



ComEd Instant Discounts Impact Evaluation Report

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

Presented to
Commonwealth Edison Company

DRAFT

March 5, 2018

Prepared by:

Luke Scheidler
Itron, Consulting and Analysis

George Jiang
Itron, Consulting and Analysis



www.navigant.com

Submitted to:

ComEd
Three Lincoln Centre
Oakbrook Terrace, IL 60181

Submitted by:

Navigant Consulting, Inc.
150 N. Riverside, Suite 2100
Chicago, IL 60606

Contact:

Randy Gunn, Managing Director
312.583.5714
Randy.Gunn@Navigant.com

Jeff Erickson, Director
608.497.2322
Jeff.Erickson@Navigant.Com

Rob Neumann, Assoc. Director
312.583.2176
Rob.Neumann@Navigant.com

Disclaimer: This report was prepared by Navigant Consulting, Inc. ("Navigant") for ComEd based upon information provided by ComEd and from other sources. Use of this report by any other party for whatever purpose should not, and does not, absolve such party from using due diligence in verifying the report's contents. Neither Navigant nor any of its subsidiaries or affiliates assumes any liability or duty of care to such parties, and hereby disclaims any such liability.

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 Hours of Use and Interactive Effects.....	12
7. Appendix 3. TRC Detail.....	12

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

1. INTRODUCTION

This report presents the results of the impact evaluation of ComEd's Program Year 9 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.

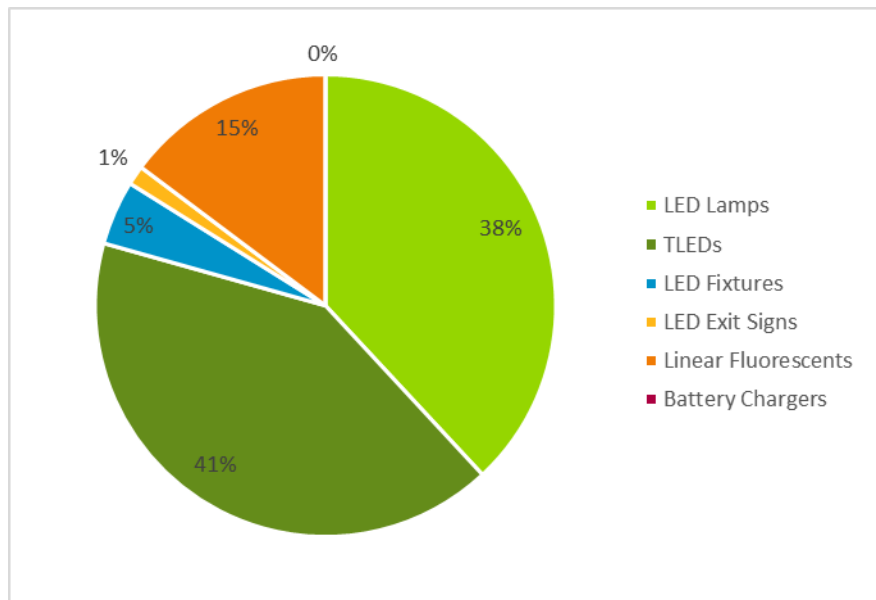
³ These totals reflect the ex post deductions resulting from false transactions identified by ComEd as part of their QA/QC process and reviewed by the evaluation team. See False Transactions memo dated January 18, 2018.

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	1,902,004	677,711	811,139	88,422	27,559	297,173	169
PY7 Carryover – PY9 Installs	43,544	33,268	0	3,153	0	7,123	0
PY8 Carryover – PY9 Installs	31,954	23,538	0	5,080	0	3,337	0
Total Installed Units in PY9	1,977,502	734,517	811,139	96,655	27,559	307,633	169

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 (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex Ante Gross Savings	257,987	67.850	NR
Program Gross Realization Rate	94%	93%	N/A
Verified Gross Savings	243,221	62.864	48.263
Program Net-to-Gross Ratio (NTGR)	0.77	0.77	0.77
Verified Net Savings	188,061	48.565	37.318

Source: ComEd tracking data and Navigant team analysis.

Table 3-2 includes additional savings detail, including line items for carryover, small business overlap, and false transactions adjustments. The small business overlap is currently marked as N/A pending additional information from ComEd and the implementation teams. The false transactions adjustment resulted in a 26,172 MWh deduction in PY9, but some of this will be recouped in the next two years as carryover. These CY2018 and CY2019 additions will be included the carryover section of the PY9 evaluation research report.

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

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Summer Peak Demand Savings (MW)
Ex Ante Gross Savings*	240,344	62.906	NR
Ex Ante Gross Carryover	17,643	4.944	3.507
Ex Ante Total Gross Savings	257,987	67.850	NR
Program Gross Realization Rate	94%	93%	NR
Verified Gross Program Savings*	251,750	64.399	49.780
Verified Gross Carryover Savings	17,643	4.944	3.507
SBES Overlap Adjustment	N/A	N/A	N/A
False Transactions Adjustment	-26,172	-6.479	-5.025
Verified Total Gross Savings	243,221	62.864	48.263
Program Net-to-Gross Ratio (NTGR)	0.77	0.77	0.77
Verified Net Program Savings	175,781	45.135	34.875
Verified Net Carryover Savings	12,280	3.430	2.443
Verified Net Savings	188,061	48.565	37.318

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 (69% and 24%, respectively). The 113% realization rate for TLEDs is driven by a difference in definitions of measure wattages⁵. The 93% realization rate for LED Fixtures and the 109% realization rate for Linear Fluorescents are due in large part to differences in applied hours of use. Additional details on these adjustments can be found in Section 6 (Appendix 1).

⁵ Measure wattages for TLEDs are still under review pending documentation from the implementation team. This will be resolved in the final report.

Table 4-1. PY9 Energy Savings by Measure

Enduse Type	Research Category	Ex Ante Gross Savings (MWh)	Verified Gross Realization Rate	Verified Gross Savings (MWh)	NTGR *	Verified Net Savings (MWh)	Technical Measure Life	Persistence	Effective Useful Life (EUL)†
Lighting	LED Lamps	167,813	100%	167,125	0.78	130,358	7.4	N/A	7.4
Lighting	TLEDs	51,491	113%	58,190	0.78	45,389	13.5	N/A	13.5
Lighting	LED Fixtures	16,076	93%	15,029	0.78	11,722	10.8	N/A	10.8
Lighting	LED Exit Signs	5,220	102%	5,302	0.78	4,136	4.0	N/A	4.0
Lighting	Linear Fluorescents	5,183	109%	5,651	0.75	4,238	11.0	N/A	11.0
Power Electronics	Battery Chargers	453	100%	453	0.78	354	20**	N/A	20**
	Carryover	17,643	100%	17,643	0.70	12,280	N/A	N/A	N/A
	False Transactions	-5,892	N/A	-26,172	0.78	-20,414	N/A	N/A	N/A
	Total	257,987	94%	243,221	0.77	188,061			

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 (MW)	Verified Gross Realization Rate	Verified Gross Demand Reduction (MW)	NTGR*	Verified Net Demand Reduction (MW)
Lighting	LED Lamps	43.762	97%	42.647	0.78	33.265
Lighting	TLEDs	14.353	108%	15.478	0.78	12.073
Lighting	LED Fixtures	4.196	99%	4.158	0.78	3.244
Lighting	LED Exit Signs	0.586	93%	0.546	0.78	0.426
Lighting	Linear Fluorescents	1.479	95%	1.412	0.75	1.059
Power Electronics	Battery Chargers	0.066	238%	0.156	0.78	0.122
	Carryover	4.944	100%	4.944	0.70	3.430
	False Transactions	-1.536	N/A	-6.479	0.78	-5.054
	Total	67.850	93%	62.864	0.77	48.565

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.

Table 4-3. PY9 Peak Demand Savings by Measure

Enduse Type	Research Category	Ex-Ante Gross Peak Demand Reduction (MW)	Verified Gross Realization Rate	Verified Gross Peak Demand Reduction (MW)	NTGR*	Verified Peak Net Demand Reduction (MW)
Lighting	LED Lamps	NR	N/A	32.448	0.78	25.310
Lighting	TLEDs	NR	N/A	12.178	0.78	9.499
Lighting	LED Fixtures	NR	N/A	3.174	0.78	2.476
Lighting	LED Exit Signs	NR	N/A	0.757	0.78	0.591
Lighting	Linear Fluorescents	NR	N/A	1.157	0.75	0.868
Power Electronics	Battery Chargers	NR	N/A	0.066	0.78	0.051
	Carryover	NR	N/A	3.507	0.70	2.443
	False Transactions	NR	N/A	-5.025	0.78	-3.919
	Total	NR	N/A	48.263	0.77	37.318

* 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
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

* State of Illinois Technical Reference Manual version 5.0 from <http://www.ilsag.info/technical-reference-manual.html>

† 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 94 percent. However, this realization rate is distorted by the false transactions adjustment, without which the realization rate would have been 102 percent. This increase in verified savings was largely driven by differences in applied TLED measure wattages and differences in hours of use by business type as specified in the IL TRM v5.0. Reductions in verified savings were partially 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.

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 a power factor was being applied to the measure wattage of TLEDs, lowering the delta watts and claimed savings⁶. The evaluation team used the manufacturer-specified wattages for TLEDs in its calculations of verified savings.

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 Measure wattages for TLEDs are still under review pending documentation from the implementation team. This will be resolved in the final report.

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.

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 of unit sales. LEDs⁷ 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.

⁷ Including LED lamps, TLEDs, fixtures and exit signs.

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	279320	261262	1,109,148	791,443	2025	67331	160	2,510,689
PY6	343,577	362,332	804,299	840,903	2607	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	4173	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 6-4.⁸ These tables include both ex ante and verified savings parameter estimates. The differences are explained in the section after the tables.

⁸ 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	75,498	75,498	Evaluated
	Total		2,128,881	2,128,881
Delta Watts	LED Lamps	53.6	53.6	Deemed
	TLEDs	17.2	19.1	Deemed
	LED Fixtures	45.9	46.8	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

‡ State of Illinois Technical Reference Manual version 5.0 from <http://www.ilsag.info/technical-reference-manual.html>.

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.

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. The most significant difference in delta watts lies in the TLED measure wattages. The evaluation team used the manufacturer-specified bare lamp wattages as the measure wattage; whereas ComEd applied a ballast/power factor adjustment which raised the measure wattage. The evaluation team has requested documentation of ex ante measure wattages. The appropriate methodology is under review and may result in changes in verified savings. For the other measures, ComEd accurately defined ex ante assignments of baseline and measure, with only small discrepancies for a handful of line items. Average delta watts for each non-TLED lighting measure differed by no more than 0.8W 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 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.

7. APPENDIX 3. TRC DETAIL

We will add this section in the second draft.