

Residential Portfolio Evaluation Summary

PROGRAM YEAR 2018

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Introduction

Ameren Missouri engaged Cadmus to perform annual process and impact evaluations of the following residential energy efficiency programs over a three-year period, from 2016 through 2018:

- Heating and Cooling
- Lighting
- Efficient Products (including an evaluation of smart thermostats)
- Energy Efficiency Kits
- Home Energy Reports (HER)

This annual summary report presents key energy savings, demand reduction, and cost-effectiveness results for program year 2018 (PY18), the period from March 1, 2018, through February 28, 2019. While Cadmus evaluated smart thermostats as a part of the Efficient Products program, this summary report presents findings specific to smart thermostats independently throughout the document.

Separate, program-specific PY18 evaluation reports offer more detail regarding impact methodologies used, results, and key process evaluation findings, conclusions, and recommendations.

Energy Savings

Table 1 summarizes *ex post* gross, and *ex post* net energy savings (MWh/year) for each program and for the overall residential portfolio in PY18. The table also compares Cadmus' *ex post* net energy savings to program-specific and residential portfolio net energy savings targets, approved by Missouri Public Service Commission (MPSC).

As the table shows, the residential portfolio achieved 106% of its energy savings target for PY18.

Table 1. Summary of PY18 Residential Programs’ Energy Savings (MWh/Year)

Program	MPSC-Approved Target	<i>Ex Post</i> Gross Savings Determined by EM&V ^a	<i>Ex Post</i> Net Savings Determined by EM&V ^b	Percent of Goal Achieved ^c
Efficient Products	4,760	4,270	3,278	69%
Smart Thermostats	2,087	2,163	1,518	73%
Energy Efficiency Kits	6,228	5,915	5,031	81%
Home Energy Reports	33,750	26,376	26,376	78%
Heating and Cooling	22,320	54,444	41,388	185%
Lighting	9,943	8,383	6,094	61%
Portfolio	79,088	101,550	83,685	106%

^a MWh were calculated by multiplying verified program participation by Cadmus’ evaluated per-unit savings values. For Home Energy Reports, Cadmus set the *ex post* gross savings equal to *ex post* net savings.

^b Calculated by multiplying Cadmus’ evaluated gross savings and evaluated net-to-gross (NTG) ratio, and adding program-level nonparticipant spillover to each program.

^c Compares MPSC-approved target and *ex post* net savings, determined by evaluation, measurement, and verification (EM&V).

Demand Reduction

Table 2 summarizes *ex post* gross, and *ex post* net demand reduction (kW) for each program and for the residential portfolio overall. It also compares Cadmus’ *ex post* net demand reductions to MPSC-approved targets.

Energy savings and demand reductions do not perfectly correlate (as the measure mix for some programs generates greater peak savings). For PY18, the residential portfolio met 83% of its demand reduction target, based on demand savings that persist through 2023 or beyond.

Table 2. Summary of PY18 Residential Program Demand Reductions (kW)

Program	MPSC-Approved Target ^a	Ex Post Gross Savings Determined by EM&V ^b	Ex Post Net Reduction Determined by EM&V (First Year) ^c	Percent of Goal Achieved (First Year) ^d	Ex Post Net Reduction Determined by EM&V (Year 2023) ^e	Percent of Goal Achieved (Year 2023) ^d
Efficient Products	1,235	1,175	874	71%	874	71%
Smart Thermostats	1,974	2,049	1,436	73%	N/A	N/A
Energy Efficiency Kits	1,046	1,058	927	89%	927	89%
Home Energy Reports	15,714	12,293	12,293	78%	N/A	N/A
Heating and Cooling	14,193	36,987	27,008	190%	26,933	190%
Lighting	1,485	1,261	928	63%	928	63%
Portfolio	35,708	54,824	43,466	122%	29,662	83%

^a The Non-Unanimous Stipulation and Agreement in File No. EO-2015-0055 states: “Only measures that are expected to deliver energy savings in 2023 and beyond are counted towards the demand goal in the EO included in Appendix A.” Cadmus referenced the Ameren Missouri Technical Resource Manual (TRM) for secondary data on measure expected useful life to assess whether or not measures proved sufficiently long-lived to apply the stipulated energy-to-demand ratio to determine 2023-persistent kW savings. Demand savings resulting from Smart Thermostats and HER were not counted toward this goal.

^b Demand reductions (kW) were calculated by applying coincident factors from the Ameren Missouri 2016–2018 Energy Efficiency Plan, MPSC file number EO-2015-0055, Appendix E to evaluated energy savings.

^c Calculated by multiplying Cadmus’ evaluated gross savings and evaluated NTG ratio.

^d Calculated by dividing MPSC Approved Target by Ex Post Net Savings Determined by EM&V.

^e Demand savings persisting to 2023.

Cost-Effectiveness

Using final PY18 program participation and implementation data as well as *ex post* gross and net savings estimates presented in this report, the Cadmus team determined cost-effectiveness for the PY18 programs and the residential portfolio using DSMore (a financial analysis tool designed to evaluate costs, benefits, and risks from demand-side management [DSM] programs and services). As shown in the Cost-Effectiveness Details section, the Cadmus team assessed cost-effectiveness using all five of DSMore’s standard perspectives:

- Utility Cost Test (UCT)
- Total Resource Cost (TRC)
- Ratepayer Impact Test (RIM)
- Societal Cost Test (SCT)
- Participant Cost Test (PART)

All cost-effectiveness results shown include the program’s share of portfolio-level or indirect costs, determined using the present value of each program’s UCT lifetime benefits (i.e., present value 2016 dollars of avoided generation costs as well as deferral of capacity costs for capital, transmission, and distribution). The Cost-Effectiveness Details section provides further details.

As shown in Table 3, the five residential programs collectively resulted in UCT and TRC cost-effective ratios of 2.27 and 1.46, respectively, at a portfolio level.

Table 3. Summary of PY18 Residential Program Cost-Effectiveness

Program	UCT	TRC	RIM	SCT	PART ^a
Efficient Products	1.16	1.07	0.33	1.47	5.15
Smart Thermostats	2.43	1.19	0.55	1.55	2.58
Energy Efficiency Kits	2.77	2.85	0.39	4.69	N/A
Home Energy Reports	1.32	1.32	0.33	1.32	N/A
Heating and Cooling	2.34	1.36	0.54	1.99	3.08
Lighting	2.77	2.76	0.37	4.06	N/A
Portfolio	2.27	1.46	0.49	2.12	3.93

^a HER and Energy Efficiency Kit programs do not have participant costs. The Lighting program’s lifetime participant costs were lower over the bulb lifetime than if they hadn’t participated, even though upfront costs were higher.

Table 4 details program benefits and costs used to determine annual net shared benefits for the UCT, in 2016 dollars. Annual net shared benefits are net of costs borne by the utility, but not costs borne by other parties. For example, the report includes the incentive cost, which the utility accrued, but does not include remaining incremental measure costs if the incentive did not fully cover these (hence, the participant paid the costs).¹ In total, the residential portfolio generated just over \$21 million dollars in net benefits.

¹ Net benefits, as defined in 4 CSR 240-20.092(1)(HH), means the program benefits measured and documented through EM&V reports, TRMs and statewide TRM, less the sum of the program costs including the design, administration, delivery, end-use measures, incentive payments to customers, EM&V, utility market potential studies, and statewide TRM or TRM and statewide TRM.

State of Missouri. “Administrative Rules: Missouri Code of State Regulations.” Missouri 4 CSR 240-20.092(1)(HH). Revised June 2019. Available online: <https://www.sos.mo.gov/CMSImages/AdRules/csr/current/4csr/4c240-20b.pdf>

Table 4. Summary of PY18 Net Benefits (2016 Dollars)

Program	UCT Net Lifetime Benefits ^a	Program Costs ^b	Net Benefits ^c
Efficient Products	\$1,237,031	\$1,068,557	\$168,473
Smart Thermostats	\$1,189,287	\$489,681	\$699,606
Energy Efficiency Kits	\$2,293,834	\$827,638	\$1,466,196
Home Energy Reports	\$1,152,239	\$875,076	\$277,163
Heating and Cooling	\$29,573,393	\$12,632,595	\$16,940,798
Lighting	\$3,578,373	\$1,293,094	\$2,285,279
Portfolio^d	\$39,024,158	\$17,186,641	\$21,837,517

^a UCT Net Lifetime Benefits equal the value (in 2016 dollars) of utility-avoided costs over the measure’s lifetime, based on evaluated net savings applied at the measure level.

^b Program costs at the portfolio level include costs in addition to program-level costs.

^c Net benefits, as defined in 4 CSR 240-20.092(1)(HH) are the same as UCT net lifetime benefits minus costs.

^d May not sum exactly due to rounding.

By program, Table 5 details costs and benefits pertaining to TRC test results, which include all costs paid either by the utility or by the participant. For example, this includes full incremental measure costs, rather than just the incentive amount (typically representing only a portion of the incremental cost) paid by the utility. Though TRC costs are higher than UCT costs (as they include more costs), benefits remain the same.

Table 5. Summary of TRC Benefits and Costs (2016 Dollars)

Program	TRC Net Lifetime Benefits	Costs ^a	TRC Net Lifetime Benefits Less Costs ^b
Efficient Products	\$1,237,031	\$1,153,338	\$83,692
Smart Thermostats	\$1,189,287	\$997,659	\$191,628
Energy Efficiency Kits	\$2,293,834	\$805,427	\$1,488,408
Home Energy Reports	\$1,152,239	\$875,076	\$277,163
Heating and Cooling	\$29,573,393	\$21,690,241	\$7,883,152
Lighting	\$3,578,373	\$1,294,780	\$2,283,593
Portfolio^b	\$39,024,158	\$26,816,521	\$12,207,637

^a This table’s costs include the portion of portfolio costs distributed across programs (see Table 7 for details on program and portfolio spending).

^b May not sum exactly due to rounding.

This report focuses primarily on the UCT and TRC analyses, given they are the most common cost-effectiveness tests used. However, Cadmus also reported on the RIM, SCT, and PCT. Table 6 shows the costs Cadmus included in each test.

Table 6. Costs Associated with Each Cost-Effectiveness Test

Test	Costs Included
UCT	All costs paid by the utility directly.
TRC	All costs paid by the utility or the participant.
RIM	All costs paid by the utility or the participant, and includes revenue loss associated with reduced sales
SCT	All costs paid by the utility or the participant.
PCT	All costs paid by the participant.

Cost-Effectiveness Details

Methodology

As discussed, the Cadmus team assessed cost-effectiveness using five tests, as defined by the California Standard Practice Manual² (i.e., TRC, UCT, RIM, SCT, and PART).

DSMore takes hourly prices and hourly energy savings from specific measures installed through the residential portfolio, and correlates prices and savings to 33 years of historic weather data. Using long-term weather ensures that the model captures low-probability, high-consequence weather events, and appropriately values these. As a result, the model produces an accurate evaluation of a demand-side efficiency measure relative to other alternative supply options.

The Cadmus team used evaluated results for model inputs (e.g., PY18 program-specific participation counts, per-unit gross savings, NTG, and nonparticipant spillover).

The team used measure-specific load shapes provided by Ameren Missouri to inform the model when to apply savings for each measure over any given day. This ensured that the load shape for an end use matched the system peak impacts of that end use, and provided the correct summer coincident savings. The team used measure lifetime assumptions and incremental costs from the Ameren Missouri TRM or from the original Batch Tool provided with the Cycle 2 MEEIA filing.

The model also applied actual PY18 Ameren Missouri program costs. At the program level, the team applied actual spending, broken down into contractor administration, incentives, and marketing costs. Some general costs—including research and development, educational outreach, and portfolio administration—were allocated across all programs in both the business and residential portfolios. Costs specific to the residential portfolio – including EM&V, data tracking, and some general marketing costs – were allocated across just the residential programs discussed in this report.

² California Measurement Advisory Council. October 2001. *California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects*. Available online: http://www.calmac.org/events/SPM_9_20_02.pdf

Table 7 summarizes PY18 electric spending by program and by other portfolio-related activities, including residential portfolio general expense and marketing costs.

Table 7. Ameren Missouri PY18 Spending Data

2018 Residential Program Costs	Non-Incentive Costs	Incentive Costs	Total Costs
Efficient Products	\$394,321	\$778,720	\$1,173,041
Smart Thermostats	\$150,425	\$361,800	\$512,225
Energy Efficiency Kits	\$329,835	\$524,095	\$853,931
Home Energy Reports	\$950,353	\$0	\$950,353
Heating and Cooling	\$3,493,331	\$9,237,528	\$12,730,859
Lighting	\$937,271	\$399,609	\$1,336,879
Total Residential Programs	\$6,255,535	\$11,301,752	\$17,557,287
2018 Other Portfolio Costs			
Demand Response	\$0		\$0
R&D / Emerging Technologies	\$13,041		\$13,041
Educational Outreach	\$5,570		\$5,570
Portfolio Administration	\$66,433		\$66,433
Potential Study Costs	\$0		\$0
Data Tracking Costs	\$52,096		\$52,096
Residential EM&V	\$889,958		\$889,958
Residential Other	\$376,200		\$376,200
Total Other	\$1,403,298	\$0	\$1,403,298
Total Portfolio Costs^a	\$7,658,833	\$11,301,752	\$18,960,585

^a May not sum exactly due to rounding.

Table 8 summarizes benefit and cost inputs for each cost-effectiveness test.

Table 8. Summary of Benefits and Costs Included in Each Cost-Effectiveness Test

Test	Benefits	Costs
	Perspective of utility, government agency, or third-party program implementer	
UCT	<ul style="list-style-type: none"> • Energy-related avoided costs • Capacity-related costs avoided by the utility, including generation, transmission, and distribution 	<ul style="list-style-type: none"> • Program overhead costs • Utility/program administrator incentive costs • Utility/program administrator installation costs
	Perspective of all utility customers (participants and nonparticipants) in the utility service territory	
TRC	<ul style="list-style-type: none"> • Energy-related avoided costs • Capacity-related avoided costs, including generation, transmission, and distribution • Additional resource savings • Applicable tax credits 	<ul style="list-style-type: none"> • Program overhead costs • Program installation costs • Incremental measure costs (whether paid by customer or utility)^a
	Impact of the efficiency measure on nonparticipating ratepayers overall	
RIM	<ul style="list-style-type: none"> • Energy-related avoided costs • Capacity-related avoided costs, including generation, transmission, and distribution 	<ul style="list-style-type: none"> • Program overhead costs • Utility/program administrator incentives • Utility/program administrator installation costs • Lost revenue due to reduced energy bills
	Perspective of all utility customers (participants and nonparticipants) in the utility service territory (using a societal discount rate)	
SCT	<ul style="list-style-type: none"> • Energy-related avoided costs • Capacity-related avoided costs, including generation, transmission, and distribution • Additional resource savings • Applicable tax credits • Non-energy benefits 	<ul style="list-style-type: none"> • Program overhead costs • Program installation costs • Incremental measure costs (whether paid by the customer or utility)¹
	Perspective of the customers installing the measures	
PCT	<ul style="list-style-type: none"> • Bill savings • Incremental installation costs • Applicable tax credits or incentives 	<ul style="list-style-type: none"> • Incentive payments • Incremental equipment costs

^a Incentives are considered in the incremental measure costs.

Residential Portfolio

Table 9, Table 10, Table 11, Table 12, and Table 13 provide total benefits and costs for the residential portfolio, along with benefit/cost ratios for each cost-effectiveness test. As shown, the residential portfolio generated almost \$39 million in UCT gross lifetime benefits, and had a cost-effective ratio above 1.00 under the UCT, TRC, PART and SCT tests.

Table 9. Utility Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$19,312,655	
Avoided Electric Capacity	\$13,645,245	
Avoided T&D Electric	\$6,066,259	
Incentives		\$10,076,500
Program Overhead Costs		\$7,110,141
Total	\$39,024,158	\$17,186,641
UCT Benefit/Cost Ratio	2.27	

Table 10. Total Resource Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$19,312,655	
Avoided Electric Capacity	\$13,645,245	
Avoided T&D Electric	\$6,066,259	
Participant Costs (Net)		\$16,547,060
Program Overhead Costs		\$10,269,461
Total	\$39,024,158	\$26,816,521
TRC Benefit/Cost Ratio	1.46	

Table 11. Ratepayer Impact Measure Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$19,312,655	
Avoided Electric Capacity	\$13,645,245	
Avoided T&D Electric	\$6,066,259	
Program Overhead Costs		\$7,110,141
Incentives		\$10,076,500
Lost Revenue		\$62,600,020
Total	\$39,024,158	\$79,786,661
RIM Benefit/Cost Ratio	0.49	

Table 12. Societal Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$26,452,875	
Avoided Electric Capacity	\$19,132,792	
Avoided T&D Electric	\$7,875,172	
Program Overhead Costs		\$7,595,856
Participant Costs (Net)		\$17,677,438
Total	\$53,460,840	\$25,273,293
SCT Benefit/Cost Ratio	2.12	

Table 13. Participant Cost Test Inputs and Results

	Benefits	Costs
Participant Bill Savings (Electric, Gross)	\$84,539,636	
Incentives	\$10,076,500	
Participant Costs (Gross)		\$24,055,858
Total	\$94,616,136	\$24,055,858
PCT Benefit/Cost Ratio	3.93	

Efficient Products

Table 14, Table 15, Table 16, Table 17, and Table 18 show total benefits and costs for the Efficient Products program (excluding smart thermostats), along with benefit/cost ratios for each cost-effectiveness test. The following section shows smart thermostats separately.

Table 14. Utility Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$811,158	
Avoided Electric Capacity	\$287,825	
Avoided T&D Electric	\$138,047	
Incentives		\$681,391
Program Overhead Costs		\$387,167
Total	\$1,237,031	\$1,068,557
UCT Benefit/Cost Ratio	1.16	

Table 15. Total Resource Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$811,158	
Avoided Electric Capacity	\$287,825	
Avoided T&D Electric	\$138,047	
Participant Costs (Net)		\$613,198
Program Overhead Costs		\$540,140
Total	\$1,237,031	\$1,153,338
TRC Benefit/Cost Ratio	1.07	

Table 16. Ratepayer Impact Measure Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$811,158	
Avoided Electric Capacity	\$287,825	
Avoided T&D Electric	\$138,047	
Program Overhead Costs		\$387,167
Incentives		\$681,391
Lost Revenue		\$2,631,206
Total	\$1,237,031	\$3,699,764
RIM Benefit/Cost Ratio	0.33	

Table 17. Societal Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$1,024,660	
Avoided Electric Capacity	\$372,505	
Avoided T&D Electric	\$170,453	
Program Overhead Costs		\$413,615
Participant Cost (net)		\$655,088
Total	\$1,567,618	\$1,068,703
SCT Benefit/Cost Ratio	1.47	

Table 18. Participant Cost Test Inputs and Results

	Benefits	Costs
Participant Bill Savings (Electric, Gross)	\$3,423,260	
Participant Bill Savings (Natural Gas, Gross)	\$0	
Incentives	\$681,391	
Participant Costs (Gross)		\$796,544
Total	\$4,104,651	\$796,544
PCT Benefit/Cost Ratio	5.15	

Smart Thermostats

Table 19, Table 20, Table 21, Table 22, and Table 23 show total benefits and costs for smart thermostats provided through the Efficient Products program, along with benefit/cost ratios for each cost-effectiveness test.

Table 19. Utility Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$412,657	
Avoided Electric Capacity	\$524,655	
Avoided T&D Electric	\$251,975	
Incentives		\$319,224
Program Overhead Costs		\$170,457
Total	\$1,189,287	\$489,681
UCT Benefit/Cost Ratio	2.43	

Table 20. Total Resource Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$412,657	
Avoided Electric Capacity	\$524,655	
Avoided T&D Electric	\$251,975	
Participant Costs (Net)		\$731,435
Program Overhead Costs		\$266,224
Total	\$1,189,287	\$997,659
TRC Benefit/Cost Ratio	1.19	

Table 21. Ratepayer Impact Measure Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$412,657	
Avoided Electric Capacity	\$524,655	
Avoided T&D Electric	\$251,975	
Program Overhead Costs		\$170,457
Incentives		\$319,224
Lost Revenue		\$1,663,421
Total	\$1,189,287	\$2,153,102
RIM Benefit/Cost Ratio	0.55	

Table 22. Societal Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$511,977	
Avoided Electric Capacity	\$674,736	
Avoided T&D Electric	\$310,132	
Program Overhead Costs		\$182,101
Participant Cost (Net)		\$781,401
Total	\$1,496,845	\$963,502
SCT Benefit/Cost Ratio	1.55	

Table 23. Participant Cost Test Inputs and Results

	Benefits	Costs
Participant Bill Savings (Electric, Gross)	\$2,374,952	
Participant Bill Savings (Natural Gas, Gross)	\$0	
Incentives	\$319,224	
Participant Costs (Gross)		\$1,044,478
Total	\$2,694,176	\$1,044,478
PTC Benefit/Cost Ratio	2.58	

Energy Efficiency Kits

Table 24, Table 25, Table 26, Table 27, and Table 28 show total benefits and costs for the Energy Efficiency Kits program, along with benefit/cost ratios for each cost-effectiveness test.

Table 24. Utility Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$1,599,951	
Avoided Electric Capacity	\$494,598	
Avoided T&D Electric	\$199,285	
Incentives		\$463,839
Program Overhead Costs		\$363,800
Total	\$2,293,834	\$827,638
UCT Benefit/Cost Ratio	2.77	

Table 25. Total Resource Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$1,599,951	
Avoided Electric Capacity	\$494,598	
Avoided T&D Electric	\$199,285	
Participant Costs (Net)		\$268,752
Program Overhead Costs		\$536,675
Total	\$2,293,834	\$805,427
TRC Benefit/Cost Ratio	2.85	

Table 26. Ratepayer Impact Measure Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$1,599,951	
Avoided Electric Capacity	\$494,598	
Avoided T&D Electric	\$199,285	
Program Overhead Costs		\$363,800
Incentives		\$463,839
Lost Revenue		\$4,988,809
Total	\$2,293,834	\$5,816,447
RIM Benefit/Cost Ratio	0.39	

Table 27. Societal Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$2,208,959	
Avoided Electric Capacity	\$695,535	
Avoided T&D Electric	\$263,520	
Program Overhead Costs		\$388,652
Participant Cost (Net)		\$287,112
Total	\$3,168,013	\$675,763
SCT Benefit/Cost Ratio	4.69	

Table 28. Participant Cost Test Inputs and Results

	Benefits	Costs
Participant Bill Savings (Electric, Gross)	\$6,212,358	
Participant Bill Savings (Natural Gas, Gross)	\$0	
Incentives	\$463,839	
Participant Costs (Gross)		N/A
Total	\$6,676,197	N/A
PCT Benefit/Cost Ratio	N/A	

Home Energy Report

Table 29, Table 30, Table 31, Table 32, and Table 33 show total benefits and costs for the Home Energy Report program, along with benefit/cost ratios for each cost-effectiveness test. For cost-effectiveness purposes, Ameren Missouri set *ex post* gross savings equal to *ex post* net savings.

Table 29. Utility Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$673,464	
Avoided Electric Capacity	\$219,217	
Avoided T&D Electric	\$259,558	
Incentives		\$0
Program Overhead Costs		\$875,076
Total	\$1,152,239	\$875,076
UCT Benefit/Cost Ratio	1.32	

Table 30. Total Resource Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$673,464	
Avoided Electric Capacity	\$219,217	
Avoided T&D Electric	\$259,558	
Participant Costs (Net)		\$0
Program Overhead Costs		\$875,076
Total	\$1,152,239	\$875,076
TRC Benefit/Cost Ratio	1.32	

Table 31. Ratepayer Impact Measure Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$673,464	
Avoided Electric Capacity	\$219,217	
Avoided T&D Electric	\$259,558	
Program Overhead Costs		\$875,076
Incentives		\$0
Lost Revenue		\$2,587,739
Total	\$1,152,239	\$3,462,814
RIM Benefit/Cost Ratio	0.33	

Table 32. Societal Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$719,471	
Avoided Electric Capacity	\$234,192	
Avoided T&D Electric	\$277,289	
Program Overhead Costs		\$934,855
Participant Cost (Net)		\$0
Total	\$1,230,952	\$934,855
SCT Benefit/Cost Ratio	1.32	

Table 33. Participant Cost Test Inputs and Results

	Benefits	Costs
Participant Bill Savings (Electric, Gross)	\$2,587,739	
Incentives	\$0	
Participant Costs (Gross)		N/A
Total	\$2,587,739	N/A
PCT Benefit/Cost Ratio	N/A	

Heating and Cooling

Table 34, Table 35, Table 36, Table 37, and Table 38 show total benefits and costs for the Heating and Cooling program, along with benefit/cost ratios for each cost-effectiveness test.

Table 34. Utility Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$12,861,994	
Avoided Electric Capacity	\$11,657,153	
Avoided T&D Electric	\$5,054,246	
Incentives		\$8,612,046
Program Overhead Costs		\$4,020,549
Total	\$29,573,393	\$12,632,595
UCT Benefit/Cost Ratio	2.34	

Table 35. Total Resource Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$12,861,994	
Avoided Electric Capacity	\$11,657,153	
Avoided T&D Electric	\$5,054,246	
Participant Costs (Net)		\$14,931,987
Program Overhead Costs		\$6,758,253
Total	\$29,573,393	\$21,690,241
TRC Benefit/Cost Ratio	1.36	

Table 36. Ratepayer Impact Measure Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$12,861,994	
Avoided Electric Capacity	\$11,657,153	
Avoided T&D Electric	\$5,054,246	
Program Overhead Costs		\$4,020,549
Incentives		\$8,612,046
Lost Revenue		\$42,358,720
Total	\$29,573,393	\$54,991,315
RIM Benefit/Cost Ratio	0.54	

Table 37. Societal Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$17,358,073	
Avoided Electric Capacity	\$16,410,407	
Avoided T&D Electric	\$6,606,790	
Program Overhead Costs		\$4,295,204
Participant Cost (Net)		\$15,952,035
Total	\$40,375,271	\$20,247,239
SCT Benefit/Cost Ratio	1.99	

Table 38. Participant Cost Test Inputs and Results

	Benefits	Costs
Participant Bill Savings (Electric, Gross)	\$58,376,288	
Incentives	\$8,612,046	
Participant Costs (Gross)		21775430.22
Total	\$66,988,334.62	\$21,775,430
PCT Benefit/Cost Ratio	3.08	

Lighting

Table 39, Table 40, Table 41, Table 42, and Table 43 show total benefits and costs for the Lighting program, along with benefit/cost ratios for each cost-effectiveness test.

Table 39. Utility Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$2,953,430	
Avoided Electric Capacity	\$461,796	
Avoided T&D Electric	\$163,147	
Incentives		\$0
Program Overhead Costs		\$1,293,093
Total	\$3,578,373	\$1,293,094
UCT Benefit/Cost Ratio	2.77	

Table 40. Total Resource Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$2,953,430	
Avoided Electric Capacity	\$461,796	
Avoided T&D Electric	\$163,147	
Participant Costs (Net)		\$1,687
Program Overhead Costs		\$1,293,093
Total	\$3,578,373	\$1,294,780
TRC Benefit/Cost Ratio	2.76	

Table 41. Ratepayer Impact Measure Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$2,953,430	
Avoided Electric Capacity	\$461,796	
Avoided T&D Electric	\$163,147	
Program Overhead Costs		\$1,293,093
Incentives		\$0
Lost Revenue		\$8,370,125
Total	\$3,578,373	\$9,663,219
RIM Benefit/Cost Ratio	0.37	

Table 42. Societal Cost Test Inputs and Results

	Benefits	Costs
Avoided Electric Production	\$4,629,736	
Avoided Electric Capacity	\$745,417	
Avoided T&D Electric	\$246,989	
Program Overhead Costs		\$1,381,428
Participant Cost (net)		\$1,802
Total	\$5,622,142	\$1,383,231
SCT Benefit/Cost Ratio	4.06	

Table 43. Participant Cost Test Inputs and Results

	Benefits	Costs ^a
Participant Bill Savings (Electric, Gross)	\$11,565,038	
Incentives	\$0	
Participant Costs (Gross)		N/A
Total	\$11,565,038	N/A
PCT Benefit/Cost Ratio	6,855	

^a The participants costs for lighting are actually negative over the lifetime of the bulb. Rather than try to account for negative incremental costs, the Cadmus team set the incremental cost of LEDs to 0, as a conservative approach.