

Date: June 9, 2009
To: Jim Gilroy
From: Brian Hedman
Re: Utah Residential New Construction Program 2009

The tables below present the assumptions and cost effectiveness findings of the 2009 Utah Residential New Construction Program based on program savings assumptions provided by Rocky Mountain Power.¹ The residential new construction program is a multi-measure residential energy efficiency program. This cost effectiveness analysis was conducted with the following assumptions:

- Measures were assigned individual measure lives and load shapes
- Measures were analyzed using the 2007 IRP east side 60% residential lighting decrement values

Cost Effectiveness Assumptions

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

The program is cost effective from all perspectives.

Table 1: Inputs

Parameter	Value
Discount Rate	7.1%
Line Loss	9.720%
Residential Energy Rate (\$/kWh)	\$0.0865
Net to Gross Ratio	80%

¹ "CECalssummary v 2009.xls" with updated budget information provided in an email from Jim Gilroy dated April 27, 2009

Table 2: Program Costs and Savings

Administration									
Year	Program	Utility	Evaluation	Code Training	Incentives	Inspections	Total Utility Cost	Net Annual Savings kwh	Net Incremental Cost
2009	\$820,639	\$30,000	\$85,000	\$40,000	\$728,090	\$10,000	\$1,713,729	3,319,949	\$745,416

Table 3: Program Participation

Tiers	Measure	Quantity	Savings / measure	Incentive	Savings per Tier	Incentive per Tier	Measure Life (yrs)	Incremental Cost	Incremental Total
Tier 1	ES + 50% cfl	1,372	1,753	\$ 250	2,405,116	\$ 343,000	12	\$ 262	\$ 359,464
Tier 2	ES + 75% cfl + SEER 14	328	2,309	\$ 300	757,352	\$ 98,400	11	\$ 312	\$ 102,336
Tier 3	ES + SEER 15 + 90% cfl + U=0.3	20	3,233	\$ 800	64,665	\$ 16,000	11	\$ 672	\$ 13,440
GSHP Option	Ground Source Heat Pump home	9	15,568	\$ 2,000	140,112	\$ 18,000	15	\$ 13,025	\$ 117,225
MF Twnhse	For 5-12 contiguous units: Meet 2009 ENERGY STAR specifications including performance-based duct sealing, air conditioner equipment commissioning, performance testing, correct sizing and best practices installation; plus installation of CFLs in 50% of available light sockets; ENERGY STAR appliance package (dishwasher, washer, refrigerator where permanently installed)	439	1,002	\$ 300	439,878	\$ 131,700	12	\$ 207	\$ 90,873
MF Flat	For 13 or more contiguous units: Meet 2009 ENERGY STAR specifications including performance-based duct sealing, air conditioner equipment commissioning, performance testing, correct sizing and best practices installation; plus installation of CFLs in 50% of available light sockets ENERGY STAR appliance package (dishwasher, washer, refrigerator where permanently installed)	150	645	\$ 200	96,750	\$ 30,000	12	\$ 73	\$ 10,950
Tiers Total		2,318			3,903,873	\$ 637,100			\$ 694,288
Plus Measures									
Single Family	Lighting upgrade to 75% ENERGY STAR CFLs	549	76	\$ 100	41,724	\$ 54,900	6	\$ 300	\$ 164,700
Single Family	Lighting upgrade to 90% ENERGY STAR CFLs	147	984	\$ 75	144,584	\$ 11,025	6	\$ 99	\$ 14,553
Single Family	14 SEER HVAC equipment with correct sizing and best practices installation	43	120	\$ 100	5,160	\$ 4,300	15	\$ 350	\$ 15,050
Single Family	Installation of a single vent evaporative cooling system	12	520	\$ 400	6,240	\$ 4,800	15	\$ 700	\$ 8,400
Single Family	Installation of a ducted high efficiency evaporative cooling system	2	920	\$ 750	1,840	\$ 1,500	15	\$ 1,200	\$ 2,400
Single Family	Installation of an Energy Star dishwasher	879	30	\$ 10	26,370	\$ 8,790	12	\$ 25	\$ 21,975
Single Family	Installation of whole house fan system	12	360	\$ 200	4,320	\$ 2,400	15	\$ 492	\$ 5,904
Single Family	ENERGY STAR ceiling fan with "Gossamer" blade design	12	85	\$ 75	1,020	\$ 900	12	\$ 25	\$ 300
Single Family	Lighting upgrade - Energy Star Fixture	18	102	\$ 50	1,836	\$ 900	15	\$ 50	\$ 900
MF Twnhse	Lighting upgrade to 90% ENERGY STAR CFLs	25	490	\$ 35	12,250	\$ 875	6	\$ 48	\$ 1,200
MF Twnhse	14 SEER HVAC equipment with correct sizing and best practices installation	6	120	\$ 100	720	\$ 600	15	\$ 350	\$ 2,100
Plus Measure Total		1,705			246,064	\$ 90,990			\$ 237,482
Total					4,149,936	\$ 728,090			\$ 931,770

Results

The cost-effectiveness of the Utah Residential New Construction program 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, heating, lighting and general household load shapes for Utah. Each of these hourly saving values is multiplied by the associated hourly avoided-costs from Rocky Mountain Power'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.

Table 4: 2007 IRP 60% Load Factor Decrement

All Measures				AC: IRP 60% LF	
	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	0.0703	\$1,616,298	\$2,065,847	\$449,550	1.278
Total Resource Cost Test (TRC) No Adder	0.0703	\$1,616,298	\$1,878,043	\$261,745	1.162
Utility Cost Test (UCT)	0.0696	\$1,600,120	\$1,878,043	\$277,923	1.174
Utah Rate Impact Test (URIM)		\$1,887,296	\$1,878,043	(\$9,253)	0.995
Participant Cost Test (PCT)		\$16,177	\$2,538,069	\$2,521,891	156.890
Lifecycle Revenue Impacts (\$/kWh)				\$0.0000000312	

Tables 5-8 present the cost effectiveness by measure category.

Table 5: Shell Measures

	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$189,450	\$875,226	\$685,776	4.620
Total Resource Cost Test (TRC) No Adder	\$189,450	\$795,660	\$606,210	4.200
Utility Cost Test (UCT)	\$211,724	\$795,660	\$583,936	3.758
Utah Rate Impact Test (URIM)	\$250,663	\$795,660	\$544,997	3.174
Participant Cost Test (PCT)	(\$22,274)	\$872,489	\$894,763	NA

Table 6: AC Measures

	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$161,909	\$173,073	\$11,164	1.069
Total Resource Cost Test (TRC) No Adder	\$161,909	\$157,339	(\$4,570)	0.972
Utility Cost Test (UCT)	\$80,148	\$157,339	\$77,191	1.963
Utah Rate Impact Test (URIM)	\$94,044	\$157,339	\$63,294	1.673
Participant Cost Test (PCT)	\$81,760	\$182,151	\$100,391	2.228

Table 7: Lighting Measures

	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$1,242,677	\$1,003,868	(\$238,809)	0.808
Total Resource Cost Test (TRC) No Adder	\$1,242,677	\$912,607	(\$330,069)	0.734
Utility Cost Test (UCT)	\$1,294,193	\$912,607	(\$381,585)	0.705
Utah Rate Impact Test (URIM)	\$1,526,709	\$912,607	(\$614,102)	0.598
Participant Cost Test (PCT)	(\$51,516)	\$1,463,122	\$1,514,638	NA

Table 8: Dishwashers

	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$22,262	\$13,681	(\$8,582)	0.615
Total Resource Cost Test (TRC) No Adder	\$22,262	\$12,437	(\$9,826)	0.559
Utility Cost Test (UCT)	\$14,055	\$12,437	(\$1,618)	0.885
Utah Rate Impact Test (URIM)	\$15,880	\$12,437	(\$3,443)	0.783
Participant Cost Test (PCT)	\$8,207	\$20,306	\$12,099	2.474