



Memorandum

To: Angela Long, Pacific Power
From: David Basak, Navigant
Date: October 19, 2016
Re: Cost-Effectiveness Results for the Portfolio and Sector Level - Washington

Navigant estimated the cost-effectiveness for the overall energy efficiency portfolio and component sectors, based on PY2017 costs and savings estimates provided by PacifiCorp. This memo provides the cost-effectiveness results for the overall energy efficiency portfolio and the two sector components. PacifiCorp evaluates program cost-effectiveness based on the PacifiCorp Total Resource Cost Test (PTRC) plus a 10% Conversation Adder and Non-energy Benefits (NEB). The memo consists of the following tables.

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Table 1 - Utility Inputs

Parameter	Value
Discount Rate	6.66%
Residential Line Loss	9.67%
Commercial Line Loss	9.53%
Industrial Line Loss	8.16%
Residential Energy Rate (\$/kWh)(base year 2015)	\$0.0919
Commercial Energy Rate (\$/kWh)(base year 2015)	\$0.0851
Industrial Energy Rate (\$/kWh)(base year 2015)	\$0.0692
Inflation Rate	1.9%

¹ Future rates determined using a 1.9% annual escalator.

Table 2 – Portfolio Level Costs

Description	Cost
Be wattsmart, Begin at Home	\$60,947
Customer outreach/communication	\$250,000
Program Evaluations (& savings verification)	\$333,666
Total Costs	\$644,613

Table 3 – Costs by Program

	Program Delivery	Utility Admin	Incentives	Total Utility Costs	Gross Customer Costs
Home Energy Savings (HES)	\$997,032	\$75,000	\$2,325,371	\$3,397,403	\$4,564,815
Home Energy Reporting (HER)	\$376,907	\$0	\$0	\$376,907	\$0
Wattsmart Business	\$3,018,248	\$173,000	\$3,340,478	\$6,531,726	\$9,770,001
NEEA (Northwest Energy Efficiency Alliance)	\$911,483	\$0	\$0	\$911,483	\$0
Total	\$5,303,670	\$248,000	\$5,665,849	\$11,217,519	\$14,334,817

Table 4 – Savings by Program

	Gross kWh Savings	Realization Rate	Adjusted Gross kWh Savings	Net to Gross Ratio	Net kWh Savings	Measure Life
Home Energy Savings (HES)	10,835,081	100%	10,835,081	100%	10,835,081	13
Home Energy Reporting (HER)	0	0%	0	0%	0	N/A
Wattsmart Business	26,994,515	93%	25,068,590	100%	25,068,590	14

	Gross kWh Savings	Realization Rate	Adjusted Gross kWh Savings	Net to Gross Ratio	Net kWh Savings	Measure Life
NEEA	2,799,506	100%	2,799,506	100%	2,799,506	10
Total	40,629,102	95%	38,703,177	100%	38,703,177	14

Table 5 – Home Energy Savings Non-Energy Benefits

Measure Category	Quantity	Non-Energy Benefits Water (\$/yr)	Non-Energy Benefits Other (\$/yr)	Measure Life	Total NEB (\$/yr)	Total Present Value Benefits
Clothes Washers - 2.75 IMEF or Higher - Electric DHW & Electric Dryer	141	\$23.28	\$0.00	14	\$221.65	\$31,253
Clothes Washers - 2.75 IMEF or Higher - Electric DHW & Gas Dryer	40	\$23.28	\$0.00	14	\$221.65	\$8,866
Clothes Washers - 2.75 IMEF or Higher - Gas DHW & Electric Dryer	15	\$23.28	\$0.00	14	\$221.65	\$3,325
Heat Pump Clothes Dryer - Ventless	10	\$0.00	\$54.11	12	\$466.82	\$4,668
Ductless Heat Pump - Zonal to DHP HSPF 9.0 and above	57	\$45.76	\$0.00	15	\$454.24	\$25,892
Manufactured Homes Ductless Heat Pump - Zonal to DHP HSPF 9.0 and above	5	\$45.76	\$0.00	15	\$454.24	\$2,271
New Homes Ductless Heat Pump	1	\$0.00	\$51.48	15	\$511.02	\$511
CFLs - General Purpose - Retail	30,000	\$0.00	\$0.93	6	\$4.78	\$143,345
CFLs - Specialty - Retail	6,000	\$0.00	\$3.18	5	\$14.03	\$84,207
LEDs - General Purpose (Omnidirectional) - Retail	235,150	\$0.00	\$0.75	12	\$6.47	\$1,521,537
LEDs - Specialty (Decorative and Directional) - Retail	106,992	\$0.00	\$0.88	12	\$7.59	\$812,289
Energy Savings Kit - Basic - 1 Bathroom	745	\$20.53	\$3.08	7	\$139.55	\$103,962
Energy Savings Kit - Basic - 2 Bathrooms	1,315	\$41.06	\$3.08	9	\$307.56	\$404,442
Energy Savings Kit - Best - 1 Bathroom	41	\$20.53	\$2.60	11	\$189.84	\$7,783
Energy Savings Kit - Best - 2 Bathrooms	161	\$41.06	\$2.60	11	\$358.34	\$57,693
Energy Savings Kit - Better - 1 Bathroom	16	\$20.53	\$3.08	9	\$164.51	\$2,632
Energy Savings Kit - Better - 2 Bathrooms	39	\$41.06	\$3.08	9	\$307.56	\$11,995
Energy Savings Kit - CFL	395	\$0.00	\$3.08	5	\$13.59	\$5,369
Energy Savings Kit - LED	38	\$0.00	\$2.60	12	\$22.43	\$852

Table 6 - Benefit/Cost Ratios by Portfolio Type

	PTRC	TRC	UCT	RIM	PCT
Home Energy Savings (HES)	1.56	1.42	2.35	0.59	2.71
Home Energy Savings (HES) with NEBs	2.14	2.00	2.35	0.59	3.43
Home Energy Reporting (HER)	n/a	n/a	n/a	n/a	n/a
Wattsmart Business	1.60	1.45	2.97	0.68	2.46
NEEA	1.55	1.41	1.41	0.42	n/a

Table 7 – Home Energy Savings (HES) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0552	\$5,636,847	\$8,789,606	\$3,152,758	1.56
Total Resource Cost Test (TRC) No Adder	\$0.0552	\$5,636,847	\$7,990,551	\$2,353,703	1.42
Utility Cost Test (UCT)	\$0.0333	\$3,397,403	\$7,990,551	\$4,593,147	2.35
Rate Impact Test (RIM)		\$13,460,598	\$7,990,551	-\$5,470,048	0.59
Participant Cost Test (PCT)		\$4,564,815	\$12,388,566	\$7,823,751	2.71
Lifecycle Revenue Impacts (\$/kWh)					\$0.0001055971
Discounted Participant Payback (years)					2.08

Table 8 - Home Energy Savings (HES) Cost-Effectiveness Results (Including NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0552	\$5,636,847	\$12,076,831	\$6,439,983	2.14
Total Resource Cost Test (TRC) No Adder	\$0.0552	\$5,636,847	\$11,277,776	\$5,640,928	2.00
Utility Cost Test (UCT)	\$0.0333	\$3,397,403	\$7,990,551	\$4,593,147	2.35
Rate Impact Test (RIM)		\$13,460,598	\$7,990,551	-\$5,470,048	0.59
Participant Cost Test (PCT)		\$4,564,815	\$15,675,791	\$11,110,976	3.43
Lifecycle Revenue Impacts (\$/kWh)					\$0.0001055971
Discounted Participant Payback (years)					2.08

Table 9 - Home Energy Reporting (HER) Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh*	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	n/a	\$376,907	\$0	-\$376,907	n/a

Cost-Effectiveness Test	Levelized \$/kWh*	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (TRC) No Adder	n/a	\$376,907	\$0	-\$376,907	n/a
Utility Cost Test (UCT)	n/a	\$376,907	\$0	-\$376,907	n/a
Rate Impact Test (RIM)		\$376,907	\$0	-\$376,907	n/a
Participant Cost Test (PCT)		\$0	\$0	\$0	n/a
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000934194
Discounted Participant Payback (years)					n/a

*All first year savings will have been reported in 2016

Table 10 – Wattsmart Business Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0508	\$12,597,075	\$20,115,742	\$7,518,667	1.60
Total Resource Cost Test (TRC) No Adder	\$0.0508	\$12,597,075	\$18,287,038	\$5,689,963	1.45
Utility Cost Test (UCT)	\$0.0249	\$6,167,551	\$18,287,038	\$12,119,487	2.97
Rate Impact Test (RIM)		\$26,878,040	\$18,287,038	-\$8,591,001	0.68
Participant Cost Test (PCT)		\$9,770,001	\$24,050,966	\$14,280,965	2.46
Lifecycle Revenue Impacts (\$/kWh)					\$0.0001520121
Discounted Participant Payback (years)					3.43

Table 11 - NEEA Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0417	\$911,483	\$1,411,969	\$500,486	1.55
Total Resource Cost Test (TRC) No Adder	\$0.0417	\$911,483	\$1,283,608	\$372,125	1.41
Utility Cost Test (UCT)	\$0.0417	\$911,483	\$1,283,608	\$372,125	1.41
Rate Impact Test (RIM)		\$3,024,986	\$1,283,608	-\$1,741,378	0.42
Participant Cost Test (PCT)		\$0	\$2,113,503	\$2,113,503	n/a
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000165953
Discounted Participant Payback (years)					n/a

Table 12 - Benefit/Cost Ratios by Portfolio and Sector Type

	PTRC	TRC	UCT	RIM	PCT
Residential Programs	1.46	1.33	2.12	0.58	2.71
Residential Programs (Including NEBs)	2.01	1.88	2.12	0.58	3.43
Residential Programs (Including NEEA)	1.46	1.33	2.00	0.55	3.07
Residential Programs (Including NEBs & NEEA)	1.95	1.82	2.00	0.55	3.79
Non-Residential Programs	1.60	1.45	2.97	0.68	2.46
Non-Residential Programs (Including NEEA)	1.60	1.45	2.92	0.68	2.51
Total Portfolio	1.50	1.36	2.48	0.64	2.54
Total Portfolio (Including NEBs)	1.67	1.54	2.48	0.64	2.77
Total Portfolio (Including NEEA)	1.50	1.37	2.40	0.62	2.69
Total Portfolio (Including NEBs & NEEA)	1.67	1.53	2.40	0.62	2.92

Table 13 – Residential Energy Efficiency Portfolio Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0589	\$6,013,754	\$8,789,606	\$2,775,851	1.46
Total Resource Cost Test (TRC) No Adder	\$0.0589	\$6,013,754	\$7,990,551	\$1,976,796	1.33
Utility Cost Test (UCT)	\$0.0370	\$3,774,310	\$7,990,551	\$4,216,240	2.12
Rate Impact Test (RIM)		\$13,837,505	\$7,990,551	-\$5,846,955	0.58
Participant Cost Test (PCT)		\$4,564,815	\$12,388,566	\$7,823,751	2.71
Lifecycle Revenue Impacts (\$/kWh)					\$0.000120752

Table 14 - Residential Energy Efficiency Portfolio Cost-Effectiveness Results (Including NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0589	\$6,013,754	\$12,076,831	\$6,063,076	2.01
Total Resource Cost Test (TRC) No Adder	\$0.0589	\$6,013,754	\$11,277,776	\$5,264,021	1.88
Utility Cost Test (UCT)	\$0.0370	\$3,774,310	\$7,990,551	\$4,216,240	2.12
Rate Impact Test (RIM)		\$13,837,505	\$7,990,551	-\$5,846,955	0.58
Participant Cost Test (PCT)		\$4,564,815	\$15,675,791	\$11,110,976	3.43
Lifecycle Revenue Impacts (\$/kWh)					\$0.000120752

Table 15 - Residential Energy Efficiency Portfolio Cost-Effectiveness Results (Including NEEA)

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0565	\$6,697,367	\$9,800,151	\$3,102,784	1.46
Total Resource Cost Test (TRC) No Adder	\$0.0565	\$6,697,367	\$8,909,228	\$2,211,862	1.33
Utility Cost Test (UCT)	\$0.0376	\$4,457,923	\$8,909,228	\$4,451,306	2.00
Rate Impact Test (RIM)		\$16,135,895	\$8,909,228	-\$7,226,667	0.55
Participant Cost Test (PCT)		\$4,564,815	\$14,003,343	\$9,438,528	3.07
Lifecycle Revenue Impacts (\$/kWh)					\$0.000149246

Table 16 - Residential Energy Efficiency Portfolio Cost-Effectiveness Results (Including NEBs and NEEA)

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0565	\$6,697,367	\$13,087,376	\$6,390,009	1.95
Total Resource Cost Test (TRC) No Adder	\$0.0565	\$6,697,367	\$12,196,453	\$5,499,087	1.82
Utility Cost Test (UCT)	\$0.0376	\$4,457,923	\$8,909,228	\$4,451,306	2.00
Rate Impact Test (RIM)		\$16,135,895	\$8,909,228	-\$7,226,667	0.55
Participant Cost Test (PCT)		\$4,564,815	\$17,290,568	\$12,725,753	3.79
Lifecycle Revenue Impacts (\$/kWh)					\$0.000149246

Table 17 – Non-Residential Energy Efficiency Portfolio Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0508	\$12,597,075	\$20,115,742	\$7,518,667	1.60
Total Resource Cost Test (TRC) No Adder	\$0.0508	\$12,597,075	\$18,287,038	\$5,689,963	1.45
Utility Cost Test (UCT)	\$0.0249	\$6,167,551	\$18,287,038	\$12,119,487	2.97
Rate Impact Test (RIM)		\$26,878,040	\$18,287,038	-\$8,591,001	0.68
Participant Cost Test (PCT)		\$9,770,001	\$24,050,966	\$14,280,965	2.46
Lifecycle Revenue Impacts (\$/kWh)					\$0.000163744

Table 18 – Non-Residential Energy Efficiency Portfolio Cost-Effectiveness Results (Including NEEA)

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0506	\$12,824,946	\$20,517,166	\$7,692,220	1.60
Total Resource Cost Test (TRC) No Adder	\$0.0506	\$12,824,946	\$18,651,969	\$5,827,023	1.45
Utility Cost Test (UCT)	\$0.0252	\$6,395,422	\$18,651,969	\$12,256,547	2.92
Rate Impact Test (RIM)		\$27,604,637	\$18,651,969	-\$8,952,668	0.68
Participant Cost Test (PCT)		\$9,770,001	\$24,549,692	\$14,779,691	2.51
Lifecycle Revenue Impacts (\$/kWh)					\$0.000170637

Table 19 – Total Portfolio Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0550	\$19,255,443	\$28,905,348	\$9,649,906	1.50
Total Resource Cost Test (TRC) No Adder	\$0.0550	\$19,255,443	\$26,277,589	\$7,022,147	1.36
Utility Cost Test (UCT)	\$0.0302	\$10,586,475	\$26,277,589	\$15,691,115	2.48
Rate Impact Test (RIM)		\$41,360,158	\$26,277,589	-\$15,082,569	0.64
Participant Cost Test (PCT)		\$14,334,817	\$36,439,532	\$22,104,716	2.54
Lifecycle Revenue Impacts (\$/kWh)					\$0.000287473

Table 20 - Total Portfolio Cost-Effectiveness Results (Including NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0550	\$19,255,443	\$32,192,573	\$12,937,131	1.67
Total Resource Cost Test (TRC) No Adder	\$0.0550	\$19,255,443	\$29,564,814	\$10,309,372	1.54
Utility Cost Test (UCT)	\$0.0302	\$10,586,475	\$26,277,589	\$15,691,115	2.48
Rate Impact Test (RIM)		\$41,360,158	\$26,277,589	-\$15,082,569	0.64
Participant Cost Test (PCT)		\$14,334,817	\$39,726,757	\$25,391,941	2.77
Lifecycle Revenue Impacts (\$/kWh)					\$0.000287473

Table 21 - Total Portfolio Cost-Effectiveness Results (Including NEEA)

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0542	\$20,166,926	\$30,317,317	\$10,150,391	1.50
Total Resource Cost Test (TRC) No Adder	\$0.0542	\$20,166,926	\$27,561,197	\$7,394,272	1.37
Utility Cost Test (UCT)	\$0.0309	\$11,497,958	\$27,561,197	\$16,063,240	2.40
Rate Impact Test (RIM)		\$44,385,145	\$27,561,197	-\$16,823,947	0.62
Participant Cost Test (PCT)		\$14,334,817	\$38,553,036	\$24,218,219	2.69
Lifecycle Revenue Impacts (\$/kWh)					\$0.000320663

Table 22 - Total Portfolio Cost-Effectiveness Results (Including NEBs and NEEA)

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0542	\$20,166,926	\$33,604,542	\$13,437,616	1.67
Total Resource Cost Test (TRC) No Adder	\$0.0542	\$20,166,926	\$30,848,422	\$10,681,497	1.53
Utility Cost Test (UCT)	\$0.0309	\$11,497,958	\$27,561,197	\$16,063,240	2.40
Rate Impact Test (RIM)		\$44,385,145	\$27,561,197	-\$16,823,947	0.62
Participant Cost Test (PCT)		\$14,334,817	\$41,840,261	\$27,505,444	2.92
Lifecycle Revenue Impacts (\$/kWh)					\$0.000320663