

**Energy Efficiency / Demand Response  
Plan: Plan Year 3 (6/1/2010-5/31/2011)**

**Review of PY3 Total Resource Cost Test  
Assumptions**

**Presented to**

**Commonwealth Edison Company**

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## 1. Overview

As part of Navigant’s evaluation of Commonwealth Edison Company’s (ComEd) energy efficiency and demand response programs for program year three we reviewed the outputs of DSMore, an excel based tool, that calculates program level cost effectiveness for various tests, including the Utility, Ratepayer Impact Measure (RIM), Participant, Total Resource Cost (TRC) and Societal tests. The focus of this review is on the basis and reasonableness of the assumptions used to conduct the Illinois TRC test.

The Illinois TRC test is defined in the Illinois Power Agency Act SB1592 as follows:

“ ‘Total resource cost test’ or ‘TRC test’ means a standard that is met if, for an investment in energy efficiency or demand-response measures, the benefit-cost ratio is greater than one. The benefit-cost ratio is the ratio of the net present value of the total benefits of the program to the net present value of the total costs as calculated over the lifetime of the measures. A total resource cost test compares the sum of avoided electric utility costs, representing the benefits that accrue to the system and the participant in the delivery of those efficiency measures, to the sum of all incremental costs of end-use measures that are implemented due to the program (including both utility and participant contributions), plus costs to administer, deliver, and evaluate each demand-side program, to quantify the net savings obtained by substituting the demand-side program for supply resources. In calculating avoided costs of power and energy that an electric utility would otherwise have had to acquire, reasonable estimates shall be included of financial costs likely to be imposed by future regulations and legislation on emissions of greenhouse gases.”<sup>1</sup>

The Illinois TRC test differs from traditional TRC tests in its requirement to include a reasonable estimate of the financial costs associated with future regulations and legislation on the emissions of greenhouse gases (GHG). This difference adds an additional benefit to investments in efficiency programs that are typically included in the Societal test in other jurisdictions. However, the Illinois TRC test differs from the Societal test in that it only includes benefits associated with avoided GHG’s and the discount rate applied to future benefits is the electric distribution companies (EDCs) Weighted Average Cost of Capital (WACC) which is typically used for in TRC calculations.

### 1.1 *IL TRC Equation*

The equation used to calculate the Illinois TRC is presented below:

#### Equation 1 – Illinois TRC

$$BCR_{ILTRC} = B_{ILTRC} / C_{ILTRC}$$

Where,

- BCR<sub>ILTRC</sub>** = Benefit-cost ratio of the Illinois total resource cost test
- B<sub>ILTRC</sub>** = Benefits of a Illinois program or portfolio
- C<sub>ILTRC</sub>** = Costs of a Illinois program or portfolio

<sup>1</sup> Illinois Power Agency Act SB1592, pages 7-8.

The benefits of the Illinois TRC are calculated using the following equation:

**Equation 2 – IL TRC Benefits**

$$B_{ILTRC} = \sum_{t=1}^N \frac{UAEP_t + UATD_t + UAA_t + EB_t}{(1+d)^{t-1}} + \sum_{t=1}^N \frac{UAC_{at} + PAC_{at}}{(1+d)^{t-1}}$$

The costs of the Illinois TRC are calculated using the following equation:

**Equation 3 - IL TRC Costs**

$$C_{ILTRC} = \sum_{t=1}^N \frac{PRC_t + PIC_t + PEAM_t + PCN_t + UIC_t}{(1+d)^{t-1}}$$

Where benefits are defined as:

- UAEP<sub>t</sub> = Utility avoided electric production costs in year t
- UATD<sub>t</sub> = Utility avoided transmission and distribution costs in year t
- UAA<sub>t</sub> = Utility avoided ancillary costs in year t
- EB<sub>t</sub> = Environmental Benefits in year t
- UAC<sub>at</sub> = Utility avoided supply costs for the alternate fuel in year t
- PAC<sub>at</sub> = Participant avoided costs in year t for alternate fuel devices

And costs are defined as:

- PRC<sub>t</sub> = Program Administrator program costs in year t
- PIC<sub>t</sub> = Program Implementation costs in year t
- PEAM<sub>t</sub> = Program Evaluation, Measurement & Verification (EM&V), Advertising and Miscellaneous costs in year t
- PCN = Net Participant costs
- UIC<sub>t</sub> = Utility increased supply costs in year t

## 1.2 TRC Data Requirements

The data points needed to conduct the Illinois TRC test are provided in Table 1 below and are divided into generic and program specific categories. The program specific data points are further subdivided into those that are provided by ComEd versus those that are a result of the Navigant’s evaluation activities.

**Table 1 Data points needed to conduct TRC**

Category	Data Point	Source
Generic	<ul style="list-style-type: none"> <li>• Avoided energy costs (\$/kWh)</li> <li>• Avoided capacity costs (\$/kW)</li> <li>• Discount Rate</li> <li>• Line Losses</li> <li>• Escalation Rates</li> <li>• CO2 costs</li> </ul>	ComEd
Program Specific	<ul style="list-style-type: none"> <li>• Participants</li> <li>• Verified Ex-Ante Energy Savings (kWh)</li> <li>• Verified Ex-Ante Capacity Savings (kW)</li> <li>• Realization Rate</li> <li>• Net to Gross Ratio</li> </ul>	Navigant
	<ul style="list-style-type: none"> <li>• Measure life</li> <li>• Implementation Costs</li> <li>• Utility Admin Costs</li> <li>• Utility Incentive Costs</li> <li>• Participant Costs</li> </ul>	ComEd

This document provides a summary of the results at the portfolio and program level, the program specific inputs, a description of each of the data points provided by ComEd, the basis of their determination and their reasonableness.

## 2. Summary of Results & Generic Data Points

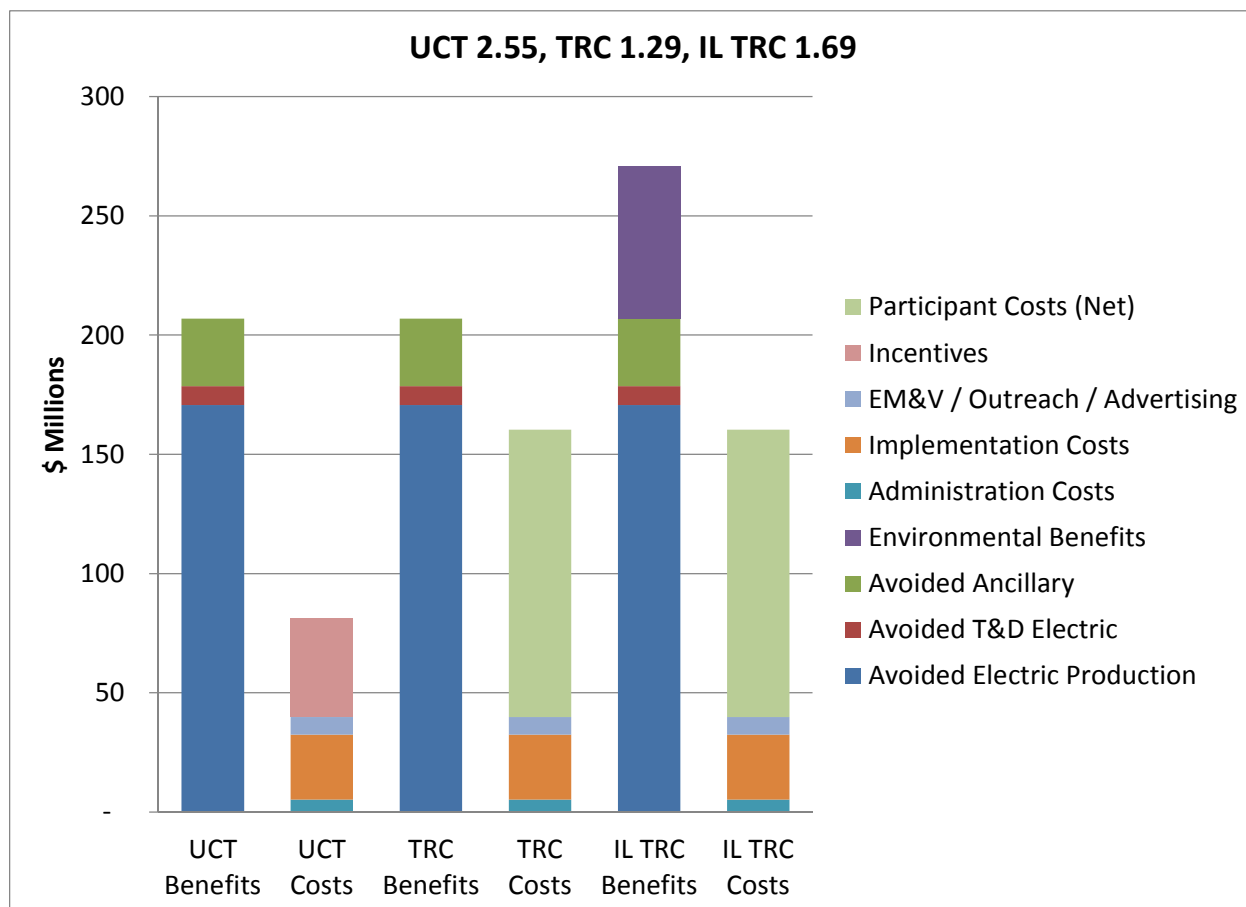
### 2.1 Present Value Summary of Portfolio Benefits and Costs

A summary of the portfolio level results, separated by benefits and cost components, is presented in Table 2 and Figure 1 below.

**Table 2 – Summary of Portfolio Level Costs and Benefits**

	UCT Test		TRC Test		Illinois TRC Test	
	UCT Benefits	UCT Costs	TRC Benefits	TRC Costs	IL TRC Benefits	IL TRC Costs
Avoided Electric Production	170,611,365		170,611,365		170,611,365	
Avoided T&D Electric	7,890,239		7,890,239		7,890,239	
Avoided Ancillary	28,372,168		28,372,168		28,372,168	
Environmental Benefits					64,069,234	
Administration Costs		5,228,611		5,228,611		5,228,611
Implementation Costs		27,230,789		27,230,789		27,230,789
EM&V / Outreach / Advertising		7,408,195		7,408,195		7,408,195
Incentives		41,145,714				
Net Participant Costs				120,369,303		120,369,303
Present Value Totals	206,873,771	81,013,310	206,873,771	160,236,898	270,943,005	160,236,898
Ratio	2.55		1.29		1.69	

**Figure 1 – Summary of Portfolio Level Benefits and Costs**



As shown in Figure 1, the majority of the benefits in the UCT and TRC test are derived from avoided electric production costs, followed by avoided ancillary costs and finally avoided T&D costs. However, in IL TRC test, environmental benefits are second to avoided electric production in terms of total benefits.

On the cost side, net participant costs represent the largest component followed by implementation, EM&V / outreach / advertising and administration costs in the IL TRC test.

## 2.2 *Generic Data Points*

Table 3 shows the typical values for the generic data points used in the IL TRC calculation and is followed by a description of what each of the components used in the TRC calculation represents.



**Table 3 - Summary of Generic Data Points Used for TRC**

Data Point	Value
Avoided Electric Production (\$/MWh)	\$31.06
Avoided T&D (\$/kW)	\$9.00
Avoided Ancillary (\$/kW)	\$3.45
Discount Rate (Utility WACC %)	8.51%
Line Losses (%)	9.08%
CO2 Benefits (\$/MWh)	\$13.90

### 2.3 *Avoided Electric Production costs (\$/MWh)*

Avoided electric production costs are those associated with purchasing energy from PJM. As per ComEd, avoided energy costs are based on NYMEX “ATC” for NI-Hub. ComEd does not typically use a single value for avoided electric production costs.

### 2.4 *Avoided T&D Electric (\$/kW)*

Avoided transmission and distribution (T&D) costs is a benefit associated with not needing to build transmission and distribution infrastructure to meet demand at peak times.

### 2.5 *Avoided Ancillary (\$/kW)*

Avoided Ancillary is a benefit associated with avoided costs attributable to the Open Access Transmission Tariff (OATT) that EDCs participating in the PJM market are required to pay based on demand.

### 2.6 *Environmental Benefit*

The Illinois TRC requires that CO<sub>2</sub> benefits be included. ComEd incorporates a value for CO<sub>2</sub> of \$0.0139 / kWh. As described in Exhibit A of ComEd’s last plan filing, this value is calculated by using an expected value of carbon emissions of \$18.50 / tonne, which is based on the average value calculated from the NRDC’s analysis of the proposed Waxman-Markey and Kerry-Lieberman legislation, and PJM’s 2009 marginal power plant emission rate. This approach towards approximating the CO<sub>2</sub> benefit per kWh is reasonable.

### 2.7 *Admin Costs*

These are ComEd’s internal staff costs for administering these programs.

### 2.8 *Implementation Costs*

These are the costs associated with the implementation of the programs, typically paid to a third party to deliver the program.

### 2.9 *EM&V / Outreach / Advertising*

These are costs associated with evaluating the ComEd portfolio, outreach activities as well as advertising such as general energy efficiency promotion and its associated environmental benefits.

## 2.10 *Incentives*

The incentives are paid either to program participants and are shown above, but not included in the calculation of costs in the TRC test.

## 2.11 *Net Participant Costs*

Participant costs are the costs that participants pay as a result of participating in an energy efficiency program. They are calculated from the perspective of “what would the participant have paid in absence of the program”. The gross participant costs are multiplied by the net-to-gross (NTG) ratio to determine the net participant costs which is the amount that is used in the calculation of the TRC test.

## 2.12 *Discount Rate*

Not included in Table 2 above, the discount rate is an important determinant of overall cost effectiveness. The avoided electric production, T&D, ancillary and environmental benefits accrue over the life of the measures included in each program. These benefits are discounted to determine the present value of the cumulative benefits.

The discount rate used of 8.51% reflects ComEd’s weighted average cost of capital (WACC) and is appropriate rate to use for the Total Resource Cost (TRC) Test or the Rate Payer Impact Measure (RIM) Test.

The discount rate for the Societal Test is typically lower than the rate used in the TRC test. The Societal test is like the TRC except that it adds additional non-traditional benefits, like avoided environmental benefits, and the discount rate used is a societal discount rate, which is typically lower than a utility WACC.

## 2.13 *Line Losses*

Also not included in Table 2, line losses are important to incorporate in the calculation of total benefits. The energy and demand savings included in the evaluations are estimated at the customer or meter level. The savings that accrue to ComEd rate payers are those at the generator level and therefore the estimated savings are increased by the line losses within ComEd’s transmission and distribution network.

The line losses of 9.08% are based on ComEd’s internal analysis and were included in the three year plan filed with and approved by the commission. These line losses are in the higher end of the range that Navigant has seen, but are reasonable.

### 3. Program Specific Data

#### 3.1 Present Value Summary of Program Benefits and Costs

A summary of the program level benefits and costs is in Table 4 below.

**Table 4 - Summary of Program Level Benefits and Costs (000's)**

Program	Benefits				Costs					IL TRC		
	Avoided Electric Production	Avoided T&D	Avoided Ancillary	Environmental Benefits	Admin Costs	Implementation Costs	EM&V/ Outreach/ Advertise	Incentives <sup>2</sup>	Participant Costs (Net)	IL TRC Benefits	IL TRC Costs	IL TRC Test
Residential E-STAR® Lighting	70,294	1,862	8,392	25,970	225	2,458	212	12,711	19,085	106,518	21,980	4.85
Appliance Recycling	11,176	503	2,285	4,137	265	3,844	1,026	1,075	-	18,101	5,135	3.53
Multi-Family All-Electric	894	18	81	389	38	464	1	-	-	1,382	503	2.75
Multi-Family Joint	1,548	38	177	568	97	790	18	-	-	2,332	905	2.58
All-Electric Single Family Tune-Up	81	2	11	35	52	42	24	156	10	129	128	1.01
Single Family Joint	513	19	84	186	105	349	15	91	155	802	625	1.28
CACES	787	109	140	198	164	1,941	260	-	-	1,234	2,365	0.52
Home Energy Report	530	-	121	204	115	417	1,642	-	-	856	2,175	0.39
Business Prescriptive	59,258	2,988	12,686	22,738	350	6,322	620	20,179	85,360	97,670	92,652	1.05
Business Custom	8,361	251	1,067	3,208	75	455	154	2,879	12,317	12,887	13,001	0.99
C&I Retro-Commissioning	1,541	34	155	638	249	786	62	2,345	2,272	2,369	3,369	0.70
C&I New Construction	1,708	88	342	655	96	669	2	636	1,212	2,794	1,978	1.41
AC Cycling	-	1,571	1,001	-	19	314	711	1,074	-	2,572	1,044	2.46
Carry Over	13,948	407	1,833	5,153	3,379	8,381	2,660	-	-	21,340	14,419	1.48
Sum of Program Specific Data	170,639	7,891	28,375	64,081	5,229	27,231	7,408	41,146	120,411	270,986	160,278	1.69
ComEd Summary All Advertising Costs	170,611	7,890	28,372	64,069	5,229	27,231	7,408	41,146	120,369	270,943	160,237	1.69
Delta	28	1	3	12	-	-	-	-	41	43	41	(0.00)
Delta %	0.02%	0.01%	0.01%	0.02%	0.00%	0.00%	0.00%	0.00%	0.03%	0.02%	0.03%	

<sup>2</sup> Incentives are shown in this table but are treated as transfer payments and do not impact calculation of TRC costs.

Of note, when comparing the sum of the program specific values and the summary file that ComEd provided, the summary file understates total IL TRC benefits by \$43,000 and understates costs by \$41,000. These values represent 0.02 and 0.03% of the portfolio level IL TRC benefits and costs respectively and have no impact on the portfolio level TRC.

### 3.2 *Discrepancies between Evaluated and DSMore Ex-Post Net Energy Savings*

In comparing the first year ex-post net energy savings that Navigant estimated and the implied first year energy savings used in DSMore, Navigant identified several discrepancies listed in Table 5 below. These discrepancies are relatively minor and typically due changes in the evaluated results that were calculated after the DSMore calculations had been performed. On balance the values used in DSMore understate total energy savings by approximately 9,700 MWh or by 1.5% of the portfolio total savings, and therefore the DSMore outputs are conservative.

**Table 5 - Navigant Evaluated vs. DSMore Implied Ex-Post Net Savings (MWh)**

Program	Navigant Evaluated Ex-Post Net Savings	DSMore Implied Ex-Post Net Savings <sup>3</sup>	Difference	% Change
Residential ENERGY STAR® Lighting	264,631	258,066	(6,565)	-2%
Appliance Recycling	44,851	44,603	(248)	-1%
Multi-Family All-Electric Efficiency Upgrade	4,295	3,866	(429)	-10%
Multi-Family Joint	6,970	5,645	(1,325)	-19%
All-Electric Single Family Home Energy Performance Tune-Up	360	347	(13)	-4%
Single Family Joint	1,811	1,808	(3)	0%
Central Air Conditioning Efficiency Services	2,225	2,221	(4)	0%
Home Energy Report	13,479	13,479	0	0%
Business Prescriptive	189,379	188,268	(1,111)	-1%
Business Custom	26,434	26,562	128	0%
C&I Retro-Commissioning	15,373	15,198	(175)	-1%
C&I New Construction	5,963	5,963	0	0%
Central Air Conditioning Cycling	-	-	-	
Portfolio Carry Over	51,201	51,201	0	0%
<b>Total</b>	<b>626,972</b>	<b>617,226</b>	<b>(9,747)</b>	<b>-2%</b>

### 3.3 *Program Specific Data Review*

Amongst the Program Specific data that were used in TRC calculation, several were based on ComEd's internal tracking system of its conservation related expenditures. These include implementation, utility admin and utility incentive costs. Implementation and incentives costs are tracked by program, where utility admin costs were allocated to each program based on a survey of ComEd's energy efficiency staff.

<sup>3</sup> Based on preliminary evaluation ex post net savings from the evaluation team in November 2011. Navigant calculated the 1<sup>st</sup> year energy savings based on the per-participant energy savings and the number of net participants.

This approach seems reasonable and we therefore see no reason to doubt that these costs are accurate and reasonable.

The remaining data points that were provided by ComEd in the TRC evaluation were the Measure Life and Incremental Costs. The Measure Life determines how long the savings from any one measure will last. The Incremental costs are the costs associated with a participant, participating in the program, before accounting for any incentives. In most cases these costs are the difference between the more energy efficient measure purchased due to participation in the energy efficiency program and the baseline measure costs, which is what the participant would have bought in absence of the program. In some instances, like when installing attic insulation, the “baseline” measure is to not install any insulation, and therefore the incremental cost is the full cost of the measure. In rebate programs participants generally pay a portion of the incremental costs in contrast with direct install programs where the utility generally pays more or all of the incremental costs, in either case the incremental costs should still be included in the TRC calculation. In some cases, like refrigerator retirement programs, there are no participant / incremental costs.

The rest of this document provides the program specific values used to calculate the program specific TRC and assess the reasonableness of the data points determined by ComEd that were used in DSMore to calculate cost effectiveness.

### 3.4 Residential Lighting Program

**Table 6 - IL TRC Components for Residential Lighting Program (\$ in 000's)**

Item	Value
Measure Life	9
Ex-Post Gross Savings (MWh)	373,991
Ex-Post Gross Savings (kW)	39,000
Ex-Post Net Savings (MWh)	264,631
Ex-Post Net Savings (kW)	27,000
Avoided Electric Production	\$ 70,294
Avoided T&D Electric	\$ 1,862
Avoided Ancillary	\$ 8,392
Environmental Benefits	\$ 25,970
Administration Costs	\$ 225
Implementation Costs	\$ 2,458
EM&V / Outreach / Advertising	\$ 212
Utility Incentive Costs	\$ 12,711
Gross Participant Costs	\$ 27,659
Net Participant Costs	\$ 19,085
Total IL TRC Benefits	\$ 106,518
Total IL TRC Costs	\$ 21,980
IL TRC Test	4.85

### 3.4.1 Measure Life

The average measure life for this program was based on the weighted average of standard CFL's and specialty bulbs useful life as described by the manufacturer. Manufacturer's rated useful life is regularly used in some jurisdictions and so is appropriate here, although other jurisdictions put limits on CFL's useful lives.

### 3.4.2 Participant/Incremental Costs

Participant costs of \$2.47 per bulb were used. This represents a weighted average of the pre-incentive cost of standard and specialty bulbs included in this program. Navigant notes that this cost should be reduced by the weighted average cost of non-CFL standard and specialty bulbs. In addition, the benefit associated with longer useful lives of CFLs as compared to incandescent bulbs was not incorporated into this analysis. Therefore, the program costs included in the DSMore TRC calculation are overstated.

### 3.4.3 Load Shape

The residential load shape was used for this program which is appropriate given its target market and that, as described in the evaluation, only 3% of bulbs were installed outside of non-residential locations.

### 3.4.4 Incentives

Incentives in this program were paid primarily to the retailers on bulbs sold and additionally there were a small amount of coupons made available to end consumers. The incentives offset a portion of the incremental costs.

## 3.5 *Appliance Recycling Program*

**Table 7 - IL TRC Components for Appliance Recycling Program (\$ in 000's)**

Item	Value
Measure Life	8
Ex-Post Gross Savings (MWh)	65,592
Ex-Post Gross Savings (kW)	11,800
Ex-Post Net Savings (MWh)	44,851
Ex-Post Net Savings (kW)	8,000
Avoided Electric Production	\$ 11,176
Avoided T&D Electric	\$ 503
Avoided Ancillary	\$ 2,285
Environmental Benefits	\$ 4,137
Administration Costs	\$ 265
Implementation Costs	\$ 3,844
EM&V / Outreach / Advertising	\$ 1,026
Utility Incentive Costs	\$ 1,075
Gross Participant Costs	\$ -
Net Participant Costs	\$ -
Total IL TRC Benefits	\$ 18,101
Total IL TRC Costs	\$ 5,135
IL TRC Test	3.53

### 3.5.1 Measure Life

A measure life of eight years was used for this program, which is consistent with a 2010 analysis conducted by the Vermont Energy Investment Corporation (VEIC) for the Northeastern Energy Efficiency Partnerships (NEEP), but is longer than the five years included in the California Public Utility Commission’s (CPUC) Database for Energy Efficiency Resources (DEER). However, given the longer history of refrigerator retirement programs in California, the VEIC measure life is more appropriate for Illinois.

### 3.5.2 Participant/Incremental Costs

Participants do not bear any costs to participate in this program.

### 3.5.3 Load Shape

The residential load shape that was used for this program is appropriate for the programs target market, residential appliance retirement.

### 3.5.4 Incentives

Incentives were paid to residential home owners who allowed ComEd to pick up and retire their old appliances.

## 3.6 Residential Multi-family All Electric

**Table 8 - IL TRC Components for Residential Multi-Family All Electric Program (\$ in 000's)**

Item	Value
Measure Life	9
Ex-Post Gross Savings (MWh)	4,776
Ex-Post Gross Savings (kW)	300
Ex-Post Net Savings (MWh)	4,295
Ex-Post Net Savings (kW)	300
Avoided Electric Production	\$ 894
Avoided T&D Electric	\$ 18
Avoided Ancillary	\$ 81
Environmental Benefits	\$ 389
Administration Costs	\$ 38
Implementation Costs	\$ 464
EM&V / Outreach / Advertising	\$ 1
Utility Incentive Costs	\$ -
Gross Participant Costs	\$ -
Net Participant Costs	\$ -
Total IL TRC Benefits	\$ 1,382
Total IL TRC Costs	\$ 503
IL TRC Test	2.75

**Table 9 - IL TRC Components for Residential Multi-Family Joint Program (\$ in 000's)**

Item	Value
Measure Life	
Ex-Post Gross Savings (MWh)	8,605
Ex-Post Gross Savings (kW)	900
Ex-Post Net Savings (MWh)	6,970
Ex-Post Net Savings (kW)	700
Avoided Electric Production	\$ 1,548
Avoided T&D Electric	\$ 38
Avoided Ancillary	\$ 177
Environmental Benefits	\$ 568
Administration Costs	\$ 97
Implementation Costs	\$ 790
EM&V / Outreach / Advertising	\$ 18
Utility Incentive Costs	\$ -
Gross Participant Costs	\$ -
Net Participant Costs	\$ -
Total IL TRC Benefits	\$ 2,332
Total IL TRC Costs	\$ 905
IL TRC Test	2.58

### 3.6.1 Measure Life

A measure life of nine years was used for this program, which installed faucet and shower aerators as well as CFLs in units in multi-family buildings. The California Public Utility Commission's Database for Energy Efficiency Resources (DEER) lists the useful life at ten years for aerators and 4 to eight years for CFLs depending on the manufacturers rated life. On balance, the nine year EUL is reasonable.<sup>4</sup>

### 3.6.2 Participant/Incremental Costs

This program was a direct install program where participants did not bear any costs to participate, however the incremental costs are included as part of the program implementation/participation costs paid for by the utility.

### 3.6.3 Load Shape

A residential multi-family load shape was used for this program and is therefore appropriate.

### 3.6.4 Incentives

Incentives were not paid to participants but were provided in the form of measures installed. In terms of the TRC calculation, by including these costs as implementation costs 100% of the measure cost is included as a cost in the TRC calculation. This is appropriate because in absence of the program these measures would not have been installed and therefore the full cost of the measure should be included.

<sup>4</sup> DEER database available here:

[http://www.deeresources.com/index.php?option=com\\_content&view=article&id=65&Itemid=57](http://www.deeresources.com/index.php?option=com_content&view=article&id=65&Itemid=57)



### 3.7 *The Central Air Conditioning Efficiency Services (CACES)*

The Central Air Conditioning Efficiency Services (CACES) program consists of two distinct programs serving different markets through a common marketing and delivery infrastructure. The Diagnostics and Tune-Up program targets improved efficiency for existing residential air conditioning equipment. The Quality Installation program addresses high-efficiency equipment installations for new and replacement air conditioning equipment, including additional incentives for high SEER units.

**Table 10 - IL TRC Components for CACES Program (\$ in 000's)**

Item	Value
Measure Life	15
Ex-Post Gross Savings (MWh)	2,225
Ex-Post Gross Savings (kW)	3,000
Ex-Post Net Savings (MWh)	2,225
Ex-Post Net Savings (kW)	3,000
Avoided Electric Production	\$ 787
Avoided T&D Electric	\$ 109
Avoided Ancillary	\$ 140
Environmental Benefits	\$ 198
Administration Costs	\$ 164
Implementation Costs	\$ 1,941
EM&V / Outreach / Advertising	\$ 260
Utility Incentive Costs	\$ -
Gross Participant Costs	\$ -
Net Participant Costs	\$ -
Total IL TRC Benefits	\$ 1,234
Total IL TRC Costs	\$ 2,365
IL TRC Test	0.52

## **Diagnostics and Tune-Up program**

### **3.7.1 Measure Life**

Measure life was five years for the diagnostics and tune-up program, which is within the range of what Navigant has seen for similar programs in other jurisdictions.

### **3.7.2 Participant/Incremental Costs**

There are no participant costs included in DSMore for this program. The participant costs associated with this program are those incurred by the contractor for the purchase of diagnostic and Service Assistant equipment needed to conduct the diagnosis and tune-up of air conditioning equipment or the equipment required to conduct the quality installations. These costs should be included in the program level TRC, however their relative cost is likely to be small and not expected to make a material difference on the TRC analysis.

### **3.7.3 Load Shape**

Residential single family load shapes were used to evaluate cost effectiveness and are appropriate given the target market for this program.

### **3.7.4 Incentives**

The incentives in this program are provided to participating HVAC contractors due to costs associated with using the diagnostic tool and the extra time required to adhere to the protocols needed to conduct the analysis.

## **Quality Installation Program**

### **3.7.5 Measure Life**

The measure life of for this program was 15 years which is consistent with the CPUC DEER database.

### **3.7.6 Participant/Incremental Costs**

There are no participant costs included in DSMore for this program. This program shared the same installation team as the Diagnostics and Tune-Up Program. The equipment costs that were paid for by the installers in order to conduct the installations to the required specifications, should be included in the program level TRC, to the extent that the same equipment was used to conduct both programs, these costs should be divided amongst them.

### **3.7.7 Load Shape**

Residential single family load shapes were used to evaluate cost effectiveness and are appropriate given the target market for this program.

### **3.7.8 Incentives**

The incentives in this program are provided to participating HVAC contractors due to costs associated with using the diagnostic tool and the extra time required to adhere to the protocols needed to conduct the analysis.

## **3.8 *Single Family Home Performance***

This program was a direct install program and included an energy audit of participant's homes. Measures installed included CFLs, faucet aerators, hot water pipe insulation, low flow showerheads, water heater turndown and an energy survey.

**Table 11 – IL TRC Components for Single Family Home Performance Program (\$ in 000's)**

Item	Value
Measure Life	9
Ex-Post Gross Savings (MWh)	390
Ex-Post Gross Savings (kW)	-
Ex-Post Net Savings (MWh)	360
Ex-Post Net Savings (kW)	-
Avoided Electric Production	\$ 81
Avoided T&D Electric	\$ 2
Avoided Ancillary	\$ 11
Environmental Benefits	\$ 35
Administration Costs	\$ 52
Implementation Costs	\$ 42
EM&V / Outreach / Advertising	\$ 24
Utility Incentive Costs	\$ 156
Gross Participant Costs	\$ 11
Net Participant Costs	\$ 10
Total IL TRC Benefits	\$ 129
Total IL TRC Costs	\$ 128
IL TRC Test	1.01

**Table 12 - IL TRC Components for Single Family Joint Program (\$ in 000's)**

Item	Value
Measure Life	9
Ex-Post Gross Savings (MWh)	2,268
Ex-Post Gross Savings (kW)	300
Ex-Post Net Savings (MWh)	1,812
Ex-Post Net Savings (kW)	300
Avoided Electric Production	\$ 513
Avoided T&D Electric	\$ 19
Avoided Ancillary	\$ 84
Environmental Benefits	\$ 186
Administration Costs	\$ 105
Implementation Costs	\$ 349
EM&V / Outreach / Advertising	\$ 15
Utility Incentive Costs	\$ 91
Gross Participant Costs	\$ 155
Net Participant Costs	\$ 155
Total IL TRC Benefits	\$ 802
Total IL TRC Costs	\$ 625
IL TRC Test	1.28

### 3.8.1 Measure Life

The measure life used for savings included in this program was nine years. This measure life is reasonable for the majority of measures including CFLs, faucet aerators, hot water pipe insulation and low flow showerheads.

### 3.8.2 Participant/Incremental Costs

Participant costs used in DSMore are \$25 per participant, which was the required participant co-payment, and represents a cost that they would not have incurred in absence of the program.

### 3.8.3 Load Shape

Residential single family load shapes were used to evaluate cost effectiveness and are appropriate given the target market for this program.

### 3.8.4 Incentives

Incentives were not paid to participants but were provided in the form of measures installed and the remaining cost of the energy audit. In terms of the TRC calculation, by including these costs as implementation costs 100% of the measure cost is included as a cost in the TRC calculation. This is appropriate because in absence of the program these measures would not have been installed and therefore the full cost of the measure should be included.

## 3.9 *C&I Prescriptive Program*

**Table 13 - IL TRC Components for C&I Prescriptive Program (\$ in 000's)**

Item	Value
Measure Life	12
Ex-Post Gross Savings (MWh)	261,483
Ex-Post Gross Savings (kW)	46,900
Ex-Post Net Savings (MWh)	189,379
Ex-Post Net Savings (kW)	34,000
Avoided Electric Production	\$ 59,258
Avoided T&D Electric	\$ 2,988
Avoided Ancillary	\$ 12,686
Environmental Benefits	\$ 22,738
Administration Costs	\$ 350
Implementation Costs	\$ 6,322
EM&V / Outreach / Advertising	\$ 620
Utility Incentive Costs	\$ 20,179
Gross Participant Costs	\$ 118,555
Net Participant Costs	\$ 85,360
Total IL TRC Benefits	\$ 97,670
Total IL TRC Costs	\$ 92,652
IL TRC Test	1.05

### 3.9.1 Measure Life

There are a variety of measures included in the C&I prescriptive program with measure lives ranging from three to eighteen years. As part of its program evaluation activities Navigant conducted an engineering review and analysis of measure savings based on project documentation, default assumptions and tracking data and found the assumptions to be reasonable. Navigant conducted a further analysis of the tracking data base and found that the weighted average measure life was 13.1 years, where ComEd assumed a 12 year measure life in its DSMore analysis of this program. The measure lives for individual measures were based on references in the ComEd Working papers including DEER, other utilities, third party reports or KEMA's experience from PY1 and PY2. These sources are regularly used in energy efficiency program evaluation and therefore the measure lives are reasonable.

### 3.9.2 Participant/Incremental Costs

Navigant's engineering review of a sample of projects also included reviewing the Workpapers that accompanied them. These workpapers included incremental costs based on third party references, like DEER, other utilities, third party reports or KEMA's experience. Overall, these costs are reasonable.

### 3.9.3 Load Shape

A business load shape was used for this program and is appropriate given the broad mix of measures and target market.

### 3.9.4 Incentives

Incentives were paid to participants and covered a portion of the incremental participant costs.

## 3.10 C&I Custom Program

**Table 14 - IL TRC Components for C&I Custom Program (\$ in 000's)**

Item	Value
Measure Life	12
Ex-Post Gross Savings (MWh)	47,433
Ex-Post Gross Savings (kW)	5,100
Ex-Post Net Savings (MWh)	26,434
Ex-Post Net Savings (kW)	2,300
Avoided Electric Production	\$ 8,361
Avoided T&D Electric	\$ 251
Avoided Ancillary	\$ 1,067
Environmental Benefits	\$ 3,208
Administration Costs	\$ 75
Implementation Costs	\$ 455
EM&V / Outreach / Advertising	\$ 154
Utility Incentive Costs	\$ 2,879
Gross Participant Costs	\$ 21,995
Net Participant Costs	\$ 12,317
Total IL TRC Benefits	\$ 12,887
Total IL TRC Costs	\$ 13,001
IL TRC Test	0.99

### 3.10.1 Measure Life

Similarly to the C&I Prescriptive program, there were a number of measures included in this program with measure lives varying from one to twenty-six years. The weighted average measure life of the savings was 11.4 years as compared to the 12 years used by ComEd in its DSMore analysis.

Measure life data for this program was based on information provided by participants and reviewed by the program implementer, KEMA, for reasonableness. This approach is sound.

### 3.10.2 Participant/Incremental Costs

Incremental cost data was provided by participants as part of their application for this program. Both the efficient measure and baseline costs are requested when completing an application to this program and these costs are reviewed by the program implementer KEMA for reasonableness before being submitted. This approach is sound.

### 3.10.3 Load Shape

A business load shape was used for this program and is appropriate given the broad mix of measures and target market.

### 3.10.4 Incentives

Incentives were paid to participants and covered a portion of the incremental participant costs.

## 3.11 *C&I Retro Commissioning Program*

**Table 15 - IL TRC Components for C&I Retro Commissioning Program (\$ in 000's)**

Item	Value
Measure Life	3
Ex-Post Gross Savings (MWh)	21,574
Ex-Post Gross Savings (kW)	1,700
Ex-Post Net Savings (MWh)	15,373
Ex-Post Net Savings (kW)	1,200
Avoided Electric Production	\$ 1,541
Avoided T&D Electric	\$ 34
Avoided Ancillary	\$ 155
Environmental Benefits	\$ 638
Administration Costs	\$ 249
Implementation Costs	\$ 786
EM&V / Outreach / Advertising	\$ 62
Utility Incentive Costs	\$ 2,345
Gross Participant Costs	\$ 3,186
Net Participant Costs	\$ 2,272
Total IL TRC Benefits	\$ 2,369
Total IL TRC Costs	\$ 3,369
IL TRC Test	0.70

### 3.11.1 Measure Life

Given the custom nature of this program, Navigant did a measure level review as part of its evaluation and found that the measure savings and persistence were reasonable.

### 3.11.2 Participant/Incremental Costs

Participant costs are those associated with the cost of the study, part of which was paid for through the program. DSMore shows Participant/Incremental costs as \$24,574 + Average incentive per participant. The incentive cost represents the costs associated with the studies performed for participants and would not have been incurred in absence of the program, therefore these costs should be included as part of the total incremental costs. In short, they are appropriate.

### 3.11.3 Load Shape

The large C&I class was used for this program, which is consistent with the targeted participants.

### 3.11.4 Incentives

The incentives cover a portion of the study costs and are paid on behalf of the participants.

## 3.12 *C&I New Construction Program*

**Table 16 - IL TRC Components for C&I New Construction Program (\$ in 000's)**

Item	Value
Measure Life	12
Ex-Post Gross Savings (MWh)	9,174
Ex-Post Gross Savings (kW)	2,300
Ex-Post Net Savings (MWh)	5,963
Ex-Post Net Savings (kW)	1,500
Avoided Electric Production	\$ 1,708
Avoided T&D Electric	\$ 88
Avoided Ancillary	\$ 342
Environmental Benefits	\$ 655
Administration Costs	\$ 96
Implementation Costs	\$ 669
EM&V / Outreach / Advertising	\$ 2
Utility Incentive Costs	\$ 636
Gross Participant Costs	\$ 1,865
Net Participant Costs	\$ 1,212
Total IL TRC Benefits	\$ 2,794
Total IL TRC Costs	\$ 1,978
IL TRC Test	1.41

### ***3.12.1.1 Measure Life***

A measure life of 12 years was used in the DSMore analysis for this program. The program has a strong focus on lighting and HVAC improvements which both have measure lives of 12 years or longer, therefore the measure life is somewhat conservative.

### ***3.12.1.2 Participant/Incremental Costs***

The incremental costs for this program are associated with the implementing high efficiency measures in a New Construction project, including lighting and HVAC measures. Incremental costs were estimated for this program based on an industry average used in ComEd's 2007 plan and were then escalated by 3% per year. The program manual states that incentives will be set at 50 – 100 % of incremental costs. As estimated, incentives represent 36% of incremental costs, suggesting that the incremental costs are lower than anticipated. Given the difficulty in obtaining specific incremental costs and costs used relative to incentives, these costs seem reasonable.

### ***3.12.1.3 Load Shape***

An all business load shape was used to reflect that both large and small customers participate in this program.

### ***3.12.1.4 Incentives***

Incentives are paid directly to participants, building owners or developers to offset a portion of the incremental costs.



### 3.13 *A/C Cycling Program*

**Table 17 - IL TRC Components for A/C Cycling Program (\$ in 000's)**

Item	Value
Measure Life	15
Ex-Post Gross Savings (MWh)	-
Ex-Post Gross Savings (kW)	14,700
Ex-Post Net Savings (MWh)	-
Ex-Post Net Savings (kW)	14,700
Avoided Electric Production	\$ -
Avoided T&D Electric	\$ 1,571
Avoided Ancillary	\$ 1,001
Environmental Benefits	\$ -
Administration Costs	\$ 19
Implementation Costs	\$ 314
EM&V / Outreach / Advertising	\$ 711
Utility Incentive Costs	\$ 1,074
Gross Participant Costs	\$ -
Net Participant Costs	\$ -
Total IL TRC Benefits	\$ 2,572
Total IL TRC Costs	\$ 1,044
IL TRC Test	2.46

#### 3.13.1 **Measure Life**

Measure life of fifteen years is assumed based on life of switch equipment. This is appropriate if ComEd intends on implementing this program for the life of switch.

#### 3.13.2 **Participant/Incremental Costs**

There are no participant/incremental costs associated with this program.

#### 3.13.3 **Load Shape**

The residential load shape used for this program's evaluation is appropriate.

#### 3.13.4 **Incentives**

The incentives are paid to participants in order to encourage and maintain participation.

### 3.14 *Home Energy Report*

**Table 18 - IL TRC Components for Home Energy Report (\$ in 000's)**

Item	Value
Measure Life	1
Ex-Post Gross Savings (MWh)	NA
Ex-Post Gross Savings (kW)	-
Ex-Post Net Savings (MWh)	13,479
Ex-Post Net Savings (kW)	-
Avoided Electric Production	\$ 530
Avoided T&D Electric	\$ -
Avoided Ancillary	\$ 121
Environmental Benefits	\$ 204
Administration Costs	\$ 115
Implementation Costs	\$ 417
EM&V / Outreach / Advertising	\$ 1,642
Utility Incentive Costs	\$ -
Gross Participant Costs	\$ -
Net Participant Costs	\$ -
Total IL TRC Benefits	\$ 856
Total IL TRC Costs	\$ 2,175
IL TRC Test	0.39

#### 3.14.1 **Measure Life**

A measure life of one year is used for this program, which is appropriate given that is an informational and behavior based program.

#### 3.14.2 **Participant/Incremental Costs**

These costs are included as zero in the program DSMore. However, it is unknown if participants made any investments in energy efficient devices to help them reduce energy use as a result of the information they received due to the program. The costs associated with any such investments would ideally be included in the TRC test for this program, assuming the cost for doing so is reasonable.

#### 3.14.3 **Load Shape**

The residential load shape used for this program's evaluation is appropriate given its target market.

#### 3.14.4 **Incentives**

There are no incentives paid in this program.