



ComEd Commercial Lit Signage IPA Program Impact Evaluation Report

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

Presented to
ComEd

FINAL

April 12, 2018

Prepared by:

Rick Berry
Navigant Consulting, Inc.

Nishant Mehta
Navigant Consulting, Inc.

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

Patricia Plympton, Associate Director
202-253-9356
Patricia.Plympton@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.....	2
5. Impact Analysis Findings and Recommendations	3
5.1 Impact Parameter Estimates.....	3
5.1.1 LED Lamps and Fixtures.....	4
5.1.2 Linear Fluorescent Lamps and Fixtures	4
5.2 Other Impact Findings and Recommendations.....	6
6. Appendix 1. Impact Analysis Methodology	8
6.1 Verified Net Program Savings Analysis Approach.....	8
7. Appendix 2. Impact Analysis Detail.....	8
8. Appendix 3. Total Resource Cost Detail.....	10

LIST OF TABLES AND FIGURES

Figure 2-1. Percentage of Measures Installed by Type	2
Table 2-1. PY9 Volumetric Findings Detail	1
Table 3-1. PY9 Total Annual Incremental Savings	2
Table 4-1. PY9 Energy Savings by Measure Category	3
Table 4-2. PY9 Demand Savings by Measure Category	3
Table 5-1. LED Lamps and Fixtures Custom and Deemed Values Comparison	4
Table 5-2. Linear Fluorescent Lamps and Fixtures Custom and Deemed Values Comparison	5
Table 5-3. Energy Savings by Measure	6
Table 5-4. Measures with Incorrect Savings Values.....	7
Table 5-5. Measures with Incorrectly Mapped Savings Values	8
Table 7-1. Measure Name Mapping	8
Table 8-1. Total Resource Cost Savings Summary.....	11

1. INTRODUCTION

This report presents the results of the impact evaluation of ComEd's Program Year 9 (PY9) Lit Signage Program. It presents a summary of the energy and demand impacts for the total program and broken out by relevant measure and program structure details. The appendix presents the impact analysis methodology. PY9 covers June 1, 2016 through December 31, 2017.

2. PROGRAM DESCRIPTION

The ComEd Lit Signage Program is designed to achieve energy savings through upgrading lit signage, billboards, architectural and wayfinding, in small commercial customers.¹ Eligible customers receive a free lighting assessment from a trade ally which identifies the energy savings opportunities. These customers can select which measures are appropriate to implement, and can do so at a reduced cost. The trade allies receive incentives directly from the program and the customers are billed at a reduced rate.

The program had 278 participants² and 437 projects in PY9 which distributed 61,975 measures as shown in the following table and graph.

Table 2-1. PY9 Volumetric Findings Detail

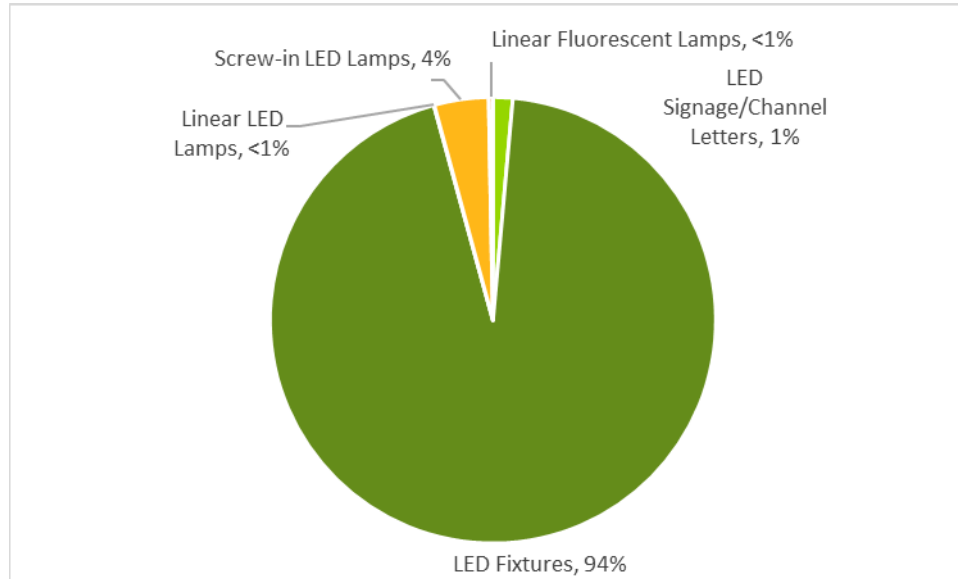
Participation	PY9
Participants	278
Total Measures	61,975
Number of Units/Project	141.8
Installed Projects	437

Source: ComEd tracking data and Navigant team analysis.

¹ "Small commercial" customers are defined as customers with peak demand less than or equal to 100 kW.

² Participants are defined by unique customer names in the program tracking data.

Figure 2-1. Percentage of Measures Installed by Type



Source: Evaluation Analysis

3. PROGRAM SAVINGS

Table 3-1 summarizes the incremental energy and demand savings the Lit Signage Program achieved in PY9. The program achieved a verified gross energy savings of 18,329 MWh. The program energy realization rate is 101 percent, due primarily to incorrect savings values in the tracking data. The verified net energy and demand savings are 16,496 MWh and 3.36 MW respectively.

Table 3-1. PY9 Total Annual Incremental Savings

Savings Category	Energy Savings (kWh)	Demand Savings (kW)	Peak Demand Savings (kW)
Ex Ante Gross Savings	18,107,063	NR	NR
Program Gross Realization Rate	101%	NA	NA
Verified Gross Savings	18,328,806	3,738	0
Program Net-to-Gross Ratio (NTGR)	0.90	0.90	0.90
Verified Net Savings	16,495,926	3,364	0

Source: ComEd tracking data and Navigant team analysis.

4. PROGRAM SAVINGS BY MEASURE

The program includes 24 measures which have been categorized into the four groups shown in Table 4-1. The LED Fixtures category contributed the most savings, with the “LED Fixture ≤350W Replacing 1000W HID” measure providing 57 percent of the verified program savings. Since all measures are designed for exterior applications, no peak demand savings value was reported.

Table 4-1. PY9 Energy Savings by Measure Category

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 Fixtures	17,094,609	101%	17,283,815	0.90	15,555,434	NA	NA	10.2
Lighting	LED Signage/Channel Letters	261,080	100%	261,178	0.90	235,060	NA	NA	10.2
Lighting	Linear LED Lamps	6,374	80%	5,099	0.90	4,589	NA	NA	10.2
Lighting	Screw-in LED Lamps	693,912	104%	723,045	0.90	650,741	NA	NA	10.2
Lighting	Linear Fluorescent Lamps	51,089	109%	55,669	0.90	50,102	NA	NA	4.9
	Total	18,107,063	101%	18,328,806	0.90	16,495,926	NA	NA	10.2

* 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>.

† EUL is a combination of technical measure life and persistence.

Source: ComEd tracking data and Navigant team analysis.

Table 4-2. PY9 Demand Savings by Measure Category

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 Fixtures	NR	NA	3,525	0.90	3,173
Lighting	LED Signage/Channel Letters	NR	NA	53	0.90	48
Lighting	Linear LED Lamps	NR	NA	1	0.90	1
Lighting	Screw-in LED Lamps	NR	NA	147	0.90	133
Lighting	Linear Fluorescent Lamps	NR	NA	11	0.90	10
	Total	NR	NA	3,738	0.90	3,364

* 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>.

Source: ComEd tracking data and Navigant team analysis.

5. IMPACT ANALYSIS FINDINGS AND RECOMMENDATIONS

5.1 Impact Parameter Estimates

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

5.1.1 LED Lamps and Fixtures³

$$\Delta kWh = \frac{Watts_{Base} - Watts_{EE}}{1000} * Hours * WHF_e * ISR$$

$$\Delta kW_{peak} = \frac{Watts_{Base} - Watts_{EE}}{1,000} * ISR * WHF_d * CF$$

$$\Delta kW_{non-peak} = \frac{Watts_{Base} - Watts_{EE}}{1,000} * ISR * WHF_d$$

Where:

- $Watts_{Base}$ = Input wattage of existing or baseline system
- $Watts_{EE}$ = Input wattage of proposed system
- Hours = Annual operating hours
- WHF_e = Waste heat factor for energy
- ISR = In service rate
- IF_{kWh} = Lighting-HVAC interaction factor
- WHF_d = Waste heat factor for demand
- CF = Summer peak coincidence factor

Table 5-1. LED Lamps and Fixtures Custom and Deemed Values Comparison

Value	Variable	Source	Deemed/ Custom
Varies by Measure	$Watts_{Base}$	Program Planning Documents ⁴	Deemed
Varies by Measure	$Watts_{EE}$	Program Planning Documents ⁴	Deemed
4,903	Hours	IL TRM 4.5.4	Deemed
0	WHF_e	IL TRM 4.5.4	Deemed
1.0	ISR	IL TRM 4.5.4	Deemed
1	WHF_d	IL TRM 4.5.4	Deemed
0	CF	IL TRM 4.5.4	Deemed

5.1.2 Linear Fluorescent Lamps and Fixtures⁵

$$\Delta kWh = \frac{Watts_{Base} - Watts_{EE}}{1000} * Hours * WHF_e * ISR$$

$$\Delta kW_{peak} = \frac{Watts_{Base} - Watts_{EE}}{1,000} * ISR * WHF_d * CF$$

$$\Delta kW_{non-peak} = \frac{Watts_{Base} - Watts_{EE}}{1,000} * ISR * WHF_d$$

³ IL TRM v5.0, 4.5.4 LED Bulbs and Fixtures

⁴ GDS-Lit Signage Scope of Work, Draft 2.4.

⁵ IL TRM v5.0, 4.5.3 High Performance and Reduced Wattage T8 Fixtures and Lamps

Where:

- $Watts_{Base}$ = Input wattage of existing or baseline system
- $Watts_{EE}$ = Input wattage of proposed system
- Hours = Annual operating hours
- WHF_e = Waste heat factor for energy
- ISR = In service rate
- IF_{kWh} = Lighting-HVAC interaction factor
- WHF_d = Waste heat factor for demand
- CF = Summer peak coincidence factor

Table 5-2. Linear Fluorescent Lamps and Fixtures Custom and Deemed Values Comparison

Value	Variable	Source	Deemed/ Custom
Varies by Measure	$Watts_{Base}$	Program Planning Documents ⁴	Deemed
Varies by Measure	$Watts_{EE}$	Program Planning Documents ⁴	Deemed
4,903	Hours	IL TRM 4.5.3	Deemed
0	WHF_e	IL TRM 4.5.3	Deemed
1.0	ISR	IL TRM 4.5.3	Deemed
1	WHF_d	IL TRM 4.5.3	Deemed
0	CF	IL TRM 4.5.3	Deemed

There are 24 measures in the program, however the program tracking data has multiple distinct measure names mapped to each of these 24 measures. The ex ante savings by measure is provided in Table 5-3.

Table 5-3. Energy Savings by Measure

Measure*	Ex Ante Gross Savings (kWh)	Verified Gross Savings (kWh)	Realization Rate
LED Fixture ≤350W Replacing 1000W HID	3,726.3	3,726.3	100%
LED Fixture ≤125W Replacing 400W HID	1,642.5	1,642.5	100%
LED Fixture Retrofit ≤155W Replacing 400W HID	1,642.5	1,642.5	100%
LED Fixture ≤55W Replacing 250W Fixture	1,201.2	1,201.2	100%
LED Fixture ≤65W Replacing 250-320W HID	1,152.2	1,152.2	100%
LED Fixture ≤35W Replacing 175W HID	931.6	931.6	100%
LED Fixture Gooseneck Replacing 150W-225W Fixture	794.3	794.3	100%
LED Lamp <31W Replacing 150+W Spot	652.1	652.1	100%
LED Fixture ≤19W Replacing 70W-150W HID	554.0	554.0	100%
LED Fixture ≤35W Replacing 100W HID Area Light	480.5	480.5	100%
LED Fixture Retrofit ≤155W Replacing 250-320W HID or 250W Fixture	465.8	465.8	100%
LED Lamp >20W Replacing 85W-100W Incand. Spot	406.9	406.9	100%
LED Lamp ≤20W Replacing 100W Incand. Spot	406.9	406.9	100%
LED Fixture Retrofit ≤120W Replacing 175W HID	377.5	377.5	100%
LED Lamp replacing 85-99W Flood	353.0	353.0	100%
LED Lamp >14.5W Replacing 75W Incand. Spot	333.4	333.4	100%
LED Lamp ≤14.5W Replacing 75W Incand. Spot	304.0	304.0	100%
LED Fixture Retrofit ≤45W Replacing 70W-150W HID	259.9	259.9	100%
T8HO 4', 2L or T8HO 8', 1L Replacing T12HO 8', 1L	255.0	255.0	100%
LED Lamp >14.5W Replacing 60W Incand. Spot	225.5	225.5	100%
T8HO 4', 1L Replacing T12HO 4', 1L	225.5	225.5	100%
LED Lamp ≤14.5W Replacing 60W Incand. Spot	210.8	210.8	100%
LED Channel Letter Replacing Neon Letter	98.1	98.1	100%
LED Box sign replacing 2 lamp T12 (per Watt reduced)	4.903	4.903	100%

* The measure mapping details are provided in Table 7-1.
 Source: GDS-Lit Signage Scope of Work, Draft 2.4.

5.2 Other Impact Findings and Recommendations

Navigant reviewed the tracking data for quality and completeness and verified the savings for the program. Navigant found three issues that led to realization rates different than 100 percent. These are detailed in the findings below.

Finding 1. Ex ante savings for 24 measures in the tracking system do not match with the ex ante savings calculation provided by the implementer. Navigant attempted to recreate the ex ante savings but could not determine the cause of the discrepancy. This issue affected 3,451 installations in the program tracking data.

Table 5-4. Measures with Incorrect Savings Values

Measure Name in Tracking Data	Quantity of Units Affected	Ex Ante Gross Unit Savings in Tracking Data (kWh)	Verified Gross Unit Savings (kWh)	RR
LED Fixture Retrofit <=155W with controls Replacing 400-999W HID	383	1,495.42	1,642.51	110%
LED Fixture Retrofit <=155W With Controls Replacing >=400W HID	533	1,495.42	1,642.51	110%
LED Fixture Retrofit <=155W Replacing 400-999W HID	45	1,495.42	1,642.51	110%
LED Fixture <=35W Replacing 101-175W HID	14	907.06	931.57	103%
LED Fixture <=45W with controls Replacing 101-175W HID	371	848.22	931.57	110%
LED Fixture <=45W with controls Replacing >=175W HID	489	848.22	931.57	110%
LED Fixture <=45W Replacing 101-175W HID	12	848.22	931.57	110%
LED Fixture <=45W Replacing >=175W HID	25	848.22	931.57	110%
LED Fixture Retrofit <=155W with controls Replacing 176-250W HID	17	710.94	465.79	66%
LED Lamp <31W Replacing 150W Spot	419	612.87	652.10	106%
LED Fixture <=19W with controls Replacing >=70W HID	82	544.23	554.04	102%
LED Fixture <=19W Replacing 70W-150W HID	43	544.23	554.04	102%
LED Fixture <=19W with controls Replacing 70W-150W HID	128	544.23	554.04	102%
LED Fixture <=35W with controls Replacing 70-100W HID	69	455.98	480.49	105%
LED Lamp <=20W Replacing >=100W Incandescent or Halogen	413	387.34	406.95	105%
LED Lamp >20W Replacing 100-149W Incand. Spot	143	387.34	406.95	105%
LED Lamp >20W Replacing 85-99W Flood	8	328.50	406.95	124%
T8HO 8', Alt. LED Replacing T12HO 8', 1L	20	318.70	254.96	80%
LED Lamp <=14.5W Replacing 75-84W Incand. Spot	32	299.08	303.99	102%
LED Lamp <=14.5W Replacing >=75W Incandescent or Halogen	93	294.18	303.99	103%
LED Lamp >14.5W Replacing >=75W Incandescent or Halogen	66	284.37	333.40	117%
LED Lamp >14.5W Replacing 75-84W Incand. Spot	5	284.37	333.40	117%
T8HO 4', 1L Replacing T12HO 4', 1L	18	147.09	225.54	153%
LED Channel Letter Replacing Neon Letter	23	93.80	98.06	105%

Source: ComEd tracking data and Navigant team analysis.

Finding 2. There are six program measures whose ex ante unit savings incorrectly equal that of another program measure. This issue affected 386 installations in the program tracking data. Correcting this resulted in a realization rate increase for the affected measures.

Recommendation 1. Navigant recommends updating the tracking system to reflect correct savings for all program measures.

Table 5-5. Measures with Incorrectly Mapped Savings Values

Measure Name in Tracking Data	Quantity of Units Affected	Ex Ante Gross Unit Savings (kWh)	Verified Gross Unit Savings (kWh)	Ex Ante Gross Savings (kWh)	Verified Gross Savings (kWh)	RR
LED Fixture Retrofit <=120W With Controls Replacing >=175W HID	8	1,152.21	377.53	9,218	3,020	33%
LED Fixture Retrofit <=120W with controls Replacing 101-175W HID	7	465.79	377.53	3,260	2,643	81%
LED Fixture Retrofit <=45W with contols Replacing 70W-150W HID	136	406.95	259.86	55,345	35,341	64%
LED Fixture Retrofit <=45W With Controls Replacing >=70W HID	3	406.95	259.86	1,221	780	64%
LED Lamp <=14.5W Replacing 60-74W Incand. Spot	231	225.54	210.83	52,099	48,701	93%
LED Lamp >14.5W Replacing 60-74W Incand. Spot	1	210.83	225.54	211	226	107%
Total	386	NA	NA	121,354	90,710	75%

Source: ComEd tracking data and Navigant team analysis.

Finding 3. There are two measure installations with no ex ante savings values in the program tracking data. Both occurrences involve Project 10405.

Recommendation 2. Navigant recommends updating the tracking system to ensure correct measure savings for all projects.

6. APPENDIX 1. IMPACT ANALYSIS METHODOLOGY

6.1 Verified Net Program Savings Analysis Approach

Navigant calculated verified net energy and demand savings by multiplying the verified gross savings estimates by a net-to-gross ratio (NTGR). In PY9, the NTGR estimates used to calculate the net verified savings were based on past evaluation research and defined by a consensus process through SAG, as documented in a spreadsheet.⁶

7. APPENDIX 2. IMPACT ANALYSIS DETAIL

Table 7-1. Measure Name Mapping

Program Measure	Tracking Data Measure Name
LED Lamp Replacing 85-99W Flood	LED Lamp <=20W Replacing 85-99W Flood
	LED Lamp <=20W Replacing >=85W Incandescent or Halogen
	LED Fixture <=35W Replacing 70-100W HID
LED Fixture <=35W Replacing 100W HID Area Light	LED Fixture <=35W Replacing >=100W HID
	LED Fixture <=35W with controls Replacing 70-100W HID
	LED Fixture <=35W with controls Replacing >=100W HID
	LED Fixture <=45W with controls Replacing 100W HID Area Light
	LED Fixture <=125W Replacing 400-999W HID
LED Fixture <=125W Replacing 400W HID	LED Fixture <=125W Replacing >=400W HID
	LED Fixture <=125W with controls Replacing 400-999W HID
	LED Fixture <=125W with controls Replacing >=400W HID
LED Fixture <=55W Replacing 250W Fixture	LED Fixture <=55W Replacing 176-250W Fixture
	LED Fixture <=55W Replacing >=250W Fixture

⁶ 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>

Program Measure	Tracking Data Measure Name
	LED Fixture <=55W with controls Replacing 176-250W Fixture
	LED Fixture <=55W with controls Replacing >=250W Fixture
LED Lamp <31W Replacing 150+W Spot	LED Lamp <31W Replacing 150W Spot
	LED Lamp <=31W Replacing >=150W Incandescent or Halogen
LED Lamp >14.5W Replacing 75W Incand. Spot	LED Lamp >14.5W Replacing 75-84W Incand. Spot
	LED Lamp >14.5W Replacing >=75W Incandescent or Halogen
LED Lamp ≤14.5W Replacing 75W Incand. Spot	LED Lamp <=14.5W Replacing 75-84W Incand. Spot
	LED Lamp <=14.5W Replacing >=75W Incandescent or Halogen
LED Box Sign Replacing 2 Lamp T12 (per Watt reduced)	LED Box Sign Retrofit Replacing T12 (Per Watt Reduced)
	LED Box Sign Retrofit Replacing Lamp T12 (per Watt reduced)
	LED Fixture <=19W Replacing 70W-150W HID
LED Fixture ≤19W Replacing 70W-150W HID	LED Fixture <=19W Replacing >=70W HID
	LED Fixture <=19W with controls Replacing 70W-150W HID
	LED Fixture <=19W with controls Replacing >=70W HID
	LED Fixture <=35W Replacing 101-175W HID
LED Fixture ≤35W Replacing 175W HID	LED fixture <=45W replacing 101-175W HID
	LED Fixture <=45W Replacing >=175W HID
	LED Fixture <=45W with controls Replacing 101-175W HID
	LED Fixture <=45W with controls Replacing >=175W HID
	LED Fixture Retrofit <=155W Replacing 400-999W HID
LED Fixture Retrofit ≤155W Replacing 400W HID	LED Fixture Retrofit <=155W Replacing >=400W HID
	LED Fixture Retrofit <=155W with controls Replacing 400-999W HID
	LED Fixture Retrofit <=155W with controls Replacing >=400W HID
	LED Fixture <=350W Replacing 1000W HID
LED Fixture ≤350W Replacing 1000W HID	LED Fixture <=350W Replacing >=1000W HID
	LED Fixture <=350W with controls Replacing 1000W HID
	LED Fixture <=350W with controls Replacing >=1000W HID
	LED Fixture Retrofit <=350W with controls Replacing 1000W HID
	LED Fixture Retrofit <=350W with controls Replacing >=1000W HID
	LED Fixture <=65W Replacing 251-320W HID
LED Fixture ≤65W Replacing 250-320W HID	LED Fixture <=65W Replacing >=250W HID
	LED Fixture <=65W with controls Replacing 251-320W HID
	LED Fixture <=65W with controls Replacing >=250W HID
	LED Lamp >20W replacing 85-99W Flood
LED Lamp >20W Replacing 85W-100W Incand. Spot	LED Lamp >20W Replacing >=85W Incandescent or Halogen
	LED Lamp >20W Replacing 100-149W Incand. Spot
LED Lamp ≤20W Replacing 100W Incand. Spot	LED Lamp <=20W Replacing 100-149W Incand. Spot
	LED Lamp <=20W Replacing >=100W Incandescent or Halogen
LED Lamp >14.5W Replacing 60W Incand. Spot	LED Lamp >14.5W Replacing 60-74W Incand. Spot
	LED Lamp >14.5W Replacing >=60W Incandescent or Halogen
LED Lamp ≤14.5W Replacing 60W Incand. Spot	LED Lamp <=14.5W Replacing 60-74W Incand. Spot
	LED Lamp <=14.5W Replacing >=60W Incandescent or Halogen
LED Fixture Retrofit ≤155W Replacing 250-320W HID or 250W Fixture	LED Fixture Gooseneck <15W Replacing 150W-225W Fixture
	LED Fixture Gooseneck Fixture, <15W, Replacing 150W-225W Fixture
	LED Fixture Retrofit <=45W Replacing 70W-150W HID
LED Fixture Retrofit ≤120W Replacing 175W HID	LED Fixture Retrofit <=45W Replacing >=70W HID
	LED Fixture Retrofit <=45W with controls Replacing 70W-150W HID
	LED Fixture Retrofit <=45W with controls Replacing >=70W HID
	LED Fixture Retrofit <=155W Replacing 176-250W Fixture
LED Fixture Retrofit ≤155W Replacing 250-320W HID or 250W Fixture	LED Fixture Retrofit <=155W Replacing 250-320W HID
	LED Fixture Retrofit <=155W Replacing >=250W HID
	LED Fixture Retrofit <=155W with controls Replacing 250-320W HID

Program Measure	Tracking Data Measure Name
LED Fixture Retrofit ≤120W Replacing 175W HID	LED Fixture Retrofit ≤155W with controls Replacing 176-250W HID
	LED Fixture Retrofit ≤155W with controls Replacing ≥250W HID
	LED Fixture Retrofit ≤120W Replacing 175W HID
	LED Fixture Retrofit ≤120W Replacing ≥175W HID
	LED Fixture Retrofit ≤120W with controls Replacing 101-175W HID
	LED Fixture Retrofit ≤120W with controls Replacing ≥175W HID
LED Channel Letter Replacing Neon Letter	LED Channel Letter Replacing Neon Letter
	LED Channel Letter Replacing Neon Letter (per letter)
T8HO 4', 2L or T8HO 8', 1L Replacing T12HO 8', 1L	T8HO 4', 2L Replacing T12HO 8', 1L
	T8HO 4', 2L (BF<1.0) Replacing T12HO 8', 1L
	T8HO 8', 1L Replacing T12HO 8', 1L
	T8HO 8', 1L (BF<1.0) Replacing T12HO 8', 1L
	T8HO 8', 1L (BF<1.0) Replacing T12HO 8', 1L
	T8HO 8'. Alt. LED Replacing T12HO 8', 1L

Source: ComEd program documentation.

8. APPENDIX 3. TOTAL RESOURCE COST DETAIL

The Total Resource Cost (TRC) variable table only includes cost-effectiveness analysis inputs available at the time of finalizing this PY9 Commercial Lit Signage IPA program 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. EULs are subject to change and are not final.

Table 8-1. Total Resource Cost Savings Summary

End Use Type	Research Category	Units	Quantity	Effective Useful Life (yrs)	Ex Ante Gross Savings (kWh)	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Savings (kWh)	Verified Gross Peak Demand Reduction (kW)
Lighting	LED Box sign replacing 2 lamp T12 (per Watt reduced)	Watt reduced	51,809	10.2	254,020	0	254,020	0
Lighting	LED Channel Letter Replacing Neon Letter	Letter	73	10.2	7,060	0	7,158	0
Lighting	LED Fixture ≤125W Replacing 400W HID	Fixture	1,798	10.2	2,953,224	0	2,953,224	0
Lighting	LED Fixture ≤19W Replacing 70W-150W HID	Fixture	253	10.2	137,691	0	140,172	0
Lighting	LED Fixture ≤350W Replacing 1000W HID	Fixture	2,795	10.2	10,414,953	0	10,414,953	0
Lighting	LED Fixture ≤35W Replacing 100W HID Area Light	Fixture	256	10.2	121,315	0	123,006	0
Lighting	LED Fixture ≤35W Replacing 175W HID	Fixture	911	10.2	773,551	0	848,660	0
Lighting	LED Fixture ≤55W Replacing 250W Fixture	Fixture	730	10.2	876,902	0	876,902	0
Lighting	LED Fixture ≤65W Replacing 250-320W HID	Fixture	244	10.2	281,138	0	281,138	0
Lighting	LED Fixture Gooseneck Replacing 150W-225W Fixture	Fixture	21	10.2	16,680	0	16,680	0
Lighting	LED Fixture Retrofit ≤120W Replacing 175W HID	Fixture	15	10.2	12,478	0	5,663	0
Lighting	LED Fixture Retrofit ≤155W Replacing 250-320W HID or 250W Fixture	Fixture	19	10.2	13,017	0	8,850	0
Lighting	LED Fixture Retrofit ≤155W Replacing 400W HID	Fixture	961	10.2	1,437,094	0	1,578,447	0
Lighting	LED Fixture Retrofit ≤45W Replacing 70W-150W HID	Fixture	139	10.2	56,566	0	36,120	0
Lighting	LED Lamp <31W Replacing 150+W Spot	Lamp	419	10.2	256,795	0	273,229	0
Lighting	LED Lamp >14.5W Replacing 60W Incand. Spot	Lamp	35	10.2	7,879	0	7,894	0
Lighting	LED Lamp >14.5W Replacing 75W Incand. Spot	Lamp	71	10.2	20,191	0	23,672	0
Lighting	LED Lamp >20W Replacing 85W-100W Incand. Spot	Lamp	151	10.2	58,017	0	61,449	0
Lighting	LED Lamp ≤14.5W Replacing 60W Incand. Spot	Lamp	245	10.2	55,051	0	51,653	0
Lighting	LED Lamp ≤14.5W Replacing 75W Incand. Spot	Lamp	138	10.2	40,881	0	41,950	0
Lighting	LED Lamp ≤20W Replacing 100W Incand. Spot	Lamp	619	10.2	243,802	0	251,901	0
Lighting	LED Lamp replacing 85-99W Flood	Lamp	32	10.2	11,297	0	11,297	0
Lighting	T8HO 4', 1L Replacing T12HO 4', 1L	Lamp	23	4.9	2,648	0	5,187	0
Lighting	T8HO 4', 2L or T8HO 8', 1L Replacing T12HO 8', 1L*	Lamp	218	5.7	54,816	0	55,580	0
Total			61,975	10.2	18,107,063	0	18,328,806	0

* This measure includes tubular LED lamps (TLED). The EUL value of this measure is a weighted average by verified energy savings.