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Memorandum

To: Don Jones Jr., PacifiCorp/Rocky Mountain Power
From: David Basak, Navigant
Date: July 3, 2014
Re: OPOWER Residential Program Cost Effectiveness and Program Design – Utah

Navigant has developed this memo in response to PacifiCorp’s proposed OPOWER program cost effectiveness modeling needs for the residential sector in the state of Utah.

This memo presents the cost effectiveness results of individual analysis runs and a compilation of combined years for the state of Utah. Each scenario is analyzed using the expected results for the Tier 1 – 100K and Tier 2 – 100K Options with modeled assumptions provided by OPOWER. These scenarios utilize the following assumptions:

- **Avoided Costs:** All scenarios use the “East - Residential Whole House” decrement value stream provided in the 2013 PacifiCorp Integrated Resource Plan.
- **Modeling Inputs:** Navigant utilized measure savings and costs provided by OPOWER to PacifiCorp. The program savings are assumed to include a 2-4% discount for overlap with existing rebate programs.
- **Energy Rates:** Navigant utilized the 2013 rates provided by PacifiCorp and applied an escalation of 1.9% to arrive at estimated rates for PY2014-2017.
- **Net-to-Gross:** Along with OPOWER’s discount, an additional Net-to-Gross Ratio of 99% was used to account for a conservative estimate of 1% attribution to other DSM programs.
- **Incremental Costs:** \$0 incremental costs were assumed for customers, because all net impacts are assumed to be zero-cost behavioral actions.
- **Lifetime:** This analysis made a conservative assumption of a one-year measure life associated with behavioral measures.

This memo will begin by addressing the inputs for PY2014-2017 for the OPOWER program. The cost-effectiveness inputs are as follows:

Table 1 –Cost Effectiveness Analysis Inputs

Parameters	2014	2015	2016	2017
Discount Rate for all B/C Tests	6.88%	6.88%	6.88%	6.88%
Line Loss Factor - Energy (%)	9.32%	9.32%	9.32%	9.32%
Residential Energy Rate (\$/kWh)	\$0.108	\$0.110	\$0.112	\$0.114
Net-to-Gross Ratio	99%	99%	99%	99%
Escalation Rate	1.9%	1.9%	1.9%	1.9%

Table 2 –Annual Program Costs for PY 2014-2017 (Source: PacifiCorp)

Scenario	Incentives (\$)	OPower (\$)	Evaluation (\$)	PC Internal - Admin (\$)	Total Program Costs (\$)
Program Year 2014 - Tier 1 100K (kWh)	\$0	\$373,500	\$0	\$15,605	\$389,105
Program Year 2014 - Tier 2 100K (kWh)	\$0	\$353,500	\$0	\$2,290	\$355,790
Program Year 2015 - Tier 1 100K (kWh)	\$0	\$1,020,500	\$50,000	\$37,452	\$1,107,952
Program Year 2015 - Tier 2 100K (kWh)	\$0	\$772,520	\$0	\$5,496	\$778,016
Program Year 2016 - Tier 1 100K (kWh)	\$0	\$1,068,000	\$0	\$37,452	\$1,105,452
Program Year 2016 - Tier 2 100K (kWh)	\$0	\$780,320	\$0	\$5,496	\$785,816
Program Year 2017 - Tier 1 100K (kWh)	\$0	\$1,129,312	\$50,000	\$37,452	\$1,216,764
Program Year 2017 - Tier 2 100K (kWh)	\$0	\$762,284	\$0	\$5,496	\$767,780
Program Year 2014-2017 - Tier 1 100K (kWh)	\$0	\$3,591,312	\$100,000	\$127,961	\$3,819,273
Program Year 2014-2017 - Tier 2 100K (kWh)	\$0	\$2,668,624	\$0	\$18,778	\$2,687,402

Table 3 –Annual Program Savings at Site for PY 2014-2017 in kWh (Source: OPOWER)

Scenario	Gross Annual Energy Savings at Site (kWh)	Net Annual Energy Savings at Site (kWh)	Gross Annual Energy Savings at Generator (kWh)	Net Annual Energy Savings at Generator (kWh)
Program Year 2014 - Tier 1 100K (kWh)	2,039,000	2,018,610	2,228,994	2,206,704
Program Year 2014 - Tier 2 100K (kWh)	1,173,000	1,161,270	1,282,300	1,269,477
Program Year 2015 - Tier 1 100K (kWh)	18,860,004	18,671,404	20,617,379	20,411,205
Program Year 2015 - Tier 2 100K (kWh)	12,300,000	12,177,000	13,446,114	13,311,653
Program Year 2016 - Tier 1 100K (kWh)	22,719,996	22,492,796	24,837,045	24,588,675
Program Year 2016 - Tier 2 100K (kWh)	15,125,004	14,973,754	16,534,352	16,369,008
Program Year 2017 - Tier 1 100K (kWh)	22,874,004	22,645,264	25,005,404	24,755,350
Program Year 2017 - Tier 2 100K (kWh)	15,321,996	15,168,776	16,749,700	16,582,203
Program Year 2014-2017 - Tier 1 100K (kWh)	66,493,004	65,828,074	72,688,822	71,961,934
Program Year 2014-2017 - Tier 2 100K (kWh)	43,920,000	43,480,800	48,012,466	47,532,341

The PY 2014 cost/benefits results for Tier 1–100K and Tier 2–100K Options are as follows:

Table 4 –PY 2014 Cost/Benefit Test Results (Tier 1 – 100K Expansion)

Benefit/Cost Test Performed	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.2024	\$389,105	\$163,605	(\$225,500)	0.42
Total Resource Cost Test (TRC) No Adder	\$0.2024	\$389,105	\$148,732	(\$240,373)	0.38
Utility Cost Test (UCT)	\$0.2024	\$389,105	\$148,732	(\$240,373)	0.38
Rate Impact Test (RIM)		\$610,447	\$148,732	(\$461,716)	0.24
Participant Cost Test (PCT)		\$0	\$223,578	\$223,578	n/a
Lifecycle Revenue Impacts (\$/kWh)				\$0.000039260	
Discounted Participant Payback (years)				n/a	

Table 5 –PY 2014 Cost/Benefit Test Results (Tier 2 – 100K Expansion)

Benefit/Cost Test Performed	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.3216	\$355,790	\$94,119	(\$261,671)	0.26
Total Resource Cost Test (TRC) No Adder	\$0.3216	\$355,790	\$85,563	(\$270,227)	0.24
Utility Cost Test (UCT)	\$0.3216	\$355,790	\$85,563	(\$270,227)	0.24
Rate Impact Test (RIM)		\$483,124	\$85,563	(\$397,562)	0.18
Participant Cost Test (PCT)		\$0	\$128,621	\$128,621	n/a
Lifecycle Revenue Impacts (\$/kWh)				\$0.000033805	
Discounted Participant Payback (years)				n/a	

The PY 2015 cost/benefits results for Tier 1–100K and Tier 2–100K Options are as follows:

Table 6 –PY 2015 Cost/Benefit Test Results (Tier 1 – 100K Expansion)

Benefit/Cost Test Performed	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0623	\$1,107,952	\$1,594,340	\$486,388	1.44
Total Resource Cost Test (TRC) No Adder	\$0.0623	\$1,107,952	\$1,449,400	\$341,448	1.31
Utility Cost Test (UCT)	\$0.0623	\$1,107,952	\$1,449,400	\$341,448	1.31
Rate Impact Test (RIM)		\$3,194,188	\$1,449,400	(\$1,744,788)	0.45
Participant Cost Test (PCT)		\$0	\$2,107,309	\$2,107,309	n/a
Lifecycle Revenue Impacts (\$/kWh)				\$0.000143118	
Discounted Participant Payback (years)				n/a	

Table 7 –PY 2015 Cost/Benefit Test Results (Tier 2 – 100K Expansion)

Benefit/Cost Test Performed	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0671	\$778,016	\$1,039,787	\$261,771	1.34
Total Resource Cost Test (TRC) No Adder	\$0.0671	\$778,016	\$945,260	\$167,244	1.21
Utility Cost Test (UCT)	\$0.0671	\$778,016	\$945,260	\$167,244	1.21
Rate Impact Test (RIM)		\$2,138,604	\$945,260	(\$1,193,344)	0.44
Participant Cost Test (PCT)		\$0	\$1,374,332	\$1,374,332	n/a
Lifecycle Revenue Impacts (\$/kWh)				\$0.000097885	
Discounted Participant Payback (years)				n/a	

The PY 2016 cost/benefits results for Tier 1–100K and Tier 2–100K Options are as follows:

Table 8 –PY 2016 Cost/Benefit Test Results (Tier 1 – 100K Expansion)

Benefit/Cost Test Performed	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0516	\$1,105,452	\$1,988,265	\$882,813	1.80
Total Resource Cost Test (TRC) No Adder	\$0.0516	\$1,105,452	\$1,807,513	\$702,061	1.64
Utility Cost Test (UCT)	\$0.0516	\$1,105,452	\$1,807,513	\$702,061	1.64
Rate Impact Test (RIM)		\$3,666,420	\$1,807,513	(\$1,858,906)	0.49
Participant Cost Test (PCT)		\$0	\$2,586,836	\$2,586,836	n/a
Lifecycle Revenue Impacts (\$/kWh)				\$0.000146561	
Discounted Participant Payback (years)				n/a	

Table 9 –PY 2016 Cost/Benefit Test Results (Tier 2 – 100K Expansion)

Benefit/Cost Test Performed	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0551	\$785,816	\$1,323,614	\$537,798	1.68
Total Resource Cost Test (TRC) No Adder	\$0.0551	\$785,816	\$1,203,286	\$417,470	1.53
Utility Cost Test (UCT)	\$0.0551	\$785,816	\$1,203,286	\$417,470	1.53
Rate Impact Test (RIM)		\$2,490,686	\$1,203,286	(\$1,287,401)	0.48
Participant Cost Test (PCT)		\$0	\$1,722,091	\$1,722,091	n/a
Lifecycle Revenue Impacts (\$/kWh)				\$0.000101502	
Discounted Participant Payback (years)				n/a	

The PY 2017 cost/benefits results for Tier 1–100K and Tier 2–100K Options are as follows:

Table 10 –PY 2017 Cost/Benefit Test Results (Tier 1 – 100K Expansion)

Benefit/Cost Test Performed	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0564	\$1,216,764	\$2,179,288	\$962,524	1.79
Total Resource Cost Test (TRC) No Adder	\$0.0564	\$1,216,764	\$1,981,171	\$764,407	1.63
Utility Cost Test (UCT)	\$0.0564	\$1,216,764	\$1,981,171	\$764,407	1.63
Rate Impact Test (RIM)		\$3,844,079	\$1,981,171	(\$1,862,909)	0.52
Participant Cost Test (PCT)		\$0	\$2,653,854	\$2,653,854	n/a
Lifecycle Revenue Impacts (\$/kWh)				\$0.000144730	
Discounted Participant Payback (years)				n/a	

Table 11 –PY 2017 Cost/Benefit Test Results (Tier 2 – 100K Expansion)

Benefit/Cost Test Performed	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0531	\$767,780	\$1,459,781	\$692,001	1.90
Total Resource Cost Test (TRC) No Adder	\$0.0531	\$767,780	\$1,327,074	\$559,294	1.73
Utility Cost Test (UCT)	\$0.0531	\$767,780	\$1,327,074	\$559,294	1.73
Rate Impact Test (RIM)		\$2,527,669	\$1,327,074	(\$1,200,596)	0.53
Participant Cost Test (PCT)		\$0	\$1,777,666	\$1,777,666	n/a
Lifecycle Revenue Impacts (\$/kWh)				\$0.000093275	
Discounted Participant Payback (years)				n/a	

The PY 2014-2017 cost/benefits results for Tier 1–100K and Tier 2–100K Options are as follows:

Table 12 –PY 2014-2017 Cost/Benefit Test Results (Tier 1 – 100K Expansion)

Benefit/Cost Test Performed	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0609	\$3,819,273	\$5,925,497	\$2,106,224	1.55
Total Resource Cost Test (TRC) No Adder	\$0.0609	\$3,819,273	\$5,386,816	\$1,567,543	1.41
Utility Cost Test (UCT)	\$0.0609	\$3,819,273	\$5,386,816	\$1,567,543	1.41
Rate Impact Test (RIM)		\$11,315,135	\$5,386,816	(\$5,928,319)	0.48
Participant Cost Test (PCT)		\$0	\$7,571,577	\$7,571,577	n/a
Lifecycle Revenue Impacts (\$/kWh)				\$0.000119748	
Discounted Participant Payback (years)				n/a	

Table 13 –PY 2014-2017 Cost/Benefit Test Results (Tier 2 – 100K Expansion)

Benefit/Cost Test Performed	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conversation Adder	\$0.0649	\$2,687,402	\$3,917,301	\$1,229,899	1.46
Total Resource Cost Test (TRC) No Adder	\$0.0649	\$2,687,402	\$3,561,183	\$873,781	1.33
Utility Cost Test (UCT)	\$0.0649	\$2,687,402	\$3,561,183	\$873,781	1.33
Rate Impact Test (RIM)		\$7,640,084	\$3,561,183	(\$4,078,902)	0.47
Participant Cost Test (PCT)		\$0	\$5,002,710	\$5,002,710	n/a
Lifecycle Revenue Impacts (\$/kWh)				\$0.000082391	
Discounted Participant Payback (years)				n/a	