	20,756	2.37
Conventional	ODP	10	1200	86.3%	26%	70%	8,815	1.01
Conventional	ODP	30	1200	89.4%	16%	70%	29,389	3.35
Conventional	TEFC	60	1200	87.1%	23%	70%	54,781	6.25
Conventional	TEFC	50	1200	87.5%	20%	70%	47,415	5.41
Conventional	TEFC	30	1200	88.5%	13%	70%	30,859	3.52
Conventional	ODP	40	1200	89.7%	31%	70%	31,357	3.58
Conventional	ODP	20	1200	84.5%	14%	70%	21,274	2.43
Conventional	TEFC	25	1200	84.0%	10%	70%	28,121	3.21
Conventional	TEFC	50	1200	87.5%	10%	70%	53,992	6.16
Conventional	TEFC	20	1200	83.0%	18%	70%	20,549	2.35
Conventional	TEFC	60	1200	88.0%	80%	70%	9,495	1.08
Conventional	TEFC	30	1200	85.0%	47%	70%	18,319	2.09
Conventional	TEFC	40	1200	89.7%	10%	70%	42,134	4.81
Conventional	TEFC	30	1200	86.5%	10%	70%	32,769	3.74
Conventional	TEFC	75	1200	90.9%	10%	70%	77,958	8.90
Conventional	ODP	25	1200	92.4%	11%	70%	25,253	2.88
Conventional	TEFC	15	1200	87.2%	11%	70%	16,055	1.83
Conventional	TEFC	30	1200	89.4%	38%	70%	20,893	2.39

Conventional	TEFC	20	1200	88.1%	23%	70%	18,053	2.06
Conventional	ODP	60	1200	90.4%	10%	70%	62,711	7.16
Total							1,387,408	158.38

Results

It was calculated that the installation of the POC's, decreases annual energy consumption by 1,387,408 kWh and a demand reduction of 158.38 kW resulting in a realization rate of 91%.

ADM attributes the low realization rate to SPS assuming an average baseline time clock setting of 80%. ADM used a recommended baseline time clock setting of 70%.

Verified Gross Savings & Realization Rates

Type	***Claimed***		***Verified***			
	kWh Savings	***kW Savings***	***kWh Savings***	***kW Savings***	***Realization Rate kWh***	***Realization Rate kW***
POC's	1,519,545	216.83	1,387,408	158.38	91%	73%
Total	**1,519,545**	**216.83**	**1,387,408**	**158.38**	**91%**	**73%**

Project Number 1-8HV7H
Program Business Motor & Drive Efficiency

Project Summary

The participant is an oil company that received incentives from SPS for the installation of Pump-Off Controllers (POC) on above ground oil well pumps. On-site, ADM verified the participant had installed:

- (1) POC on a 40 HP 1200 RPM Tatung pump;
- (2) POC's on 25 HP 1200 RPM Robbins & Myers pumps;
- (1) POC on a 50 HP 1200 RPM Toshiba pump;
- (2) POC on a 30 HP 1200 RPM GE pump;
- (1) POC on a 25 HP 1200 RPM Toshiba pump;
- (2) POC's on 40 HP 1200 RPM Westinghouse pumps;
- (1) POC on a 20 HP 1200 RPM Toshiba pump; and
- (1) POC on a 60 HP 1200 RPM Toshiba pump.

M&V Methodology

ADM verified the installation of the POC's on 20 HP to 60 HP pumps used to extract oil from the ground. The POC is designed to allow the oil depth of the well to reach an optimum depth before allowing the pump to start. Once the pump has been engage the controller only allows pumping if the oil depth is above the optimum pumping depth and once the level falls below this depth the pump is shut off. The original control strategy involved the use of an adjustable timer that would simply turn the pump on and off based on the set position of the timer.

Savings Calculations

ADM used SPS's deemed POC calculator to determine the annual energy savings of the installed POC's. The calculator was developed as a joint venture between ADM and SPS, which is informed by extensive monitoring performed by ADM at an earlier date. The deemed calculator uses the following equation:

$$kWh_{Savings} = \left(\frac{Hp \times .746 \times LF}{Eff \times Mech}\right) \times \left(\left[8{,}760 \times \left\{8.366 + .956 \times Pump_{eff} \times TC \times 100\right\}\right] - \left[8{,}760 * TC\right]\right)$$

Parameters for kWh Savings Calculation of POC

$kWh_{Savings}$	Annual kWh Savings for the installation of a POC
Hp	Motor Horsepower
LF	Motor Load Factor
Eff	Motor Efficiency
Mech	Mechanical Efficiency of the pump jack.
$Pump_{eff}$	Volumetric pump efficiency

TC	Time Clock setting observed during the site visit

The summary of ADM's findings can be found in the following table:

Ex-Post POC Calculated Savings

Unit Type	Motor Enclosure	HP	RPM	Motor Eff	Pump Eff	Baseline Time Clock	kWh Savings	Peak kW Reduction
Conventional	ODP	40	1200	88.5%	59%	70%	17,218	1.97
Conventional	TEFC	25	1200	88.9%	43%	70%	15,891	1.81
Conventional	TEFC	50	1200	89.9%	37%	70%	35,268	4.03
Conventional	TEFC	30	1200	89.4%	11%	70%	31,320	3.58
Conventional	TEFC	25	1200	88.0%	10%	70%	26,842	3.06
Conventional	TEFC	25	1200	88.0%	10%	70%	26,842	3.06
Conventional	TEFC	40	1200	89.7%	10%	70%	42,134	4.81
Conventional	TEFC	20	1200	88.1%	15%	70%	20,143	2.30
Conventional	TEFC	60	1200	90.4%	26%	70%	50,490	5.76
Conventional	TEFC	40	1200	89.7%	19%	70%	37,515	4.28
Conventional	ODP	30	1200	88.5%	24%	70%	26,567	3.03
Total							330,231	37.70

Results

It was calculated that the installation of the POC's, decreases annual energy consumption by 330,231 kWh and a demand reduction of 37.70 kW resulting in a realization rate of 86%.

ADM attributes the low realization rate to SPS assuming an average baseline time clock setting of 80%. ADM used a recommended baseline time clock setting of 70%.

Verified Gross Savings & Realization Rates

Type	Claimed		Verified			
	kWh Savings	kW Savings	kWh Savings	kW Savings	Realization Rate kWh	Realization Rate kW
POC's	385,054	54.94	330,231	37.70	86%	69%
Total	**385,054**	**54.94**	**330,231**	**37.70**	**86%**	**69%**

Project Number 1-8HV75
Program Business Motor and Drive Efficiency

Project Summary

The participant is an oil company that received incentives from SPS for the installation of Pump-Off Controllers (POC) on above ground oil well pumps. On site ADM verified the participant installed:

- (1) POC on a 25 HP 1200 RPM Toshiba pump;
- (2) POC's on 15 HP 1200 RPM Tatung pumps; and
- (1) POC on a 20 HP 1200 RPM WEG pump.

M&V Methodology

ADM verified the installation of the POC's on 15 HP to 20 HP pumps used to extract oil from the ground. The POC is designed to allow the oil depth of the well to reach an optimum depth before allowing the pump to start. Once the pump has been engage the controller only allows pumping if the oil depth is above the optimum pumping depth and once the level falls below this depth the pump is shut off. The original control strategy involved the use of an adjustable timer that would simply turn the pump on and off based on the set position of the timer.

Savings Calculations

ADM used SPS's deemed POC calculator to determine the annual energy savings of the installed POC's. The calculator was developed as a joint venture between ADM and SPS, which is informed by extensive monitoring performed by ADM at an earlier date. The deemed calculator uses the following equation:

$$kWh_{Savings} = \left(\frac{Hp \times .746 \times LF}{Eff \times Mech}\right) \times \left(\left[8{,}760 \times \left\{8.366 + .956 \times Pump_{eff} \times TC \times 100\right\}\right] - \left[8{,}760 * TC\right]\right)$$

Parameters for kWh Savings Calculation of POC

$kWh_{Savings}$	Annual kWh Savings for the installation of a POC
Hp	Motor Horsepower
LF	Motor Load Factor
Eff	Motor Efficiency
Mech	Mechanical Efficiency of the pump jack.
$Pump_{eff}$	Volumetric pump efficiency
TC	Time Clock setting observed during the site visit

The summary of ADM's findings can be found in the following table:

Ex-Post POC Calculated Savings

Unit Type	Motor Enclosure	HP	RPM	Motor Eff	Pump Eff	Baseline Time Clock	kWh Savings	Peak kW Reduction
Conventional	ODP	25	1200	88.0%	10%	70%	26,842	3.06
Conventional	ODP	15	1200	86.0%	10%	70%	16,480	1.88
Conventional	ODP	15	1200	86.0%	10%	70%	16,480	1.88
Conventional	ODP	20	1200	86.5%	10%	70%	21,846	2.49
Total							81,649	9.32

Results

It was calculated that the installation of the POC's, decreases annual energy consumption by 81,649 kWh and a demand reduction of 9.32 kW resulting in a realization rate of 87%.

ADM attributes the low realization rate to SPS assuming an average baseline time clock setting of 80%. ADM used a recommended baseline time clock setting of 70%.

Verified Gross Savings & Realization Rates

Type	Claimed		Verified			
	kWh Savings	kW Savings	kWh Savings	kW Savings	Realization Rate kWh	Realization Rate kW
POC's	93,782	13.38	81,649	9.32	87%	70%
Total	**93,782**	**13.38**	**81,649**	**9.32**	**87%**	**70%**

Project Number 1-8HVVJ
Program Business Motor & Drive Efficiency

Project Summary

The participant is an oil company that received incentives from SPS for the installation of Variable Frequency Drives (VFD) on process pumps. On-site, ADM verified the participant installed:

- (2) VFDs on 100 HP process pumps.

M&V Methodology

ADM verified the installation of VFDs on two 100 HP pumps used to pump water back into the ground that is extracted during the oil production process. During the on-site verification, it was determined that the VFD's operation is controlled off of the water pressure of the system and is designed to maintain a constant pressure. The baseline pumps used trim valves to modulate flow and regulate the pressure of the system as the motors operated at constant speed.

Savings Calculations

ADM installed monitoring equipment to obtain the typical operation of the salt water disposal pumps. WattNode loggers were installed on the main electrical circuit serving the VFDs, in which kW demand was monitored at 15 second intervals for approximately seven weeks.

Using this data, an average daily kW profile for each day of the week was able to be determined. Using the pump affinity law the corresponding GPM flow rate for each hour was determined. The following equation was used to calculate flow rates:

$$GPM = \left(\frac{kW}{kW_{Max}}\right)^{\frac{1}{2.7}} \times GPM_{Max}$$

Parameters for Pump Affinity Calculation

GPM	Resultant GPM at Hourly kW
kW	kW Demand of Pump at Given Hour
kW_{Max}	Max kW of Pump at 60 Hz
GPM_{Max}	Maximum Flow Rate of Pump at 60 Hz

Assuming that the GPM of the system remains constant between the as-built and baseline system, manufacturer pump curves were used to determine the resulting kW demand necessary to produce the corresponding flow rate.

The annual savings for the installation of the VFD is the difference between the baseline and as-built profiles extrapolated to a yearly interval.

Results

Verified Gross Savings & Realization Rates

Type	Claimed		Verified			
	kWh Savings	kW Savings	kWh Savings	kW Savings	Realization Rate kWh	Realization Rate kW
(2) 100 Hp VFDs	398,501	77.41	539,837	62.02	135%	80%
Total	**398,501**	**77.41**	**539,837**	**62.02**	**135%**	**80%**

It was calculated that the installation of the VFDs, decreases annual energy consumption by 539,837 kWh and a demand reduction of 62.052 kW resulting in a realization rate of 135%.

ADM attributes the high realization rate to the ex-ante analysis using a deemed savings approach for VFD savings. The ex-ante analysis assumes that the motors operate for 5,126 hours and the VFDs reduce consumption by 33%. These assumptions do not properly reflect the system at hand as it was determined through monitoring data that the pumps operate for 8,628 hours per year and has an average reduction of approximately 65%

Project Number 1-8958V
Program Business Motor & Drive Efficiency

Project Summary

The participant is an oil company that received incentives from SPS for the installation of Pump-Off Controllers (POC) on above ground oil well pumps. On site, ADM verified the participant installed:

- (1) POC on a 10 HP 1200 RPM pump;
- (2) POCs on 15 HP 1200 RPM pumps;
- (3) POCs on 20 HP 1200 RPM pumps; and
- (9) POCs on 40 HP 1200 RPM pumps.

M&V Methodology

ADM verified the installation of the POC's on 10 HP to 40 HP pumps used to extract oil from the ground. The POC is designed to allow the oil depth of the well to reach an optimum depth before allowing the pump to start. Once the pump has been engage the controller only allows pumping if the oil depth is above the optimum pumping depth and once the level falls below this depth the pump is shut off. The original control strategy involved the use of an adjustable timer that would simply turn the pump on and off based on the set position of the timer.

Savings Calculations

ADM used SPS's deemed POC calculator to determine the annual energy savings of the installed POC's. The calculator was developed as a joint venture between ADM and SPS, which is informed by extensive monitoring performed by ADM at an earlier date. The deemed calculator uses the following equation:

$$kWh_{Savings} = \left(\frac{Hp \times .746 \times LF}{Eff \times Mech}\right) \times \left(\left[8{,}760 \times \left\{8.366 + .956 \times Pump_{eff} \times TC \times 100\right\}\right] - \left[8{,}760 * TC\right]\right)$$

Parameters for kWh Savings Calculation of POC

$kWh_{Savings}$	Annual kWh Savings for the installation of a POC
Hp	Motor Horsepower
LF	Motor Load Factor
Eff	Motor Efficiency
Mech	Mechanical Efficiency of the pump jack.
$Pump_{eff}$	Volumetric pump efficiency
TC	Time Clock setting observed during the site visit

The summary of ADM's findings can be found in the following table:

Ex-Post POC Calculated Savings

Unit Type	Motor Enclosure	HP	RPM	Motor Eff	Pump Eff	Baseline Time Clock	kWh Savings	Peak kW Reduction
Conventional	ODP	20	1200	88.1%	17%	70%	19,621	2.24
Conventional	ODP	40	1200	89.7%	10%	70%	42,134	4.81
Conventional	ODP	40	1200	89.7%	17%	70%	38,542	4.40
Conventional	ODP	40	1200	88.5%	10%	70%	42,705	4.88
Conventional	ODP	20	1200	88.1%	10%	70%	21,450	2.45
Conventional	ODP	40	1200	93.0%	20%	70%	35,689	4.07
Conventional	ODP	15	1200	87.2%	10%	70%	16,253	1.86
Conventional	ODP	40	1200	88.5%	10%	70%	42,705	4.88
Conventional	ODP	40	1200	88.5%	11%	70%	42,185	4.82
Conventional	ODP	10	1200	86.3%	10%	70%	10,948	1.25
Conventional	ODP	15	1200	87.2%	17%	70%	14,867	1.70
Conventional	ODP	40	1200	86.3%	13%	70%	42,194	4.82
Conventional	ODP	20	1200	88.1%	12%	70%	20,927	2.39
Conventional	ODP	40	1200	89.7%	74%	70%	9,289	1.06
Conventional	ODP	40	1200	89.7%	79%	70%	6,723	0.77
Total							406,232	46.37

Results

It was calculated that the installation of the POC's, decreases annual energy consumption by 406,232 kWh and a demand reduction of 46.37 kW resulting in a realization rate of 86%.

ADM attributes the low realization rate to SPS assuming an average baseline time clock setting of 80%. ADM used a recommended baseline time clock setting of 70%.

Verified Gross Savings & Realization Rates

Type	Claimed		Verified			
	kWh Savings	kW Savings	kWh Savings	kW Savings	Realization Rate kWh	Realization Rate kW
POC's	472,581	67.44	406,232	46.37	86%	69%
Total	**472,581**	**67.44**	**406,232**	**46.37**	**86%**	**69%**

Project Number 1333878
Program Business Motor & Drive Efficiency

Project Summary

The participant is an oil company that received incentives from SPS for the installation of Pump-Off Controllers (POC) on above ground oil well pumps. On-site, ADM verified the participant had installed:

- (7) POCs on 25 HP 1200 RPM pumps.

M&V Methodology

ADM verified the installation of the POC's on 25 HP pumps used to extract oil from the ground. The POC is designed to allow the oil depth of the well to reach an optimum depth before allowing the pump to start. Once the pump has been engage the controller only allows pumping if the oil depth is above the optimum pumping depth and once the level falls below this depth the pump is shut off. The original control strategy involved the use of an adjustable timer that would simply turn the pump on and off based on the set position of the timer.

Savings Calculations

ADM used SPS's deemed POC calculator to determine the annual energy savings of the installed POC's. The calculator was developed as a joint venture between ADM and SPS, which is informed by extensive monitoring performed by ADM at an earlier date. The deemed calculator uses the following equation:

$$kWh_{Savings} = \left(\frac{Hp \times .746 \times LF}{Eff \times Mech}\right) \times \left(\left[8{,}760 \times \left\{8.366 + .956 \times Pump_{eff} \times TC \times 100\right\}\right] - \left[8{,}760 * TC\right]\right)$$

Parameters for kWh Savings Calculation of POC

$kWh_{Savings}$	Annual kWh Savings for the installation of a POC
Hp	Motor Horsepower
LF	Motor Load Factor
Eff	Motor Efficiency
Mech	Mechanical Efficiency of the pump jack.
$Pump_{eff}$	Volumetric pump efficiency
TC	Time Clock setting observed during the site visit

The summary of ADM's findings can be found in the following table:

Ex-Post POC Calculated Savings

Unit Type	Motor Enclosure	HP	RPM	Motor Eff	Pump Eff	Baseline Time Clock	kWh Savings	Peak kW Reduction
Conventional	ODP	25	1200	88.9%	18%	70%	23,982	2.74
Conventional	TEFC	25	1200	88.9%	12%	70%	25,923	2.96
Conventional	TEFC	25	1200	88.9%	18%	70%	23,982	2.74
Conventional	TEFC	25	1200	88.9%	22%	70%	22,687	2.59
Conventional	TEFC	25	1200	88.9%	16%	70%	24,629	2.81
Conventional	TEFC	25	1200	88.9%	17%	70%	24,305	2.77
Conventional	TEFC	25	1200	88.9%	17%	70%	24,305	2.77
Total							169,813	19.39

Results

It was calculated that the installation of the POC's, decreases annual energy consumption by 169,813 kWh and a demand reduction of 19.39 kW resulting in a realization rate of 85%.

ADM attributes the low realization rate to SPS assuming an average baseline time clock setting of 80%. ADM used a recommended baseline time clock setting of 70%.

Verified Gross Savings & Realization Rates

Type	Claimed		Verified			
	kWh Savings	kW Savings	kWh Savings	kW Savings	Realization Rate kWh	Realization Rate kW
POC's	199,596	28.48	169,813	19.39	85%	68%
Total	**199,596**	**28.48**	**169,813**	**19.39**	**85%**	**68%**

Project Number 1333882
Program Business Motor & Drive Efficiency

Project Summary

The participant is an oil company that received incentives from SPS for the installation of Pump-Off Controllers (POC) on above ground oil well pumps. On-site, ADM verified the participant had installed:

- (1) POC on a 25 HP 1200 RPM Lufkin pump.

M&V Methodology

ADM verified the installation of the POC on the 25 HP pump used to extract oil from the ground. The POC is designed to allow the oil depth of the well to reach an optimum depth before allowing the pump to start. Once the pump has been engage the controller only allows pumping if the oil depth is above the optimum pumping depth and once the level falls below this depth the pump is shut off. The original control strategy involved the use of an adjustable timer that would simply turn the pump on and off based on the set position of the timer.

Savings Calculations

ADM used SPS's deemed POC calculator to determine the annual energy savings of the installed POC's. The calculator was developed as a joint venture between ADM and SPS, which is informed by extensive monitoring performed by ADM at an earlier date. The deemed calculator uses the following equation:

$$kWh_{savings} = \left(\frac{Hp \times .746 \times LF}{Eff \times Mech}\right) \times \left([8.760 \times \{8.366 + .956 \times Pump_{eff} \times TC \times 100\}] - [8.760 * TC]\right)$$

Parameters for kWh Savings Calculation of POC

$kWh_{Savings}$	Annual kWh Savings for the installation of a POC
Hp	Motor Horsepower
LF	Motor Load Factor
Eff	Motor Efficiency
Mech	Mechanical Efficiency of the pump jack.
$Pump_{eff}$	Volumetric pump efficiency
TC	Time Clock setting observed during the site visit

The summary of ADM's findings can be found in the following table:

Ex-Post POC Calculated Savings

Unit Type	*Motor Enclosure*	*HP*	*RPM*	*Motor Eff*	*Pump Eff*	*Baseline Time Clock*	*kWh Savings*	*Peak kW Reduction*
Conventional	ODP	25	1200	88.0%	11%	70%	26,515	3.03
Total							26,515	3.03

Results

It was calculated that the installation of the POC's, decreases annual energy consumption by 26,515 kWh and a demand reduction of 3.03 kW resulting in a realization rate of 87%.

ADM attributes the low realization rate to SPS assuming an average baseline time clock setting of 80%. ADM used a recommended baseline time clock setting of 70%.

Verified Gross Savings & Realization Rates

Type	Claimed		Verified			
	kWh Savings	kW Savings	kWh Savings	kW Savings	Realization Rate kWh	Realization Rate kW
POC's	30,575	4.36	26,515	3.03	87%	69%
Total	**30,575**	**4.36**	**26,515**	**3.03**	**87%**	**69%**

Project Number 1333893
Program Business Motor & Drive Efficiency

Project Summary

The participant is an oil company that received incentives from SPS for the installation of Pump-Off Controllers (POC) on above ground oil well pumps. On-site, ADM verified the participant had installed:

- (1) POC on a 25 HP 1200 RPM Lufkin pump.

M&V Methodology

ADM verified the installation of the POC on the 25 HP pump used to extract oil from the ground. The POC is designed to allow the oil depth of the well to reach an optimum depth before allowing the pump to start. Once the pump has been engage the controller only allows pumping if the oil depth is above the optimum pumping depth and once the level falls below this depth the pump is shut off. The original control strategy involved the use of an adjustable timer that would simply turn the pump on and off based on the set position of the timer.

Savings Calculations

ADM used SPS's deemed POC calculator to determine the annual energy savings of the installed POC's. The calculator was developed as a joint venture between ADM and SPS, which is informed by extensive monitoring performed by ADM at an earlier date. The deemed calculator uses the following equation:

$$kWh_{Savings} = \left(\frac{Hp \times .746 \times LF}{Eff \times Mech}\right) \times \left([8{,}760 \times \{8.366 + .956 \times Pump_{eff} \times TC \times 100\}] - [8{,}760 * TC]\right)$$

Parameters for kWh Savings Calculation of POC

$kWh_{Savings}$	Annual kWh Savings for the installation of a POC
Hp	Motor Horsepower
LF	Motor Load Factor
Eff	Motor Efficiency
Mech	Mechanical Efficiency of the pump jack.
$Pump_{eff}$	Volumetric pump efficiency
TC	Time Clock setting observed during the site visit

The summary of ADM's findings can be found in the following table:

Ex-Post POC Calculated Savings

Unit Type	*Motor Enclosure*	*HP*	*RPM*	*Motor Eff*	*Pump Eff*	*Baseline Time Clock*	*kWh Savings*	*Peak kW Reduction*
Conventional	ODP	25	1200	91.7%	12%	70%	25,132	2.87
Total							25,132	2.87

Results

It was calculated that the installation of the POC's, decreases annual energy consumption by 25,132 kWh and a demand reduction of 2.87 kW resulting in a realization rate of 83%.

ADM attributes the low realization rate to SPS assuming an average baseline time clock setting of 80%. ADM used a recommended baseline time clock setting of 70%.

Verified Gross Savings & Realization Rates

Type	Claimed		Verified			
	kWh Savings	kW Savings	kWh Savings	kW Savings	Realization Rate kWh	Realization Rate kW
POC's	30,205	4.31	25,132	2.87	83%	67%
Total	**30,205**	**4.31**	**25,132**	**2.87**	**83%**	**67%**

Project Number 1-8E27V
Program Business Cooling Efficiency

Project Summary

The participant is a retail facility that received incentives from SPS for implementing energy efficient HVAC systems. The facility installed new high efficiency Roof Top Units (RTUs). On-site, ADM verified the participant installed:

- (4) 5 ton Lennox DX units

M&V Methodology

ADM verified the installation of all RTUs and concluded that the rebated RTUs matched those that were installed. The Equivalent Full Load Hours value was obtained from SPS's 2011 Tech Assumptions which was stated to be 1,681 hours for a retail type facility. ADM reviewed this value via simulation of archetypical buildings with Roswell NM TMY weather data and determined the value to be reasonable.

Deemed Savings Parameters

Building Type	***EFLH***
Retail	1,681

Savings Calculations

Using values from the table above, ADM calculated HVAC savings as follows:

$$Annual\ kWh\ Savings = \#Units \times Cap \times \left(\frac{12}{SEER_{base}} - \frac{12}{SEER_{post}}\right) \times EFLH$$

Parameters for Calculation of kWh Savings for HVAC Retrofits

#Units	Quantity of Rebated HVAC Units
Cap	Unit Capacity (Measured in Tons)
$SEER_{base}$	Baseline SEER
$SEER_{Post}$	Installed SEER
EFLH	Equivalent Full Load Hours (Encompassing both heating and cooling hours in cases of heat pumps)

Following this, ADM calculated peak kW savings. Peak savings for HVAC retrofits are calculated using the following equation:

$$Peak\ kW\ Savings = \#Units \times Cap \times \left(\frac{12}{EER_{base}} - \frac{12}{EER_{post}}\right) \times CF$$

Parameters for Calculation of kW reduction for HVAC Retrofits

#Units	Quantity of Rebated HVAC Units
Cap	Unit Capacity (Measured in Tons)
$SEER_{base}$	Baseline SEER
$SEER_{Post}$	Installed SEER
CF	Coincidence factor.

HVAC Retrofit kWh Savings Calculations

# of Units	Capacity	EFLH	SEER		*Expected kWh Savings*	*Realized kWh Savings*	Realization Rate
			Base	Post			
4	5	1,681	14	12	10,459	11,527	46%
				Total	**10,459**	**4,803**	**46%**

HVAC Retrofit kW Savings Calculations

# of Units	Capacity	EFLH	EEER		*Expected kW Savings*	*Realized kW Savings*	Realization Rate
			Base	Post			
4	5	1,681	14	12	7.32	7.55	39%
				Total	**7.32**	**7.55**	**%**

Results

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
(4) 5 ton roof top units	11,527	7.55	110.2%	103.4%
Total	**11,527**	**7.55**	**110.2%**	**103.4%**

10. Appendix B: Detailed TRC Tables

Table 10-1 Detailed TRC Table

Program	*Avoided Production Costs*	*Avoided Capacity Expansion Costs*	*Net Customer Investment*	*Administration Costs*	*Incentives*
Home Energy Services	$1,560,356	$1,449,101	$0	$798,379	$416,062
Home Lighting & Recycling	$4,590,098	$1,014,161	$518,752	$554,928	$458,523
Evaporative Cooling	$413,764	$630,561	$10,060	$114,695	$70,800
Low Income	$50,824	$24,411	$0	$64,031	$4,370
Refrigerator Recycling	$96,747	$25,668	$0	$87,551	$20,625
School Education Kits	$304,726	$16,562	$0	$109,612	$44,183
Energy Feedback Pilot	$91,168	$12,956	$0	$104,914	$0
Business Lighting	$1,587,225	$892,220	$638,256	$245,333	$319,928
Business Cooling	$192,332	$166,215	$99,568	$73,060	$67,352
Business Custom	$198,074	$99,815	$87,530	$166,285	$43,765
Business Motors & Drives	$5,067,562	$1,077,838	$2,008,863	$144,033	$925,850
Business Computers	$3,196	$905	$730	$1,936	$415
Small Business Lighting	$2,478,819	$1,295,871	$1,323,770	$692,774	$655,210
Residential Saver's Switch	$686	$143,134	$0	$337,298	$84,037
Business Saver's Switch	$18	$5,724	$0	$148,026	$22,930