

EPY4/GPY1 Cost Effectiveness Summary Report:

June 2011 through May 2012

Prepared for:
Illinois Department of Commerce and Economic Opportunity

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Total Resource Cost (TRC) Test Results

This report presents the results of the cost effectiveness evaluation of all programs offered by the Illinois Department of Commerce and Economic Opportunity (DCEO). This report presents results for activity during electric program year four and natural gas program year one (EPY4/GPY1), which is defined as the period from June 2011 through May 2012.

1.1 TRC Definition and Modeling Inputs

The Total Resource Cost (TRC) Test measures the net costs of a demand-side management program as a resource option based on the total costs of the program, including both participant and utility costs.¹ The Illinois Power Agency Act specifies that programs are to be administered only if they are cost effective at the program level (excluding programs aimed at income qualified customers). Specifically, “*Including cost-effective renewable resources in that portfolio will reduce long-term direct and indirect costs to consumers by decreasing environmental impacts and by avoiding or delaying the need for new generation, transmission, and distribution infrastructure.*”

The goal of this evaluation is to determine the TRC score for each of the programs implemented through DCEO during EPY4/GPY1.

The specifics for conducting the testing are laid out in the California Standard Practice Manual:

The TRC test represents the combination of the effects of a program on both the customers participating and those not participating in a program. The benefits calculated in the Total Resource Cost Test are the avoided supply costs, the reduction in transmission, distribution, generation, and capacity costs valued at marginal cost for the periods when there is a load reduction. The avoided supply costs should be calculated using net program savings, savings net of changes in energy use that would have happened in the absence of the program. The costs in this test are the program costs paid by both the utility and the participants, plus the increase in supply costs for the periods in which load is increased. Thus all equipment costs, installation, operation and maintenance, cost of removal (less salvage value), and administration costs, no matter who pays for them, are included in this test.

ADM utilizes modeling software called DSMore to perform the cost effectiveness testing. The complete set of utility and program specific inputs to the model are specified in Table 1. EPY4/GPY1 is the first program year that included funds for measures targeting natural gas savings. Any program with electric and natural gas savings would have the benefit streams from both natural gas and electric sources combined for the purposes of this evaluation.

¹ California Standard Practice Manual, page 18.

Table 1 Inputs to the TRC Model

<i>Category</i>	<i>Input</i>	<i>Source(s)</i>
Utility Specific	Avoided Cost of Energy Projections (\$/kWh) (2012 - 2035)	Ameren, ComEd, People's Gas, Nicor and Northshore
	Avoided Electric Capacity Cost Projections (\$/kW) (2012 - 2035)	
	Avoided Procurement Cost of Natural Gas Projections (\$/Therm) (2012 - 2035)	
	Weighted Average Cost of Capital (Used to Discount Future Benefit Streams to Present Dollars)	
	Electric Line Loss Percentage (Rates Vary by Customer Type, i.e. Residential vs Commercial)	
	Gas Distribution Loss Percentage	
Program Specific	Realized Net kWh Savings	ADM
	Realized Net Peak kW Savings	ADM
	Realized Net Therm Savings	ADM
	Aggregate Effective Useful Life	ADM, DEER
	Incremental Costs	ADM, DEER
	Program Incentives	DCEO
	Implementation Costs	DCEO
	Administration and Evaluation Costs	DCEO

1.1.1 Utility Specific Inputs

The avoided energy cost projections (kWh, kW and therms) were acquired and applied individually from each utility. The weighted average cost of capital (WACC), electric line loss, and natural gas loss rates are also specific to each utility. These inputs define a set of models that allow savings streams to be converted to dollars and combined at the utility level.

1.1.2 Program Specific Inputs

The realized savings values come from the EPY4/GPY1 evaluation reports completed by ADM. The aggregate effective useful life (EUL) was calculated at the measure level and applied using

each program tracking database. Individual measure lives were sourced from the Database for Energy Efficient Resources (DEER) database of residential and commercial EULs. Incremental costs were also referenced from both DEER measure cost databases and ADM's internal sources created from work on similar programs in North America. Program incentives, implementation costs, administrative costs, and evaluation costs were provided by the DCEO program manager. The total expenditure columns in Table 2 consist of incentive, administration, implementation, and evaluation, measurement, and verification (EM&V) costs. These values are all broken out by utility and fuel type.

Table 2 Total Expenditures by IOU/Fuel Type and by Program

Program	North Shore	Ameren		ComEd	Nicor	Peoples	Total	
	Gas	Electric	Gas	Electric	Gas	Gas	Gas	Electric
Custom	58,142	2,222,752	382,272	5,754,394	300,314	280,530	1,021,257	7,977,147
Standard (Prescriptive)	67,508	2,580,817	443,853	6,681,373	348,691	325,720	1,185,772	9,262,190
New Construction	-	172,525	2,987	45,452	7,024	-	10,011	217,977
Retro Commissioning	-	200,000	50,000	1,100,000	250,000	100,000	400,000	1,300,000
Boiler Tune-Up	4,800	-	130,125	-	175,724	89,363	400,012	-
Total Public Sector	130,449	5,291,348	1,009,237	13,934,076	1,081,754	795,613	3,017,053	19,225,425
Lights for Learning	-	115,255	-	352,856	-	-	-	468,111
SEDAC	30,516	674,195	165,541	1,886,137	475,235	115,724	787,017	2,560,332
Building Operator Certification (BOC)	1,920	53,630	19,980	160,084	31,660	11,810	65,370	213,714
Total Market Transformation	32,436	727,825	185,521	2,046,221	506,895	127,534	852,387	2,774,046
Low Income Residential Retrofit	35,723	2,027,743	564,446	4,749,767	738,655	405,012	1,743,836	6,777,510
Affordable Housing Construction	14,250	400,317	136,685	3,130,113	194,637	130,328	475,900	3,530,430
Public Housing Authority	15,536	926,547	556,232	1,388,219	674,965	250,046	1,496,779	2,314,766
Total Low Income Sector	65,509	3,354,607	1,257,363	9,268,098	1,608,257	785,386	3,716,515	12,622,705
Total Portfolio	228,394	9,373,780	2,452,122	25,248,396	3,196,906	1,708,534	7,585,955	34,622,176

Notes: (1) The Retro Commissioning program is structured with a majority of expenditure happening in EPY4, which benefits from those expenditures will continue to accrue in EPY5. (2) The Market transformation programs (SEDAC, Lights for Learning, and BOC) have benefits that are not quantified by this analysis because they accrue to other programs.

1.2 Analysis Technique, Inputs and TRC Results

To evaluate the DCEO portfolio of programs, ADM applied utility specific savings and valued them using the corresponding cost, loss and discount rates. The output of each utility model is a dollar figure that represents the discounted present value of the savings over the lifetime of each measure. The program savings at the portfolio level are detailed in Table 3. These dollar amounts were then summed up to determine the “Total Benefits” column in Table 4. The “Total Cost” column was calculated by combining incremental costs, program administration and evaluation costs, and the cost of incentives administered to free riders. The TRC score is developed by taking the ratio of total benefits to total costs (Total Benefits/Total Costs).

The TRC ratio for the entire portfolio is 2.26. This indicates that the current mix of programs (including low income and market transformation programs), are a cost effective allocation of resources. The public sector (excluding low income programs) TRC is 2.84. This is largely due to the success of the Custom and Standard Incentive Programs, which account for roughly 80% of portfolio benefits. Figure 1 details the percentage of total benefits contributed by each Program.

Table 3 Portfolio Level Expected, Gross and Net Savings

<i>Program</i>	<i>Expected kWh</i>	<i>Gross Realized kWh</i>	<i>Net Realized kWh</i>	<i>Expected Therms</i>	<i>Gross Realized Therms</i>	<i>Net Realized Therms</i>
Custom	59,793,548	57,254,082	54,076,457	2,317,745	2,535,123	2,193,620
Standard (Prescriptive)	56,151,930	66,357,365	64,041,574	105,741	70,548	60,250
New Construction	1,901,685	1,737,225	1,655,708	12,710	13,854	11,907
Retro Commissioning	6,309,947	5,932,585	5,932,585	-	-	-
Boiler Tune-Up	-	-	-	2,097,277	1,471,958	1,422,270
Total Public Sector	124,157,110	131,281,257	125,706,324	4,533,473	4,091,483	3,688,047
Lights for Learning	787,395	689,388	599,767	-	-	-
Building Operator Certification	N/A	N/A	1,631,148	N/A	N/A	1,694
SEDAC	N/A	N/A	1,776,875	N/A	N/A	17,131
Market Transformation	787,395	689,388	4,007,790	-	-	18,825
Residential Retrofit	11,454,529	9,046,554	9,046,554	328,268	328,861	328,861
Low Income Affordable Housing Construction	3,217,713	3,569,206	3,569,206	16,749	30,998	30,998
Low Income Public Housing Authority	2,785,697	2,781,182	2,781,182	190,097	161,896	161,896
Total Low Income Sector	17,457,939	15,396,942	15,396,942	535,114	521,755	521,755
Total Portfolio	142,402,444	147,367,587	145,111,056	5,068,587	4,614,932	4,228,627

Notes: (1) The Retro Commissioning program is expected to have natural gas savings in GPY2 that result from projects initiated in GPY1. Natural gas savings were not expected for projects initiated in EPY3.

Table 4 Benefits, Costs and TRC by Utility Company and Sector

Program	Benefits (2012 Dollars)								Total Costs (2012 Dollars)	TRC Ratio
	North Shore	Ameren		ComEd	Nicor	Peoples	Total Benefits			
Fuel Type	Gas	Electric	Gas	Electric	Gas	Gas	Gas	Electric		
Custom	570,819	11,419,972	5,040,006	27,403,349	1,569,846	10,321,878	17,502,549	38,823,321	19,297,508	2.92
Standard (Prescriptive)	16,359	10,912,489	87,902	37,089,387	242,245	10,321,878	10,668,385	48,001,876	22,782,322	2.58
New Construction	-	1,282,659	42,223	305,088	1,481,259	81,087	1,604,569	1,587,747	1,442,882	2.21
Retro Commissioning	-	690,246	-	2,948,762	-	-	-	3,639,009	1,715,367	2.12
Boiler Tune-Up	2,796	-	1,766,965	-	3,407,710	4,653,263	9,830,735	-	1,048,906	9.37
Total Public Sector	589,975	24,305,366	6,937,096	67,746,587	6,701,060	25,378,106	39,606,238	92,051,953	46,286,986	2.84
Building Operator Certification	31	29,020	1,360	138,528	119	303	1,813	167,549	267,274	0.66
Lights for Learning	-	78,264	-	386,173	-	-	-	464,437	504,107	0.92
SEDAC	754,887	308,552		528,133	214,509		969,396	836,686	3,901,726	0.46
Total Market Transformation	754,918	421,596	1,360	1,052,835	214,627	303	971,209	1,474,431	4,673,107	0.52
Residential Retrofit	26,178	2,116,201	938,685	3,276,175	435,488	734,899	2,135,250	5,392,376	8,116,334	0.93
Low Income Affordable Housing Construction	99,861	411,449	-	5,777,568	54,058	-	153,919	6,189,017	3,876,002	1.64
Low Income Public Housing Authority	68,957	755,573	476,553	368,897	253,983	131,633	931,126	1,124,471	3,561,499	0.58
Total Low Income Sector	194,996	3,283,223	1,415,238	9,422,640	743,529	866,532	3,220,294	12,705,863	15,553,834	1.02
Total Portfolio	1,539,889	28,010,185	8,353,694	78,222,062	7,659,217	26,244,941	43,797,741	106,232,247	66,513,926	2.26

Notes: (1) The building operator certification and SEDAC programs serve to increase participation in all other incentive programs and their TRC underestimate their true influence.

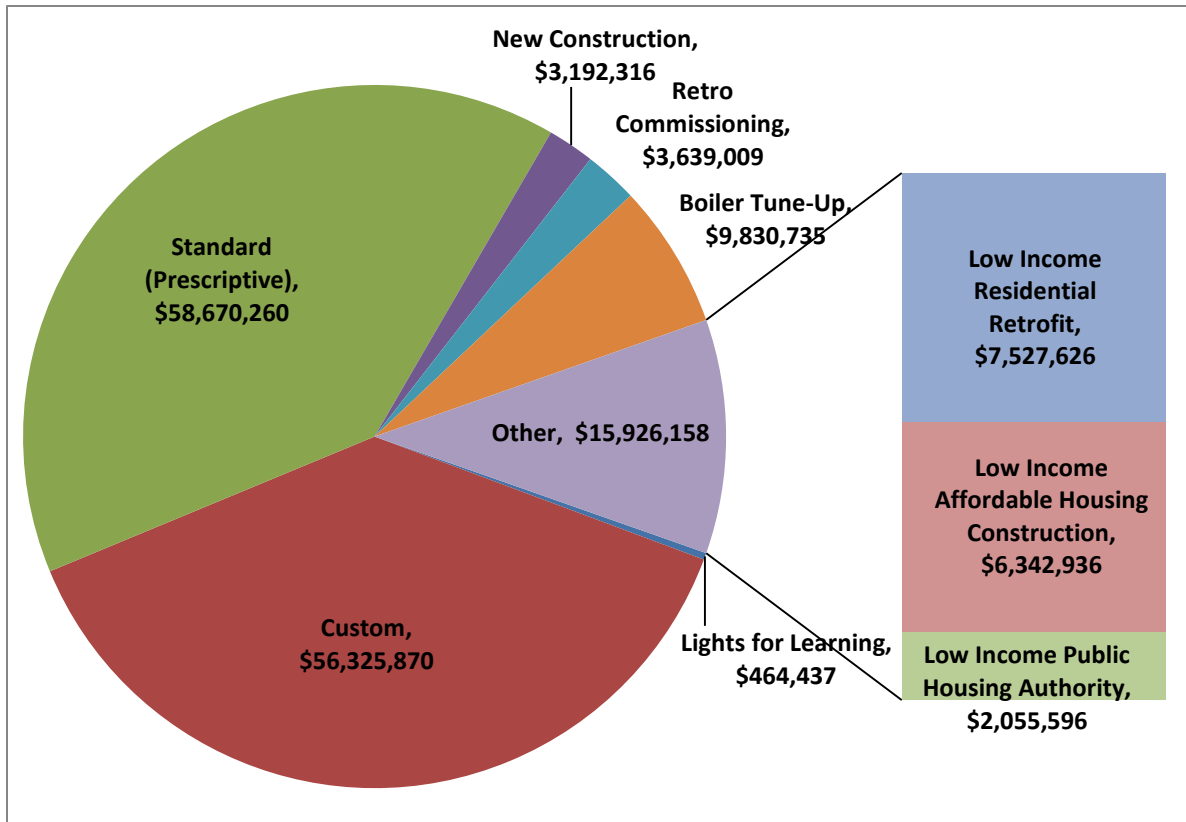


Figure 1 Direct Contribution to Total Benefits by Program (Incentive Programs only)

In terms of contributions to total benefits the rankings by program are: (1) Public Sector Standard Incentives, (2) Public Sector Custom Incentives, (3) Public Sector Boiler Tune-Up, (4) Low Income Residential Retrofit, (5) Affordable Housing Construction, (6) Public Sector Retro-Commissioning, (7) Public Housing Authority, (8) Public Sector New Construction, and (9) Lights for Learning. This is largely indicative of the size of the programs, but also takes into account the EUL of the measures, and the portion of gross savings that can be attributed to the effects of the program. The market transformation programs have been excluded from this figure because a comparison with the savings attributed to the incentive programs would not be reasonable based on how savings have been allocated. That is, some energy savings attributed to the incentive programs are likely indirectly attributable to the market transformation programs, leading to a potential understatement of the energy savings attributable to the market transformation programs.

The contribution of gas savings to the overall portfolio can be seen in Figure 2 70% of total benefits can be attributed to electric savings, while the remaining 30% were from natural gas savings. Figure 2 details the breakdown of savings source by program category.

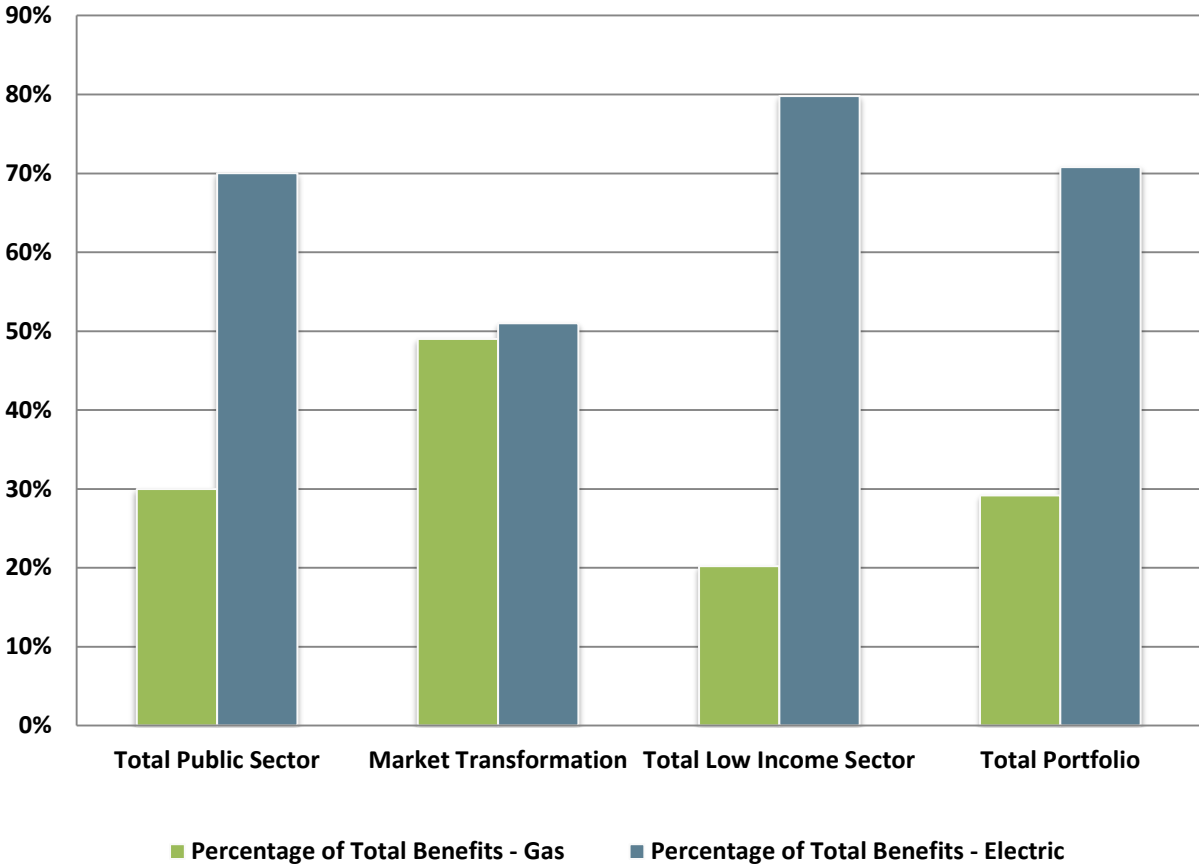


Figure 2 Gas and Electric Contributions to Total Benefits by Program

1.3 Program Level Inputs

All EULs were calculated by referencing DEER for each measure in the program and then constructing an average of all measures lives, weighted by savings (Net MMBTU), within each program. The weighted average savings for each program are described in Table 5.

Table 5 Expected Useful Life (EUL) by Program

Program	Measure Life Description
Lights for Learning	The Lights for Learning Program was implemented as an education program, with the incentive amount going to fund half of the cost for energy efficient products. The average EUL of those products was 20 years.
Custom	The average of all measures in the custom portfolio across all programs is 14 years.
Standard (Prescriptive)	The prescriptive program had an average DEER EUL of 14 years. This was calculated at the measure level and aggregated by IOU.

<i>Program</i>	<i>Measure Life Description</i>
New Construction	An EUL of 20 years was assumed for this program. This is consistent with other evaluations of New Construction programs.
Retro Commissioning	The Retro Commissioning Program referenced the DEER database for all measures, and was calculated to have an EUL of 14 years.
Boiler Tune-Up	The Boiler Tune-Up Program average EUL was determined to be 8 years.
Building Operator Certification	The Building Operator Certification Program was an education/market transformation program, and as structured has an EUL of one year.
SEDAC	The average EUL for the SEDAC Program was determined to be 14 years through the cross-referencing of all spillover measures with the DEER database
Residential Retrofit	The Low Income Residential Retrofit program has an average EUL of 11 years.
Low Income Affordable Housing Construction	The Affordable Housing Construction Program consists of new construction projects and was given the same measure life (20 years) as the NC program.
Low Income Public Housing Authority	The Public Housing Authority Program consisted of upgrades to existing homes and was calculated to have an EUL of 11 years.

The Net MMBTU values were calculated to allow electric and natural gas measures to have equal contributions to the weighted average formula. The program level DSMore output for the public sector is summarized in Table 6. The market transformation programs² are detailed in Table 7, and the low income programs in Table 8. The benefit streams have been divided and presented as six sub-categories:

1. *Avoided Electric Production*: Determined by using each IOUs projections for average annual costs of electric production.
2. *Avoided Electric Capacity*: A projection of the market price each IOU will have to pay during the peak hours of each year. An applicable load shape is applied to the savings for each program, and the resulting peak kW savings are matched up with the IOU specific cost projection.

² These programs are designed to boost participation in all the other Public sector programs, and as such should not be compared to the other programs based on TRC score alone. The evaluation reports for these programs provide additional detail on the program impacts.

3. *Avoided Transmission and Distribution (T&D) Electric*: Also IOU specific, this takes into account the amount of energy loss that exists between the power generation and the customer's residence. Can range from 3 to 9%.
4. *Avoided Ancillary*: Defined by the US Federal Energy Regulatory Commission as "those services necessary to support the transmission of electric power from seller to purchaser given the obligations of control areas and transmitting utilities within those control areas to maintain reliable operations of the interconnected transmission system."
5. *Avoided Gas Production*: The projected average annual cost of natural gas, applied for each IOU.
6. *Avoided Gas Capacity*: The cost of providing gas when the system is at peak demand. IOU specific values that are projected into the future.

The Program related costs are reported and inputted as four separate categories:

1. *Administration/Program Costs*: These are costs attributable to the actual implementation of each program. It includes payments to contractors (in the case of direct install programs), salaries for program managers, but explicitly excludes any incentive payments.
2. *EM&V Costs*: The evaluation costs for each program.
3. *Utility Incentive Costs*: The incentive payments made to participants of the program.
4. *Participant Costs*: The additional costs of implementing the measures, after subtracting out the cost of baseline equipment and the incentive payments. These cost figures come from DEER, and internal cost databases that ADM has constructed from other data collected in the region.

Table 6 Public Sector Program Level Detail from DSMore

	<i>Custom</i>	<i>Standard (Prescriptive)</i>	<i>New Construction</i>	<i>Retro Commissioning</i>	<i>Boiler Tune- Up</i>
Measure Life	14	14	20	14	8
Ex-Post Gross MWh	57,254	66,357	1,737	5,933	-
Ex-Post Gross kW	-	-	-	222	-
Ex-Post Net MWh	54,076	64,042	1,656	5,933	-
Ex-Post Net kW	5,831	9,255	179	222	-
Ex-Post Gross Therms	2,535,123	70,548	13,854	-	1,471,958
Ex-Post Net Therms	2,193,620	60,250	11,907	-	1,422,270
Avoided Electric Production	\$33,431,224	\$39,508,942	\$1,403,136	\$3,454,898	\$-
Avoided Electric Capacity	\$3,513,346	\$5,504,167	\$127,878	\$116,919	\$-
Avoided T&D Electric	\$630,108	\$1,008,225	\$17,277	\$23,268	\$-
Avoided Ancillary	\$1,248,642	\$1,980,541	\$39,457	\$43,924	\$-
Avoided Gas Production	\$16,943,460	\$10,327,602	\$1,553,314	\$-	\$9,516,709
Avoided Gas Capacity	\$559,089	\$340,783	\$51,255	\$-	\$314,026
Administration/Program Costs	\$1,822,031	\$1,051,409	\$27,363	\$1,383,595	\$15,516
EM&V Costs	\$96,293	\$55,566	\$1,446	\$73,122	\$820
Utility Incentive Costs	\$6,895,844	\$9,070,833	\$200,624	\$216,405	\$295,133
Gross Participant Costs	\$18,502,366	\$22,516,719	\$1,485,210	\$331,772	\$1,069,493
Net Participant Costs	\$17,475,477	\$21,730,913	\$1,415,519	\$331,772	\$1,033,391
Total Benefits	\$56,325,870	\$58,670,260	\$3,192,316	\$3,639,009	\$9,830,735
Total Costs	\$19,297,508	\$22,782,322	\$1,442,882	\$1,715,367	\$1,048,906
TRC	2.92	2.58	2.21	2.12	9.37

Notes: These values have been summed across all applicable IOUs for each program.

Table 7 Market Transformation Program Level Detail from DSMore

	<i>Building Operator Certification</i>	<i>SEDAC</i>	<i>Lights for Learning</i>
Measure Life	1	14	1
Ex-Post Gross MWh	-	-	689
Ex-Post Gross kW	-	-	62
Ex-Post Net MWh	1,631	1,777	600
Ex-Post Net kW	464	649	54
Ex-Post Gross Therms	-	17,131	-
Ex-Post Net Therms	1,694	17,131	-
Avoided Electric Production	\$140,991	\$686,415	\$409,851
Avoided Electric Capacity	\$8,166	\$97,430	\$35,812
Avoided T&D Electric	\$9,722	\$17,724	\$6,075
Avoided Ancillary	\$14,429	\$35,116	\$12,699
Avoided Gas Production	\$1,755	\$933,475	\$-
Avoided Gas Capacity	\$58	\$30,802	\$-
Administration/Program Costs	\$267,274	\$3,231,624	\$416,166
EM&V Costs	\$14,125	\$170,789	\$21,994
Utility Incentive Costs	\$-	\$-	\$51,945
Gross Participant Costs	\$-	\$670,102	\$101,081
Net Participant Costs	\$-	\$670,102	\$87,940
Total Benefits	\$175,121	\$1,800,963	\$464,437
Total Costs	\$267,274	\$3,901,726	\$504,107
TRC	0.66	0.46	0.92

Notes: These values have been summed across all applicable IOUs for each program.

Table 8 Low Income Program Level Detail from DSMore

	<i>Low Income Residential Retrofit</i>	<i>Affordable Housing Construction</i>	<i>Public Housing Authority</i>
Measure Life	11	20	11
Ex-Post Gross MWh	9,047	3,569	2,781
Ex-Post Gross kW	1,280	2,392	448
Ex-Post Net MWh	9,047	3,569	2,781
Ex-Post Net kW	1,280	2,392	448
Ex-Post Gross Therms	328,861	30,998	161,896
Ex-Post Net Therms	328,861	30,998	161,896
Avoided Electric Production	4,395,384	2,821,638	900,263
Avoided Electric Capacity	\$640,092	\$2,179,445	\$147,286
Avoided T&D Electric	\$123,213	\$389,143	\$25,648
Avoided Ancillary	\$233,686	\$798,791	\$51,274
Avoided Gas Production	\$2,067,043	\$149,002	\$901,383
Avoided Gas Capacity	\$68,207	\$4,917	\$29,743
Administration/Program Costs	\$8,116,334	\$3,876,002	\$3,561,499
EM&V Costs	\$428,943	\$204,844	\$188,223
Utility Incentive Costs	\$-	\$-	\$-
Gross Participant Costs	\$-	\$-	\$-
Net Participant Costs	\$-	\$-	\$-
Total Benefits	\$7,527,626	\$6,342,936	\$2,055,596
Total Costs	\$8,116,334	\$3,876,002	\$3,561,499
TRC	0.93	1.64	0.58

Notes: These values have been summed across all applicable IOUs for each program.