



Review of EPY6 Total Resource Cost Test Assumptions

FINAL

**Energy Efficiency / Demand Response Plan:
Plan Year 6 (PY6)
(6/1/2013-5/31/2014)**

**Presented to
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Table of Contents

1. Overview.....	1
1.1 IL TRC Equation.....	2
1.2 UCT Equation	3
1.3 Cost-Effectiveness Data Requirements.....	4
2. Summary of Results & Generic Data Points	5
2.1 Generic Data Points.....	6
2.2 Avoided Electric Production Costs (\$/MWh).....	7
2.3 Avoided Electric Capacity Costs (\$/kW-year).....	7
2.4 Avoided T&D Electric (\$/kW)	7
2.5 Avoided Ancillary (\$/kW).....	8
2.6 Non-Incentive Costs.....	8
2.7 Incentives.....	8
2.8 Incremental Costs	9
2.9 Discount Rate	10
2.10 Line Losses	10
2.11 Miscellaneous EEPS Portfolio Costs	10
2.12 Gas Interactive Effects	10
3. Program Specific Data.....	11
3.1 Program Specific Data Review	15
3.2 Residential Energy Star Lighting (EEPS-only)	16
3.2.1 Measure Life	17
3.2.2 Participant/Incremental Costs	17
3.2.3 NPV of Avoided Incandescent Light Bulb Purchases.....	18
3.2.4 Impact Results	18
3.3 Residential Fridge and Freezer Recycle Rewards.....	19
3.3.1 Measure Life	19
3.3.2 Participant/Incremental Costs	19
3.3.3 Impact Results	19
3.4 Complete System Replacement.....	20
3.4.1 Measure Life	20
3.4.2 Participant/Incremental Costs	20
3.4.3 Impact Results	21
3.5 Elementary Education	21
3.5.1 Measure Life	22
3.5.2 Participant/Incremental Costs	22
3.5.3 NPV of Avoided Incandescent Light Bulb Purchases.....	23
3.5.4 Impact Results	23
3.6 Home Energy Report	23
3.6.1 Measure Life	24
3.6.2 Participant/Incremental Costs	24
3.6.3 Impact Results	24
3.7 Multi-Family Home Energy Savings (EEPS-only).....	24

3.7.1	Measure Life	25
3.7.2	Participant/Incremental Costs	25
3.7.3	NPV of Avoided Incandescent Light Bulb Purchases.....	26
3.7.4	Impact Results	26
3.8	Single Family (EEPS-only)	26
3.8.1	Measure Life	27
3.8.2	Participant/Incremental Costs	27
3.8.3	NPV of Avoided Incandescent Light Bulb Purchases.....	28
3.8.4	Impact Results	28
3.9	Residential New Construction.....	28
3.9.1	Measure Life	29
3.9.2	Participant/Incremental Costs	29
3.9.3	NPV of Avoided Incandescent Light Bulb Purchases.....	30
3.9.4	Impact Results	30
3.10	Business Standard	30
3.10.1	Measure Life	31
3.10.2	Participant/Incremental Costs	31
3.10.3	Impact Results	32
3.11	Business Custom	32
3.11.1	Measure Life	32
3.11.2	Participant/Incremental Costs	32
3.11.3	Impact Results	33
3.12	Data Centers.....	33
3.12.1	Measure Life	33
3.12.2	Participant/Incremental Costs	34
3.12.3	Impact Results	34
3.13	Business Instant Lighting Discount Program.....	34
3.13.1	Measure Life	35
3.13.2	Participant/Incremental Costs	36
3.13.3	NPV of Avoided Incandescent Light Bulb Purchases.....	38
3.13.4	Impact Results	38
3.14	Industrial Systems Study	38
3.14.1	Measure Life	39
3.14.2	Participant/Incremental Costs	39
3.14.3	Impact Results	39
3.15	Business New Construction Service	39
3.15.1	Measure Life	40
3.15.2	Participant/Incremental Costs	40
3.15.3	Impact Results	40
3.16	Small Business Energy Services (EEPS-only)	40
3.16.1	Measure Life	41
3.16.2	Participant/Incremental Costs	41
3.16.3	NPV of Avoided Incandescent Light Bulb Purchases.....	42
3.16.4	Impact Results	42
3.17	Business Retro-Commissioning.....	42
3.17.1	Measure Life	43

3.17.2 Participant/Incremental Costs 43
3.17.3 Impact Results 43
Appendix A: TRC Benefit Cost Results for Jointly Implemented Programs 44

List of Figures and Tables

Table

Table 1-1 - Data points needed to conduct TRC	4
Table 2-1 – Summary of ComEd EEPs Costs and Benefits (\$ in 000’s).....	5
Table 2-2 - Summary of Generic Data Points Used for TRC	7
Table 3-1 - Summary of Program Level Benefits, Costs (\$ in 000’s) and IL TRC Test– ComEd Specific w/o Gas Data from Joint Programs	12
Table 3-2. Summary of Program Level Benefits, Costs (\$ in 000’s) and Utility Cost Test– ComEd Specific w/o Gas Data from Joint Programs	13
Table 3-3. IL TRC Component Table.....	15
Table 3-4. IL TRM Version 2.0 NPV of Baseline Replacement Costs Summary	16
Table 3-5. IL TRC Components for Residential ENERGY STAR Lighting Program	17
Table 3-6. Measure life of the Residential ENERGY STAR Lighting Program Measures.....	17
Table 3-7. Incremental Cost of the of the Residential ENERGY STAR Lighting Program Measures	18
Table 3-8. Residential ENERGY STAR Lighting Incentive PY6 Impact Results	18
Table 3-9. Residential ENERGY STAR Lighting Natural Gas Savings per Bulb.....	18
Table 3-10. IL TRC Components for Residential Fridge and Freezer Recycle Rewards	19
Table 3-11. Residential Fridge and Freezer Recycle Rewards PY6 Impact Results	20
Table 3-12. IL TRC Components for Complete System Replacement	20
Table 3-13. Complete System Replacement Program PY6 Impact Results	21
Table 3-14. IL TRC Components for Residential Elementary Energy Education program	22
Table 3-15. Measure life of the Residential Elementary Energy Education Program Measures.....	22
Table 3-16. Incremental Cost of the of the Elementary Energy Education Program Measures	23
Table 3-17. Residential Elementary Energy Education PY6 Impact Results.....	23
Table 3-18. IL TRC Components for Home Energy Reports.....	24
Table 3-19. Home Energy Reports PY6 Impact Results.....	24
Table 3-20. IL TRC Components for Multi-Family Home Energy Savings Program	25
Table 3-21. Measure life of the Multi-Family Home Energy Savings Program Measures.....	25
Table 3-22. Incremental Cost of the of the Multi-Family Home Energy Savings Program Measures	26
Table 3-23. Multi-Family Home Energy Savings PY6 Impact Results.....	26
Table 3-24. IL TRC Components for Single Family Programs.....	27
Table 3-25. Measure life of the Single Family Program Measures	27
Table 3-26. Incremental Cost of the of the Single Family Program Measures	28
Table 3-27. Single Family PY6 Impact Results	28
Table 3-28. IL TRC Components for Residential New Construction Program	29
Table 3-29. Measure life of the Residential New Construction Program Measures	29
Table 3-30. Incremental Cost of the of the Residential New Construction Program Measures	30
Table 3-31. Residential New Construction Savings PY6 Impact Results	30
Table 3-32. IL TRC Components for Business Standard Program	31
Table 3-33. Measure life of the Business Standard Program Measures.....	31
Table 3-34. Business Standard Savings PY6 Impact Results	32
Table 3-35. IL TRC Components for Business Custom Program	32
Table 3-36. Business Custom Savings PY6 Impact Results	33

Table 3-37. IL TRC Components for Data Centers Program.....	33
Table 3-38. Data Centers Savings PY6 Impact Results.....	34
Table 3-39. IL TRC Components for BILD Program	34
Table 3-40. Measure life of the BILD Program Measures	36
Table 3-41. Incremental Cost of the of the BILD Program Measures.....	37
Table 3-42. BILD Savings PY6 Impact Results	38
Table 3-43. IL TRC Components for Industrial Systems Study Program	38
Table 3-44. Industrial Systems Study Savings PY6 Impact Results	39
Table 3-45. IL TRC Components for Business New Construction Service Program	39
Table 3-46. Business New Construction Service Savings PY6 Impact Results	40
Table 3-47. IL TRC Components for Small Business Energy Services Program	41
Table 3-48. Measure life of the Small Business Energy Services Program Measures	41
Table 3-49. Incremental Cost of the of the Small Business Energy Services Program Measures	42
Table 3-50. Small Business Energy Services Savings PY6 Impact Results	42
Table 3-51. IL TRC Components for Business Retro-Commissioning Program	42
Table 3-52. Data Centers Savings PY6 Impact Results.....	43
Table A-1. Summary of Jointly Implemented Programs and Timing.....	44
Table A-2. Summary of Program Level Benefits, Costs (\$ in 000's) and IL TRC Test – Jointly Implemented Programs.....	46
Table A-3. Summary of Program Level Benefits, Costs (\$ in 000's) and Utility Cost Test – Jointly Implemented Programs.....	47

1. Overview

As part of Navigant’s evaluation of Commonwealth Edison Company’s (ComEd) energy efficiency and demand response programs for program year six 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, with the results of the Utility Cost Test (UCT) also reported.

The savings numbers and cost-benefit results included in this report are reflective of the Energy Efficiency Portfolio Standard (EEPS) portion of the ComEd energy efficiency and demand response programs, and are not inclusive of the Illinois Power Agency (IPA) portion. Additionally, for programs that are jointly implemented by ComEd and one or more Illinois gas utilities (including Nicor Gas, Peoples Gas, and/or North Shore Gas), only the electric portion of the program savings and cost-benefit calculations are included here. The combined joint calculations for these programs are included in Appendix A.

The Illinois TRC test is defined in the Illinois Power Agency Act (see 20 ILCS 3855/1-10) 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, as well as other quantifiable societal benefits, including avoided natural gas utility costs, 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.¹

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 GHGs and the discount rate applied to future benefits is the electric distribution companies (EDCs) Weighted Average Cost of Capital (WACC), which is typically used in TRC calculations, as opposed to a societal discount rate.

¹ See Section 1-10 Definitions of the Illinois Power Agency Act:
<http://www.ilga.gov/legislation/ilcs/fulltext.asp?DocName=002038550K1-10>

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_{ILTRC}	=	Benefit-cost ratio of the Illinois total resource cost test
B_{ILTRC}	=	Present value of benefits of a Illinois program or portfolio
C_{ILTRC}	=	Present value of costs of a Illinois program or portfolio

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

Equation 2 – IL TRC Benefits

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

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 _t	=	Utility avoided electric production costs in year t
UATD _t	=	Utility avoided transmission and distribution costs in year t
UAA _t	=	Utility avoided ancillary costs in year t
EB _t	=	Environmental Benefits in year t
UAC _{at}	=	Utility avoided supply costs for the alternate fuel in year t
PAC _{at}	=	Participant avoided costs in year t for alternate fuel devices
RC	=	NPV of replacement costs of incandescent equivalents

And costs are defined as:

PRC _t	=	Program Administrator program costs in year t
PIC _t	=	Program Implementation costs in year t
PEAM _t	=	Program Evaluation, Measurement & Verification (EM&V), Advertising and Miscellaneous costs in year t
PCN	=	Net Participant costs
UIC _t	=	Utility increased supply costs in year t
d	=	Utility weighted average cost of capital, used as discount rate

The Illinois TRC test allows for utilities to claim as a benefit the net present value (NPV) of the avoided cost of purchasing incandescent bulbs that accrues to program participants as a result of the significantly longer lifetimes of efficient CFLs and LED light bulbs. In general, the avoided cost per bulb is determined by comparing the estimated useful life of efficient and baseline bulbs to determine the number of baseline bulb purchases that are avoided. Based on the average purchase price of baseline bulbs, an NPV is determined by discounting the value of these avoided purchases over the course of the lifetime of the efficient bulb. The Illinois TRM provides deemed NPV values per bulb based on efficient bulb-type, socket type (commercial or residential), and lumen range. These benefits were included in the program calculations provided below.

1.2 UCT Equation

The results of the Utility Cost Test are also presented in Section 2 of this report. The UCT (a subset of the Program Administrator Cost Test) approaches cost effectiveness from the perspective of the utility. It determines whether the energy supply and capacity costs avoided by the utility exceed the overhead and cost outlays that the utility incurred to implement energy efficiency programs. The structure of the calculation is similar to the IL TRC, with a few key changes. Since the UCT is primarily focused on utility outlays, incentives paid by the utility to either participants or third party implementers are included in the calculation in place of incremental or participant costs. Additionally, since non-energy benefits accrue to society rather than to the utility implementing energy efficiency programs, these benefits are not included in the UCT formula.

Using the equation terms previously defined for the IL TRC equation, the UCT equation is defined as:

Equation 4 – UCT

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

Where,

- BCR_{UCT}** = Benefit-cost ratio of the Utility Cost Test
- B_{UCT}** = Present value of benefits to a utility of a program or portfolio
- C_{UCT}** = Present value of costs to a utility of a program or portfolio

The benefits of the UCT are calculated using the following equation:

Equation 5 – UCT Benefits

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

The costs of the UCT are calculated using the following equation:

Equation 6 - UCT Costs

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

Where the new term, PIN_t , is defined as the program incentives provided by the utility in year t .

1.3 Cost-Effectiveness Data Requirements

The data points needed to conduct the Illinois TRC test are provided in Table 1-1 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 1-1 - Data points needed to conduct EEPS TRC

Category	Data Point	Source
Generic	• Avoided Energy Costs (\$/kWh)	ComEd
	• Avoided Capacity Costs (\$/kW-year)	
	• Discount Rate	
	• Escalation Rates	
	• Line Losses	
	• Avoided GHG Emission Costs	
Program Specific	• Participants / Measure Count	Navigant
	• Verified Ex-Post Energy Savings (kWh)	
	• Verified Ex-Post Capacity Savings (kW)	
	• Realization Rate	
	• Net to Gross Ratio	
	• Measure life	ComEd
	• Non-Incentive Costs	
	• Utility Incentive Costs	
	• Incremental Costs (Gross)	
	• Incremental Costs (Net)	

Source: Navigant analysis

This document provides a summary of the results for the total ComEd EEPS and at the program level, the program specific inputs and range of assumptions, a description of each of the data points, the basis of their determination and their reasonableness.

2. Summary of Results & Generic Data Points

A summary of the ComEd EEPS results, separated by benefits and cost components, is presented in Table 2-1 and Figure 2-1 below. Note that the primary difference between the results of the TRC Test and the IL TRC Tests are the added benefits of avoided environmental damages in the IL TRC Test.

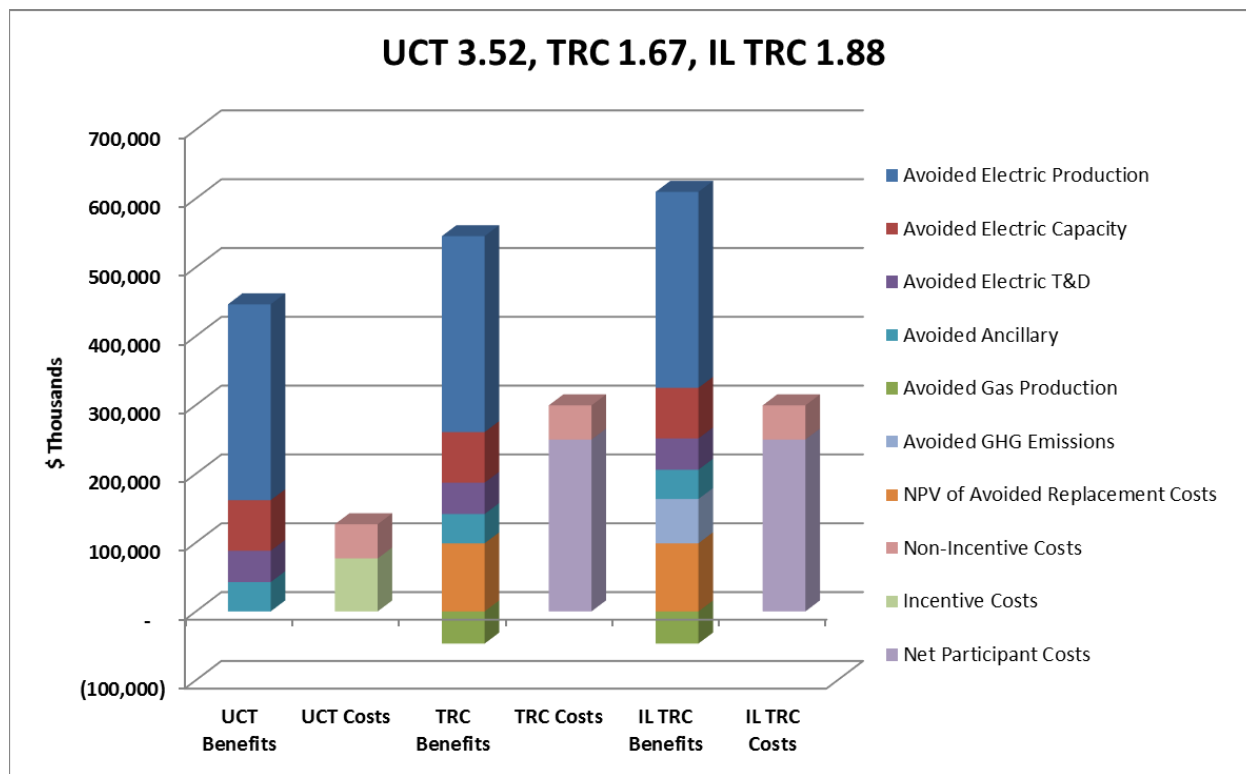
The calculations show the EEPS total to be cost effective under all scenarios.

Table 2-1 – Summary of ComEd EEPS Costs and Benefits (\$ in 000's)

	UCT Test		TRC Test		IL TRC Test	
	UCT Benefits	UCT Costs	TRC Benefits	TRC Costs	IL TRC Benefits	IL TRC Costs
Avoided Electric Production	284,640		284,640		284,640	
Avoided Electric Capacity	73,548		73,548		73,548	
Avoided Gas Production			(46,636)		(46,636)	
Avoided T&D Electric	45,516		45,516		45,516	
Avoided Ancillary	42,562		42,562		42,562	
NPV of Avoided Replacement Costs			98,964		98,964	
Avoided GHG Emissions					64,351	
Non-Incentive Costs		49,651		49,651		49,651
Incentive Costs		77,010				
Net Participant Costs				249,706		249,706
Present Value Totals	446,266	126,662	498,594	299,357	562,945	299,357
Ratio	3.52		1.67		1.88	

Source: Navigant analysis

Figure 2-1 – Summary of ComEd EEPS Benefits and Costs



Source: Navigant analysis

As shown in Figure 2-1, the majority of the benefits in the UCT and TRC tests are derived from avoided electric production. The value of avoided electric capacity, T&D, and ancillary also contribute to overall EEPS benefits. Both TRC tests also include a component for the value of avoided incandescent replacement costs, while the IL TRC also includes an additional component for the value of avoided greenhouse gas emissions.

On the cost side, net participant costs represent the largest component followed by the non-incentive costs of program implementation, such as administration, marketing, and EM&V. For the UCT, the sum of all incentives provided is used in place of net participant costs. The sum of all incentives is less than the sum of all net incremental costs. Therefore, the EEPS UCT test ratio of 3.52 exceeds both the EEPS TRC ratio of 1.67 and the EEPS IL TRC ratio of 1.88.

2.1 Generic Data Points

Table 2-2 shows the values for the general data points used all the cost-benefit calculations. The table is followed by a description of what each of the component represents and how it is sourced.

Table 2-2 - Summary of Generic Data Points Used for EEPS TRC

Data Point	Value
Avoided Electric Production (\$/MWh)	\$56.89 1 st year weighted average
Avoided Electric Capacity (\$/kW-year)	\$90.13
Avoided T&D (\$/kW)	\$42.00
Avoided Ancillary (\$/kW)	\$3.65
Discount Rate (Utility WACC %)	7.06%
Line Losses (%)	11.02%
CO2 costs	\$0.0139/kWh

Source: Navigant analysis

2.2 *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 for the first 3 years. Future years are estimated and include the environmental benefits deriving from the expected impacts of CO₂ regulations.² ComEd does not typically use a single value for avoided electric production costs. The DSMore model calculates electric production costs under a wide variety of scenarios. The value included above is a weighted average of the probability of each scenario occurring.

2.3 *Avoided Electric Capacity Costs (\$/kW-year)*

Avoided electric capacity costs are those associated with the construction of addition electricity generation facilities to meet peak demand. Incremental reductions in the amount of electricity demand during peak hours can delay or eliminate the need to build additional generation. ComEd is a participant in the Reliability Pricing Model (“RPM”), which is PJM’s forward capacity market. The DSMore model uses actual RPM clearing prices for avoided demand costs through the 2013 program year (EPY6). After this time frame, it is assumed that capacity prices will rise to the Cost of New Entry (CONE) value of \$317.95/MW-day by 2018. From there, the price is escalated at the same rate as supply costs based on Annual Energy Outlook (AEO) 2010 forecasts.³

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

Avoided transmission and distribution (T&D) costs are a benefit associated with not needing to build transmission and distribution infrastructure to meet demand at peak times. Based on a review of avoided costs on ComEd’s grid attributable to energy efficiency, a value of \$42/kW-year was used in the evaluation of most EEPS programs.

² The primary environmental benefit that could be included in the Illinois TRC test is the value of avoided CO₂ emissions. ComEd included the average carbon value proposed by the NRDC within our analysis. This value (\$18.50/tonne) was applied to marginal power plant emission rate to arrive at an average value of \$0.0139/kWh. DSMore does not provide escalation factors for externalities and emissions.

³ U.S. Energy Information Administration. Annual Energy Outlook. <http://www.eia.gov/forecasts/aeo/>

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 *Non-Incentive Costs*

Non-incentive costs are program administrator costs (related to energy efficiency) that are not otherwise classified as financial incentives paid to customers or incentives paid to third parties. In other words, non-incentive costs are equal to all program administrator costs minus incentives.

Examples of non-incentive costs include:

- Costs for overhead, labor and materials required to develop, deliver, and administer functions related to the implementation of energy efficiency programs or portfolio. This can include such things as rebate processing, measurement and verification, quality assurance, advertising and marketing, or customer relations, among others.
- Program administrator payment to a third party whose principal purpose is not to reduce the cost of the efficient measure to the customer.
- Program administrator payment to a third party to cover the cost of services that are principally intended to be a form of marketing, as opposed to being truly necessary for any customer implementation of efficient measures, should be classified as non-incentive costs.

2.7 *Incentives*

Incentives⁴ include financial incentives paid to customers plus incentives paid to third parties. Financial Incentives Paid to Customers means payment⁵ made by a program administrator directly to an end-use Customer to encourage the Customer to participate in an efficiency Program and offset some or all of the Customer's costs to purchase and install a qualifying efficient Measure, ultimately resulting in a reduction in the net price paid by the Customer for the efficient Measure. This rebate type of Incentive is

⁴ The Illinois TRC test requires that "all incremental costs of end use measures (including both utility and participant contributions)" should be reflected as costs in the TRC test calculation. As long as we ensure that "all incremental costs of end-use measures" is included in the TRC test calculation, there is no need to add Program Administrator Contribution costs (i.e., Incentives) and Participant Contribution costs as separate components to the TRC test. However, Program Administrator Contribution costs (i.e., Incentives) are needed for purposes of calculating the Program Administrator Cost Test/Utility Cost Test (PACT/UCT) since those are a component of the Program Administrator expenses. Most TRC modeling software requires users to input the Incentives as a separate input in addition to providing all Incremental Costs such that the PACT/UCT can be calculated; for this reason, the separate Incentives input in the TRC model is not "used" when calculating the TRC test because these costs are already reflected in the Incremental Cost input, and if the model were to use both the Incentives input and the Incremental Cost input, it would result in double counting of costs in the TRC analysis.

⁵ Payments include both Incentive checks and gift cards that are not restricted to specific retailers. Any fees incurred by the Program Administrator to obtain gift cards should be classified as Non-Incentive Costs because such fees are not principally intended to reduce the net price to the Customer of purchasing and installing the qualifying efficient Measure.

often referred to as a downstream incentive which has the result that the net price to the Customer of an Energy Efficiency Program-sponsored Measure is reduced by the amount of the Incentive.

Incentives paid to third parties means payment made by a program administrator to a third party that is principally intended to reduce the net price to the customer of purchasing and installing a qualifying efficient Measure. Incentives paid to third parties include payments made by a program administrator to trade allies, manufacturers, wholesalers, distributors, contractors, builders, retailers, implementation contractors, or other non-customer stakeholders that are principally intended to defray the incremental cost to the customer of purchasing and installing an efficient measure. Incentives paid to third parties also includes payment made by a program administrator to an implementation contractor to cover the full cost of direct installation measures (materials and labor), for the portion not covered by the customer, or the full cost of study-based services that are truly necessary for a customer to implement efficient measures, as opposed to being principally intended to be a form of marketing.

2.8 Incremental Costs

Incremental costs means the difference between the cost of the efficient measure and the cost of the most relevant baseline measure that would have been installed (if any) in the absence of the efficiency Program. Installation costs (material and labor) and Operations and Maintenance (O&M) costs shall be included if there is a difference between the efficient measure and the baseline measure. In cases where the efficient measure has a significantly shorter or longer life than the relevant baseline measure (e.g., LEDs versus halogens), the avoided baseline replacement measure costs should be accounted for in the TRC analysis. The incremental cost input in the TRC analysis is not reduced by the amount of any incentives.

Examples of incremental cost calculations include:

- The incremental cost for an efficient measure that is installed in new construction or is being purchased at the time of natural installation, investment, or replacement is the additional cost incurred to purchase an efficient measure over and above the cost of the baseline/standard (i.e., less efficient) measure (including any incremental installation, replacement, or O&M costs if there is a difference between the efficient measure and baseline measure).
- For a retrofit measure where the efficiency program caused the customer to update their existing equipment, facility, or processes, where the customer would not have otherwise made a purchase, the appropriate baseline is zero expenditure, and the incremental cost is the full cost of the new retrofit measure (including installation costs).
- For the early replacement of a functioning measure with a new efficient measure, where the customer would not have otherwise made a purchase for a number of years, the appropriate baseline is a dual baseline that begins as the existing measure and shifts to the new standard measure after the expected remaining useful life of the existing measure ends. Thus, the incremental cost is the full cost of the new efficient measure (including installation costs) being purchased to replace a still-functioning measure less the present value of the assumed deferred replacement cost of replacing the existing measure with a new baseline measure at the end of the existing measure's life.
- For study-based services that are truly necessary for a customer to implement efficient measures, as opposed to being principally intended to be a form of marketing, the incremental cost is the full cost of the study-based service.

- For the early retirement of duplicative functioning equipment before its expected life is over (e.g., appliance recycling programs), the incremental costs are composed of the customer's value placed on their lost amenity, any customer transaction costs, and the pickup and recycling cost. The incremental costs include the actual cost of the pickup and recycling of the equipment because this is assumed to be the cost of recycling the equipment that would have been incurred by the customer if the customer were to recycle the equipment on their own in the absence of the efficiency program. The payment a program administrator makes to the customer serves as a proxy for the value the customer places on their lost amenity and any customer transaction costs.

2.9 Discount Rate

The discount rate is an important determinant of overall cost effectiveness. The avoided electric production, capacity T&D, and ancillary 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 7.06 percent reflects ComEd's weighted average cost of capital (WACC) and is appropriate rate to use for the Total Resource Cost (TRC) Test.

2.10 Line Losses

Included in Table 2-2, 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 11.02 percent are based on ComEd's internal analysis. These line losses are in the higher end of the range that Navigant has seen, but are reasonable.

2.11 Miscellaneous EEPS Portfolio Costs

In addition to costs allocated directly to energy efficiency programs, portfolio level costs not directly incurred by specific programs are also included. These costs may include administrative, research and development, outreach, advertising, evaluation, measurement, and verification, legal, and other expenses. Since statutory costs effectiveness is measured at the portfolio level, ComEd does not allocate these costs to individual programs.

2.12 Gas Interactive Effects

Gas interactive effects is an issue to be assessed going forward – Navigant does not have the detail for this TRC assumptions review to incorporate gas interactive effects. In order to be included in future TRC reviews, gas interactive effects should be addressed during the program year evaluations and should be incorporated in individual program reports going forward, as needed.

3. Program Specific Data

A summary of the components of the cost effectiveness calculations for each program are shown in Table 3-1 for the Illinois TRC calculations and Table 3-2 for the Utility Cost Test calculations. The tables include the value of each benefit and cost component for each program, as well as EEPS totals for each component. The cost-benefit results included in these tables are reflective of only the Energy Efficiency Portfolio Standard (EEPS) portion of the ComEd energy efficiency and demand response programs, and are not inclusive of the Illinois Power Agency (IPA) portion. Additionally, for programs that are jointly implemented by ComEd and one or more Illinois gas utility, only the electric portion of the program savings and cost-benefit calculations are included here.

Table 3-1 - Summary of Program Level Benefits, Costs (\$ in 000's) and IL TRC Test- ComEd EEPS Specific w/o Gas Data from Joint Programs

Program								Costs			IL Total Resource Cost (TRC) Test			
	Avoided Electric Production	Avoided Electric Capacity	Avoided T&D Electric	Avoided Ancillary	Avoided Gas Production	Other Benefits	Definition of Other Benefits	Non-Incentive Costs	Incentive Costs	Incremental Costs (Net)	IL TRC Benefits	IL TRC Costs	IL TRC Test Net Benefits	IL TRC Test
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l) = (b+c+d+e+f+g)	(m) = (i+k)	(n) = (l-m)	(o) = (n)
Residential Lighting	\$ 24,637,472	\$ 6,365,425	\$ 3,744,356	\$ 6,686,299	\$ (16,220,346)	\$ 42,598,899	Avoided GHGs / NPV of Avoided Replacements	\$ 3,264,857	\$ 10,545,459	\$ 6,056,585	\$ 67,812,105	\$ 9,321,442	\$ 58,490,662	7.27
Appliance Recycling	\$ 5,161,061	\$ 1,972,957	\$ 1,198,350	\$ 1,799,731	\$ -	\$ 2,491,033	Avoided GHGs	\$ 1,620,176	\$ 5,270,798	\$ 3,763,350	\$ 12,623,132	\$ 5,383,526	\$ 7,239,606	2.34
Complete System Replacement	\$ 1,295,966	\$ 2,812,140	\$ 1,852,570	\$ 431,200	\$ -	\$ 537,407	Avoided GHGs	\$ 564,210	\$ 4,309,250	\$ 8,168,570	\$ 6,929,283	\$ 8,732,780	\$ (1,803,497)	0.79
Elementary Education	\$ 522,414	\$ 197,589	\$ 121,114	\$ 182,355	\$ -	\$ 682,971	Avoided GHGs / NPV of Avoided Replacements	\$ 689,125	\$ 124,309	\$ 108,743	\$ 1,706,442	\$ 797,868	\$ 908,573	2.14
Home Energy Reports	\$ 3,727,596	\$ -	\$ -	\$ -	\$ -	\$ 1,991,682	Avoided GHGs	\$ 1,788,260	\$ -	\$ -	\$ 5,719,277	\$ 1,788,260	\$ 3,931,017	3.20
Joint Multi-Family	\$ 2,681,633	\$ 752,182	\$ 452,720	\$ 775,265	\$ -	\$ 3,958,568	Avoided GHGs / NPV of Avoided Replacements	\$ 2,380,849	\$ 2,434,179	\$ 2,281,234	\$ 8,620,368	\$ 4,662,083	\$ 3,958,285	1.85
Joint Single Family	\$ 726,559	\$ 1,439,567	\$ 948,448	\$ 250,188	\$ -	\$ 1,204,426	Avoided GHGs / NPV of Avoided Replacements	\$ 833,920	\$ 571,767	\$ 1,383,862	\$ 4,569,189	\$ 2,217,782	\$ 2,351,406	2.06
Res New Construction	\$ 162,976	\$ 135,407	\$ 90,762	\$ 53,998	\$ -	\$ 68,498	Avoided GHGs / NPV of Avoided Replacements	\$ 28,763	\$ 9,425	\$ 56,350	\$ 511,641	\$ 85,113	\$ 426,528	6.01
C&I Standard	\$ 120,000,814	\$ 28,674,151	\$ 17,973,648	\$ 13,664,840	\$ (15,548,613)	\$ 25,197,611	Avoided GHGs	\$ 9,055,909	\$ 23,439,907	\$ 146,090,589	\$ 189,962,452	\$ 155,146,498	\$ 34,815,953	1.22
C&I Custom	\$ 10,090,008	\$ 966,558	\$ 605,862	\$ 1,148,978	\$ -	\$ 2,118,686	Avoided GHGs	\$ 1,186,565	\$ 1,916,622	\$ 11,898,322	\$ 14,930,093	\$ 13,084,887	\$ 1,845,206	1.14
Data Centers	\$ 7,757,174	\$ 923,039	\$ 578,583	\$ 828,924	\$ -	\$ 1,523,672	Avoided GHGs	\$ 1,012,562	\$ 1,354,529	\$ 2,937,827	\$ 11,611,392	\$ 3,950,389	\$ 7,661,003	2.94
BILD	\$ 39,214,519	\$ 10,651,126	\$ 6,340,016	\$ 4,624,468	\$ (6,683,051)	\$ 36,428,751	Avoided GHGs / NPV of Avoided Replacements	\$ 2,259,841	\$ 9,849,870	\$ 44,228,525	\$ 90,575,830	\$ 46,488,366	\$ 44,087,464	1.95
Industrial Systems	\$ 13,273,110	\$ 3,097,131	\$ 1,988,762	\$ 1,501,245	\$ -	\$ 2,678,664	Avoided GHGs	\$ 2,199,818	\$ 2,243,753	\$ 3,341,092	\$ 22,538,912	\$ 5,540,910	\$ 16,998,002	4.07
C&I New Construction	\$ 8,902,196	\$ 2,450,762	\$ 1,536,196	\$ 1,013,719	\$ -	\$ 1,869,271	Avoided GHGs	\$ 2,139,473	\$ 2,825,345	\$ 2,690,913	\$ 15,772,144	\$ 4,830,386	\$ 10,941,758	3.27
Small Business	\$ 15,712,057	\$ 8,051,958	\$ 5,043,705	\$ 4,437,490	\$ (8,183,707)	\$ 6,925,527	Avoided GHGs / NPV of Avoided Replacements	\$ 2,081,838	\$ 9,232,557	\$ 8,394,458	\$ 31,987,029	\$ 10,476,296	\$ 21,510,733	3.05
Retro-Commissioning	\$ 7,054,465	\$ 252,704	\$ 151,619	\$ 782,838	\$ -	\$ 1,710,394	Avoided GHGs	\$ 1,740,997	\$ 2,882,513	\$ 3,942,271	\$ 9,952,020	\$ 5,683,268	\$ 4,268,752	1.75
3rd Party Program Results	\$ 114,106	\$ 18,936	\$ 8,613	\$ 41,177	\$ -	\$ 60,968	Avoided GHGs	\$ 460,142	\$ -	\$ -	\$ 243,799	\$ 460,142	\$ (216,343)	0.53
Sum of programs	\$ 261,034,126	\$ 68,761,631	\$ 42,635,324	\$ 38,222,715	\$ (46,635,717)	\$ 132,047,028		\$ 33,307,305	\$ 77,010,283	\$ 245,342,692	\$ 496,065,107	\$ 278,649,997	\$ 217,415,110	1.78
Portfolio-Level Costs & CFL Carryover Savings	\$ 23,605,795	\$ 4,786,329	\$ 2,880,800	\$ 4,338,869	\$ -	\$ 31,268,004	NPV of Avoided Replacements	\$ 16,344,088	\$ -	\$ 4,363,140	\$ 66,879,798	\$ 20,707,228	\$ 46,172,570	
Aggregate EEPS Portfolio	\$ 284,639,922	\$ 73,547,960	\$ 45,516,125	\$ 42,561,584	\$ (46,635,717)	\$ 163,315,032		\$ 49,651,393	\$ 77,010,283	\$ 249,705,832	\$ 562,944,905	\$ 299,357,225	\$ 263,587,680	1.88

Note: The cost-benefit results included here are reflective of only the EEPS portion of the ComEd portfolio and are not inclusive of the Illinois Power Agency (IPA) portion. Within the ComEd DSM runs, 3rd Party programs are only analyzed in aggregate, and thus are presented here as a single line item. In aggregate, 3rd Party programs represent such a small portion of EEPS savings that their impact on EEPS cost effectiveness is negligible.

Source: Navigant analysis

Table 3-2. Summary of Program Level Benefits, Costs (\$ in 000's) and Utility Cost Test- ComEd EEPS Specific w/o Joint Program Gas Data

Program								Costs			Utility Cost Test (UCT)			
	Avoided Electric Production	Avoided Electric Capacity	Avoided T&D Electric	Avoided Ancillary	Avoided Gas Production	Other Benefits	Definition of Other Benefits	Non-Incentive Costs	Incentive Costs	Incremental Costs (Net)	UCT Benefits	UCT Costs	UCT Test Net Benefits	UCT Test
	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l) = (b+c+d+e)	(m) = (i+j)	(n) = (l-m)	(o) = (l/m)
Residential Lighting	\$ 24,637,472	\$ 6,365,425	\$ 3,744,356	\$ 6,686,299	\$ (16,220,346)	\$ 42,598,899	Avoided GHGs / NPV of Avoided Replacements	\$ 3,264,857	\$ 10,545,459	\$ 6,056,585	\$ 41,433,552	\$ 13,810,316	\$ 27,623,236	3.00
Appliance Recycling	\$ 5,161,061	\$ 1,972,957	\$ 1,198,350	\$ 1,799,731	\$ -	\$ 2,491,033	Avoided GHGs	\$ 1,620,176	\$ 5,270,798	\$ 3,763,350	\$ 10,132,099	\$ 6,890,974	\$ 3,241,125	1.47
Complete System Replacement	\$ 1,295,966	\$ 2,812,140	\$ 1,852,570	\$ 431,200	\$ -	\$ 537,407	Avoided GHGs	\$ 564,210	\$ 4,309,250	\$ 8,168,570	\$ 6,391,875	\$ 4,873,460	\$ 1,518,415	1.31
Elementary Education	\$ 522,414	\$ 197,589	\$ 121,114	\$ 182,355	\$ -	\$ 682,971	Avoided GHGs / NPV of Avoided Replacements	\$ 689,125	\$ 124,309	\$ 108,743	\$ 1,023,471	\$ 813,434	\$ 210,037	1.26
Home Energy Reports	\$ 3,727,596	\$ -	\$ -	\$ -	\$ -	\$ 1,991,682	Avoided GHGs	\$ 1,788,260	\$ -	\$ -	\$ 3,727,596	\$ 1,788,260	\$ 1,939,336	2.08
Joint Multi-Family	\$ 2,681,633	\$ 752,182	\$ 452,720	\$ 775,265	\$ -	\$ 3,958,568	Avoided GHGs / NPV of Avoided Replacements	\$ 2,380,849	\$ 2,434,179	\$ 2,281,234	\$ 4,661,800	\$ 4,815,028	\$ (153,228)	0.97
Joint Single Family	\$ 726,559	\$ 1,439,567	\$ 948,448	\$ 250,188	\$ -	\$ 1,204,426	Avoided GHGs / NPV of Avoided Replacements	\$ 833,920	\$ 571,767	\$ 1,383,862	\$ 3,364,762	\$ 1,405,687	\$ 1,959,075	2.39
Res New Construction	\$ 162,976	\$ 135,407	\$ 90,762	\$ 53,998	\$ -	\$ 68,498	Avoided GHGs / NPV of Avoided Replacements	\$ 28,763	\$ 9,425	\$ 56,350	\$ 443,143	\$ 38,188	\$ 404,955	11.60
C&I Standard	\$ 120,000,814	\$ 28,674,151	\$ 17,973,648	\$ 13,664,840	\$ (15,548,613)	\$ 25,197,611	Avoided GHGs	\$ 9,055,909	\$ 23,439,907	\$ 146,090,589	\$ 180,313,453	\$ 32,495,816	\$ 147,817,637	5.55
C&I Custom	\$ 10,090,008	\$ 966,558	\$ 605,862	\$ 1,148,978	\$ -	\$ 2,118,686	Avoided GHGs	\$ 1,186,565	\$ 1,916,622	\$ 11,898,322	\$ 12,811,407	\$ 3,103,187	\$ 9,708,220	4.13
Data Centers	\$ 7,757,174	\$ 923,039	\$ 578,583	\$ 828,924	\$ -	\$ 1,523,672	Avoided GHGs	\$ 1,012,562	\$ 1,354,529	\$ 2,937,827	\$ 10,087,720	\$ 2,367,091	\$ 7,720,629	4.26
BILD	\$ 39,214,519	\$ 10,651,126	\$ 6,340,016	\$ 4,624,468	\$ (6,683,051)	\$ 36,428,751	Avoided GHGs / NPV of Avoided Replacements	\$ 2,259,841	\$ 9,849,870	\$ 44,228,525	\$ 60,830,129	\$ 12,109,711	\$ 48,720,418	5.02
Industrial Systems	\$ 13,273,110	\$ 3,097,131	\$ 1,988,762	\$ 1,501,245	\$ -	\$ 2,678,664	Avoided GHGs	\$ 2,199,818	\$ 2,243,753	\$ 3,341,092	\$ 19,860,248	\$ 4,443,571	\$ 15,416,677	4.47
C&I New Construction	\$ 8,902,196	\$ 2,450,762	\$ 1,536,196	\$ 1,013,719	\$ -	\$ 1,869,271	Avoided GHGs	\$ 2,139,473	\$ 2,825,345	\$ 2,690,913	\$ 13,902,873	\$ 4,964,818	\$ 8,938,055	2.80
Small Business	\$ 15,712,057	\$ 8,051,958	\$ 5,043,705	\$ 4,437,490	\$ (8,183,707)	\$ 6,925,527	Avoided GHGs / NPV of Avoided Replacements	\$ 2,081,838	\$ 9,232,557	\$ 8,394,458	\$ 33,245,210	\$ 11,314,395	\$ 21,930,815	2.94
Retro-Commissioning	\$ 7,054,465	\$ 252,704	\$ 151,619	\$ 782,838	\$ -	\$ 1,710,394	Avoided GHGs	\$ 1,740,997	\$ 2,882,513	\$ 3,942,271	\$ 8,241,626	\$ 4,623,510	\$ 3,618,116	1.78
3rd Party Program Results	\$ 114,106	\$ 18,936	\$ 8,613	\$ 41,177	\$ -	\$ 60,968	Avoided GHGs	\$ 460,142	\$ -	\$ -	\$ 182,831	\$ 460,142	\$ (277,311)	0.40
Sum of programs	\$ 261,034,126	\$ 68,761,631	\$ 42,635,324	\$ 38,222,715	\$ (46,635,717)	\$ 132,047,028		\$ 33,307,305	\$ 77,010,283	\$ 245,342,692	\$ 410,653,796	\$ 110,317,588	\$ 300,336,208	3.72
Portfolio-Level Costs & CFL Carryover Savings	\$ 23,605,795	\$ 4,786,329	\$ 2,880,800	\$ 4,338,869	\$ -	\$ 31,268,004	NPV of Avoided Replacements	\$ 16,344,088	\$ -	\$ 4,363,140	\$ 35,611,794	\$ 16,344,088	\$ 19,267,706	
Aggregate EEPS Portfolio	\$ 284,639,922	\$ 73,547,960	\$ 45,516,125	\$ 42,561,584	\$ (46,635,717)	\$ 163,315,032		\$ 49,651,393	\$ 77,010,283	\$ 249,705,832	\$ 446,265,590	\$ 126,661,676	\$ 319,603,914	3.52

Note: The cost-benefit results included here are reflective of only the EEPS portion of the ComEd portfolio and are not inclusive of the Illinois Power Agency (IPA) portion. Within the ComEd DSMore runs, 3rd Party programs are only analyzed in aggregate, and thus are presented here as a single line item. In aggregate, 3rd Party programs represent such a small portion of total savings that their impact on EEPS cost effectiveness is negligible.

Source: Navigant analysis

3.1 Program Specific Data Review

With respect to the program specific data used in ComEd’s TRC calculations, several were based on the utility’s internal tracking and accounting systems. These data are ultimately input into ComEd’s Demand Side Management Option Risk Evaluator (DSMore) models to generate the TRC results, including implementation, utility administration and utility incentive costs. Implementation and incentives costs are tracked by program, where utility administrative costs were provided by ComEd’s energy efficiency staff to Navigant for review. It is worth noting that many of the programs were jointly implemented by Peoples Gas, Nicor Gas, and ComEd. These programs include Multi-Family Direct Install, Single Family Direct Install, Elementary Energy Education, Residential New Construction, Business New Construction, C&I Retro-Commissioning, and Small Business Direct Install. In these cases, the utility costs were split between the utilities based on an agreed percentage.

The remaining data points that were used by ComEd in the TRC evaluation were the Measure Life and Incremental Costs. These values were reviewed by Navigant who confirmed or advised revisions based upon reviews of deemed values in the Illinois TRM Version 2.0, where appropriate. The measure life determines how long the energy and demand savings from any one measure will last. The incremental costs are the costs associated with participating in the program, before accounting for any incentives. In rebate programs, participants generally pay a portion of the incremental costs, in contrast with direct install programs where the utility generally pays most or all of the incremental costs. In all these cases, the participant incremental costs should be included in the TRC calculation if non-zero.

The following sections include program level TRC calculation results, including the following table that informs the final program level TRC.

Table 3-3. IL TRC Component Table

Item	Explanation of Value
Ex-Post Gross Savings (MWh) @ the Meter	Program level gross impacts
Ex-Post Net Savings (MWh) @ the Meter	Program level net impacts that inform avoided costs
Utility Non-Incentive Costs	Program administrative, implementation, and other related costs
Utility Incentive Costs	Incentive costs paid to participants (e.g., directly as rebates, via buy-downs through upstream incentives, etc.)
Gross Incremental Costs ⁶	Measure incremental costs paid by participants and/or the utility
Net Incremental Costs	Measure incremental costs paid by participants and/or the utility adjusted for costs associated with measures acquired by free riders or through spillover activities
Total TRC Benefits	See Equation 2
Total TRC Costs	See Equation 3
Total TRC Net Benefits	Total TRC Benefits minus Total TRC Costs
TRC Test Ratio	Total TRC Benefits divided Total TRC Costs

Source: DSMore, Navigant analysis

To account for programs that could claim benefits associated with the value of avoided incandescent purchases due to the installation of CFLs or LEDs, Navigant reviewed Version 2.0 of the Illinois TRM to

⁶ Utility incentive costs are provided to Navigant in the aggregate. To assess incentive costs in greater detail, Navigant will need more granular incentive cost detail in the future.

identify the per-lamp NPVs of Baseline Replacement Costs for CFL/LED installations. Table 3-4 identifies those NPVs for the range of applications specified within the TRM. The cost-benefit calculations utilize these values to estimate the benefits associated with CFL/LED replacements based on the number of each bulb type installed through each program.

Table 3-4. IL TRM Version 2.0 NPV of Baseline Replacement Costs Summary

TRM Page	Application	Per Lamp NPV of Baseline Replacement Costs				Average Cost
		Lumen range: 1490-2600	Lumen range: 1050-1489	Lumen range: 750-1049	Lumen range: 310-749	
240	Commercial ENERGY STAR CFL	\$11.81	\$11.81	\$8.60	\$8.60	\$10.21
247	Non-EISA compliant	\$12.86	\$12.86	\$9.36	\$9.36	\$11.11
272	LED bulbs and fixtures	\$32.23	\$32.23	\$28.66	\$28.66	\$30.45
502	Residential Energy Star CFL	\$5.41	\$5.41	\$5.41	\$5.41	\$5.41
502, 514	Multi-family common area Energy Star CFL	\$13.09	\$13.09	\$8.24	\$8.24	\$10.67
503, 514	Residential exterior Energy Star CFL	\$9.36	\$9.36	\$8.55	\$8.55	\$8.96
513	Multi-family in unit and unknown Energy Star CFL	\$5.41	\$5.41	\$5.41	\$5.41	\$5.41
517, 527	Energy Star specialty compact CFL	\$23.97	\$23.97	\$23.97	\$23.97	\$23.97

Source: Illinois TRM, DSMore, Navigant analysis

3.2 Residential Energy Star Lighting (EEPS-only)

The main goal of ComEd’s PY6 Residential ENERGY STAR Lighting program (Residential ES Lighting) is to increase the market penetration of energy-efficient lighting within the Commonwealth Edison Company’s (ComEd’s) service territory by offering incentives for bulbs purchased through various retail channels. The program also seeks to increase customer awareness and acceptance of energy-efficient lighting technologies, as well as proper bulb disposal, through the distribution of educational materials. In PY6, the EEPS portion of the Residential ES Lighting program offered incentives for the purchase of standard compact fluorescent lamps (CFLs).⁷ The IPA portion of the program included specialty CFLs, but the IPA portion of the program is not included within these cost-benefit calculations.

⁷ LEDs and CFL/LED fixtures were offered in PY5 but were not offered in PY6. LED bulbs have been reintroduced to the program in PY7.

Table 3-5. IL TRC Components for Residential ENERGY STAR Lighting Program

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	340,774
Ex-Post Net Savings (MWh) @ the Meter	184,018
Utility Non-Incentive Costs	\$3,264,857
Utility Incentive Costs	\$10,545,459
Gross Incremental Costs	\$11,215,897
Net Incremental Costs	\$6,056,585
NPV of Avoided Incandescent Light Bulbs	\$36,072,316
Total TRC Benefits	\$67,812,105
Total TRC Costs	\$9,321,442
Total TRC Net Benefits	\$58,490,663
TRC Test Ratio	7.27

Source: DSMore, Navigant analysis

3.2.1 Measure Life

A range of measure lives were used for the Residential ES Lighting program depending on which measure group was being analyzed. The table below summarizes the measure lives used for different measures of the program as noted within DSMore. These measure lives are consistent with the current version of the Illinois TRM, except that they are rounded up to the next whole year to accommodate limitations in the DSMore software used to perform the TRC calculations, which cannot accept fractional EULs.⁸ In order to compensate for this, energy savings in the last year are reduced accordingly to match the intended measure life. In this instance, a six year measure life is used for residential CFLs, but the energy savings in the last year is reduced by 80 percent so the final results match the 5.2 year measure life in the IL TRM.

Table 3-6. Measure life of the Residential ENERGY STAR Lighting Program Measures

Measure	Measure Life (in years)
C&I Sector 40W EISA-compliant CFL	3
C&I Sector 60W EISA-compliant CFL	3
C&I Sector Other EISA-compliant CFL	3
Residential Sector 40W EISA-compliant CFL	6
Residential Sector 60W EISA-compliant CFL	6
Residential Sector Other EISA-compliant CFL	6

Source: DSMore, Navigant analysis

3.2.2 Participant/Incremental Costs

Incremental measures costs are deemed per measure in the Illinois TRM and were used to determine the program participant costs as reported in ComEd's DSMore outputs. These values were consistent with recent iterations of the Illinois TRM and other resources, such as program records. The table below summarizes the incremental cost used for the Residential ES Lighting program measures.

⁸ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

Table 3-7. Incremental Cost of the of the Residential ENERGY STAR Lighting Program Measures

Measure	Incremental cost per unit (in \$)
C&I Sector 40W replacement EISA-compliant CFL	\$1.80
C&I Sector 60W replacement EISA-compliant CFL	\$1.80
C&I Sector Other EISA-compliant CFL	\$1.80
Residential Sector 40W replacement EISA-compliant CFL	\$1.80
Residential Sector 60W replacement EISA-compliant CFL	\$1.80
Residential Sector Other EISA-compliant CFL	\$1.80

Source: DSMore, Navigant analysis

3.2.3 NPV of Avoided Incandescent Light Bulb Purchases

The ENERGY STAR Lighting program incented a total of 6,231,054 bulbs through the EEPS portion of the program during PY6. With a claimed NPV of avoided incandescent purchases of \$36,072,316, this works out to an average of \$5.79 per bulb, which is about \$0.38, or 7 percent, more than the per bulb value for residential CFLs provided by the TRM as shown in Table 3-4. This difference is accounted for by the portion of program bulbs that are estimated to have been installed in commercial lighting sockets, which have an average NPV of almost twice as much (\$10.21).

3.2.4 Impact Results

Table 3-8 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-8. Residential ENERGY STAR Lighting Incentive PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	442,599	n/a	n/a
Verified Gross Savings	340,774	282.8	40.0
Verified Net Savings	184,018	152.7	21.6

Source: ComEd tracking data and evaluation team analysis

The TRC calculations for the Residential Energy Star Lighting program also include the cost of increased natural gas usage associated with reduced waste heat from the use of efficient light bulbs. These calculations are based on the deemed calculation for natural gas savings for standard CFLs in the Illinois TRM.⁹ The TRM formula calculates savings in terms of therms, which were converted to CCF for input into DSMore.

Table 3-9. Residential ENERGY STAR Lighting Natural Gas Savings per Bulb

Bulb Type	Residential End Use (CCF)	C&I End Use (CCF)
40W EISA	-0.73	-1.60
60W EISA	-1.11	-2.43
Other EISA	-1.08	-2.36

Source: DSMore output files

⁹ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013. Page 512 for residential and page 246 for commercial.

3.3 Residential Fridge and Freezer Recycle Rewards

The Residential Fridge and Freezer Recycle Rewards (FFRR) program was designed to achieve energy savings through the retirement and recycling of older, inefficient refrigerators, freezers, and room air conditioners (ACs). The primary objectives of the program are to decrease the retention of high energy-use refrigerators and freezers and deliver long-term energy savings. A secondary objective is to dispose of these older units in an environmentally safe manner.

Table 3-10. IL TRC Components for Residential Fridge and Freezer Recycle Rewards

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	35,478
Ex-Post Net Savings (MWh) @ the Meter	25,331
Utility Non-Incentive Costs	\$1,620,176
Utility Incentive Costs	\$5,270,798
Gross Incremental Costs*	\$5,270,798
Net Incremental Costs*	\$3,763,350
Total TRC Benefits	\$12,623,132
Total TRC Costs	\$5,385,526
Total TRC Net Benefits	\$7,239,606
TRC Test Ratio	2.34

Source: DSMore, Navigant analysis

*The cost of appliance removal is captured within the Utility Non-Incentive Costs by ComEd.

3.3.1 Measure Life

A single measure life of 8 years was used for the FFRR program to represent the mix of refrigerators and freezers recycled. Navigant identified this measure life within ComEd’s DSMore outputs as well as the Illinois TRM.¹⁰

3.3.2 Participant/Incremental Costs

In the TRC calculations performed for the FFRR program in DSMore, the incremental costs were set to zero for participants. Though this is a correct reflection of the participants’ financial outlay, per the Illinois TRM, the actual cost of removing the appliances should be utilized as the incremental cost (or \$120 per unit, if unknown). Instead, the DSMore calculations include the cost of program delivery and appliance removal in the utility non-incentive cost portion of the calculations. Navigant adjusted for this by assuming that the entirety of the implementation portion of program costs, or approximately \$3.6 million, reflects the costs of picking up and recycling participant appliances. This works out to just under \$90 per recycled unit, which is a typical amount for an appliance recycling program. For TRC calculations, this total implementation amount was treated as both an incremental cost and a component of the incentive to program participants, in addition to the cash payment.

3.3.3 Impact Results

Table 3-11 shows the key results of the gross and net impact evaluation using deemed savings estimates.

¹⁰ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013. Section 5.1.8 Refrigerator and Freezer Recycling.

Table 3-11. Residential Fridge and Freezer Recycle Rewards PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	38,149	4.85	3.46
Verified Gross Savings	35,478	4.80	4.51
Verified Net Savings	25,331	3.22	3.22

Source: ComEd tracking data and evaluation team analysis

3.4 Complete System Replacement

The Complete System Replacement (CSR) program provides cash incentives to encourage ComEd customers to purchase higher efficiency air conditioning systems. This program is offered in conjunction with high efficiency furnace rebates through the Home Energy Efficiency Rebates (Home EER) program offered by Nicor Gas and the Residential Prescriptive Rebate Program offered by Peoples Gas and North Shore Gas. Both rental and owner-occupied dwellings are eligible for rebates for furnaces and air conditioning systems.

Table 3-12. IL TRC Components for Complete System Replacement

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	5,515
Ex-Post Net Savings (MWh) @ the Meter	3,254
Utility Non-Incentive Costs	\$6,929,282
Utility Incentive Costs	\$4,309,250
Gross Incremental Costs	\$13,845,034
Net Incremental Costs	\$8,168,570
Total TRC Benefits	\$6,929,283
Total TRC Costs	\$8,732,780
Total TRC Net Benefits	-\$1,803,497
TRC Test Ratio	0.79

Source: DSMore, Navigant analysis

3.4.1 Measure Life

A single measure life of 18 years was used for the CSR program to represent the mix of air conditioning systems installed through the program that contribute toward electric savings. Those systems range in size (tonnage) and efficiency (SEER). Navigant identified this measure life within ComEd’s DSMore outputs as well as the Illinois TRM and determined them to be reasonable.¹¹

3.4.2 Participant/Incremental Costs

Similar to measure life, a single incremental cost of \$333 is estimated for the program and used to develop the TRC estimate. This cost estimate represents the mix of air conditioning systems installed through the program that contribute toward electric savings. Navigant identified this incremental cost within

¹¹ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

ComEd’s DSMore outputs and determine that estimate and the inputs to arrive at that estimate to be reasonable. ComEd estimated incremental costs by reflecting a 13 SEER unit rated for 2.8 tons being replaced by a 14.5 SEER unit. The Illinois TRM¹² specifies an incremental cost of \$119 per ton per SEER (2.8 * \$119 = \$333). This calculation was utilized for the approximately 13 percent of program measures that were determined to have been installed at the time of retirement of the existing measure.

For the approximately 87 percent of program measures determined to have been early replacements, the actual cost of installing the efficient unit is unknown. Therefore, the incremental costs calculation utilizes a deemed amount of \$3,413 to represent the present cost of installing the efficient unit according to the TRM.¹³ Also incorporated into the incremental cost is present value benefit of no longer having to install a new measure in the future when the existing measure would have retired prior to retrofit. This amount is assumed to be \$2,857, 6 years in the future. These values combine to result in an incremental cost of \$1,432 for early retirement retrofits. Navigant utilized this revised value for the incremental cost per installed unit to adjust the TRC calculations for the CSR program. However, it should be noted that while Navigant was able to adjust incremental costs for the proportion of existing measures that were retired early, Navigant was unable to make the corresponding adjustment to avoided costs and net benefits without a new DSMore run.

3.4.3 Impact Results

Table 3-13 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-13. Complete System Replacement Program PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	5,633	N/A	N/A
Verified Gross Savings	5,515	7.95	4.05
Verified Net Savings	3,254	4.69	2.39

Source: ComEd tracking data and Navigant analysis

3.5 Elementary Education

The Elementary Energy Education (EEE) program’s primary focus is to produce electricity and natural gas savings in the residential sector by motivating 5th grade students and their families to reduce energy consumption from water heating and lighting in their home. The EEE program aims to increase participation in other ComEd and Nicor Gas programs via cross-marketing and increased customer awareness of energy efficiency issues.

¹² IBID Section 5.3.3

¹³ IBID Section 5.3.3

Table 3-14. IL TRC Components for Residential Elementary Energy Education program

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	4,162
Ex-Post Net Savings (MWh) @ the Meter	3,163
Utility Non-Incentive Costs	\$689,125
Utility Incentive Costs	\$124,309
Gross Incremental Costs	\$143,083
Net Incremental Costs	\$108,743
NPV of Avoided Incandescent Light Bulbs	\$430,046
Total TRC Benefits	\$1,706,442
Total TRC Costs	\$797,868
Total TRC Net Benefits	\$908,573
TRC Test Ratio	2.14

Source: Navigant analysis

3.5.1 Measure Life

Different measure lives were used for the Residential EEE program depending on which measure group was being analyzed. The table below summarizes the measure lives as noted within DSMore. These measure lives are consistent with the current version of the Illinois TRM.¹⁴ ComEd specifies a measure of 6 years for CFLs and uses 10 years to represent the mix of water conservation measures offered by the program. These measure lives are rounded up to the next whole year to accommodate limitations in the DSMore software used to perform the TRC calculations, which cannot accept fractional EULs.¹⁵ In order to compensate for this, energy savings in the last year are reduced accordingly to match the intended measure life. For example, a six year measure life is used for residential CFLs, but the energy savings in the last year is reduced by 80 percent so the final results match the 5.2 year measure life in the IL TRM. A similar adjust was made to reflect the weighted average measure life for all water measures in the Residential EEE program.

Table 3-15. Measure life of the Residential Elementary Energy Education Program Measures

Measure	Measure Life (in years)
CFL 60W Replacement	6
Water Related Measures	10

Source: DSMore, Navigant analysis

3.5.2 Participant/Incremental Costs

Incremental measures costs are deemed per measure in the Illinois TRM and were used to determine the program participant costs as reported in ComEd’s DSMore outputs. These values were consistent with recent iterations of the Illinois TRM and other resources, such as program records. The table below summarizes the incremental cost used for the Residential Elementary Energy Education program measures. Navigant was not provided sufficient detail to ascertain the actual cost of each measure or measure group implemented through the Elementary Energy Education program. However, as part of

¹⁴ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

¹⁵ Ibid

the review, the incremental costs utilized in the DSMore run were compared to values for similar programs and deemed values in the IL TRM and were determined to be reasonable.

Additional, program records indicated that the DSMore calculations were likely double counting the cost of water measures by including all measure-related contractor costs in the incremental cost calculation, rather than just those associated with the CFLs in the energy efficiency kits. Since the incremental costs for the water measures are already included in the TRC calculations for Nicor Gas, Navigant removed the incremental costs associated with water measures from ComEd’s TRC calculations to prevent double counting.

Table 3-16. Incremental Cost of the of the Elementary Energy Education Program Measures

Measure	Incremental cost per unit (in \$)
CFL 60W Replacement	\$1.80
Water Related Measures	\$9.20

Source: DSMore, Navigant analysis

3.5.3 NPV of Avoided Incandescent Light Bulb Purchases

The Elementary Energy Education program provided a total of 79,491 bulbs during PY6. With a claimed NPV of avoided incandescent purchases of \$430,046, this works out to an average of \$5.41 per bulb, which matches the per bulb value for residential CFLs provided by the TRM, as shown in Table 3-4.

3.5.4 Impact Results

Table 3-17 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-17. Residential Elementary Energy Education PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	4,172,174	n/a ¹⁶	n/a
Verified Gross Savings	4,162,033	483	n/a
Verified Net Savings	3,163,145	367	n/a

Source: ComEd tracking data and evaluation team analysis

3.6 Home Energy Report

ComEd designed the Home Energy Report (HER) behavioral program to generate energy savings by providing residential customers with sets of information about customer energy use and energy conservation. Information can induce customers to reduce their energy use, creating average energy savings in the one to three percent range. Program participants receive home energy reports that include their recent energy usage patterns and tips on how to reduce energy consumption tailored to their circumstances.

¹⁶ Ex-Ante gross kW were not included in the program tracking system.

Table 3-18. IL TRC Components for Home Energy Reports

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter †	129,063
Ex-Post Net Savings (MWh) @ the Meter †	129,063
Utility Non-Incentive Costs	\$1,788,260
Utility Incentive Costs	\$0
Gross Incremental Costs*	\$0
Net Incremental Costs*	\$0
Total TRC Benefits	\$5,719,277
Total TRC Costs	\$1,788,260
Total TRC Net Benefits	\$3,931,017
TRC Test Ratio	3.20

Source: DSMore, Navigant analysis

*The cost of the reports is captured within the Utility Non-Incentive Costs by ComEd

† Program ex-post gross and net savings are shown after the removal of 181 of calculated uplift savings

3.6.1 Measure Life

A measure life of 1 year was used for Home Energy Report program. Navigant identified this measure life within ComEd’s DSMore outputs and determine that estimate to be conservative and reasonable in consideration of ongoing research.¹⁷

3.6.2 Participant/Incremental Costs

The participant costs are assumed to be zero. The cost of producing and delivering the reports are included within the utility non-incentive costs.

3.6.3 Impact Results

Table 3-19 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-19. Home Energy Reports PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	110,582	n/a	n/a
Verified Gross Savings	129,244	n/a	n/a
Verified Net Savings	129,244	n/a	n/a

Source: ComEd tracking data and evaluation team analysis

3.7 Multi-Family Home Energy Savings (EEPS-only)

The Multi-Family Home Energy Savings (MFHES) program is in the second year of jointly implemented program delivery with Nicor Gas and Peoples Gas and North Shore Gas. The MFHES program is designed to secure energy savings through direct installation of low-cost efficiency measures, such as

¹⁷ The Illinois TRM does not include an applicable measure life. Both Navigant and Cadmus have recently conducted research into Home Energy Report persistence and measure life. As a result, the IL TRM Version 5.0 contains a deemed measure life that will be used in future evaluation years.

CFLs, water efficient showerheads and faucet aerators in residential dwelling units of eligible multifamily residences. The PY6 program year is the first full year for joint delivery.

Table 3-20. IL TRC Components for Multi-Family Home Energy Savings Program

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	45,750
Ex-Post Net Savings (MWh) @ the Meter	39,490
Utility Non-Incentive Costs	\$2,380,849
Utility Incentive Costs	\$2,434,179
Gross Incremental Costs	\$2,642,858
Net Incremental Costs	\$2,281,234
NPV of Avoided Incandescent Light Bulbs	\$2,806,410
Total TRC Benefits	\$8,620,368
Total TRC Costs	\$4,662,083
Total TRC Net Benefits	\$3,958,285
TRC Test Ratio	1.85

Source: DSMore, Navigant analysis

3.7.1 Measure Life

A range of measure lives were used for the MFHES program depending on which measure group was being analyzed. The table below summarizes the measure lives groups as noted within DSMore. In some cases, these measure lives are rounded up to the next whole year to accommodate limitations in the DSMore software used to perform the TRC calculations, which cannot accept fractional EULs.¹⁸ In order to compensate for this, energy savings in the last year are reduced accordingly to match the intended measure life. For example, a six year measure life is used for residential CFLs, but the energy savings in the last year is reduced by 80 percent so the final results match the 5.2 year measure life in the IL TRM.

Table 3-21. Measure life of the Multi-Family Home Energy Savings Program Measures

Measure	Measure Life (in years)
Residential (Tenant Space) Water Aerators	6
Residential (Tenant Space) 40W Replacement EISA-compliant CFL	6
Residential (Tenant Space) Other non-EISA-compliant CFL	6
Residential (Tenant Space) 60W Replacement EISA-compliant CFL	6
Business (Common Areas) Other non-EISA-compliant CFL	2
Business (Common Areas) 40W Replacement EISA-compliant CFL	2

Source: DSMore, Navigant analysis

3.7.2 Participant/Incremental Costs

Incremental measures costs are deemed per measure in the Illinois TRM and were used to determine the program participant costs as reported in ComEd's DSMore outputs. These values were consistent with recent iterations of the Illinois TRM and other resources, such as program records. The table below summarizes the incremental costs used for the MFHES program measures.

¹⁸ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

Table 3-22. Incremental Cost of the of the Multi-Family Home Energy Savings Program Measures

Measure	Incremental cost per unit (in \$)
Residential (Tenant Space) Water Aerators	\$9.38
Residential (Tenant Space) 40W Replacement EISA-compliant CFL	\$7.50
Residential (Tenant Space) Other non-EISA-compliant CFL	\$7.50
Residential (Tenant Space) 60W Replacement EISA-compliant CFL	\$7.50
Business (Common Areas) Other non-EISA-compliant CFL	\$7.50
Business (Common Areas) 40W Replacement EISA-compliant CFL	\$7.50

Source: DSMore, Navigant analysis

3.7.3 NPV of Avoided Incandescent Light Bulb Purchases

The MFHES program provided a total of 280,017 during PY6 through the EEPS portion of the program. With a claimed NPV of avoided incandescent purchases of \$2,806,410, this works out to an average of \$10.02 per bulb.

3.7.4 Impact Results

Table 3-23 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-23. Multi-Family Home Energy Savings PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	39,285	29.74	6.21
Verified Gross Savings	45,750	29.74	6.21
Verified Net Savings	39,490	27.45	5.29

Source: ComEd tracking data and Navigant analysis

3.8 Single Family (EEPS-only)

The Single Home Energy Savings (HES) program is a joint program of Nicor Gas and ComEd. The HES program provides single-family homeowners who are customers of Nicor Gas or ComEd in the Nicor Gas territory a home weatherization service package. The weatherization package includes a comprehensive home energy assessment with combustion safety testing, direct installation of selected energy efficiency and water-saving measures, and incentives for installing a recommended package of weatherization measures. In PY6, the program launched an air sealing and insulation prescriptive track, and some contractors were allowed to conduct assessments in place of the implementation contractor.

The Single Family Home Energy Jumpstart (HEJ) program was in its first year in PY6.¹⁹ The HEJ program is a joint program of Peoples Gas and North Shore Gas and ComEd. The PY6 HEJ program planning targeted net savings of 2,000 MWh. The goal of this residential direct install program is to secure energy savings through direct installation of low-cost efficiency measures, such as water efficient showerheads

¹⁹ PY6 began June 1, 2013, and ended May 31, 2014.

and faucet aerators, pipe insulation, programmable thermostats, and, beginning in PY6, CFLs and the other previously installed measures for customers with electric space heat or electric hot water heating at eligible single family residences.

Table 3-24. IL TRC Components for Single Family Programs

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	4,902
Ex-Post Net Savings (MWh) @ the Meter	3,894
Utility Non-Incentive Costs	\$833,920
Utility Incentive Costs	\$571,767
Gross Incremental Costs	\$1,743,922
Net Incremental Costs	\$1,383,862
NPV of Avoided Incandescent Light Bulbs	\$867,236
Total TRC Benefits	\$4,569,189
Total TRC Costs	\$2,217,782
Total TRC Net Benefits	\$2,351,407
TRC Test Ratio	2.06

Source: DSMore, Navigant analysis

3.8.1 Measure Life

A range of measure lives were used for the Single Family program depending on which measure group was being analyzed. The table below summarizes the measure lives groups as noted within DSMore. These measure lives are consistent with the current version of the Illinois TRM²⁰, with the exception of weatherization measures, which should be assumed to have a measure life of 15 years per the TRM. In some cases, these measure lives are rounded up to the next whole year to accommodate limitations in the DSMore software used to perform the TRC calculations, which cannot accept fractional EULs.²¹ In order to compensate for this, energy savings in the last year are reduced accordingly to match the intended measure life. For example, a six year measure life is used for residential CFLs, but the energy savings in the last year is reduced by 80 percent so the final results match the 5.2 year measure life in the IL TRM.

Table 3-25. Measure life of the Single Family Program Measures

Measure	Measure Life (in years)
Residential 40W Replacement EISA-compliant CFL	6
Residential 60W Replacement EISA-compliant CFL	6
Residential Other non-EISA-compliant CFL	7
Residential Water Related Measures (e.g., aerators)	4
Residential Weatherization and Air Sealing Measures	19

Source: DSMore, Navigant analysis

3.8.2 Participant/Incremental Costs

Incremental measures costs are deemed per measure in the Illinois TRM. Reasonable values to utilize in the cost-benefit calculations can be either the actual cost of installing a measure in a participant's

²⁰ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

²¹ Ibid

household, on average, or in some cases, a deemed value set by the TRM if actual costs are unknown. The table below summarizes the incremental cost used for the program measures. Navigant was not provided sufficient detail to ascertain the actual cost of each measure or measure group implemented through the Single Family program. However, as part of the review, the incremental costs utilized in the DSMore run were compared to values for similar programs and deemed values in the IL TRM and were determined to be reasonable.

Table 3-26. Incremental Cost of the of the Single Family Program Measures

Measure	Incremental cost per unit (in \$)
Residential 40W Replacement EISA-compliant CFL	\$4.85
Residential 60W Replacement EISA-compliant CFL	\$4.85
Residential Other non-EISA-compliant CFL	\$4.85
Residential Water Related Measures (e.g., aerators)	\$13.06
Residential Weatherization and Air Sealing Measures	\$408.71

Source: DSMore, Navigant analysis

3.8.3 NPV of Avoided Incandescent Light Bulb Purchases

The Single Family HES program provided a total of 95,738 during PY6 through the EEPS portion of the program. With a claimed NPV of avoided incandescent purchases of \$867,236, this works out to an average of \$9.06 per bulb.

3.8.4 Impact Results

Table 3-27 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-27. Single Family PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	4,839	n/a	n/a
Verified Gross Savings	4,902	5.55	1.51
Verified Net Savings	3,894	5.40	1.21

Source: ComEd tracking data and evaluation team analysis

3.9 Residential New Construction

The Residential New Construction program is jointly offered by ComEd and Nicor Gas. Nicor Gas is the lead utility. The program launched in early 2012 and did not claim savings in the first program year, but ex-ante gross savings estimates exceeded both gas and electric savings targets for PY5 and again in PY6. ComEd incentivizes several ENERGY STAR electric appliances and claims savings from these installations as well as whole-home electricity savings calculated with REM/Rate.

Table 3-28. IL TRC Components for Residential New Construction Program

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	508
Ex-Post Net Savings (MWh) @ the Meter	406
Utility Non-Incentive Costs	\$28,763
Utility Incentive Costs	\$9,425
Gross Incremental Costs	\$70,438
Net Incremental Costs	\$56,350
NPV of Avoided Incandescent Light Bulbs	\$1,883
Total TRC Benefits	\$511,641
Total TRC Costs	\$85,113
Total TRC Net Benefits	\$426,528
TRC Test Ratio	6.01

Source: DSMore, Navigant analysis

3.9.1 Measure Life

A range of measure lives were used for the Residential New Construction program depending on which measure group was being analyzed. The table below summarizes the measure lives groups as noted within DSMore. ComEd aggregated several measure mixes into three groupings. Navigant reviewed these measure lives and determined that they are consistent with the current version of the Illinois TRM²² and reasonable, with the exception of weatherization measures, which should be assumed to have a measure life of 15 years per the TRM.

Table 3-29. Measure life of the Residential New Construction Program Measures

Measure	Measure Life (in years)
PY6 RNC 60W	6
PY6 RNC Prescription Measures	10
PY6 RNC Weatherization and Program Cost	20

Source: DSMore, Navigant analysis

3.9.2 Participant/Incremental Costs

Incremental measures costs are deemed per measure in the Illinois TRM and were used to vet the program participant costs as reported in ComEd’s DSMore outputs. Similar to the measure lives, ComEd aggregated several measure incremental costs into three groupings. Navigant reviewed these measures and determined that they were consistent with recent iterations of the Illinois TRM and other resources, such as program records. The table below summarizes the incremental cost used for the Residential New Construction program measures, which include installation costs associated with the program. The lighting costs (60W CFL) reflect direct install costs that include labor, per the Illinois TRM, which specifies \$7.50 for the full installed cost unless actual costs are available.²³

²² Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

²³ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013. Section 5.5.1 ENERGY STAR Compact Fluorescent Lamp (CFL).

Table 3-30. Incremental Cost of the of the Residential New Construction Program Measures

Measure	Incremental cost per unit (in \$)
PY6 RNC 60W CFL	\$7.50
PY6 RNC Prescription Measures	\$43.18
PY6 RNC Weatherization and Program Cost	\$68.98

Source: DSMore, Navigant analysis

3.9.3 NPV of Avoided Incandescent Light Bulb Purchases

The Elementary Energy Education program provided a total of 348 bulbs during PY6. With a claimed NPV of avoided incandescent purchases of \$1,883, this works out to an average of \$5.41 per bulb, which matches the per bulb value for residential CFLs provided by the TRM, as shown in Table 3-4.

3.9.4 Impact Results

Table 3-31 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-31. Residential New Construction Savings PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	554	n/a	n/a
Verified Gross Savings	508	0.133	n/a
Verified Net Savings	406	0.107	n/a

Source: ComEd tracking data and Navigant analysis

3.10 Business Standard

ComEd offered prescriptive incentives for common energy efficiency measures under the Smart Ideas for Your Business Standard Incentives Program (Standard program) in PY6. The Standard program facilitates the implementation of cost-effective energy efficiency improvements for non-residential (commercial and industrial) customers. Eligible measures include energy-efficient indoor and outdoor lighting, HVAC equipment, refrigeration, commercial kitchen equipment, variable speed drives, compressed air equipment and other qualifying products. Additional program measures will continue to be researched and recommendations will be made for amendments to the TRM as appropriate.

Table 3-32. IL TRC Components for Business Standard Program

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	268,982
Ex-Post Net Savings (MWh) @ the Meter	184,696
Utility Non-Incentive Costs	\$9,055,909
Utility Incentive Costs	\$23,439,907
Gross Incremental Costs	\$212,759,014
Net Incremental Costs	\$146,090,589
Total TRC Benefits	\$189,962,452
Total TRC Costs	\$155,146,498
Total TRC Net Benefits	\$34,815,954
TRC Test Ratio	1.22

Source: DSMore, Navigant analysis

3.10.1 Measure Life

A range of measure lives were used for the Business Standard program depending on which measure group was being analyzed. The table below summarizes the measure lives groups as noted within DSMore. ComEd aggregated several measure mixes into two groupings. The single measure life assigned to these groups are intended to be a weighted average measure life of the individual measures compiling this group. Navigant reviewed these measure lives and determined that they are consistent with the current version of the Illinois TRM²⁴ and reasonable.

Table 3-33. Measure life of the Business Standard Program Measures

Measure	Measure Life (in years)
Commercial Lighting Related Measures	12
Commercial Non-Lighting Related Measures	12

Source: DSMore, Navigant analysis

3.10.2 Participant/Incremental Costs

Incremental measures costs are deemed per measure in the Illinois TRM and were used to determine the program participant costs as reported in ComEd’s DSMore outputs. Similar to the measure lives, ComEd aggregated several measure incremental costs into three groupings. Navigant reviewed these measures and determined that they were consistent with recent iterations of the Illinois TRM and other resources, such as program records. At the project level, incremental costs are sourced from the Business Standard project details. Incremental measure costs vary significantly for the range of equipment installed. Incremental costs average \$39,103 per installed project, or \$0.54/kWh. Navigant does not have a full breakout of the individual measure costs and incremental costs incented through the program. However, Navigant reviewed the DSMore measure costs in aggregate and determined that they were reasonable and consistent with the program records.

²⁴ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

3.10.3 Impact Results

Table 3-34 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-34. Business Standard Savings PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	271,269	n/a	43.84
Verified Gross Savings	268,982	79.57	46.89
Verified Net Savings	184,696	53.75	31.97

Source: ComEd tracking data and Navigant analysis

3.11 Business Custom

ComEd’s Smart Ideas for Your Business suite of energy efficiency programs for business customers includes the Custom incentive program. This program provides a Custom incentive for less common or more complex energy-saving measures installed in qualified retrofit and equipment replacement projects. Custom incentives are available based on the project’s kWh savings (\$0.07/kWh with caps), provided the project meets all program eligibility requirements.

Table 3-35. IL TRC Components for Business Custom Program

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	26,588
Ex-Post Net Savings (MWh) @ the Meter	16,219
Utility Non-Incentive Costs	\$1,186,565
Utility Incentive Costs	\$1,916,622
Gross Incremental Costs	\$19,505,445
Net Incremental Costs	\$11,898,322
Total TRC Benefits	\$14,930,093
Total TRC Costs	\$13,084,887
Total TRC Net Benefits	\$1,845,206
TRC Test Ratio	1.14

Source: DSMore, Navigant analysis

3.11.1 Measure Life

A measure life of 12 years is assumed for measures and projects associated with the Business Custom program. Navigant reviewed this measure life estimate and determined that it was reasonable and consistent with the current version of the Illinois TRM²⁵ for similar business measures (e.g., HVAC equipment) installed through other prescriptive programs.

3.11.2 Participant/Incremental Costs

Incremental measures costs are sourced from the custom projects and average \$68.22 per measure installed within the custom projects. Navigant was provided limited information regarding the

²⁵ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

compilation of this per measure cost of installation, but in the aggregate, Navigant reviewed these measure costs and determined that they were reasonable relative to the program design and consistent with program records.

3.11.3 Impact Results

Table 3-36 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-36. Business Custom Savings PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	27,305	n/a	1.83
Verified Gross Savings	26,588	n/a	1.75
Verified Net Savings	16,219	n/a	1.12

Source: ComEd tracking data and Navigant analysis

3.12 Data Centers

ComEd’s Data Centers Efficiency program provides incentives to both new and existing data centers for implementing program-eligible energy efficiency measures. The program pays an incentive of \$0.07/kWh saved for eligible projects with caps on the total amount.

Table 3-37. IL TRC Components for Data Centers Program

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	21,333
Ex-Post Net Savings (MWh) @ the Meter	12,939
Utility Non-Incentive Costs	\$1,012,562
Utility Incentive Costs	\$1,354,529
Gross Incremental Costs	\$4,843,702
Net Incremental Costs	\$2,937,827
Total TRC Benefits	\$11,611,392
Total TRC Costs	\$3,950,389
Total TRC Net Benefits	\$7,661,003
TRC Test Ratio	2.94

Source: DSMore, Navigant analysis

3.12.1 Measure Life

A measure life of 16 years is assumed for measures and projects associated with the Data Centers program. Navigant reviewed these measure lives for the equipment associated with projects (e.g., HVAC measures) and determined that they are consistent with the current version of the Illinois TRM²⁶ and reasonable.

²⁶ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

3.12.2 Participant/Incremental Costs

Incremental measure costs are sourced from the Data Centers projects and average \$3.63 per control point measure installed based on actual customer costs. Navigant reviewed these measure costs and determined that they were reasonable and consistent with program records. The Illinois TRM does not include any specific measure guidance for data centers.

3.12.3 Impact Results

Table 3-38 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-38. Data Centers Savings PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	21,905	n/a	1.996
Verified Gross Savings	21,333	n/a	1.842
Verified Net Savings	12,939	n/a	1.069

Source: ComEd tracking data and Navigant analysis

3.13 Business Instant Lighting Discount Program

The primary component of PY6 Midstream Incentives program covers lighting products and is branded as the Business Instant Lighting Discounts (BILD) program. The BILD program provides incentives to increase the market share of energy efficient CFLs, LEDs, Linear Fluorescents (LF), and High Intensity Discharge (HID) lamps sold to business customers. Additionally, linear fluorescent ballasts were added to the program offerings in PY6.

Table 3-39. IL TRC Components for BILD Program

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	265,158
Ex-Post Net Savings (MWh) @ the Meter	167,049 ²⁷
Utility Non-Incentive Costs	\$2,259,841
Utility Incentive Costs	\$9,849,870
Gross Incremental Costs	\$70,204,234
Net Incremental Costs	\$44,228,525
NPV of Avoided Incandescent Light Bulbs	\$27,370,771
Total TRC Benefits	\$90,575,830
Total TRC Costs	\$46,488,366
Total TRC Net Benefits	\$44,087,464
TRC Test Ratio	1.95

Source: DSMore, Navigant analysis

²⁷ The Ex-Post Net Savings presented exclude the Carryover Net Savings that total 17,599 MWh.

3.13.1 Measure Life

A range of measure lives were used for the BILD program depending on which measure group was being analyzed. The table below summarizes the measure lives groups as noted within DSMore. ComEd aggregated several measure mixes into groupings based on technology and application, commercial or residential. ComEd's benefit-cost analysis also distinguished those measures related to carryover savings. Navigant reviewed these measure lives and determined that they are consistent with the current version of the Illinois TRM²⁸ and reasonable, except for linear LED ballasts, where a 7 year measure life was used instead of the TRM value of 15 years.

²⁸ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

Table 3-40. Measure life of the BILD Program Measures

Measure	Measure Life (in years)
Commercial 40W Replacement EISA-exempt CFL	3
Commercial 40W Replacement EISA-compliant CFL	3
Commercial 40W Replacement EISA-exempt LED	6
Commercial 40W Replacement EISA-compliant LED	6
Commercial 60W Replacement EISA-compliant CFL	3
Commercial 60W Replacement EISA-exempt LED	6
Commercial 60W Replacement EISA-compliant LED	6
Commercial 75 to 100W Replacement EISA-exempt LED	6
Commercial Other EISA-exempt CFL	3
Commercial Other EISA-compliant CFL	3
Commercial Other EISA-exempt LED	6
Commercial Other EISA-compliant LED	6
Commercial Replacement Ballast	7
Commercial (Carryover) 40W Replacement EISA-compliant CFL	3
Commercial (Carryover) 60W Replacement EISA-compliant CFL	3
Commercial (Carryover) Other EISA-exempt CFL	3
Commercial (Carryover) Other EISA-compliant CFL	3
Commercial (Carryover) Linear fluorescent	15
Residential (Carryover) 40W Replacement EISA-compliant CFL	6
Residential (Carryover) 60W Replacement EISA-compliant CFL	6
Residential (Carryover) Other EISA-exempt CFL	7
Residential (Carryover) Other EISA-compliant CFL	6
Residential (Carryover) Linear fluorescent	15
Multi-family 40W Replacement EISA-exempt CFL	7
Multi-family 40W Replacement EISA-compliant CFL	6
Multi-family 40W Replacement EISA-exempt LED	10
Multi-family 40W Replacement EISA-compliant LED	10
Multi-family 60W Replacement EISA-compliant CFL	6
Multi-family 60W Replacement EISA-exempt LED	10
Multi-family 60W Replacement EISA-compliant LED	10
Multi-family 75 to 100W Replacement EISA-exempt LED	10
Multi-family Other EISA-exempt CFL	7
Multi-family Other EISA-compliant CFL	6
Multi-family Other EISA-exempt LED	10
Multi-family Other EISA-compliant LED	10

Source: DSMore, Navigant analysis

3.13.2 Participant/Incremental Costs

Incremental measures costs are deemed per measure in the Illinois TRM and were used to determine the program participant costs as reported in ComEd’s DSMore outputs. Similar to the measure lives, ComEd aggregated several measure mixes into groupings based on technology and application, commercial or residential. ComEd’s benefit-cost analysis also distinguished those measures related to carryover savings. Navigant reviewed these measure costs and determined that they were consistent with recent iterations of the Illinois TRM and other resources, such as program records. The table below summarizes the incremental cost used for the BILD program measures. Carryover related measures have zero incremental

cost since those costs were not incurred during PY6 but rather accounted within the PY4 and PY5 benefit-cost analyses.

Table 3-41. Incremental Cost of the of the BILD Program Measures

Measure	Incremental cost per unit (in \$)
Commercial 40W Replacement EISA-exempt CFL	\$5.00
Commercial 40W Replacement EISA-compliant CFL	\$1.80
Commercial 40W Replacement EISA-exempt LED	\$40.00
Commercial 40W Replacement EISA-compliant LED	\$40.00
Commercial 60W Replacement EISA-compliant CFL	\$1.80
Commercial 60W Replacement EISA-exempt LED	\$40.00
Commercial 60W Replacement EISA-compliant LED	\$40.00
Commercial 75 to 100W Replacement EISA-exempt LED	\$40.00
Commercial Other EISA-exempt CFL	\$5.00
Commercial Other EISA-compliant CFL	\$1.80
Commercial Other EISA-exempt LED	\$40.00
Commercial Other EISA-compliant LED	\$40.00
Commercial Replacement Ballast	\$40.00
Commercial (Carryover) 40W Replacement EISA-compliant CFL	\$0.00
Commercial (Carryover) 60W Replacement EISA-compliant CFL	\$0.00
Commercial (Carryover) Other EISA-exempt CFL	\$0.00
Commercial (Carryover) Other EISA-compliant CFL	\$0.00
Commercial (Carryover) Linear fluorescent	\$0.00
Residential (Carryover) 40W Replacement EISA-compliant CFL	\$0.00
Residential (Carryover) 60W Replacement EISA-compliant CFL	\$0.00
Residential (Carryover) Other EISA-exempt CFL	\$0.00
Residential (Carryover) Other EISA-compliant CFL	\$0.00
Residential (Carryover) Linear fluorescent	\$0.00
Multi-family 40W Replacement EISA-exempt CFL	\$5.00
Multi-family 40W Replacement EISA-compliant CFL	\$1.80
Multi-family 40W Replacement EISA-exempt LED	\$40.00
Multi-family 40W Replacement EISA-compliant LED	\$40.00
Multi-family 60W Replacement EISA-compliant CFL	\$1.80
Multi-family 60W Replacement EISA-exempt LED	\$40.00
Multi-family 60W Replacement EISA-compliant LED	\$40.00
Multi-family 75 to 100W Replacement EISA-exempt LED	\$40.00
Multi-family Other EISA-exempt CFL	\$5.00
Multi-family Other EISA-compliant CFL	\$1.80
Multi-family Other EISA-exempt LED	\$40.00
Multi-family Other EISA-compliant LED	\$40.00

Source: DSMore, Navigant analysis

In most instances, an incremental cost of \$40 was utilized for screw-in LEDs. Navigant recognizes that the market for these bulbs has changed very rapidly just within the last couple years. Though there is no TRM value for screw-in LED incremental costs, it is Navigant’s opinion that a \$40 incremental cost per bulb is high and that a cost of approximately \$20 is more appropriate for the PY6 time period. In this case, the TRC results would be conservative.

3.13.3 NPV of Avoided Incandescent Light Bulb Purchases

The BILD program incented a total of 2,650,246 bulbs during PY6. With a claimed NPV of avoided incandescent purchases of \$27,370,771, this reflects an average NPV of \$10.33 per bulb, which is about \$0.38, or 7 percent, more than the per bulb value for residential CFLs provided by the TRM as shown in Table 3-4. This difference is accounted for by the portion of program bulbs that are estimated to have been installed in commercial lighting sockets, which have an average NPV of almost twice as much (\$10.21).

3.13.4 Impact Results

Table 3-42 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-42. BILD Savings PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Program Savings	242,194	n/a	n/a
Verified Gross Program Savings	265,158	62	54
Verified Net Program Savings	167,049	39	34
Verified Net Carryover Savings	17,599	3.9	3.5
Verified Total PY6 Net Savings	184,648	42.9	37.5

Source: ComEd tracking data and Navigant analysis

3.14 Industrial Systems Study

The Industrial Systems Study program, started in PY4 with compressed air systems, and has expanded over the past three years to include process cooling and industrial refrigeration systems. The Industrial Systems program offers a combination of technical assistance and financial incentives. Technical assistance includes an industrial systems study which assesses the performance of the facility's industrial compressed air, process cooling, and refrigeration systems to ensure efficient, economical operation. The study identifies cost-effective energy saving measures, using a combination of capital investment and low or no cost measures.

Table 3-43. IL TRC Components for Industrial Systems Study Program

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	24,121
Ex-Post Net Savings (MWh) @ the Meter	17,902
Utility Non-Incentive Costs	\$2,199,818
Utility Incentive Costs	\$2,243,753
Gross Incremental Costs	\$4,501,758
Net Incremental Costs	\$3,341,092
Total TRC Benefits	\$22,538,912
Total TRC Costs	\$5,540,910
Total TRC Net Benefits	\$16,998,002
TRC Test Ratio	4.07

Source: DSMore, Navigant analysis

3.14.1 Measure Life

A measure life of 15 years is assumed for measures and projects associated with the Industrial Systems Study program. Navigant reviewed these measure lives and determined that they are consistent with the current version of the Illinois TRM²⁹ and reasonable.

3.14.2 Participant/Incremental Costs

Incremental measures costs are sourced from the Industrial Systems Study projects and average \$4.48 per installed unit based on actual customer costs. Navigant reviewed these measure costs and determined that they were reasonable and consistent with program records.

3.14.3 Impact Results

Table 3-44 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-44. Industrial Systems Study Savings PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	25,393	n/a	3.30
Verified Gross Savings	24,121	n/a	3.63
Verified Net Savings	17,902	n/a	3.01

Source: ComEd tracking data and evaluation team analysis

3.15 Business New Construction Service

The New Construction Service program aims to capture immediate and long-term energy efficiency opportunities that are available during the design and construction of new buildings, additions, and renovations in the non-residential market. The program is jointly offered by ComEd and Nicor Gas. The ComEd program has been operating since June 1, 2009 (PY2). Nicor Gas joined the program to offer natural gas rebates in June 2011.

Table 3-45. IL TRC Components for Business New Construction Service Program

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	27,518
Ex-Post Net Savings (MWh) @ the Meter	14,310
Utility Non-Incentive Costs	\$2,139,473
Utility Incentive Costs	\$2,825,345
Gross Incremental Costs	\$5,174,601
Net Incremental Costs	\$2,690,913
Total TRC Benefits	\$15,772,144
Total TRC Costs	\$4,830,386
Total TRC Net Benefits	\$10,941,758
TRC Test Ratio	3.27

Source: DSMore, Navigant analysis

²⁹ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

3.15.1 Measure Life

A measure life of 12 years is assumed for measures and projects associated with the Business New Construction Service program. Navigant reviewed the measure life for the program and determined that it is consistent with the current version of the Illinois TRM³⁰ and reasonable.

3.15.2 Participant/Incremental Costs

Incremental measures costs are sourced from the Business New Construction Service projects and average \$11.10 per unit based on actual customer costs associated with the incremental expenses of purchasing and installing efficient equipment during the construction process. Also included are some costs associated with the provision of studies/expertise regarding the installation of efficient measures. Navigant does not have a full breakout of the individual measure costs and incremental costs incented through the program. However, Navigant reviewed these measure costs and determined that they were reasonable and consistent with program records. Further, the incremental cost to achieve one kWh of savings is \$0.19 and this falls in line with industry standards.³¹

3.15.3 Impact Results

Table 3-46 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-46. Business New Construction Service Savings PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	27,208	6.18	6.18
Verified Gross Savings	27,518	7.05	5.46
Verified Net Savings	14,310	3.57	2.84

Source: ComEd tracking data and evaluation team analysis

3.16 Small Business Energy Services (EEPS-only)

Small Business Energy Savings (SBES) program is ComEd’s primary energy efficiency program for small business customers. PY6 represents the program’s third full year of operation. The SBES program is designed to assist qualified ComEd non-residential customers to achieve electric energy savings by educating them about energy efficiency opportunities through on-site assessments conducted by trade allies and installation of no-cost direct-install measures.³² Further savings were available to participating customers through incentives of 30 to 75 percent offered for select contractor-installed (CI) measures.

³⁰ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

³¹ Incremental Measure Costs in New Construction Programs. California Joint Utilities. HMG.

http://www.calmac.org/publications/HMG_IMC_White_Paper_v3_Final.pdf

³² No-cost direct-install measures include low-flow showerheads, faucet aerators, pre-rinse spray valves, vending machine controls, and compact fluorescent lamps (CFLs).

Table 3-47. IL TRC Components for Small Business Energy Services Program

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	135,303
Ex-Post Net Savings (MWh) @ the Meter	128,538
Utility Non-Incentive Costs	\$2,081,838
Utility Incentive Costs	\$9,232,557
Gross Incremental Costs	\$8,836,262
Net Incremental Costs	\$8,394,458
NPV of Avoided Incandescent Light Bulbs	\$147,196
Total TRC Benefits	\$31,987,029
Total TRC Costs	\$10,476,296
Total TRC Net Benefits	\$21,510,733
TRC Test Ratio	3.05

Source: DSMore, Navigant analysis

3.16.1 Measure Life

A range of measure lives were used for the Small Business Energy Services program depending on which measure group was being analyzed. The table below summarizes the measure lives groups as noted within DSMore. ComEd aggregated several measure mixes into two groupings; one to reflect the mix of installed measures, and another to account for heating penalties related to HVAC interactions. Navigant reviewed these measure lives and determined that they are consistent with the current version of the Illinois TRM³³ and reasonable.

Table 3-48. Measure life of the Small Business Energy Services Program Measures

Measure	Measure Life (in years)
Commercial Small Business Related Measures	12
Commercial Small Business Heating Penalty Impacts/Measures	12

Source: DSMore, Navigant analysis

3.16.2 Participant/Incremental Costs

Incremental measures costs are deemed per measure in the Illinois TRM and were used to determine the program participant costs as reported in ComEd’s DSMore outputs. Similar to the measure lives, ComEd aggregated several measure incremental costs into two groupings for benefit-cost testing purposes. The non-zero incremental costs shown represent the mix of measures installed through the program in PY6 (rather than the heating interactions). Navigant does not have a full breakout of the individual measure costs and incremental costs incented through the program. However, Navigant reviewed these measures and determined that they were consistent with recent iterations of the Illinois TRM and other resources, such as program records. The table below summarizes the incremental cost used for the Small Business Energy Services program measures.

³³ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

Table 3-49. Incremental Cost of the of the Small Business Energy Services Program Measures

Measure	Incremental cost per unit (in \$)
Commercial Small Business Related Measures	\$961.82

Source: DSMore, Navigant analysis

3.16.3 NPV of Avoided Incandescent Light Bulb Purchases

The SBES program incented a total of 14,041 bulbs through the EEPS portion of the program during PY6. With a calculated NPV of avoided incandescent purchases of \$147,196, this works out to an average of \$10.48 per bulb. As shown in Table 3-4, this average value is in between the \$10.21 for commercial installed ENERGY STAR CFLs and the \$11.11 for non-EISA compliant CFLs, which account for the bulb mix for which this benefit is calculated.

3.16.4 Impact Results

Table 3-50 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-50. Small Business Energy Services Savings PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	135,607	49.51	25.66
Verified Gross Savings	135,303	35.61	24.95
Verified Net Savings	128,538	33.83	23.70

Source: ComEd tracking data and Navigant analysis

3.17 Business Retro-Commissioning

The Northern Illinois Joint Utility Retro-Commissioning (Retro-Commissioning or RCx) program is offered in partnership between ComEd, Nicor Gas, Peoples Gas, and North Shore Gas. The Retro-Commissioning program helps commercial and industrial customers improve the performance and reduce energy consumption of their facilities through the systematic evaluation of *existing* building systems. Low- and no-cost measures are targeted and implemented to improve system operations, reduce energy use and demand and, in many cases, improve occupant comfort.

Table 3-51. IL TRC Components for Business Retro-Commissioning Program

Item	Value
Ex-Post Gross Savings (MWh) @ the Meter	25,302
Ex-Post Net Savings (MWh) @ the Meter	26,314
Utility Non-Incentive Cost	\$1,740,997
Utility Incentive Costs*	\$2,882,513
Gross Incremental Costs	\$3,790,656
Net Incremental Costs	\$3,942,271
Total TRC Benefits	\$9,952,020
Total TRC Costs	\$5,683,268
Total TRC Net Benefits	\$4,268,752
TRC Test Ratio	1.75

Source: DSMore, Navigant analysis - *Includes study and assessment costs.

3.17.1 Measure Life

A measure life of five years is assumed for measures and projects associated with the Business Retro-Commissioning program. Navigant reviewed these measure lives and determined that they are reasonable. The Illinois TRM does not include details for RCx. However, Navigant concluded that five years is reasonable and in line with previous program evaluation cycles.

3.17.2 Participant/Incremental Costs

Incremental measures costs are sourced from the Business Retro-Commissioning project details. Incremental costs range from \$0 for no-cost measures such as schedule resets to roughly \$100,000 for system wide controls implementations. The average measure incremental cost is \$4,482 per measure. Navigant reviewed the DSMore measure costs and determined that they were reasonable and consistent with program records. In addition, the participant incremental costs have been adjusted to include the costs associated with project studies conducted prior to the implementation of any recommendations.

3.17.3 Impact Results

Table 3-52 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-52. Data Centers Savings PY6 Impact Results

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-ante Gross Savings	26,459	n/a	0.832
Verified Gross Savings	25,302	0.779	0.636
Verified Net Savings	26,314	0.811	0.662

Source: ComEd tracking data and evaluation team analysis

Appendix A: TRC Benefit Cost Results for Jointly Implemented Programs

Several of the energy efficiency programs implemented by Commonwealth Edison (ComEd), Nicor Gas, Peoples Gas, and North Shore Gas are “joint” programs such that they are designed and operated jointly by ComEd and one or more of the gas utilities for customers who are served both by ComEd (electric service) and Nicor Gas, Peoples Gas, or North Shore Gas (gas service). The intent of the joint programs is to gain efficiencies in the marketing and operations of the programs for the joint customer participants from what would occur if each utility marketed and operated its own program. For each joint program, the utilities involve a common implementation contractor. In total, there are seven jointly implemented programs. **Navigant’s analysis shows that when the jointly implemented programs are viewed in the aggregate, each program was cost-effective over the three-year period based on both the IL TRC test and the UCT.** Table A-1 lists the seven programs jointly implemented by ComEd and the gas utilities, and indicates which gas utilities jointly implemented the programs in which program years.

Table A-2. Summary of Jointly Implemented Programs and Timing

Program	Peoples Gas / North Shore Gas			Nicor Gas		
	EPY4 / GPY1	EPY5 / GPY2	EPY6 / GPY3	EPY4 / GPY1	EPY5 / GPY2	EPY6 / GPY3
Home Energy Savings / Single Family Retrofit			X	X	X	X
Multi-Family Retrofit	X	X	X	X	X	X
Elementary Energy Education				X	X	X
Residential New Construction				X	X	X
C&I Retrocommissioning	X	X	X	X	X	X
C&I New Construction				X	X	X
Small Business Direct Install / Efficiency	X	X	X	X	X	

Source: Navigant researched data

It is important to note that joint cost-effectiveness calculations are not always equal to the sum of the cost-effectiveness numbers filed separately for each participating utility. There can be several reasons for these differences, but the main difference is to avoid the double counting of savings or costs that may already be included by more than one utility. In particular, incremental costs for measures that generate both gas and electric savings, such as thermostats and envelope measures, are prone to double counting, especially when based on deemed TRM values. Though double counting is most common for incremental measures, it is also possible for other TRC calculation components, including estimated avoided costs, interactive effects, and implementation costs.

A summary of the components of the joint cost effectiveness calculations for each joint program are shown in Table A-2 for the Illinois TRC calculations and Table A-3 for the Utility Cost Test calculations. The tables include the value of each benefit and cost component for each program, when aggregated across all utilities that were involved in its joint implementation. For the IL TRC, the TRC ratio for the individual programs ranged from 1.74 for C&I Retro-Commissioning to 4.25 for C&I New Construction. For the UCT, the results ranged from 1.36 for Home Energy Savings / Single Family Retrofit to 3.12 for C&I New Construction.

Table A-3. Summary of Program Level Benefits, Costs (\$ in 000's) and IL TRC Test – Jointly Implemented Programs

Program (a)	Costs														IL Total Resource Cost (TRC) Test			
	Avoided Electric Production	Avoided Electric Capacity	Avoided Electric T&D	Avoided Ancillary	Avoided Gas Production	Avoided Gas Capacity	Other Benefits	Other Benefits	Non-Incentive Costs (Electric)	Non-Incentive Costs (Gas)	Incentive Costs (Electric)	Incentive Costs (Gas)	Net Incremental Costs (Electric)	Net Incremental Costs (Gas)	IL TRC Benefits	IL TRC Costs	IL TRC Test Net Benefits	IL TRC Test
	(b)	(c)	(d)	(e)	(f)	(g)	(h)	Description	(i)	(j)	(k)	(l)	(m)	(n)	(o) = (b+c+d+e+f+g+h)	(p) = (i+j+m+n)	(q) = (o-p)	(r) = (o/p)
Home Energy Savings / Single Family Retrofit	\$ 1,064,833	\$ 1,450,043	\$ 952,332	\$ 270,032	\$ 7,333,180	\$ 803,928	\$ 1,222,287	GHG / Environmental Benefits	\$ 1,565,878	\$ 2,495,877	\$ 996,856	\$ 3,642,295	\$ 1,815,297	\$ 1,129,156	\$ 13,096,635	\$ 7,006,208	\$ 6,090,427	1.87
Multifamily	\$ 6,423,217	\$ 1,035,848	\$ 567,978	\$ 926,694	\$ 83,416,090	\$ 8,983,137	\$ 10,026,867	GHG / Environmental Benefits	\$ 3,375,618	\$ 8,233,785	\$ 5,094,767	\$ 19,759,360	\$ 3,215,209	\$ 20,881,315	\$ 111,379,831	\$ 35,705,927	\$ 75,673,904	3.12
Elementary Energy Education	\$ 1,120,925	\$ 209,537	\$ 124,784	\$ 223,658	\$ 3,488,639	\$ 387,627	\$ 1,143,773	GHG / Environmental Benefits	\$ 1,050,991	\$ 303,896	\$ 211,617	\$ 1,787,683	\$ 171,775	\$ 1,412,064	\$ 6,698,942	\$ 2,938,726	\$ 3,760,216	2.28
Res New Construction	\$ 252,007	\$ 135,477	\$ 91,225	\$ 60,913	\$ 3,780,487	\$ 420,054	\$ 848,028	GHG / Environmental Benefits	\$ 93,840	\$ 793,329	\$ 46,699	\$ 1,240,200	\$ 85,548	\$ 1,975,452	\$ 5,588,191	\$ 2,948,170	\$ 2,640,021	1.90
C&I Retrocommissioning	\$ 14,504,074	\$ 414,186	\$ 735,731	\$ 794,319	\$ 9,263,602	\$ 1,002,355	\$ 4,925,600	GHG / Environmental Benefits	\$ 4,412,640	\$ 1,082,433	\$ 7,053,106	\$ 3,188,949	\$ 9,131,600	\$ 3,507,586	\$ 31,639,867	\$ 18,134,259	\$ 13,505,608	1.74
C&I New Construction	\$ 24,778,780	\$ 3,756,282	\$ 6,558,377	\$ 1,145,666	\$ 2,625,391	\$ 291,710	\$ 6,428,585	GHG / Environmental Benefits	\$ 4,728,092	\$ 278,864	\$ 6,950,253	\$ 607,593	\$ 4,771,801	\$ 936,477	\$ 45,584,792	\$ 10,715,234	\$ 34,869,558	4.25
Small Business Direct Install / Efficiency	\$ 29,197,433	\$ 8,665,482	\$ 5,213,139	\$ 7,346,248	\$ 9,984,955	\$ 1,965,045	\$ 12,155,921	GHG / Environmental Benefits	\$ 6,901,054	\$ 2,319,112	\$ 14,590,730	\$ 3,312,580	\$ 16,717,772	\$ 2,852,589	\$ 74,528,222	\$ 28,790,526	\$ 45,737,695	2.59

Note: In some instances, incremental costs for gas utilities have been altered from those utilized in the utility-specific cost-benefit calculations to prevent double counting of incremental costs when performing the joint calculations. Examples of this included thermostat measures and Elementary Energy Education kits. Additionally, for some programs including Single Family Retrofit, Multi-Family Retrofit, and Small Business Direct Install, Navigant did not have sufficient information from all utilities and all program years to ensure that costs associated with energy assessments, direct install labor and materials were treated consistently. In these cases, there is some uncertainty as to how these costs are distributed among cost categories within the joint TRC analysis.

Source: Navigant analysis

Table A-4. Summary of Program Level Benefits, Costs (\$ in 000's) and Utility Cost Test – Jointly Implemented Programs

Program									Costs						Utility Cost Test (UCT), All Utilities Combined			
	Avoided Electric Production	Avoided Electric Capacity	Avoided Electric T&D	Avoided Ancillary	Avoided Gas Production	Avoided Gas Capacity	Other Benefits	Other Benefits	Non-Incentive Costs (Electric)	Non-Incentive Costs (Gas)	Incentive Costs (Electric)	Incentive Costs (Gas)	Net Incremental Costs (Electric)	Net Incremental Costs (Gas)	UCT Benefits	UCT Costs	UCT Test Net Benefits	UCT Test
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	Description	(i)	(j)	(k)	(l)	(m)	(n)	(o) = (b+c+d+e+f+g)	(p) = (i+j+k+l)	(q) = (o-p)	(r) = (o/p)
Home Energy Savings / Single Family Retrofit	\$ 1,064,833	\$ 1,450,043	\$ 952,332	\$ 270,032	\$ 7,333,180	\$ 803,928	\$ 1,222,287	GHG / Environmental Benefits	\$ 1,565,878	\$ 2,495,877	\$ 996,856	\$ 3,642,295	\$ 1,815,297	\$ 1,129,156	\$ 11,874,348	\$ 8,700,905	\$ 3,173,443	1.36
Multifamily	\$ 6,423,217	\$ 1,035,848	\$ 567,978	\$ 926,694	\$ 83,416,090	\$ 8,983,137	\$ 10,026,867	GHG / Environmental Benefits	\$ 3,375,618	\$ 8,233,785	\$ 5,094,767	\$ 19,759,360	\$ 3,215,209	\$ 20,881,315	\$ 101,352,964	\$ 36,463,530	\$ 64,889,434	2.78
Elementary Energy Education	\$ 1,120,925	\$ 209,537	\$ 124,784	\$ 223,658	\$ 3,488,639	\$ 387,627	\$ 1,143,773	GHG / Environmental Benefits	\$ 1,050,991	\$ 303,896	\$ 211,617	\$ 1,787,683	\$ 171,775	\$ 1,412,064	\$ 5,555,169	\$ 3,354,187	\$ 2,200,982	1.66
Res New Construction	\$ 252,007	\$ 135,477	\$ 91,225	\$ 60,913	\$ 3,780,487	\$ 420,054	\$ 848,028	GHG / Environmental Benefits	\$ 93,840	\$ 793,329	\$ 46,699	\$ 1,240,200	\$ 85,548	\$ 1,975,452	\$ 4,740,163	\$ 2,174,068	\$ 2,566,095	2.18
C&I Retrocommissioning	\$ 14,504,074	\$ 414,186	\$ 735,731	\$ 794,319	\$ 9,263,602	\$ 1,002,355	\$ 4,925,600	GHG / Environmental Benefits	\$ 4,412,640	\$ 1,082,433	\$ 7,053,106	\$ 3,188,949	\$ 9,131,600	\$ 3,507,586	\$ 26,714,267	\$ 15,737,128	\$ 10,977,139	1.70
C&I New Construction	\$ 24,778,780	\$ 3,756,282	\$ 6,558,377	\$ 1,145,666	\$ 2,625,391	\$ 291,710	\$ 6,428,585	GHG / Environmental Benefits	\$ 4,728,092	\$ 278,864	\$ 6,950,253	\$ 607,593	\$ 4,771,801	\$ 936,477	\$ 39,156,206	\$ 12,564,802	\$ 26,591,404	3.12
Small Business Direct Install / Efficiency	\$ 29,197,433	\$ 8,665,482	\$ 5,213,139	\$ 7,346,248	\$ 9,984,955	\$ 1,965,045	\$ 12,155,921	GHG / Environmental Benefits	\$ 6,901,054	\$ 2,319,112	\$ 14,590,730	\$ 3,312,580	\$ 16,717,772	\$ 2,852,589	\$ 62,372,301	\$ 27,123,476	\$ 35,248,825	2.30

Note: In some instances, incremental costs for gas utilities have been altered from those utilized in the utility-specific cost-benefit calculations to prevent double counting of incremental costs when performing the joint calculations. Examples of this included thermostat measures and Elementary Energy Education kits. Additionally, for some programs including Single Family Retrofit, Multi-Family Retrofit, and Small Business Direct Install, Navigant did not have sufficient information from all utilities and all program years to ensure that costs associated with energy assessments, direct install labor and materials were treated consistently. In these cases, there is some uncertainty as to how these costs are distributed among cost categories within the joint TRC analysis.

Source: Navigant analysis

With respect to the program specific data used in TRC calculation, several were based on each utility's internal tracking and accounting systems. These include implementation, utility administration and utility incentive costs. Implementation and incentives costs are tracked by program, where each utility's admin costs were provided by the respective utility energy efficiency staff. Utility costs for implementing the programs were split between the utilities based on an agreed percentage. For this joint benefit cost analysis, the costs, while split between ComEd, Nicor Gas, Peoples Gas, and North Shore Gas, represent the total costs for implementing the program.

The remaining data points that were reviewed in compiling the joint cost effectiveness calculations are incremental costs and the value of avoided greenhouse gas (GHG) emissions. Incremental costs are the costs associated with participating in the program, before accounting for any incentives. For most of the measures included in the joint programs, the claimed savings are all gas or all electric. In these instances, there is no risk of incremental costs being double counted. However, for a handful of measures that frequently generate both electric and gas savings (e.g. programmable thermostats, envelope measures, whole building projects), Navigant reviewed the input data to ensure that any incremental costs are included only once in the joint cost-effectiveness calculations. For some programs, including Single Family Retrofit, Multi-Family Retrofit, and Small Business Direct Install, Navigant did not have sufficient information from all utilities and all program years to ensure that the costs associated with energy assessments, direct install labor and materials were treated consistently. In these cases, there is some uncertainty as to how these costs are distributed among cost categories within the joint TRC analysis. Navigant also made an effort to harmonize the value of avoided GHG emissions included in the joint program benefits at a value of approximately \$27.50 per ton of avoided CO₂.