



ComEd Instant Discounts Impact Evaluation Report

Energy Efficiency / Demand Response Plan:
Plan Year 9 (PY9)

Presented to
Commonwealth Edison Company

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TABLE OF CONTENTS

- 1. Introduction 1
- 2. Program Description 1
- 3. Program Savings..... 2
- 4. Program Savings by Measure..... 3
- 5. Impact Analysis Findings and Recommendations 5
 - 5.1 Impact Parameter Estimates..... 5
 - 5.2 Other Impact Findings and Recommendations..... 6
- 6. Appendix 1. Impact Analysis Methodology 7
 - 6.1 Tracking System Review..... 7
 - 6.2 Program Volumetric Detail 8
 - 6.3 Gross Program Impact Parameter Estimates 9
 - 6.3.1 Unit Sales 11
 - 6.3.2 Delta Watts 12
 - 6.3.3 Installation Rates 12
 - 6.3.4 Residential/Non-residential Installation Location Split 12
 - 6.3.5 Leakage 12
 - 6.3.6 Hours of Use and Interactive Effects 12
 - 6.4 CY2018 Carryover Savings Estimate 13
- 7. Appendix 2. TRC Detail..... 15

LIST OF TABLES AND FIGURES

- Figure 2-1. Number of Measures Installed by Type..... 2
- Table 2-1. PY9 Volumetric Findings Detail 2
- Table 3-1. PY9 Total Annual Incremental Savings 3
- Table 3-2. PY9 Total Annual Incremental Savings (Detail) 3
- Table 4-1. PY9 Energy Savings by Measure 4
- Table 4-2. PY9 Demand Savings by Measure..... 4
- Table 4-3. PY9 Peak Demand Savings by Measure 5
- Table 5-1. Verified Gross Savings Parameters..... 6
- Table 6-1. Distribution of End-User Business Types 8
- Table 6-2. PY8 Volumetric Findings Detail 9
- Table 6-3. Verified Gross Savings Parameters..... 10
- Table 6-4. Verified Gross Savings Parameters – Residential vs. Non-Residential 11
- Table 6-5. CY2018 Verified Savings Carryover Estimate 14
- Table 7-1. TRC-Related Data 15

1. INTRODUCTION

This report presents the results of the impact evaluation of ComEd's Program Year 9 (PY9) Business Instant Discounts Program. It includes a summary of the energy and demand savings impacts for the total program and is also broken out by relevant measure and program structure details. Section 6 (Appendix 1) presents the impact analysis methodology. PY9 covered the time between June 1, 2016 through December 31, 2017.

2. PROGRAM DESCRIPTION

The Business Instant Discounts Program provides incentives to increase the market share of energy efficient products commonly sold to business customers. The Instant Discounts Program was launched as a pilot in PY3 and became a full-scale program in PY4.¹ The program was designed to provide an expedited, simple solution to business customers interested in purchasing efficient lighting by providing instant discounts at the point of sale. The Instant Discounts Program also offers commercial, industrial and contractor customers discounts, at the time of sale, on high-efficiency battery chargers.

At this time, the Instant Discounts Program provides incentives on a mix of standard and specialty LEDs (lamps and fixtures), LED exit signs, linear fluorescent (LF) lamps, tubular LEDs (TLEDs), and battery chargers. The PY9 rebate values vary by technology, as follows:

- LED lamps (screw based and pin based) \$2 to \$10.
- LED trim kits \$2 to \$10
- LED exit signs \$5 to \$20
- Linear fluorescent lamps \$1
- TLEDs \$5
- Industrial battery chargers \$185 per unit.

In PY9, Instant Discounts Program sales came from a total of 83 unique distributors (this is a decrease from 88 unique distributors in PY8). Instant Discounts products were sold to approximately 6,500 unique end users.² All Instant Discounts Program unit sales were delivered via the "distributor program." In prior program years, a small fraction of products was sold through a "retail program," which sells bulbs directly to contractors through the pro desk of major Do-it-Yourself retailers, but this delivery channel was not included in the PY8 or PY9 programs.

The program distributed 2,053,214 measures in PY9, comprised of 38% LED lamps, 41% TLEDs, 15% linear fluorescents, and 5% LED fixtures as shown below in Table 2-1 and Figure 2-1.³

¹ The Instant Discounts Program was initially branded as the Midstream Incentive Program and was rebranded as the Business Instant Lighting Discounts program in PY5. In PY9, it was rebranded again as Instant Discounts due to the inclusion of non-lighting products.

² The exact number of unique end-users is unknown due to multiple various name and address combinations for the same end-user in the tracking data.

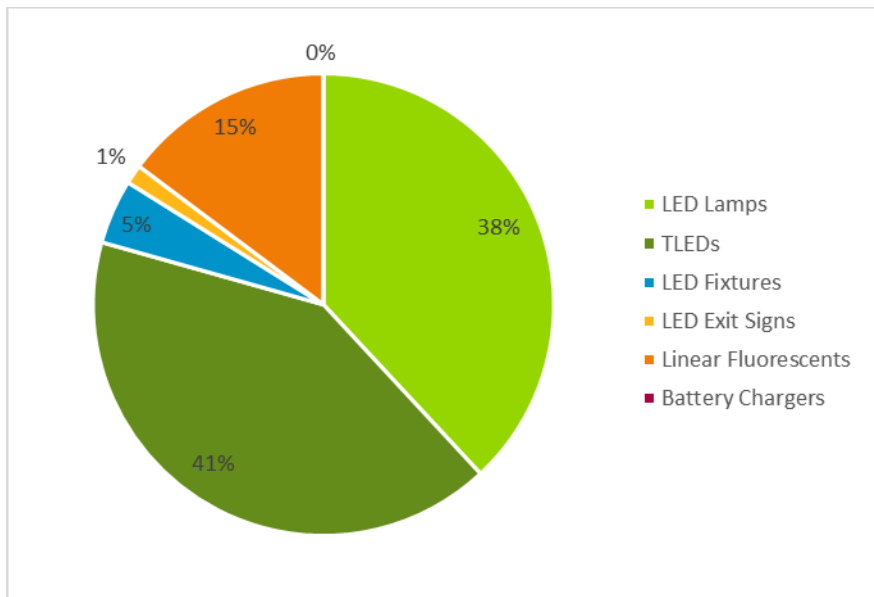
³ These totals reflect the ex post deductions resulting from false transactions identified by ComEd as part of their QA/QC process and reviewed by the evaluation team. See False Transactions memo dated January 18, 2018.

Table 2-1. PY9 Volumetric Findings Detail

Participation	Total	LED Lamps	TLEDs	LED Fixtures	LED Exit Signs	Linear Fluorescents	Battery Chargers
PY9 Incentivized Units	2,053,214	781,645	847,833	92,651	27,754	303,331	169
PY9 1st Year Installed Units	1,892,091	674,119	806,840	87,954	27,413	295,598	168
PY7 Carryover – PY9 Installs	43,544	33,268	0	3,153	0	7,123	0
PY8 Carryover – PY9 Installs	25,466	16,567	0	3,356	0	5,543	0
Total Installed Units in PY9	1,961,102	723,955	806,840	94,462	27,413	308,265	168

Source: ComEd tracking data and Navigant team analysis.

Figure 2-1. Number of Measures Installed by Type



Source: ComEd tracking data and Navigant team analysis.

3. PROGRAM SAVINGS

Table 3-1 summarizes the incremental energy and demand savings the Instant Discounts Program achieved in PY9. The values in Table 3-1 include carryover savings from PY7 and PY8 as well as deductions from false transactions that were discovered through ComEd’s QA/QC process. Additional detail, with carryover and false transactions⁴ broken out, can be found in Table 3-2.

⁴ Power Energy Solutions is a former distributor for the Instant Discounts program that was found to have submitted false transactions and invoices in PY9. Recommendations for deducting associated savings can be found in the memo titled “PY9 ComEd Business Instant Lighting Discounts Program – Power Energy Solutions Data Investigation and Transaction Verification,” dated 1/17/2018.

Table 3-1. PY9 Total Annual Incremental Savings

Savings Category	Energy Savings (kWh)	Demand Savings (kW)	Peak Demand Savings (kW)
Ex Ante Gross Savings	256,341,662	67,419	NR
Program Gross Realization Rate	92%	91%	N/A
Verified Gross Savings	236,476,312	61,107	46,895
Program Net-to-Gross Ratio (NTGR)	0.77	0.77	0.77
Verified Net Savings	182,812,031	47,197	36,253

Source: ComEd tracking data and Navigant team analysis.

Table 3-2 includes additional savings detail, including line items for carryover and false transactions adjustments. The false transactions adjustment resulted in a 26,033,694 kWh deduction in PY9, but some of this will be recouped in the next two years as carryover. The CY2018 additions are included the carryover appendix section of this report.

Table 3-2. PY9 Total Annual Incremental Savings (Detail)

Savings Category	Energy Savings (kWh)	Demand Savings (kW)	Summer Peak Demand Savings (kW)	Winter Peak Demand Savings (kW)
Ex Ante Gross Savings	240,343,911	62,906	NR	NR
Ex Ante Gross Carryover	15,997,751	4,513	3,175	3,035
Ex Ante Total Gross Savings	256,341,662	67,419	NR	NR
Program Gross Realization Rate	92%	91%	NR	NR
Verified Gross Program Savings	246,512,256	63,038	48,718	45,767
Verified Gross Carryover Savings	15,997,751	4,513	3,175	3,035
False Transactions Adjustment	-26,033,694	-6,445	-4,998	-4,612
Verified Total Gross Savings	236,476,312	61,107	46,895	44,190
Program Net-to-Gross Ratio (NTGR)	0.77	0.77	0.77	0.77
Verified Net Program Savings	171,804,652	44,101	34,067	32,070
Verified Net Carryover Savings	11,007,378	3,096	2,186	2,089
Verified Net Savings	182,812,031	47,197	36,253	34,159

Source: ComEd tracking data and Navigant team analysis.

* PY9 sales only, excludes carryover

4. PROGRAM SAVINGS BY MEASURE

The program includes six measure types, as shown in the following table. LED lamps and TLEDs contributed the most energy savings (71% and 23%, respectively). The 93% realization rate for LED Fixtures and the 108% realization rate for Linear Fluorescents are due in large part to differences in applied hours of use. The 105% realization rate for TLEDs is driven by adjusted calculations for measure wattages. Additional details on these differences and adjustments can be found in Section 6 (Appendix 1).

Table 4-1. PY9 Energy Savings by Measure

Enduse Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTGR *	Verified Net Savings (kWh)	Technical Measure Life	Persistence	Effective Useful Life (EUL)†
Lighting	LED Lamps	167,812,981	99%	166,020,032	0.78	129,495,625	9	N/A	9
Lighting	TLEDs	51,490,944	105%	54,270,248	0.78	42,330,793	14	N/A	14
Lighting	LED Fixtures	16,075,538	93%	14,873,973	0.78	11,601,699	11	N/A	11
Lighting	LED Exit Signs	5,220,443	101%	5,273,912	0.78	4,113,652	8	N/A	8
Lighting	Linear Fluorescents	5,182,853	108%	5,620,860	0.75	4,215,645	11	N/A	11
Power Electronics	Battery Chargers	453,231	100%	453,231	0.78	353,520	20**	N/A	20**
	Carryover	15,997,751	100%	15,997,751	0.78	11,007,378	N/A	N/A	N/A
	False Transactions	-5,892,079	N/A	-26,033,694	0.78	-20,306,282	N/A	N/A	N/A
Total		256,341,662	92%	236,476,312	0.77	182,812,031			

Source: ComEd tracking data and Navigant team analysis.

* A deemed value. Source: ComEd_NTG_History_and_PY9_Recommendations_2016-02-26_Final.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

** 20-year technical measure life as per PG&E workpaper

† EUL is a combination of technical measure life and persistence. Persistence has not yet been quantified by the evaluation team, so EUL is equal to technical measure life (rated hours / HOU) and is currently capped at 15 years for all commercial lighting measures.

Table 4-2 presents the PY9 demand savings by measure category, including carryover and false transactions adjustments. The major driver of the differences in verified and ex ante savings are delta watts and the residential and non-residential splits. Differences in these applied parameters have a larger percentage impact on demand realization rates, given the smaller units of savings. Additional details on these adjustments can be found in Section 6 (Appendix 1).

Table 4-2. PY9 Demand Savings by Measure

Enduse Type	Research Category	Ex-Ante Gross Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Demand Reduction (kW)	NTGR*	Verified Net Demand Reduction (kW)
Lighting	LED Lamps	43,762	97%	42,364	0.78	33,044
Lighting	TLEDs	14,353	101%	14,454	0.78	11,274
Lighting	LED Fixtures	4,196	98%	4,115	0.78	3,210
Lighting	LED Exit Signs	586	93%	543	0.78	424
Lighting	Linear Fluorescents	1,479	95%	1,405	0.75	1,054
Power Electronics	Battery Chargers	66	238%	156	0.78	122
	Carryover	4,513	100%	4,513	0.78	3,096
	False Transactions	-1,536	N/A	-6,445	0.78	-5,027
Total		67,419	91%	61,107	0.77	47,197

Source: ComEd tracking data and Navigant team analysis.

* A deemed value. Source: ComEd_NTG_History_and_PY9_Recommendations_2016-02-26_Final.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

Table 4-3 shows the verified summer peak demand reduction from each measure category. Ex ante peak demand reductions were not reported (NR).

Table 4-3. PY9 Peak Demand Savings by Measure

Enduse Type	Research Category	Ex-Ante Gross Peak Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Peak Demand Reduction (kW)	NTGR*	Verified Peak Net Demand Reduction (kW)
Lighting	LED Lamps	NR	N/A	32,233	0.78	25,141
Lighting	TLEDs	NR	N/A	11,374	0.78	8,872
Lighting	LED Fixtures	NR	N/A	3,142	0.78	2,450
Lighting	LED Exit Signs	NR	N/A	753	0.78	587
Lighting	Linear Fluorescents	NR	N/A	1,151	0.75	863
Power Electronics	Battery Chargers	NR	N/A	66	0.78	51
	Carryover	NR	N/A	3,175	0.78	2,186
	False Transactions	NR	N/A	-4,998	0.78	-3,898
	Total	NR	N/A	46,895	0.77	36,253

* A deemed value. Source: ComEd_NTG_History_and_PY9_Recommendations_2016-02-26_Final.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

5. IMPACT ANALYSIS FINDINGS AND RECOMMENDATIONS

5.1 Impact Parameter Estimates

Energy and demand savings are estimated using the following formula as specified in the TRM:

Verified Gross Annual ΔkWh = Delta Watts/1000 * ISR * (1-Leakage) * HOU * IEe

Verified Gross Annual ΔkW = Delta Watts/1000 * ISR * (1-Leakage)

Verified Gross Annual Summer Peak ΔkW = Gross Annual ΔkW * Summer Peak CF * IEd

Where:

- Delta Watts = Difference between Baseline Wattage and measure Wattage
- HOU = Annual Hours of Use
- IEe = Energy Interactive Effects
- Leakage = % of Program Bulbs installed outside of ComEd Service Territory
- Summer Peak CF = Peak load coincidence factor, the percentage of Program Bulbs turned on during summer peak hours (weekdays from 1 to 5 p.m.)
- IEd = Demand Interactive Effects

The lifetime energy and demand savings are estimated by multiplying the verified savings by the effective useful life for each measure.

The EM&V team conducted research to validate the parameters that were not specified in the TRM. The results are shown in the following table.

Table 5-1. Verified Gross Savings Parameters

Verified Savings Parameters	Data Source	Deemed or Evaluated?
Program Bulbs	PY9 Program Tracking Data	Evaluated
Delta Watts	Illinois TRM v5	Deemed
Installation Rate	Illinois TRM v5	Deemed
Leakage	PY9 End User Surveys	Evaluated
Res / Non-Res Split	Illinois TRM v5	Deemed
Hours of Use (HOU)	Illinois TRM v5	Deemed
Summer Peak Coincidence Factor (CF)	Illinois TRM v5	Deemed
Energy Interactive Effects	Illinois TRM v5	Deemed
Demand Interactive Effects	Illinois TRM v5	Deemed
NTGR†	IL Stakeholder Advisory Group website	Deemed

† A deemed value. Source: ComEd_NTG_History_and_PY9_Recommendations_2016-02-26_Final.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

5.2 Other Impact Findings and Recommendations

This section summarizes the key impact findings and recommendations.

Program Tracking Data Review

Finding 1. Overall, the tracking data was very accurate in terms of bulb information and application of the IL TRM v5.0. The bulb information provided (wattages, center beam candlepower (CBCP), beam angle, lamp diameter, and LED directional shape) was complete and accurate for most of the measures.

Verified Gross Impacts and Realization Rate

Finding 2. The PY9 gross realization rate on this savings estimate is 92 percent. However, this realization rate is distorted by the false transactions adjustment, without which the realization rate would have been 100.1 percent. Reductions in verified savings were also adjusted since ex ante estimates do not include a residential and nonresidential split. The IL TRM specifies a split of 4 percent residential and 96 percent commercial for LED lamps and one percent / 99 percent for linear fluorescent lamps. Commercial installations have higher deemed hours of use and interactive effects values than residential installations, so attributing savings to residential installs has a downward impact on savings.

Recommendation 2. ComEd could improve their ex ante savings estimates by establishing preliminary business types for end users where possible and applying the associated parameters from the TRM. Estimates could also be improved by applying the deemed residential and nonresidential splits and the other appropriate deemed residential parameters (hours of use, interactive effects, etc.).

6. APPENDIX 1. IMPACT ANALYSIS METHODOLOGY

This section presents the methods associated with the verified gross impact findings.

6.1 Tracking System Review

The tracking system review in the PY9 BILD Program was an iterative process. ComEd provided a comprehensive dataset that only included current program year records based on collaboration with the evaluation team from the previous year. Initial checks ensured that the current program year records were complementary and non-overlapping with bulb sales attributed to previous program years. Records were also checked to verify that the bulbs were bought and installed in ComEd territory in the PY9 date range.

The evaluation team also strived to assign business types to large transactions, as specified in the IL TRM. For the top 50% of non-contractor sales volume, the evaluation team used the business name to assign a more accurate business type to each end user, as specified in the IL TRM v5.0. Additionally, where the evaluation team identified the purchaser as a contractor, the business type was also assigned as “Unknown” because contractors may install lamps at a variety of business types. After this process, the evaluation team was able to establish business type for 11 percent of Instant Discounts transactions (29 percent of total sales volume). Table 6-1 shows the distribution of the assigned business types used in the analysis. The evaluators recommend that ComEd and the implementation team continue to work collaboratively with evaluation efforts to improve business type assignments.

Table 6-1. Distribution of End-User Business Types

End-User Business Type	Transactions	Percent	Total Units Sold	Percent
Assisted Living	176	1%	14,150	1%
College	209	1%	62,777	3%
Elementary School	16	0.0%	7,344	0.4%
Garage, 24/7 lighting	2	0.0%	1,202	0.1%
Grocery	46	0.1%	26,038	1%
Healthcare Clinic	551	2%	44,842	2%
High School	20	0.1%	4,586	0.2%
Hospital - CAV econ	632	2%	37,341	2%
Hotel/Motel - Common	193	1%	22,750	1%
Hotel/Motel - Guest	233	1%	32,171	2%
MF - High Rise - Common	226	1%	36,219	2%
MF - Mid Rise	72	0.2%	12,455	1%
Manufacturing Facility	282	1%	70,903	4%
Movie Theater	3	0.0%	1,149	0.1%
Office - High Rise - CAV econ	309	1%	30,080	2%
Office - Low Rise	135	0.4%	45,287	2%
Office - Mid Rise	115	0.4%	21,824	1%
Religious Building	59	0.2%	10,103	1%
Retail - Department Store	28	0.1%	13,090	1%
Retail - Strip Mall	28	0.1%	5,949	0.3%
Unknown	16,951	52%	712,250	37%
Warehouse	202	1%	51,876	3%
Contractor (Unknown)	11,818	37%	644,474	34%

Source: ComEd tracking data and Navigant team analysis.

The evaluation team also reviewed lamp information by manufacturer and model number. The wattage and lumens were verified for the top two-thirds (66.7 percent) of lighting sales volume. For directional LEDs, candela, beam spread, and lamps, diameter was also verified. This resulted in a handful of minor changes to these fields to increase the accuracy of impact calculations. The evaluation team also looked up reflector types (e.g., PAR38, BR20, etc.) for each of the directional LEDs. These are necessary to use the lumen mappings in the IL TRM v4.0 to determine delta watts of these bulbs. In this review, the evaluation team found that the calculation of bare lamp measure wattages for certain TLED manufacturers was incorrect, lowering the delta watts and claimed savings. The evaluation team used the manufacturer-reported measure wattages in these cases to arrive at delta watts.

Overall, the tracking data was accurate in terms of bulb information and application of the IL TRM. After each of the validation steps above, there were only 16 model numbers with discrepancies between reported and TRM-based savings calculations, apart from the TLED measure wattages.

6.2 Program Volumetric Detail

As shown in Table 6-2, the total number of units sold during the PY9 BILD and BPD programs was 2,053,383, which is a 26 percent increase from the total units sold in PY8. This was largely due to the

introduction of TLEDs, which made up 847,833 unit sales. LEDs⁵ comprised 85 percent of PY9 BILD sales. Compared to PY8, the total sales of LEDs increased by 55 percent and total sales of linear fluorescent lamps decreased by 40 percent.

Table 6-2. PY8 Volumetric Findings Detail

Program Year	Standard CFLs	Specialty CFLs	LEDs	Linear FLs	HIDs	LF Ballasts	Battery Chargers	Total
PY9	N/A	N/A	1,749,883	303,331	N/A	N/A	169	2,053,383
PY8	N/A	N/A	1,131,992	503,948	N/A	N/A	76	1,636,016
PY7	279,320	261,262	1,109,148	791,443	2,025	67,331	160	2,510,689
PY6	343,577	362,332	804,299	840,903	2,607	67,391	N/A	2,421,109
PY5	249,799	347,639	211,955	503,627	2,799	N/A	N/A	1,315,819
PY4	194,180	381,072	N/A	N/A	N/A	N/A	N/A	575,252
PY3	4,173	929	N/A	N/A	N/A	N/A	N/A	5,102

Source: ComEd tracking data and Navigant team analysis.

6.3 Gross Program Impact Parameter Estimates

The EM&V team conducted research to validate and supplement parameters that were not fully specified in the tracking system. Evaluation research verified specialty bulb type classifications (globe, candelabra, PAR30, etc.) and ensured that TRM parameters that vary by bulb type were applied correctly. The evaluation team also applied the residential and non-residential splits for each product type (detailed in Table 6-3). Finally, where possible, the evaluation team assigned building type based on business name and address and applied the building type specific parameters from the TRM. The resulting verified savings parameters used in PY9 that are independent of installation location (residential versus non-residential) are included in Table 6-3 and those parameters that may vary are included in Table 6-4.⁶ These tables include both ex ante and verified savings parameter estimates. The differences are explained in the section after the tables.

⁵ Including LED lamps, TLEDs, fixtures and exit signs.

⁶ Values in Table 6-4 reflect the weighted average parameters for all business types.

Table 6-3. Verified Gross Savings Parameters

Gross Savings Input Parameters	Product Type	PY9 Ex Ante Value	PY9 Verified Savings Value	Deemed ‡ or Evaluated?
Program Unit Sales	LED Lamps	781,645	781,645	Evaluated
	TLEDs	847,833	847,833	Evaluated
	LED Fixtures	92,651	92,651	Evaluated
	LED Exit Signs	27,754	27,754	Evaluated
	Linear Fluorescents	303,331	303,331	Evaluated
	Battery Chargers	169	169	Evaluated
	Carryover Bulbs	69,010	69,010	Evaluated
	Total		2,122,393	2,122,393
Delta Watts	LED Lamps	53.6	53.6	Deemed
	TLEDs	17.2	17.9	Deemed
	LED Fixtures	45.9	46.6	Deemed
	LED Exit Signs	19.8	19.8	Deemed
	Linear Fluorescents	4.7	4.8	Deemed
	Battery Chargers	321.3	321.3	Deemed
Res/NonRes Split	LED Lamps, TLEDs, LED Fixtures	0%/100%	4%/96%	Deemed
	Linear Fluorescents	0%/100%	1%/99%	Deemed
	LED Exit Signs, Battery Chargers	0%/100%	0%/100%	Deemed
Leakage	All	NR	0.53%	Evaluated

‡ State of Illinois Technical Reference Manual version 5.0 from <http://www.ilsag.info/technical-reference-manual.html>.
 Source: ComEd tracking data and Navigant team analysis.

Table 6-4. Verified Gross Savings Parameters – Residential vs. Non-Residential

Gross Impact Parameters	Product Type	PY9 ComEd Reported (Ex Ante)	PY9 Verified (Ex Post)		Deemed ‡ or Evaluated?
			Res	Non-Res	
Installation Rate	LED Lamps	95.7%	95.0%	95.7%	Deemed
	TLEDs	95.7%	95.0%	95.7%	Deemed
	LED Fixtures	95.7%	95.0%	95.7%	Deemed
	LED Exit Signs	100.0%	100.0%	100.0%	Deemed
	Linear Fluorescents	98.0%	95.0%	98.0%	Deemed
	Battery Chargers	100.0%	100.0%	100.0%	Deemed
Hours of Use	LED Lamps	3,612	847	3,644	Both
	TLEDs	3,379	847	3,550	Both
	LED Fixtures	3,612	891	3,409	Both
	LED Exit Signs	8,766	8,766	8,766	Both
	Linear Fluorescents	3,379	891	3,687	Both
	Battery Chargers	8,365	8,365	8,365	Both
Summer Peak CF	LED Lamps	NR	0.08	0.58	Both
	TLEDs	NR	0.08	0.62	Both
	LED Fixtures	NR	0.09	0.58	Both
	LED Exit Signs	NR	1.00	1.00	Both
	Linear Fluorescents	NR	0.09	0.61	Both
	Battery Chargers	NR	0.00	0.58	Both
Winter Peak CF	LED Lamps	NR	0.12	0.55	Evaluated
	TLEDs	NR	0.12	0.56	Evaluated
	LED Fixtures	NR	0.12	0.55	Evaluated
	LED Exit Signs	NR	1.00	1.00	Evaluated
	Linear Fluorescents	NR	0.12	0.55	Evaluated
	Battery Chargers	NR	-	-	Evaluated
Interactive Effects	LED Lamps	1.09	1.06	1.10	Both
	TLEDs	1.09	1.06	1.09	Both
	LED Fixtures	1.09	1.06	1.09	Both
	LED Exit Signs	1.09	1.04	1.11	Both
	Linear Fluorescents	1.09	1.06	1.10	Both
	Battery Chargers	NR	NR	NR	Both

‡ State of Illinois Technical Reference Manual version 5.0 from <http://www.ilsag.info/technical-reference-manual.html>.
 * A value of "Both" indicates that business-type specific parameters from the TRM were used, but that evaluation activities were necessary to identify business types.
 Source: ComEd tracking data and Navigant team analysis.

6.3.1 Unit Sales

There were no misclassifications of lamp categories in the tracking system; therefore, there were no differences in unit sales in any lamp category between ex ante and ex post.

6.3.2 Delta Watts

The differences in delta watts between ex ante and ex post were marginal for each of the measure groups. ComEd accurately defined ex ante assignments of baseline and measure, with only small discrepancies for a handful of line items. The average delta watts for TLEDs is higher in ex post because the evaluation team used a slightly different approach in its calculation. ComEd calculated TLED measure wattages by removing a standard ballast/power factor (0.88) included by certain manufacturers in their lamp specification sheets. After discussion with the implementing team, it was determined that certain manufacturers' reported bare lamp wattages were actually correct, and did not require a ballast factor adjustment. In these cases, the evaluation team used the manufacturer-reported bare lamp watts to calculate delta watts. Average delta watts for each lighting measure differed by no more than 0.7W between ex ante and ex post. These remaining small differences were due to the updates of lamp specifications based on the evaluation team's bulb information lookups and a small number of misclassified lamp types.

6.3.3 Installation Rates

The installation rates defined by ComEd match the IL TRM v5.0 for non-residential installations. However, ComEd does not define a residential and non-residential split in their ex ante estimates as defined by the IL TRM. Instead, ex ante estimates use only the non-residential installation rates from the IL TRM v5.0. Due to the applied residential and non-residential split, a small portion of the LED bulbs, LED fixtures, and linear fluorescents were subject to a slightly lower residential installation rate for the verification analysis.

6.3.4 Residential/Non-residential Installation Location Split

There were no residential installations for BILD products assumed by ComEd in their tracking system (100 percent non-residential). Evaluators used the IL TRM v5.0 for the ex post verified savings residential and non-residential split values. For LED bulbs and fixtures, the split was 4 percent residential and 96 percent non-residential. For LED exit signs, the split was 100 percent non-residential. For linear fluorescents, the split was 1 percent residential and 99 percent non-residential.

6.3.5 Leakage

Based on the end-user telephone interviews conducted for the PY9 evaluation, leakage of program bulbs outside of ComEd territory appears to be a very small issue for the Instant Discounts Program. Of the 529 respondents, only 28 indicated that some bulbs of the program bulbs they purchased were installed outside of the ComEd service territory. The estimated percentage of bulbs reported to have been installed outside of ComEd territory was approximately 0.53 percent of the total bulbs purchased by survey respondents. Additional details on leakage from the end user survey will be presented in an evaluation research report.

6.3.6 Hours of Use and Interactive Effects

In ComEd's tracking system, there were no residential installations assumed and all end user business types were classified as "Unknown." As mentioned above, the evaluation team used the business name to assign a more accurate business type for the top 50% of non-contractor sales volume. This resulted in varying values for hours of use and interactive effects. For energy and demand interactive effects, there were only small differences between ex ante and non-residential ex post values. Residential interactive effects values, which are lower, were applied to a small portion of sales in accordance with the residential and non-residential split. The primary drivers of the realization rates for LED fixtures and linear fluorescents were the differences in hours of use. For LED fixtures, this resulted in an average non-residential HOU that was almost six percent lower than ex ante values. For linear fluorescents, the ex post non-residential HOU was nine percent higher than ex ante. In addition, while residential installations

make up a small portion of sales, the residential HOU values for the lighting measures were much lower than their non-residential counterparts.

6.4 CY2018 Carryover Savings Estimate

Calculation of the Calendar Year 2018 (CY2018) carryover estimate relies upon the IL TRM v5.0 and the PY8 and PY9 reports. At this time all of these data sources are available and thus it is possible to estimate the gross and net carryover energy savings that the evaluation team recommends for PY8. The energy and demand savings from these PY8 and PY9 late installed bulbs are calculated based on the following parameters:

- Delta Watts – Verified savings estimate from the year of installation (source: IL TRM v5.0).
- Res/Non-Res Split - Verified savings estimate from the year of purchase (source: IL TRM v4.0 and IL TRM v5.0).
- HOU and Peak CF – Verified savings estimate from the year of installation (source: IL TRM v5.0).
- Energy and Demand IE – Verified savings estimate from the year of installation (source: IL TRM v5.0.)
- Installation Rate - Verified savings estimate from the year of purchase (source: IL TRM v4.0 and IL TRM v5.0). For false transactions, the CY2018 installation rate is half of the difference between the adjusted first year and lifetime installation rates as detailed memo titled “PY9 ComEd Business Instant Lighting Discounts Program – Power Energy Solutions Data Investigation and Transaction Verification,” dated 1/17/2018.
- NTGR – Evaluation research from the year of purchase (source: PY8 and PY9 Reports).

Table 6-5 shows that in CY2018, 77,067 bulbs, purchased during either PY8 or PY9 (including false transactions), are expected to be installed within ComEd service territory. The table provides both the gross and net energy and demand savings from these bulbs. The total net energy savings is estimated to be 10,550,375 kWh, 2,411 summer peak kW, and 2,014 winter peak kW, which will be counted in CY2018 as Instant Discounts program carryover savings.

Table 6-5. CY2018 Verified Savings Carryover Estimate

CY2018 Verified Savings Carryover Estimate	PY8 Bulbs	PY9 Bulbs	False Transactions	CY2018 Carryover
Carryover Bulbs Installed During CY2018	21,881	31,954	23,233	77,067
Average Delta Watts	41.1	31.7	71.0	46.3
Average Daily Hours of Use	9.6	9.6	9.6	9.6
Summer Peak Load Coincidence Factor	0.65	0.65	0.64	0.64
Winter Peak Load Coincidence Factor	0.54	0.54	0.53	0.54
Gross kWh Impact per unit	144.0	110.8	248.8	161.8
Gross kW Impact per unit	0.04	0.03	0.07	0.05
Installation Rate	100%	100%	100%	100%
Energy Interactive Effects	1.09	1.09	1.09	1.09
Demand Interactive Effects	1.35	1.36	1.36	1.36
Carryover Gross Energy Savings (kWh)	3,432,888	3,857,892	6,297,748	13,588,528
Carryover Gross Demand Savings (kW)	900	1,015	1,650	3,565
Carryover Gross Summer Peak Demand Savings (kW)	787	890	1,428	3,106
Carryover Gross Winter Peak Demand Savings (kW)	657	743	1,194	2,594
Net-to-Gross Ratio	0.74	0.78	0.78	0.78
Carryover Net Energy Savings (kWh)	2,630,834	3,007,297	4,912,243	10,550,375
Carryover Net Demand Savings (kW)	690	791	1,287	2,768
Carryover Net Summer Peak Demand Savings (kW)	603	694	1,114	2,411
Carryover Net Winter Peak Demand Savings (kW)	504	579	931	2,014
Effective Useful Life (Res/Non-Res)	15/9	15/10	15/8	15/9

Source: ComEd tracking data and Navigant team analysis.

7. APPENDIX 2. TRC DETAIL

Total Resource Cost (TRC) related data for the Instant Discounts Program can be found in Table 7-1.⁷

Table 7-1. TRC-Related Data

Measure	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (kWh)	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Savings (kWh)	Verified Gross Peak Demand Reduction (kW)	NTGR	Heating Penalty (Therms)
LED Lamps	Lamps	781,645	9	167,812,981	NR	166,020,032	32,233	0.78	(1,803,483)
TLEDs	Lamps	847,833	14	51,490,944	NR	54,270,248	11,374	0.78	(700,754)
LED Fixtures	Lamps	92,651	11	16,075,538	NR	14,873,973	3,142	0.78	(191,292)
LED Exit Signs	Lamps	27,754	8	5,220,443	NR	5,273,912	753	0.78	(66,508)
Linear Fluorescents	Lamps	303,331	11	5,182,853	NR	5,620,860	1,151	0.75	(71,749)
Battery Chargers*	Units	169	20	453,231	NR	453,231	66	0.78	-

Source: ComEd tracking data and Navigant team analysis.

This TRC variable table only includes cost-effectiveness analysis inputs available at the time of finalizing this PY9 impact evaluation report. Additional required cost data (e.g., measure costs, program level incentive and non-incentive costs) are not included in this table and will be provided to evaluation at a later date. Detail in this table other than final PY9 savings and program data are subject to change and are not final.

⁷ In 2020 the baseline shifts from halogen to CFL and thus the resulting savings will be reduced for future program years. A separate working document has been created and should be used to conduct the TRC analysis for the residential lighting program.