



Appendix 3

Utah Cost Effectiveness

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Portfolio and Sector Level Cost Effectiveness

Cadmus estimated the cost-effectiveness results for the Utah DSM Portfolio, based on 2013 costs and savings estimates provided by PacifiCorp. This memo provides the cost-effectiveness results for the 2013 DSM portfolio, the 2013 energy efficiency portfolio, the 2013 commercial and industrial energy efficiency portfolio (C&I), and the 2013 residential energy efficiency portfolio. Separate memos provide individual program cost-effectiveness.

Except for the rate impact test (RIM), the 2013 DSM portfolio—with load control included—proved cost-effective from all perspectives.

Table 1 lists the utility sector-level inputs.

Table 1. Portfolio Utility Inputs

Parameter	Value
Discount Rate	6.88%
Residential Line Loss	9.32%
Commercial Line Loss	8.71%
Industrial Line Loss	5.85%
Irrigation Line Loss	9.24%
Residential Energy Rate (\$/kWh) (base year 2013)	\$0.1056
Commercial Energy Rate (\$/kWh) (base year 2013)	\$0.0821
Industrial Energy Rate (\$/kWh) (base year 2013)	\$0.0561
Irrigation Energy Rate (\$/kWh) (base year 2013)	\$0.0729
Inflation Rate ¹	1.90%

¹Future rates determined using a 1.9% annual escalator.

Table 2 lists the portfolio costs.

Table 2. Portfolio Costs 2013

Cost	Value
Outreach and Communication Campaign	\$1,442,042
U of U Ambassador Sponsorship	\$6,426
Portfolio Technical Reference Database	\$179,999
Portfolio Code Training	\$52,865
Portfolio DSM Central	\$255,672
Self Direction Credits	\$3,275,803
Total	\$5,212,808

Table 3 through Table 6 provides the cost-effectiveness results for the various portfolios.

**Table 3. Utah 2013 Total DSM Portfolio
Cost-Effectiveness Results (Including Portfolio Costs and Load Control)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	N/A	\$159,823,773	\$302,638,135	\$142,814,362	1.89
Total Resource Cost Test (TRC) No Adder	N/A	\$159,823,773	\$275,125,577	\$115,301,805	1.72
Utility Cost Test (UCT)	N/A	\$134,051,678	\$275,125,577	\$141,073,900	2.05
Rate Impact Test (RIM)		\$275,045,647	\$275,125,577	\$79,931	1.00
Participant Cost Test (PCT)		\$89,197,122	\$218,767,775	\$129,570,653	2.45
Lifecycle Revenue Impacts (\$/kWh)					(\$0.000000205)

**Table 4. Utah 2013 Total Energy Efficiency Portfolio
Cost-Effectiveness Results (Including Portfolio Costs)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.058	\$96,156,315	\$154,849,176	\$58,692,862	1.61
Total Resource Cost Test (TRC) No Adder	\$0.058	\$96,156,315	\$140,771,979	\$44,615,664	1.46
Utility Cost Test (UCT)	\$0.031	\$50,977,636	\$140,771,979	\$89,794,343	2.76
Rate Impact Test (RIM)		\$191,971,605	\$140,771,979	(\$51,199,626)	0.73
Participant Cost Test (PCT)		\$89,197,122	\$199,361,191	\$110,164,069	2.24
Lifecycle Revenue Impacts (\$/kWh)					\$0.000131582

**Table 5. Utah 2013 C&I Energy Efficiency Portfolio
Cost-Effectiveness Results**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.037	\$38,652,340	\$91,204,197	\$52,551,857	2.36
Total Resource Cost Test (TRC) No Adder	\$0.037	\$38,652,340	\$82,912,907	\$44,260,566	2.15
Utility Cost Test (UCT)	\$0.019	\$19,663,053	\$82,912,907	\$63,249,854	4.22
Rate Impact Test (RIM)		\$96,008,360	\$82,912,907	(\$13,095,453)	0.86
Participant Cost Test (PCT)		\$36,004,805	\$97,268,218	\$61,263,413	2.70
Lifecycle Revenue Impacts (\$/kWh)					\$0.000052664

**Table 6. Utah 2013 Residential Energy Efficiency Portfolio
Cost-Effectiveness Results**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.083	\$52,291,167	\$63,644,979	\$11,353,812	1.22
Total Resource Cost Test (TRC) No Adder	\$0.083	\$52,291,167	\$57,859,072	\$5,567,905	1.11
Utility Cost Test (UCT)	\$0.041	\$26,101,775	\$57,859,072	\$31,757,297	2.22
Rate Impact Test (RIM)		\$90,750,437	\$57,859,072	(\$32,891,365)	0.64
Participant Cost Test (PCT)		\$53,192,318	\$102,092,973	\$48,900,656	1.92
Lifecycle Revenue Impacts (\$/kWh)					\$0.000084530

Program Level Cost Effectiveness

Home Energy Savings

Cadmus estimated the cost-effectiveness results for the Utah Home Energy Savings program, based on 2013 costs and savings estimates provided by PacifiCorp. The utility discount rate is from the 2013 PacifiCorp Integrated Resource Plan (IRP). This memo provides the cost-effectiveness inputs and results for the 2013 Home Energy Savings program overall and for the individual measure groups.

Cost-effectiveness was tested using the following:

- The 2013 IRP east residential house 35% load factor decrement for the appliance measure group;
- The 2013 IRP east residential lighting 48% load factor decrement for the lighting measure group; and
- The 2013 IRP east residential cooling 10% load factor decrement for the HVAC and weatherization measure groups.

Except for the rate impact test (RIM), the Home Energy Savings program proved cost-effective from all perspectives.

Table 1 lists the utility inputs.

Table 7. Home Energy Savings Utility Inputs

Parameter	Value
Discount Rate	6.88%
Residential Line Loss	9.32%
Residential Energy Rate (\$/kWh) (base year 2013)	\$0.1056
Inflation Rate ¹	1.90%

¹Future rates determined using a 1.9% annual escalator.

Table 2 lists the annual program costs.

Table 8. Home Energy Savings Annual Program Costs

Measure Group	Utility Admin	Program Management	Incentives	Total Utility Costs	Gross Customer Costs
Appliance	\$52,186	\$336,420	\$498,120	\$886,726	\$1,926,820
HVAC	\$245,707	\$1,583,949	\$2,445,166	\$4,274,821	\$4,366,872
Lighting	\$112,408	\$724,636	\$10,215,302	\$11,052,345	\$29,049,133
Weatherization	\$190,052	\$1,225,170	\$3,163,188	\$4,578,411	\$13,541,505
Total	\$600,353	\$3,870,175	\$16,321,776	\$20,792,304	\$48,884,330

Table 3 shows the annual energy savings and measure lives.

Table 9. Home Energy Savings Annual Energy Savings

Measure Group	Gross kWh Savings	Realization Rate	Adjusted Gross Savings	Net to Gross Percentage	Net kWh Savings	Measure Life
Appliance	1,130,875	100%	1,130,875	66%	746,377	14
HVAC	5,324,441	100%	5,324,441	89%	4,738,752	17
Lighting	78,908,060	100%	78,908,060	73%	57,602,884	8
Weatherization	4,118,409	100%	4,118,409	100%	4,118,409	30
Total	89,481,784		89,481,784		67,206,422	

Tables 4 through Table 8 provide the cost-effectiveness results for the program and various measure groups.

Table 10. Home Energy Savings Program Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.087	\$44,376,117	\$54,160,551	\$9,784,434	1.22
Total Resource Cost Test (TRC) No Adder	\$0.087	\$44,376,117	\$49,236,865	\$4,860,748	1.11
Utility Cost Test (UCT)	\$0.041	\$20,792,304	\$49,236,865	\$28,444,561	2.37
Rate Impact Test (RIM)		\$73,301,167	\$49,236,865	(\$24,064,302)	0.67
Participant Cost Test (PCT)		\$48,884,330	\$84,333,372	\$35,449,043	1.73
Lifecycle Revenue Impacts (\$/kWh)					\$0.000061845

Discounted Participant Payback (years)	3.73
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**Table 11. Home Energy Savings Appliance
Cost-Effectiveness Results**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.214	\$1,660,307	\$674,262	(\$986,046)	0.41
Total Resource Cost Test (TRC) No Adder	\$0.214	\$1,660,307	\$612,965	(\$1,047,342)	0.37
Utility Cost Test (UCT)	\$0.115	\$886,726	\$612,965	(\$273,761)	0.69
Rate Impact Test (RIM)		\$1,704,615	\$612,965	(\$1,091,650)	0.36
Participant Cost Test (PCT)		\$1,926,820	\$1,737,345	(\$189,475)	0.90
Lifecycle Revenue Impacts (\$/kWh)	\$0.000004184				
Discounted Participant Payback (years)	N/A				

**Table 12. Home Energy Savings HVAC
Cost-Effectiveness Results**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.104	\$5,716,171	\$11,377,986	\$5,661,815	1.99
Total Resource Cost Test (TRC) No Adder	\$0.104	\$5,716,171	\$10,343,624	\$4,627,453	1.81
Utility Cost Test (UCT)	\$0.078	\$4,274,821	\$10,343,624	\$6,068,803	2.42
Rate Impact Test (RIM)		\$10,188,804	\$10,343,624	\$154,820	1.02
Participant Cost Test (PCT)		\$4,366,872	\$9,090,091	\$4,723,219	2.08
Lifecycle Revenue Impacts (\$/kWh)	(\$0.000000526)				
Discounted Participant Payback (years)	3.69				

**Table 13. Home Energy Savings Lighting
Cost-Effectiveness Results**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.057	\$22,042,911	\$28,432,765	\$6,389,854	1.29
Total Resource Cost Test (TRC) No Adder	\$0.057	\$22,042,911	\$25,847,968	\$3,805,057	1.17
Utility Cost Test (UCT)	\$0.029	\$11,052,345	\$25,847,968	\$14,795,623	2.34
Rate Impact Test (RIM)		\$49,851,724	\$25,847,968	(\$24,003,756)	0.52
Participant Cost Test (PCT)		\$29,049,133	\$63,365,136	\$34,316,003	2.18
Lifecycle Revenue Impacts (\$/kWh)					\$0.000149139
Discounted Participant Payback (years)					2.36

**Table 14. Home Energy Savings Weatherization
Cost-Effectiveness Results**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.248	\$14,956,727	\$13,675,538	(\$1,281,189)	0.91
Total Resource Cost Test (TRC) No Adder	\$0.248	\$14,956,727	\$12,432,307	(\$2,524,420)	0.83
Utility Cost Test (UCT)	\$0.076	\$4,578,411	\$12,432,307	\$7,853,897	2.72
Rate Impact Test (RIM)		\$11,556,023	\$12,432,307	\$876,284	1.08
Participant Cost Test (PCT)		\$13,541,505	\$10,140,801	(\$3,400,704)	0.75
Lifecycle Revenue Impacts (\$/kWh)					(\$0.000002252)
Discounted Participant Payback (years)					N/A

See ya later, refrigerator®

Cadmus estimated the cost-effectiveness results for the Utah See Ya Later Refrigerator (SYLR) program, based on 2013 costs and savings estimates provided by PacifiCorp. The utility discount rate is from the 2013 PacifiCorp Integrated Resource Plan (IRP). This memo provides the cost-effectiveness inputs and results for the 2013 See Ya Later Refrigerator program overall and for the individual measure groups.

Cost-effectiveness was tested using the following:

- The 2013 IRP east residential house 35% load factor decrement for refrigerators and freezers; and
- The 2013 IRP east residential lighting 48% load factor decrement for kits.

Except for the rate impact test (RIM), the SYLR program proved cost-effective from all perspectives.

Table 1 lists the utility inputs.

Table 15. SYLR Utility Inputs

Parameter	Value
Discount Rate	6.88%
Residential Line Loss	9.32%
Residential Energy Rate (\$/kWh) (base year 2013)	\$0.1056
Inflation Rate ¹	1.90%

¹Future rates determined using a 1.9% annual escalator.

Table 2 lists annual program costs.

Table 16. SYLR Annual Program Costs

Measure	Utility Admin	Program Management	Program Development	Incentives	Total Utility Costs
Refrigerators	\$57,928	\$731,482	211,720	\$261,570	\$1,262,700
Freezers	\$10,479	\$132,324	38,300	\$59,310	\$240,413
Kits	\$3,257	\$41,127	11,904	\$58,786	\$115,073
Total	\$71,664	\$904,932	\$261,924	\$379,666	\$1,618,186

Table 3 provides the annual energy savings and measure lives.

Table 17. SYLR Annual Energy Savings

Measure	Gross kWh Savings	Realization Rate	Adjusted Gross Savings	Net-to-Gross Percentage	Net kWh Savings	Measure Life
Refrigerators	10,593,585	101%	10,699,521	56%	5,991,732	7
Freezers	1,743,714	111%	1,935,523	56%	1,083,893	5
Kits	802,087	75%	601,565	100%	601,565	6

Total	13,139,386		13,236,609		7,677,190	
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Tables 4 through Table 7 provide the cost-effectiveness results for the various programs.

**Table 18. SYLR Program
Cost-Effectiveness Results**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.035	\$1,618,186	\$3,549,795	\$1,931,609	2.19
Total Resource Cost Test (TRC) No Adder	\$0.035	\$1,618,186	\$3,227,086	\$1,608,900	1.99
Utility Cost Test (UCT)	\$0.035	\$1,618,186	\$3,227,086	\$1,608,900	1.99
Rate Impact Test (RIM)		\$6,261,908	\$3,227,086	(\$3,034,822)	0.52
Participant Cost Test (PCT)		\$0	\$8,409,396	\$8,409,396	N/A
Lifecycle Revenue Impacts (\$/kWh)					\$0.000021129
Discounted Participant Payback (years)					N/A

**Table 19. SYLR Refrigerators Program
Cost-Effectiveness Results**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.033	\$1,262,700	\$2,914,747	\$1,652,047	2.31
Total Resource Cost Test (TRC) No Adder	\$0.033	\$1,262,700	\$2,649,770	\$1,387,070	2.10
Utility Cost Test (UCT)	\$0.033	\$1,262,700	\$2,649,770	\$1,387,070	2.10
Rate Impact Test (RIM)		\$5,058,367	\$2,649,770	(\$2,408,597)	0.52
Participant Cost Test (PCT)		(\$0)	\$7,039,547	\$7,039,547	N/A
Lifecycle Revenue Impacts (\$/kWh)					\$0.000016769
Discounted Participant Payback (years)					N/A

**Table 20. SYLR Freezers Program
Cost-Effectiveness Results**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.046	\$240,413	\$392,634	\$152,222	1.63
Total Resource Cost Test (TRC) No Adder	\$0.046	\$240,413	\$356,940	\$116,528	1.48
Utility Cost Test (UCT)	\$0.046	\$240,413	\$356,940	\$116,528	1.48
Rate Impact Test (RIM)		\$754,210	\$356,940	(\$397,270)	0.47
Participant Cost Test (PCT)		\$0	\$976,805	\$976,805	N/A
Lifecycle Revenue Impacts (\$/kWh)	\$0.000003710				
Discounted Participant Payback (years)	N/A				

**Table 21. SYLR Kits
Program Cost-Effectiveness Results**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.034	\$115,073	\$242,413	\$127,340	2.11
Total Resource Cost Test (TRC) No Adder	\$0.034	\$115,073	\$220,376	\$105,303	1.92
Utility Cost Test (UCT)	\$0.034	\$115,073	\$220,376	\$105,303	1.92
Rate Impact Test (RIM)		\$449,331	\$220,376	(\$228,955)	0.49
Participant Cost Test (PCT)		\$0	\$393,044	\$393,044	6.69
Lifecycle Revenue Impacts (\$/kWh)	\$0.000001820				
Discounted Participant Payback (years)	N/A				

New Homes

Cadmus estimated the cost-effectiveness results for the Utah New Homes program, based on 2013 costs and savings estimates provided by PacifiCorp. The utility discount rate is from the 2013 PacifiCorp Integrated Resource Plan (IRP). This memo provides the cost-effectiveness inputs and results for two options of the 2013 New Homes program.

Cost-effectiveness was tested using the 2013 IRP east residential house 35% load factor decrement. The last two tables in this memo (Table 4 and Table 5) show the cost-effectiveness results for Option 1¹ and Option 2², respectively.

Table 22. New Homes Utility Inputs

Parameter	Value
Discount Rate	6.88%
Residential Line Loss	9.32%
Residential Energy Rate (\$/kWh) (base year 2013)	\$0.1056
Inflation Rate ¹	1.90%

¹Future rates determined using a 1.9% annual escalator.

Table 2 lists the annual program costs.

Table 23. New Homes Annual Program Costs

Measure Group	Utility Admin	Program Delivery	Program Development	Incentives	Total Utility Costs	Gross Customer Costs
Option 1	\$41,592	\$840,533	\$110,984	\$420,406	\$1,413,515	\$2,153,994
Option 2	\$32,466	\$811,625	\$81,582	\$420,406	\$1,346,080	\$2,153,994

Table 3 shows the annual energy savings and measure lives.

Table 24. New Homes Annual Energy Savings

Measure Group	Gross kWh Savings	Realization Rate	Adjusted Gross Savings	Net to Gross Percentage	Net kWh Savings	Measure Life
Option 1	2,138,279	100%	2,138,279	80%	1,710,623	14
Option 2	2,138,279	100%	2,138,279	80%	1,710,623	14

¹ Option 1 – 2013 expenditures including final allocation portion from 2011 program design efforts.

² Option 2 – 2013 expenditures excluding final allocation portion from 2011 program design efforts.

Table 4 shows the cost-effectiveness results for Option 1.

Table 25. New Homes: Option 1 Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.156	\$2,716,304	\$1,530,514	(\$1,185,790)	0.56
Total Resource Cost Test (TRC) No Adder	\$0.156	\$2,716,304	\$1,391,376	(\$1,324,928)	0.51
Utility Cost Test (UCT)	\$0.081	\$1,413,515	\$1,391,376	(\$22,138)	0.98
Rate Impact Test (RIM)		\$3,243,710	\$1,391,376	(\$1,852,334)	0.43
Participant Cost Test (PCT)		\$2,153,994	\$2,708,150	\$554,156	1.26
Lifecycle Revenue Impacts (\$/kWh)	\$0.000007449				
Discounted Participant Payback (years)	9.48				

Table 5 shows the cost-effectiveness results for Option 2.

Table 26. New Homes: Option 2 Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.152	\$2,648,869	\$1,530,514	(\$1,118,355)	0.58
Total Resource Cost Test (TRC) No Adder	\$0.152	\$2,648,869	\$1,391,376	(\$1,257,493)	0.53
Utility Cost Test (UCT)	\$0.077	\$1,346,080	\$1,391,376	\$45,297	1.03
Rate Impact Test (RIM)		\$3,176,275	\$1,391,376	(\$1,784,899)	0.44
Participant Cost Test (PCT)		\$2,153,994	\$2,708,151	\$554,157	1.26
Lifecycle Revenue Impacts (\$/kWh)	\$0.000007178				
Discounted Participant Payback (years)	9.48				

Home Energy Reports

Cadmus estimated the cost-effectiveness results for the Utah Home Energy Reports program, based on 2013 costs and savings estimates provided by PacifiCorp. The utility discount rate is from the 2013 PacifiCorp Integrated Resource Plan (IRP). This memo provides the cost-effectiveness inputs and results for the 2013 Home Energy Reports program.

Cost-effectiveness was tested using the 2013 IRP east residential house 35% load factor decrement. Except for the rate impact test (RIM), the Home Energy Reports program proves cost-effective from all perspectives.

Table 1 lists the utility inputs.

Table 27. Home Energy Reports Utility Inputs

Parameter	Value
Discount Rate	6.88%
Residential Line Loss	9.32%
Residential Energy Rate (\$/kWh) (base year 2013)	\$0.1056
Inflation Rate ¹	1.90%

¹Future rates determined using a 1.9% annual escalator.

Table 2 lists the annual program costs.

Table 28. Home Energy Reports Annual Program Costs

Measure Group	Utility Admin	Program Delivery	Program Development	Incentives	Total Utility Costs
Home Energy Reports	\$28,073	\$768,750	\$5,772	\$0	\$802,595

Table 3 shows the annual energy savings and measure lives.

Table 29. Home Energy Reports Annual Energy Savings

Measure Group	Gross kWh Savings	Realization Rate	Adjusted Gross Savings	Net to Gross Percentage	Net kWh Savings	Measure Life
Home Energy Reports	32,298,825	100%	32,298,825	100%	32,298,825	1

Table 4 shows the cost-effectiveness results.

Table 30. Home Energy Reports Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.023	\$802,595	\$2,526,478	\$1,723,883	3.15
Total Resource Cost Test (TRC) No Adder	\$0.023	\$802,595	\$2,296,798	\$1,494,203	2.86
Utility Cost Test (UCT)	\$0.023	\$802,595	\$2,296,798	\$1,494,203	2.86
Rate Impact Test (RIM)		\$4,213,351	\$2,296,798	(\$1,916,553)	0.55
Participant Cost Test (PCT)		\$0	\$3,410,756	\$3,410,756	N/A
Lifecycle Revenue Impacts (\$/kWh)	\$0.000082522				
Discounted Participant Payback (years)	N/A				

Low Income

Cadmus estimated the cost-effectiveness results for the Utah Low Income Weatherization program, based on 2013 costs and savings estimates provided by PacifiCorp. The utility discount rate is from the 2013 PacifiCorp Integrated Resource Plan (IRP). This memo provides the cost-effectiveness inputs and results for the 2013 Low Income Weatherization program.

Cost-effectiveness was tested using the 2013 IRP east residential house 35% load factor decrement. Except for the rate impact test (RIM), the program proves cost-effective from all perspectives.

Table 1 lists the utility inputs.

Table 31. Low Income Weatherization Utility Inputs

Parameter	Value
Discount Rate	6.88%
Residential Line Loss	9.32%
Residential Energy Rate (\$/kWh) (base year 2013)	\$0.1056
Inflation Rate ¹	1.90%

¹Future rates determined using a 1.9% annual escalator.

Table 2 lists the annual program costs.

Table 32. Low Income Weatherization Annual Program Costs

	Utility Admin	Program Delivery	Program Development	Incentives	Total Utility Costs
Low Income Weatherization	\$20,571	\$7,499	\$2,808	\$98,219	\$129,097

Table 3 lists the annual energy savings and measure life.

Table 33. Low Income Weatherization Annual Energy Savings

	Gross kWh Savings	Realization Rate	Adjusted Gross Savings	Net-to-Gross Percentage	Net kWh Savings	Measure Life
Low Income Weatherization	475,374	100%	475,374	100%	475,374	11

Table 4 lists the program cost-effectiveness results.

Table 34. Low Income Weatherization Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.031	\$129,097	\$347,127	\$218,031	2.69
Total Resource Cost Test (TRC) No Adder	\$0.031	\$129,097	\$315,570	\$186,474	2.44
Utility Cost Test (UCT)	\$0.031	\$129,097	\$315,570	\$186,474	2.44
Rate Impact Test (RIM)		\$554,026	\$315,570	(\$238,456)	0.57
Participant Cost Test (PCT)		\$0	\$523,148	\$523,148	N/A
Lifecycle Revenue Impacts (\$/kWh)					\$0.000001147
Discounted Participant Payback (years)					N/A

Non-Residential Energy Efficiency

Cadmus estimated the cost-effectiveness results for the Utah wattsmart Business program, based on 2013 costs and savings estimates provided by PacifiCorp. The utility discount rate is from the 2013 PacifiCorp Integrated Resource Plan (IRP). This memo provides the cost-effectiveness inputs and results for the 2013 wattsmart Business program overall and for the individual measure groups.

Cost-effectiveness inputs and results for the 2013 wattsmart Business program are presented for the program overall and individually by measure group. Depending on the measure category, cost-effectiveness was tested using the following:

- The 2013 IRP east system 70% load factor decrement;
- The east commercial cooling 20% load factor decrement; or
- The east commercial lighting 48% load factor decrement.

Except for the rate impact test (RIM), the wattsmart Business program proved cost-effective from all perspectives.

The following tables are included in this report:

Table 1. Utility Inputs	Table 10. Controls Cost-Effectiveness
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Table 35. wattsmart Business Utility Inputs

Parameter	Value
Discount Rate	6.88%
Commercial Line Loss	8.71%
Industrial Line Loss	5.85%
Irrigation Line Loss	9.24%
Commercial Energy Rate (\$/kWh) (base year 2013)	\$0.0821
Industrial Energy Rate (\$/kWh) (base year 2013)	\$0.0561
Irrigation Energy Rate (\$/kWh) (base year 2013)	\$0.0729
Inflation Rate ¹	1.90%

¹Future rates determined using a 1.9% annual escalator.

Table 36. wattsmart Business Annual Program Costs

Measure Group	Eng. Costs	Utility Admin	Program Delivery	Program Dev.	Incentives	Total Utility Costs	Gross Customer Costs
Additional Measures	\$45,045	\$25,729	\$56,546	\$21,889	\$423,745	\$572,954	\$1,085,793
Appliance	\$37	\$21	\$47	\$18	\$1,100	\$1,223	\$3,779
Building Shell	\$14,963	\$8,547	\$18,784	\$7,271	\$241,825	\$291,390	\$1,013,934
Compressed Air	\$122,775	\$70,128	\$154,124	\$59,662	\$553,543	\$960,231	\$907,892
Controls	\$11,692	\$6,679	\$14,678	\$5,682	\$221,631	\$260,362	\$550,327
Dairy Farm Equipment	\$5,498	\$3,140	\$6,902	\$2,672	\$34,059	\$52,271	\$101,287
Food Service	\$7,659	\$4,375	\$9,615	\$3,722	\$48,877	\$74,248	\$173,409
HVAC	\$262,268	\$149,805	\$329,236	\$127,448	\$1,980,307	\$2,849,064	\$5,952,533
Irrigation	\$14,653	\$8,370	\$18,395	\$7,121	\$93,434	\$141,973	\$435,292
Lighting	\$885,028	\$505,519	\$1,111,015	\$430,077	\$7,693,222	\$10,624,860	\$20,859,629
Motors	\$196,584	\$112,287	\$246,781	\$95,529	\$2,254,735	\$2,905,915	\$3,047,613
Office	\$80,420	\$45,935	\$100,955	\$39,080	\$216,822	\$483,213	\$371,592
Refrigeration	\$51,928	\$29,661	\$65,187	\$25,234	\$273,340	\$445,349	\$1,501,725
Total	\$1,698,550	\$970,195	\$2,132,264	\$825,405	\$14,036,639	\$19,663,053	\$36,004,805

Table 37. wattsmart Business Annual Energy Savings

Measure Group	Gross kWh Savings	Realization Rate	Adjusted Gross Savings	Net to Gross Percentage	Net kWh Savings	Measure Life
Additional Measures	2,808,091	108%	3,020,590	92%	2,770,680	13.6
Appliance	2,318	108%	2,493	92%	2,287	13.6
Building Shell	932,790	108%	1,003,378	92%	920,363	13.6
Compressed Air	7,653,805	108%	8,232,999	92%	7,551,837	13.6
Controls	728,899	108%	784,058	92%	719,188	13.6
Dairy Farm Equipment	342,746	108%	368,683	92%	338,180	13.6
Food Service	477,481	108%	513,614	92%	471,120	13.6
HVAC	16,349,864	108%	17,587,123	92%	16,132,042	13.6
Irrigation	913,502	108%	982,630	92%	901,332	13.6
Lighting	55,172,943	108%	59,348,097	92%	54,437,897	13.6
Motors	12,255,115	108%	13,182,508	92%	12,091,845	13.6
Office	5,013,432	108%	5,392,818	92%	4,946,640	13.6
Refrigeration	3,237,180	108%	3,482,150	92%	3,194,052	13.6
Total	105,888,166		113,901,141		104,477,462	

**Table 38: wattsmart Business Program
Summary of Benefit/Cost Ratios by Measure Category**

Measure	PTRC	TRC	UCT	RIM	PCT
Additional Measures - CI	1.80	1.64	3.28	0.82	2.11
Appliance - CI	0.49	0.45	1.31	0.51	0.84
Building Shell - CI	0.74	0.67	2.26	0.64	1.02
Compressed Air - CI	4.37	3.97	5.13	0.86	6.35
Controls - CI	0.92	0.84	1.75	0.60	1.39
Dairy Farm Equipment	2.15	1.95	4.15	0.67	3.24
Food Service	1.95	1.78	4.41	0.71	2.73
HVAC - CI	2.91	2.65	5.88	1.16	2.46
Irrigation - Ag	1.58	1.44	4.54	0.83	1.79

Lighting - CI	2.18	1.98	4.12	0.83	2.58
Motors - CI	2.46	2.24	2.65	0.77	3.28
Office	6.28	5.70	7.17	0.76	12.58
Refrigeration - CI	1.50	1.36	4.74	0.81	1.75
Total	2.36	2.15	4.22	0.86	2.70

Table 39. wattsmart Business Program Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.037	\$38,652,340	\$91,204,197	\$52,551,857	2.36
Total Resource Cost Test (TRC) No Adder	\$0.037	\$38,652,340	\$82,912,907	\$44,260,566	2.15
Utility Cost Test (UCT)	\$0.019	\$19,663,053	\$82,912,907	\$63,249,854	4.22
Rate Impact Test (RIM)		\$96,008,360	\$82,912,907	(\$13,095,453)	0.86
Participant Cost Test (PCT)		\$36,004,805	\$97,268,218	\$61,263,413	2.70
Lifecycle Revenue Impacts (\$/kWh)					\$0.000052664
Discounted Participant Payback (years)					2.81

Table 40. wattsmart Business Additional Measures Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.042	\$1,145,169	\$2,064,781	\$919,612	1.80
Total Resource Cost Test (TRC) No Adder	\$0.042	\$1,145,169	\$1,877,074	\$731,905	1.64
Utility Cost Test (UCT)	\$0.021	\$572,954	\$1,877,074	\$1,304,120	3.28
Rate Impact Test (RIM)		\$2,281,132	\$1,877,074	(\$404,059)	0.82
Participant Cost Test (PCT)		\$1,085,793	\$2,286,004	\$1,200,211	2.11
Lifecycle Revenue Impacts (\$/kWh)					\$0.000001625
Discounted Participant Payback (years)					3.88

Table 41. wattsmart Business Appliances Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.156	\$3,590	\$1,762	(\$1,828)	0.49
Total Resource Cost Test (TRC) No Adder	\$0.156	\$3,590	\$1,602	(\$1,988)	0.45
Utility Cost Test (UCT)	\$0.053	\$1,223	\$1,602	\$378	1.31
Rate Impact Test (RIM)		\$3,114	\$1,602	(\$1,512)	0.51
Participant Cost Test (PCT)		\$3,779	\$3,161	(\$618)	0.84
Lifecycle Revenue Impacts (\$/kWh)	\$0.000000006				
Discounted Participant Payback (years)	N/A				

Table 42. wattsmart Business Building Shell Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.106	\$979,610	\$723,106	(\$256,504)	0.74
Total Resource Cost Test (TRC) No Adder	\$0.106	\$979,610	\$657,369	(\$322,241)	0.67
Utility Cost Test (UCT)	\$0.032	\$291,390	\$657,369	\$365,979	2.26
Rate Impact Test (RIM)		\$1,022,763	\$657,369	(\$365,394)	0.64
Participant Cost Test (PCT)		\$1,013,934	\$1,039,168	\$25,234	1.02
Lifecycle Revenue Impacts (\$/kWh)	\$0.000001469				
Discounted Participant Payback (years)	12.99				

Table 43. wattsmart Business Compressed Air Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.017	\$1,239,465	\$5,419,273	\$4,179,808	4.37
Total Resource Cost Test (TRC) No Adder	\$0.017	\$1,239,465	\$4,926,612	\$3,687,147	3.97
Utility Cost Test (UCT)	\$0.013	\$960,231	\$4,926,612	\$3,966,381	5.13
Rate Impact Test (RIM)		\$5,743,363	\$4,926,612	(\$816,751)	0.86
Participant Cost Test (PCT)		\$907,892	\$5,768,121	\$4,860,229	6.35
Lifecycle Revenue Impacts (\$/kWh)					\$0.000003285
Discounted Participant Payback (years)					0.85

Table 44. wattsmart Business Controls Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.076	\$543,526	\$501,811	(\$41,714)	0.92
Total Resource Cost Test (TRC) No Adder	\$0.076	\$543,526	\$456,192	(\$87,334)	0.84
Utility Cost Test (UCT)	\$0.037	\$260,362	\$456,192	\$195,831	1.75
Rate Impact Test (RIM)		\$758,124	\$456,192	(\$301,931)	0.60
Participant Cost Test (PCT)		\$550,327	\$764,292	\$213,965	1.39
Lifecycle Revenue Impacts (\$/kWh)					\$0.000001214
Discounted Participant Payback (years)					7.14

Table 45. wattsmart Business Food Service Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.039	\$184,433	\$360,331	\$175,898	1.95
Total Resource Cost Test (TRC) No Adder	\$0.039	\$184,433	\$327,574	\$143,140	1.78
Utility Cost Test (UCT)	\$0.016	\$74,248	\$327,574	\$253,326	4.41
Rate Impact Test (RIM)		\$463,658	\$327,574	(\$136,084)	0.71
Participant Cost Test (PCT)		\$173,409	\$473,411	\$300,002	2.73
Lifecycle Revenue Impacts (\$/kWh)	\$0.000000547				
Discounted Participant Payback (years)	3.15				

Table 46. wattsmart Business Dairy Farm Equipment Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.033	\$111,119	\$238,514	\$127,395	2.15
Total Resource Cost Test (TRC) No Adder	\$0.033	\$111,119	\$216,831	\$105,712	1.95
Utility Cost Test (UCT)	\$0.015	\$52,271	\$216,831	\$164,560	4.15
Rate Impact Test (RIM)		\$322,093	\$216,831	(\$105,262)	0.67
Participant Cost Test (PCT)		\$101,287	\$328,218	\$226,931	3.24
Lifecycle Revenue Impacts (\$/kWh)	\$0.000000423				
Discounted Participant Payback (years)	2.41				

Table 47. wattsmart Business HVAC Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.039	\$6,328,804	\$18,419,245	\$12,090,441	2.91
Total Resource Cost Test (TRC) No Adder	\$0.039	\$6,328,804	\$16,744,769	\$10,415,964	2.65
Utility Cost Test (UCT)	\$0.018	\$2,849,064	\$16,744,769	\$13,895,704	5.88
Rate Impact Test (RIM)		\$14,472,742	\$16,744,769	\$2,272,026	1.16
Participant Cost Test (PCT)		\$5,952,533	\$14,652,420	\$8,699,886	2.46
Lifecycle Revenue Impacts (\$/kWh)	(\$0.000009137)				
Discounted Participant Payback (years)	3.39				

Table 48. wattsmart Business Irrigation Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.050	\$447,817	\$708,647	\$260,830	1.58
Total Resource Cost Test (TRC) No Adder	\$0.050	\$447,817	\$644,225	\$196,408	1.44
Utility Cost Test (UCT)	\$0.016	\$141,973	\$644,225	\$502,252	4.54
Rate Impact Test (RIM)		\$771,670	\$644,225	(\$127,445)	0.83
Participant Cost Test (PCT)		\$435,292	\$779,928	\$344,637	1.79
Lifecycle Revenue Impacts (\$/kWh)	\$0.000000513				
Discounted Participant Payback (years)	5.68				

Table 49. wattsmart Business Lighting Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.041	\$22,065,434	\$48,153,072	\$26,087,638	2.18
Total Resource Cost Test (TRC) No Adder	\$0.041	\$22,065,434	\$43,775,520	\$21,710,086	1.98
Utility Cost Test (UCT)	\$0.020	\$10,624,860	\$43,775,520	\$33,150,660	4.12
Rate Impact Test (RIM)		\$52,995,752	\$43,775,520	(\$9,220,232)	0.83
Participant Cost Test (PCT)		\$20,859,629	\$53,885,891	\$33,026,262	2.58
Lifecycle Revenue Impacts (\$/kWh)					\$0.000037080
Discounted Participant Payback (years)					3.05

Table 50. wattsmart Business Motors Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.029	\$3,446,647	\$8,480,023	\$5,033,376	2.46
Total Resource Cost Test (TRC) No Adder	\$0.029	\$3,446,647	\$7,709,112	\$4,262,465	2.24
Utility Cost Test (UCT)	\$0.025	\$2,905,915	\$7,709,112	\$4,803,197	2.65
Rate Impact Test (RIM)		\$9,995,967	\$7,709,112	(\$2,286,854)	0.77
Participant Cost Test (PCT)		\$3,047,613	\$9,984,328	\$6,936,716	3.28
Lifecycle Revenue Impacts (\$/kWh)					\$0.000009197
Discounted Participant Payback (years)					1.03

Table 51. wattsmart Business Office Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.012	\$607,239	\$3,810,451	\$3,203,211	6.28
Total Resource Cost Test (TRC) No Adder	\$0.012	\$607,239	\$3,464,046	\$2,856,807	5.70
Utility Cost Test (UCT)	\$0.010	\$483,213	\$3,464,046	\$2,980,833	7.17
Rate Impact Test (RIM)		\$4,571,923	\$3,464,046	(\$1,107,877)	0.76
Participant Cost Test (PCT)		\$371,592	\$4,674,326	\$4,302,734	12.58
Lifecycle Revenue Impacts (\$/kWh)					\$0.000004455
Discounted Participant Payback (years)					0.56

Table 52. wattsmart Business Refrigeration Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.049	\$1,549,488	\$2,323,180	\$773,692	1.50
Total Resource Cost Test (TRC) No Adder	\$0.049	\$1,549,488	\$2,111,982	\$562,494	1.36
Utility Cost Test (UCT)	\$0.014	\$445,349	\$2,111,982	\$1,666,633	4.74
Rate Impact Test (RIM)		\$2,606,061	\$2,111,982	(\$494,079)	0.81
Participant Cost Test (PCT)		\$1,501,725	\$2,628,949	\$1,127,224	1.75
Lifecycle Revenue Impacts (\$/kWh)					\$0.000001987
Discounted Participant Payback (years)					5.98