



EPY4 Summary Evaluation Report

Energy Efficiency / Demand Response Plan:
Plan Year 4
(6/1/2011-5/31/2012)

Presented to
Commonwealth Edison Company

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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 4 (PY4), which ran from June 1, 2011 to May 31, 2012.

The PY4 ComEd Portfolio included ten programs targeted to residential customers and nine programs targeted to business customers. This section includes a brief overview of the Portfolio and its energy impacts.

Additional information about each individual program, including key evaluation findings and recommendations, is included in the next section of the Summary Report. Full program evaluation reports are included in the Appendix.

E-1. ComEd PY4 Portfolio Results

In PY4, ComEd's energy efficiency portfolio achieved 944,142 net MWh to meet its statutory goals. This included 844,254 net MWh from funded measures in PY4 and 99,888 MWh from previously funded CFL bulbs installed during PY2 and PY3. Savings from these bulbs were excluded from previous program year's results because they were placed into storage at that time. On a current evaluated basis, the evaluation team estimated that ComEd's efficiency programs achieved 862,914 net MWh energy savings in the ComEd service territory for PY4. This included 763,026 net MWh from funded measures in PY4, plus the same CFL Carryover (Table E-1).¹ The achieved net demand savings for PY4 was 186.2 MW from all programs, including 3.5 MW from the demand response program.

Based on these savings and portfolio expenditures, the PY4 portfolio cost effectiveness, based on the Illinois TRC test, is 2.00.

The ComEd program tracking systems reported 1,474,063 MWh of gross savings for combined residential and business programs in PY4, including carryover. Evaluation review of these ex-ante gross savings estimates on a program-by-program basis concluded that 90% of the estimated gross savings had been realized (including lighting carryover from PY2 and PY3 from Residential ENERGY STAR Lighting Program). Additional evaluation work to estimate free riders and spillover effects resulted in an overall net-to-gross ratio of 0.65. The result of all the individual program reviews based on research findings was an ex-post estimate of 862,914 MWh of net energy savings.²

Carryover Savings. The Residential ENERGY STAR Lighting Program had measures (CFLs) sold or incented in PY2 and PY3 that were not installed at that time but were installed in PY4 according to evaluation analysis. Those measures are credited to the PY4 savings as Late Installs or Carryover savings.

¹ 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.

² Id.

Table E-1. ComEd Portfolio EPY4 Results – Planned and Net Energy Savings – Verified

	Ex-Ante		Ex-Post				†
	Gross (MWh)	Net (MWh)	Gross (MWh)	Realization Rate	Net (MWh)	NTG	
Residential Programs							
Residential Energy Star Lighting	642,616	284,494	533,162	0.83	319,243	0.60	†
Residential Fridge and Freezer	95,795	62,267	97,039	1.15	72,302	0.75	†
Multifamily Joint	12,618	10,497	11,446	0.91	9,456	0.83	†
Single Family HES Joint	527	358	574	1.09	468	0.82	No
Complete Systems Replacement	1,068	630	638	0.60	377	0.59	No
Home Energy Report	66,176	66,176	66,176	1.00	66,176	1.00	No
Clothes Washer	2,484	1,366	3,704	1.49	2,511	0.68	No
Residential New Construction	NA	NA	NA	NA	NA	NA	NA
Elementary Energy Education	584	408	634	1.09	479	0.76	No
Central Air Conditioning Efficiency Services	2,484	2,484	2,571	1.04	2,571	1.00	†
Total Residential	824,352	428,680	715,944	0.87	473,582	0.66	
Business Programs							
Business Standard	333,031	246,443	316,379	0.95	234,120	0.74	†
Business Custom	39,370	29,921	31,437	0.80	23,892	0.76	†
Data Centers	5,382	4,306	4,323	0.80	1,840	0.43	No
Retro-Commissioning	29,908	27,395	27,315	0.91	25,021	0.92	†
Compressed Air	5,928	4,742	4,473	0.75	2,997	0.67	No
New Construction	20,748	12,449	18,200	0.88	10,400	0.57	‡
Mid-Stream C&I Lighting	108,783	45,689	101,230	0.93	63,358	0.63	No
Small Business Energy Savings	10,728	8,583	9,483	0.86	9,009	0.95	No
IP Thermostat	NA	NA	34	NA	34	1.00	No
Total Commercial	553,878	379,527	512,874	0.93	370,672	0.72	
Carryover							
Residential Energy Star Lighting	95,834	95,834	150,935	1.57	99,888	0.66	
Total Carryover	95,834	95,834	150,935	1.57	99,888	0.66	
Portfolio Total	1,474,063	904,042	1,379,754	0.94	944,142	0.68	

Source: Ex Ante from ComEd. Ex-Post from evaluation analysis.

† = Ex Post NTG is deemed for Table E-1 and Research Findings for Table E-2.

‡ Systems Track = deemed (0.59), Comprehensive Track = Research Findings (0.54)

Note: Residential New Construction Program had zero reported savings in EPY4

Fridge and Freezer RR = (ex post net/ex ante net). It is not based on gross.

Table E-2. ComEd Portfolio Year 4 Results – Planned and Net Energy Savings – Evaluated

	Ex-Ante		Ex-Post				†
	Gross (MWh)	Net (MWh)	Gross (MWh)	Realization Rate	Net (MWh)	NTG	
Residential Programs							
Residential Energy Star Lighting	642,616	284,494	500,450	0.78	267,986	0.54	†
Residential Fridge and Freezer	95,795	62,267	42,697	0.45	32,834	0.77	†
Multifamily Joint	12,618	10,497	12,185	0.97	11,860	0.97	†
Single Family HES Joint	527	358	574	1.09	468	0.82	No
Complete Systems Replacement	1,068	630	638	0.60	377	0.59	No
Home Energy Report	66,176	66,176	66,176	1.00	66,176	1.00	No
Clothes Washer	2,484	1,366	3,704	1.49	2,511	0.68	No
Residential New Construction	NA	NA	NA	NA	NA	NA	NA
Elementary Energy Education	584	408	634	1.09	479	0.76	No
Central Air Conditioning Efficiency Services	2,484	2,484	2,571	1.04	2,571	1.00	†
Total Residential	824,352	428,680	629,629	0.76	385,261	0.61	
Business Programs							
Business Standard	333,031	246,443	346,352	1.04	242,446	0.70	†
Business Custom	39,370	29,921	31,437	0.80	19,328	0.61	†
Data Centers	5,382	4,306	4,323	0.80	1,840	0.43	No
Retro-Commissioning	29,908	27,395	27,315	0.91	28,353	1.04	†
Compressed Air	5,928	4,742	4,473	0.75	2,997	0.67	No
New Construction	20,748	12,449	18,200	0.88	10,400	0.57	‡
Mid-Stream C&I Lighting	108,783	45,689	101,230	0.93	63,358	0.63	No
Small Business Energy Savings	10,728	8,583	9,483	0.86	9,009	0.95	No
IP Thermostat	NA	NA	34	NA	34	1.00	No
Total Commercial	553,878	379,527	542,847	0.98	377,765	0.70	
Carryover							
Residential Energy Star Lighting	95,834	95,834	150,935	1.57	99,888	0.66	
Total Carryover	95,834	95,834	150,935	1.57	99,888	0.66	
Portfolio Total	1,474,063	904,042	1,323,411	0.90	862,914	0.65	

Source: Ex Ante from ComEd. Ex-Post from evaluation analysis.

Note: Shaded cells are the only ones different from Table E-1 (not counting the column subtotals).

†Residential New Construction Program had zero reported savings in EPY4

‡ComEd does not calculate gross MWh for CFL Carryover

Table E- 3. ComEd Portfolio Year 4 Results – Net Peak Demand Savings (MW)

	Ex-Post Gross	Ex-Post Net		Ex-Post Research Findings Gross	Ex-Post Research Findings Net
Residential					
Residential ENERGY STAR Lighting	62.4	37.3		58.4	31.3
Residential Fridge and Freezer	14.8	11.0		7.2	5.5
Multifamily Joint	1.1	1.0		1.3	1.2
Single Family HES Joint	0.040	0.032		0.040	0.032
Complete Systems Replacement (CSR)	0.9	0.5		0.9	0.5
Home Energy Report†	0.0	0.0		0.0	0.0
Clothes Washer	0.5	0.3		0.5	0.3
Residential New Construction	NA	NA		NA	NA
Elementary Energy Education	0.058	0.043		0.158	
Central Air Conditioning Efficiency Services	3.5	3.5		3.5	3.5
Total Residential	83.3	53.7		71.9	42.4
Business					
Business Standard	43.2	30.2		43.2	30.2
Business Custom	2.9	2.2		2.9	1.8
Data Centers	0.2	0.1		0.2	0.1
Retro-Commissioning	0.384	0.352		0.384	0.352
Compressed Air	0.5	0.3		0.5	0.3
New Construction	2.9	1.6		2.9	1.6
Mid-Stream C&I Lighting	17.0	10.7		17.8	
Small Business Energy Savings	1.8	1.7			
C&R IP Thermostat	NA	NA			
Total Business	68.8	47.2		67.8	34.5
ComEd Program Total	152.0	100.9		139.7	76.9
Carryover					
Residential ENERGY STAR Lighting	129.8	85.3			
Total Carryover	129.8	85.3		0	0
ComEd EPY4 Total Portfolio	281.8	186.2		139.7	76.9

† No demand savings were calculated.

E-2. ComEd Portfolio EPY4 Energy Realization Rates by Program

Evaluation research produces a gross realization rate and net-to-gross ratio for each program. The gross realization rate is the ratio of ex-post gross to ex-ante gross savings. Ex-ante gross values are the expected total savings as calculated from and recorded in ComEd's data tracking system. Ex-post gross values are the accepted gross savings from program after verification by evaluators. The gross realization rates for ComEd's programs are shown in Table E-2.

The Net-to-Gross Ratio (NTG) is the ratio of ex-post net savings to ex-post gross savings. Ex-post net savings are calculated by adjusting ex-post gross savings for free ridership and spillover where free ridership



reduces ex-post savings and spillover increases it. The NTG ratios for ComEd's programs are also shown in Table E-1 or Table E-2.

E-3. Summary

In EPY4, ComEd achieved verified net savings of 944,142 MWh based on deemed savings values and research findings net savings of 862,914 MWh of based on evaluation research.

Navigant has reviewed the Illinois TRC calculations provided by ComEd and agrees to their reasonableness. Given a calculated Illinois TRC of 2.00, the EPY4 portfolio passes the cost-effectiveness requirement.³

Additional information on Programs' results details, evaluation findings, evaluation approaches, and recommendations can be found in the remaining sections of this Summary Report and in individual program evaluation reports included as appendices.

³ 20 ILCS 3855/1-10.

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 whole-house retrofit upgrades, hiring qualified contractors to provide maintenance for air conditioning units, retiring and recycling old appliances, and purchasing energy efficient products. In addition, this sector includes a residential demand response program that does not contribute kWh savings.

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 those 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 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 with up to date information and application materials on its website.⁴

Some residential programs implemented programs jointly with gas companies sharing overlapping service territories during this program year.

The Residential Lighting program was the biggest program as measured by energy savings, representing approximately 67% of overall sector savings (verified values) and approximately 70% of overall sector savings (evaluation research findings) (Figure 1-1 and Figure 1-2). Certain programs included measure-level findings as can be seen in the in the Single Family Program and the findings are shown in Table 1-1 and Table 1-2.

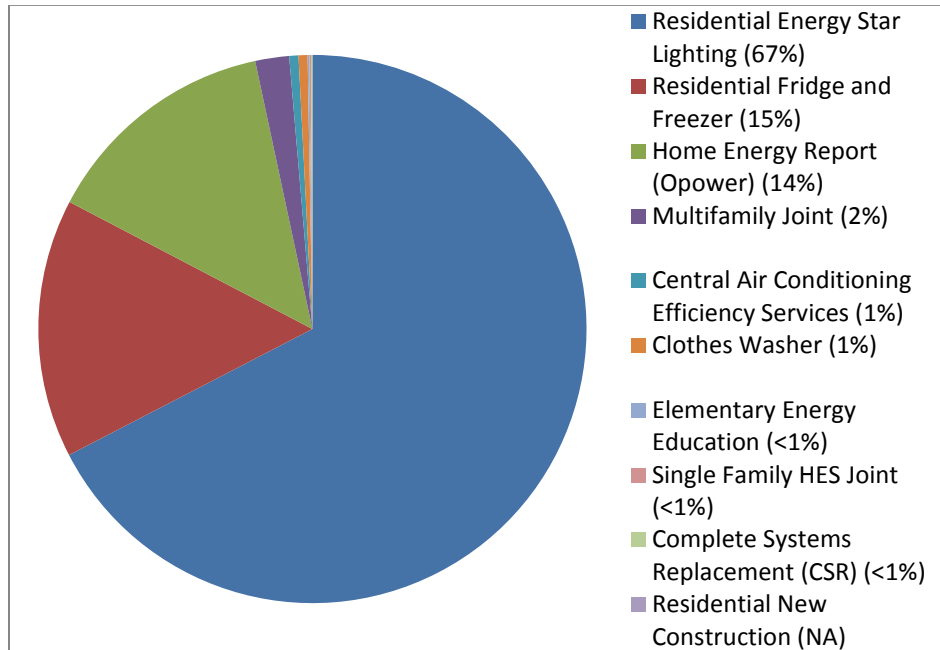
The average weighted research findings NTG ratio for the group of residential programs was 0.61. Individual NTG ratios varied from 0.54 for Residential Lighting Program to 1.00 for the Central Air Conditioning Efficiency Services Program. Some evaluation efforts were able to calculate NTG ratios for specific measure types, as seen in Table 1-1 and Table 1-2. The program-specific evaluation data collection efforts were typically designed to produce statistically significant results at the program level. As a result, the measure-specific NTG values are not necessarily statistically significant.

A major differences between the following figures are the Residential Fridge and Freezer Program comprising a greater percentage of the overall residential sector ex-post net energy savings when using deemed NTG values (15%) versus when using the research findings NTG values (9%). Residential ENERGY STAR Lighting Program comprises a greater portion of the overall residential ex-post net energy savings when using researching findings NTG values (70%) as compared to using the deemed NTG values (67%);

⁴ ComEd, Home Savings, www.comed.com/home-savings/Pages/default.aspx (accessed September 17, 2013)

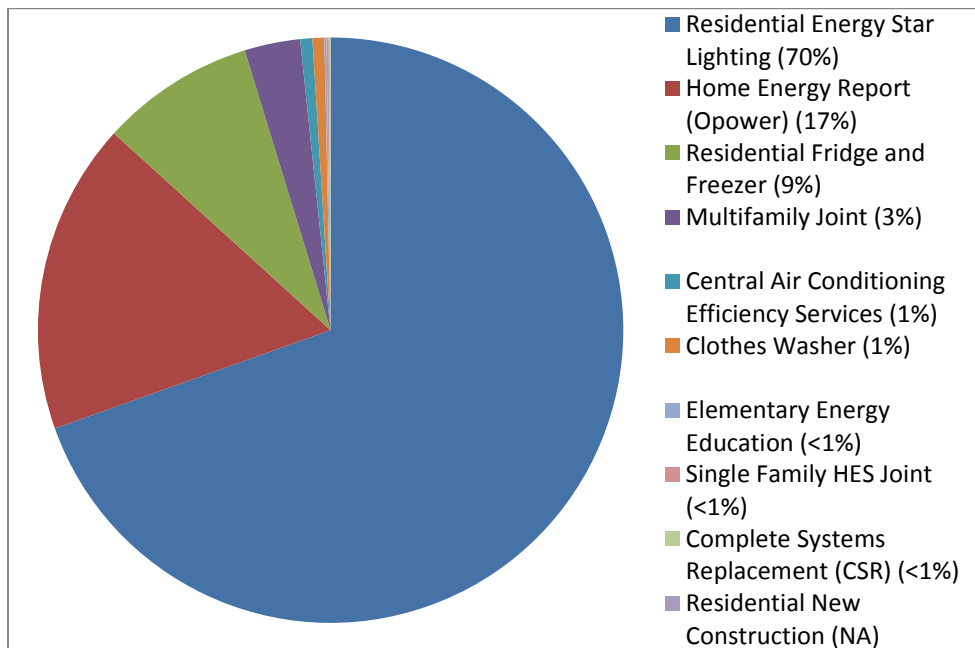
similarly, the Home Energy Report and Multifamily Programs reveal an increase when applying researched values. The overall percentage for the Freezer Program decreased when researched values were applied.

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



Source: Evaluation research

Figure 1-2. Residential Ex-Post Net Energy Savings – Evaluation Research Findings



Source: Evaluation research

Table 1-1. EPY4 Residential Programs Net-to-Gross Ratios

Program	Deemed NTG†	Research Findings			
		Program NTG	Free Ridership	Spillover	Measure Level NTG ‡
Residential ENERGY STAR Lighting	Standard Bulb and Fixtures - PY2 Evaluation Report Specialty Bulbs – ICC Order 10-0570 Standard=0.58 Specialty=0.8 CFL Fixtures=0.58 LEDs=0.8 LED Fixtures=0.58 Coupons=0.58 Total=0.6	0.54	48%	2%	Standard 0.55 Specialty 0.44
Residential Fridge and Freezer	Refrigerator = 0.73 Freezer = 0.82 Room AC = 0.72	Specific NTG Per Measure	23%	0%	Refrigerator 0.77 Freezer 0.77 Room AC 0.58
Multifamily Joint	CFLs = 0.81 Water efficiency measures = 0.93	0.97	3%	NA	CFLs 0.98 Water Efficiency 0.94
Single HES Joint	Not deemed	0.82	22%	3%	See Table 1-2
CSR	Not deemed	0.59	41%	0%	Not Available
Home Energy Report	NA	NA	NA	NA	NA
Clothes Washer Rebate	Not deemed	0.68	32%	0%	Not Available
Residential New Construction	No impacts	NA	NA	NA	Not Available
Elementary Energy Education	Not deemed	Specific NTG Per Measure	22% 18% 22% 31%	19% 14% 9% 31%	Showerheads 0.92 Kitchen Aerators 0.92 Bathroom Aerators 0.79 CFLs 0.73
CACES	1.0	NA	NA	NA	NA
Total Residential (weighted)		0.61			

Source: SAG spreadsheet and evaluation research

† Source: ComEd Filing

‡ 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 1-2. EPY4 Measure-Level MWH Savings – Single Family HES†

	Measure	Ex-Ante Gross MWh	RR	Verified Gross MWh	NTG	Verified Net MWh
Direct Install Measures	9 Watt CFL	38	1.09	42	0.80	33
	14 Watt CFL	111	1.09	121	0.80	97
	19 Watt CFL	81	1.10	89	0.80	71
	23 Watt CFL	112	1.10	122	0.80	98
	9 Watt Globe CFL	20	1.09	22	0.80	17
	Shower Head	5	1.48	7	0.93	7
	Kitchen Aerator	1	0.46	0	0.99	0
	Bathroom Aerator	2	0.57	1	0.99	1
	Hot Water Temperature Setback	0	-	0	0.88	0
	Pipe Insulation	1	1.54	2	0.93	2
	Programmable Thermostat	0	-	2.7	0.90	0
	Programmable Thermostat Education	0	-	8.5	0.90	0
	<i>Subtotal</i>	371	1.10	418	0.80	327
Retrofit Measures	Attic Insulation	68	1.00	68	0.81	55
	Wall Insulation	1	1.00	1	0.78	1
	Floor Insulation (Other)	6	1.00	6	0.84	5
	Duct Insulation & Sealing	1	1.00	1	0.80	1
	Air Sealing	80	1.00	80	0.86	69
<i>Subtotal</i>		156	1.00	156	0.84	131
Total Savings		527	1.07	574	0.82	468

Source: Navigant analysis

†CFLs, temperature turndown, and thermostats are deemed; showerheads, aerators, pipe insulation are partially deemed; all weatherization measures are not deemed.

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. This sector includes programs that encourage and incent 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.

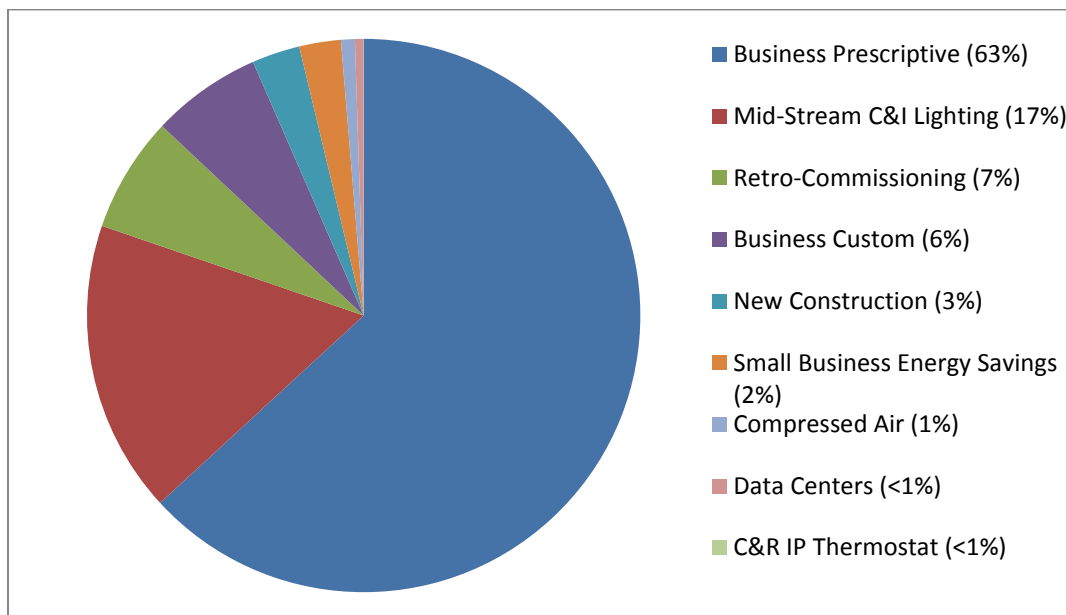
Commercial & Industrial programs are marketed under the Smart Ideas for Your Business® brand. Many C&I programs work closely with ComEd's account managers, energy efficiency program managers and trade allies to recruit qualified participants. These programs also conduct outreach through mass media, social media, direct mail, utility bill inserts, conventions, trade shows and public events. ComEd maintains a webpage for these programs with up to date information and application materials on its website.⁵

The Business Standard program was the largest C&I program as measured by energy savings, representing 63% of overall sector savings (verified values) and approximately 64% of overall sector savings (evaluation research findings) (Figure 1-3 and Figure 1-4).

The average research based weighted Net-to-Gross (NTG) Ratio for the group of Business programs was 0.70. Individual NTG ratios varied from 0.43 for the Data Centers Program to 1.04 for the Retro-Commissioning 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 NTG values are not necessarily statistically significant, although some evaluation efforts were able to calculate NTG ratios for specific measure types.

There was very little noticeable difference between the following figures besides the Business Standard Program comprising a slightly greater percentage of the overall C&I sector ex-post net energy savings when using research findings NTG values (65%) versus when using the deemed NTG values (63%).

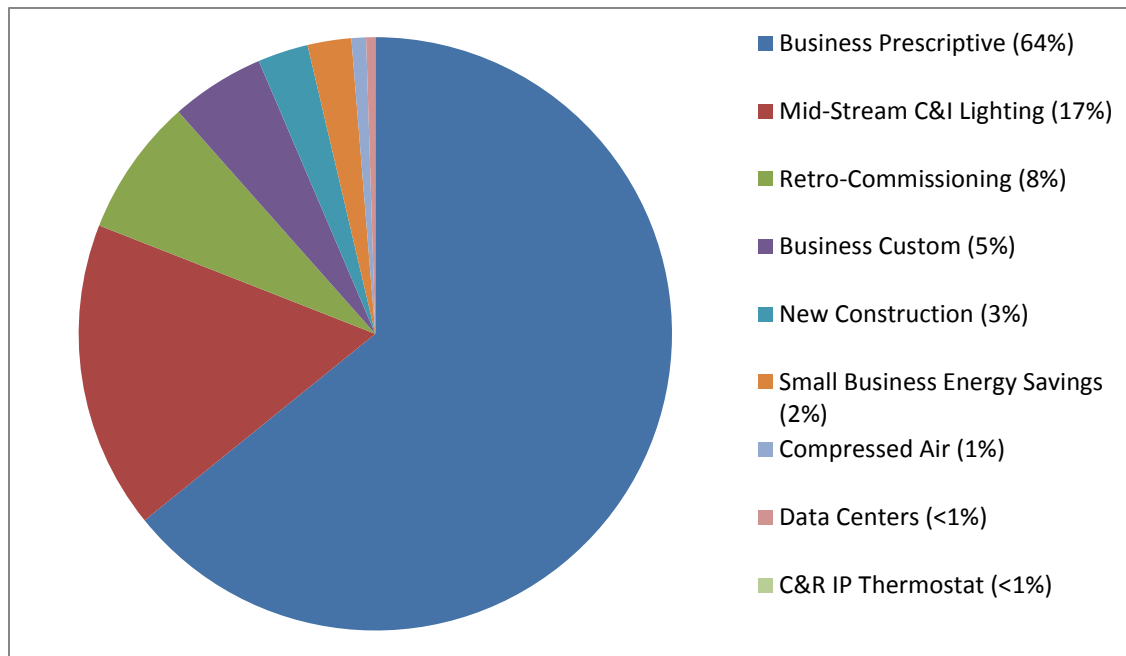
Figure 1-3. C&I Ex-Post Net Energy Savings – Verified



Source: Evaluation research

⁵ ComEd, Business Savings, www.ComEd.com/business-savings/Pages/default.aspx (accessed September 17, 2013)

Figure 1-4. C&I Ex-Post Net Energy Savings – Evaluation Research Findings



Source: Evaluation research

Table 1-3. C&I Programs Net-to-Gross Ratios

Program	Deemed NTG†	Research Findings			
		Program NTG (Researched)	Free Ridership	Spillover	Measure Level NTG ‡
Business Standard	0.74	0.70	31%	1%	Lighting 0.70 Non-Lighting 0.63
Business Custom	0.76	0.61	39%	0%	Not available
Data Centers	Not deemed	0.43	57%	0%	Not available
Mid-Stream C&I Lighting	Not deemed	0.63	39%	2%	Not available
Retro-Commissioning	0.916	1.04	10%	14%	Not available
New Construction	Systems Track 0.59	0.57	43%	0%	Systems 0.59 Comprehensive 0.54
Small Business Energy Services	Not deemed	0.95	5%	0%	Not Available
Compressed Air	Not deemed	0.67	33%	0%	Not Available
IP Thermostat	Not deemed	1.00	NA	NA	Not Available
Total C&I (weighted)		0.70			

† Source: ComEd Filing

‡ Not necessarily statistically significant

Note: The IP Thermostat NTG was not deemed but was not independently calculated in EPY4.

1.2 ComEd EPY4 Portfolio Level Cost Effectiveness

The ComEd portfolio of programs is cost effective at a TRC of 2.00. Only the Single Family HES, CACES, Home Energy Report, and Compressed Air are not cost effective, with TRC values less than one (Table 1-4). The cost effectiveness of the portfolio is dependent on a number of assumptions and these are described in the EPY4 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.⁶

ComEd uses DSMore™ software for the calculation of the TRC test.⁷ 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

⁶ 20 ILCS 3855/1-10.

⁷ Demand Side Management Option Risk Evaluator (DSMore) software is developed by Integral Analytics.

Lighting savings from PY2 and PY3 that are considered deferred installations and were not previously counted.

Table 1-4. Cost Effectiveness of the ComEd Portfolio

	Illinois Total Resource Cost Test
Residential ENERGY STAR Lighting	4.70
Fridge & Freezer Recycle	3.72
Clothes Washer Rebates	3.28
Multi-Family	4.04
Single Family	0.34
Elementary Education	1.36
CACES	0.76
Home Energy Report	0.95
Complete System Replacement	1.11
Business Prescriptive	1.30
Business Custom	1.15
Midstream Lighting	4.92
Business Retro-Commissioning	1.50
Small Business	1.99
C&I New Construction	2.50
Data Centers	1.61
Compressed Air	0.76
Portfolio, Carryover & RLD 3 rd Party	1.91
ComEd Total Portfolio	2.00

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.

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. Generally, impact evaluation methods included reviewing program tracking databases and other program methodology for calculating reported savings, conducting 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 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 EPY4. Due to the nature of the programs, the Home Energy Report Program was subject to a different evaluation method and was assessed through a regression-based billing analysis.

Table 2-1. Evaluation Approaches – Residential Programs

	Lighting	HES-Single Family Multi-Family	HEER - CSR	Fridge /Freezer	Clothes Washer	New Construction	Element. Energy Ed.	HER	CACES
Evaluation Tasks									
Reporting									
Verification and Gross Realization Rate or Reduced Consumption	X	X	X	X	X	X	X	X	X
Measure-Level Deemed Savings Review	X	X	X	X	X	X	X		X
NTG Ratio	X	X	X	X	X	X	X		X
Process Analysis	X	X	X	X	X	X	X		
Impact Analysis									
Participant Surveys - Impact†	X	X	X	X	X	X	X		
• Participant Self-Report NTG 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								
• Self-Report NTG Analysis	X								
• Installation Rate Analysis	X								
• Demand Modeling NTG	X†								
Billing & Tracking Data Analysis								X	X
Shelf Surveys - Impact	X								
Multi-State NTG Study	X†								
Metering study for lighting HOU/Peak	X								
Trade Ally Interviews - NTG	X†	X		X	X				

Evaluation Tasks	Lighting	HES-Single Family	Multi-Family	HEER - CSR	Fridge /Freezer	Clothes Washer	New Construction	Element. Energy Ed.	HER	CACES
Process Analysis										
ComEd Program Manager and Implementation Contractor Interviews	X	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				
Participant Telephone Interviews	X	X	X	X	X	X				

† Not used in the final NTG 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	RCx	MSI	C&I NC	Compressed Air	Small Bus.	Data Centers	Thermostats
Reporting									
Verification and Gross Realization Rate	X	X	X	X	X	X	X	X	
Measure-Level Deemed Savings Review	X	X			X	X	X		
NTG Ratio	X	X	X	X	X	X	X	X	X
Process Analysis	X	X		X	X	X	X		X
Impact Analysis									
General Population Surveys - Impact	X	X	X		X	X	X		
• Customer Self-Report NTG Analysis	X	X	X	X	X	X	X	X	
• Installation Rate Analysis	X	X	X	X	X	X	X		X
Trade Ally Interviews – NTG		X	X			X	X		
Process Analysis									
Program Manager and Implementer Interviews	X	X	X	X	X	X	X	X	
Stakeholder Interviews	X	X	X	X		X	X		
Participant Telephone Interviews	X	X	X	X	X	X	X		

3. Program Level Findings and Recommendations

This section includes program-level detail for ComEd's EPY4 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 EPY4 Residential ENERGY STAR Lighting program (Residential Lighting) in Program Year 2012 (PY4) are presented below.⁸ 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 Residential Lighting program provides incentives to increase the market share of ENERGY STAR (ES) qualified compact fluorescent lamp (CFL) bulbs and fixtures sold through retail sales channels. It also seeks to distribute educational materials that will increase customer awareness and acceptance of energy-efficient lighting technology, as well as promote proper bulb disposal. The goal of the Residential Lighting program for EPY4 was to sell 12.1 million discounted CFL and LED bulbs and fixtures to residential customers within ComEd's service territory. A total of 11,425,351⁹ standard CFL bulbs, 1,097,670 specialty CFL bulbs, 24,919 LED bulbs, 84,539 CFL fixtures, and 16,551 LED fixtures were sold as part of the program for a grand total of 12,649,030 bulbs.

The EPY4 Residential Lighting program reported ex-ante gross energy savings of 642,616 MWh (Table 3-1). The evaluation verified gross (adjusted) energy savings were 533,162 MWh. Verified net energy savings were 319,2431 MWh. The program's verified gross (adjusted) peak demand savings were 62.3 MW and verified net demand savings were 37.3 MW.

Table 3-1. Residential Lighting Program EPY4 Verified Savings Estimates

Savings Estimate	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex Ante Unadjusted Gross	642,616	-	-
Ex Ante Net	284,494	-	-
Ex Post Unadjusted Gross	701,430	606.3	77.1
Ex Post Adjusted Gross	533,162	446.3	62.3
Ex Post Verified Net	319,243	267.2	37.3

Source: Evaluation Team Analysis of ComEd Tracking database

⁸ June 1, 2011 to May 31, 2012. Note, that any reference to prior program years shall be designated by "PY" with the corresponding number of years one, two and three as follows: PY1, PY2 and PY3.

⁹ This assumes all coupon bulbs are standard bulbs.

The program design and delivery methods did not substantially change for EPY4 and so, in accord with the NTG Framework¹⁰, the evaluation team used the NTG rate calculated in the PY2 evaluation research. Thus the program falls under the following condition from the NTG Framework: “Where a program design and its delivery methods are relatively stable over time, *and* an Illinois evaluation of that program has estimated a NTG ratio, that ratio can be used *prospectively* until a new evaluation estimates a new NTG ratio.”

Table 3-2 presents the Research Findings gross realization rate estimates across all program bulb types. The realization rate is the installation rate times the leakage rate. As this table shows the overall average realization rate was estimated to be 68%, down by 4% relative to the PY3 value of 71%. By bulb type the gross realization rates were estimated to be 67% for standard bulbs, 73% for specialty bulbs and 96% for LEDs and fixtures. This differentiation between bulb type realization rates is entirely driven by the installation rate as the leakage rate applied was consistent across bulb types. Further details on the Evaluation Research estimates of Installation Rate and Leakage are presented below.

Table 3-2. Residential Lighting Program Research Findings Gross Realization Rate Estimates

Parameter	Standard	Specialty	CFL Fixtures	LEDs	LED Fixtures	Coupons	Total
Installation Rate	70%	75%	100%	100%	100%	70%	70%
Leakage	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%
Realization Rate	0.67	0.73	0.96	0.96	0.96	0.67	0.68

Source: Navigant Consulting Team Analysis of In-Store Intercept Survey (PY4)

The evaluation estimated EPY4 Residential CFL energy and demand savings included from bulbs that were purchased during PY2 and PY3 but were not installed during those program years. Savings from these bulbs were excluded from previous program year’s results and credited to the EPY4 savings as carryover savings. As documented in a memo to ComEd and the ICC¹¹ the evaluation team recommends estimating the savings resulting from the installation of prior year program bulbs using the impact parameter estimates (HOU, DW, NTGR) from the program year of sale and with an assumed installation rate of 100%.

Table 3-3 below shows the net energy savings in EPY4 attributable to the approximately 2.7 million bulbs sold but not installed during PY2 and PY3 (i.e., carryover), resulting in an additional 99,888 MWh of net energy savings attributable to EPY4.

¹⁰ “Proposed Framework for Counting Net Savings in Illinois.” Memorandum March 12, 2010 from Philip Mosenthal, OEI, and Susan Hedman, OAG.

¹¹ Memo to ComEd and ICC Residential Lighting Program Interested Parties Re: Calculation of CFL Carryover Savings. September 18th, 2012, from Navigant Evaluation Team.

Table 3-3. EPY4 Residential Lighting Program Carryover Gross and Net Energy Savings Estimation

Impact Parameter and Findings	PY2 Program Bulbs	PY3 Program Bulbs	Total EPY4 Carryover
Program Bulbs Installed During EPY4	1,076,143	1,596,986	2,673,129
Average Delta Watts	49.2	48.1	n/a
Average Daily Hours of Use	3.48	2.98	n/a
Gross kWh Impact per unit	62.5	52.4	56.5
Gross kW Impact per unit	0.05	0.05	0.05
Installation Rate	100%	100%	100%
PY4 Carryover Gross Energy Savings (MWh)	67,223	83,712	150,936
PY4 Carryover Gross Demand Savings (MW)	52.9	76.9	129.8
Energy Interactive Effects	1	1.02	n/a
Net-to-Gross Ratio	0.58	0.71	0.66
PY4 Carryover Net Energy Savings (MWh)	39,275	60,613	99,888
PY4 Carryover Net Demand Savings (MW)	30.9	54.4	85.3

Source: Navigant Consulting Team Analysis

Interactive Effects (IE). To estimate interactive effects between the reduction in waste heat from more efficient lighting and the resulting changes in HVAC system demand, Waste Heat Factors for summer peak demand savings (WHFd) and energy savings (WHFe) were developed using the Illinois Technical Reference Manual (TRM) and data from the U.S. DOE EIA Residential Energy Consumption Survey (RECS) 2009.

Weighting the overall Energy and Demand Interactive Effects residential and commercial installations by the proportion of program bulbs going into each of these building types yields an overall program wide Energy IE of 1.03 and Peak CF of 1.10, as shown in Table 3-4.

Table 3-4. Residential Lighting Program Weighted Overall Energy and Demand Interactive Effects

Sector	% of installs	Energy IE	Demand IE
Residential	95%	1.03	1.09
Non-Residential	5%	1.14	1.24
Overall	100%	1.03	1.10

Source: Evaluation Team Analysis

Net-to-Gross Ratio (NTGR). The Net-to-Gross Ratio is a measure of the proportion of gross program impacts that can reliably be attributed to the program. The Evaluation Research EPY4 net-to-gross ratio (NTGR) was estimated to be 0.54 (shown in Table 3-5 below). This EPY4 estimate was calculated as the retailer sales-weighted average of in-store intercept self-report results. It represents a decrease of 25% from the PY3 recommended NTGR of 0.71 and a decrease of 9% from the PY2 NTGR of 0.58.

Table 3-5. Residential Lighting Program EPY4 Net-to-Gross Ratios by Bulb Type

Program Bulb Type		Free Ridership	Spillover	NTGR
Standard CFLs	Overall	0.47	0.02	0.55
	Top Two Models	0.43	0.02	0.59
	Remaining Models	0.55	0.02	0.47
Specialty CFLs	Overall	0.58	0.02	0.44
Overall ¹²		0.48	0.02	0.54

Source: Evaluation Team Analysis

Impact Recommendations. The following list summarizes the key impact recommendations from the study:

- **Tracking Data Issues:** Future evaluations would benefit greatly from a single, consistent model key that linked the tracking data (both regular program and coupon) with both the Goals Tracker and the bulb information table (ENERGY STAR or similar lighting tables). Additionally the “Lookup Measure Res Lighting” table, the ENERGY STAR table, and the Goals Tracker provided in EPY4 each had missing or inaccurate bulb information on lumens, wattage, and manufacturer base wattage for some bulb models. All of these variables are critical to the evaluation process and should be verified for accuracy.
- **Delta Watts Estimation:** The evaluation team recommends switching to a bulb type lumen mapping that is based on the new ENERGY STAR draft specification for lamps¹³). Using a lumen-based method that also relies on bulb shape provides a more robust means of establishing base wattage equivalents across all bulb types, especially specialty CFLs and LEDs. Because lumen output is a measure of the total light produced in all directions from a source, bulbs such as reflectors (and LEDs in general) that focus light in a single direction require a different lumen mapping than a standard CFL. The TRM that goes into effect in PY5 assigns base-wattages using lumen bins that are not differentiated by bulb type and, thus, this issue continues under the PY5 TRM.
- **Residential versus Non-Residential Split:** The evaluation team believes that due to the large impact this Res/NonRes split has on the resulting program impact estimates and the relatively stable split from year-to-year, this parameter should be a deemed parameter (94/6) that is evaluated each year to ensure its continued appropriateness.

¹² This program sales weighted average NTGR estimate will also be applied to LED bulbs and all fixtures sold through the Residential Lighting program. It should be noted that this weighted average is sub-optimal and does not reflect an actual estimate of NTGR for these program bulb types, however due to the lack of LED and fixture specific data it is the best proxy available.

¹³http://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/lamps/V1.0_Draft_2_Specification.pdf?4749-8e30

- **Interactive Effects – WHFd¹⁴:** The evaluation team recognizes that there are many factors influencing the interaction between lighting and HVAC system load. The evaluation team recommends that the approach in the Illinois TRM should be regarded as the lower boundary of possible demand savings, which is appropriate given unknown factors about time delays between lighting waste heat and realized HVAC load, waste heat leakage through the building envelope, and occupant behavior factors such as thermostat operation.

Process Recommendations. The following list summarizes the key process recommendations from the study.

Program Awareness: Awareness of ComEd’s Residential Lighting program and program discounts continues to be quite low with the vast majority (87%) of intercept survey respondents reporting they were unaware of the ComEd discounts. Utility bills were the most common self-reported source of program awareness and in-store marketing materials were the second most common self-reported source (e.g., 86% of respondents reported not seeing any in-store marketing materials). Utility bills and in-store marketing should have increasing focus going forward.

Specialty Bulb Market Findings:

- **CFL Installations:** The majority of specialty CFL purchasers who did not buy program bulbs reported that they were unaware of the discount (49%). In-store marketing materials appear to be more influential to standard CFL purchasers (56% ranked them as extremely influential) than to specialty CFLs purchasers (50% ranked them as not very influential).
- **State of the LED Market:** Increased incentives and increased LED in-store information, either from ComEd or provided by the manufacturers on the packages themselves, may be necessary to assist customers in overcoming these existing barriers. The shelf surveys also indicate that at the current time, LEDs are not a replacement option for 75 or 100-watt standard incandescent bulbs as none were found that produced equivalent lumens at the retailers surveyed.
- **75 and 100-watt Replacement Lamp Availability:** EPY4 shelf surveys of 75 and 100-watt standard incandescent equivalent bulbs provided interesting data. Across the surveyed stores, standard, a-lamp and dimmable CFLs (program and non-program) accounted for 50% of the bulbs on the shelves. Incandescent bulbs made up 42% of available bulbs, 53% of which were 100-watt incandescents, and halogens accounted for the remaining 8%.

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 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 refrigerators and freezers in an environmentally safe manner by offering comprehensive toxic material recycling and disposal that conforms to applicable environmental laws and regulations and permitting requirements. The program’s primary focus is on resource acquisition, that is, cost-effective energy savings. This program is not seeking to transform the

¹⁴ WHFd = Waste heat factor for demand to account for cooling savings from efficient lighting in cooled buildings is provided in the Illinois TRM in Section 6.5.

market for recycling older appliances; for example, by developing the private sector's capability to provide recycling as a paid-for service.

The EPY4 evaluation-verified net energy savings were 72,302 MWh (Table 3-6) which is approximately 115% of the ex ante net energy savings estimates. The evaluation-verified savings is based on an in-depth review and analysis of tracking data, application of the deemed savings factors approved in the Illinois Commerce Commission's Order 10-0570, dated December 21, 2010, and a separate verification of units being picked up by the program via a telephone survey. The evaluation team and ComEd both performed the same savings calculation, applying the PY2 regression coefficients to the mix and characteristics of units collected in EPY4, the evaluation team was unable to reproduce ComEd's numbers to be able to explain the difference in impact estimates.

Table 3-6. Fridge and Freezer Program EPY4 Verified Savings Estimates

Savings Estimate	Energy Savings (MWh)	Demand Savings (MW)
Ex Ante Gross Savings	-	-
Ex Ante Net Savings	62,267	-
Evaluation-Verified Gross Savings	97,039	14.8
Evaluation-Verified Net Savings	72,302	11.0
Verified Net Savings	72,302	11.0

Source: EM&V analysis

Verification Rate: The evaluation verification rate for this program is 1.00. This is based on 100% of phone survey respondents answering "yes" to a question asking if they recalled having their refrigerator, freezer and/or Room AC picked up by JACO.

Tracking Data Issues: The evaluation team continues to recommend the program tracking data receive periodic reviews for data quality and completeness. Data exported for the evaluation team should also be checked for anomalies. Incomplete data fields need to be populated *where feasible*, particularly those data fields that are critical to the evaluation, such as appliance brand, model number, age/year manufactured, size, configuration and location.

Process Recommendations. The following list summarizes the key process recommendations from the study.

- **Program Incentive Levels:** Maintaining current rebate levels, with occasional 'special' offerings is an effective method of reaching higher savings targets.
- **Participant Satisfaction:** As the program continues to progress, routinely review program processes and procedures in order to maintain these satisfaction levels.
- **Environmental Benefits of Program:** If the program wishes to pursue additional retail partnerships, it is recommended the program tie-in to green corporate practices may be one benefit to highlight.

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

The MFHES program provides natural gas energy efficiency measures to Nicor Gas, Peoples Gas, and North Shore Gas customers and electric energy efficiency measures to ComEd customers. The objectives of the MFHES Program evaluation are to: (1) to quantify gross and net savings impacts for the program, (2) to determine key process-related program strengths and weaknesses, and (3) to identify ways the program can potentially be improved.¹⁵

Table 3-7 presents energy and demand savings induced through the ComEd EPY4 program. These results include energy and demand savings through installation of CFLs in all natural gas service territories. The program also installed water efficiency measures in dwelling units with electric water heat in all natural gas service territories. For water efficiency measures, Navigant noted that deemed savings from water efficiency measures were estimated by residence instead of by each individual measure. For example, the deemed energy impact would be the same whether the MFHES program installed one or two bathroom faucet aerators in a residence. Navigant applied the deemed unit savings to calculate verified gross energy savings found in this report. For ComEd, Navigant used deemed realization rates (96.0 percent for CFLs and 67.0 percent for water efficiency measures; resulting in a program-level realization rate of 90.7 percent for electric measures) to calculate verified gross savings. Using the NTG Framework¹⁶, Navigant applied deemed Net-to-Gross ratios (0.81 Net-to-Gross for CFLs and 0.93 Net-to-Gross for water efficiency measures). The program average NTG ratio (using net savings/verified gross savings) was 0.83 for energy savings and 0.82 for demand savings.

Table 3-7. MFHES EPY4 Verified Savings Estimates

Savings Estimates	Energy Savings (MWh)	Demand Savings (MW)
Ex-Ante Gross	12,618	1.1
Ex-Ante Net	10,497	1.0
Verified Gross	11,446	1.1
Verified Net	9,456	1.0
EPY4 Program NTGR	0.83	0.82

Source: Navigant analysis of ComEd tracking database (9-25-12 extract) and program tracking data

Impact Recommendations: The following list summarizes the key impact recommendations from the study.

- The program should track whether a building has a central or individual domestic hot water system and track savings separately from each;
- Include a unique identifier for individual projects in the program tracking system to facilitate transfer between the implementation contractor's tracking system and ComEd's tracking system.
- To the extent feasible, the program should attempt to minimize hand-written data entry and the possibility of data entry errors from transposing hand-written information into the program tracking database;

¹⁵ ComEd has offered a multi-family program since EPY1. ComEd offered jointly implemented pilot programs with Nicor Gas, Peoples Gas, and North Shore Gas in EPY3.

¹⁶ "Proposed Framework for Counting Net Savings in Illinois." Memorandum March 12, 2010 from Philip Mosenthal, OEI, and Susan Hedman, OAG.

- Some resident reports indicated that DI Techs were unable to install energy efficiency measures due to poor conditions. Navigant recommends that the program develop a definition for this term and include it in the program Operations Manual;
- The implementation contractor should consider modifications to the Operations Manual and Property Enrollment Form regarding the baseline GPM of showerheads and aerators. The Operations Manual should identify the minimum rating for baseline GPM required to be eligible for the direct installation of showerheads and aerators (e.g. 2.5 GPM or greater).

Process Recommendations. The following list summarizes the key process recommendations from the study.

- Emphasize the importance of installing the maximum number of eligible direct install measures in dwelling units to field teams;
- Track reasons why dwelling units are not available to field teams during direct installation activities. Take appropriate steps to reduce the number of unavailable units;
- Track reasons why measures are not installed in dwelling units during direct installation activities. Determine appropriate steps to reduce the number of times that field teams enter a dwelling unit but are unable to install measures;
- Place a greater emphasis on completing common area assessments;
- Track common area referrals to other programs and participation rates from referrals;
- Target common area energy efficiency opportunities through increased communication and/or co-marketing with other energy efficiency programs;
- Develop a script for follow up calls that could include ongoing customer satisfaction with direct install measures, any action items from the property manager customer survey and a request for referrals; and
- The program should consider revising the tenant customer satisfaction survey to include more questions about customer satisfaction with each of the individual direct install measures.

3.4 Home Energy Savings (HES)

The HES program provided customers in single family homes a discounted home energy assessment and free or incentivized direct install and weatherization measure recommendations and installations. The objectives of the HES program evaluation in EPY4 were to (1) quantify net savings impacts from the program, (2) identify ways in which the program can be improved, and (3) determine process-related program strengths and weaknesses. Evaluation activities will extend across EPY4-EPY6, with the focus of the EPY4 evaluation on high-priority issues, especially those affecting program participation. The main focus of the impact evaluation was to validate estimates of gross and net program savings and program tracking information. The process evaluation included a review of the program's administration, delivery, and a combination of trade ally, participant, and non-participant responses to our research questions.

Table 3-8 outlines the program's electric and therm savings for EPY4.¹⁷ The NTG Framework¹⁸ calls for retroactively applying the NTG ratio for "previously evaluated programs undergoing significant changes — either in the program design or delivery, or changes in the market itself." The evaluation team believes the

¹⁷ The September 14, 2012 final version of the first State of Illinois Energy Efficiency Technical Reference Manual (TRM) (effective as of June 1, 2012) has been agreed to by Illinois Stakeholder Advisory Group (SAG) and the Illinois Commerce Commission in Docket No. 12-0528. The verified gross savings shown in Table E-1 are deemed by the TRM for measures outlined in the document.

¹⁸ "Proposed Framework for Counting Net Savings in Illinois." Memorandum March 12, 2010 from Philip Mosenthal, OEI, and Susan Hedman, OAG.

HES program meets this criterion because the program changed assessment pricing and implementation contractors in EPY4.

Table 3-8. Home Energy Savings Program EPY4 Verified Savings Estimates

	Energy Savings (MWh)	Peak Demand Savings (kW)	Energy Savings (Therms)
Ex-Ante Gross Savings	527	31	104,505
Ex-Ante Net Savings	358	22	96,105
Realization Rate†	1.09	1.30	1.05
Verified Gross Savings	574	40	109,380
Overall NTG Ratio‡	0.82	0.80	0.86
Research Findings Net Savings	468	32	94,597
Verified Net Savings	468	32	94,597

Source: Navigant Analysis; Nicor EEP Final – Revision for Compliance Filing 05-27-2011 FINAL; ComEd - EPY4 QTR 4 Report

† Realization rates represent the ratio between verified gross and ex-ante gross savings.

‡ Overall NTG is the ratio between verified net and verified gross savings. The NTG ratio was calculated using EPY4 evaluation research and applied retrospectively.

In EPY4 the electric component of the program achieved 107% of planning net savings goals.

Table 3-9 presents the measure-specific electric savings for EPY4.

Impact Recommendations. The following list summarizes the key impact recommendations from the study:

- Finding.** The data entry process involves taking field notes on paper and then re-entering the information into *EM HOME* on a computer in the work van requiring duplicate data entry.

Recommendation. Explore switching from paper-to-computer based data entry during the energy assessments to using tablet computers equipped with *EM HOME* software.
- Finding.** The tracking database extract did not specify whether values were field-specified or default values.

Recommendation. Record in the tracking system whether building characteristics are field-specified or default values (e.g., heating and cooling system efficiencies), to clarify the basis for subsequent savings estimates.
- Finding.** The *EM HOME* simulation engine does not integrate customer billing data.

Recommendation. Continue refining the *EM HOME* simulation engine to further improve savings estimates and reduce associated uncertainties. Explore options for improving modeling calibration using customer billing data, to provide an added dimension in estimating savings.
- Finding.** The tracking system did not track kW savings for electric retrofit measures.

Recommendation. Provide kW savings for electric retrofit measures to better facilitate cost-effectiveness estimates and various electric resource planning efforts.

Table 3-9. Home Energy Savings Program Measure-Level Savings

	Measure	Ex-Ante Gross MWh	RR	Verified Gross MWh	NTG	Verified Net MWh
Direct Install Measures	9 Watt CFL	38	1.09	42	0.80	33
	14 Watt CFL	111	1.09	121	0.80	97
	19 Watt CFL	81	1.10	89	0.80	71
	23 Watt CFL	112	1.10	122	0.80	98
	9 Watt Globe CFL	20	1.09	22	0.80	17
	Shower Head	5	1.48	7	0.93	7
	Kitchen Aerator	1	0.46	0	0.99	0
	Bathroom Aerator	2	0.57	1	0.99	1
	Hot Water Temperature Setback	0	-	0	0.88	0
	Pipe Insulation	1	1.54	2	0.93	2
	Programmable Thermostat	0	-	3	0.90	2
	Programmable Thermostat Education	0	-	9	0.90	8
<i>Subtotal</i>		371	1.13	418	0.81	337
Retrofit Measures	Attic Insulation	68	1.00	68	0.81	55
	Wall Insulation	1	1.00	1	0.78	1
	Floor Insulation (Other)	6	1.00	6	0.84	5
	Duct Insulation & Sealing	1	1.00	1	0.80	1
	Air Sealing	80	1.00	80	0.86	69
<i>Subtotal</i>		156	1.00	156	0.84	131
Total Savings		527	1.09	574	0.82	468

Source: Navigant analysis

Process Recommendations: The following lists the key process recommendations from the study.

At this stage in the program's development, Navigant finds that program processes are generally well-planned and executed, and that the program is serving participants very well. However, since the program did not reach its participation goals in EPY4, the evaluation team conducted research on participants, non-participants, and trade allies to determine marketing outreach effectiveness and potential barriers to participation.

- The evaluation team suggests a workshop meeting of energy advisors, trade allies, and other program stakeholders to gather feedback on the previous year's program efforts and associated marketing efforts, with the goal of improving the marketing material for future program years.
- The program could benefit from conducting focus groups to explore how best to remove barriers to participation for these program-knowledgeable non-participants.

- The evaluation team suggests a workshop meeting of energy advisors, trade allies, and other program stakeholders to gather feedback on the previous year's program efforts and associated marketing efforts, with the goal of improving the marketing material for future program years.
- Consider modifying the program marketing collateral to more clearly emphasize that, while strongly encouraged and that there is considerable program support to do so, customers are not obligated to purchase the weatherization measures suggested by the assessment, along with pointing out that direct install measures provide immediate savings benefits that outweigh the cost of getting an assessment.
- The program may benefit from addressing these concerns in its marketing and outreach materials in order to tip hesitant but interested potential participants into scheduling an assessment. Given the very high levels of participant satisfaction with the program, the program may consider providing customers summary information that addresses common misconceptions about the program.

3.5 Residential New Construction

The Residential New Construction Program is jointly offered by Nicor Gas and ComEd. Residential Science Resources (RSR) implements the program for both utilities. Wisconsin Energy Conservation Corporation (WECC) administers the program for Nicor Gas. The program launched in early 2012, but *did not claim any savings in EPY4*. RSR uses completed REM/Rate files for each home to calculate whole-house savings. In addition, ComEd incentivizes several ENERGY STAR electric appliances and claims savings from these installations. The program relies on networks of builders and HERS raters to garner participation and has already attracted several raters and builders to the program. The Residential New Construction Program pays incentives of \$500 per home to raters and \$300 per home to builders; builders receive additional incentives from ComEd for installing program-qualified ENERGY STAR electric appliances. To qualify for the program, homes must achieve savings of at least 10% over an equivalent code-compliant new home. The residential energy code in effect in Illinois was IECC 2009, though it was expected to change to IECC 2012.

The evaluation relied heavily on interviews with program administrators and key RSR staff, tracking system review, and program literature review. Navigant did not conduct a full impact evaluation for EPY4 because the program did not claim any savings. Navigant conducted reviews of the program verification and due diligence procedures, planned savings calculation approaches, and tracking system.

Tracking System Review: Navigant reviewed RSR's proprietary HouseRater software, which the program uses to collect and track extensive data on Program homes. The software requires builders and raters to upload REM/Rate files for each submitted home and pulls all data points from the file into the tracking system. The level of detail captured by this tracking system exceeds national best practices. This will be a significant asset to the program. RSR is working with both Nicor Gas and ComEd to establish a system for transferring selected data from HouseRater to the utilities' program tracking databases. RSR has established which data will be transferred, but the method of transfer is being established and is not yet final.

Tracking System Recommendations: The following list summarizes the key recommendations from the study.

- The program should formalize protocols for problem builders and raters. Clearly outlining consequences for problem raters and builders will ensure that the negative effects of these participants can be mitigated efficiently. This process should also incorporate an educational aspect to maintain good relations with as many raters and builders as possible.

- RSR should improve the documentation for the HouseRater tracking system. RSR should also work with Nicor and ComEd to link HouseRater to utility customer information systems. Improved documentation will help new users become familiar with the system much more quickly, and will also facilitate evaluation. Linking to the customer information systems will enable the program to identify homeowners who have purchased program homes.

Process Recommendation: The program should develop a program brand as soon as possible to raise awareness among homeowners. This will help raise awareness among homeowners and the real estate community, which in turn can create demand for program homes as well as increase the market value of the homes.

3.6 Home Energy Report (HER)

The ComEd Home Energy Report (HER)¹⁹ is a behavioral program designed to generate energy savings by providing residential customers with sets of information about customer energy use and energy conservation. 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; and c) information on how their energy use compares to that of neighbors with similar homes. Currently, participating households receive the reports bimonthly. This type of information has been shown in other studies to stimulate customers to reduce their energy use, creating average energy savings in the 1% to 3% range, depending on local energy use patterns. The primary objective of the evaluation was to determine the extent to which participants in each wave of the HER program reduced their energy consumption due to the reports in EPY4, and whether this reduction varied seasonally. No process evaluation was conducted for this program.

The ComEd HER program was rolled out in four waves: A pilot program involving approximately 50,000 residential customers initiated in Summer 2009 (Wave 1); a wave of about 3,000 customers (Wave 2) that started the program in Fall 2010 to fill in for Wave 1 inactive accounts; a major expansion of approximately 200,000 customers in Spring 2011 (Wave 3); and another fill in wave of about 20,000 in Winter 2011-2012 (Wave 4).

Navigant received tracking data and monthly billing data for all program participants and control customers for the period of September 2008 to May 2012. The HER program was implemented by the program implementer as a randomized controlled trial (RCT) in which individuals are randomly assigned to a treatment (participant) group and a control group, for the purpose of estimating changes in energy use due to the program.

Impact Findings:

The program savings for EPY4 are presented in Table 3-10 along with seasonal impacts. Findings include:

- Total program net savings in EPY4 are 66,176 MWh.
- On a percentage basis, savings per customer are highest for Wave 1 participants (2.20%).
- Over the past two years energy savings by Wave 1 customers do not show signs of diminishing.

¹⁹ The program implementer, OPower, designed the program, including the substance of the reports and the allocation of households between participant and control groups.

- On an absolute basis, savings per customer were virtually the same for Wave 1 and Wave 3 customers (see Table 3-10). Navigant expects savings for Wave 3 customers to rise in PY5 only modestly above the 1.66% savings of EPY4.
- On a percentage basis, savings per customer are lowest for Wave 4 participants (1.16%). Participants in this group started receiving reports during the winter of 2011-2012 and their savings are likely in a ramp-up phase. Navigant expects that savings for Wave 4 participants will increase by at least 50% over the next year.

Table 3-10. HER Program EPY4 Verified Savings Estimates

Type of Statistic	Wave 1	Wave 2	Wave 3	Wave 4	Total
	<i>Standard errors are in italics</i>				
Number of Participants	46,142	2,973	193,902	20,188	263,205
Sample Size, Treatment	39,488	2,687	183,288	19,857	245,320
Sample Size, Control	31,350	2,670	45,323	19,898	99,241
Percent Savings	2.20%	1.45%	1.66%	1.16%	
	<i>0.11%</i>	<i>0.39%</i>	<i>0.07%</i>	<i>0.31%</i>	
kWh Savings per customer	330.80	201.48	325.44	28.46	
	<i>16.81</i>	<i>54.77</i>	<i>13.86</i>	<i>7.64</i>	
Total MWh Savings	13,571	559	51,552	494	66,176
	<i>691</i>	<i>151</i>	<i>2078</i>	<i>133</i>	
Verified Net Savings	13,571	559	51,552	494	66,176

Source: Navigant Analysis

The program appears to be performing well and so **impact recommendations** are limited:

- Continue the program in its current form for at least another year.
- If the program is expanded, the evaluator should receive the billing data for the new treatment and control households for the year prior to the date households are added to the program, which is *before* the home energy reports are initially sent to the new treatment households. The evaluator shall verify that the allocation of households across the two groups is consistent with a randomized controlled trial.

3.7 Clothes Washer Rebate

The Clothes Washer Rebate Program (CWR) provides rebates to purchasers of specific clothes washers in an effort to promote upgrading of high-efficiency clothes washers among residential customers of ComEd. The objectives of the evaluation are to: (1) quantify net energy and peak demand savings impacts from the program during Program Year 4 (PY4), (2) determine key process-related program strengths and weaknesses; and (3) provide recommendations to improve the program in the future. The program was implemented and managed by ComEd and APT through various retailers.

To estimate gross energy savings, the Evaluation Team relied on data and the algorithm from the Illinois Technical Reference Manual (TRM)²⁰. The Evaluation Team used the TRM's existing values for evaluating

²⁰ Illinois Statewide Technical Reference Manual, September 14, 2012, pages 296-302 – The September 14, 2012 final version of the first

ex-post savings in this report since there were no ex-ante deemed per-unit savings values for efficient clothes washers in EPY4 - those values are presented, below, in Table 3-11.

Table 3-11. Clothes Washer Savings by Efficiency Level

Efficiency Level ²¹	MEF †	MEF Savings ²² (kWh)
Baseline Efficiency ²³	1.64	0
ENERGY STAR	2.07	130
CEE Tier 2 ²⁴	2.28	177
CEE Tier 3	2.71	248

Source: Illinois TRM

† MEF: Modified Energy Factor, this is a metric to rate efficiency of clothes washers. The units of the MEF are ft³/kWh/cycle.

The evaluation included surveys with program participants and interviews with participating retailers. The participant survey was used to develop the net-to-gross ratio as well as support the process evaluation.

This program had not been evaluated before and so according to the NTG Framework,²⁵ the Net-to-Gross (NTG) ratio was applied retroactively. The ex-ante net energy savings were 1,366 MWh. The evaluation-verified net energy savings were 2,511 MWh; therefore, 184% of the program estimated savings were verified by the evaluation. This was calculated using the default gross per unit energy savings for clothes washers (outlined above in Table 3-11 and, then, the net-to-gross (NTG) factor was applied to the total gross savings. The Evaluation Team calculated a net-to-gross ratio of 0.678, which includes a free ridership rate of 0.322. Table 3-12 compares the ex-ante savings values to the evaluated savings.

Table 3-12. CWR EPY4 Verified Savings Estimates

	Total Number of Units	Gross Energy (MWh) Savings	Research Findings Net Energy (MWh) Savings	Gross Demand (kW) Savings	Research Findings Net Demand (kW) Savings
Ex-Ante EPY4	21,463	2,484	1,366	N/A	N/A
Evaluated EPY4	21,463	3,704	2,511	477	323
Realization Rate	-	149%	N/A†	N/A	N/A

Source: Utility tracking data and Evaluation Team Analysis.

†Realization Rate is based only on Gross Savings Evaluations.

State of Illinois Energy Efficiency Technical Reference Manual (TRM) (effective as of June 1, 2012) has been agreed to by Illinois Stakeholder Advisory Group (SAG) participants and is currently pending approval before the Illinois Commerce Commission in Docket No. 12-0528 as of the date of this report.

²¹ TRM at page 298; These savings are default for the efficiency level if water heating and drying are both 100% electric.

²² MEF (Modified Energy Savings) calculates the amount of dryer energy required to remove remaining moisture from washed items in addition to the water heating energy and machine energy required by the washer. MEF units are expressed as ft³/kWh/cycle

²³ TRM - Average MEF of non-ENERGY STAR units from the California Energy Commission (CEC) database of Clothes Washer products.

²⁴ Consortium of Energy Efficiency (CEE) Tier levels are levels of higher efficiency clothes washers developed by the CEE. The tier levels are developed so that each are a certain percentage above set standards based on energy and water consumption.

²⁵ "Proposed Framework for Counting Net Savings in Illinois." Memorandum March 12, 2010 from Philip Mosenthal, OEI, and Susan Hedman, OAG.

The Evaluation Team also evaluated the verification rate for this program and found it to be 1.00. This is based on 100% of phone survey respondents answering “yes” to the question asking if they recalled purchasing a new clothes washer through the program. The evaluation team found the tracking data to be complete and the data accurately reflects the program. However, review of the per unit savings data in the database was difficult to decipher in its current format and the evaluation team recommends reconfiguring the tracking data so that it can more easily be reviewed.

Impact Recommendations. The following list summarizes the key impact recommendations from the study.

- ComEd should reevaluate their goals based on the evaluated per-unit savings outlined in the next finding. This will provide a more accurate estimate of goals.
- **Default Per Unit Savings.** ComEd should use the above default savings values for program tracking and gross savings estimates. The evaluated NTG value of 0.678 should also be used for net savings estimates.
- **Net Program Impact Analysis.** The design intent of the Clothes Washer Rebate program was to entice low-end clothes washer purchasers to consider an alternative energy-efficient washer. This led to a 0.678 NTG ratio partially due to limiting other higher-end clothes washers (e.g., price and efficiency limitation). It is understood that this is part of the program design; however, if the program considered also targeting higher end clothes washers, the program could witness an improved NTG ratio.

Process Recommendations. The following list summarizes the key process recommendations from the study.

- **Program Awareness Levels.** Remind rebated customers six months to one year after participating in the program by sending a letter, providing a bill insert in participant monthly bills or sending an e-mail. This will remind the customers of their participation, increase awareness and is also an opportunity for ComEd to inform the customer of newer programs.
- **Program Incentive Levels.** Maintain the current rebate level and consider the instant rebate for all future rebate programs, as both the customers and retailers are extremely happy with it.
- **Participant Satisfaction.** Continue to operate the program as is since it will be ending at the end of PY5. However, future programs that look at this program as an example should make sure that the eligible models are as expansive as possible and do not limit the retailers.

3.8 Elementary Energy Education

The Elementary Energy Education (EEE) program is jointly offered by Nicor Gas and ComEd who engaged National Energy Foundation (NEF) to implement the program. The EEE program is branded THINK! ENERGY. In EPY4, the program targeted 5th grade students in public and large private schools that are customers of Nicor Gas or jointly Nicor Gas and ComEd. Schools received an invitation to participate and register to schedule the interactive presentations; alternatively, schools could register on the program website to join a waiting list if the program was fully-enrolled when they registered. Students and teachers are incentivized to return the report cards with a \$100 mini-grant for each class that completes and returns 80% of their cards. Students are also incentivized to receive a program wristband if they complete and return

a card. NEF based the program's savings on the installation rate of implemented measures reported in the household report card against the number of kits that were reported taken home.

The EEE program's primary focus is to produce natural gas and electricity savings in the residential sector by motivating students and their families to take steps through reducing energy consumption for water heating and lighting in their home, a secondary goal of the program is to reduce residential use of water. 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. Navigant primarily used participant surveys and in-depth interviews with program staff to gain an understanding of the program as developed in EPY4. In addition to these surveys and interviews, Navigant also reviewed program plans and other documentation.

Total net electric savings from the program were 478,865 kWh (Table 3-13). Verified gross savings were calculated using IL TRM algorithms and parameters. The NTG ratio was estimated using a participant self-report survey, which produced a NTG for Showerheads of 0.92, Kitchen Aerators 0.92, Bathroom Aerators 0.79, and CFLs 0.73.

The overall participation goal of 10,000 kits distributed (5,000 kits each for Nicor Gas-only and Nicor Gas-ComEd) was nearly met with 4,997 kits distributed to Nicor Gas-only schools, and 4,975 kits distributed to Nicor Gas-ComEd schools.

Table 3-13. EEE Program EPY4 Verified Savings Estimates

	kWh	kW
Ex Ante Gross	583,568	NA
Ex Ante Net	408,498	NA
Verified Gross	634,232	58.3
Verified Net	478,865	43.3
Research Findings NTG Ratio	0.76	0.75

Source: Navigant Analysis

Note: Nicor Gas-only participant electric savings are not included here but will be included in the benefit-cost analysis.

Impact Recommendations. The following list summarizes the key impact recommendations from the study.

- **Finding.** Navigant's survey included students who returned their Home Report Cards (HRCs) and students who did not. Installation rates did not differ across these two groups of students.
- The program should emphasize that the CFLs should replace incandescent and that the HRC include a baseline question.
- In order to address the tracking system inadequacies, the program should review the National Energy Foundation (NEF) tracking system use which creates a single master multi-user tracking database and establishes clear documented procedures for tracking kits, HRCs, and incentives.

Process Recommendations. The following list summarizes the key process recommendations from the study.

- The program should research the installation and fitting problems of the showerheads and aerators (amounts to about one-third of aerators not installed, and a fifth of showerheads).
- Evaluate features of other kitchen aerators and showerheads for consumer satisfaction, functional performance and base household water pressure requirements
- The evaluation team recommends establishing clear protocols and explanatory materials to address situations where original or lead teachers are not present to administer the program, distribute program kits, or deliver program surveys.
- Enhance installation instructions in the kit by providing Spanish language documentation, adding instructional photographs and/or illustrations, adding video tutorial content to the NEF website to further complement the paper-based installation instructions (in English and Spanish).
- Address the trend of not immediately installing CFLs upon using the kit to increase installation rates by providing tips about CFLs that address common concerns and misconceptions (such as that they are a health hazard due to mercury, etc.) and stressing not to wait for an incandescent to burn-out.

3.9 Residential Home Energy Efficiency – Complete System Replacement (CSR)

The Complete System Replacement (CSR) program offers education and cash incentives to ComEd residential customers to encourage purchases of higher efficiency air conditioning equipment in conjunction with the Nicor Home Energy Efficiency Rebate (HEER) Program and North Shore Gas and Peoples Gas' Residential Prescriptive Rebate (RPR) Program which incent installing high efficiency gas furnaces. This program is jointly implemented by the utilities. To be eligible for program rebates, customers must be active residential customers of ComEd and also of Nicor Gas, North Shore Gas, or Peoples Gas. The premises must also be used for residential purposes in existing buildings. Qualified air conditioning units must be purchased at the same time as the qualifying furnaces, and must have a SEER of 14.5 or higher.

The CSR program produced research findings net savings of 376,524 kWh in EPY4 (Table 3-14). The gross realization rate differed by gas utility at 60% for Nicor and 58% for Peoples and North Shore Gas. The evaluation team surveyed participants to measure free ridership. The participants were then stratified by gas utility to mirror each utilities' share of CSR program savings. Free-ridership was averaged across all respondents to calculate the Net-to-Gross ratio. The overall program FR rate is 0.41 for a NTG ratio of 0.59.

Table 3-14. CSR Program EPY4 Research Findings Savings Estimates

	kWh Savings	kW Savings
Ex Ante Gross ²⁶	1,067,555	n/a
Ex Ante Net	629,857	n/a
Research Findings Gross	638,176	850
Research Findings Net	376,524	502
Verified Net Savings	376,524	502

Source: Program tracking data and evaluation analysis

²⁶ Navigant calculated total ex ante gross savings by summing the unit savings in each implementer's tracking data. Since it was the first year for the program, data flow to the ComEd tracking database was not fully synchronized and ComEd agreed that the implementer databases for EPY4 would be more accurate. These savings estimates exceeded ComEd's original planning ex ante values.

Impact Recommendations. The following list summarizes the key impact recommendations from the study.

- The program should establish a clear methodology for calculating unit kWh and kW savings and apply this methodology to all databases. This will increase the accuracy of ex ante savings estimates.
- The program should standardize data tracking fields and an extract template for both implementers to use. In addition to standardizing which fields are included in what order, the content should have identical validation rules (e.g. operable or inoperable, or yes or no, but not both).
- If the program would like to claim early retirement savings in the future, it should establish a clear methodology for determining which units can use an early retirement baseline.
- The program needs to improve the tracking of these key variables, and stands to gain from doing so. Tracking these variables more consistently will improve accuracy of savings estimates, and in the case of installed SEER could improve unit kWh savings by as much as 50 kWh if the installed unit efficiency exceeds the TRM default SEER of 14.5.

Process Recommendations. The following list summarizes the key process recommendations from the study.

- Simplify and clarify the application.
- Work with trade allies to simplify the application procedure.
- Work with trade allies to develop promotional literature that can be used by trade allies to promote the program to their customers, both at the time of purchase and before.
- Given the trade allies important role in the CSR process, the utilities should create an additional incentive or recognition for the trade allies who participate in the program.

3.10 Central Air Conditioning Efficiency Services (CACES)

ComEd's Residential Central Air Conditioning Efficiency Services (CACES) program aimed to increase the efficiency of existing air conditioning equipment and promote the quality installation of high-efficiency equipment in replacement situations and in new construction. The residential CACES program consists of two distinct programs serving different markets through a common marketing and delivery infrastructure. The Diagnostics and Tune-Up program targets improved efficiency for existing residential air conditioning equipment. The Quality Installation program addresses high-efficiency equipment installations for new and replacement air conditioning equipment. Both of these programs are co-marketed and branded as CACES. Because the program's savings did not meet ComEd's expectations for the first two years of the program, ComEd elected to sunset CACES during the middle of EPY4.

The CACES Program achieved 2,571 of Verified Net MWh of savings in EPY4 (Table 3-15). Diagnostics and Tune-Up program savings per participant exceeded ex ante values in EPY4. Planned savings per participant had been sharply reduced to reflect the evaluation results from prior program evaluations.

Table 3-15. CACES Program EPY4 Verified Savings Estimates

	Ex Ante	Evaluated Gross	Evaluated Net	Realization Rate
Participants (#customers)	10,969	10,980	10,980	100.1%
Energy Savings (MWh)	2,484	2,571	2,571	103.5%
Demand Savings (MW)	NA	3.54	3.54	NA

Source: Program Database and Navigant Analysis

3.11 Business Standard

The ComEd Smart Ideas for Your Business program provides incentives for business customers who upgrade their facilities with energy efficient equipment. This incentive program is available to all eligible, nonpublic, commercial and industrial customers in ComEd's service territory. There were two specific program elements that were available to ComEd customers during electric program year 4 (PY4) under the ComEd Smart Ideas for Your Business incentives program: the Standard Program, providing prescriptive incentives, and the Custom Program, where incentives were available to customers for less common or more complex energy-saving measures installed in qualified retrofit and equipment replacement projects. Custom measure incentives were paid based on the first year energy (kWh) savings.

ComEd retained KEMA Services Inc. in June 2008 and KEMA continues to serve as the Standard Program implementer, responsible for day-to-day operations of the program. The basic program design remains largely unchanged from PY3; however ComEd has continued to refine the program in order to meet energy savings goals.

The primary objectives of the Standard evaluation are to conduct savings verification of gross impacts and quantify net impacts, conduct measure and program-level research, determine key process-related program strengths and weaknesses, and identify ways in which the program can be improved. Elements of the Standard program that factored into the EPY4 evaluation include the following:

- The majority of measures offered in the EPY4 Standard Program have deemed gross per unit savings. The EPY4 ex ante and ex post net-to-gross ratio was drawn from EPY2 research.
- ComEd offered larger customers options for technical assistance in identifying projects at their facilities.
- ComEd offered a number of bonus incentives throughout the year to boost participation and savings generated by a number of measures.
- ComEd offered trade allies opportunities to earn performance bonuses based upon how much energy savings they brought into the program.
- ComEd continued to leverage the account manager relationships with their customers to promote the program. For EPY4, goals were set for presentations to Tier 1 customers and for completing Smart Ideas Opportunity Assessments (SIOAs) with customers.

The Standard program produced 234,120 MWh of verified net savings in EPY4 (Table 3-16). Verified gross energy savings were 5 percent lower than ex-ante gross savings reported in ComEd's tracking system, resulting in a realization rate of 0.95 (realization rate = evaluation verified gross / ex-ante gross from the tracking system). The deemed NTG ratio was 0.74.

Table 3-16. Standard Program EPY4 Verified Savings Estimates

Savings Estimates	Energy Savings (kWh)
Ex Ante Gross†	333,030,521
Ex Ante Net‡	246,442,585
Verified Gross	316,378,995
Verified Net	234,120,456

† Source: Ex-ante gross savings from ComEd online tracking system, September 25, 2012.

‡ ComEd's reported net savings are based on a net-to-gross ratio of 0.74.

The relative precision at a 90% confidence level for the Standard projects in the savings verification sample is $\pm 3\%$ for the evaluation verified gross realization rate on ex-ante savings of 0.95.

Impact Recommendations. The following list summarizes the key impact recommendations from the study.

- The evaluation team believes it is reasonable that the net savings for the EPY4 Standard Program be based on application of the Net-to-Gross ratio contained in the Illinois Commerce Commission's Order 10-0570, dated December 21, 2010, that specified a net-to-gross ratio of 0.74 for EPY4, based on evaluation research conducted with EPY2 participants.
- For deemed values it is especially important to record accurate quantities and confirm eligibility. ComEd should consider a reassessment of internal project verification procedures in light of EPY4 evaluation findings and use of deemed measures.
- The need for accurate recording of quantities, measure type, and business type should be stressed with trade allies. Although these types of adjustments might be caught and fixed by increasing the number of on-site pre- and post-inspections by the program, that would not be practical for the large number of small projects in the program.
- Ongoing tracking system verification checks by program staff emphasizing the types of issues found in EPY4 evaluation should be implemented.²⁷ Tracking system related evaluation adjustments might be caught and fixed prior to annual evaluations. Although ComEd and the evaluation team conducted periodic checks during the program year, some incorrect per unit savings values made it to final reporting.

Process Recommendations. The following list summarizes the key process recommendations from the study.

- ComEd should continue to develop tactics to drive website traffic and make sure that the program information appears on areas of the ComEd website that customers most often visit. Customers found the website very useful, however only 59% reported actually going there to learn about the program. The challenge for the Smart Ideas program appears to be in getting customers to the website to begin with.
- ComEd should continue these efforts as well as look for new opportunities to engage the account management channel; perhaps expanding the outreach to smaller managed accounts. ComEd should continue to look for ways to reward top-performing account managers.
- ComEd could produce more industry-specific marketing materials (such as case studies) to help the account managers tailor their presentations to specific customer segments.

²⁷ ComEd indicated this recommended activity is underway in their comments on the draft report for this program.

- ComEd could consider ways in which they could strengthen the ties between account managers and trade allies. This could include having more trade allies present at Lunch-and-Learns for the account managers or having account managers attend Trade Ally Basic Training sessions or events.

3.12 Business Custom

The ComEd Smart Ideas for Your Business program provides incentives for business customers who upgrade their facilities with energy efficient equipment. This incentive program is available to all eligible, nonpublic, commercial and industrial customers in ComEd's service territory. There were two specific program elements that were available to ComEd customers during electric program year 4 (PY4) under the ComEd Smart Ideas for Your Business incentives program: the Standard Program, providing prescriptive incentives, and the Custom Program, where incentives were available to customers for less common or more complex energy-saving measures installed in qualified retrofit and equipment replacement projects. Custom measure incentives were paid based on the first year energy (kWh) savings.

The Custom Program produced verified net savings of 23,892,030 kWh and 2,172 kW in EPY4 (Table 3-17). The EPY4 Research Findings gross realization rate for energy savings is 0.80 and for peak demand savings is 0.93 (gross realization rate = Research Findings gross / ex ante tracking system gross). For EPY4, evaluation verified NTGR of 0.76 is a deemed value derived from PY2 evaluation results.

Table 3-17. Custom Program EPY4 Verified Savings Estimates

Savings Estimates	Energy Savings (kWh)	Peak Demand Savings (kW)
Ex Ante Gross†	39,369,921	3,084
Ex Ante Net‡	29,921,140	2,344
Research-Findings Gross	31,436,881	2,858
Verified Net	23,892,030	2,172

† Source: Ex ante savings from ComEd tracking system, September 25, 2012

‡ Ex ante net savings include a deemed PY2 net-to-gross ratio of 0.76

The relative precision at a 90% confidence level for the Research Findings gross impact results is ± 12% for the kWh Realization Rate and ± 20% for the kW Realization Rate.

The EPY4 energy gross realization rate of 0.80 is commendable for a Custom program. EPY4 gross realization rate results indicate that the smallest projects (stratum 3) (RR = 0.72) realized a lower proportion of their ex ante claims than the largest (stratum 1) (RR = 0.80) and medium projects (stratum 2) (RR = 0.86). The evaluation team hypothesizes that this may be due to program M&V activities being less rigorous for strata 3 projects. The EPY4 energy gross realization rate of 0.80 is lower than the PY3 level of 0.85. For EPY4, the impact sample consisted of a significant number of lighting sites i.e., 16 out of the 33 projects in the impact sample, and the gross realization rate for these projects was typically high which generally improved the program energy realization rate. However, the overall program energy realization rate was pushed somewhat lower by the non-lighting projects. This is due to the complexity involved with non-lighting projects. Projects involving non-lighting end uses such as HVAC, Compressed Air and EMCS require a more in-depth technical review and pose greater challenges for the program in terms of deriving accurate savings estimates.

Impact Recommendations. The following list summarizes the key impact recommendations from the study.

- The program should enhance in-depth technical reviews of assumptions, data analysis and normalization methods used in savings calculations. Such an effort would seek to reduce the frequency of errors and improve impact estimates.
- The program should consider using IPMVP Option A or B retrofit isolation as the primary M&V method instead of Option C (utility meter data analysis), if cost effective. This will improve the certainty in resulting savings estimates.
- The program should collect additional data to more accurately estimate the operating hours for lighting projects. The program should verify in greater detail if the data collected is representative of typical operating conditions.
- The program should collect site specific data and use customized calculation models rather than using a deemed savings approach since the EPY4 program consisted of a significant number of lighting projects it is critical that the program calculations follow a consistent and thorough approach to estimate IE savings for lighting projects.
- ComEd should randomly select a sample (up to 15%) of participants and conduct on-site audits to verify the installed quantities and confirm that the invoices match the actual installed quantities.
- The program should conduct a thorough review of the pre-existing equipment as part of the baseline selection process. The customer or trade ally provided information should be double checked when possible to ensure that the information provided is consistent with the actual existing conditions.
- When selecting baseline for replace-on-burnout (ROB) or natural replacement type projects, the baseline selection should be based on existing code requirements. Illinois currently has International Energy Conservation Code (IECC) 2009 as the commercial energy code. ASHRAE code requirements should only be used in the absence of IECC 2009 code.
- The program should calculate demand savings for all eligible projects and also ensure that the demand savings are populated consistently in the tracking system.

Process Recommendations. The following list summarizes the key process recommendations from the study.

- The number of Custom applications has decreased dramatically year-over-year from PY3 (a 60% drop). To address this, ComEd should consider using the Custom offering to introduce emerging technologies and thereby expand the reach and offering across all program elements. Emerging replacement technologies should be less prone to free ridership, as they represent opportunities for the ComEd Custom program to introduce customers and trade allies to these newer technologies. Conversely, by offering more established technologies the program is exposed to greater potential free ridership.
- ComEd should try and grow the number of non-lighting projects coming through the Custom program.
- ComEd could consider ways in which they could strengthen the ties between account managers and trade allies. This could include having more trade allies present at Lunch-and-Learns for the account managers or having account managers attend Trade Ally Basic Training sessions or other trade ally events to familiarize more account managers with the trade ally network.
- ComEd may consider charging a nominal fee (far below the \$5,000 for the FSA offering) to SIOA participants in order to eliminate customers that do not have any intention of completing projects.

3.13 Business Retro-Commissioning

The ComEd Smart Ideas for your Business Retro-Commissioning Program was offered in partnership with Nicor Gas Energy Efficiency Program and 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 operation, reduce energy use and demand, and, in many cases, improve occupant comfort. The Retro-Commissioning 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.

Significant changes in the program 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:

- Natural gas savings is now addressed in the program through the joint offering with Nicor Gas and Peoples Gas and North Shore Gas. The change accompanies an increased customer spending commitment of \$5,000 or \$10,000, depending on project size.
- ComEd has spun-off Compressed Air and Data-Center retro-commissioning into stand-alone programs more focused on the needs of these segments.
- Multiple-building projects can now be aggregated to reach the 500 peak kW participation requirement. This change enables campuses to include smaller buildings in the program.
- Guidelines were established to allow buildings served by district energy plants to participate.
- The number of eligible commercial building Retro-commissioning Service Providers (RSPs) expanded from eight to 23 commercial building RSPs compared to EPY3.

The Retro-Commissioning Program produced verified net savings of 25,021 MWh and 352 kW in EPY4 (Table 3-18). Ex Ante and Ex Post estimates for electric savings assume a deemed Net-to-Gross (NTG) ratio of 0.926. There were 50 participants in the EPY4 program representing 41 unique customer decision makers.²⁸ Three projects were participants in EPY3 with select measures completed and verified in EPY4. The evaluation estimated free-ridership through participant and RSP surveys. Navigant calculated free-ridership and spillover for each interview and then savings-weighted participant and RSP NTG ratios for the program. Navigant calculated free ridership at 0.097 and spillover at 0.136 for a final Research Findings NTG of 1.038 for electricity.

Table 3-18. Retro-Commissioning EPY4 Verified Savings Estimates

Research Category	Energy Savings (MWh)	Peak Demand Savings (kW)
Ex Ante Gross	29,908	800.2
Ex Ante Net ²⁹	27,395	733.0
Research Findings Gross	27,315	384.3
Verified Net	25,021	352.0

Source: Utility tracking data and Navigant analysis.

²⁸ Three projects were completed at a private university and one corporation completed projects at eight properties in the ComEd service territory.

²⁹ The program-assumed net-to-gross ratio is 0.916 for electricity savings.

Impact Recommendations. The following list summarizes the key impact recommendations from the study.

- Savings is driven largely by effective trade allies. Increasing the number of active trade allies performing more projects will help gas goal achievement.
- Explore ways to encourage use of existing program-standard savings calculators, when the common measures qualify for their use, e.g., less than 75,000 kWh savings.
- During savings-calculation quality control steps, look specifically for interactive and concurrent savings with a checklist by measure type.
- The program should consider making demand savings a contractual goal for the implementation contractor to raise their attention to the issue.
- The program needs to establish a standard methodology for demand savings estimates and those methods must be enforced during quality assurance steps. Accurate accounting for demand savings does contribute to measure payback at the customer level and contributes to the program's success.

Process Recommendations. The following is a list of key process recommendations from the study.

- Because RSPs are the primary conduit for program participation, the IC should stress the importance of completing a project during training and be sure all RSPs clearly understand inactivity and no projects will result in rebid or removal from the program.
- More effort is needed from Program Managers and the IC to engage the participants and keep the implementation phase moving along on a timely basis. Include implementation milestone dates in the implementation phase that will status each recommendation periodically.
- RSPs should be reminded to conduct more implementation follow-up to encourage timely project completion. If this fails to spur implementation, the RSP scoring system should be reviewed to ensure it is not penalizing RSPs for aspects of the program that they have less control over (e.g., implementation timing) or program approaches should be put in place that allow RSPs to guide the participants more actively through the customer-directed phases.

3.14 Business New Construction Service

The Business New Construction Service 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 administrates the program for Nicor Gas.

In EPY4, the program maintained three tracks for projects: Comprehensive, Systems, and Small Buildings. For customers building facilities greater than 50,000 square feet, ComEd and Nicor Gas offered Comprehensive Track incentives for whole-building electric and gas therm savings. In the Comprehensive Track, implementers are highly involved in the design of the building to help bring about savings by combining all building components into a holistic, integrated and efficient design. Through the Systems Track, ComEd and Nicor Gas offered Standard incentives for select window, roof insulation, boiler, lighting, and heating, ventilating, and air-conditioning (HVAC) systems measures to customers with facilities greater than 20,000 square feet. The Small Building Track contained challenging lighting and daylighting requirements for buildings under 20,000 square feet and is only available to ComEd customers. In EPY4 the

program had a mix of Systems Track (44) projects and Comprehensive Track (6) projects.³⁰ There were no projects processed through the Small Buildings Track in EPY4. The program structure is changing in the EPY5 program year to focus more on comprehensive projects.

The Program produced 10,400 MWh and 1.61 MW of net savings (Table 3-19). Verified electric systems track impacts are based on the deemed realization rate (RR). The Systems Track projects' electric energy NTGR is deemed at 0.59 and the Comprehensive Track projects' electric energy research NTGR was evaluated as 0.54. The evaluation did not apply the realization rate or net-to-gross factors to the interactive effects.

Impact Recommendations. The following is a list of key impact recommendations from the study.

- Ensure that the hours of operation are representative of the lighting hours of operation and not the facility business hours.
- If a building includes space types with dramatically differing schedules, input these spaces individually into the workbook in order to more accurately reflect overall facility lighting operation and savings.
- Use regionally appropriate data sources whenever possible. The Illinois technical reference manual (TRM) was not available for this program year, but should be used for prescriptive heating measures in future years.
- Develop a more formal protocol for reaching out to the evaluation team when the implementation team encounters large projects with uncertain baselines or projects where low attribution seems likely.
- The implementation team should review, possibly further develop, and document its free-rider screening process for potential projects. The program's operation manual indicates that the program screens for free riders, but the evaluation results indicate that there are a few participating in the program.

³⁰ Counts of projects paid or with payment requested by end of EPY4. Projects still in verification process at this time will be included in EPY5 evaluation. Program database records show that there were 43 Systems Track projects and 7 Comprehensive Track projects. However, according to other program records and as clarified by the implementer, two of the projects recorded as Comprehensive Track projects finished as Systems Track projects, and one of the projects recorded as a Systems Track project finished as a Comprehensive Track project.

Table 3-19. Business New Construction Program EPY4 Verified Savings Estimates

	ComEd			Nicor Gas		Program Total	
	Peak Demand Savings (MW)	Energy Savings (MWh)	Energy Savings with Interactive Effects (MWh)	Energy Savings (Therms)	Energy Savings with Interactive Effects (Therms) ³¹	Verified Energy Savings (MBtu) ^{**}	Research Energy Savings (MBtu)
Ex ante gross savings*	3.409	20,748	20,748	54,426 §	54,426 §	76,235	76,235
Ex ante net savings†	N/A	12,449	12,449	32,656	32,656	45,742	45,742
Adjusted gross savings †	2.93	18,200	18,200	64,400	63,600	68,700	68,300
Net savings	1.61	10,400	10,400	21,300	20,500	37,600	39,700

* Source: Ex ante savings from program tracking spreadsheet "nc project dump.rdl", July 10, 2012. Nicor Gas submitted a revised filing of 51,293 ex ante therms due to the removal of one project during final reconciliation review; since the evaluation team had already drawn the sample for EPY4, the values in this report reflect the original ex ante therms of 54,426.

† Source: ComEd EPY4 Ex Ante Table; implies a net-to-gross ratio of 0.60

§ Although program records indicate 85,806 gross therms, we only list therm savings for which Nicor Gas paid incentives. Program tracking data includes interactive therms for projects which paid gas incentives.

† Research gross savings for all Comprehensive Track projects and gas Systems Track projects; Verified gross savings for electric Systems Track projects.

** MBtu values are calculated by applying conversion factors to the ex ante MWh and therm values. Verified MBtu were calculated using verified electric Systems Track parameters, Research MBtu were calculated using research results only.

Process Recommendations. The following is a list of process recommendations from the study.

- Ensure that all marketing and program materials are prominently co-branded.
- The implementation team likely has a good understanding of its marketing effectiveness across the many professional organizations it already targets. Per its discretion, it should consider expanding outreach efforts to additional organizations.
- Better describe the program to potential participants by enhancing the program website. Focus groups indicated they need more clarity on program processes.
- Clarify the program's structure and benefits for potential participants by offering training on becoming a program ally.

3.15 Comprehensive Compressed Air Study

ComEd's Smart Ideas for Your Business suite of energy efficiency programs for business customers introduced a new Compressed Air Study Program in EPY4. The program offers a combination of technical assistance and financial incentives. Technical assistance includes a comprehensive compressed air system study which assesses the performance of the facility's industrial compressed air system to ensure efficient, economical operation. This service examines the system's operating pressure, controls sequencing, compressors and more to help identify energy saving measures, using a combination of capital investment and low or no cost measures.

³¹ The difference between the ex post gross therms with and without interactive savings does not match the total interactive effects shown in Table E-2 because one project's interactive savings were already included in the ex ante tracking system therm totals.

The Compressed Air Program produced 2,996,604 kWh and 331 kW of Research Findings net savings in EPY4 (Table 3-20). The EPY4 Research Findings gross realization rate for energy savings was 0.75 and the gross realization rate for demand savings was 0.68 (realization rate = Research Findings gross / ex ante gross). The EPY4 Research Findings net-to-gross ratio (NTGR) for energy savings was 0.67 and the NTGR for demand savings was 0.72. There were nine completing projects in EPY4.

Table 3-20. Compressed Air Study Program EPY4 Verified Savings Estimates

Savings Estimates	Energy Savings (kWh)	Peak Demand Savings (kW)
Ex ante Gross†	5,927,508	680
Ex ante Net‡	4,742,006	544
Research Findings Gross	4,472,612	461
Research Findings Net	2,996,604	331
Verified Net Savings	2,996,604	331

† Source: Ex ante savings from ComEd tracking spreadsheet, September 25, 2012. Research Findings from evaluation research.

‡ Ex ante net savings include an assumed net-to-gross ratio of 0.80

The relative precision at a 90% confidence level, based on the seven completed surveys for the program NTG ratio, is $\pm 10\%$ for kWh and $\pm 12\%$ for kW.

Impact Recommendations. The following list summarizes the key impact recommendations from the study.

- The program should probe more to verify if the facility has any firm plans to change operating conditions in the foreseeable future. The program might also be able to incorporate longer measurement periods and/or pre- and post-installation monitoring in order to ensure better model calibration based on more comprehensive observations of plant operation.
- Since a significant amount of savings for the EPY4 program are from the air leaks repair measure it is critical that the program calculations for this measure follow a consistent and thorough approach for all projects.
- Determine whether pre or post measurement data will require normalization to properly adjust for weekly or seasonal variation, market fluctuations, or to ensure equivalent modeling of operating conditions for the baseline and post-installation estimates. Normalization would ensure that energy savings calculations represent typical annual operating conditions.
- The program should be more focused on verifying whether or not the energy usage, airflow and production data collected represents typical annual operating conditions for the project. The program calculations should verify correlation between energy usage, airflow (CFMs) and production where possible and methodically select the normalization parameter to improve the accuracy of estimated savings.
- The program should select baselines based on standard industry practice or minimum efficiency equipment available in the market as a replacement option (e.g., Use AIRMaster+ for selecting minimum efficiency options for air compressors).
- The program should continue to take measurements for pre retrofit and post retrofit conditions. Additionally, the program should notify customers that the program requires production data for

the pre and post periods and also annual production data to accurately model the final savings estimates.

- An approach to reducing free ridership is for program administrators to exclude projects from the program that they believe have a high probability of being free riders. Similarly, if there is evidence that the program did not contribute significantly to the decision to install a particular measure or equipment type then an incentive may not be warranted.

Processes Recommendations: The following is a list of key process recommendations from the study.

- Make the program rules and requirements more clear as much as possible. Facilitate improving communication among all of the players involved. Provide clear direction to the team in terms of roles and expectations. Strong communication and clear expectations are crucial to the success of the program.
- Increase ongoing communications with customers. Consider increasing efforts to publicize the program, and developing additional technical briefs that provide information about each type of energy savings measure.
- The program should use this feedback to improve program processes, and also independently gather information from Compressed Air Service Providers (CASP's) about project experiences to inform program improvements.
- CASPs will be an important factor for the success of the program since they play key roles in various program activities. The program administrators should increase the pool of qualified service providers under the program in order to increase program participation, and expand program reach and offerings.

3.16 Data Centers Efficiency Program

ComEd's Smart Ideas for Your Business suite of energy efficiency programs for business customers introduced the Data Centers Efficiency Program in EPY4. The Data Centers Efficiency program provides incentives to both new and existing data centers for implementing energy efficiency measures. In EPY4, a total of two projects were completed as part of the Data Centers program. For the EPY4 impact evaluation, gross impact results were developed based on detailed M&V analysis performed for the two projects and net impact results were developed based on survey data collected for the two projects.

The Data Centers Efficiency Program produced Research Findings net savings of 1,840,104 kWh and 133 kW in EPY4 (Table 3-21). The EPY4 evaluation calculated a gross energy savings realization rate of 0.80 (realization rate = Research Findings gross / ex ante gross) and a net-to-gross ratio of 0.43 for energy savings. The NTGR was assessed using a self-report approach supported by data collected during participant phone surveys. No realization rate was calculated for gross demand savings since there were no ex ante demand savings reported.

Impact Recommendations. The following list summarizes the key impact recommendations from the study.

- The program should calculate peak kW savings for all completed projects. The program should also ensure that calculated peak kW savings are reported consistently in the program tacking system.
- The program should attempt to collect power factor and voltage readings through spot measurements. This will allow for an accurate estimation of the equipment power (kW) consumption. In addition, spot kW measurements can help verify or calibrate logged data.

- To increase the program NTG score, the program should attempt to minimize cases where the customer has already decided to install the same equipment at the same time in the absence of program incentives.

Table 3-21. Data Centers Efficiency Program EPY4 Verified Savings Estimates

Savings Estimates	Energy Savings (kWh)	Peak Demand Savings (kW)
Ex ante Gross†	5,382,384	0
Ex ante Net‡	4,305,907	0
Research Findings Gross	4,323,193	212
Research Findings Net	1,840,104	133
Verified Net Savings	1,840,104	133

Source: Evaluation analysis and ComEd tracking data.

† Ex ante gross savings estimates reported by ComEd

‡ Ex ante net savings include an assumed net-to-gross ratio of 0.80

3.17 Mid-Stream Incentives Lighting

The Mid-Stream Incentives Lighting (MSI) program provided incentives to increase the market share of qualified compact fluorescent lamps (CFL) sold to business customers. The MSI Program was launched as a pilot in PY3. The program was designed to provide an expedited, simple solution to business customers interested in purchasing efficient lighting by providing an instant discount at the point of sale. The program targeted distributors whose customer base is predominantly end-users, as opposed to those mostly selling to contractors. As of the end of EPY4, program bulbs had been sold through a total of 18 unique distributors,³² which represents a significant increase from the four distributors enrolled as of the end of the PY3 pilot.

The MSI program produced Research Findings net savings of 63,358 MWh and 10.7 MW of peak demand savings in EPY4 (Table 3-22). The NTGR was calculated using a customer self-report method based on data collected during the end user telephone surveys. An overall NTGR estimate of 0.63 was applied to all program bulb types (the number of end user survey completes did not allow for the estimation of NTGR by program bulb type).

Table 3-22. MSI Program EPY4 Research Findings Savings Estimates

Savings Estimate	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex Ante Unadjusted Gross	108,783	-	-
Ex Ante Net	45,689	-	-
Unadjusted Research Findings Gross	123,414	29.1	17.8
Research Findings Gross	101,230	21.1	17.0
Research Findings Net	63,358	13.2	10.7
Verified Net Savings	63,358	13.2	10.7

Source: Evaluation Team Analysis

³² Many of these 18 distributors sold program bulbs through multiple storefronts, and thus the total number of retail locations that sold program bulbs in PY4 was 75 based on program tracking data.

Impact Recommendations. The following list summarizes the key impact recommendations from the study.

- The program tracking system should switch to a bulb-type lumen mapping. Using a lumen-based method that also relies on bulb shape provides a more robust means of establishing base wattage equivalents across all bulb types, especially specialty CFLs and LEDs.
- ComEd should ensure the end-user contact information is available for PY5 sales so that a larger end-user telephone survey can be conducted. A larger sample would allow for correlations between bulb type and quantity of program bulbs purchased (as well as potentially other segmentation variables, such as end user business type) to be evaluated in a robust and multifaceted manner.
- The EPY4 evaluation of NTGR was constrained by the small sample of customers the evaluation team was able to conduct telephone surveys with due to limited contact information. The evaluation team recommends working closely with program distributors to ensure end user contact data is available to the evaluation team in order to increase the robustness and segmentation used to evaluate the MSI NTGR in PY5.

Process Recommendations. The following is a list of key process recommendations from the study.

- ComEd should develop the list of qualifying products for each program year as soon as possible. Some distributors recommended developing this list sooner than the program has in the past because of amount of time it takes to ensure that all lighting products offered adhere to the requirements of the program.
- ComEd is encouraged to consider developing and sharing enhanced marketing and education materials with distributors to help them better promote the program and highlight the energy savings resulting from switching to CFLs to customers.
- ComEd should consider using EISA 2007 to educate customers about CFLs and other efficient lighting products, as well as proper replacement of efficient lighting. Commercial customers are typically more informed than residential customers about existing regulations.
- The evaluation team recommends that ComEd work with distributors to ensure that effective CFL disposal practices for commercial customers are in place.

3.18 Small Business Energy Savings

The Small Business Energy Savings (SBES) Program is designed to achieve energy savings goals by educating ComEd/Nicor Gas and ComEd/Peoples Gas/North Shore Gas non-residential customers about electric and natural gas opportunities through on-site assessments. Energy advisors from Peoples Gas/North Shore Gas implementer Franklin Energy or Nicor Gas implementer Nexant conduct a high-level walk-through assessment of each site. Customers achieve immediate savings with the direct installation of specific products during the assessment at no cost to them. The no-cost measures promoted by the program include the direct installation of low-flow faucet aerators and showerheads, pre-rinse spray valves, vending machine controls, and compact fluorescent lights. Nexant and Franklin Energy tested offering free installed programmable thermostats to encourage customers to participate in the assessments. Further savings are offered to customers through incentives of 30 to 70 percent for select, low-cost natural gas and electric energy efficiency measures that may be installed by a local contractor at a second on-site visit. If the premise is rented, the program implementer coordinates with the landlord/property owners.

The verification impact evaluation compared the program savings calculations to the State of Illinois Technical Reference Manual (TRM).

The SBES program produced 9,009,031 kWh of verified net energy savings and 1,677 kW of peak demand savings (Table 3-23). The gross realization rate was 1.03 for electric savings. The evaluation calculated free-ridership using an algorithm approach based on interview results from participating customers supported by data collected through in-depth trade ally interviews. The existence of spillover was examined using survey self-report data and trade ally self-report data. The NTGR for electric savings was 0.95. Three small participant spillover projects were included in the ComEd NTGR, but the impact (about 0.003 added) was not significant at the two-digit level. Trade allies reported no non-participant spillover for gas measures. Trade allies provided anecdotal evidence of non-participant spillover for electric measures, but they did not provide enough information to quantify it.

Table 3-23. Small Business Energy Savings Program EPY4 Verified Savings Estimates

Savings Estimate	EPY4 ComEd Electric Energy Savings (kWh)	EPY4 ComEd Electric Peak Demand Reduction (peak kW) [†]	GPY1 Nicor Gas Natural Gas Energy Savings (Therms) ³³ (Corrected TRM Algorithm)
Ex-Ante Gross [†]	10,728,417 ³⁴	NA	109,353
Ex-Ante Net [‡]	8,582,734	NA	87,482
Tracking System Ex-Ante Gross	9,206,981	1,704	NA
Verified Gross	9,483,190	1,755	109,353
Verified Net	9,009,031	1,677	109,353

[†] Source: Electric ex-ante gross savings from ComEd online tracking system, October 29, 2012. Nicor Gas ex-ante savings from an extract dated October 6, 2012.

[‡] ComEd ex-ante net savings shown here is an evaluation estimate that applied a NTGR of 0.80 to the ex-ante gross savings. Nicor Gas ex-ante net savings includes a NTGR of 0.80.

The relative precision at a 90% confidence level is ± 5 percent for the electric gross impact savings verification sample, and ± 3 percent for the electric NTG sample. The relative precision at a 90 percent confidence level is ± 10 percent for the gas NTG sample, and no evaluation adjustments were made as a result of the gross impact verification of gas measures.

Impact Recommendations. The following list summarizes the key impact recommendations from the study:

- Implementers should reinforce with trade allies the importance of accurate invoicing that reflects final customer decisions regarding installed measures.
- While some level of post-installation adjustment to quantities is to be expected, implementers should monitor participant satisfaction regarding lighting levels.
- There are three areas of higher uncertainty that require attention in the second program year: lighting hours of use, heating equipment capacities, and programmable thermostat per-unit savings.

Process Recommendations. The following is a list of key process recommendations from the study.

- Lighting-only firms participated at twice the rate of HVAC-only firms in EPY4. Nexant has been actively recruiting more HVAC contractors and mechanical engineering firms. The Evaluation Team

³³ Verified gross and net savings match ex ante gross savings for Nicor Gas due to a verified gross realization rate of exactly 1.00, and a NTGR of 1.00 when rounded to two decimal places of precision.

³⁴ Derived by Evaluation staff from ComEd's tracking system data.

advises Nexant to concentrate on HVAC firms that are willing to enter partnership relationships with lighting companies and that are in less-covered geographic areas.

- Small business customers are ‘low information’ customers and it will take time and resources for their knowledge base to catch up with that of larger customers.
- ComEd needs to continue general advertising of the SBES Program to increase customer awareness and receptivity and promote the program.
- Customers should be required to sign a change-order (tracking) form if they change the scope of the project substantially to ensure that the changes to measure quantities are recorded in the tracking system for evaluation purposes.³⁵

3.19 Commercial and Retail Internet Protocol Thermostat and Controller Program

The Commercial and Retail Internet Protocol Thermostat and Controller Program is a third-party provider program run by RLD Resources. The program targets small to mid-size office buildings and retail stores (100 kW– 400 kW) as well as local Heating Ventilation and Air Conditioning (HVAC) contractors and Building Automation System (BAS) contractors. For the contractors, the program provides marketing and technical training, devices (kits) and monitoring. RLD provides incentives to the contractors for installing IP thermostat kits. An incentive of \$0.04/kWh saved up to \$500 is offered for participation in the program.

Navigant reviewed the estimated savings and savings calculations for the seven installations in EPY4 and determined that industry standard protocols and approaches were used in the savings calculations. The seven installations completed in EPY4 produced 34,433 kWh of evaluation-verified gross savings. Since there was too few participants to warrant a free ridership study the evaluation applied a net-to-gross rate of 1.0 to calculate net savings. The table below shows the savings calculations parameters.

Given the state of the program development, the evaluation team developed no impact or process recommendations.

Table 3-24. Thermostat Program EPY4 Verified Savings Estimates

Parameter	Evaluation-Verified Value	Source Notes
Evaluation–Verified Gross Savings kWh/Participant	4,919	RLD Data extract and savings calculations, 10/3/2012
Participants	7	RLD Data extract and savings calculations, 10/3/2012
Evaluation–Verified Gross Total Savings kWh	34,433	RLD Data extract and savings calculations, 10/3/2012
Net-to-Gross Ratio	1.0	Default assumption lacking any evidence to the contrary
Verified Net Total Savings kWh	34,433	Calculation

Source: Evaluation research

³⁵ In PY2/5 Nexant is requiring customers to sign or initial a revised Installation Agreement with the scope changes noted.

Appendix A. ComEd EPY4 Program Evaluation Reports

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

1. Total Resource Cost Test Assumptions
2. Residential ENERGY STAR Lighting
3. Residential Fridge and Freezer Recycle Rewards
4. Multi-Family Home Energy Savings (Multi-Family or MFHES) – includes joint reports
5. Home Energy Savings (HES)
6. Residential New Construction
7. Home Energy Report (HER)
8. Clothes Washer Rebate
9. Elementary Energy Education
10. Residential Home Energy Efficiency – Complete System Replacement (CSR) – includes joint reports
11. Central Air Conditioning Efficiency Services (CACES)
12. Business Standard
13. Business Custom
14. Business Retro-Commissioning
15. Business New Construction Service
16. Comprehensive Compressed Air Study
17. Data Centers Efficiency Program
18. Mid-Stream Incentives Lighting
19. Small Business Energy Savings – includes joint reports
20. Commercial and Retail Internet Protocol Thermostat and Controller Program