



## Plan Year 5 Summary Evaluation Report

Energy Efficiency / Demand Response Plan:  
Plan Year 5 (PY5)  
(6/1/2012-5/31/2013)

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## E. Executive Summary

This report presents summary findings and recommendations from the impact and process evaluation of the energy efficiency and demand response programs offered by Commonwealth Edison Company (ComEd) in Plan Year 5 (PY5), which ran from June 1, 2012 to May 31, 2013.

The PY5 ComEd Portfolio included ten programs targeted to residential customers and ten programs targeted to business customers. Section 1 includes a brief overview of the Portfolio and its energy impacts (*which are referred to publicly as “Smart Ideas for Your Home” and “Smart Ideas for Your Business” for the Residential and C&I sectors, respectively*). Section 2 identifies program level evaluation activities. Section 3 provides program level results, findings and key recommendations. Full program evaluation reports are included in Appendix A.

The evaluation has estimated savings by 2 methods, verified savings using deemed evaluation parameters when specified by Illinois’ statutory framework, and research savings based on evaluation parameters determined in the current year. Verified savings are used to determine compliance with statutory goals and are provided in this section. Research savings present an alternate view based on traditional retrospective evaluation. An overview of the research savings is provided in Section 4.

### ***E.1. ComEd PY5 Verified Portfolio Results***

The estimated verified savings uses deemed evaluation values when available and research values and evaluators judgment for areas where deeming has not been specified. The deemed values are typically previous research findings, but set in place at the beginning of the program year to mitigate retrospective risk. Verified savings are used to determine compliance with annual statutory goals and are reported by ComEd in filings and responses for program achieved results. ComEd’s adjusted statutory net goal was 827,575 MWh. In PY5, ComEd’s energy efficiency portfolio achieved 949,392 verified net MWh to meet its statutory goals (Table E-1). This included 824,978 net MWh from funded measures in PY5 and 124,414 MWh from previously funded CFL bulbs (*funded in PY3 or PY4 through the Residential Lighting Program [Res Lighting] and Business Instant Lighting Discounts Program [BILD] and expected to be installed in PY5*). Savings from these bulbs were excluded from previous program year’s results because they were placed into storage at that time. It is estimated that there will be a total PY6 carryover of 95,185 MWh of net energy savings from the Res Lighting Program and 17,297 MWh of net energy savings from the BILD Program. This is a total estimated PY6 carryover of 115,482.

Based on these savings and portfolio expenditures, the PY5 portfolio cost effectiveness, based on the Illinois TRC test, is 2.83.

Verified energy savings are documented in Table E-1 and Table E-2 following this page.

**Table E-1. ComEd Portfolio Year 5 Results – Planned and Net Energy Savings – Verified**

	Ex-Ante	Ex-Post			
	Gross (MWh)	Realization Rate	Gross (MWh)	NTGR	Net (MWh)
<b>Residential Programs</b>					
Residential Energy Star Lighting	418,865	0.94	394,595	0.73	287,135
Residential Fridge and Freezer	46,763*	0.96	44,674	0.68	30,531
Multifamily HES Joint	13,692	1.00	13,706	0.82	11,285
Single Family HES Joint	1,122	1.00	1,121	0.87	973
Complete Systems Replacement	2,375	1.31	3,109	0.99	3,077
Home Energy Report	N/A	N/A	97,442	1.00	97,442
Clothes Washer	1,283	1.38	1,774	0.68	1,203
Residential New Construction	279	0.90	251	0.80	201
Elementary Energy Education	2,130	1.38	2,942	0.76	2,236
C3-CUB Energy Saver	N/A	N/A	2,914	1.00	2,914
<b>Total Residential</b>	<b>439,746</b>	<b>1.28</b>	<b>562,528</b>	<b>0.78</b>	<b>436,997</b>
<b>Business Programs</b>					
Business Standard	262,295	1.00	261,525	0.71	186,433
Business Custom	57,307	0.89	51,072	0.56	28,600
Retro-Commissioning	26,203	0.95	24,788	0.71	17,599
Industrial Systems	13,101	0.88	11,578	0.67	7,757
New Construction	34,929	0.98	34,138	0.65	22,190
Business Instant Lighting Discount (BILD)	84,977	1.46	124,093	0.74	91,829
Dent on Energy †	-	-	-	-	-
C&I Behavioral §	-	-	-	-	-
Small Business Energy Services	37,329	1.00	37,303	0.90	33,573
<b>Total Commercial</b>	<b>516,140</b>	<b>1.05</b>	<b>544,497</b>	<b>0.71</b>	<b>387,981</b>
<b>Carryover</b>					
Residential Energy Star Lighting	178,757	1.05	187,018	0.62	116,371
Business Instant Lighting Discount (BILD)	18,990	0.68	12,850	0.63	8,043
<b>Total Carryover</b>	<b>197,747</b>	<b>1.01</b>	<b>199,868</b>	<b>0.62</b>	<b>124,414</b>
<b>Portfolio Total</b>	<b>1,153,633</b>	<b>1.13</b>	<b>1,306,892</b>	<b>0.73</b>	<b>949,392</b>

\* Evaluation team estimate

† In concurrence with ComEd, Navigant is not reporting ex ante or ex post savings from the Dent on Energy Program for EPY5 due to the lack of clarifications necessary from the implementation contractor to verify program savings.

§ C&I Behavioral did not have savings, but is included in Section 3 as a summary.

**Table E-2. ComEd Portfolio Year 5 Results – Verified Net Peak Demand Savings (MW)**

	Ex-Ante	Ex-Post			
	Gross (MW)	Realization Rate	Gross (MW)	NTGR	Net (MW)
<b>Residential</b>					
Residential Energy Star Lighting	-	N/A	41.8	0.73	30.4
Residential Fridge and Freezer	N/A	N/A	6.15	0.68	4.18
Multifamily Joint	0.15	1.00	0.15	0.80	0.12
Single Family HES Joint	-	-	-	-	-
Complete Systems Replacement (CSR)	N/A	N/A	2.29	0.99	2.27
Home Energy Report	N/A	N/A	N/A	N/A	N/A
Clothes Washer	0.17	1.38	0.23	0.68	0.16
Residential New Construction	N/A	N/A	0.07	0.80	0.05
Elementary Energy Education	N/A	N/A	0.19	0.76	0.15
C3-CUB Energy Saver	N/A	N/A	N/A	N/A	N/A
<b>Total Residential</b>	<b>0.32</b>		<b>50.88</b>	<b>0.73</b>	<b>37.33</b>
<b>Business</b>					
Business Standard	42.2	1.00	42.1	0.72	30.4
Business Custom	4.35	1.39	6.06	0.46	2.79
Retro-Commissioning	2.82	0.64	1.80	0.71	1.28
Industrial Systems	1.44	0.91	1.31	0.72	0.94
New Construction	7.2	1.01	7.3	0.66	4.8
Business Instant Lighting Discounts	N/A	N/A	27.5	0.74	20.3
Dent on Energy †	-	-	-	-	-
C&I Behavioral §	-	-	-	-	-
Small Business Energy Services	6.58	0.96	6.33	0.90	5.71
<b>Total Commercial</b>	<b>64.59</b>	<b>1.43</b>	<b>92.40</b>	<b>0.72</b>	<b>66.22</b>
<b>Carryover</b>					
Residential Energy Star Lighting	-	N/A	20.6	0.62	12.8
Business Instant Lighting Discounts	3.2	0.81	2.6	0.62	1.6
<b>Total Carryover</b>	<b>3.20</b>	<b>7.25</b>	<b>23.20</b>	<b>0.62</b>	<b>14.40</b>
<b>Portfolio Total</b>	<b>68.11</b>	<b>2.44</b>	<b>166.48</b>	<b>0.71</b>	<b>117.94</b>

† In concurrence with ComEd, Navigant is not reporting ex ante or ex post savings from the Dent on Energy Program for EPY5 due to the lack of clarifications necessary from the implementation contractor to verify program savings.

§ C&I Behavioral did not have savings, but is included in Section 3 as a summary.

The ComEd program tracking systems reported 1,153,633 MWh of gross savings for combined residential and business programs in PY5, including carryover. Evaluation verification review of these ex-ante gross savings estimates on a program-by-program basis concluded that 113% of the estimated gross savings had been realized (including lighting carryover from PY3 and PY4 from Residential ENERGY STAR Lighting Program and Business Instant Lighting Discount). Additional evaluation work to estimate free riders and spillover effects resulted in an overall verified net-to-gross ratio of 0.73.



In the course of estimating verified gross savings, the evaluation team used a variety of impact parameters in its calculations across programs. Many of these parameters (e.g., delta watts, hours-of-use, peak coincidence factors, full load cooling hours, demand coincidence factor, energy and demand interactive effects, realization rates, etc.) were deemed for EPY5 based on the Illinois Technical Reference Manual v1.0<sup>1</sup> (TRM) that went into effect at the beginning of the program year. Custom measures are not included in the TRM since they are not standard. Evaluation research determined the split of quantities of bulbs sold and installed in residential vs. non-residential locations and various other parameters not included in the IL TRM. Net savings were based on the application of a net-to-gross ratio that was determined through a Statewide Advisory Group consensus process, which relied heavily on previous evaluation research findings. Recommended changes to the TRM are shown in the attached file in Appendix B.

The programs that calculated savings using the TRM in PY5 include:

**Residential Programs:** Residential Lighting, Fridge Freezer Recycle Rewards, Multifamily, Single Family, Residential New Construction, Complete System Replacement and Elementary Energy Education.

**Business Programs:** Standard, BILD, New Construction, Small Business Energy Services and IP Thermostats.

Programs that did not apply the TRM in PY5 include:

**Residential Programs:** Home Energy Report

**Business Programs:** Custom, Industrial Systems, Data Centers, Retrocommissioning and C&I Behavioral

**Carryover Savings.** The Residential ENERGY STAR Lighting Program had measures (CFLs) sold or incented in PY3 and PY4 that were not installed at that time but were installed in PY5 according to evaluation analysis. Those measures are credited to the PY5 savings as Late Installs or Carryover Savings. Similarly, BILD includes carryover savings.

## ***E.2. ComEd PY5 Research Portfolio Results***

Using its newest research findings, the evaluation team estimated that ComEd's efficiency programs achieved 880,612 net MWh energy savings in the ComEd service territory for PY5. This included 756,198 net MWh from funded measures in PY5, plus the same CFL Carryover determined for verified savings. The result of all the individual program reviews based on research findings was a realization rate of 115%, a net-to-gross ratio of 0.66, and an ex-post estimate of 880,612 MWh of net energy savings.<sup>2</sup> Researched savings reflect evaluation adjustments to any of the savings parameters using the best available research. This can occur even if a parameter is deemed for the verified savings analysis. Parameters that are adjusted will vary by program and depend on the specifics of the research that was performed during the evaluation effort. Researched savings are also used to adjust deemed values during the annual Illinois TRM update process. Any such changes to deemed values are assessed and altered through the SAG Technical Advisory Committee's process updating the Illinois TRM, which occurs on an annual basis. Detailed research findings are presented in Section 4.

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<sup>1</sup> State of Illinois Energy Efficiency Technical Reference Manual. Final, As of September 14<sup>th</sup>, 2012. Effective: June 1<sup>st</sup>, 2012; <http://www.icc.illinois.gov/downloads/public/edocket/339744.pdf>

<sup>2</sup> State of Illinois Energy Efficiency Technical Reference Manual. Final, As of September 14<sup>th</sup>, 2012. Effective: June 1<sup>st</sup>, 2012; <http://www.icc.illinois.gov/downloads/public/edocket/339744.pdf>

### *E.3. ComEd Portfolio PY5 Summary and Conclusions*

For ComEd's Program Year 5, the net verified savings of 949,392 MWh exceeded its adjusted statutory goal of 827,575 net MWh. Based on the Illinois TRC calculation, the portfolio TRC of 2.83 has met the statutory cost effectiveness test. ComEd's Energy Efficiency portfolio has exceeded its key compliance requirements.

## 1. Overview of ComEd Portfolio

### 1.1 Sector Level Results

#### 1.1.1 Residential Sector Impacts — Smart Ideas

The residential sector includes ten programs designed to achieve cost-effective energy efficiency and demand savings in single family and multifamily residences. This sector includes programs that encourage and incent residential customers to improve the energy performance of their homes through retiring and recycling old appliances, purchasing energy efficient products, and behavior programs.

Participating customers may receive technical or financial resources, such as a home energy audit, instant or mail-in rebates for purchasing energy efficient products, or direct installation of energy efficiency measures, such as faucet aerators or water efficient showerheads at no cost to the participant. ComEd ran a behavioral program where selected customers receive energy reports showing their energy consumption and that for typical households, along with energy saving suggestions.

Marketing and outreach for these programs are conducted through a variety of channels under ComEd's Smart Ideas® brand. Outreach efforts include communication with trade allies, mass media, the internet and social media, direct mail, utility bill inserts, in-store displays, conventions, trade shows and public events. ComEd maintains a webpage for these programs under [www.ComEd.com](http://www.ComEd.com).<sup>3</sup>

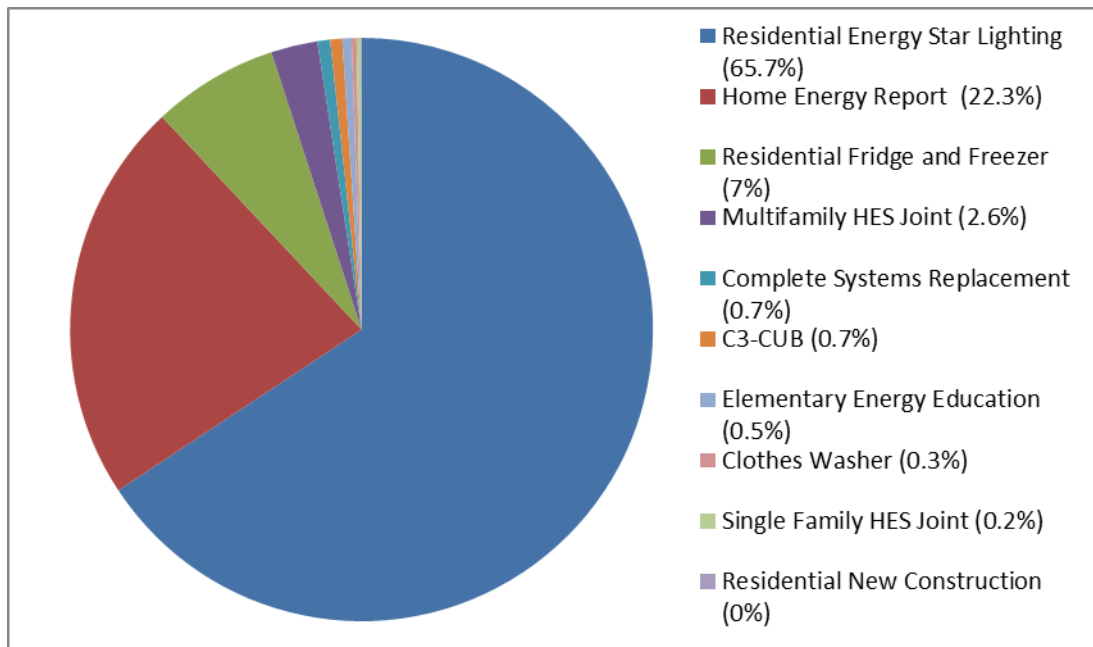
Some residential programs were implemented jointly with gas companies sharing overlapping service territories, including Home Energy Savings, Elementary Energy Education, Complete Systems Replacement, Residential New Construction, and Multi-Family.

The Residential Lighting program was the biggest program as measured by energy savings, representing approximately 66% of overall sector savings using verified values. The Home Energy Report (HER) program is the second largest program by savings. Figure 1-1 below depicts the relative impacts of individual programs within the residential sector.

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<sup>3</sup> ComEd, Home Savings, [www.comed.com/home-savings/Pages/default.aspx](http://www.comed.com/home-savings/Pages/default.aspx) (accessed April 25, 2014)

**Figure 1-1. Residential Ex-Post Net Energy Savings – Verified Values**



Source: Evaluation research

### 1.1.2 Commercial & Industrial Sector Impacts – Smart Ideas for Your Business

The Commercial & Industrial (C&I) Sector includes nine programs designed to achieve cost-effective energy efficiency and demand savings in commercial and industrial facilities. The programs encourage and incentivize customers to make energy efficiency improvements at their facilities by providing technical and financial resources.

Participating customers may receive technical resources such as expert design consultation for new construction projects or energy audits and recommendations for performance improvement at existing facilities from qualified contractors. Customers may qualify for financial incentives by implementing recommendations from program representatives. In addition, customers may receive rebates by purchasing and installing qualified energy efficient products at their facilities.

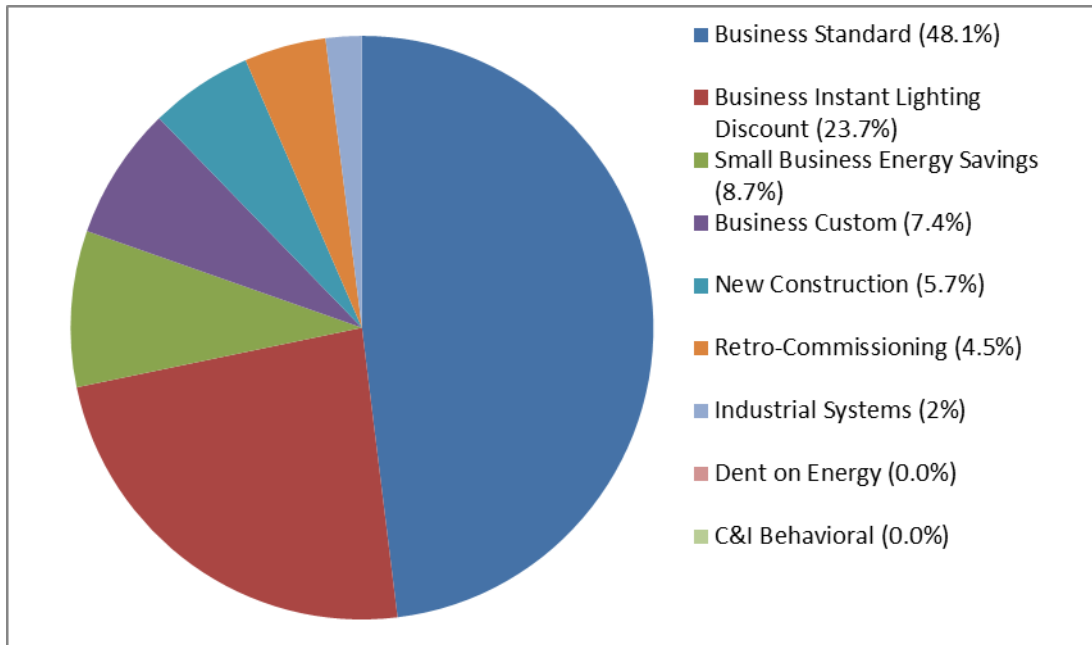
C&I programs are marketed under the Smart Ideas for Your Business® brand. Many C&I programs work closely with ComEd’s account managers, energy efficiency program managers and trade allies to recruit qualified participants. These programs also conduct outreach through mass media, social media, direct mail, utility bill inserts, conventions, trade shows and public events. ComEd maintains a webpage for these programs on [www.ComEd.com](http://www.ComEd.com).<sup>4</sup>

Some business programs were implemented jointly with gas companies sharing overlapping service territories, including Retro-Commissioning, Business New Construction and Small Business Energy Services.

The Business Standard program was the largest C&I program as measured by energy savings, representing 48% of overall sector savings using verified values (Figure 1-2).

<sup>4</sup> ComEd, Business Savings, [www.ComEd.com/business-savings/Pages/default.aspx](http://www.ComEd.com/business-savings/Pages/default.aspx) (accessed September 17, 2013)

**Figure 1-2. C&I Ex-Post Net Energy Savings – Verified**



Source: Evaluation research

\* Note, Dent on Energy and C&I Behavioral had no savings in PY5

## 1.2 ComEd PY5 Portfolio Level Cost Effectiveness

The ComEd portfolio of programs is cost effective at a TRC of 2.83. The cost effectiveness of the portfolio is dependent on a number of assumptions and these are described in the PY5 TRC Summary in the appendices. Only the Single Family HES program is not cost effective, with TRC values less than one (Table 1-1). The cost effectiveness of the portfolio is dependent on a number of assumptions and these are described in the PY5 TRC Summary in the appendices.

Cost effectiveness was determined for individual programs and for the portfolio of programs as a whole. It is assessed through the use of the Total Resource Cost (TRC) test. The TRC test is defined in the Illinois Power Agency Act SB1592 as follows:

*‘Total resource cost test’ or ‘TRC test’ means a standard that is met if, for an investment in energy efficiency or demand-response measures, the benefit-cost ratio is greater than one. The benefit-cost ratio is the ratio of the net present value of the total benefits of the program to the net present value of the total costs as calculated over the lifetime of the measures. A total resource cost test compares the sum of avoided electric utility costs, representing the benefits that accrue to the system and the participant in the delivery of those efficiency measures, to the sum of all incremental costs of end-use measures that are implemented due to the program (including both utility and participant contributions), plus costs to administer, deliver, and evaluate each demand-side program, to quantify the net savings obtained by substituting the demand-side program for supply resources. In calculating avoided costs of power and energy that an electric utility would otherwise have had to*

*acquire, reasonable estimates shall be included of financial costs likely to be imposed by future regulations and legislation on emissions of greenhouse gases.<sup>5</sup>*

ComEd uses DSMore™ software for the calculation of the TRC test.<sup>6</sup> The DSMore model accepts information on program parameters, such as number of participants, gross savings, free ridership and program costs, and calculates a TRC which fits the requirements of the Illinois legislation.

One important feature of the DSMore model is that it performs a probabilistic estimation of future avoided energy costs. It looks at the historical relationship between weather, electric use and prices in the PJM Northern Illinois region and forecasts a range of potential future electric energy prices. The range of future prices is correlated to the range of weather conditions that could occur, and the range of weather is based on weather patterns seen over the historical record. This method captures the impact on electric prices that comes from extreme weather conditions. Extreme weather creates extreme peaks which create extreme prices. These extreme prices generally occur as price spikes and they create a skewed price distribution. High prices are going to be much higher than the average price while low prices are going to be only moderately lower than the average. DSMore is able to quantify the weighted benefits of avoiding energy use across years which have this skewed price distribution.

Additional costs are included in the determination of the TRC ratio at the portfolio level. These are costs related to the overall delivery of energy efficiency and demand response programs that cannot be assigned to any of the individual evaluated programs, like evaluation, measurement and verification costs, portfolio-level administration costs, research and development costs, educational outreach costs and Energy Insight Online (EIO) costs. In addition, the portfolio level TRC also includes benefits associated with Residential Lighting savings from PY3 and PY4 and BILD from PY4 that are considered deferred installations (“carryovers”) and were not previously counted.

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<sup>5</sup> 20 ILCS 3855/1-10.

<sup>6</sup> Demand Side Management Option Risk Evaluator (DSMore) software is developed by Integral Analytics.

**Table 1-1. Cost Effectiveness of the ComEd Portfolio**

	Illinois Total Resource Cost Test
Residential ENERGY STAR Lighting	4.81
Fridge & Freezer Recycle	2.19
Clothes Washer Rebates	1.28
Multi-Family †	3.59
Single Family †	0.66
Elementary Education †	2.45
Residential New Construction †	1.28
Home Energy Report	1.16
Complete System Replacement †	3.04
Business Prescriptive	3.09
Business Custom	2.20
BILD Lighting	2.36
Business Retro-Commissioning †	3.76
Small Business Energy Services †	1.52
Business New Construction †	8.16
Data Centers	1.58
Industrial Systems	2.27
Portfolio, Carryover & RLD	1.91
<b>ComEd Total Portfolio</b>	<b>2.83</b>

† Indicates that the program was jointly implemented with gas utilities

Source: ComEd DSMore analysis. Details on the assumptions used can be found at the end of the Results section in each program-specific report and in the TRC Summary Report.

Note: Jointly implemented programs with natural gas company's impacts (Nicor, Peoples Gas and North Shore gas) were not included in TRC calculations and Table 1-1 only represents ComEd electric TRCs.

## 2. Evaluation Methods

The ComEd evaluation, measurement and verification (EM&V) team developed an evaluation work plan for each program in the portfolio. Within each program’s evaluation plan, the level of rigor and evaluation methods were selected based on findings from each program’s previous evaluation reports, including anticipated program impacts and planned changes to program design or implementation. For most programs, impact evaluation methods included reviewing program tracking databases and other program methodology for calculating reported savings, conducting primary and secondary research for verification and due diligence reviews, sampling projects for engineering reviews and/or on-site data collection, communicating with implementation contractors and/or trade allies about their participation, and contacting program participants and non-participants via telephone surveys. Frequent process evaluation methods included in-depth interviews with program staff, implementation contractors and trade allies, reviewing program materials and contacting program participants and non-participants via telephone surveys.

Table 2-1 and Table 2-2 summarize each program’s main evaluation tasks conducted during PY5. Due to the nature of the program, the Behavioral Programs (Home Energy Report, C3-CUB Energy Saver, and the C&I Behavioral pilot) were subject to a different evaluation method, a regression-based billing analysis.



**Table 2-1. Evaluation Approaches – Residential Programs**

Evaluation Tasks	Lighting	HES-Single Family	Multi-Family	HEER - CSR	Fridge /Freezer	Clothes Washer	New Construction	Element. Energy Ed.	HER	CUB C3
<b>Reporting</b>										
Verification and Gross Realization Rate-Measure-Level Deemed Savings Review	X	X	X	X	X	X	X	X	X	X
Net-to-gross Ratio	X	X	X	X	X	X		X		
Process Analysis	X	X	X	X	X	X	X	X		
<b>Impact Analysis</b>										
Participant Surveys – Impact	X	X	X	X	X	X		X		
• Participant Self-Report NTGR Analysis	X	X	X	X	X	X		X		
• Installation Rate Analysis	X	X	X	X	X	X		X	X	X
• ANCOVA Modeled HOU/CF	X†									
In-store Intercept Surveys – Impact	X									
Billing & Tracking Data Analysis									X	X
Shelf Surveys – Impact	X									
Metering Study for Lighting HOU/Peak	X									
Trade Ally Interviews – NTGR	X†	X	X	X	X					
<b>Process Analysis</b>										
ComEd Program Manager and Implementation Contractor Interviews	X	X	X	X	X		X	X		
General Population Surveys – Process	X							X		
In-store Intercept Surveys – Process	X									
Shelf Surveys – Process	X									
Stakeholder Interviews		X	X	X	X		X			
Participant Telephone Interviews	X	X	X	X	X		X			

Source: Navigant Evaluation

† Not used in the final NTGR calculations.

‡ This was a survey of the general population for the Residential Lighting Program.

**Table 2-2. Evaluation Approaches – C&I Programs**

Evaluation Tasks	Standard	Custom (incl. Data Centers)	RCx	BILD	C&I New Constr.	Industrial Systems (Incl. Compr. Air)	Small Bus.	Thermostats	C&I Behavioral
Verification & Gross Realization Rate	X	X	X	X	X	X	X		X
Measure-Level Deemed Savings Review	X	X		X	X	X	X		
Net-to-gross Ratio	X	X	X	X	X	X	X		
Process Analysis	X	X	X	X	X	X	X	X	
Customer Self-Report NTGR Analysis	X	X		X	X	X			
Installation Rate Analysis	X	X	X	X	X	X	X	X	X
Trade Ally Interviews – NTGR	X					X			
Program Manager and Implementer Interviews	X	X	X	X	X	X	X		
Stakeholder Interviews	X	X	X	X	X	X	X		
Participant Telephone Interviews	X	X		X	X	X	X		
Billing and Tracking Data Analysis									X

Source: Navigant Evaluation

### 3. Program Level Findings and Recommendations

This section includes program-level detail for ComEd’s PY5 portfolio of programs including a brief program description, key findings and recommendations for each program.

#### 3.1 Residential Energy Star® Lighting

The results from the evaluation of ComEd’s PY5 Residential ENERGY STAR® Lighting program (Residential Lighting) are presented below. The main goal of the Residential Lighting program is to increase the market penetration of energy efficient lighting within 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. The goal of the Residential Lighting program for EPY5 was to sell 10,100,000 discounted CFL and LED bulbs and fixtures to residential customers within ComEd’s service territory. The program exceeded this goal by selling a total of 10,897,894 bulbs through program retailers across all bulb types. Applying the deemed installation rates to these bulb sales results in a total of 7,706,971 EPY5 bulbs installed during the program year. An estimated 3,331,459 additional bulb installations stemming from prior program year bulb sales (EPY3 and EPY4) leads to a total of 11,038,430 high efficiency bulbs sold through the Residential ES Lighting program being installed within ComEd service territory in EPY5. These bulbs and fixtures sales led to the program achieving 130% of their targeted net energy savings.

The program design and delivery methods did not substantially change for PY5 and in accordance with the SAG consensus decision the evaluation team used the NTGR rate calculated in the PY3 evaluation research. The evaluation team recommends utilizing a weighted rolling 3-year average of the standard and specialty CFL evaluation based NTGR estimate going forward. This rolling average would provide some consistency and ensure that the NTGR results from any one single year do not drastically alter the resulting net savings.

Table 3-1 summarizes the electricity savings from the ComEd EPY5 Residential Lighting program.

**Table 3-1. EPY5 Total Program Electric Savings**

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex Ante Gross Savings	418,865	-	-
Realization Rate	0.94	-	-
Verified Gross Savings	394,595	345.2	41.8
Net-to-gross ratio (NTGR)†	0.73	0.73	0.73
Verified Net Savings	287,135	251.1	30.4

Source: ComEd tracking data and Navigant team analysis.

† A deemed value established through the SAG consensus process.

Table 3-2 summarizes the electricity savings by bulb and shows the NTGR values deemed through the SAG consensus process<sup>7</sup> to be used to calculate EPY5 verified net savings.

**Table 3-2. Residential Lighting Program PY5 Verified Savings Estimates**

Savings Category	Stan. CFLs	Spec. CFLs	CFL Fixtures	LED Bulbs	LED Fixtures	Coupon Sales	Total
Ex Ante Gross Savings <sup>8</sup> (MWh)	n/a <sup>9</sup>	n/a	n/a	n/a	n/a	n/a	418,865
Verified Gross Realization Rate <sup>†</sup>	n/a	n/a	n/a	n/a	n/a	n/a	0.94
Verified Gross Savings (MWh)	356,359	34,782	481	1,571	1,204	198	394,595
Net-to-gross ratio (NTGR) <sup>†</sup>	0.72	0.80	0.79	0.80	0.79	0.72	0.73
Verified Net Savings (MWh)	256,579	27,826	380	1,257	951	142	287,135

Source: ComEd tracking data and Navigant team analysis.

† A deemed value established through the SAG consensus process.

Savings from bulbs purchased during EPY3 and EPY4, but not installed until EPY5 (carryover savings), can be attributed to the EPY5 program. Table 3-3 below provides an estimate of EPY5 carryover bulb savings.

**Table 3-3. EPY5 Total Program Electric Savings from Carryover**

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex Ante Gross Savings	178,757	-	-
Realization Rate	1.05	-	-
Verified Gross Savings	187,018	152.1	20.6
Net-to-gross ratio (NTGR)	0.62	0.62	0.62
Verified Net Savings	116,371	95.0	12.8

Source: ComEd tracking data and Navigant team analysis.

A residential/non-residential split is included in the second update to the IL TRM beginning in Version 2.0 (Effective June 1, 2013). Including this parameter as a deemed value in the TRM improves the verified savings realization rate by removing the uncertainty that surrounds this estimate within the calculation of verified savings. In Version 2.0 of the IL TRM, the Res/NonRes split is deemed at 96%/4% “based on a weighted (by sales volume) average of ComEd PY3 and PY4 and Ameren PY5 in-store intercept survey results.”<sup>10</sup> The evaluation team recommends updating the deemed Res/NonRes split annually based on a rolling 3-year average from the most recent evaluation research findings from ComEd and Ameren.

<sup>7</sup> Document provided by ComEd to the SAG summarizing the SAG-approved NTGR for ComEd for EPY5-EPY6 as agreed to through a consensus process in March-August 2013. ComEd PY5-PY6 Proposal Comparisons with SAG.xls, which is to be found on the Illinois SAG web site at <http://ilsag.info>.

<sup>8</sup> Ex Ante Gross Savings were not included in the tracking data. Ex Ante Gross Savings were based on estimates provided via email from Dave Nichols of ComEd on 8/30/2013.

<sup>9</sup> Ex Ante Gross Savings were not available by Bulb Type from the program data. The evaluation calculated Ex Ante Gross Savings by dividing the Ex Ante Net Savings provided by ComEd by the NTG ratios.

<sup>10</sup> IL TRM Ver. 2.0 at p. 500.

**Table 3-4. Year Average Res/NonRes Split for ComEd**

Program Year	Bulbs	Res/NonRes
EPY3	11,197,862	97% / 3%
EPY4	12,649,030	95% / 5%
EPY5	10,897,894	98% / 2%
3-year Weighted Average for EPY7	-	97% / 3%

Source: Navigant team analysis.

Version 1.0 and 2.0 of the IL TRM cite the source of first-year Installation Rate of standard and specialty CFLs as a review of EPY1-EPY3 evaluations from ComEd and Ameren. The evaluation team recommends updating the deemed installation rates for CFLs annually based on a rolling 3-year average from the most recent evaluation research findings (from both ComEd and Ameren IL when available). This would insure the deemed installation rates are reflective of the most recent data available. Table 3-5 below provides three years of evaluation research results.

**Table 3-5. 3-Year Average Standard and Specialty Installation Rates for ComEd**

Program Year	Standard CFLs		Specialty CFLs	
	Bulbs	ISR	Bulbs	ISR
EPY3	9,886,359	70.4%	1,218,595	77.7%
EPY4	11,419,752	69.7%	1,097,670	75.5%
EPY5	9,633,227	76.0%	1,197,896	91.6%
3-year Weighted Average for EPY7	-	71.9%	-	81.7%

Source: Navigant team analysis.

The NTGR for EPY5 was deemed based on the SAG consensus process. The evaluation team recommends utilizing a weighted rolling 3-year average of the standard and specialty CFL evaluation based NTGR estimate going forward in this process. This rolling average would provide some consistency from year to year and would ensure that the NTGR results from any one single year do not drastically alter the resulting net savings. Table 3-6 below provides three years of evaluation research NTGR estimates for Standard and Specialty CFLs, as well as the 3-year weighted average which is the recommended EPY7 NTGR parameter estimate.

**Table 3-6. 3-Year Average Standard and Specialty NTGR for ComEd**

Program Year	Standard CFLs		Specialty CFLs	
	Bulbs	NTGR	Bulbs	NTGR
EPY3	9,893,196	71%	1,217,723	60% <sup>11</sup>
EPY4	11,419,752	55%	1,097,670	44%
EPY5	9,633,227	55%	1,197,896	48%
3-year Weighted Average for EPY7	-	60%	-	51%

Source: Navigant team analysis.

The following list summarizes the key recommendations:

**Realization Rates**

- Providing the measure level Ex Ante savings estimates in the tracking data and/or the Goals Tracker would enable the evaluation team to gain a complete picture of the differences that exist between the Ex Ante and Verified Savings estimates, as well as allow for the estimation of Realization Rates by bulb type.

**Impact Parameters for Future Use**

- The evaluation team recommends updating the deemed Res/NonRes split annually based on a rolling 3-year average from the most recent ComEd and Ameren Evaluation Research findings.
- The evaluation team recommends updating the deemed installation rates for CFLs annually based on a rolling 3-year average from the most recent evaluation research findings (from both ComEd and Ameren IL when available). This would insure the deemed installation rates are reflective of the most recent data available. The evaluation team recommends utilizing a weighted rolling 3-year average of the standard and specialty CFL evaluation based NTGR estimate going forward in this process.

**Impact of EISA 2007 on Marketplace**

- Continue to capitalize on changes being brought by the EISA standards by providing in-store and out-of-store educational information on the benefits of high efficiency CFL products, as well as incentives to entice CFL purchases. The opportunity will be at its peak over the next two years as the EISA standard changes impact 40 and 60-watt replacement bulbs, the largest segment of the medium-screw based (MSB) market. Continue to track bulb availability on program retailers’ shelves via annual shelf surveys.

**Program Tracking Data**

- While light bulb model matching to goals tracker was a much more straightforward process in EPY5 than in previous program years, creating a bulb information database (Goals Tracker or otherwise) with a clear one-to-one match with the model numbers in the tracking data would streamline future evaluation efforts.

<sup>11</sup> In PY3, NTGR was not estimated separately for Standard and Specialty CFLs. In order to estimate a 3-year rolling average NTGR estimate for Specialty CFLs, the PY3 NTGR estimate was multiplied by the ratio of the average PY4 and PY5 Specialty CFL NTGR estimates over the average PY4 and PY5 Standard CFL NTGR estimates. The resulting ratio was 85%. Applying this ratio to the PY3 NTGR estimate (71%) results in a PY3 NTGR estimate (85%\*71% = 60%) which the evaluation team believes more accurately reflects the NTGR estimate for Specialty CFLs.

- There should be an additional field for Specialty type (reflector, candelabra, globe, etc.).

### 3.2 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.

The PY5 evaluation-verified net energy savings were 30,531 MWh, (Table 3-7).

**Table 3-7 Fridge and Freezer Program PY5 Total Electric Savings**

Savings Category †	Energy Savings (MWh)	Peak Demand Savings (MW)
Ex Ante Gross Savings	46,763*	N/A
Realization Rate	0.96	-
Verified Gross Savings	44,674	6.15
Net-to-gross ratio (NTGR)	0.68	0.68
Verified Net Savings	30,531	4.18

\* Evaluation team estimate.

Source: Utility tracking data and Navigant analysis.

The following table summarizes the program savings by measure.

**Table 3-8. EPY5 Program Results by Measure**

Savings Category	Refrigerators	Freezers	Room ACs
Ex-Ante Gross Savings (MWh)	N/A	N/A	N/A
Verification Factor †	0.997	0.997	0.997
Part-Use Factor †	0.877	0.877	1.00
Verified Gross Savings (MWh)	37,092	7,434	147.11
Net to gross ratio (NTGR)*	0.67	0.75	0.70
Verified Net Savings (MWh)	24,852	5,576	103

Source: Utility tracking data and Navigant analysis.

\* The Net-to-Gross ratios from the PY3 evaluation based on the SAG consensus process.

† Value are deemed by the IL TRM.

As in PY4, the research-based net-to-gross ratios for refrigerators and freezers incorporate a retailer-based net-to-gross ratio for units that were subsequently replaced by participants. Many participant-replacers indicated that in the program’s absence, they would have given their units to the retailer they bought the new one from. In turn, those retailers indicated they would have deconstructed and/or recycled many of those units via their normal collection procedures. Directionally, the NTG ratios are significantly lower from PY4, in part because input from a greater number of retailers was incorporated into the NTGR calculation.

The following provides insight into key program recommendations:

**Net-to-Gross Ratio**

- Free ridership can be reduced by increasing marketing to those who have secondary units and eliminating participation by those who are replacing existing primary units. However, this comes at a cost, since the pool of available participants would be reduced significantly by doing so.

**Energy and Demand Savings Estimates**

- For units with negative energy and demand consumption from the regression equation, we recommend that additional language be added to the TRM to address this situation. The language could be: “The regression based savings algorithm produces negative unit energy or demand consumption values for a very small percentage of units. For such units with negative consumption, the average consumption of similar size and age units should be used in place of the negative value.”

**Data Collection**

- We recommend that the participating retailers capture the prior location of the units and if the unit is a primary or secondary unit. Nearly 5,000 records were missing this information and most of the missing records were picked up by participating retailers.

**3.3 Multi-Family Home Energy Savings (Multi-Family or MFHES)**

The Multi-Family Home Energy Savings (MFHES) program is in the second year of jointly implemented program delivery with Nicor Gas Company and with Peoples Gas and North Shore Gas. The MFHES program achieves electric energy and demand savings for ComEd customers and natural gas energy savings for customers of Nicor Gas, 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 CFLs, water efficient showerheads and faucet aerators in residential dwelling units of eligible multifamily residences. During EPY5, the MFHES program expanded its scope to offer direct installation measures in common areas (i.e., hallways or exterior locations) of eligible multifamily properties. The program added assisted living, senior housing and public housing market segments to eligible properties.

Navigant calculated verified net savings of 11,285 MWh for the EPY5 ComEd Multi-Family program, as shown in Table 3-9, below. Measure savings are derived from the Illinois TRM and engineering analysis of program population-level data.

**Table 3-9. EPY5 Multi-Family Program Savings**

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Coincident Peak Demand Savings (MW)
Ex-Ante Gross Savings	13,692	1.46	0.15
Realization Rate	1.00	1.00	1.00
Verified Gross Savings	13,706	1.46	0.15
Net-to-gross ratio (NTGR)	0.82	0.80	0.80
Verified Net Savings	11,285	1.20	0.12

Source: Navigant analysis of EPY5 Multifamily program tracking data (8/27/2013 Frontier data extract).



Table 3-10 below summarizes EPY5 Multi-Family program savings by measure type (lighting measures and non-lighting measures). The program achieved verified net savings of 9,864 MWh from lighting measures (including CFLs in residential units and common areas) and 1,421 MWh from water efficiency measures (including showerheads, kitchen and bathroom faucet aerators).<sup>12</sup> Verified net demand savings were 1.20 MW and verified net coincident peak demand savings were 0.12 MW.

**Table 3-10. EPY5 Multi-Family Program Results by Measure Type**

Savings Category	Lighting Measures	Non-Lighting Measures	Total
Ex-Ante Gross Savings (MWh)	12,174	1,518	13,692
Ex-Ante Gross Demand Savings (MW)	1.33	0.13	1.46
Verified Gross Realization Rate	100%	101%	100%
Verified Gross Savings (MWh)	12,178	1,528	13,706
Verified Gross Demand Savings (MW)	1.33	0.13	1.46
Net to Gross Ratio (NTGR) †	0.81	0.93	0.82
Verified Net Savings (MWh)	9,864	1,421	11,285
Verified Net Demand Savings (MW)	1.08	0.12	1.20
Verified Net Coincident Peak Demand Savings (MW)	0.11	0.01	0.12

Source: Navigant analysis of EPY5 Multifamily program tracking data (8/27/2013 Frontier data extract).

† NTGR is a deemed value. Document provided by ComEd to the SAG summarizing the SAG-approved NTGR for ComEd for EPY5-EPY6 as agreed to through a consensus process in March-August 2013. ComEd PY5-PY6 Proposal Comparisons with SAG.xls, which is to be found on the Illinois SAG web site at <http://ilsag.info>.

Table 3-11 summarizes EPY5 Multi-Family program ex-ante gross, verified gross and verified net results by measure. Verified gross demand savings were 1.46 MW and verified gross coincident peak demand was 0.15 MW. Verified net demand savings were 1.20 MW and verified coincident net peak demand was 0.12 MW for this program.

<sup>12</sup> The program installed 9 vending miser measures during the EPY5/GPY2 program year. These savings accounted for verified gross savings of 14,516 kWh and verified net savings of 13,500 kWh. For purposes of this evaluation report, electricity savings from vending misers are included with water efficiency measures as “non-lighting measures.”

**Table 3-11. EPY5 Multi-Family Program Results by Measure**

Equipment End-Use Type	Ex-Ante Gross Savings (kWh)	Verified Gross Realization Rate†	Verified Gross Savings (kWh)	Net-to-Gross Ratio†	Verified Net Savings (kWh)
9W CFL	42,573	100%	42,573	0.81	34,484
14W CFL	6,948,734	100%	6,945,991	0.81	5,626,252
19W CFL	501,222	101%	506,117	0.81	409,955
23W CFL	135,752	100%	135,806	0.81	110,003
9W Globe CFL	3,294,879	100%	3,298,140	0.81	2,671,493
14W Globe CFL	129,154	98%	126,692	0.81	102,620
9W incl. Globe CFL (common area)	102,662	100%	102,606	0.81	83,111
14W CFL (common area)	857,128	100%	855,330	0.81	692,817
19W CFL (common area)	158,008	102%	160,506	0.81	130,009
23W CFL (common area)	3,821	100%	3,820	0.81	3,094
Showerheads (IU)	1,240,186	101%	1,249,666	0.93	1,162,189
Kitchen Aerators (IU)	119,052	91%	108,750	0.93	101,138
Bath Aerators (IU)	142,897	108%	154,277	0.93	143,477
Kitchen Aerator (CA)	167	108%	180	0.93	168
Bathroom Aerator (CA)	1,063	102%	1,083	0.93	1,007
Vending Misers	14,490	100%	14,516	0.93	13,500
<b>TOTAL</b>	<b>13,691,786</b>	<b>100%</b>	<b>13,706,052</b>	<b>0.82</b>	<b>11,285,319</b>

Source: Navigant analysis of EPY5 Multifamily program tracking data (8/27/2013 Frontier data extract).

† NTGR is a deemed value. Document provided by ComEd to the SAG summarizing the SAG-approved NTGR for ComEd for EPY5-EPY6 as agreed to through a consensus process in March-August 2013. ComEd PY5-PY6 Proposal Comparisons with SAG.xls, which is to be found on the Illinois SAG web site at <http://ilsag.info>.

‡ Based on evaluation research findings.

The following summarizes the key recommendation from the study.

#### Measure Savings Estimates

- The implementation contractor should update ex-ante measure savings values for CFLs and common area kitchen and bathroom aerators. Installing thermostatically initiated shower restriction valves (i.e. Showerstart™ device) could save an additional 84kWh/year in multifamily homes; therefore, consideration of using thermostatically initiated shower restrictions should be considered.

### 3.4 Complete System Replacement (CSR)

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. Customers must be active residential customers of ComEd and one of the aforementioned gas utilities to receive rebates for high efficiency furnaces and air conditioning systems, and the premises must be used for

residential purposes in existing buildings. In EPY5, the ComEd CSR program rebated 4,675 projects for a total of 4,460 participants. This is slightly more than double the number of projects for EPY4 (2,054 projects).

Rebates are offered for the installation of air conditioning systems in conjunction with high-efficiency furnaces. The dollar amount of the rebate depends on the size and efficiency of the replacement measures. The CSR rebates range from \$600 to \$1,000 depending on the gas utility, furnace efficiency level, and CAC unit efficiency level.

Table 3-12 summarizes the electricity savings from the CSR program.

**Table 3-12. EPY5 CSR Program Results**

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Coincident Peak Demand Savings (MW)
Ex Ante Gross Savings (MWh)	2,375	N/A	N/A
Verified Gross Realization Rate	1.31	N/A	N/A
Verified Gross Savings (MWh)	3,109	4.50	2.29
Net to gross ratio (NTGR)	0.99	0.99	0.99
Verified Net Savings (MWh)	3,077	4.45	2.27

Source: Utility tracking data and Navigant analysis

The SAG NTGR consensus process determined<sup>13</sup> that the NTGR value should be calculated by the EM&V team and applied retrospectively to calculate verified net savings. The participating trade ally free ridership rate was calculated from the trade ally survey at 0.25 (see Table 3-13). The spillover calculated from the same survey was 0.12.

**Table 3-13. CSR Participating Trade Ally Free Ridership and Spillover**

	Sales Weighted Free-Ridership	Sales Weighted Spillover	N
Highest Volume Trade Allies	0.21	0.12	13
Medium Volume Trade Allies	0.34	0.10	18
Lowest Volume Trade Allies	0.35	0.20	18
<b>All Participating Trade Allies</b>	<b>0.25</b>	<b>0.12</b>	<b>49</b>

Source: Evaluation Team analysis.

Non-participating trade ally spillover was explored in “drop-out” and never-participated trade ally surveys. Navigant calculated spillover for each non-participating trade ally and then sales-weighted spillover for the program.

<sup>13</sup> Document provided by ComEd to the SAG summarizing the SAG-approved NTGR for ComEd for EPY5-EPY6 as agreed to through a consensus process in March-August 2013. ComEd PY5-PY6 Proposal Comparisons with SAG.xls, which is to be found on the Illinois SAG web site at <http://ilsag.info>.

**Table 3-14. CSR Non-Participating Trade Ally Spillover**

	Sales Weighted Spillover	N
Non-Participating Trade Allies	0.20	45

Source: Evaluation Team analysis.

The overall program NTGR was calculated by averaging the EPY4 participant and the EPY5 trade ally free-ridership rates, and then adding the EPY4 participant spillover, and EPY5 participating trade ally and non-participating trade ally spillover, as follows:

$$NTG_{Program} = 1 - \frac{(FR_{Part.} + FR_{TA})}{2} + SO_{Part.} + SO_{Part.TA} + SO_{Non-Part.TA}$$

- Where
- NTGProgram = Program NTGR
  - FRPart. = Participant Free-Ridership
  - FR<sub>TA</sub> = Trade Ally Free-Ridership
  - SO<sub>Part.</sub> = Participant Spillover
  - SO<sub>PartTA</sub> = Participating TA Spillover
  - SO<sub>Non-PartTA</sub> = Non-Participating TA Spillover

The participant free ridership rate from the EPY4 study was 0.41. The participant spillover was assumed to be zero since it is unlikely participants would have bought another CAC unit (particularly without participating in the program), and the evaluation found no evidence that participation in the CSR program led to the adoption of any additional energy saving measures.

The resulting program NTGR rate is as follows:

$$1 - \frac{(0.41 + 0.25)}{2} + 0 + 0.12 + 0.20 = 0.99$$

The following are the key recommendations for PY5:

**Tracking Database**

- Navigant recommends that the utilities and implementation contractors involved in the Complete System Replacement, Residential Prescriptive Rebates, and Home Energy Efficiency Rebates programs work together to develop a tracking database that is functional for all parties.

**Net-to-Gross Rate**

- Assuming other criteria NTGR Framework criteria are met, the NTGR rate found by this evaluation should be applied retrospectively for EPY5, and may be used as the deemed NTGR for EPY7.

**Demand Savings Estimates.**

- Navigant recommends that ComEd track ex ante demand savings in their tracking database.

**Early Replacement Analysis.**

- Navigant suggests that the IL TRM be changed to allow the secondary measure replaced by a CSR participant to be considered early replacement. Navigant suggests that the early replacement rate for the secondary measure be deemed at 43%.

### 3.5 Home Energy Savings (HES)

The Home Energy Savings (HES) program is a joint program of Nicor Gas and ComEd, with Nicor Gas leading the program implementation. The 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 is a comprehensive home energy assessment that includes combustion safety testing, direct installation of selected energy efficiency and water-saving measures, and incentives for installing a recommended package of weatherization measures. Direct install measures for the HES program include CFLs, low-flow showerheads, low-flow kitchen and bathroom faucet aerators, hot water heater temperature setback, pipe insulation, programmable thermostats, and programmable thermostat education. Weatherization measures include attic, wall, duct, and floor insulation, along with air sealing measures. In EPY5/GPY2, the utilities partnered with Energy Impact Illinois (EI2), which added outreach efforts and funded an increase in incentives from EPY4/GPY1 levels. The program also piloted a reduction in the home assessment fee from \$99 to \$49 over a three month period. The reduction in the assessment fee led to an influx of participants.

Table 3-15 summarizes the program savings by utility. The EPY5/GPY2 HES program realized net energy savings of 235,554 therms and 973 MWh.

**Table 3-15. Home Energy Savings Program EPY5/GPY2 Verified Savings Estimates**

Savings Category	ComEd (MWh)
Ex-ante Gross Savings	1,122
Verified Gross Realization Rate	0.999‡
Verified Gross Savings	1,121
Net to gross ratio (NTGR)	0.87†
<b>Verified Net Savings</b>	<b>973</b>

Source: Navigant analysis of GPY2/EPY5 tracking data.

† A deemed value based on the SAG consensus process. ComEd overall NTGR based on deemed measure-specific NTGR values.

‡ Based on evaluation research findings.

Table 3-16 presents the ex-ante and verified gross and net electric savings for the EPY5/GPY2 HES program, by measure.

**Table 3-16. Home Energy Savings Program Measure-Level Savings**

Research Category	Measure	Ex-ante Gross Savings (MWh)	Verified Gross Realization Rate	Verified Gross Savings (MWh)	NTGR <sup>†</sup>	Verified Net Savings (MWh)
Direct Install Measures	9 Watt CFL	74	1.00‡	74	0.89	66
	14 Watt CFL	269	0.998‡	268	0.89	239
	19 Watt CFL	132	0.995‡	131	0.89	117
	23 Watt CFL	122	1.00‡	122	0.89	108
	9 Watt Globe CFL	211	1.00‡	211	0.89	187
	Shower Head	19	1.01‡	19	0.94	18
	Kitchen Aerator	0.4	1.18‡	0.4	0.94	0.4
	Bathroom Aerator	2.2	1.13‡	2.5	0.94	2.3
	Hot Water Temperature Setback	0.4	0.23‡	0.1	0.94	0.1
	Pipe Insulation	3.9	1.21‡	4.7	0.94	4.4
Subtotal		834	0.998	833	0.89	742
Weatherization Measures	Attic Insulation	119	1.00	119	0.80	95
	Wall Insulation	1.7	1.00	1.7	0.80	1.4
	Floor Insulation (Other)	3.1	1.00	3.1	0.80	2.5
	Duct Insulation & Sealing	1.6	1.00	1.6	0.80	1.3
	Air Sealing	163	1.00	163	0.80	130
Subtotal		288	1.00	288	0.80	230
Total		1,122	0.999	1,121	0.87	973

Source: Navigant analysis

<sup>†</sup> A deemed value based on the SAG consensus process. ComEd overall NTGR based on deemed measure-specific NTGR values.

<sup>‡</sup> Based on evaluation research findings.

The following provides insight into key program recommendations.

**Gross Realization Rates**

- Navigant recommends updating ex-ante calculations for kitchen and bathroom faucet aerators based on clarifications presented in the Illinois TRM version 2.0.

**Tracking System Review**

- Navigant recommends adding a field in the tracking database for participant type to distinguish full-participants from assessment-only participants.

**Assessment Pricing**

- Navigant recommends that Nicor Gas and ComEd retain the \$99 assessment pricing and selectively lower assessment pricing to \$49 to increase participation as necessary.

**Incentive Level**

- Navigant recommends Nicor Gas and ComEd continue with the increased incentive level with the expectation that these incentives, when combined with improvements described below, will increase conversions and lead to deeper savings per participant.

**Full Participation Barriers**

- Navigant recommends addressing any aspects of program processes that may be causing assessment scheduling, post-assessment application processing, or weatherization contractor assignment delays. Ensuring sufficient assessor staffing levels may help alleviate assessment scheduling delays. Navigant recommends that the implementation contractor allow the number of assessors to increase or decrease as needed according to participation demand.

**Future Evaluation Risk**

- Navigant has reason to believe that future NTGR research may yield notably different results given interim changes in incentive levels, assessment pricing, and/or outreach methods. Navigant recommends addressing any aspects of program processes that may be causing assessment scheduling, post-assessment application processing, or weatherization contractor assignment delays. Ensuring sufficient assessor staffing levels may help alleviate assessment scheduling delays.

**3.6 Residential New Construction**

The Residential New Construction program (RNC) is jointly offered by Nicor Gas and ComEd. The RNC program provides incentives to builders and HERS raters for building new homes at least 10% more efficient than current code and installing qualifying energy efficiency equipment in new homes. The RNC program launched in EPY4 but this is the first program year where it is claiming savings. Table 3-17 summarizes the natural gas and electricity savings from the RNC program.

**Table 3-17. Residential New Construction EPY5 Total Program Savings**

Savings Category	Energy Savings (MWh)	Coincident Peak Demand Savings (MW)
Ex Ante Gross Savings	279	-
Realization Rate	0.90	-
Verified Gross Savings	251	0.07
Net to gross ratio (NTGR)	0.80	0.80
Verified Net Savings	201	0.05

*Source: Utility tracking data and Navigant analysis.*

Navigant built four aggregate models for the impact analysis, grouping homes into the following categories: single-story detached, two or more story detached, single-story attached, and two or more story attached. The following two tables summarize the program electric savings by home type.



**Table 3-18. EPY5 RES NC Program Results by Home Type: kWh**

Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate ‡	Verified Gross Savings (kWh)	Free Ridership †	Spillover †	NTGR †	Verified Net Savings (kWh)
Detached 1 Story	42,460	112%	47,532	0.2	0	0.8	38,026
Detached 2+ Story	141,658	83%	117,562	0.2	0	0.8	94,050
Attached 1 Story	26,069	84%	21,821	0.2	0	0.8	17,457
Attached 2+ Story	68,855	93%	63,730	0.2	0	0.8	50,984
<b>Total</b>	<b>279,042</b>	<b>90%</b>	<b>250,645</b>	<b>0.2</b>	<b>0</b>	<b>0.8</b>	<b>200,516</b>

Source: Utility tracking data and Navigant analysis.

† A deemed value based on the SAG consensus process.

‡ Based on evaluation research findings.

The following provides insight into key program recommendations.

- Work with builders and raters to improve areas where as-built conditions are below code, such as wall and foundation insulation levels, as well as those that are at or just above code, such as window U-values, major appliances, and cooling equipment.
- Increase direct builder outreach in order to build stronger relationships through the following avenues:
  - One-on-one meetings with builders
  - Builder training sessions for both technical skills and marketing techniques
  - Having a clear “go-to” person or contact list for builders seeking technical support or looking for guidance on program requirements
- Create separate marketing materials for both builders and prospective homeowners, tailored to the needs of each group.

### 3.7 Home Energy Report (HER)

The ComEd Home Energy Report (HER) behavioral program is designed to generate energy savings by providing residential customers with information about their energy use and energy savings measures and actions. The information is provided in the form of Home Energy Reports that give customers various types of information, including: a) how their recent energy use compares to their energy use in the past; b) tips on how to reduce energy consumption, some of which are tailored to the customer’s circumstances (e.g., customers with pools receive information on how to reduce energy use by pools); and c) information on how their energy use compares to that of neighbors with similar homes. This set of information has been shown in other studies to induce customers to reduce their energy use, creating average energy savings in the 1% to 3% range.

The ComEd Home Energy Report program is characterized as rolled out in five waves: A pilot program targeting 50,000 residential customers initiated in July 2009 (Wave 1); a wave of about 3,000 customers (Wave 2) targeted for program enrollment in September 2010 to “fill-in” for Wave 1 drops; a major expansion targeting 200,000 customers begun in May 2011 (Wave 3); another fill-in wave of 20,000 customers in January 2012 (Wave 4); and a third fill-in wave of 20,000 customers in July 2012 (Wave 5). Moreover, 10,000 customers within both Waves 1 and 3 were targeted to have home energy reports terminated beginning in October 2012 for the remainder of EPY5, thereby creating two subgroups within each of these waves: a terminated report (TR) group, and a continued report (CR) group.



The design of the program did not change in EPY5, but the enrollment configuration did. In particular, it included two related modifications. The first is that approximately 10,000 customers each in program waves 1 and 3 were targeted for termination of reports in autumn 2012 as part of a persistence study, with the termination lasting throughout EPY5. The second is that, to compensate for the potential reduced savings due to this termination, a “fill-in” wave (wave 5) targeting 20,000 new customers were added in July 2012.

The evaluation approach involved the use of a billing analysis using fixed effects regression specification to compare the energy use of HER treatment and control households. Table 3-19 summarizes the total electricity savings from the HER Program. Verified net savings are presented both before and after the uplift adjustment. This adjustment takes account of double counted savings that were included in the billing analysis results due to participation in other ComEd energy efficiency programs, beyond the participation rate of the control households.

**Table 3-19 HER EPY5 Total Program Electric Savings**

Savings Category	Energy Savings (MWh)
Verified Net Savings, Prior to Uplift Adjustment	97,746
Verified Net Savings	97,442

*Source: ComEd billing data, Opower implementation data, and Navigant analysis.*

Table 3-20 summarizes program savings by participant wave. The number of participants represents the number of customers assigned to each participant group, while the sample size indicates the number of customers with sufficient data for inclusion in the regression analysis.

**Table 3-20. HER EPY5 Program Savings, by Wave**

Type of Statistic	Wave 1 CR	Wave 1 TR	Wave 2	Wave 3 CR	Wave 3 TR	Wave 4	Wave 5	Total
	<i>Standard errors are provided in italics</i>							
Number of Participants	37,535	8,783	2,928	186,500	9,694	20,377	18,189	284,006
Sample Size, Treatment	30,429	7,146	2,269	162,504	8,388	18,490	11,506	-
Sample Size, Control		35,304	2,276		42,290	18,572	7,302	-
Percent Savings	2.17%	2.13%	2.45%	2.11%	2.40%	1.44%	1.44%	2.04%
	<i>0.19%</i>	<i>0.32%</i>	<i>0.66%</i>	<i>0.10%</i>	<i>0.21%</i>	<i>0.19%</i>	<i>0.40%</i>	-
kWh Savings per customer	344.39	335.68	360.37	421.14	478.54	190.61	270.06	383.47
	<i>30.24</i>	<i>51.26</i>	<i>96.96</i>	<i>19.44</i>	<i>42.90</i>	<i>24.86</i>	<i>74.02</i>	-
Verified Gross Savings, Prior to Uplift Adjustment, MWh (1)	10,817	2,475	910	71,969	4,238	3,670	3,666	97,746
	<i>949.69</i>	<i>377.92</i>	<i>244.80</i>	<i>3322.33</i>	<i>379.96</i>	<i>478.59</i>	<i>1004.91</i>	-
Savings Uplift in other EE programs, MWh (2)	103	-4	1	258	-38	-2	-14	304
<b>Verified Gross Savings, MWh (3)</b>	10,714	2,479	908	71,711	4,276	3,672	3,681	97,442

Source: Navigant analysis.

(1) Total savings are pro-rated for participants that close their accounts during PY5.

(2) Negative double counted savings indicate that the participation rate in the EE program is higher for the control group than the treatment group. This lowers the baseline and underestimates HER program savings.

(3) Gross savings adjusted for savings uplift are equal to gross savings less the uplift of savings in other EE programs.

Key findings include the following:

- Total program verified net savings in EPY5 are 97,442 MWh;
- On a percentage basis, savings for Wave 1, 2, and 3 participants who have been enrolled in the program at least two years are statistically no different from one another (at the 90% confidence level), averaging roughly 2.14%;
- Using past reported savings from the EPY3 and EPY4 evaluation reports, over the past three years energy savings by Wave 1 customers have been remarkably stable: 2.05% in EPY3, 2.20% in EPY4, and 2.16% in EPY5. This is a significant finding and indicates that going forward the program is likely to continue to generate savings of approximately 2% for this group; and
- On a percentage basis, savings per customer are lowest for Wave 4 and Wave 5 participants (1.44% for each). For Wave 5, which enrolled in July 2012, the relatively low savings can be attributed to a ramp-up phase during EPY5. For Wave 4, which began receiving reports in January 2012, this explanation is somewhat less persuasive, though Navigant’s experience in evaluating the first year of this program for Waves 1-3, and for the same program for other utilities, is that the ramp-up phase is typically 8-13 months, which means that for Wave 4 the program ramp-up extended into EPY5 by at least several months.

A set of 10,000 customers from both Waves 1 and 3 were terminated in October 2013, with the intention to measure the long-run persistence of savings in the absence of reports. However, the terminated customers in Waves 1 and 3 began receiving reports again in summer 2013 (EPY6), halting the planned persistence study. The evaluation will use this group to test the velocity of the rebound to “full” energy savings – the expected savings in the absence of termination. This will provide insight to whether intermediate termination of

reports after an initial period of constant messaging is more cost-effective than long-run constant messaging, which could be the case if energy-saving behaviors become stable habits, or perhaps quasi-habits with a slow decay.

With these experiments underway, and the program otherwise performing well, recommendations are limited:

- If the program is expanded again, Navigant should continue to review the billing data for the new treatment and control households for the year prior to the date households are added to the program. Navigant will verify that the allocation of households across the two groups is consistent with a randomized controlled trial.

### 3.8 Clothes Washer Rebate

The Clothes Washer Rebate (CWR) program provided point-of-sale rebates to ComEd residential customers who purchased specific high-efficiency clothes washer models. This program offered an incentive for the purchase of two types of ENERGY STAR® clothes washers:

- Top-loading washers with a minimum modified energy factor (“MEF”) of 2.0
- Front-loading washers with a MEF of 2.0.

Qualifying models were identified in participating retail outlets by a ComEd sticker, and retailers promoted the program through their advertising. Only ComEd residential customers could qualify for rebates at participating retail stores. Participating retailers used customers’ home ZIP Codes to verify that they qualified for rebates. Qualifying customers received a point-of-sale rebate of seventy-five dollars for any qualifying energy efficient clothes washing unit purchased and delivered during PY5. The CWR program was implemented and managed by ComEd and Applied Proactive Technology (APT) through participating retailers.

Because the program was terminated after PY5 and was not offered in PY6, Navigant performed an attenuated evaluation that focused on quantifying gross and net energy savings impacts from the Program; no process evaluation was performed. Table 3-21 summarizes the electric savings from the ComEd PY5 CWR program. Navigant verified net energy savings of 1,203 MWh, as well as 0.16 MW of net coincident peak demand savings.

**Table 3-21 ComEd CWR PY5 CWR Program Savings**

Program Result	Energy Savings (MWh)	Coincident Peak Demand Savings (MW)
Ex-Ante Gross Savings	1,283	0.17
Ex-Ante NTG Ratio <sup>14</sup>	0.60	0.60
Ex-Ante Net Savings <sup>15</sup>	770	0.12
Verified Gross Savings	1,774	0.23
Verified Gross Realization Rate	1.38	1.38
NTG Ratio <sup>16</sup>	0.68	0.68
Verified Net Savings	1,203	0.16

Source: ComEd tracking data and Navigant analysis.

Key program recommendations include the following:

- If the Program is implemented again in the future, ComEd should revisit the method it uses to set its planning goal to obtain a more accurate savings estimate, for example by relying on the average per-unit verified net energy savings.
- If the Program is implemented again in the future, ComEd should base its ex-ante savings values on measure counts in the tracking file and parameter values and algorithms found in the TRM.

### 3.9 Elementary Energy Education

The Elementary Energy Education (EEE) program is jointly offered by Nicor Gas and ComEd. The EEE program’s primary focus is to produce natural gas and electricity savings in the residential sector by motivating 5<sup>th</sup> grade students and their families to reduce energy consumption for water heating and lighting in their home. Additionally, the EEE program aims to increase participation in other Nicor Gas and ComEd programs via cross-marketing and increased customer awareness of energy efficiency issues. This program is offered to schools in a service territory served by Nicor Gas and an electricity delivery provider other than ComEd (Nicor Gas only) and to schools in a service territory served by both Nicor Gas and ComEd (“Joint” refers to Utilities Joint Service Territory). Table 3-22 and Table 3-22 summarize the verified natural gas and electricity savings from the EEE program. Verified gross savings were calculated using the Illinois TRM Version 1.0<sup>17</sup> algorithms and parameters.

<sup>14</sup> ComEd used a NTG ratio of 0.60 to calculate ex-ante net savings (ComEd PY5 NTG Comparisons with SAG.xls).

<sup>15</sup> ComEd PY5 FINAL Cost\_kWh.pdf, received from ComEd October 10, 2013.

<sup>16</sup> A deemed value based on the SAG consensus process.

<sup>17</sup> State of Illinois Energy Efficiency Technical Reference Manual. Final as of September 14, 2012, effective June 1, 2012. [http://ilsagfiles.org/SAG\\_files/Technical\\_Reference\\_Manual/Illinois\\_Statewide\\_TRM\\_Version\\_1.0.pdf](http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Illinois_Statewide_TRM_Version_1.0.pdf)

**Table 3-22 EEE EPY5 Electric Savings (Joint\*)**

Program Result	Energy Savings (MWh)	Peak Demand (MW)
Ex Ante Gross Savings	2,130	NA
Verified Gross Realization Rate	1.38‡	NA
Verified Gross Savings	2,942	0.19
Net to gross ratio (NTGR) †	0.76	0.76
Verified Net Savings	2,236	0.15

Source: Utility tracking data and Navigant analysis.

\*Nicor Gas only participant electric savings are not included here, but included in the benefit-cost analysis

† NTGR is a deemed value. Document provided by ComEd to the SAG summarizing the SAG-approved NTGR for ComEd for EPY5-EPY6 as agreed to through a consensus process in March-August 2013. ComEd PY5-PY6 Proposal Comparisons with SAG.xls, which is to be found on the Illinois SAG web site at <http://ilsag.info>.

‡ Based on evaluation research findings.

Table 3-23, below, shows verified gross savings by measure type for the Joint program.

**Table 3-23. EEE EPY5/GPY2 Joint Verified Gross Impact Savings Estimates by Measure Type**

Savings Type	Research Category	Ex Ante Gross Savings	Verified Gross Realization Rate ‡	Verified Gross Savings	NTGR †	Verified Net Savings
kWh	Showerheads	554,238	2.10	1,166,124	0.76	886,254
	Kitchen Aerators	96,187	0.94	90,075	0.76	68,457
	Bathroom Aerators	82,250	1.31	108,090	0.76	82,149
	CFLs	1,397,160	1.13	1,577,818	0.76	1,199,142
	<b>Total</b>	<b>2,129,834</b>	<b>1.38</b>	<b>2,942,108</b>		<b>2,236,002</b>
kW	Showerheads	NA	NA	41.4	0.76	31.4
	Kitchen Aerators	NA	NA	6.4	0.76	4.9
	Bathroom Aerators	NA	NA	6.4	0.76	4.9
	CFLs	NA	NA	139.9	0.76	106.3
	<b>Total</b>			<b>194.1</b>		<b>147.5</b>

Source: Evaluation Team analysis.

† A deemed value based on the SAG consensus process.

‡ Based on evaluation research findings.

A future evaluation risk for the program is the in-service rate (ISR) for the program measures. Currently, the Illinois TRM Version 1.0 requires this program to use ISRs that were developed for direct install programs and that are almost two times the ISRs that Navigant found in our primary research in EPY4/GPY1 and in the program’s Household Report Cards (HRC) data for EPY5/GPY2. For EPY6/GPY3, Navigant will use the Illinois TRM Version 2.0 which states that ISRs for measures distributed through efficiency kits can be determined through evaluation. These ISRs will likely be closer to the ISRs we found in our primary research in GPY1/EPY4.

The following provides insight into key program recommendations.

## Tracking System Review

- Rather than hard-coding the values in the tracking system for EPY6/GPY3, the program implementer, National Energy Foundation (NEF), should document and incorporate the algorithms and assumptions for the savings so they can be verified.
- The program should calculate savings for single family homes separately from multi-family homes in EPY6//GPY3 tracking system for water heating measures.

## Review Process

- As these improvements may increase actual ISRs, the program should consider conducting research periodically on ISRs of the top-saving measures by, for example, surveying students in randomly selected classes in early spring to capture persistence.

## 3.10 Business Standard

ComEd offers standard incentives (rebates) for common energy efficiency measures under the ComEd Smart Ideas for Your Business® Standard (Standard) program to facilitate the implementation of cost-effective energy efficiency improvements for non-residential (commercial and industrial) customers. The Standard program is available to all eligible, nonpublic, commercial and industrial customers in ComEd's service territory. KEMA Services Inc. is the program implementation contractor, responsible for day-to-day operations of the program. Eligible projects must involve new equipment installed at an existing facility that results in a permanent reduction in electrical energy usage (kWh). 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. The EPY5 evaluation for the Standard program continued the gross impact, net impact, and process evaluation activities that were conducted from EPY1 through EPY4, with adjustments to reflect changes to program elements and evaluation requirements that came into effect in EPY5. These changes include ComEd's comprehensive restructuring of business program delivery strategy in EPY5 that necessitates process evaluation to expand beyond program-specific research to include cross cutting issues.

The EPY5 gross impact evaluation approach reflects the partial reliance on the State of Illinois Energy Efficiency Technical Reference Manual (Illinois TRM) for deemed gross savings of some program measures, and the need to conduct evaluation research to estimate gross impacts for non-deemed measures. Navigant assigned projects into lighting and non-lighting end-use categories for sampling, analysis and reporting. Verified net energy and demand (coincident peak) savings were calculated by multiplying the Verified Gross Savings estimates by a net-to-gross ratio (NTGR). In PY5, the NTGR estimates used to calculate the Net Verified Savings were based on past evaluation research (EPY3) and defined through a consensus process through SAG.<sup>18</sup>

Table 3-24 summarizes the electric savings from the Standard program.

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<sup>18</sup> Document provided by ComEd to the SAG summarizing the SAG-approved NTGR for ComEd for EPY5-EPY6 as agreed to through a consensus process in March-August 2013. ComEd PY5-PY6 Proposal Comparisons with SAG.xls, which is to be found on the Illinois SAG web site at <http://ilsag.info>.

**Table 3-24 Standard EPY5 Total Program Electric Savings**

Savings Category	Energy Savings (MWh)	Total Demand Savings (MW)
Ex Ante Gross Savings	262,295	42.2
Realization Rate	1.00	1.00
Verified Gross Savings	261,525	42.1
Net to gross ratio (NTGR)	0.71	0.72
Verified Net Savings	186,433	30.4

Source: Utility tracking data (August 2, 2013) and Navigant analysis.

Table 3-25 below summarizes program savings by end-use category assigned by Navigant to each project, based on the predominant energy savings measure types. If project energy savings were entirely or more than half lighting, it was defined as a “Lighting” project. All other projects were defined as “Non-lighting” in the evaluation. Sample sizes for verifying gross realization rates provided a 90/3 (energy) and 90/9 (peak demand) level of confidence and relative precision for lighting projects, and 90/8 (energy) and 90/15 (peak demand) for non-lighting projects. When lighting and non-lighting results are combined for the program total, the levels of confidence and relative precision are 90/3 (energy) and 90/8 (peak demand).

**Table 3-25. Standard EPY5 Program Savings Results by End-Use Category**

Savings Category	Lighting End-use	Non-Lighting End-use	Overall Program
<b>Energy Savings (MWh)</b>			
Ex Ante Gross Savings	197,993	64,302	262,295
Ex Ante Gross Savings (%)	75%	25%	100%
Verified Gross Realization Rate	1.02‡	0.92‡	1.00‡
Verified Gross Savings	202,396	59,128	261,525
Net to Gross Ratio (NTGR)	0.74†	0.62†	0.71†
Verified Net Savings	149,773	36,660	186,433
Verified Net Savings (%)	80%	20%	100%
<b>Coincident Peak Demand Savings (MW)</b>			
Ex Ante Gross Savings	29.0	13.2	42.2
Ex Ante Gross Savings (%)	69%	31%	100%
Verified Gross Realization Rate	1.21‡	0.53‡	1.00‡
Verified Gross Savings	35.2	7.0	42.1
Net to Gross Ratio (NTGR)	0.74†	0.62†	0.72†
Verified Net Savings	26.0	4.3	30.4
Verified Net Savings (%)	86%	14%	100%

Source: Utility tracking data (August 2, 2013) and Navigant analysis.

‡ Realization rate is based on EPY5 evaluation research findings. Reported program gross savings results have been rounded.

† NTGR is a deemed value. Document provided by ComEd to the SAG summarizing the SAG-approved NTGR for ComEd for EPY5-EPY6 as agreed to through a consensus process in March-August 2013.



The following provides insight into recommendations.

## **Program Participation**

- To maintain or grow the Standard program as the T12 market phases out, ComEd should continue to pursue the strategy of targeting marketing efforts to specific measures, channels, and messages. ComEd should consider ongoing assessment of program results and trends on an end-use basis, potentially even at the measure level for key measures, to determine which are underperforming against savings potential and which are growing.

## **Gross Realization Rates**

- The measure level findings identified in the evaluation report merit follow-up by ComEd and the Illinois TRM process. ComEd may want to consider adding an additional testing process after each update to the tracking system.
- Deemed and non-deemed non-lighting measures should be the emphasis for improving ex ante savings estimates. Among non-deemed measures, energy management control systems are the highest priority for further research. The Illinois TRM needs revisions to the Guest Room Energy Management measure, which has an error in the example calculation for peak demand savings, and evaluation research suggests the Illinois TRM may be overstating energy savings.
- ComEd should consider enhancing the pre- and post-installation verification approach on large chiller and variable speed drive projects to ensure eligibility.

## **Net-to-Gross estimates**

- The EPY5 research findings for NTGR ratios for lighting (0.79, with spillover added) and non-lighting (0.75 with spillover) should be considered for future deeming. The non-lighting NTGR ratios estimated prior to EPY5 were not significant at the 90/10 level.

## **Program Participation and Marketing.**

- Program staff should coordinate closely with other Smart Ideas for Your Business Program elements, such as Business Instant Lighting Discounts (BILD), Custom, Small Business Energy Services, Industrial Systems, and others that are relevant to the targeted market areas to review individual measures and channels that may be more effectively delivered through the Standard program.

## **3.11 Business Custom**

The Business Custom (Custom) program provides a custom incentive, based on a formula, 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, provided the project meets all program eligibility requirements. Note that the EPY5 Data Centers Efficiency program was also evaluated as part of the Custom program evaluation. The new Data Centers Efficiency program provides incentives for installing energy efficiency measures in both new and existing data centers. Both the Custom program and the Data Centers efficiency program pay an incentive of \$0.07/kWh saved for eligible projects. The Custom program also provides an early commitment incentive option to the customers. The early commitment option provides incentive funding certainty once an application is approved. To qualify for this option, projects must reduce energy consumption by a minimum of 500 MWh. For qualifying early commitment projects, the program pays an incentive of \$0.06/kWh saved. Incentives cannot exceed 50% of the total project cost and 100% of the incremental project cost.



Table 3-26 summarizes the electricity savings from the Custom program.

**Table 3-26 Custom EPY5 Total Program Electric Savings**

Savings Category	Energy Savings (MWh)	Peak Demand Savings (MW)
Ex Ante Gross Savings	57,307	4.35
Realization Rate	0.89	1.39
Verified Gross Savings	51,072	6.06
Net to gross ratio (NTGR)	0.56	0.46
Verified Net Savings	28,600	2.79

Source: Utility tracking data and Navigant analysis.

A total of 148 projects were completed in EPY5. Out of the 148 tracking records, 137 were custom and 11 were data center tracking records. The evaluation results yielded an energy gross realization rate of 0.89 and a peak demand gross realization rate of 1.39 based on the gross impact sample size of 20 projects in EPY5, The relative precision for the gross impact results at one-tailed 90% confidence level is  $\pm 6\%$  for the MWh Realization Rate and  $\pm 39\%$  for the MW Realization Rate. The primary factor that contributed to the relatively low precision for MW Realization Rate is that only 15 projects from the total of 20 sampled projects reported non-zero ex ante MW savings estimates, resulting in less sample-based coverage for the demand realization rate. Additionally, the wide range of EPY5 project gross MW realization rates that varied from 0 to 17.27 also affected the precision around the peak demand results.

For EPY5, the evaluation verified NTGR of 0.56 for energy savings is a deemed value derived from EPY3 evaluation results as defined through a consensus process through SAG.

The following provides insight into key program recommendations:

#### **Demand Savings Estimates**

- The program should calculate peak MW savings for all projects and ensure that the estimated savings meet PJM peak demand calculation requirements. Program peak MW savings calculations should be based on the actual verified site specific operating conditions of the installed measure to ensure greater accuracy of the estimate.
- Program calculations should not report low peak MW savings using a conservative calculation method without a strong technical basis. The program should provide a solid technical rationale in support of the conservative calculation method used for estimating peak MW savings.

#### **Improvements to Custom Ex-Ante Savings Calculations**

- Given the large number of lighting projects in the program, it is critical that the methods used by the program for estimating customer self-reported operating hours are thorough. For small lighting projects, where no measurements are performed for estimating operating hours, interviews with multiple facility staff should be conducted to verify customer self-reported operating hours. The source for the estimated lighting operating hours should be clearly reported within each project file.
- The program calculations should ensure the individual air compressor curves or the compressed air system curves used are consistent with operating air compressors and controls. The program should conduct in-depth reviews to verify the accuracy of the savings calculation models. Use

more rigorous quality control methods such as senior engineers performing reality checks to verify reasonability or technical feasibility of the estimated savings to reduce errors in ex ante calculations.

### Improvements to Data Centers Ex-Ante Savings Calculations

- When regression models are being developed the correlation between independent variables and the dependent variable should have an  $R^2$  value better than 0.75, consistent with IPMVP guidelines. Establish the correlation between IT loads and power (MW) usage for savings normalization.

### Program Marketing

- ComEd should continue, if not increase, email marketing to customers as well as outreach to customers through the ComEd account managers.

### Early Commitment Offering

- In addition to increasing general marketing through email and ComEd account managers, as mentioned earlier, ComEd should specifically focus on increasing awareness of the EC offering among both trade allies and customers.

## 3.12 Business Retro-Commissioning

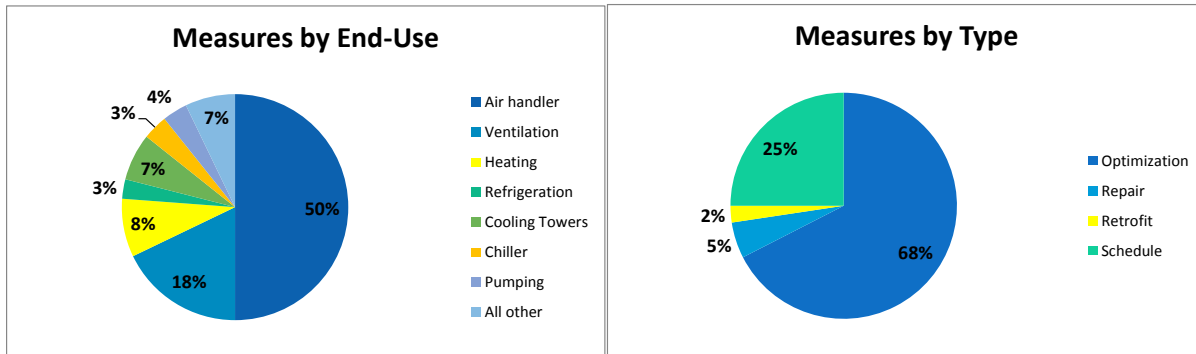
The Business Retro-Commissioning (RCx) program was offered in partnership between ComEd, Nicor Gas, Peoples Gas and North Shore Gas. The program helps commercial and industrial customers improve the performance and reduce energy consumption of their facilities through the systematic evaluation of *existing* 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. The program aims to streamline the typical retro-commissioning process in order to facilitate implementation of projects that yield savings in the program year they are initiated. The program had 46 participants in EPY5/GPY2 and implemented 252 measures.

Changes to the program, introduced in EPY4/GPY1, have increased its scope and market for services. Other changes have facilitated participation and the ability of participants to complete improvements before the end of the program year:

- Program practices successfully incorporated buildings served by district energy plants. Several of these customers participated in the program in EPY5/GPY2.
- Campus aggregation of smaller buildings has increased the number of eligible buildings and completed projects.
- The new database to track project progress has been used to good effect with current projects and has been retro-actively populated with prior program year data to trend program reach and effect over time.

Navigant categorized the data by end-use and type of measure as shown in Figure 3-1. As in previous years, air handler and ventilation measures top the list. Similarly, optimization measures comprise a majority of measures implemented and savings achieved.

**Figure 3-1. RC Distribution of Retro-Commissioning Measures by End-Use and Type**



Source: Utility tracking data and Navigant analysis.

Table 3-27 summarizes the program savings results by utility.

**Table 3-27 RCx EPY5/GPY2 Program Results by Utility**

Savings Category	ComEd MWh	ComEd MW
Ex Ante Gross Savings <sup>19</sup>	26,203	2.818
Verified Gross Realization Rate <sup>‡</sup>	0.946	0.639
Verified Gross Savings	24,788	1.801
Net to gross ratio (NTGR) <sup>†</sup>	0.71	0.71
Verified Net Savings <sup>‡</sup>	17,599	1.279

Source: Utility tracking data and Navigant analysis.

<sup>†</sup> Deemed through the SAG consensus process.

<sup>‡</sup> Based on evaluation research findings. For further explanation on development of the gross realization rate, see the discussion directly below.

\*North Shore Gas was included in the Retrocommissioning Program for EPY5/GPY2, but NSG had no savings.

Research findings gross realization rates are based on engineering review of algorithms used to estimate ex ante savings. Review of a census of projects and measures is cost-prohibitive, thus Navigant developed a sampling plan for projects. The impact sample uses a stratified ratio estimator approach. All of the projects were sorted by magnitude of savings by utility and divided into three strata (large (A), medium (B) and small (C) savers) for each utility. Navigant then randomly sampled within each strata to achieve desired statistical confidence and precision – 90/10 respectively – for each utility. This approach tends to select a near-census of large savers and a balanced number of projects in the medium and small saver strata. Sampling for three utilities independently does not guarantee that a project sampled for one utility will also be sampled for its corresponding utility of the other fuel type. Navigant’s approach was to sample for 90/10 for ComEd and subsequently to sample for the gas utilities.

To estimate evaluated gross and net savings, the evaluation used a variety of parameters in its calculations. A few of those parameters were deemed for this program year and most were examined or adjusted based on evaluation research. NTG ratios (ComEd @ .71 and gas utilities @ 1.02) are the key deemed parameters

<sup>19</sup> From Tracking System

used in the analysis. Gross savings are evaluated each year, and are treated as custom measures (outside of the TRM).

The following provides key program recommendations:

### **Program Savings Goals Attainment**

- Even though the EPY6/GPY3 pipeline of projects appears to be strong for all utilities, except North Shore Gas<sup>20</sup>, goals attainment is very dependent on the number of projects processed by the program. EPY5/GPY2 projects involved two more retro-commissioning service providers (RSPs) than EPY4/GPY1 (11 versus 9), but that still leaves more than 50% of participating RSPs without a completed project. Working with the new RSPs to complete projects and enroll future participants should be a priority for meeting future goals.

### **Gross Realization Rates**

- When measures are covered in the TRM consider using the algorithms there for *ex ante* estimates rather than custom methods to improve consistency of savings values. Consider proposing V-bank filters for deemed savings through the prescriptive program. Base deemed savings on research from pre- and post-installation measurements through retro-commissioning verification processes.

### **Demand Savings Estimates**

- Consider reporting demand savings for measures that generate reliable savings – for example, fixing/changing minimum ventilation rates or turning off loads that were running at peak hours. Establishing clear guidelines for the kind of measures that ComEd would qualify for reporting can reduce the burden on RSPs and the implementation contractor for reviewing measures.
- Consider establishing and enforcing clear methods for estimating demand savings, where it is reliable. Reducing the scope when estimates are required and establishing clear methods will reduce the burden on RSPs to perform the estimates and give participants clear indications when measures will also achieve cost savings from demand reduction.

### **Service Provider Participation**

- Consider focusing marketing and follow-up efforts with new or less active RSPs to help them understand the value proposition for themselves and their customers for participating in the program.

### **Participant Building Operator Certification Training**

- Consider stronger tools for enforcing this program requirement – such as requiring participants to pay for training tuition prior to program completion. The program might collect the tuition in escrow and pay for the training when the participant enrolls.

### **Program Processes**

- Consider closer coordination with controls contractors, either by Nexant or also by utility staff. Closer coordination and more frequent monitoring will ensure that contractors are on track to implement projects successfully. This issue should diminish as retro-commissioning benefits are more widely understood and accepted.

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<sup>20</sup> North Shore Gas has one pipeline project in recent tracking review.

### 3.13 Business New Construction Service

The Business New Construction Service (BNC) program joined the ComEd portfolio of programs in EPY2 to bring about energy savings as well as help bring about changes in knowledge of energy-efficient commercial building practices. In the fall of 2011, this program became jointly offered by ComEd and Nicor Gas. The Energy Center of Wisconsin implements the program for ComEd as a turn-key program. Wisconsin Energy Conservation Corporation administers the program for Nicor Gas.

Prior to EPY5/GPY2, the program offered incentives through three tracks: Systems, Comprehensive, and Small Buildings. In EPY5/GPY2, the program transitioned toward a single performance-based, Comprehensive track model and eliminated the remaining tracks previously offered. The Comprehensive track offers customers with building facilities greater than 20,000 square feet incentives for whole-building electric savings. The change to a single track only affects new projects initiated in EPY5/GPY2 or later. Future program years for electric and gas are likely to see more Comprehensive Track projects and fewer projects from the Systems and Small Buildings Tracks. Since new construction projects typically take longer than one program year to complete, more than half of all projects completed in EPY5/GPY2 were Systems Track projects initiated in past years.

The program had 111 projects in EPY5/GPY2, consisting of 41 ComEd-only projects and 70 projects completed as ComEd and Nicor Gas joint projects.

Table 3-28. summarizes the gross and net electricity and gas savings from the Business New Construction Program by utility.

**Table 3-28. BNC EPY5/GPY2 Program Results by Channel and Measure**

Utility	Metric	Ex Ante Gross Savings	Gross Realization Rate†	Evaluation-Adjusted Gross Savings	NTGR‡	Verified Net Savings
ComEd	MWh	34,929	0.98	34,138	0.65	22,190
	MW	7.2	1.02	7.3	0.65	4.8

Source: Utility tracking data and Navigant analysis.

† Based on a combination of evaluation research findings and deemed values

‡ Deemed through the SAG consensus process.

The following provides insight into key program recommendations:

- Calculating savings according to the program guidelines will result in higher ex ante estimates and realization rates closer to 100% for future projects.
- To address lower gas savings, focus on past participant data mining and also target previously untapped sectors with large gas loads. For example, the large hot water loads in the hospitality and food service sectors may be a potential source of savings.

### 3.14 Industrial Systems Study Program

The Industrial Systems Study (Industrial) program expanded from the study of compressed air systems starting in EPY4. In EPY5, the Industrial program was expanded again to include the study of process cooling systems and industrial refrigeration systems. The Industrial 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 examines the systems' operating characteristics to help identify energy saving measures, using a combination of capital investments and low or no cost measures.

In total, 21 projects were completed in EPY5. Although the program offers studies for process cooling systems and industrial refrigeration systems, only compressed air systems projects were completed in EPY5. This is most likely due to the program's strong momentum with this end-use; the other two end-uses were added in EPY5 and it appears have not gained sufficient momentum.

Table 3-29. summarizes the electricity savings from the EPY5 Industrial Program.

**Table 3-29. Industrial EPY5 Total Program Electric Savings**

Savings Category	Energy Savings (MWh)	Total Demand Savings (MW)
Ex-ante Gross Savings	13,101	1.44
Realization Rate	0.88	0.91
Verified Gross Savings	11,578	1.31
Net to gross ratio (NTGR)	0.67	0.72
Verified Net Savings	7,757	0.94

Source: Utility tracking data and EM&V team analysis.

The energy NTGR used to calculate the verified EPY5 savings is a deemed SAG<sup>21</sup> value derived from EPY4 evaluation results. The EPY5 demand NTGR value is also derived from the EPY4 evaluation results and the evaluation team believes it is a reasonably representative value. The deemed values are 0.67 for energy savings and 0.72 for demand savings.

The following provides insight into key program recommendations:

**Production Data Collection and Analysis**

- The program should strongly consider making production data collection a program requirement. Production data is a critical parameter that impacts savings calculations for industrial systems, gathering production data for each completed project would significantly increase the accuracy of savings estimates.

**Data Collection Activities**

- The program should use power (MW) meters to collect MW measurements using interval metering instrumentation and recording devices. The availability of MW data will reduce uncertainty in metering data-based MW estimation by reducing reliance on assumptions. This will also increase the value of metering resource expenditures, given the improved resulting accuracy and reliability.

<sup>21</sup> Document provided by ComEd to the SAG summarizing the SAG-approved NTGR for ComEd for EPY5-EPY6 as agreed to through a consensus process in March-August 2013. ComEd PY5-PY6 Proposal Comparisons with SAG.xls, which is to be found on the Illinois SAG web site at <http://ilsag.info>.

- The program should consider increasing the metering period to four weeks. This will ensure that more varying conditions are captured and also minimize any loss of data due to compressor breakdown/shutdown and the resulting lack of representativeness of typical operations during the logged period.

**Improvements to Ex-ante Savings Calculations**

- The program should check to make sure actual CFM reduction is consistent with the program estimates. The difference between pre- and post-period CFM should be adjusted to match the demand reduction observed.

**Program Process**

- Customers, service providers, and program staff all mentioned program time requirements as major concerns, this finding indicates that the program may have room to improve to keep customers satisfied, service providers engaged, and the program meeting its participation goals. The changes rolled out in January 2013 appear to be a step in the right direction and hopefully we will see the positive results in next year’s evaluation.

**3.15 Business Instant Lighting Discounts Program (BILD)**

The Business Instant Lighting Discounts (BILD) program provides incentives to increase the market share of energy efficient compact fluorescent lamps (CFL), LEDs, Linear Fluorescents (LF), and High Intensity Discharge (HID) lamps sold to business customers. The program was designed to provide an expedited, simple solution to business customers interested in purchasing efficient lighting by providing instant discounts at the point-of-sale. The program targeted lighting distributors whose customer base is predominantly end-users, as opposed to those distributors who sell mostly to contractors. In EPY5 84 distributors, at 166 unique distributor locations, were enrolled in the program.

Table 3-30 summarizes the electricity savings from the EPY5 BILD program.

**Table 3-30. BILD EPY5 Total Program Electric Savings**

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex Ante Gross Savings	84,977	-	-
Realization Rate	1.46	-	-
Verified Gross Savings	124,093	30.1	27.5
Net to gross ratio (NTGR)	0.74	0.74	0.74
Verified Net Savings	91,829	22.2	20.3

Source: ComEd tracking data and Navigant team analysis.

In addition to the savings resulting from bulbs purchased during EPY5, savings from bulbs purchased during the previous two program years, but not installed until EPY5 (carryover savings), can be attributed to the EPY5 program.<sup>22</sup> Table 3-31 below provides an estimate of EPY5 Carryover bulb savings.

<sup>22</sup> For the EPY5 BILD program carryover bulbs came only from EPY4 since EPY3 was a pilot program year and all bulbs sold were assumed to have been installed in EPY3.



**Table 3-31. BILD EPY5 Total Program Electric Savings from Carryover**

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex Ante Gross Savings	18,990	4.0	3.2
Realization Rate	0.68	0.81	0.81
Verified Gross Savings	12,850	3.1	2.6
Net to gross ratio (NTGR)	0.63	0.62	0.62
Verified Net Savings †	8,043	1.9	1.6

Source: ComEd tracking data and Navigant team analysis.

† The NTG ratio was deemed through the SAG consensus process.

Table 3-32 summarizes the electricity savings from the EPY5 BILD Program by bulb type.

**Table 3-32. BILD EPY5 Program Results by Bulb Type<sup>23</sup>**

Savings Category	Stan. CFLs	Spec. CFLs	LED Bulbs	LED Fixtures	Linear FLs	HID Bulbs	Total
Ex Ante Gross Savings <sup>24</sup> (MWh)	n/a <sup>25</sup>	n/a	n/a	n/a	n/a	n/a	84,977
Verified Gross Realization Rate†	n/a	n/a	n/a	n/a	n/a	n/a	146%
Verified Gross Savings (MWh)	32,522	39,163	38,356	2,005	11,065	983	124,093
Net-to-gross ratio (NTGR)†	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Verified Net Savings (MWh)	24,066	28,981	28,383	1,484	8,188	728	91,829

Source: ComEd tracking data and Navigant team analysis.

† The NTG ratio was deemed through the SAG consensus process.

Table 3-33 summarizes estimates of impact parameters for the EPY5 BILD program that could be used for future evaluations.

<sup>23</sup> Excludes carryover savings.

<sup>24</sup> Ex Ante Gross Savings were not included in the tracking data. Ex Ante Gross Savings were based on estimates provided via email from Dave Nichols of ComEd on 8/30/2013.

<sup>25</sup> The evaluation calculated the Ex Ante Gross Savings by dividing the Ex Ante Net Savings provided by ComEd by the NTGR. The Gross Savings estimates included in the program tracking data were not consistent with the final Ex Ante estimates or the NTGR estimates provided by ComEd.



**Table 3-33. BILD Impact Estimate Parameters for Future Use**

Parameter	Value	Data Source
Res/NonRes Split <sup>26</sup> by Bulb Type	CFLs/LEDs - 7%/ 93% Fixture/LF/HID – 1%/ 99%	Up to 3-year rolling average of Evaluation Research estimates (currently EPY4 and EPY5 for CFLs/LEDs and EPY5 only for others)
Installation Rates by Bulb Type	CFLs - 75% LEDs/HID - 91% Linear FL - 96%	Up to 3-year rolling average of Evaluation Research estimates (currently EPY4 and EPY5 for CFLs and EPY5 only for others)
NTGR by Bulb Type	CFLs - 0.64 LEDs/HID - 0.70 Linear FL - 0.56	Up to 3-year rolling average of Evaluation Research estimates (currently EPY4 and EPY5 for CFLs and EPY5 only for others)

Source: Navigant team analysis.

At this time it is not possible to estimate what the statewide deemed Res/NonRes split would be for Version 3.0 due to the lack of Ameren IL data; however, Table 3-34 below provides two years of ComEd evaluation research results for CFLs and LEDs and one year of ComEd evaluation research results for Fixtures, Linear Fluorescents, and HID bulbs which can be used to come up with a statewide estimate.

**Table 3-34. BILD Recommended Residential/Nonresidential Split for ComEd**

Evaluation Program Year	CFLs/LEDs		Fixtures/LF/HID	
	N	Res/NonRes Rate	N	Res/NonRes Rate
EPY4	575,252	6% / 94%	n/a	n/a
EPY5	799,871	8% / 92%	515,948	1% / 99%
2-year Weighted Res/NonRes Split for EPY7		<b>7% / 93%</b>		<b>1% / 99%</b>

Source: Navigant team analysis.

The following points are key recommendations from the PY5 BILD evaluation:

**Recommended Changes to Deemed Parameter Estimates**

- Update the Res/NonRes split (included in TRM v2.0) annually using a 3-year<sup>27</sup> rolling average of Evaluation Research estimates,
- Update the deemed installation rates for BILD program bulbs annually based on a rolling 3-year average<sup>28</sup> from the most recent BILD evaluation research findings,
- Update the NTGR (determined currently through a Statewide Advisory Group consensus process) using a weighted rolling 3-year average<sup>29</sup> of the evaluation based NTGR estimate.

**Tracking Data Recommendations**

- Continued improvements to tracking data, such as including measure level ex ante savings estimates, customer phone number and business type, specialty and reflector bulb type, and flags

<sup>26</sup> Residential/Nonresidential (Res/NonRes)

<sup>27</sup> Up to 3-years based on the availability of relevant data from prior program cycles.

<sup>28</sup> Average of most recently available evaluation data, up to 3 years.

<sup>29</sup> Average of most recently available evaluation data, up to 3 years.

indicating bulb dimmability, will improve the accuracy of reported results and allow for realization rates to be estimated by bulb type.

#### **Program Costs**

- Program planners should continue to carefully examine the effects of including additional bulb types on all impact parameters and balance these effects against incentive dollar allocation to manage the portfolio cost effectiveness targets in future program years.

#### **Distributor Satisfaction and Barriers to Participation**

- The evaluation team recommends that ComEd develop the list of qualifying products for each program year as soon as possible.

#### **Program Marketing and Barriers to Efficient Lighting Purchase**

- The evaluation team recommends that ComEd provide additional training for distributors that emphasizes how to effectively market the program to customers using the program materials and the discounts available for qualified products. ComEd is encouraged to consider expanding the marketing materials to include comparisons between standard and high efficiency bulbs for each category of bulb sold through the program to help distributors better promote the options available.

#### **Bonus Program Results**

- The evaluation team cautions ComEd if a bonus program is offered in future program years, the targeted energy savings should be set much higher and should be based on historical monthly bulb sales estimates to avoid needlessly paying additional incentive payments to distributors whose sales were likely to rise on their own.

#### **NTGR for Linear Fluorescent Bulbs**

- If linear fluorescent bulbs do not meet program cost effectiveness requirements with lower NTGR estimates, ComEd should consider focusing the BILD program more on emerging LED technologies which have higher NTGR estimates, and move the Linear FL program away from an incentive program to more of an educational program focused on the energy and monetary savings (and low payback period on investment) resulting from high efficiency T8 purchases in the absence of incentives.

### **3.16 Small Business Energy Services (SBES)**

The Small Business Energy Services (SBES) program was in its second year of operation in EPY5/GPY2. The SBES program is jointly implemented with ComEd, Nicor Gas, and Peoples Gas and North Shore Gas. The implementation contractors were Nexant Inc., which delivered the Program to customers of both ComEd and Nicor Gas in Nicor Gas's service territory, and Franklin Energy Services, which delivered the program to customers served by ComEd and Peoples Gas or North Shore Gas. The Program is designed to assist non-residential customers<sup>30</sup> in lowering their energy usage and energy bills by educating them about electric and natural gas savings opportunities through on-site assessments.

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<sup>30</sup> To qualify for the SBES program, customers must be active Commercial and Industrial (C&I) customers of ComEd with peak demand of less than 100 kW, and Nicor or Peoples Gas/North Shore Gas customers who use less than 60,000 therms per year.

Key changes during this program year included a ComEd-led geographically-focused marketing pilot program (“geo-marketing pilot”), and a steam trap replacement/repair special (“steam trap special”) offered by Nicor Gas to dry cleaners in parts of its service territory.<sup>31</sup>

The SBES Program had 1,881 unique electric projects in EPY5/GPY2, of which 302 were implemented through the geo-marketing pilot program. The program distributed 1,245 direct-install electric measures and 189,563 contractor-installed electric measures (including 13,195 measures through the geo-marketing pilot program), for a total of 190,808 electric measures. Savings per contractor-installed project were similar in the core program and the geo-marketing pilot. Table 3-35. summarizes electric savings from the ComEd EPY5/GPY2 SBES program. Navigant verified net savings of 33,573 MWh, as well as 5.7 MW of net coincident peak demand savings.

**Table 3-35. ComEd SBES EPY5/GPY2 Program Electric Savings**

Savings Category	Energy Savings (MWh)	Coincident Peak Demand Savings (MW)	Non-Coincident Peak Demand Savings (MW)
Ex-Ante Gross Savings	37,329	6.58	6.58
Ex-Ante NTGR	0.85	0.85	0.85
Ex-Ante Net Savings <sup>32</sup>	31,730	5.39	5.59
Verified Gross Realization Rate	1.00	0.96	1.00
Verified Gross Savings	37,303	6.33	6.57
NTGR †	0.90	0.90	0.90
Verified Net Savings	33,573	5.71	5.92

Source: Frontier EPY5 tracking system data, Navigant analysis.

† The NTG ratio of 0.90 was deemed through the SAG consensus process

In EPY5/GPY2, the SBES program achieved 377 percent of its targeted electric savings of 8,900 MWh.

This following are key program recommendations.

#### Program Savings Goals Attainment

- The program should expand the geo-marketing pilot program to other communities in its service territory.
- The Program should continue the steam trap special and expand it to other parts of Nicor Gas/PGL/NSG’s service territories and other venues with boilers (e.g., apartment buildings).

#### Gross Realization Rates

- The program should revise the tracking system unit savings values for EC motors to conform with the C&I Standard program.
- The program should monitor steam trap applications to ensure that trade allies or contractors are inspecting traps before replacement, and document this information in the tracking system. When

<sup>31</sup> Peoples Gas also had an initiative promoting dry cleaner steam trap replacements in GPY2. However, they did not want it separately evaluated for this program year.

<sup>32</sup> ComEd’s ex-ante net is based on a 0.85 net-to-gross ratio (source: ComEd PY5-PY6 Proposal Comparisons with SAG.xls, received from ComEd Oct. 10, 2013).

multiple trap replacements are performed with less than complete audit coverage, the percentage of traps inspected should also be indicated.

#### **Pilot Program Recommendations**

- The program should extend the pilot to other small and mid-sized communities in ComEd’s service territory, and think creatively about adapting the geo-marketing delivery model to other settings where feasible.
- The program should seek out other opportunities to improve gas savings by identifying measures or market segments with significant savings potential and partnering with trade or community groups to promote uptake.

#### **Trade Ally and Other Participation.**

- The program should give pilot program trade allies more notice before starting the pilot program in each targeted community.

### **3.17 Commercial and Retail Internet Protocol Thermostat and Controller Program**

The third-party program Commercial and Retail Internet Protocol Thermostat and Controller Program (Dent on Energy Program) targets small to mid-size office buildings, churches and retail stores (100 kW– 400 kW) as well as local Heating Ventilation and Air Conditioning (HVAC) contractors and Building Automation System (BAS) contractors. The energy savings target for EPY5 was 10,000 MWh. For the contractors, the Dent on Energy Program provides marketing and technical training, devices (kits) and monitoring. RLD, the implementation contractor for this program, administers incentives to the contractors for installing IP thermostat kits. An incentive of \$0.04/kWh with savings up to \$500 is offered for participation in the program. For EPY5, the implementation contractor, RLD Resources hired one specific contractor (HVAC Direct) to perform the installations due to insufficient interest from HVAC and BAS contractors.

For EPY5, Navigant received and reviewed ex ante gross energy savings estimates from fourteen facilities that had received IP Thermostats through the Dent on Energy Program. *Navigant was unable to obtain the necessary clarifications from the implementation contractor to verify the gross energy savings.* In concurrence with ComEd, Navigant is not reporting ex ante or ex post savings for the Dent on Energy for EPY5, and will review the implementation contractor’s approach for EPY5 in EPY6 and if feasible, report EPY5 savings at that time.

The program had 14 participant facilities in PY5 and distributed 14 IP Thermostats. For EPY5, a protocol was not available to calculate energy savings, however participant interviews were conducted and a NTGR estimate of 1.0 was produced. Free ridership and spillover were both estimated to be zero. Navigant will attempt to produce verified savings for EPY5 in EPY6.

The following provides insight into key program recommendations:

#### **Program Savings Goals Attainment**

- Include the logo on a consistent basis in all Dent on Energy marketing materials and Web site to eliminate all market confusion as to which company is sponsoring the program.
- Provide contact information to facility managers for follow-up questions as well as conduct follow-up phone calls post-installation to ensure that IP Thermostat continues to operate in a manner that provides both energy efficiency and comfort.
- Consider developing an approach that would allow for more than one IP thermostat installed per facility based on energy savings potential analysis from additional IP thermostat(s).

**Process Goals**

- In EPY6, establish the approach to calculating ex ante gross savings early in the program year.
- In EPY6, provide Navigant with sufficient program materials to conduct verification, due diligence and tracking system review and recommendations.

**3.18 C3-CUB Energy Saver Program**

The C3-CUB Energy Saver program (hereafter called “C3-CUB program”) is a web-based, opt-in program, introduced in June 2010, designed to generate energy savings by providing residential customers with information about their energy savings, tips on how to reduce energy consumption, and reward points for saving energy that can be redeemed at local retailers. Each month participants receive emails indicating the amount of energy they saved and the reward points earned. Reward points are strictly positive; if savings are negative, reward points are not deducted from the customer’s “Rewards Account”. An independent analysis of the program savings for the first year and a half of the program (June 2010-December 2011) estimated average annual savings of 4.4% prior to becoming a program in ComEd’s portfolio.<sup>33</sup>

In EPY5, there were a total of 5,913 customers enrolled at the start of the program year and 6,656 customers enrolled at the end of the program year. An important aspect of the program in EPY5 was a marketing campaign designed as a randomized controlled trial (RCT) involving 115,000 targeted treatment households and 63,151 targeted control households, with the treatment households receiving a single mailer encouraging energy savings and participation in the program.

Total program verified net savings was 2,914 MWh. The average percent savings per enrolled customer in PY5 is 3.81% (Standard Error = 0.59%) which is an average savings of 360 kWh per customer.

The analysis assumes that on average late enrollees in the program are the same as early enrollees on average with respect to unobserved variables that may affect program savings. This implies that the estimate of savings from the analysis is net savings. Table 3-36. summarizes the electricity savings from the C3-CUB program.

**Table 3-36. C3-CUB EPY5 Total Program Electric Savings**

Savings Category †	Energy Savings (MWh)
Verified Net Savings Prior to Uplift Adjustment †	2,916
Verified Net Savings	2,914

Source: ComEd billing data, C3 implementation data, and Navigant analysis.

†The uplift adjustment reflects savings that are jointly produced by the C3-CUB program and other EE programs.

The program appears to generate savings, with the key findings that:

- Average percent savings per enrolled customer in EPY5 is 3.81% (Standard Error = 0.59%). This is an average savings of 360 kWh per customer (SE=56); and
- Total program savings in EPY5 is 2,914 MWh (SE=449 MWh).

<sup>33</sup> Harding, M. and A. Hsiaw. Goal Setting and Energy Conservation. July 2013. Available at: [http://www.stanford.edu/~mch/resources/Harding\\_Goals.pdf](http://www.stanford.edu/~mch/resources/Harding_Goals.pdf).

The program appears to be performing well – the following are the key recommendations:

- Given the relatively high savings per participant compared to other behavioral programs, and the presumably low cost of running the program, attempts to increase enrollment should be considered, though only if such attempts also address the recommendation below.
- In the future the program should take proactive steps to investigate the issue of selection bias. For instance, a brief questionnaire to discern selection bias could be developed and administered to new enrollees upon enrollment. Navigant can assist in the development of the questionnaire.

### 3.19 C&I Behavioral

The C&I Behavioral (CIB) program provides C&I participants with an introductory mailer that explains the program and asks the customer to log into the web user interface (UI). Participants receive monthly mailers that provide updates on usage and a recommendation for energy savings and a repeated offer to use the web UI. The vast majority of C&I customers in the program consume between 10 kW and 1,000 kW per year. Assignment of customers to treatment and control groups was done using a randomized controlled trial (RCT). A total of 3,008 customers were allocated to the treatment group, and 2,999 were allocated to the control group. The allocation of customers for each business type in the program is presented in Table 1. Implementation began in September 2012, with customers receiving their first mailer in September, October, or November 2012. For each treatment customer, program measurement began in the month following the month the customer received the first mailer.

**Table 3-37. C&I Behavioral Sample sizes for control and treatment groups, by business type**

Business Type	Treatment (Sample)	Control (Sample)
Education	0	1
Food Sales	310	309
Food Service	411	409
Inpatient Health Care	1	0
Lodging	332	333
Non-refrigerated Warehouse	17	12
Office	828	831
Other	23	21
Public Assembly	9	9
Religious Worship	232	232
Retail Other Than Mall	543	547
Service	39	38
Strip Shopping Mall	105	105
Unknown	158	152
<b>Total</b>	<b>3008</b>	<b>2999</b>

Estimates of program savings are derived via two models: a post-program regression (PPR) model and a linear fixed effects regression (LFER) model. Both models are known to generate unbiased estimates of



program savings in a randomized controlled trial (RCT), though their estimates are not necessarily the same for a particular sample.<sup>34</sup>

We estimated these models using all participant and control customers together and by business type. Estimates of kWh savings are presented in Table 3-38. The table presents estimates of average daily kWh savings for the PPR and LFER models, as well as the estimates presented in the PY5 evaluation report, which covered the period through PY5 (May 2013). The table also presents aggregate savings since the start of the program, and 90% confidence levels on aggregate savings, based on the PPR model. Several results deserve emphasis:

- Through December 2013, the program did not generate statistically measurable savings, and in fact the model estimate of savings is negative, though the 90% confidence bound on this estimate is so large that it is more reasonable to conclude savings are zero.
- Only for one building type, Public Assembly, are savings positive and statistically significant, but this based on only nine treatment customers. Moreover, for one building type, Non-refrigerated Warehouse, savings are negative and statistically significant, though based on only 17 treatment customers. The best conclusion to be drawn is that for no building type is it reasonable to conclude that savings are different than zero.

**Table 3-38. C&I Behavioral Estimated program energy savings, through December 2013**

Business Type	Sample (treatment customers)	PPR Model: kWh savings per customer per day†	LFER Model: kWh savings per customer per day†	kWh savings per customer per day, PY5 (PPR Model)†	Program savings to end of 2013 (MWh)†‡	90% confidence interval on savings through the end of 2013 (MWh)		Percent Savings
						Low	High	
Food Sales	310	-83.16	-70.83	-62.15	-11,755	-27,240	3,730	-1.61%
Food Service	411	0.76	-3.54	2.88	143	-3,186	3,473	0.05%
Lodging	332	8.78	-1.53	36.74	1,329	-6,203	8,860	0.31%
Nonrefrigerated Warehouse	17	-148.19	-146.03	-154.81	-1,149	-2,069	-229	-5.51%
Office	828	-6.85	-7.17	-8.67	-2,586	-17,343	12,172	-0.25%
Other	23	298.63	218.58	123.98	3,132	-6,947	13,211	5.87%
Public Assembly	9	114.03	169.07	92.68	468	33	903	4.32%
Religious Worship	232	3.31	7.60	10.8	350	-2,046	2,746	0.30%
Retail Other Than Mall	543	-6.27	-13.63	42.47	-1,551	-13,157	10,055	-0.19%
Service	39	20.18	23.14	13.91	359	-631	1,349	1.11%
Strip Shopping Mall	105	3.40	21.15	6.41	163	-2,835	3,161	0.16%
Unknown	158	45.57	42.25	11.84	3,283	-1,745	8,311	1.61%
<b>Overall</b>	<b>3007</b>	<b>-6.02</b>	<b>-6.42</b>	<b>6.05</b>	<b>-8,259</b>	<b>-36,381</b>	<b>19,863</b>	<b>-0.21%</b>

† Negative values indicate negative savings

‡ Program savings are based on the PPR model, and the assumption that average daily savings apply to all customers for the period October 2012-December 2013

Source: Navigant analysis

The program continues to fail to show measurable energy savings. Navigant recommends a survey of customers at the end of PY6. The survey would identify barriers to enrollment in the web UI and provide insights to the low savings effect of the messaging provided in the monthly reports. The survey would address questions such as the following:

<sup>34</sup> State and Local Energy Efficiency Action Network. 2012. *Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations*. Prepared by A. Todd, E. Stuart, S. Schiller, and C. Goldman, Lawrence Berkeley National Laboratory. <http://behavioranalytics.lbl.gov>.

- Are customers having difficulty accessing the web UI?
- How might the web UI be improved to make it more useful to the customer?
- Are reports getting in the hands of relevant decision makers?
- Do customers have the perception that information provided by the mailed reports is not relevant to their business?



## 4. Evaluation Research Results

Evaluation research results are included in this section. Researched savings reflect evaluation adjustments to savings parameters based upon an evaluator’s best available research – this was done in parallel to deemed verification savings analysis. Parameters that were adjusted vary by program and depend on the specifics of the research that was performed during the evaluation effort. Researched savings were also used to adjust future deemed values (as noted below). Any changes to deemed values were assessed and possibly altered/updated through the SAG Technical Advisory Committee’s process to the Illinois TRM on an annual basis. The following is the Illinois Statewide TRM Policy Manual’s description of how evaluators are to develop research, in addition to verifying savings with the TRM<sup>35</sup>:

**Evaluators** (Evaluation Teams, Independent Consultants) – The Evaluators have primary responsibility pursuant to 220 ILCS 5/8-103(f)(7) and 220 ILCS 5/8-104(f)(8) to provide independent evaluations of the performance of the Utilities’ and DCEO’s energy efficiency portfolios. To support this responsibility in the context of the TRM, Evaluators will use TRM values to perform savings verification for prescriptive measures covered by the TRM, and, where budget allows, conduct measure and program level research to inform future TRM updates. The Evaluators shall collaborate with the Utilities, the SAG TAC, and DCEO to determine appropriate data collection and analysis that supports TRM savings verification updates, where available budget exists, while considering the administrative cost and participant burden associated with such data collection.

Using its newest research findings, the evaluation team estimated that ComEd’s efficiency programs achieved 880,612 net MWh energy savings in the ComEd service territory for PY5 (Table 4-1). This included 756,198 net MWh from funded measures in PY5, plus the verified CFL Carryover savings presented in Section 3.1.<sup>36</sup>

The result of all the individual program reviews based on research findings was a realization rate of 115% and a net-to-gross ratio of 0.66, and an ex-post estimate of 880,612 MWh of net energy savings.<sup>37</sup> Research evaluated savings are documented in Table 4-1 and Table 4-2 following this page.

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<sup>35</sup> Illinois Statewide TRM Policy Manual at page 6.

<sup>36</sup> The ICC addressed deeming lighting values temporarily in its Final Order in ComEd’s energy efficiency Plan 1 docket. See, ICC Docket No. 07-0540, Final Order at 42, February 6, 2008.

<sup>37</sup> Ibid.

**Table 4-1. ComEd Portfolio Year 5 Results – Planned and Net Energy Savings – Research**

	Ex-Ante	Ex-Post			
	Gross (MWh)	Realization Rate	Gross (MWh)	NTGR	Net (MWh)
<b>Residential Programs</b>					
Residential Energy Star Lighting	418,865	1.00	417,078	0.54	225,234
Residential Fridge and Freezer	46,763*	0.99	46,095	0.56	25,593
Multifamily HES Joint	13,692	1.00	13,706	0.82	11,285
Single Family HES Joint	1,122	1.00	1,118	0.85	953
Complete Systems Replacement	2,375	1.31	3,109	0.99	3,077
Home Energy Report	N/A	N/A	97,442	1.00	97,442
Clothes Washer	1,283	1.38	1,774	0.68	1,203
Residential New Construction	279	0.90	251	0.80	201
Elementary Energy Education	2,130	1.38	2,942	0.76	2,236
C3-CUB Energy Saver	N/A	N/A	2,914	1.00	2,914
<b>Total Residential</b>	<b>439,746</b>	<b>1.33</b>	<b>586,429</b>	<b>0.63</b>	<b>370,138</b>
<b>Business Programs</b>					
Business Standard	262,295	1.03	270,186	0.73	197,226
Business Custom	57,307	0.89	51,072	0.61	31,301
Retro-Commissioning	26,203	0.95	24,788	0.71	17,599
Industrial Systems	13,101	0.88	11,578	0.67	7,757
New Construction	34,929	0.98	34,138	0.65	22,190
Business Instant Lighting Discount	84,977	1.38	116,935	0.63	76,414
Dent on Energy†	-	-	-	-	-
C&I Behavioral	-	-	-	-	-
Small Business Energy Services	37,329	1.00	37,303	0.90	33,573
<b>Total Commercial</b>	<b>516,140</b>	<b>1.06</b>	<b>546,000</b>	<b>0.71</b>	<b>386,060</b>
<b>Carryover</b>					
Residential Energy Star Lighting	178,757	1.05	187,018	0.62	116,371
Business Instant Lighting Discount	18,990	0.68	12,850	0.63	8,043
<b>Total Carryover</b>	<b>197,747</b>	<b>1.01</b>	<b>199,868</b>	<b>0.62</b>	<b>124,414</b>
<b>Portfolio Total</b>	<b>1,153,633</b>	<b>1.15</b>	<b>1,332,296</b>	<b>0.66</b>	<b>880,612</b>

\* Evaluation team estimate

† In concurrence with ComEd, Navigant is not reporting ex ante or ex post savings from the Dent on Energy Program for EPY5 due to the lack of clarifications necessary from the implementation contractor to verify program savings.

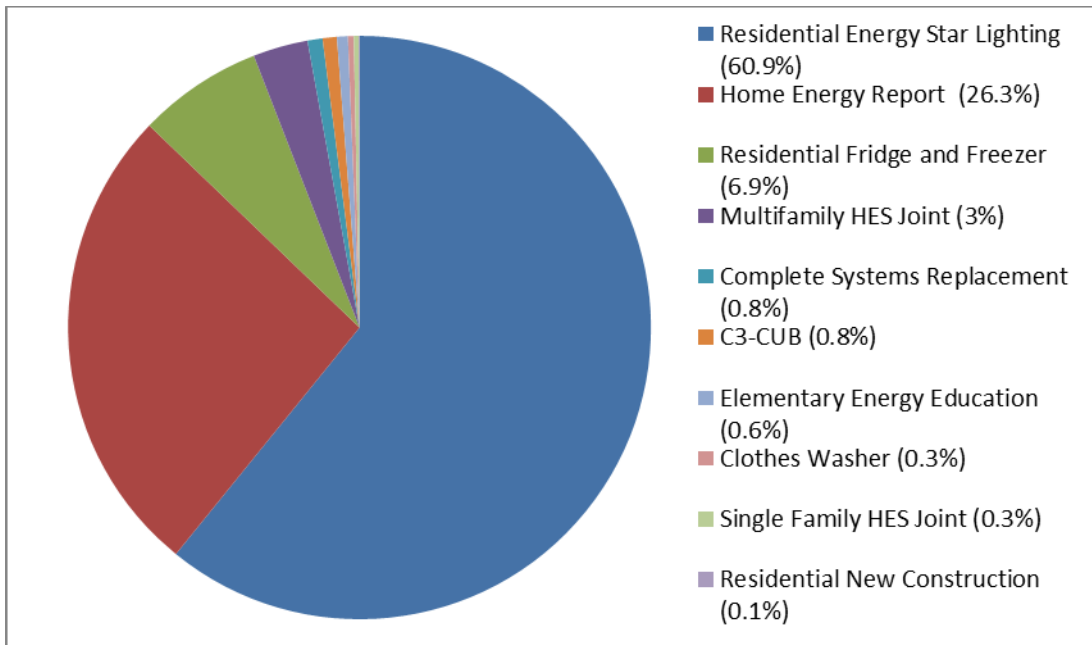
**Table 4-2. ComEd Portfolio Year 5 Results – Researched Net Peak Demand Savings (MW)**

	Ex-Ante	Ex-Post			
	Gross (MW)	Realization Rate	Gross (MW)	NTGR	Net (MW)
<b>Residential</b>					
Residential Energy Star Lighting	-	N/A	44.5	0.54	24.0
Residential Fridge and Freezer	N/A	N/A	6.35	0.56	3.53
Multifamily Joint	0.15	1.00	0.15	0.80	0.12
Single Family HES Joint	-	-	-	-	-
Complete Systems Replacement (CSR)	N/A	N/A	2.29	0.99	2.27
Home Energy Report†	N/A	N/A	N/A	N/A	N/A
Clothes Washer	0.17	1.38	0.23	0.68	0.16
Residential New Construction	N/A	N/A	0.07	0.80	0.05
Elementary Energy Education	N/A	N/A	0.19	0.76	0.15
C3-CUB Energy Saver	N/A	N/A	N/A	N/A	N/A
<b>Total Residential</b>	<b>0.32</b>	<b>170.73</b>	<b>53.78</b>	<b>0.56</b>	<b>30.28</b>
<b>Business</b>					
Business Standard	42.2	1.00	42.4	0.73	31.06
Business Custom	4.35	1.39	6.06	0.54	3.26
Retro-Commissioning	2.82	0.64	1.80	0.71	1.28
Industrial Systems	1.44	0.91	1.31	0.72	0.94
New Construction	7.2	1.01	7.3	0.66	4.8
Business Instant Lighting Discounts	N/A	N/A	25.3	0.66	16.6
Dent on Energy†	-	-	-	-	-
C&I Behavioral	-	-	-	-	-
Small Business Energy Services	6.58	0.96	6.33	0.90	5.71
<b>Total Commercial</b>	<b>64.59</b>	<b>1.40</b>	<b>90.50</b>	<b>0.70</b>	<b>63.64</b>
<b>Carryover</b>					
Residential Energy Star Lighting	-	N/A	20.6	0.62	12.8
Business Instant Lighting Discounts	3.2	0.81	2.6	0.62	1.6
<b>Total Carryover</b>	<b>3.20</b>	<b>7.25</b>	<b>23.20</b>	<b>0.62</b>	<b>14.40</b>
<b>Portfolio Total</b>	<b>68.11</b>	<b>2.46</b>	<b>167.48</b>	<b>0.65</b>	<b>108.32</b>

† In concurrence with ComEd, Navigant is not reporting ex ante or ex post savings from the Dent on Energy Program for EPY5 due to the lack of clarifications necessary from the implementation contractor to verify program savings.

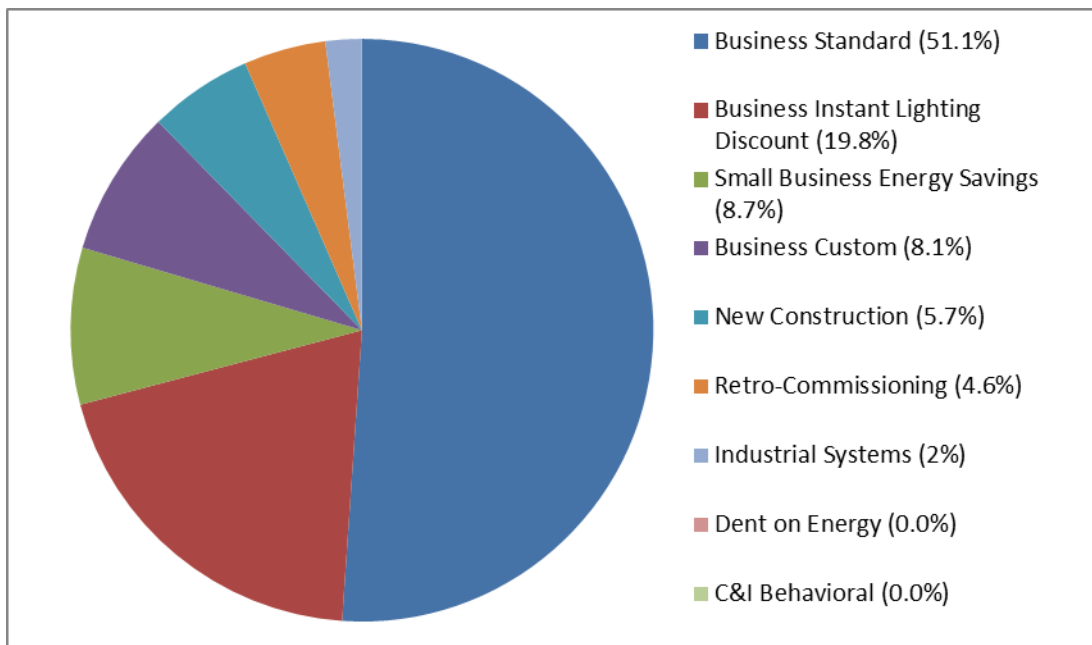
There was very little noticeable difference between verified and research-based program-level savings as a percent of the total. As shown in Figure 4-1, the Residential Lighting program accounted for approximately 61% of residential sector savings (using evaluation research findings). Home Energy Report is the second largest program by savings. Figure 4-2 shows that the Business Standard Program comprised a slightly greater percentage of the overall C&I sector ex-post net energy savings when using research findings NTGR values (51.1%) versus when using the deemed NTGR values (48.1%). The savings from the Business Instant Lighting Discount Program went down by a similar amount.

**Figure 4-1. Residential Ex-Post Net Energy Savings – Evaluation Research Findings**



Source: Evaluation research

**Figure 4-2. C&I Ex-Post Net Energy Savings – Evaluation Research Findings**



Source: Evaluation research

\* Note, Dent on Energy and C&I Behavioral had no savings in PY5

The average weighted research findings NTG ratio for the group of residential programs was 0.63. Individual NTG ratios varied from 0.54 for Residential Lighting Program to 0.99 for the Complete System Replacement Program. The program-specific evaluation data collection efforts were typically designed to produce statistically significant results at the program level. Some evaluation efforts were able to calculate

NTG ratios for specific measure types, as seen in Table 4-3. As a result, the measure-specific NTGR values are not necessarily statistically significant.

**Table 4-3. PY5 Residential Programs Researched Net-to-Gross Ratios**

Program	Research Findings			
	Program NTGR	Free Ridership	Spillover	Measure Level NTGR ‡
Residential ENERGY STAR Lighting	0.54	48%	2%	Standard 0.55 Specialty 0.48
Residential Fridge and Freezer	0.68	32%	0%	Refrigerator 0.56 Freezer 0.53 Room AC 0.50
Multifamily Joint	0.82	NA	NA	CFLs 0.81 Water Efficiency 0.93
Single HES Joint	0.86	15%	1%	See Table 4-4
CSR	0.99	Part.FR 41% TA FR 25%	Part. TA 12% Non P.TA 12%	Not Available
Home Energy Report	NA	NA	NA	NA
Clothes Washer Rebate	0.60	40%	0%	Not Available
Residential New Construction	NA	NA	NA	Not Available
Elementary Energy Education	0.76 for Showerheads, Kitchen Aerators, Bathroom Aerators & CFLs	NA	NA	NA
Total Residential (weighted)	0.63			

Source: SAG spreadsheet and evaluation research

‡Not necessarily statistically significant. For further details on the free ridership and spillover see the methodology chapter in program-specific EM&V reports for methods and the end of the impacts section of the Program Level Results chapter for results.

**Table 4-4. Researched Net-to-Gross Results by Measure for Single Family HES**

	Measure	Free Ridership	FR n=	Spillover	SO n=	NTGR
Direct-Install Measures	9 Watt CFL	0.24	45	0.04	3	0.80
	14 Watt CFL	0.24	45	0.04	3	0.80
	19 Watt CFL	0.24	45	0.04	3	0.80
	23 Watt CFL	0.24	45	0.04	3	0.80
	9 Watt Globe CFL	0.24	45	0.04	3	0.80
	Low Flow Shower Head	0.07	29	0.00	0	0.93
	Kitchen Aerator	0.01*	0	0.00*	0	0.99*
	Bathroom Aerator	0.01	32	0.00	0	0.99
	Hot Water Temperature Setback	0.12	12	0.00	0	0.88
	Pipe Insulation	0.12	28	0.05	2	0.93
	Programmable Thermostat	-	0	-	0	0.90**
	Programmable Thermostat Education	-	0	-	0	0.90**
Retrofit Measures	Attic Insulation	0.21	51	0.02	1	0.81
	Wall Insulation	0.22	5	0.00	0	0.78
	Floor Insulation (Other)	0.16	33	0.00	0	0.84
	Duct Insulation & Sealing	-	0	-	0	0.80
	Air Sealing	0.14	52	0.00	0	0.86
Overall Program		0.15	-	0.01	-	0.86

Source: Navigant participant survey; PY5 Evaluation Report.

\* Navigant did not collect NTGR data for the kitchen aerator measures, as it represented less than 5% of ex-ante program savings. Navigant applied the bathroom aerator NTGR results to the kitchen aerator measure. It was assumed that these measures were similar in free ridership and spillover.

\*\* Navigant did not collect NTGR data for the programmable thermostat measures, as it represented less than 5% of ex-ante program savings. Navigant referenced NTGR values for comparable programs in the Northeast. A NTGR value of 0.89 was used in the 2010 Gas Efficiency Annual Report by the Massachusetts Joint Utilities<sup>38</sup> and a NTGR value of 0.90 was used in the Efficiency Vermont Year 2010 Savings Claim<sup>39</sup>. Navigant assigned an average NTGR value of 0.90 for programmable

The average research based weighted Net-to-Gross ratio (NTGR) for the group of Business programs was 0.71. As shown in Table 4-5, individual NTG ratios varied from 0.48 for Data Centers and 0.61 for the Business Custom Program and 0.90 for the Small Business Energy Services Program. Program-specific evaluation data collection efforts were typically designed to produce statistically significant results at the program level. As a result, the measure-specific NTGR values are not necessarily statistically significant, although some evaluation efforts were able to calculate NTG ratios for specific measure types.

<sup>38</sup>“2010 Gas Energy Efficiency Annual Report”, Boston Gas Company, Colonial Gas Company and Essex Gas Company each d/b/a National Grid, August 2011, page 67.

<sup>39</sup>“Year 2010 Savings Claim”, Efficiency Vermont, April 1, 2011, page 162.

**Table 4-5. C&I Programs Researched Net-to-Gross Ratios**

Program	Research Findings			
	Program NTGR (Researched)	Free Ridership	Spillover	Measure Level NTGR ‡
Business Standard	Lighting 0.79 Non-Light. 0.75	Lighting 0.26 Non-Light. 0.31	Lighting 0.05 Non-Light. 0.06	Lighting 0.79 Non-Lighting 0.75
Business Custom <sup>40</sup>	0.64	36%	0%	Not available
Data Centers <sup>41</sup>	0.48	52%	0%	Not available
BILD (Mid-Stream Lighting)	0.63	42%	5%	CFLs 0.64 LEDs/HID 0.70 Linear FL 0.56
Retro-Commissioning	NA	NA	NA	NA
New Construction	NA	NA	NA	NA
Small Business Energy Services	NA	NA	NA	NA
Industrial Systems	0.67	33%	0%	NA
IP Thermostat	1.00*	NA	NA	NA
Total C&I (weighted)	0.71			

‡ Not necessarily statistically significant

\* In PY5, participant interviews were conducted and a NTGR estimate of 1.0 was produced. Free ridership and spillover were both estimated to be zero.

<sup>40</sup> For EPY5, Data Centers was included within the Custom Program analysis.

<sup>41</sup> See above footnote re: Data Centers combined within the Custom Program analysis in EPY5.

## Appendix A. ComEd PY5 Program Evaluation Reports

The program-specific reports will be attached as separate appendices.

1. Residential ENERGY STAR® Lighting
2. Residential Fridge and Freezer Recycle Rewards
3. Multi-Family Home Energy Savings (Multi-Family or MFHES)
4. Complete Systems Replacement (CSR)
5. Home Energy Savings (HES)
6. Residential New Construction
7. Home Energy Report (HER)
8. Clothes Washer Rebate
9. Elementary Energy Education
10. Business Standard
11. Business Custom
12. Business Retro-Commissioning
13. Business New Construction Service
14. Industrial Systems Study Program
15. Business Instant Lighting Discounts Program (BILD)
16. Small Business Energy Services (SBES)
17. Commercial and Retail Internet Protocol Thermostat and Controller Program
18. C3-CUB Energy Saver Program
19. C&I Behavioral