PacifiCorp
2022-2023 DSM Business Plan

Appendix 1

Portfolio and Program Cost-Effectiveness

MEMORANDUM

To: Don Jones, Jr. and Nancy Goddard, Pacific Power

From: Eli Morris and Andy Hudson, AEG

Date: September 14, 2021

Re: Washington Portfolio Level Cost-Effectiveness Analysis – 2022-2023 Biennium

AEG estimated the cost-effectiveness of Pacific Power's overall energy efficiency portfolio and individual programs in the state of Washington based on Program Year (PY) 2022 and PY2023 costs and savings estimates provided by Pacific Power.[1] The memo provides analysis inputs and results in the following tables:

[1] Consistent with Section 480-109-100 (10) (b) of the Washington Administrative Code, the Low-Income Weatherization program is excluded from this analysis.

Table 16: NEEA Cost-Effectiveness Results - PY2022 and PY2023

Table 17: Home Energy Savings Non-Energy Impacts - PY2022 and PY2023

Table 18: Wattsmart Business Non-Energy Impacts - PY2022 and PY2023

The following assumptions were utilized in the analysis:

- Avoided Costs: derived from PacifiCorp's 2021 Integrated Resource Plan (IRP) Preferred Portfolio "P02-MM-CETA", converted into annual values using load shapes from the same IRP.
- Modeling Inputs: measure savings, costs, non-energy impacts (NEIs), measure lives, incentive levels, program delivery, and portfolio costs were based on estimates provided by PacifiCorp.
- Net-to-Gross (NTG): ratios are assumed to be 1.0, consistent with condition (8)(a) to Order 01 in Docket UE-152-072.
- Retail Rates: 2020 rates provided by PacifiCorp and escalated by inflation for future years.

The following tables summarize cost-effectiveness assumptions and results for the Washington portfolio and associated programs.

Table 1 Utility Inputs

Parameter	Value
Discount Rate	6.880%
Residential Line Loss	7.676%
Commercial Line Loss	7.602%
Industrial Line Loss	6.815%
Irrigation Line Loss	7.676%
Residential Energy Rate ($/kWh)	$0.0836
Commercial Energy Rate ($/kWh)	$0.0717
Industrial Energy Rate ($/kWh)	$0.0887
Irrigation Energy Rate ($/kWh)	$0.1327
Inflation Rate[2]	2.16%

[2] Future rates determined using a 2.16% annual escalator.

Table 2: Portfolio-Level Costs, Nominal - PY2022 and PY2023

Category	PY2022	PY2023
Be wattsmart, Begin at Home	$64,523	$64,523
Customer Outreach/Communication	$250,000	$250,000
Program Evaluations (& Savings Verification)	$549,524	$259,662
Potential Study Update/Analysis	$120,115	$15,368
System Support	$166,735	$157,543
End Use Load Research & RTF Funding	$109,500	$65,500
Total	**$1,260,397**	**$812,596**

Table 3: Program Costs, Nominal - PY2022 and PY2023

Program	Program Delivery	Utility Admin	Incentives	Total Utility Budget	Gross Customer Costs
Home Energy Savings	$6,100,000	$79,942	$12,861,967	$19,041,909	$26,467,125
Home Energy Reports	$732,546	$23,429	$0	$755,974	$0
Wattsmart Business	$6,995,408	$1,118,891	$12,227,093	$20,341,392	$16,567,417
NEEA	$1,669,200	$55,000	$0	$1,724,200	$0
Total (excluding Portfolio-Level)	**$15,497,154**	**$1,277,262**	**$25,089,060**	**$41,863,475**	**$43,034,542**

Table 4: Savings by Program - PY2022 and PY2023

Program	Gross kWh Savings at Site	Realization Rate	Adjusted Gross kWh Savings at Site	Net to Gross Ratio	Net kWh Savings at Site	Measure Life
Home Energy Savings	19,813,593	92%	18,158,226	100%	18,158,226	23
Home Energy Reports	4,099,518	100%	4,099,518	100%	4,099,518	2
Wattsmart Business	70,338,038	99%	69,365,587	100%	69,365,587	10
NEEA*	6,773,770	100%	6,773,770	100%	6,773,770	14
Total Program	**101,024,919**	**97%**	**98,397,101**	**100%**	**98,397,101**	**11**

Table 5: Portfolio-Level Benefit/Cost Ratios - PY2022 and PY2023

Program	PTRC	TRC	UCT	PCT	RIM
Total Portfolio	1.47	1.33	1.90	2.14	0.73
Total Portfolio with NEIs	1.85	1.72	1.90	2.15	0.73
Total Portfolio with NEEA	1.54	1.40	1.97	2.28	0.74
Total Portfolio with NEEA and NEIs	1.95	1.81	1.97	2.29	0.74

Table 6: Total Portfolio Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0830	$58,218,193	$85,313,338	$27,095,145	1.47
Total Resource Cost Test (TRC) No Adder	$0.0830	$58,218,193	$77,557,580	$19,339,387	1.33
Utility Cost Test (UCT)	$0.0582	$40,849,903	$77,557,580	$36,707,677	1.90
Participant Cost Test (PCT)		$41,636,432	$89,091,491	$47,455,059	2.14
Rate Impact Test (RIM)		$105,673,252	$77,557,580	($28,115,672)	0.73
Lifecycle Revenue Impacts ($/kWh)					$0.0018992
Discounted Participant Payback (years)					4.97

Table 7: Total Portfolio Including NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0830	$58,218,193	$107,643,724	$49,425,531	1.85
Total Resource Cost Test (TRC) No Adder	$0.0830	$58,218,193	$99,887,966	$41,669,773	1.72
Utility Cost Test (UCT)	$0.0582	$40,849,903	$77,557,580	$36,707,677	1.90
Participant Cost Test (PCT)		$41,636,432	$89,569,924	$47,933,492	2.15
Rate Impact Test (RIM)		$105,673,252	$77,557,580	($28,115,672)	0.73
Lifecycle Revenue Impacts ($/kWh)					$0.0018992
Discounted Participant Payback (years)					4.94

Table 8: Total Portfolio Including NEEA Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0785	$59,886,899	$92,276,066	$32,389,167	1.54
Total Resource Cost Test (TRC) No Adder	$0.0785	$59,886,899	$83,887,333	$24,000,434	1.40
Utility Cost Test (UCT)	$0.0557	$42,518,608	$83,887,333	$41,368,724	1.97
Participant Cost Test (PCT)		$41,636,432	$94,897,509	$53,261,077	2.28
Rate Impact Test (RIM)		$113,147,976	$83,887,333	($29,260,643)	0.74
Lifecycle Revenue Impacts ($/kWh)					$0.0020335
Discounted Participant Payback (years)					4.73

Table 9: Total Portfolio Including NEIs and NEEA Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0785	$59,886,899	$116,519,336	$56,632,437	1.95
Total Resource Cost Test (TRC) No Adder	$0.0785	$59,886,899	$108,130,602	$48,243,704	1.81
Utility Cost Test (UCT)	$0.0557	$42,518,608	$83,887,333	$41,368,724	1.97
Participant Cost Test (PCT)		$41,636,432	$95,375,943	$53,739,510	2.29
Rate Impact Test (RIM)		$113,147,976	$83,887,333	($29,260,643)	0.74
Lifecycle Revenue Impacts ($/kWh)					$0.0020335
Discounted Participant Payback (years)					4.71

Table 10: Benefit/Cost Ratios by Program - PY2022 and PY2023

Program	PTRC	TRC	UCT	PCT	RIM
Home Energy Savings	0.82	0.74	1.27	1.26	0.61
Home Energy Savings with NEIs	1.02	0.95	1.27	1.28	0.61
Home Energy Reports	1.86	1.69	1.69	0.00	0.76
Wattsmart Business	2.44	2.22	2.69	3.48	0.83
Wattsmart Business with NEIs	3.08	2.86	2.69	3.49	0.83
NEEA	5.32	4.94	3.79	0.00	0.85

Table 11: Home Energy Savings Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1609	$31,581,260	$25,754,430	($5,826,830)	0.82
Total Resource Cost Test (TRC) No Adder	$0.1609	$31,581,260	$23,413,118	($8,168,142)	0.74
Utility Cost Test (UCT)	$0.0938	$18,415,710	$23,413,118	$4,997,409	1.27
Participant Cost Test (PCT)		$25,603,473	$32,326,206	$6,722,732	1.26
Rate Impact Test (RIM)		$38,303,992	$23,413,118	($14,890,874)	0.61
Lifecycle Revenue Impacts ($/kWh)					$0.0006884
Discounted Participant Payback (years)					15.84

Table 12: Home Energy Savings Including NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1609	$31,581,260	$32,304,751	$723,491	1.02
Total Resource Cost Test (TRC) No Adder	$0.1609	$31,581,260	$29,963,439	($1,617,821)	0.95
Utility Cost Test (UCT)	$0.0938	$18,415,710	$23,413,118	$4,997,409	1.27
Participant Cost Test (PCT)		$25,603,473	$32,748,688	$7,145,215	1.28
Rate Impact Test (RIM)		$38,303,992	$23,413,118	($14,890,874)	0.61
Lifecycle Revenue Impacts ($/kWh)					$0.0006884
Discounted Participant Payback (years)					15.54

Table 13: Home Energy Reports Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0695	$731,285	$1,359,752	$628,467	1.86
Total Resource Cost Test (TRC) No Adder	$0.0695	$731,285	$1,236,138	$504,853	1.69
Utility Cost Test (UCT)	$0.0695	$731,285	$1,236,138	$504,853	1.69
Participant Cost Test (PCT)		$0	$896,917	$896,917	n/a
Rate Impact Test (RIM)		$1,628,202	$1,236,138	($392,064)	0.76
Lifecycle Revenue Impacts ($/kWh)					$0.0001477
Discounted Participant Payback (years)					0.00

Table 14: Wattsmart Business Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0483	$23,884,963	$58,199,155	$34,314,192	2.44
Total Resource Cost Test (TRC) No Adder	$0.0483	$23,884,963	$52,908,323	$29,023,360	2.22
Utility Cost Test (UCT)	$0.0398	$19,682,223	$52,908,323	$33,226,100	2.69
Participant Cost Test (PCT)		$16,032,959	$55,868,368	$39,835,409	3.48
Rate Impact Test (RIM)		$63,720,372	$52,908,323	($10,812,049)	0.83
Lifecycle Revenue Impacts ($/kWh)					$0.0015948
Discounted Participant Payback (years)					2.73

Table 15: Wattsmart Business Including NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0483	$23,884,963	$73,650,426	$49,765,463	3.08
Total Resource Cost Test (TRC) No Adder	$0.0483	$23,884,963	$68,359,594	$44,474,631	2.86
Utility Cost Test (UCT)	$0.0398	$19,682,223	$52,908,323	$33,226,100	2.69
Participant Cost Test (PCT)		$16,032,959	$55,924,318	$39,891,360	3.49
Rate Impact Test (RIM)		$63,720,372	$52,908,323	($10,812,049)	0.83
Lifecycle Revenue Impacts ($/kWh)					$0.0015948
Discounted Participant Payback (years)					2.73

Table 16: NEEA Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0272	$1,668,706	$6,962,728	$5,294,022	4.17
Total Resource Cost Test (TRC) No Adder	$0.0272	$1,668,706	$6,329,753	$4,661,047	3.79
Utility Cost Test (UCT)	$0.0272	$1,668,706	$6,329,753	$4,661,047	3.79
Participant Cost Test (PCT)		$0	$5,806,018	$5,806,018	n/a
Rate Impact Test (RIM)		$7,474,724	$6,329,753	($1,144,971)	0.85
Lifecycle Revenue Impacts ($/kWh)					$0.0001626
Discounted Participant Payback (years)					0.00

Table 17: Home Energy Savings Non-Energy Impacts - PY2022 and PY2023

Measure	Annual Non-Energy Impacts per Measure	Annual Installs (Years)	Measure Life	Total Present Value NEIs
Single Family Ductless Heat Pump - eFAF to DHP 9.0 HSPF and above - WA	$18,960.00	2	15	$530,507
LEDs - General Purpose & Three-Way - 250 to 1049 Lumens - WA	$398.58	2	9	$6,904
LED - Direct install - Exterior - General Purpose and Three-Way - 250 to 1049 lumens - WA	$139.88	2	2	$2,224
Manufactured Home Ductless Heat Pump - eFAF to DHP 9.0 HSPF and above - WA	$366.00	2	15	$17,164
LEDs - Reflectors & Outdoor - 250 to 1049 Lumens - WA	$470.20	2	4	$7,887
LED - Direct install - High Use - General Purpose and Three-Way - 250 to 1049 lumens - WA	$125.92	2	2	$2,541
LED - Direct install - Exterior - Decorative and Mini-Base - 250 to 1049 lumens - WA	$86.23	2	2	$1,847
LED - Direct install - Exterior - Reflectors and Outdoor - 250 to 1049 lumens - WA	$119.55	2	1	$1,878
LED - Direct install - High Use - Decorative and Mini-Base - 250 to 1049 lumens - WA	$84.52	2	2	$1,497
LED - Direct install - High Use - Reflectors and Outdoor - 250 to 1049 lumens - WA	$106.32	2	2	$1,548
LED - Direct install - Moderate Use - General Purpose and Three-Way - 250 to 1049 lumens - WA	$90.88	2	4	$1,750
LED - Direct install - MR - 46 to 59W equivalent - WA	$93.33	2	3	$1,733
LED - Direct install - Moderate Use - Decorative and Mini-Base - 250 to 1049 lumens - WA	$69.57	2	3	$912
LEDs - Reflectors & Outdoor - 1050 to 1489 Lumens - WA	$163.11	1	1	$1,606
LED - Direct install - Moderate Use - Reflectors and Outdoor - 250 to 1049 lumens - WA	$85.50	2	4	$1,197
Clothes Washers - Front Load - Electric DHW & Electric Dryer - WA	$1,573.35	2	12	$32,642
Fixture - Ceiling & Wall Flush Mount - 2000 to 3999 Lumens - WA	$290.01	1	18	$4,440
Clothes Washers - Front Load - Electric DHW & Gas Dryer - WA	$209.78	2	12	$4,027
Clothes Washers - Front Load - Gas DHW & Electric Dryer - WA	$209.78	2	12	$3,779
Clothes Washers - Front Load - Any fuel type - WA	$104.89	2	12	$2,044

Table 18: Wattsmart Business Savings Non-Energy Impacts - PY2022 and PY2023

Measure	Annual Non-Energy Impacts per Measure	Total Installs	Measure Life	Total Present Value NEIs
Drain for wheel line, hand line, portable main line, pivot, or linear	$110.00	2	6	$1,472
Gasket for wheel line, hand line, or portable main line	$312.00	2	6	$5,175
Impact sprinkler, New or Rebuilt	$489.60	2	6	$5,634
Nozzle	$114.00	2	6	$2,810
Rotating sprinkler	$544.00	2	6	$6,260
Sprinkler Package - replace MESA	$1,848.00	2	6	$25,240
Wheel line leveler	$64.50	2	7	$889

MEMORANDUM

To: Don Jones, Jr. and Nancy Goddard, Pacific Power

From: Eli Morris and Andy Hudson, AEG

Date: September 14, 2021

Re: Washington Home Energy Savings Program Cost-Effectiveness Analysis – 2022-2023 Biennium

AEG estimated the cost-effectiveness of Pacific Power's Home Energy Savings Program in the state of Washington based on Program Year (PY) 2022 and PY2023 costs and savings estimates provided by Pacific Power.[1] The memo provides analysis inputs and results in the following tables:

[1] Consistent with Section 480-109-100 (10) (b) of the Washington Administrative Code, the Low-Income Weatherization program is excluded from this analysis.

Table 16: HVAC with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Table 17: Whole Home with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Table 18: Building Shell with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Table 19: Electronics with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Table 20: Lighting with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Table 21: Home Energy Savings Non-Energy Impacts - PY2022 and PY2023

The following assumptions were utilized in the analysis:

- Avoided Costs: derived from PacifiCorp's 2021 Integrated Resource Plan (IRP) Preferred Portfolio "P02-MM-CETA" converted into annual values using load shapes from the same IRP.
- Modeling Inputs: measure savings, costs, non-energy impacts (NEIs), measure lives, incentive levels, program delivery, and portfolio costs were based on estimates provided by PacifiCorp.
- Net-to-Gross (NTG): ratios are assumed to be 1.0, consistent with condition (8)(a) to Order 01 in Docket UE-152-072.
- Retail Rates: 2020 rates provided by PacifiCorp and escalated by inflation for future years.

The following tables summarize cost-effectiveness assumptions and results for the Washington Home Energy Savings Program. The cost-effectiveness analysis inputs are shown in Table 1 through Table 3 below:

Table 1: Cost-Effectiveness Analysis Inputs

Parameter	Value
Discount Rate	6.88%
Residential Line Loss	7.68%
Residential Energy Rate ($/kWh)	$0.0836
Inflation Rate[2]	2.16%
Net-to-Gross	100%
Realization Rate	100%

[2] Future rates determined using a 2.16% annual escalator.

Table 2: Annual Program Costs, Nominal - PY2022 and PY2023

Measure Category	Program Delivery	Utility Admin	Incentives	Total Utility Budget	Gross Customer Costs
Appliances	$10,208	$134	$19,900	$30,242	$17,537
Water Heating	$238,102	$3,119	$486,000	$727,221	$514,423
HVAC	$4,359,954	$57,137	$8,738,880	$13,155,971	$19,151,731
Whole Home	$261,082	$3,422	$382,002	$646,506	$582,688
Building Shell	$1,159,614	$15,199	$3,153,096	$4,327,909	$6,119,146
Electronics	$2,341	$31	$6,000	$8,371	$17,367
Lighting	$68,698	$900	$76,089	$145,688	$64,233
Total Program	**$6,100,000**	**$79,942**	**$12,861,967**	**$19,041,909**	**$26,467,125**

Table 3: Annual Savings - PY2022 and 2023

Measure Category	Gross kWh Savings at Site	Net kWh Savings at Site	Gross kWh Savings at Generator	Net kWh Savings at Generator	Measure Life
Appliances	33,144	33,144	35,688	35,688	12
Water Heating	774,234	774,234	833,664	833,664	13
HVAC	14,162,640	13,312,882	15,249,764	14,334,778	17
Whole Home	847,688	729,012	912,757	784,971	25
Building Shell	3,765,202	3,125,118	4,054,219	3,365,002	45
Electronics	7,600	7,600	8,183	8,183	5
Lighting	223,085	176,237	240,208	189,765	4
Total Program	**19,813,593**	**18,158,226**	**21,334,484**	**19,552,051**	**23**

Table 4 presents the cost-effectiveness results by measure category and the total program with and without non-energy impacts (NEIs). Including NEIs, the program is cost-effective from the PacifiCorp TRC, UCT, and PCT perspectives.

Table 4: Benefit/Cost Ratios by Measure Category - PY2022 and PY2023

Measure Category	PTRC	TRC	UCT	PCT	RIM
Appliances	1.13	1.03	0.95	2.65	0.51
Appliances (with NEIs)	2.74	2.63	0.95	4.69	0.51
Water Heating	0.97	0.89	0.92	2.22	0.48
Water Heating (with NEIs)	1.26	1.17	0.92	2.22	0.48
HVAC	0.73	0.66	1.19	1.17	0.58
HVAC (with NEIs)	0.93	0.86	1.19	1.19	0.58
Whole Home	1.41	1.28	1.67	2.24	0.69
Whole Home (with NEIs)	1.73	1.61	1.67	2.24	0.69
Building Shell	1.02	0.92	1.56	1.36	0.71
Building Shell (with NEIs)	1.21	1.12	1.56	1.36	0.71
Electronics	0.20	0.18	0.43	0.51	0.32
Electronics (with NEIs)	0.25	0.23	0.43	0.51	0.32
Lighting	0.63	0.57	0.53	2.14	0.37
Lighting (with NEIs)	0.95	0.90	0.53	2.48	0.37
Total Program	**0.82**	**0.74**	**1.27**	**1.26**	**0.61**
Total Program (with NEIs)	**1.02**	**0.95**	**1.27**	**1.28**	**0.61**

Tables 5 through 12 present detailed cost-effectiveness results for the total program and for each measure category, excluding NEIs.

Table 5: Home Energy Savings Program Cost-Effectiveness Results - PY2022 and PY2023[3]

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1609	$31,581,260	$25,754,430	($5,826,830)	0.82
Total Resource Cost Test (TRC) No Adder	$0.1609	$31,581,260	$23,413,118	($8,168,142)	0.74
Utility Cost Test (UCT)	$0.0938	$18,415,710	$23,413,118	$4,997,409	1.27
Participant Cost Test (PCT)		$25,603,473	$32,326,206	$6,722,732	1.26
Rate Impact Test (RIM)		$38,303,992	$23,413,118	($14,890,874)	0.61
Lifecycle Revenue Impacts ($/kWh)					$0.0006884
Discounted Participant Payback (years)					15.84

[3] Note that the values in the table have been discounted to 2022 dollars. Therefore, the program and administrative costs are slightly lower than shown in Table 2.

Table 6: Appliances Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0985	$26,986	$30,576	$3,589	1.13
Total Resource Cost Test (TRC) No Adder	$0.0985	$26,986	$27,796	$810	1.03
Utility Cost Test (UCT)	$0.1068	$29,273	$27,796	($1,477)	0.95
Participant Cost Test (PCT)		$16,973	$44,926	$27,953	2.65
Rate Impact Test (RIM)		$54,939	$27,796	($27,143)	0.51
Lifecycle Revenue Impacts ($/kWh)					$0.0000016
Discounted Participant Payback (years)					4.53

Table 7: Water Heating Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1085	$728,725	$709,478	($19,247)	0.97
Total Resource Cost Test (TRC) No Adder	$0.1085	$728,725	$644,980	($83,745)	0.89
Utility Cost Test (UCT)	$0.1045	$701,318	$644,980	($56,339)	0.92
Participant Cost Test (PCT)		$496,026	$1,103,364	$607,337	2.22
Rate Impact Test (RIM)		$1,336,062	$644,980	($691,083)	0.48
Lifecycle Revenue Impacts ($/kWh)					$0.0000362
Discounted Participant Payback (years)					5.84

Table 8: HVAC Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1685	$22,797,776	$16,608,377	($6,189,400)	0.73
Total Resource Cost Test (TRC) No Adder	$0.1685	$22,797,776	$15,098,524	($7,699,252)	0.66
Utility Cost Test (UCT)	$0.0940	$12,721,580	$15,098,524	$2,376,944	1.19
Participant Cost Test (PCT)		$18,525,876	$21,705,471	$3,179,594	1.17
Rate Impact Test (RIM)		$25,977,370	$15,098,524	($10,878,846)	0.58
Lifecycle Revenue Impacts ($/kWh)					$0.0005652
Discounted Participant Payback (years)					14.63

Table 9: Whole Home Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0948	$820,040	$1,152,342	$332,302	1.41
Total Resource Cost Test (TRC) No Adder	$0.0948	$820,040	$1,047,583	$227,543	1.28
Utility Cost Test (UCT)	$0.0724	$625,813	$1,047,583	$421,770	1.67
Participant Cost Test (PCT)		$563,934	$1,260,952	$697,018	2.24
Rate Impact Test (RIM)		$1,517,058	$1,047,583	($469,475)	0.69
Lifecycle Revenue Impacts ($/kWh)					$0.0000273
Discounted Participant Payback (years)					11.65

Table 10: Building Shell Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1583	$7,059,141	$7,167,976	$108,836	1.02
Total Resource Cost Test (TRC) No Adder	$0.1583	$7,059,141	$6,516,342	($542,799)	0.92
Utility Cost Test (UCT)	$0.0939	$4,188,628	$6,516,342	$2,327,714	1.56
Participant Cost Test (PCT)		$5,921,733	$8,069,801	$2,148,068	1.36
Rate Impact Test (RIM)		$9,207,208	$6,516,342	($2,690,866)	0.71
Lifecycle Revenue Impacts ($/kWh)					$0.0001655
Discounted Participant Payback (years)					32.90

Table 11: Electronics Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.5908	$19,104	$3,794	($15,310)	0.20
Total Resource Cost Test (TRC) No Adder	$0.5908	$19,104	$3,449	($15,655)	0.18
Utility Cost Test (UCT)	$0.2506	$8,103	$3,449	($4,654)	0.43
Participant Cost Test (PCT)		$16,808	$8,651	($8,157)	0.51
Rate Impact Test (RIM)		$10,947	$3,449	($7,498)	0.32
Lifecycle Revenue Impacts ($/kWh)					$0.0000005
Discounted Participant Payback (years)					9.71

Table 12: Lighting Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1948	$129,488	$81,889	($47,599)	0.63
Total Resource Cost Test (TRC) No Adder	$0.1948	$129,488	$74,444	($55,043)	0.57
Utility Cost Test (UCT)	$0.2121	$140,994	$74,444	($66,550)	0.53
Participant Cost Test (PCT)		$62,123	$133,042	$70,919	2.14
Rate Impact Test (RIM)		$200,407	$74,444	($125,962)	0.37
Lifecycle Revenue Impacts ($/kWh)					$0.0000046
Discounted Participant Payback (years)					1.99

In addition to the energy benefits reported above, the Home Energy Savings Program measures offer significant non-energy impacts (NEIs). Tables 13 through 20 present detailed cost-effectiveness results for the total program and each measure category with the inclusion of NEIs. Table 21 details the non-energy impacts included in this analysis.

Table 13: Home Energy Savings Program with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1609	$31,581,260	$32,304,751	$723,491	1.02
Total Resource Cost Test (TRC) No Adder	$0.1609	$31,581,260	$29,963,439	($1,617,821)	0.95
Utility Cost Test (UCT)	$0.0938	$18,415,710	$23,413,118	$4,997,409	1.27
Participant Cost Test (PCT)		$25,603,473	$32,748,688	$7,145,215	1.28
Rate Impact Test (RIM)		$38,303,992	$23,413,118	($14,890,874)	0.61
Lifecycle Revenue Impacts ($/kWh)					$0.0006884
Discounted Participant Payback (years)					15.54

Table 14: Appliances with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0985	$26,986	$73,826	$46,839	2.74
Total Resource Cost Test (TRC) No Adder	$0.0985	$26,986	$71,046	$44,060	2.63
Utility Cost Test (UCT)	$0.1068	$29,273	$27,796	($1,477)	0.95
Participant Cost Test (PCT)		$16,973	$79,618	$62,645	4.69
Rate Impact Test (RIM)		$54,939	$27,796	($27,143)	0.51
Lifecycle Revenue Impacts ($/kWh)					$0.0000016
Discounted Participant Payback (years)					2.56

Table 15: Water Heating with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1085	$728,725	$919,137	$190,411	1.26
Total Resource Cost Test (TRC) No Adder	$0.1085	$728,725	$854,639	$125,914	1.17
Utility Cost Test (UCT)	$0.1045	$701,318	$644,980	($56,339)	0.92
Participant Cost Test (PCT)		$496,026	$1,103,364	$607,337	2.22
Rate Impact Test (RIM)		$1,336,062	$644,980	($691,083)	0.48
Lifecycle Revenue Impacts ($/kWh)					$0.0000362
Discounted Participant Payback (years)					5.84

Table 16: HVAC with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1685	$22,797,776	$21,200,481	($1,597,295)	0.93
Total Resource Cost Test (TRC) No Adder	$0.1685	$22,797,776	$19,690,628	($3,107,148)	0.86
Utility Cost Test (UCT)	$0.0940	$12,721,580	$15,098,524	$2,376,944	1.19
Participant Cost Test (PCT)		$18,525,876	$22,072,396	$3,546,520	1.19
Rate Impact Test (RIM)		$25,977,370	$15,098,524	($10,878,846)	0.58
Lifecycle Revenue Impacts ($/kWh)					$0.0005652
Discounted Participant Payback (years)					14.35

Table 17: Whole Home with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0948	$820,040	$1,422,371	$602,331	1.73
Total Resource Cost Test (TRC) No Adder	$0.0948	$820,040	$1,317,613	$497,573	1.61
Utility Cost Test (UCT)	$0.0724	$625,813	$1,047,583	$421,770	1.67
Participant Cost Test (PCT)		$563,934	$1,260,952	$697,018	2.24
Rate Impact Test (RIM)		$1,517,058	$1,047,583	($469,475)	0.69
Lifecycle Revenue Impacts ($/kWh)					$0.0000273
Discounted Participant Payback (years)					11.65

Table 18: Building Shell with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1583	$7,059,141	$8,560,624	$1,501,483	1.21
Total Resource Cost Test (TRC) No Adder	$0.1583	$7,059,141	$7,908,990	$849,849	1.12
Utility Cost Test (UCT)	$0.0939	$4,188,628	$6,516,342	$2,327,714	1.56
Participant Cost Test (PCT)		$5,921,733	$8,069,801	$2,148,068	1.36
Rate Impact Test (RIM)		$9,207,208	$6,516,342	($2,690,866)	0.71
Lifecycle Revenue Impacts ($/kWh)					$0.0001655
Discounted Participant Payback (years)					32.90

Table 19: Electronics with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.5908	$19,104	$4,804	($14,301)	0.25
Total Resource Cost Test (TRC) No Adder	$0.5908	$19,104	$4,459	($14,645)	0.23
Utility Cost Test (UCT)	$0.2506	$8,103	$3,449	($4,654)	0.43
Participant Cost Test (PCT)		$16,808	$8,651	($8,157)	0.51
Rate Impact Test (RIM)		$10,947	$3,449	($7,498)	0.32
Lifecycle Revenue Impacts ($/kWh)					$0.0000005
Discounted Participant Payback (years)					9.71

Table 20: Lighting with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1948	$129,488	$123,509	($5,978)	0.95
Total Resource Cost Test (TRC) No Adder	$0.1948	$129,488	$116,065	($13,423)	0.90
Utility Cost Test (UCT)	$0.2121	$140,994	$74,444	($66,550)	0.53
Participant Cost Test (PCT)		$62,123	$153,907	$91,784	2.48
Rate Impact Test (RIM)		$200,407	$74,444	($125,962)	0.37
Lifecycle Revenue Impacts ($/kWh)					$0.0000046
Discounted Participant Payback (years)					1.77

Table 21: Home Energy Savings Non-Energy Impacts - PY2022 and PY2023

Measure	Annual Non-Energy Impacts per Measure	Annual Installs (Years)	Measure Life	Total Present Value NEIs
Single Family Ductless Heat Pump - eFAF to DHP 9.0 HSPF and above - WA	$18,960.00	2	15	$530,507
LEDs - General Purpose & Three-Way - 250 to 1049 Lumens - WA	$398.58	2	9	$6,904
LED - Direct install - Exterior - General Purpose and Three-Way - 250 to 1049 lumens - WA	$139.88	2	2	$2,224
Manufactured Home Ductless Heat Pump - eFAF to DHP 9.0 HSPF and above - WA	$366.00	2	15	$17,164
LEDs - Reflectors & Outdoor - 250 to 1049 Lumens - WA	$470.20	2	4	$7,887
LED - Direct install - High Use - General Purpose and Three-Way - 250 to 1049 lumens - WA	$125.92	2	2	$2,541
LED - Direct install - Exterior - Decorative and Mini-Base - 250 to 1049 lumens - WA	$86.23	2	2	$1,847
LED - Direct install - Exterior - Reflectors and Outdoor - 250 to 1049 lumens - WA	$119.55	2	1	$1,878
LED - Direct install - High Use - Decorative and Mini-Base - 250 to 1049 lumens - WA	$84.52	2	2	$1,497
LED - Direct install - High Use - Reflectors and Outdoor - 250 to 1049 lumens - WA	$106.32	2	2	$1,548
LED - Direct install - Moderate Use - General Purpose and Three-Way - 250 to 1049 lumens - WA	$90.88	2	4	$1,750
LED - Direct install - MR - 46 to 59W equivalent - WA	$93.33	2	3	$1,733
LED - Direct install - Moderate Use - Decorative and Mini-Base - 250 to 1049 lumens - WA	$69.57	2	3	$912
LEDs - Reflectors & Outdoor - 1050 to 1489 Lumens - WA	$163.11	1	1	$1,606

Measure	Annual Non-Energy Impacts per Measure	Annual Installs (Years)	Measure Life	Total Present Value NEIs
LED - Direct install - Moderate Use - Reflectors and Outdoor - 250 to 1049 lumens - WA	$85.50	2	4	$1,197
Clothes Washers - Front Load - Electric DHW & Electric Dryer - WA	$1,573.35	2	12	$32,642
Fixture - Ceiling & Wall Flush Mount - 2000 to 3999 Lumens - WA	$290.01	1	18	$4,440
Clothes Washers - Front Load - Electric DHW & Gas Dryer - WA	$209.78	2	12	$4,027
Clothes Washers - Front Load - Gas DHW & Electric Dryer - WA	$209.78	2	12	$3,779
Clothes Washers - Front Load - Any fuel type - WA	$104.89	2	12	$2,044

MEMORANDUM

To: Don Jones, Jr. and Nancy Goddard, Pacific Power

From: Eli Morris and Andy Hudson, AEG

Date: September 14, 2021

Re: Washington Home Energy Report Program Cost-Effectiveness Analysis – 2022-2023 Biennium

AEG estimated the cost-effectiveness of Pacific Power's Home Energy Report Program in the state of Washington based on Program Year (PY) 2022 and PY2023 costs and savings estimates provided by Pacific Power.[1] The memo provides analysis inputs and results in the following tables:

The Home Energy Report Program will be implemented in PY2022 and PY2023, with savings persisting into PY2022. The program was analyzed jointly for the PY2022 and PY2023 period. The following assumptions were utilized in the analysis:

- Avoided Costs: derived from PacifiCorp's 2021 Integrated Resource Plan (IRP) Preferred Portfolio "P02-MM-CETA" converted into annual values using load shapes from the same IRP.
- Modeling Inputs: measure savings, costs, non-energy impacts (NEIs), measure lives, incentive levels, program delivery, and portfolio costs were based on estimates provided by PacifiCorp.
- Net-to-Gross (NTG): ratios are assumed to be 1.0, consistent with condition (8)(a) to Order 01 in Docket UE-152-072.
- Retail Rates: 2020 rates provided by PacifiCorp and escalated by inflation for future years.

[1] Consistent with Section 480-109-100 (10) (b) of the Washington Administrative Code, the Low-Income Weatherization program is excluded from this analysis.

Tables 1 through 3 below summarize cost-effectiveness assumptions for the Washington Home Energy Report program.

Table 1: Cost-Effectiveness Analysis Inputs

Parameter	Value
Discount Rate	6.88%
Residential Line Loss	7.68%
Residential Energy Rate ($/kWh)	$0.0836
Inflation Rate[2]	2.16%
Measure Life	2
NTG	100%
Realization Rate	100%

Table 2: Annual Program Costs, Nominal - PY2022 and 2023

Program Year	Program Delivery	Utility Admin	Incentives	Total Utility Budget
2022	$360,860	$11,570	$0	$372,430
2023	$371,686	$11,859	$0	$383,545
2024	$0	$0	$0	$0

Table 3: Annual Savings - PY2022 and 2023

Program Year	Gross kWh Savings at Site	Net kWh Savings at Site	Gross kWh Savings at Generator	Net kWh Savings at Generator
2022	4,099,518	4,099,518	4,414,197	4,414,197
2023	3,930,437	3,930,437	4,232,137	4,232,137
2024	3,144,349	3,144,349	3,385,709	3,385,709

Table 4 presents the cost-effectiveness results. The program is cost-effective for the UCT, PCT, PacifiCorp TRC, and TRC tests. Costs and benefits are identical in the TRC and UCT tests because there is no customer cost to participate in the program.

[2] Future rates determined using a 2.16% annual escalator.

Table 4: Home Energy Reports Cost-Effectiveness Results - PY2022 and 2023 [3]

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0695	$731,285	$1,688,547	$957,262	2.31
Total Resource Cost Test (TRC) No Adder	$0.0695	$731,285	$1,564,933	$833,648	2.14
Utility Cost Test (UCT)	$0.0695	$731,285	$1,236,138	$504,853	1.69
Participant Cost Test (PCT)		$0	$896,917	$896,917	n/a
Rate Impact Test (RIM)		$1,628,202	$1,236,138	($392,064)	0.76
Lifecycle Revenue Impacts ($/kWh)					$0.0001477
Discounted Participant Payback (years)					0.00

[3] Note that the values in the table have been discounted to 2022 dollars. Therefore, the program and administrative costs are slightly lower than shown in Table 2.

MEMORANDUM

To: Don Jones, Jr. and Nancy Goddard, Pacific Power

From: Eli Morris and Andy Hudson, AEG

Date: September 14, 2021

Re: Washington Wattsmart Business Program Cost-Effectiveness Analysis – 2022-2023 Biennium

AEG estimated the cost-effectiveness of Pacific Power's Wattsmart Business Program in the state of Washington based on Program Year (PY) 2022 and PY2023 costs and savings estimates provided by Pacific Power. The memo provides analysis inputs and results in the following tables:

Table 38: Project Manager / Trade Ally – Rotating sprinkler with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Table 39: Project Manager / Trade Ally – Sprinkler Package - replace MESA with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Table 40: Project Manager / Trade Ally – Wheel line leveler with NEIs Cost-Effectiveness Results - PY2022 and PY2023

The following assumptions were utilized in the analysis:

- Avoided Costs: derived from PacifiCorp's 2021 Integrated Resource Plan (IRP) Preferred Portfolio "P02-MM-CETA", converted into annual values using load shapes from the same IRP.
- Modeling Inputs: measure savings, costs, non-energy impacts (NEIs), measure lives, incentive levels, program delivery, and portfolio costs were based on estimates provided by PacifiCorp.
- Net-to-Gross (NTG): ratios are assumed to be 1.0, consistent with condition (8)(a) to Order 01 in Docket UE-152-072.
- Retail Rates: 2020 rates provided by PacifiCorp and escalated by inflation for future years.

The following tables summarize cost-effectiveness assumptions and results for the Washington Wattsmart Business Program. The cost-effectiveness analysis inputs are shown in Table 1 through Table 3 below:

Table 1: Cost-Effectiveness Analysis Inputs

Parameter	Value
Discount Rate	6.88%
Commercial Line Loss	7.60%
Industrial Line Loss	6.82%
Irrigation Line Loss	7.68%
Commercial Energy Rate ($/kWh)	$0.0717
Industrial Energy Rate ($/kWh)	$0.0887
Irrigation Energy Rate ($/kWh)	$0.1327
Inflation Rate[1]	2.16%

[1] Future rates determined using a 2.16% annual escalator.

Table 2: Annual Program Costs, Nominal - PY2022 and PY2023

Delivery Channel	Measure Category	Program Delivery	Utility Admin	Vendor Incentive Pilot	Incentives	Total Utility Budget	Gross Customer Costs
Midstream	Lighting	$117,144	$18,513	$0	$188,460	$324,117	$165,955
Project Manager / Trade Ally	Adaptive Refrigeration Control	$145,035	$18,694	$0	$169,581	$333,310	$340,808
Project Manager / Trade Ally	Additional Measures	$161,717	$40,468	$0	$451,814	$653,999	$936,000
Project Manager / Trade Ally	Energy Management	$656,322	$147,068	$0	$231,100	$1,034,490	$254,210
Project Manager / Trade Ally	Fast Acting Doors	$125,511	$16,177	$0	$203,197	$344,885	$355,950
Project Manager / Trade Ally	HVAC	$740,430	$41,040	$60,000	$538,016	$1,379,486	$986,600
Project Manager / Trade Ally	Motors	$298,605	$71,836	$0	$798,896	$1,169,337	$1,287,000
Project Manager / Trade Ally	Refrigeration	$366,151	$91,625	$0	$799,200	$1,256,976	$1,008,000
Project Manager / Trade Ally	Wastewater	$41,192	$10,308	$0	$129,470	$180,970	$259,200
Project Manager / Trade Ally	Lighting	$2,132,046	$389,569	$200,000	$4,223,322	$6,944,938	$5,673,177
Project Manager / Trade Ally	NEXANT PF NON-LIGHTING PROJECTS	$28,405	$1,586	$0	$24,000	$53,991	$50,000
Project Manager / Trade Ally	Building Shell	$12,241	$1,591	$0	$46,000	$59,831	$140,000
Project Manager / Trade Ally	Food Service Equipment	$4,896	$636	$0	$2,400	$7,933	$3,600
Small Business	Lighting	$724,241	$95,442	$120,000	$2,400,000	$3,339,683	$1,540,000
Project Manager / Trade Ally	Compressed Air	$401,434	$86,916	$0	$975,424	$1,463,774	$1,437,920
Project Manager / Trade Ally	Custom Capital Projects	$395,535	$53,329	$0	$699,899	$1,148,764	$1,261,080
Project Manager / Trade Ally	Farm & Dairy	$50,204	$6,471	$0	$40,639	$97,314	$73,224

Project Manager / Trade Ally	Drain for wheel line, hand line, portable main line, pivot, or linear	$340	$44	$0	$400	$784	$1,372
Project Manager / Trade Ally	Gasket for wheel line, hand line, or portable main line	$1,856	$239	$0	$1,600	$3,695	$3,816
Project Manager / Trade Ally	Impact sprinkler, New or Rebuilt	$121	$15	$0	$180	$316	$6,174
Project Manager / Trade Ally	Irrigation Pump Upgrades, Custom	$61,361	$7,909	$0	$99,341	$168,610	$228,712
Project Manager / Trade Ally	Irrigation Pump VFD	$128,299	$16,537	$0	$184,633	$329,469	$436,632
Project Manager / Trade Ally	Nozzle	$1,496	$193	$0	$600	$2,288	$1,364
Project Manager / Trade Ally	Rotating sprinkler	$133	$17	$0	$200	$350	$6,860
Project Manager / Trade Ally	Sprinkler Package - replace MESA	$3,576	$461	$0	$3,360	$7,397	$23,537
Project Manager / Trade Ally	Upgrade sprinkler package - high pressure to MESA	$17,055	$2,198	$0	$15,260	$34,513	$85,343
Project Manager / Trade Ally	Wheel line leveler	$63	$8	$0	$100	$171	$881
Total Program		**$6,615,408**	**$1,118,891**	**$380,000**	**$12,227,093**	**$20,341,392**	**$16,567,416**

Table 3: Annual Savings - PY2022 and PY2023

Delivery Channel	Measure Category	Gross kWh Savings at Site	Realization Rate	Adjusted Gross kWh Savings at Site	Net to Gross Ratio	Net kWh Savings at Site	Measure Life
Midstream	Lighting	1,163,679	99%	1,150,879	100%	1,150,879	8
Project Manager / Trade Ally	Adaptive Refrigeration Control	1,175,200	99%	1,164,623	100%	1,164,623	12
Project Manager / Trade Ally	Additional Measures	2,544,000	99%	2,516,016	100%	2,516,016	15
Project Manager / Trade Ally	Energy Management	9,244,000	100%	9,234,756	100%	9,234,756	3
Project Manager / Trade Ally	Fast Acting Doors	1,017,000	99%	1,007,847	100%	1,007,847	8
Project Manager / Trade Ally	HVAC	2,580,000	100%	2,580,000	100%	2,580,000	11
Project Manager / Trade Ally	Motors	4,516,000	100%	4,504,240	100%	4,504,240	15
Project Manager / Trade Ally	Refrigeration	5,760,000	99%	5,708,160	100%	5,708,160	14
Project Manager / Trade Ally	Wastewater	648,000	100%	648,000	100%	648,000	15
Project Manager / Trade Ally	Lighting	24,489,901	99%	24,220,513	100%	24,220,513	8
Project Manager / Trade Ally	NEXANT PF NON-LIGHTING PROJECTS	100,000	99%	98,900	100%	98,900	10
Project Manager / Trade Ally	Building Shell	100,000	100%	100,000	100%	100,000	15
Project Manager / Trade Ally	Food Service Equipment	40,000	100%	40,000	100%	40,000	12
Small Business	Lighting	6,000,000	99%	5,934,000	100%	5,934,000	9
Project Manager / Trade Ally	Compressed Air	5,464,000	95%	5,179,872	100%	5,179,872	13
Project Manager / Trade Ally	Custom Capital Projects	3,353,000	99%	3,316,117	100%	3,316,117	15
Project Manager / Trade Ally	Farm & Dairy	406,800	99%	402,325	100%	402,325	11

Project Manager / Trade Ally	Drain for wheel line, hand line, portable main line, pivot, or linear	2,760	90%	2,478	100%	2,478	6
Project Manager / Trade Ally	Gasket for wheel line, hand line, or portable main line	15,040	90%	13,506	100%	13,506	6
Project Manager / Trade Ally	Impact sprinkler, New or Rebuilt	972	90%	873	100%	873	6
Project Manager / Trade Ally	Irrigation Pump Upgrades, Custom	497,200	90%	446,486	100%	446,486	15
Project Manager / Trade Ally	Irrigation Pump VFD	1,039,600	90%	933,561	100%	933,561	10
Project Manager / Trade Ally	Nozzle	12,120	90%	10,884	100%	10,884	6
Project Manager / Trade Ally	Rotating sprinkler	1,080	90%	970	100%	970	6
Project Manager / Trade Ally	Sprinkler Package - replace MESA	28,980	90%	26,024	100%	26,024	6
Project Manager / Trade Ally	Upgrade sprinkler package - high pressure to MESA	138,196	90%	124,100	100%	124,100	10
Project Manager / Trade Ally	Wheel line leveler	510	90%	458	100%	458	7
Total Program		**70,338,038**	**99%**	**69,365,587**	**100%**	**69,365,587**	**10**

Table 4 presents the cost-effectiveness results by delivery channel, measure category and the total program. Table 5 presents the Wattsmart Business Program cost-effectiveness; the program is cost-effective for the PacifiCorp TRC, TRC, UCT and PCT.

Table 4: Benefit/Cost Ratios by Delivery Channel and Measure Category - PY2022 and PY2023

Delivery Channel	Measure Category	PTRC	TRC	UCT	PCT	RIM
Project Manager / Trade Ally	Adaptive Refrigeration Control	2.31	2.10	3.18	2.84	0.94
Project Manager / Trade Ally	Additional Measures	2.43	2.21	3.84	2.96	0.84
Project Manager / Trade Ally	Energy Management	4.75	4.32	4.41	9.05	1.47
Project Manager / Trade Ally	Fast Acting Doors	1.53	1.39	2.01	1.98	0.82
Project Manager / Trade Ally	HVAC	1.75	1.59	2.11	2.26	0.95
Project Manager / Trade Ally	Motors	2.94	2.67	3.79	3.92	0.82
Project Manager / Trade Ally	Refrigeration	4.32	3.93	4.58	5.40	0.98
Project Manager / Trade Ally	Wastewater	2.29	2.08	3.57	2.52	0.92
Project Manager / Trade Ally	Lighting	2.19	1.99	2.41	3.25	0.79
Project Manager / Trade Ally	NEXANT PF NON-LIGHTING PROJECTS	1.06	0.96	1.43	1.65	0.69
Project Manager / Trade Ally	Building Shell	0.96	0.87	2.24	0.91	0.95
Project Manager / Trade Ally	Food Service Equipment	4.33	3.94	4.53	8.29	1.02
Small Business	Lighting	1.95	1.77	1.32	3.86	0.64
Project Manager / Trade Ally	Compressed Air	2.68	2.44	3.21	3.92	0.77
Project Manager / Trade Ally	Custom Capital Projects	2.13	1.94	2.89	3.18	0.74
Project Manager / Trade Ally	Farm & Dairy	2.76	2.51	3.35	4.92	0.78
Project Manager / Trade Ally	Irrigation Pump Upgrades, Custom	2.06	1.88	3.32	3.35	0.67
Project Manager / Trade Ally	Irrigation Pump VFD	1.68	1.53	2.70	2.78	0.65
Project Manager / Trade Ally	Upgrade sprinkler package - high pressure to MESA	1.24	1.13	3.43	1.78	0.69
Midstream	Lighting	2.89	2.63	2.46	4.92	0.83
Midstream	Lighting (with NEIs)	3.78	3.52	2.46	5.02	0.83
Project Manager / Trade Ally	Drain for wheel line, hand line, portable main line, pivot, or linear	1.02	0.93	2.08	1.59	0.64
Project Manager / Trade Ally	Drain for wheel line, hand line, portable main line, pivot, or linear (with NEIs)	1.89	1.80	2.08	2.41	0.64
Project Manager / Trade Ally	Gasket for wheel line, hand line, or portable main line	1.66	1.51	2.41	2.97	0.66
Project Manager / Trade Ally	Gasket for wheel line, hand line, or portable main line (with NEIs)	2.56	2.41	2.41	3.81	0.66
Project Manager / Trade Ally	Impact sprinkler, New or Rebuilt	0.11	0.10	2.03	0.15	0.62
Project Manager / Trade Ally	Impact sprinkler, New or Rebuilt (with NEIs)	1.03	1.02	2.03	1.06	0.62
Project Manager / Trade Ally	Nozzle	2.59	2.35	3.13	6.19	0.71
Project Manager / Trade Ally	Nozzle (with NEIs)	3.54	3.30	3.13	7.04	0.71
Project Manager / Trade Ally	Rotating sprinkler	0.11	0.10	2.04	0.15	0.62
Project Manager / Trade Ally	Rotating sprinkler (with NEIs)	1.03	1.02	2.04	1.06	0.62

Project Manager / Trade Ally	Sprinkler Package - replace MESA	0.76	0.69	2.59	1.05	0.66
Project Manager / Trade Ally	Sprinkler Package - replace MESA (with NEIs)	1.71	1.64	2.59	1.96	0.66
Project Manager / Trade Ally	Wheel line leveler	0.43	0.39	2.18	0.59	0.63
Project Manager / Trade Ally	Wheel line leveler (with NEIs)	1.39	1.36	2.18	1.53	0.63
Total Program		**2.44**	**2.22**	**2.69**	**3.48**	**0.83**
Total Program (with NEIs)		**3.08**	**2.86**	**2.69**	**3.49**	**0.83**

Table 5: Wattsmart Business Program Cost-Effectiveness Results - PY2022 and PY2023[2]

Delivery Channel	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0483	$23,884,963	$58,199,155	$34,314,192	2.44
Total Resource Cost Test (TRC) No Adder	$0.0483	$23,884,963	$52,908,323	$29,023,360	2.22
Utility Cost Test (UCT)	$0.0398	$19,682,223	$52,908,323	$33,226,100	2.69
Participant Cost Test (PCT)		$16,032,959	$55,868,368	$39,835,409	3.48
Rate Impact Test (RIM)		$63,720,372	$52,908,323	($10,812,049)	0.83
Lifecycle Revenue Impacts ($/kWh)					$0.0015948
Discounted Participant Payback (years)					2.73

Table 6 presents the PY2022 and PY2023 cost-effectiveness results for the Small Business Lighting delivery options.

Table 6: Small Business - Lighting Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0554	$2,399,866	$4,677,392	$2,277,526	1.95
Total Resource Cost Test (TRC) No Adder	$0.0554	$2,399,866	$4,252,174	$1,852,308	1.77
Utility Cost Test (UCT)	$0.0746	$3,232,186	$4,252,174	$1,019,988	1.32
Participant Cost Test (PCT)		$1,490,434	$5,746,093	$4,255,659	3.86
Rate Impact Test (RIM)		$6,655,525	$4,252,174	($2,403,351)	0.64
Lifecycle Revenue Impacts ($/kWh)					$0.0002105
Discounted Participant Payback (years)					2.40

[2] Note that the values in the table have been discounted to 2020 dollars. Therefore, the program and administrative costs are slightly lower than shown in Table 2.

Table 7 presents the PY2022 and PY2023 cost-effectiveness results for the Midstream Lighting delivery options.

Table 7: Midstream – Lighting Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0375	$291,865	$843,455	$551,590	2.89
Total Resource Cost Test (TRC) No Adder	$0.0375	$291,865	$766,778	$474,913	2.63
Utility Cost Test (UCT)	$0.0400	$311,077	$766,778	$455,701	2.46
Participant Cost Test (PCT)		$160,607	$789,455	$628,847	4.92
Rate Impact Test (RIM)		$920,712	$766,778	($153,934)	0.83
Lifecycle Revenue Impacts ($/kWh)					$0.0000311
Discounted Participant Payback (years)					1.72

Table 8 through Table 32 presents the PY2022 and PY2023 cost-effectiveness results for the Project Manager / Trade Ally delivery options without NEIs.

Table 8: Project Manager / Trade Ally –Adaptive Refrigeration Control Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0507	$488,251	$1,129,075	$640,823	2.31
Total Resource Cost Test (TRC) No Adder	$0.0507	$488,251	$1,026,431	$538,180	2.10
Utility Cost Test (UCT)	$0.0335	$322,536	$1,026,431	$703,896	3.18
Participant Cost Test (PCT)		$329,839	$937,611	$607,772	2.84
Rate Impact Test (RIM)		$1,096,023	$1,026,431	($69,592)	0.94
Lifecycle Revenue Impacts ($/kWh)					$0.0000311
Discounted Participant Payback (years)					4.22

Table 9: Project Manager / Trade Ally – Additional Measures Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0461	$1,101,496	$2,673,865	$1,572,369	2.43
Total Resource Cost Test (TRC) No Adder	$0.0461	$1,101,496	$2,430,786	$1,329,291	2.21
Utility Cost Test (UCT)	$0.0265	$632,894	$2,430,786	$1,797,892	3.84
Participant Cost Test (PCT)		$905,874	$2,683,836	$1,777,962	2.96
Rate Impact Test (RIM)		$2,879,457	$2,430,786	($448,671)	0.84
Lifecycle Revenue Impacts ($/kWh)					$0.0000721
Discounted Participant Payback (years)					5.06

Table 10: Project Manager / Trade Ally – Energy Management Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0408	$1,022,794	$4,857,723	$3,834,929	4.75
Total Resource Cost Test (TRC) No Adder	$0.0408	$1,022,794	$4,416,112	$3,393,318	4.32
Utility Cost Test (UCT)	$0.0399	$1,000,466	$4,416,112	$3,415,646	4.41
Participant Cost Test (PCT)		$245,614	$2,221,997	$1,976,383	9.05
Rate Impact Test (RIM)		$2,999,177	$4,416,112	$1,416,935	1.47
Lifecycle Revenue Impacts ($/kWh)					$0.0002109
Discounted Participant Payback (years)					0.33

Table 11: Project Manager / Trade Ally – Fast Acting Doors Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0770	$481,581	$738,213	$256,632	1.53
Total Resource Cost Test (TRC) No Adder	$0.0770	$481,581	$671,103	$189,521	1.39
Utility Cost Test (UCT)	$0.0534	$333,744	$671,103	$337,358	2.01
Participant Cost Test (PCT)		$344,494	$681,828	$337,335	1.98
Rate Impact Test (RIM)		$818,916	$671,103	($147,813)	0.82
Lifecycle Revenue Impacts ($/kWh)					$0.0000299
Discounted Participant Payback (years)					4.04

Table 12: Project Manager / Trade Ally – HVAC Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0870	$1,769,195	$3,095,259	$1,326,064	1.75
Total Resource Cost Test (TRC) No Adder	$0.0870	$1,769,195	$2,813,872	$1,044,677	1.59
Utility Cost Test (UCT)	$0.0656	$1,335,049	$2,813,872	$1,478,823	2.11
Participant Cost Test (PCT)		$954,846	$2,157,654	$1,202,809	2.26
Rate Impact Test (RIM)		$2,972,004	$2,813,872	($158,131)	0.95
Lifecycle Revenue Impacts ($/kWh)					$0.0000772
Discounted Participant Payback (years)					4.69

Table 13: Project Manager / Trade Ally – Motors Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0381	$1,604,001	$4,717,789	$3,113,788	2.94
Total Resource Cost Test (TRC) No Adder	$0.0381	$1,604,001	$4,288,899	$2,684,898	2.67
Utility Cost Test (UCT)	$0.0268	$1,131,607	$4,288,899	$3,157,292	3.79
Participant Cost Test (PCT)		$1,245,577	$4,879,465	$3,633,888	3.92
Rate Impact Test (RIM)		$5,237,889	$4,288,899	($948,990)	0.82
Lifecycle Revenue Impacts ($/kWh)					$0.0001311
Discounted Participant Payback (years)					3.75

Table 14: Project Manager / Trade Ally – Refrigeration Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0273	$1,418,473	$6,133,804	$4,715,331	4.32
Total Resource Cost Test (TRC) No Adder	$0.0273	$1,418,473	$5,576,185	$4,157,712	3.93
Utility Cost Test (UCT)	$0.0234	$1,216,393	$5,576,185	$4,359,792	4.58
Participant Cost Test (PCT)		$975,557	$5,271,226	$4,295,670	5.40
Rate Impact Test (RIM)		$5,714,143	$5,576,185	($137,957)	0.98
Lifecycle Revenue Impacts ($/kWh)					$0.0001484
Discounted Participant Payback (years)					2.59

Table 15: Project Manager / Trade Ally – Wastewater Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0489	$300,686	$688,654	$387,968	2.29
Total Resource Cost Test (TRC) No Adder	$0.0489	$300,686	$626,049	$325,363	2.08
Utility Cost Test (UCT)	$0.0285	$175,131	$626,049	$450,918	3.57
Participant Cost Test (PCT)		$250,857	$631,449	$380,592	2.52
Rate Impact Test (RIM)		$681,277	$626,049	($55,228)	0.92
Lifecycle Revenue Impacts ($/kWh)					$0.0000171
Discounted Participant Payback (years)					5.96

Table 16: Project Manager / Trade Ally – NEXANT PF NON-LIGHTING PROJECTS Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1071	$79,991	$84,735	$4,744	1.06
Total Resource Cost Test (TRC) No Adder	$0.1071	$79,991	$77,032	($2,959)	0.96
Utility Cost Test (UCT)	$0.0723	$53,991	$77,032	$23,041	1.43
Participant Cost Test (PCT)		$50,000	$82,345	$32,345	1.65
Rate Impact Test (RIM)		$112,336	$77,032	($35,305)	0.69
Lifecycle Revenue Impacts ($/kWh)					$0.0000038
Discounted Participant Payback (years)					6.07

Table 17: Project Manager / Trade Ally – Building Shell Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1568	$148,880	$142,406	($6,474)	0.96
Total Resource Cost Test (TRC) No Adder	$0.1568	$148,880	$129,460	($19,420)	0.87
Utility Cost Test (UCT)	$0.0610	$57,905	$129,460	$71,554	2.24
Participant Cost Test (PCT)		$135,494	$122,628	($12,866)	0.91
Rate Impact Test (RIM)		$136,014	$129,460	($6,554)	0.95
Lifecycle Revenue Impacts ($/kWh)					$0.0000034
Discounted Participant Payback (years)					16.57

Table 18: Project Manager / Trade Ally – Food Service Equipment Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0267	$8,839	$38,296	$29,458	4.33
Total Resource Cost Test (TRC) No Adder	$0.0267	$8,839	$34,815	$25,976	3.94
Utility Cost Test (UCT)	$0.0232	$7,677	$34,815	$27,138	4.53
Participant Cost Test (PCT)		$3,484	$28,889	$25,405	8.29
Rate Impact Test (RIM)		$34,243	$34,815	$572	1.02
Lifecycle Revenue Impacts ($/kWh)					$0.0000010
Discounted Participant Payback (years)					1.45

Table 19: Project Manager / Trade Ally –Compressed Air Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0413	$1,864,137	$4,998,568	$3,134,431	2.68
Total Resource Cost Test (TRC) No Adder	$0.0413	$1,864,137	$4,544,153	$2,680,016	2.44
Utility Cost Test (UCT)	$0.0314	$1,416,526	$4,544,153	$3,127,626	3.21
Participant Cost Test (PCT)		$1,391,640	$5,461,080	$4,069,440	3.92
Rate Impact Test (RIM)		$5,933,577	$4,544,153	($1,389,424)	0.77
Lifecycle Revenue Impacts ($/kWh)					$0.0001606
Discounted Participant Payback (years)					3.31

Table 20: Project Manager / Trade Ally – Custom Capital Projects Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0525	$1,654,867	$3,530,244	$1,875,378	2.13
Total Resource Cost Test (TRC) No Adder	$0.0525	$1,654,867	$3,209,313	$1,554,447	1.94
Utility Cost Test (UCT)	$0.0353	$1,111,748	$3,209,313	$2,097,565	2.89
Participant Cost Test (PCT)		$1,220,491	$3,884,925	$2,664,434	3.18
Rate Impact Test (RIM)		$4,319,300	$3,209,313	($1,109,987)	0.74
Lifecycle Revenue Impacts ($/kWh)					$0.0001081
Discounted Participant Payback (years)					4.71

Table 21: Project Manager / Trade Ally – Farm & Dairy Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0400	$125,702	$347,056	$221,354	2.76
Total Resource Cost Test (TRC) No Adder	$0.0400	$125,702	$315,505	$189,803	2.51
Utility Cost Test (UCT)	$0.0300	$94,166	$315,505	$221,339	3.35
Participant Cost Test (PCT)		$70,867	$348,669	$277,801	4.92
Rate Impact Test (RIM)		$403,503	$315,505	($87,998)	0.78
Lifecycle Revenue Impacts ($/kWh)					$0.0000120
Discounted Participant Payback (years)					2.24

Table 22: Project Manager / Trade Ally – Irrigation Pump Upgrades, Custom Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0680	$288,371	$595,022	$306,651	2.06
Total Resource Cost Test (TRC) No Adder	$0.0680	$288,371	$540,929	$252,558	1.88
Utility Cost Test (UCT)	$0.0385	$163,164	$540,929	$377,765	3.32
Participant Cost Test (PCT)		$221,351	$741,589	$520,238	3.35
Rate Impact Test (RIM)		$808,609	$540,929	($267,680)	0.67
Lifecycle Revenue Impacts ($/kWh)					$0.0000202
Discounted Participant Payback (years)					4.48

Table 23: Project Manager / Trade Ally – Irrigation Pump VFD Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0825	$562,712	$947,452	$384,740	1.68
Total Resource Cost Test (TRC) No Adder	$0.0825	$562,712	$861,320	$298,608	1.53
Utility Cost Test (UCT)	$0.0467	$318,824	$861,320	$542,497	2.70
Participant Cost Test (PCT)		$422,579	$1,175,464	$752,886	2.78
Rate Impact Test (RIM)		$1,315,598	$861,320	($454,277)	0.65
Lifecycle Revenue Impacts ($/kWh)					$0.0000416
Discounted Participant Payback (years)					3.59

Table 24: Project Manager / Trade Ally – Upgrade sprinkler package - high pressure to MESA Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1116	$101,224	$125,947	$24,722	1.24
Total Resource Cost Test (TRC) No Adder	$0.1116	$101,224	$114,497	$13,273	1.13
Utility Cost Test (UCT)	$0.0368	$33,397	$114,497	$81,100	3.43
Participant Cost Test (PCT)		$82,596	$147,272	$64,676	1.78
Rate Impact Test (RIM)		$165,900	$114,497	($51,403)	0.69
Lifecycle Revenue Impacts ($/kWh)					$0.0000052
Discounted Participant Payback (years)					5.61

Table 25: Project Manager / Trade Ally - Lighting Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0495	$8,121,160	$17,793,125	$9,671,965	2.19
Total Resource Cost Test (TRC) No Adder	$0.0495	$8,121,160	$16,175,568	$8,054,408	1.99
Utility Cost Test (UCT)	$0.0409	$6,719,225	$16,175,568	$9,456,344	2.41
Participant Cost Test (PCT)		$5,488,169	$17,827,319	$12,339,150	3.25
Rate Impact Test (RIM)		$20,460,310	$16,175,568	($4,284,742)	0.79
Lifecycle Revenue Impacts ($/kWh)					$0.0006472
Discounted Participant Payback (years)					2.50

Table 26: Project Manager / Trade Ally – Drain for wheel line, hand line, portable main line, pivot, or linear Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1386	$1,700	$1,739	$39	1.02
Total Resource Cost Test (TRC) No Adder	$0.1386	$1,700	$1,581	($119)	0.93
Utility Cost Test (UCT)	$0.0619	$759	$1,581	$822	2.08
Participant Cost Test (PCT)		$1,328	$2,116	$788	1.59
Rate Impact Test (RIM)		$2,488	$1,581	($907)	0.64
Lifecycle Revenue Impacts ($/kWh)					$0.0000001
Discounted Participant Payback (years)					3.70

Table 27: Project Manager / Trade Ally – Gasket for wheel line, hand line, or portable main line Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0856	$5,721	$9,475	$3,754	1.66
Total Resource Cost Test (TRC) No Adder	$0.0856	$5,721	$8,614	$2,893	1.51
Utility Cost Test (UCT)	$0.0535	$3,576	$8,614	$5,038	2.41
Participant Cost Test (PCT)		$3,693	$10,968	$7,275	2.97
Rate Impact Test (RIM)		$12,996	$8,614	($4,382)	0.66
Lifecycle Revenue Impacts ($/kWh)					$0.0000006
Discounted Participant Payback (years)					1.99

Table 28: Project Manager / Trade Ally – Impact sprinkler, New or Rebuilt Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$1.2498	$6,107	$684	($5,423)	0.11
Total Resource Cost Test (TRC) No Adder	$1.2498	$6,107	$622	($5,485)	0.10
Utility Cost Test (UCT)	$0.0626	$306	$622	$316	2.03
Participant Cost Test (PCT)		$5,975	$869	($5,106)	0.15
Rate Impact Test (RIM)		$1,001	$622	($379)	0.62
Lifecycle Revenue Impacts ($/kWh)					$0.0000000
Discounted Participant Payback (years)					42.61

Table 29: Project Manager / Trade Ally – Nozzle Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0548	$2,954	$7,635	$4,682	2.59
Total Resource Cost Test (TRC) No Adder	$0.0548	$2,954	$6,941	$3,988	2.35
Utility Cost Test (UCT)	$0.0411	$2,214	$6,941	$4,727	3.13
Participant Cost Test (PCT)		$1,320	$8,172	$6,852	6.19
Rate Impact Test (RIM)		$9,805	$6,941	($2,864)	0.71
Lifecycle Revenue Impacts ($/kWh)					$0.0000004
Discounted Participant Payback (years)					0.94

Table 30: Project Manager / Trade Ally – Rotating sprinkler Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$1.2496	$6,784	$760	($6,024)	0.11
Total Resource Cost Test (TRC) No Adder	$1.2496	$6,784	$691	($6,094)	0.10
Utility Cost Test (UCT)	$0.0624	$339	$691	$352	2.04
Participant Cost Test (PCT)		$6,639	$966	($5,673)	0.15
Rate Impact Test (RIM)		$1,111	$691	($420)	0.62
Lifecycle Revenue Impacts ($/kWh)					$0.0000000
Discounted Participant Payback (years)					42.61

Table 31: Project Manager / Trade Ally – Sprinkler Package - replace MESA Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1832	$26,685	$20,387	($6,298)	0.76
Total Resource Cost Test (TRC) No Adder	$0.1832	$26,685	$18,534	($8,151)	0.69
Utility Cost Test (UCT)	$0.0491	$7,157	$18,534	$11,376	2.59
Participant Cost Test (PCT)		$22,779	$23,977	$1,198	1.05
Rate Impact Test (RIM)		$27,883	$18,534	($9,349)	0.66
Lifecycle Revenue Impacts ($/kWh)					$0.0000011
Discounted Participant Payback (years)					5.89

Table 32: Project Manager / Trade Ally – Wheel line leveler Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.3242	$921	$396	($525)	0.43
Total Resource Cost Test (TRC) No Adder	$0.3242	$921	$360	($561)	0.39
Utility Cost Test (UCT)	$0.0582	$165	$360	$194	2.18
Participant Cost Test (PCT)		$853	$505	($348)	0.59
Rate Impact Test (RIM)		$573	$360	($214)	0.63
Lifecycle Revenue Impacts ($/kWh)					$0.0000000
Discounted Participant Payback (years)					12.16

Table 33 presents the PY2022 and PY2023 cost-effectiveness results with NEIs for the Midstream Lighting delivery options.

Table 33: Midstream – Lighting with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0375	$291,865	$1,103,959	$812,094	3.78
Total Resource Cost Test (TRC) No Adder	$0.0375	$291,865	$1,027,281	$735,416	3.52
Utility Cost Test (UCT)	$0.0400	$311,077	$766,778	$455,701	2.46
Participant Cost Test (PCT)		$160,607	$807,037	$646,429	5.02
Rate Impact Test (RIM)		$920,712	$766,778	($153,934)	0.83
Lifecycle Revenue Impacts ($/kWh)					$0.0000311
Discounted Participant Payback (years)					1.68

Table 34 through Table 40 presents the PY2022 and PY2023 cost-effectiveness results for the Project Manager / Trade Ally delivery options with NEIs. Table 41 details the non-energy benefits included in this analysis.

Table 34: Project Manager / Trade Ally – Drain for wheel line, hand line, portable main line, pivot, or linear with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1386	$1,700	$3,211	$1,511	1.89
Total Resource Cost Test (TRC) No Adder	$0.1386	$1,700	$3,052	$1,353	1.80
Utility Cost Test (UCT)	$0.0619	$759	$1,581	$822	2.08
Participant Cost Test (PCT)		$1,328	$3,204	$1,877	2.41
Rate Impact Test (RIM)		$2,488	$1,581	($907)	0.64
Lifecycle Revenue Impacts ($/kWh)					$0.0000001
Discounted Participant Payback (years)					2.44

Table 35: Project Manager / Trade Ally – Gasket for wheel line, hand line, or portable main line with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0856	$5,721	$14,650	$8,930	2.56
Total Resource Cost Test (TRC) No Adder	$0.0856	$5,721	$13,789	$8,068	2.41
Utility Cost Test (UCT)	$0.0535	$3,576	$8,614	$5,038	2.41
Participant Cost Test (PCT)		$3,693	$14,056	$10,363	3.81
Rate Impact Test (RIM)		$12,996	$8,614	($4,382)	0.66
Lifecycle Revenue Impacts ($/kWh)					$0.0000006
Discounted Participant Payback (years)					1.55

Table 36: Project Manager / Trade Ally – Impact sprinkler, New or Rebuilt with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$1.2498	$6,107	$6,318	$211	1.03
Total Resource Cost Test (TRC) No Adder	$1.2498	$6,107	$6,256	$149	1.02
Utility Cost Test (UCT)	$0.0626	$306	$622	$316	2.03
Participant Cost Test (PCT)		$5,975	$6,351	$376	1.06
Rate Impact Test (RIM)		$1,001	$622	($379)	0.62
Lifecycle Revenue Impacts ($/kWh)					$0.0000000

Discounted Participant Payback (years)	5.83

Table 37: Project Manager / Trade Ally – Nozzle with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0548	$2,954	$10,446	$7,492	3.54
Total Resource Cost Test (TRC) No Adder	$0.0548	$2,954	$9,752	$6,798	3.30
Utility Cost Test (UCT)	$0.0411	$2,214	$6,941	$4,727	3.13
Participant Cost Test (PCT)		$1,320	$9,300	$7,980	7.04
Rate Impact Test (RIM)		$9,805	$6,941	($2,864)	0.71
Lifecycle Revenue Impacts ($/kWh)					$0.0000004
Discounted Participant Payback (years)					0.82

Table 38: Project Manager / Trade Ally – Rotating sprinkler with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$1.2496	$6,784	$7,020	$236	1.03
Total Resource Cost Test (TRC) No Adder	$1.2496	$6,784	$6,951	$167	1.02
Utility Cost Test (UCT)	$0.0624	$339	$691	$352	2.04
Participant Cost Test (PCT)		$6,639	$7,057	$417	1.06
Rate Impact Test (RIM)		$1,111	$691	($420)	0.62
Lifecycle Revenue Impacts ($/kWh)					$0.0000000
Discounted Participant Payback (years)					5.83

Table 39: Project Manager / Trade Ally – Sprinkler Package - replace MESA with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1832	$26,685	$45,627	$18,942	1.71
Total Resource Cost Test (TRC) No Adder	$0.1832	$26,685	$43,774	$17,089	1.64
Utility Cost Test (UCT)	$0.0491	$7,157	$18,534	$11,376	2.59
Participant Cost Test (PCT)		$22,779	$44,668	$21,888	1.96
Rate Impact Test (RIM)		$27,883	$18,534	($9,349)	0.66
Lifecycle Revenue Impacts ($/kWh)					$0.0000011
Discounted Participant Payback (years)					3.16

Table 40: Project Manager / Trade Ally – Wheel line leveler with NEIs Cost-Effectiveness Results - PY2022 and PY2023

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.3242	$921	$1,285	$364	1.39
Total Resource Cost Test (TRC) No Adder	$0.3242	$921	$1,249	$328	1.36
Utility Cost Test (UCT)	$0.0582	$165	$360	$194	2.18
Participant Cost Test (PCT)		$853	$1,305	$453	1.53
Rate Impact Test (RIM)		$573	$360	($214)	0.63
Lifecycle Revenue Impacts ($/kWh)					$0.0000000
Discounted Participant Payback (years)					4.70

Table 41: Wattsmart Business Savings Non-Energy Impacts - PY2022 and PY2023

Measure	Annual Non-Energy Impacts per Measure	Annual Installs (Years)	Measure Life	Total Present Value NEIs
Drain for wheel line, hand line, portable main line, pivot, or linear	$110.00	2	6	$1,472
Gasket for wheel line, hand line, or portable main line	$312.00	2	6	$5,175
Impact sprinkler, New or Rebuilt	$489.60	2	6	$5,634
Nozzle	$114.00	2	6	$2,810
Rotating sprinkler	$544.00	2	6	$6,260
Sprinkler Package - replace MESA	$1,848.00	2	6	$25,240
Wheel line leveler	$64.50	2	7	$889

MEMORANDUM

To: Don Jones, Jr. and Nancy Goddard, Pacific Power

From: Eli Morris and Andy Hudson, AEG

Date: September 14, 2021

Re: Washington NEEA Cost-Effectiveness – 2022-2023 Biennium

AEG estimated the cost-effectiveness of Pacific Power's allocation of the Northwest Energy Efficiency Alliance's (NEEA's) Washington business plan in the state of Washington based on Program Year (PY) 2022 and PY2023 costs and savings estimates provided by Pacific Power. The memo provides analysis inputs and results in the following tables:

Table 1: Cost-Effectiveness Analysis Inputs

Table 2: Annual Program Costs, Nominal - PY2022 and PY2023

Table 3: Annual Savings - PY2022 and PY2023

Table 4: NEEA Cost-Effectiveness Results - PY2022 and PY2023

The NEEA business plan will be implemented in PY2022-2023. The following assumptions were utilized in the analysis:

- Avoided Costs: derived from PacifiCorp's 2021 Integrated Resource Plan (IRP) Preferred Portfolio "P02-MM-CETA", converted into annual values using load shapes from the same IRP.
- Modeling Inputs: measure savings, costs, non-energy impacts (NEIs), measure lives, incentive levels, program delivery, and portfolio costs were based on estimates provided by PacifiCorp.
- Net-to-Gross (NTG): ratios are assumed to be 1.0, consistent with condition (8)(a) to Order 01 in Docket UE-152-072.
- Retail Rates: 2020 rates provided by PacifiCorp and escalated by inflation for future years.

Tables 1 through 3 below summarize cost-effectiveness assumptions and results for the PacifiCorp's allocation of NEEA's Washington business plan.

Table 1: Cost-Effectiveness Analysis Inputs

Parameter	Value
Discount Rate	6.88%
Residential Line Loss	7.68%
Commercial Line Loss	7.60%
Industrial Line Loss	6.82%
Residential Energy Rate ($/kWh)	$0.0836
Commercial Energy Rate ($/kWh)	$0.0717
Industrial Energy Rate ($/kWh)	$0.0887
Inflation Rate[1]	2.16%
Net-to-Gross	100%
Realization Rate	100%

Table 2: Annual Program Costs, Nominal - PY2022 and PY2023

Parameter	Value
Program Delivery	$1,669,200
Utility Admin	$55,000
Incentives	$0
Total Utility Budget	$1,724,200
Gross Customer Costs	$0

Table 3: Annual Savings - PY2022 and PY2023

Parameter	Value
Gross kWh Savings at Site	6,773,770
Realization Rate	100%
Adjusted Gross kWh Savings at Site	6,773,770
Net to Gross Ratio	100%
Net kWh Savings at Site	6,773,770
Measure Life	14

[1] Future rates determined using a 2.16% annual escalator.

Table 4 presents the Washington NEEA business plan cost-effectiveness; the program is cost-effective for the UCT, PCT, PacifiCorp TRC, and TRC tests. Note that since no gross customer costs have been analyzed, the PCT is cost-effective by default with an immediate participant payback. The TRC and UCT are different here because while all costs are the same, there are health non-energy impacts (NEIs) embedded in the avoided costs used in the TRC.

Table 4: NEEA Cost-Effectiveness Results - PY2022 and PY2023[2]

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0272	$1,668,706	$8,875,611	$7,206,906	5.32
Total Resource Cost Test (TRC) No Adder	$0.0272	$1,668,706	$8,242,636	$6,573,931	4.94
Utility Cost Test (UCT)	$0.0272	$1,668,706	$6,329,753	$4,661,047	3.79
Participant Cost Test (PCT)		$0	$5,806,018	$5,806,018	n/a
Rate Impact Test (RIM)		$7,474,724	$6,329,753	($1,144,971)	0.85
Lifecycle Revenue Impacts ($/kWh)					$0.0001626
Discounted Participant Payback (years)					0.00

[2] Note that the values in the table have been discounted to 2022 dollars. Therefore, the program and administrative costs are slightly lower than shown in Table 2.