

Date: March 22, 2009
To: Don Jones Jr.
From: Brian Hedman
Re: Utah Residential Insulation Measure Cost Effectiveness

The tables below present the assumptions and cost effectiveness findings for residential insulation based on costs and savings contained in a spreadsheet provided by PacifiCorp entitled “UT CE-Inputs 2009 LBL RTF from PECI - 12 SEER - 031909”. The analysis was conducted on a savings per square foot basis. This cost effectiveness analysis was conducted with the following assumptions:

- 2007-2008 measures were analyzed based on a cooling load shape and decrement
- 2009 measures in electrically heated homes were analyzed based on a whole home load shape and decrement
- 2009 measures in gas heated homes were analyzed based on a cooling load shape and decrement

Cost Effectiveness Assumptions

The discount rate is the system average used in the 2007 IRP. PacifiCorp also provided the values for line losses and the residential retail energy rate.

Table 1: Inputs

Parameter	Value
Discount Rate	7.1%
Line Loss	8.859%
Residential Energy Rate (\$/kWh)	\$0.0830
Net to Gross Ratio	80%
Measure Life	45 years

Information in tables 2 and 3 summarizes electric energy savings, incentive levels, administrative and measure costs on a per square foot basis. Energy savings are from the cited data sources and multiplied by the net to gross ratios provided in table 1. Administrative costs were provided by the program administrator. Measure costs are from application data provided in the spreadsheet cited above. Measure costs are based on average application cost data to date and are multiplied by 50% in cases where Questar incentives are available for the same measure.

Table 2: RTF Measure Costs and Savings

Measure	2008 Net Unit Savings	2008 Customer Incentive	Admin Cost	Measure Cost
Insulation - Walls (2007 - 2008)	0.16	\$0.45	\$0.033	\$0.44
Insulation - Floor (2007 - 2008)	0.11	\$0.35	\$0.033	\$0.38
Insulation - Attic (2007 - 2008)	0.09	\$0.35	\$0.033	\$0.36

Table 3: LBL Measure Costs and Savings

Measure	2009 Net Unit Savings	2009 Customer Incentive	Admin Cost	Measure Cost
Insulation - Walls - Electric (2009)	3.01	\$0.45	\$0.027	\$0.88
Insulation - Walls - Gas (2009)	0.13	\$0.15	\$0.027	\$0.44
Insulation - Floor - Electric (2009)	2.07	\$0.25	\$0.027	\$0.75
Insulation - Floor - Gas (2009)	0	NA	NA	NA
Insulation - Attic - Electric (2009)	1.29	\$0.30	\$0.027	\$0.71
Insulation - Attic - Gas (2009)	0.16	\$0.10	\$0.027	\$0.36

Results

The cost-effectiveness of the residential insulation measures was calculated using Cadmus' Demand Impact and Cost Effectiveness model. The model distributes the assumed annual kWh savings across the year based on hourly residential air conditioning and general household load shapes for Utah. Each of these hourly saving values is multiplied by the associated hourly avoided-costs from PacifiCorp's IRP decrement values. The products are then compared on a net present value basis. This approach accurately captures the hourly differences in the value of a kWh during the year.

The results are grouped into two sections. Tables 4-12 present the measure cost analysis only. Tables 13-21 include administration costs.

Cost effectiveness excluding administrative costs.

Table 4: RTF Wall Insulation (7% IRP Decrement)

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.35	\$0.49	\$0.14	1.391
Total Resource Cost Test (TRC) No Adder	\$0.35	\$0.45	\$0.09	1.265
Utility Cost Test (UCT)	\$0.45	\$0.45	(\$0.00)	0.989
Utah Rate Impact Test (URIM)	\$0.46	\$0.47	\$0.01	1.019
Participant Cost Test (PCT)	(\$0.10)	\$0.31	\$0.40	NA

Table 5: RTF Floor Insulation (7% IRP Decrement)

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.30	\$0.33	\$0.03	1.112
Total Resource Cost Test (TRC) No Adder	\$0.30	\$0.30	\$0.00	1.011
Utility Cost Test (UCT)	\$0.35	\$0.30	(\$0.05)	0.867
Utah Rate Impact Test (URIM)	\$0.36	\$0.32	(\$0.04)	0.896
Participant Cost Test (PCT)	(\$0.05)	\$0.21	\$0.26	NA

Table 6: RTF Attic Insulation (7% IRP Decrement)

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.28	\$0.27	(\$0.01)	0.966
Total Resource Cost Test (TRC) No Adder	\$0.28	\$0.25	(\$0.03)	0.878
Utility Cost Test (UCT)	\$0.35	\$0.25	(\$0.10)	0.713
Utah Rate Impact Test (URIM)	\$0.36	\$0.26	(\$0.09)	0.741
Participant Cost Test (PCT)	(\$0.07)	\$0.17	\$0.24	NA

Table 7: LBL Wall Insulation – Electric Heat (46% IRP Decrement)

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.70	\$3.80	\$3.10	5.405
Total Resource Cost Test (TRC) No Adder	\$0.70	\$3.46	\$2.75	4.913
Utility Cost Test (UCT)	\$0.45	\$3.46	\$3.01	7.687
Utah Rate Impact Test (URIM)	\$0.70	\$3.67	\$2.97	5.243
Participant Cost Test (PCT)	\$0.25	\$5.64	\$5.38	22.186

Table 8: LBL Wall Insulation – Gas Heat (7% IRP Decrement)

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.35	\$0.39	\$0.04	1.113
Total Resource Cost Test (TRC) No Adder	\$0.35	\$0.36	\$0.00	1.011
Utility Cost Test (UCT)	\$0.15	\$0.36	\$0.21	2.374
Utah Rate Impact Test (URIM)	\$0.16	\$0.38	\$0.22	2.349
Participant Cost Test (PCT)	\$0.20	\$0.25	\$0.04	1.215

Table 9: LBL Floor Insulation – Electric Heat (46% IRP Decrement)

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.60	\$2.61	\$2.01	4.348
Total Resource Cost Test (TRC) No Adder	\$0.60	\$2.37	\$1.77	3.953
Utility Cost Test (UCT)	\$0.25	\$2.37	\$2.12	9.488
Utah Rate Impact Test (URIM)	\$0.42	\$2.52	\$2.10	5.971
Participant Cost Test (PCT)	\$0.35	\$3.86	\$3.51	11.041

Table 10: LBL Floor Insulation – Gas Heat (7% IRP Decrement)

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.00	\$0.00	\$0.00	NA
Total Resource Cost Test (TRC) No Adder	\$0.00	\$0.00	\$0.00	NA
Utility Cost Test (UCT)	\$0.00	\$0.00	\$0.00	NA
Utah Rate Impact Test (URIM)	\$0.00	\$0.00	\$0.00	NA
Participant Cost Test (PCT)	\$0.00	\$0.00	\$0.00	NA

Table 11: LBL Attic Insulation – Electric Heat (46% IRP Decrement)

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.57	\$1.63	\$1.06	2.866
Total Resource Cost Test (TRC) No Adder	\$0.57	\$1.48	\$0.91	2.606
Utility Cost Test (UCT)	\$0.30	\$1.48	\$1.18	4.934
Utah Rate Impact Test (URIM)	\$0.41	\$1.57	\$1.16	3.859
Participant Cost Test (PCT)	\$0.27	\$2.41	\$2.14	8.998

Table 12: LBL Attic Insulation – Gas Heat (7% IRP Decrement)

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.28	\$0.49	\$0.20	1.714
Total Resource Cost Test (TRC) No Adder	\$0.28	\$0.44	\$0.16	1.558
Utility Cost Test (UCT)	\$0.10	\$0.44	\$0.34	4.424
Utah Rate Impact Test (URIM)	\$0.11	\$0.47	\$0.36	4.137
Participant Cost Test (PCT)	\$0.18	\$0.31	\$0.12	1.658

Cost effectiveness including administrative costs.

**Table 13: RTF Wall Insulation including Admin
(7% IRP Decrement)**

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.39	\$0.49	\$0.10	1.272
Total Resource Cost Test (TRC) No Adder	\$0.39	\$0.45	\$0.06	1.156
Utility Cost Test (UCT)	\$0.48	\$0.45	(\$0.04)	0.922
Utah Rate Impact Test (URIM)	\$0.50	\$0.47	(\$0.02)	0.952
Participant Cost Test (PCT)	(\$0.10)	\$0.31	\$0.40	NA

**Table 14: RTF Floor Insulation including Admin
(7% IRP Decrement)**

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.33	\$0.33	\$0.00	1.002
Total Resource Cost Test (TRC) No Adder	\$0.33	\$0.30	(\$0.03)	0.911
Utility Cost Test (UCT)	\$0.38	\$0.30	(\$0.08)	0.792
Utah Rate Impact Test (URIM)	\$0.39	\$0.32	(\$0.07)	0.821
Participant Cost Test (PCT)	(\$0.05)	\$0.21	\$0.26	NA

**Table 15: RTF Attic Insulation including Admin
 (7% IRP Decrement)**

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.32	\$0.27	(\$0.04)	0.866
Total Resource Cost Test (TRC) No Adder	\$0.32	\$0.25	(\$0.07)	0.787
Utility Cost Test (UCT)	\$0.38	\$0.25	(\$0.13)	0.651
Utah Rate Impact Test (URIM)	\$0.39	\$0.26	(\$0.13)	0.678
Participant Cost Test (PCT)	(\$0.07)	\$0.17	\$0.24	NA

**Table 16: LBL Wall Insulation – Electric Heat including Admin
 (46% IRP Decrement)**

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.73	\$3.80	\$3.07	5.205
Total Resource Cost Test (TRC) No Adder	\$0.73	\$3.46	\$2.73	4.732
Utility Cost Test (UCT)	\$0.48	\$3.46	\$2.98	7.251
Utah Rate Impact Test (URIM)	\$0.73	\$3.67	\$2.94	5.048
Participant Cost Test (PCT)	\$0.25	\$5.64	\$5.38	22.186

**Table 17: LBL Wall Insulation – Gas Heat including Admin
 (7% IRP Decrement)**

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.38	\$0.39	\$0.01	1.033
Total Resource Cost Test (TRC) No Adder	\$0.38	\$0.36	(\$0.02)	0.939
Utility Cost Test (UCT)	\$0.18	\$0.36	\$0.18	2.011
Utah Rate Impact Test (URIM)	\$0.19	\$0.38	\$0.19	2.012
Participant Cost Test (PCT)	\$0.20	\$0.25	\$0.04	1.215

**Table 18: LBL Floor Insulation – Electric Heat including Admin
 (46% IRP Decrement)**

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.63	\$2.61	\$1.98	4.161
Total Resource Cost Test (TRC) No Adder	\$0.63	\$2.37	\$1.74	3.783
Utility Cost Test (UCT)	\$0.28	\$2.37	\$2.09	8.563
Utah Rate Impact Test (URIM)	\$0.45	\$2.52	\$2.07	5.612
Participant Cost Test (PCT)	\$0.35	\$3.86	\$3.51	11.041

**Table 19: LBL Floor Insulation – Gas Heat including Admin
 (7% IRP Decrement)**

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.00	\$0.00	\$0.00	NA
Total Resource Cost Test (TRC) No Adder	\$0.00	\$0.00	\$0.00	NA
Utility Cost Test (UCT)	\$0.00	\$0.00	\$0.00	NA
Utah Rate Impact Test (URIM)	\$0.00	\$0.00	\$0.00	NA
Participant Cost Test (PCT)	\$0.00	\$0.00	\$0.00	NA

**Table 20: LBL Attic Insulation – Electric Heat including Admin
 (46% IRP Decrement)**

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.60	\$1.63	\$1.03	2.736
Total Resource Cost Test (TRC) No Adder	\$0.60	\$1.48	\$0.89	2.488
Utility Cost Test (UCT)	\$0.33	\$1.48	\$1.15	4.526
Utah Rate Impact Test (URIM)	\$0.43	\$1.57	\$1.14	3.619
Participant Cost Test (PCT)	\$0.27	\$2.41	\$2.14	8.998

**Table 21: LBL Attic Insulation – Gas Heat including Admin
 (7% IRP Decrement)**

	Costs	Benefits	Net Benefit	Ratio
Total Resource Cost Test (TRC) + Conservation Adder	\$0.31	\$0.49	\$0.18	1.565
Total Resource Cost Test (TRC) No Adder	\$0.31	\$0.44	\$0.13	1.423
Utility Cost Test (UCT)	\$0.13	\$0.44	\$0.32	3.484
Utah Rate Impact Test (URIM)	\$0.14	\$0.47	\$0.33	3.342
Participant Cost Test (PCT)	\$0.18	\$0.31	\$0.12	1.658