



ComEd Residential Lighting Discounts Program and Holiday Light Exchange Program Impact Evaluation Report

Energy Efficiency / Demand Response Plan:
Program Year 2018 (CY2018)
(01/01/2018-12/31/2018)

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ComEd

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ComEd Residential Lighting Discounts and Holiday Light Exchange Impact Evaluation Report

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1. INTRODUCTION

This report presents the results of the impact evaluations of ComEd’s CY2018 Residential Lighting Discounts Program and CY2018 Holiday Light Exchange Program. It presents a summary of the energy and demand impacts for the programs and is broken out by relevant measure and program structure details. The appendix presents the impact analysis methodology. CY2018 covers January 1, 2018 through December 31, 2018.

2. PROGRAM DESCRIPTION

The primary goal of the Residential Lighting Discounts Program is to increase the market penetration of energy-efficient lighting within ComEd’s service territory by providing incentives for bulbs purchased through various retail channels. The program also seeks to increase customer awareness and acceptance of energy-efficient lighting technologies through the distribution of educational materials. In CY2018, the Residential Lighting Discounts Program offered incentives for the purchase of standard, reflector and specialty LED lamps, as well as LED fixtures.

The CY2018 Residential Lighting Discounts Program incentivized just over 11.2 million high efficiency LED lamps and fixtures. This included 7,800,621 omni-directional LEDs, 1,905,419 directional LEDs, 866,560 specialty LEDs, and 679,049 LED fixtures and retrofit kits as shown in the following table and figure. While not all these bulbs were installed in CY2018 (the TRM deems installation rates for years one, two and three), the overall quantity of bulbs installed in CY2018 was 11,824,893 as it includes carryover installations from bulbs sold in PY8 and PY9. Table 2-1 also provides the known volume of carryover bulbs that will be installed in CY2018 from program sales in PY9 and PY8 and the carryover in CY2019 and CY2020 from CY2018 sales. Estimates of CY2019 and CY2020 carryover savings are provided in Section 7.3.

Table 2-1. Residential Lighting Discounts CY2018 Volumetric Findings Detail

Participation	Total	Standard CFLs	Omni-Directional LEDs	Directional LEDs	Specialty LEDs	LED Fixtures
CY2018 Incentivized Bulbs	11,251,649	0	7,800,621	1,905,419	866,560	679,049
CY2018 1 st Year Installed Bulbs	10,307,819	0	7,035,380	1,783,663	811,187	677,589
PY8 Carryover–CY2018 Installs	900,076	824,039	54,000	16,689	5,192	157
PY9 Carryover–CY2018 Installs	616,998	352,969	188,818	52,490	22,026	694
Total Installed Bulbs in CY2018	11,824,893	1,177,008	7,278,197	1,852,842	838,405	678,441
PY9 Carryover–CY2019 Installs	530,377	300,250	165,007	45,871	19,249	0
CY2018 Carryover–CY2019 Installs	388,607	0	323,336	44,587	20,278	407
CY2018 Carryover–CY2020 Installs	335,681	0	278,482	39,061	17,764	373

Source: ComEd tracking data and Navigant team analysis.

In addition to the Residential Lighting Discounts Program, this report presents the impact evaluation results from ComEd’s Holiday Light Exchange Program. This program encourages customers to swap out their incandescent holiday light strings and replace them with LED holiday light strings provided from ComEd via giveaway events at local retailers and public spaces (arboretums, zoos, etc.). The program also provides free Tier 1 Advanced Power Strips to the first 100 customers at each event. During CY2018, the Holiday Light Exchange Program exchanged 70-bulb LED holiday light strings for 170 C7/C9 incandescent light strings and 3,378 incandescent mini light strings and distributed 440 Tier 1 Advanced Power Strips as seen in Table 2-2.

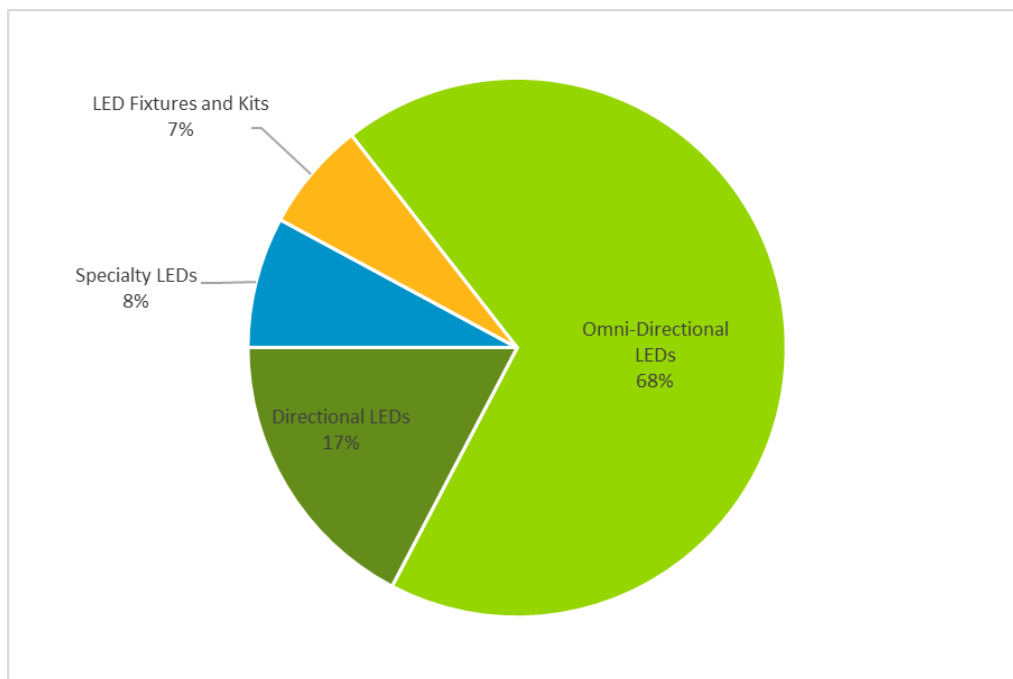
Table 2-2. Holiday Light Exchange CY2018 Volumetric Findings Detail

Participation	Total	Incandescent C7/C9 Strands Exchanged	Incandescent Mini Strands Exchanged	Tier 1 Advanced Power Strips Distributed
CY2018 Distributed Measures	3,988	170	3,378	440
CY2018 Installed Measures	3,852	170	3,378	304

Source: ComEd tracking data and Navigant team analysis.

Figure 2-1 presents the number of measures installed in CY2018 from the Residential Lighting Discounts and Holiday Light Exchange programs.

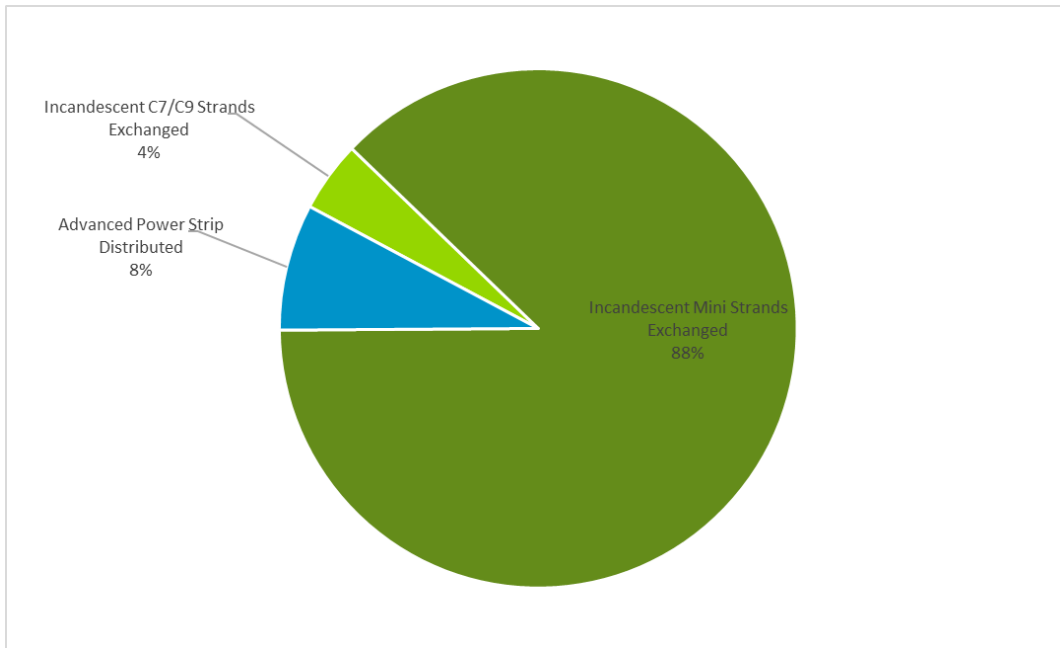
Figure 2-1. Residential Lighting Discounts Number of Measures Installed by Type



Note: This figure excludes CY2018 carryover measures.

Source: ComEd tracking data and Navigant team analysis

Figure 2-2. Holiday Light Exchange Number of Measures Installed by Type



Source: ComEd tracking data and Navigant team analysis

3. PROGRAM SAVINGS DETAIL

Table 3-1 summarizes the incremental energy and demand savings the Residential Lighting Discounts (including carryover) and Holiday Light Exchange programs achieved in CY2018. Additionally, Table 3-2 presents the incremental energy and demand savings of the Residential Lighting Discounts Program, excluding carryover from PY8 and PY9 purchases.

Table 3-1. CY2018 Total Annual Incremental Electric Savings

Savings Category	Residential Lighting Discounts				Holiday Light Exchange			
	Energy Savings (kWh)	Demand Savings (kW)	Summer Peak Demand Savings (kW)	Winter Peak Demand Savings (kW)	Energy Savings (kWh)	Demand Savings (kW)	Summer Peak Demand Savings (kW)	Winter Peak Demand Savings (kW)
Electricity								
Ex Ante Gross Savings	518,684,542	NR	NR	NR	47,962	NR	NR	NR
Program Gross Realization Rate	0.97	NA	NA	NA	1.14	NA	NA	NA
Verified Gross Savings	503,823,727	461,558	60,994	67,111	54,842	148	1.94	NA
Program Net-to-Gross Ratio (NTG)	Varies	Varies	Varies	Varies	0.80	0.80	0.80	NA
Verified Net Savings	301,534,004	275,876	36,498	40,137	43,874	118	1.55	NA
Converted from Gas*								
Ex Ante Gross Savings	NA	NA	NA	NA	NA	NA	NA	NA
Program Gross Realization Rate	NA	NA	NA	NA	NA	NA	NA	NA
Verified Gross Savings	NA	NA	NA	NA	NA	NA	NA	NA
Program Net-to-Gross Ratio (NTG)	NA	NA	NA	NA	NA	NA	NA	NA
Verified Net Savings	NA	NA	NA	NA	NA	NA	NA	NA
Total Electric Plus Gas								
Ex Ante Gross Savings	518,684,542	NR	NR	NR	47,962	NR	NR	NR
Program Gross Realization Rate	0.97	NA	NA	NA	1.14	NA	NA	NA
Verified Gross Savings	503,823,727	461,558	60,994	67,111	54,842	148	1.94	NA
Program Net-to-Gross Ratio (NTG)	Varies	Varies	Varies	Varies	0.80	0.80	0.80	NA
Verified Net Savings	301,534,004	275,876	36,498	40,137	43,874	118	1.55	NA

* There are no gas savings associated with the Residential Lighting Discounts or Holiday Light Exchange programs

NR = Not recorded

NA = Not applicable

Note: The demand savings are equivalent to the reduction in kW of bulbs installed in 2018.

The coincident Summer Peak period is defined as 1:00-5:00 PM Central Prevailing Time on non-holiday weekdays, June through August.

Source: ComEd tracking data and Navigant team analysis.

Table 3-2. Residential Lighting Discounts CY2018 Total Annual Incremental Electric Savings Excluding Carryover

Savings Category	Residential Lighting Discounts			
	Energy Savings (kWh)	Demand Savings (kW)	Summer Peak Demand Savings (kW)	Winter Peak Demand Savings (kW)
Electricity				
Ex Ante Gross Savings	467,885,454	NR	NR	NR
Program Gross Realization Rate	0.97	NA	NA	NA
Verified Gross Savings	453,027,169	415,013	55,414	60,938
Program Net-to-Gross Ratio (NTG)	Varies	Varies	Varies	Varies
Verified Net Savings	269,754,735	246,787	33,020	246,787
Converted from Gas*				
Ex Ante Gross Savings	NA	NA	NA	NA
Program Gross Realization Rate	NA	NA	NA	NA
Verified Gross Savings	NA	NA	NA	NA
Program Net-to-Gross Ratio (NTG)	NA	NA	NA	NA
Verified Net Savings	NA	NA	NA	NA
Total Electric Plus Gas				
Ex Ante Gross Savings	467,885,454	NR	NR	NR
Program Gross Realization Rate	0.97	NA	NA	NA
Verified Gross Savings	453,027,169	415,013	55,414	60,938
Program Net-to-Gross Ratio (NTG)	Varies	Varies	Varies	Varies
Verified Net Savings	269,754,735	246,787	33,020	246,787

* There are no gas savings associated with the Residential Lighting Discounts or Holiday Light Exchange programs.

NR = Not recorded

NA = Not applicable

Note: The coincident Summer Peak period is defined as 1:00-5:00 PM Central Prevailing Time on non-holiday weekdays, June through August.

Source: ComEd tracking data and Navigant team analysis.

4. CUMULATIVE PERSISTING ANNUAL SAVINGS

4.1 Residential Lighting Discounts Program

The measure-specific and total ex ante gross savings for the Residential Lighting Discounts Program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 are shown in the following table and figure. The CY2018 total CPAS across all measures is 301,534,004 kWh. There are no gas savings associated with this program. As seen in the table below, standard (omni-directional) lamps and carryover savings have a significant reduction in net savings following the implementation of the Energy Independence and Security Act (EISA) standards change in 2020. Savings from the CY2019 program may see increased reductions in 2024 if the EISA standards are applied to specialty and reflector lamps. However, since there currently is uncertainty regarding the implementation of the EISA standards to these bulb types, a reduction in future savings has not been applied within the tables below in accordance with Version 6 of the Illinois Technical Reference Manual (TRM).

Table 4-1. Residential Lighting Discounts Cumulative Persisting Annual Savings (CPAS) – Total

End Use Type	Research Category	CY2018				Verified Net kWh Savings									
		EUL	Verified Gross Savings	NTG*	Lifetime Net Savings†	2018	2019	2020	2021	2022	2023	2024	2025	2026	
Lighting	Standard LED (Residential)	10.0	212,526,024	0.58	683,315,813	123,265,094	123,265,094	123,265,094	44,788,647	44,788,647	44,788,647	44,788,647	44,788,647	44,788,647	
Lighting	Standard LED (Non-Residential)	4.6	52,215,054	0.58	108,572,129	30,284,731	30,284,731	30,284,731	11,004,025	6,713,911					
Lighting	Directional LED (Residential)	10.0	83,866,938	0.58	486,428,242	48,642,824	48,642,824	48,642,824	48,642,824	48,642,824	48,642,824	48,642,824	48,642,824	48,642,824	
Lighting	Directional LED (Non-Residential)	6.1	18,833,376	0.58	66,755,279	10,923,358	10,923,358	10,923,358	10,923,358	10,923,358	1,215,129				
Lighting	Specialty LED (Residential)	10.0	32,702,443	0.58	189,674,172	18,967,417	18,967,417	18,967,417	18,967,417	18,967,417	18,967,417	18,967,417	18,967,417	18,967,417	
Lighting	Specialty LED (Non-Residential)	4.4	6,223,484	0.58	15,774,337	3,609,621	3,609,621	3,609,621	3,609,621	1,335,854					
Lighting	LED Fixtures and Kits (Residential)	15.0	39,383,480	0.73	431,249,101	28,749,940	28,749,940	28,749,940	28,749,940	28,749,940	28,749,940	28,749,940	28,749,940	28,749,940	
Lighting	LED Fixtures and Kits (Non-Residential)	13.8	7,276,370	0.73	73,228,529	5,311,750	5,311,750	5,311,750	5,311,750	5,311,750	5,311,750	5,311,750	5,311,750	5,311,750	
Lighting	Carryover (Residential)	4.9	42,945,862	0.63	88,380,490	26,969,909	26,969,909	26,969,909	3,932,203	3,538,559					
Lighting	Carryover (Non-Residential)	3.5	7,850,696	0.61	14,707,479	4,809,360	4,809,360	4,809,360	279,400						
CY2018 Program Total Electric CPAS			503,823,727		2,158,085,569	301,534,004	301,534,004	301,534,004	176,209,185	168,972,262	157,383,937	147,675,707	146,460,578	146,460,578	
CY2018 Program Expiring Electric Savings‡									125,324,819	132,561,742	144,150,067	153,858,297	155,073,426	155,073,426	

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Lighting	Standard LED (Residential)	44,788,647											
Lighting	Standard LED (Non-Residential)												
Lighting	Directional LED (Residential)	48,642,824											
Lighting	Directional LED (Non-Residential)												
Lighting	Specialty LED (Residential)	18,967,417											
Lighting	Specialty LED (Non-Residential)												
Lighting	LED Fixtures and Kits (Residential)	28,749,940	28,749,940	28,749,940	28,749,940	28,749,940	28,749,940						
Lighting	LED Fixtures and Kits (Non-Residential)	5,311,750	5,311,750	5,311,750	5,311,750	4,175,781							
Lighting	Carryover (Residential)												
Lighting	Carryover (Non-Residential)												
CY2018 Program Total Electric CPAS		146,460,578	34,061,690	34,061,690	34,061,690	32,925,721	28,749,940						
CY2018 Program Expiring Electric Savings‡		155,073,426	267,472,314	267,472,314	267,472,314	268,608,283	272,784,064	301,534,004	301,534,004	301,534,004	301,534,004	301,534,004	301,534,004

Note: The green highlighted cell shows program total first year electric savings.

* A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

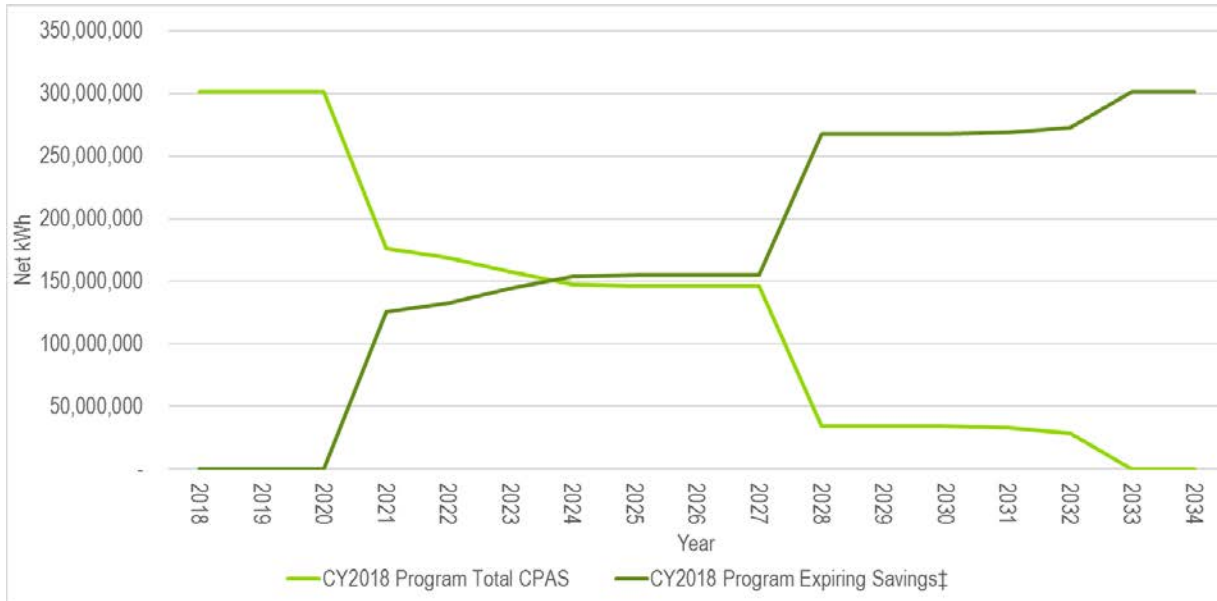
Carryover NTG values are the savings weighted average of NTG values from the program year carryover bulbs were purchased.

† Lifetime savings are the sum of CPAS savings through the EUL.

‡ Expiring savings are equal to CPAS Yn-1 - CPAS Yn + Expiring Savings Yn-1.

Source: Navigant analysis

Figure 4-1. Residential Lighting Discounts Cumulative Persisting Annual Savings



‡ Expiring savings are equal to CPAS Yn-1 - CPAS Yn + Expiring Savings Yn-1.
 Source: Navigant analysis

4.2 Holiday Light Exchange Program

The measure-specific and total ex ante gross savings for the Holiday Light Exchange Program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 are shown in the following table and figure. The total CPAS across all measures is 43,874 kWh. There are no gas savings associated with this program. All measures associated with this program have an EUL of seven years. As a result, all program savings expire in 2025.

Table 4-2. Holiday Light Exchange Cumulative Persisting Annual Savings (CPAS) – Electricity/Total

End Use Type	Research Category	EUL	CY2018 Verified Gross Savings	NTG*	Lifetime Net Savings†	Verified Net kWh Savings									
						2018	2019	2020	2021	2022	2023	2024	2025	2026	
Holiday String Lights	Holiday String Lights (Exchanged Incandescent C7/C9 and Mini)	7	37,682	0.80	211,019	30,146	30,146	30,146	30,146	30,146	30,146	30,146			
Advance Power Strip	Tier 1 Advanced Power Strips	7	17,160	0.80	96,096	13,728	13,728	13,728	13,728	13,728	13,728	13,728			
CY2018 Program Total Electric CPAS			54,842		307,115	43,874	43,874	43,874	43,874	43,874	43,874	43,874			
CY2018 Program Expiring Electric Savings‡														43,874	43,874

Note: The green highlighted cell shows program total first year electric savings (including direct electric savings and those converted from gas).

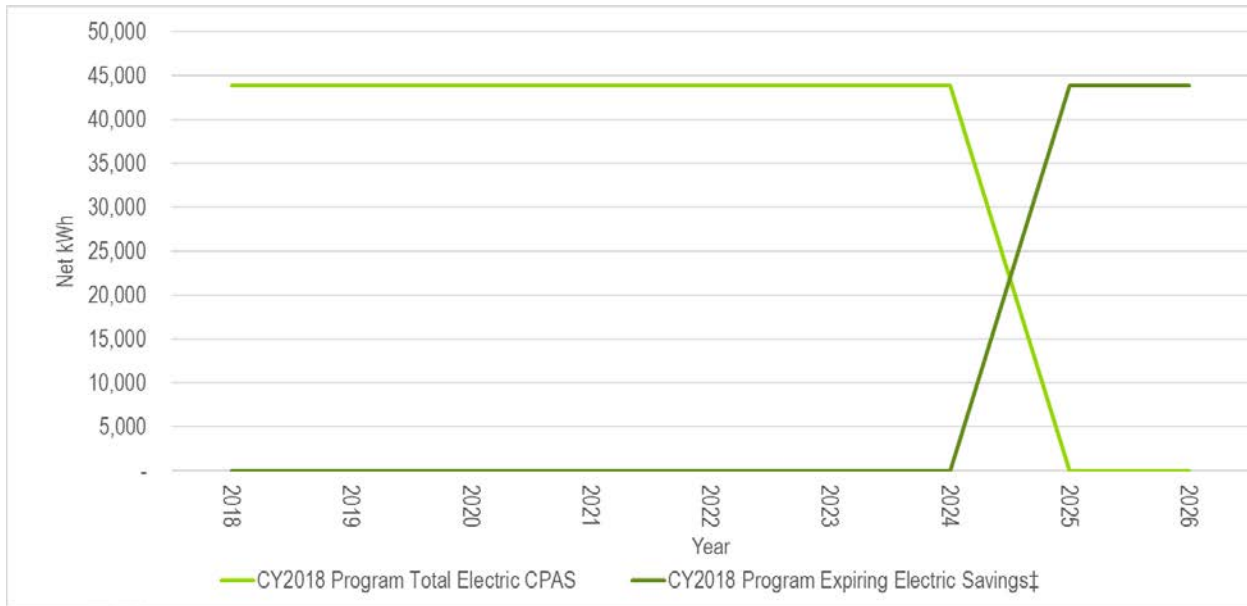
* A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

†Lifetime savings are the sum of CPAS savings through the EUL.

‡ Expiring savings are equal to CPAS Yn-1 - CPAS Yn + Expiring Savings Yn-1.

Source: Navigant analysis

Figure 4-2. Holiday Light Exchange Cumulative Persisting Annual Savings



‡ Expiring savings are equal to CPAS Yn-1 - CPAS Yn + Expiring Savings Yn-1.
 Source: Navigant analysis

5. PROGRAM SAVINGS BY MEASURE

The Residential Lighting Discounts Program includes five distinct lighting measure groups as shown in the following tables. These groups include standard omni-directional LEDs, directional LEDs (BR, R, MR, and PAR reflector lamps), specialty LEDs (globe, candelabra, and 3-way lamps), LED fixtures and retrofit kits, and carryover lamps (CFL and LED lamps and fixtures purchased in PY8 and PY9 but installed in CY2018). All five measure groups are split by the residential and non-residential sectors to highlight where the savings are expected to be realized. Overall, standard LEDs make up the largest share of program energy and demand savings (more than 50%).

The following tables also include savings estimates for the Holiday Light Exchange Program. The three measure groups included in this program are exchanged C7/C9 holiday string lights, exchanged incandescent mini holiday string lights, and distributed Tier 1 advanced power strips. The efficient measure for both the exchanged C7/C9 holiday string lights and exchanged incandescent mini holiday string lights are LED string lights. Per the IL TRM v7,¹ there are no peak demand savings associated with holiday string lights, however these measures are included in all savings tables in this section.

¹ IL TRM v6 does not include Holiday String Lights as a measure. IL TRM v7 was used as a result.

Table 5-1. CY2018 Energy Savings by Measure

Program	End Use Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)	Effective Useful Life
Residential Lighting Discounts	Lighting	Standard LED (Residential)	227,805,324	0.93	212,526,024	0.58	123,265,094	10.0
	Lighting	Standard LED (Non-Residential)	51,129,860	1.02	52,215,054	0.58	30,284,731	4.6
	Lighting	Directional LED (Residential)	87,571,966	0.96	83,866,938	0.58	48,642,824	10.0
	Lighting	Directional LED (Non-Residential)	18,684,502	1.01	18,833,376	0.58	10,923,358	6.1
	Lighting	Specialty LED (Residential)	33,548,367	0.97	32,702,443	0.58	18,967,417	10.0
	Lighting	Specialty LED (Non-Residential)	6,068,182	1.03	6,223,484	0.58	3,609,621	4.4
	Lighting	LED Fixtures and Kits (Residential)	36,217,915	1.09	39,383,480	0.73	28,749,940	15.0
	Lighting	LED Fixtures and Kits (Non-Residential)	6,859,338	1.06	7,276,370	0.73	5,311,750	13.8
	Lighting	Carryover (Residential)	42,944,528	1.00	42,945,862	0.63	26,969,909	4.9
	Lighting	Carryover (Non-Residential)	7,854,559	1.00	7,850,696	0.61	4,809,360	3.5
	Lighting	Total (Residential)	428,088,100	0.96	411,424,748	0.60	246,595,185	9.9
	Lighting	Total (Non-Residential)	90,596,442	1.02	92,398,979	0.59	54,938,819	5.5
	Lighting	Total (All Sectors)	518,684,542	0.97	503,823,727	0.60	301,534,004	9.1
Holiday Light Exchange	Holiday String Lighting	Exchanged Incandescent C7/C9 Strands	4,041	2.13	8,590	0.80	6,872	7.0
	Holiday String Lighting	Exchanged Incandescent Mini Strands	26,768	1.09	29,092	0.80	23,274	7.0
	Advanced Power Strip	Tier 1 Advanced Power Strip Distributed	17,153	1.00	17,160	0.80	13,728	7.0
	Holiday Light Exchange Total	Total	47,962	1.14	54,842	0.80	43,874	7.0

* A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.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.

Table 5-2. CY2018 Demand Savings by Measure

Program	End Use Type	Research Category	Ex Ante Gross Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Demand Reduction (kW)	NTG*	Verified Net Demand Reduction (kW)
Residential Lighting Discounts	Lighting	Standard LED (Residential)	NR	NR	236,713	0.58	137,294
	Lighting	Standard LED (Non-Residential)	NR	NR	13,262	0.58	7,692
	Lighting	Directional LED (Residential)	NR	NR	88,799	0.58	51,503
	Lighting	Directional LED (Non-Residential)	NR	NR	4,784	0.58	2,774
	Lighting	Specialty LED (Residential)	NR	NR	29,344	0.58	17,019
	Lighting	Specialty LED (Non-Residential)	NR	NR	1,581	0.58	917
	Lighting	LED Fixtures and Kits (Residential)	NR	NR	38,587	0.73	28,168
	Lighting	LED Fixtures and Kits (Non-Residential)	NR	NR	1,944	0.73	1,419
	Lighting	Carryover (Residential)	NR	NR	44,674	0.63	27,947
	Lighting	Carryover (Non-Residential)	NR	NR	1,871	0.61	1,143
	Lighting	Total (Residential)	NR	NR	438,117	0.60	261,931
	Lighting	Total (Non-Residential)	NR	NR	23,441	0.59	13,945
	Lighting	Total (All Sectors)		NR	NR	461,558	0.60
Holiday Light Exchange	Holiday String Lighting	Exchanged Incandescent C7/C9 Strands	NR	NR	7.0	0.80	5.6
	Holiday String Lighting	Exchanged Incandescent Mini Strands	NR	NR	138	0.80	111
	Advanced Power Strip	Tier 1 Advanced Power Strip Distributed	NR	NR	2.4	0.80	1.9
	Holiday Light Exchange Total		NR	NR	148	0.80	118

* A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

NR = Not recorded

Source: ComEd tracking data and Navigant team analysis.

Table 5-3. CY2018 Summer Peak Demand Savings by Measure

Program	End Use Type	Research Category	Ex Ante Gross Summer Peak Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Summer Peak Demand Reduction (kW)	NTG*	Verified Net Summer Peak Demand Reduction (kW)
Residential Lighting Discounts	Lighting	Standard LED (Residential)	NR	NR	21,283	0.58	12,344
	Lighting	Standard LED (Non-Residential)	NR	NR	10,461	0.58	6,068
	Lighting	Directional LED (Residential)	NR	NR	9,265	0.58	5,374
	Lighting	Directional LED (Non-Residential)	NR	NR	3,773	0.58	2,189
	Lighting	Specialty LED (Residential)	NR	NR	3,521	0.58	2,042
	Lighting	Specialty LED (Non-Residential)	NR	NR	1,247	0.58	723
	Lighting	LED Fixtures and Kits (Residential)	NR	NR	4,350	0.73	3,176
	Lighting	LED Fixtures and Kits (Non-Residential)	NR	NR	1,513	0.73	1,104
	Lighting	Carryover (Residential)	NR	NR	4,104	0.63	2,577
	Lighting	Carryover (Non-Residential)	NR	NR	1,476	0.61	901
	Lighting	Total (Residential)	NR	NR	42,524	0.60	25,512
	Lighting	Total (Non-Residential)	NR	NR	18,470	0.59	10,985
	Lighting	Total (All Sectors)	NR	NR	60,994	0.60	36,498
	Holiday Light Exchange	Holiday String Lighting	Exchanged Incandescent C7/C9 Strands	NA	NR	0	0.80
Holiday String Lighting		Exchanged Incandescent Mini Strands	NA	NR	0	0.80	0
Advanced Power Strip		Tier 1 Advanced Power Strip Distributed	NA	NR	1.94	0.80	1.55
Holiday Light Exchange		Total	NR	NR	1.94	0.80	1.55

* A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

NR = Not recorded

Source: ComEd tracking data and Navigant team analysis.

Table 5-4. CY2018 Winter Peak Demand Savings by Measure

Program	End Use Type	Research Category	Ex Ante Gross Winter Peak Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Winter Peak Demand Reduction (kW)	NTG*	Verified Net Winter Peak Demand Reduction (kW)
Residential Lighting Discounts	Lighting	Standard LED (Residential)	NR	NR	27,459	0.58	15,926
	Lighting	Standard LED (Non-Residential)	NR	NR	7,294	0.58	4,231
	Lighting	Directional LED (Residential)	NR	NR	11,899	0.58	6,901
	Lighting	Directional LED (Non-Residential)	NR	NR	2,631	0.58	1,526
	Lighting	Specialty LED (Residential)	NR	NR	4,546	0.58	2,637
	Lighting	Specialty LED (Non-Residential)	NR	NR	869	0.58	504
	Lighting	LED Fixtures and Kits (Residential)	NR	NR	5,171	0.73	3,775
	Lighting	LED Fixtures and Kits (Non-Residential)	NR	NR	1,069	0.73	780
	Lighting	Carryover (Residential)	NR	NR	5,274	0.63	3,309
	Lighting	Carryover (Non-Residential)	NR	NR	899	0.61	549
	Lighting	Total (Residential)	NR	NR	54,348	0.60	32,548
	Lighting	Total (Non-Residential)	NR	NR	12,763	0.59	7,590
	Lighting	Total (All Sectors)	NR	NR	67,111	0.60	40,137
Holiday Light Exchange	Holiday String Lighting	Exchanged Incandescent C7/C9 Strands	NR	NR	NA	NA	NA
	Holiday String Lighting	Exchanged Incandescent Mini Strands	NR	NR	NA	NA	NA
	Advanced Power Strip	Tier 1 Advanced Power Strip Distributed	NR	NR	NA	NA	NA
	Holiday Light Exchange Total		NR	NR	NA	NA	NA

* A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

NR = Not recorded

Note: Winter Peak demand savings are not calculated for the Holiday Light Exchange Program as no Winter Peak CF is provided in the IL TRM.

Source: ComEd tracking data and Navigant team analysis.

6. IMPACT ANALYSIS FINDINGS AND RECOMMENDATIONS

6.1 Impact Parameter Estimates

6.1.1 Lamps, Fixtures, and String Lights

Energy and demand² savings for lamps, fixtures, and string lighting are estimated using the following formulas as specified in the IL TRM:

$$\text{Verified Gross Annual } \Delta \text{kWh} = \text{ResSplit} * \text{Res } \Delta \text{kWh} + \text{NonResSplit} * \text{NonRes } \Delta \text{kWh}$$

Where:

$$\text{Res } \Delta \text{kWh} = \text{Bulbs} * \text{DeltaWatts}/1000 * \text{ISR}_r * (1-\text{Leakage}) * \text{HOU}_r * \text{WHF}_{e_r}$$

$$\text{NonRes } \Delta \text{kWh} = \text{Bulbs} * \text{DeltaWatts}/1000 * \text{ISR}_{nr} * (1-\text{Leakage}) * \text{HOU}_{nr} * \text{WHF}_{e_{nr}}$$

$$\text{Verified Gross Annual } \Delta \text{kW} = \text{Delta Watts}/1000 * \text{ISR} * (1-\text{Leakage})$$

² Holiday string lights do not have summer or winter peak demand savings.

Verified Gross Annual Summer Peak ΔkW = Gross Annual ΔkW * Summer Peak CF * WHFd
Verified Gross Annual Winter Peak ΔkW = Gross Annual ΔkW * Winter Peak CF

Where:

- **Res/NonRes split** = Percentage of program bulbs installed in residential and non-residential locations. Deemed within Illinois TRM v6.
- **Bulbs** = Quantity of bulbs sold through the CY2018 program, based on program tracking data.
- **Delta Watts** = Difference in wattage between the baseline bulb (WattsBase) and the efficient program bulb (WattsEE):
 - WattsBase = Baseline bulb wattage, mapping deemed in Illinois TRM v6.
 - WattsEE = Wattage of efficient program bulb, based on program tracking data.
- **ISR_{r(nr)}** = First-year installation rate (residential or non-residential), deemed in Illinois TRM v6.
- **Leakage** = Percentage of program bulbs installed outside of ComEd service territory, deemed in Illinois TRM v6.
- **HOU_{r(nr)}** = Annual hours-of-use (residential or non-residential), deemed in Illinois TRM v6.
- **WHFe_{r(nr)}** = Waste heat factor – Energy (residential or non-residential), deemed in Illinois TRM v6.
- **WHFd_{r(nr)}** = Waste heat factor – Demand (residential or non-residential), deemed in Illinois TRM v6.
- **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.).
- **Winter Peak CF** = Peak load coincidence factor, the percentage of program bulbs turned on during the PJM Winter Peak hours.³

The source of the verified first-year gross and net savings parameters are shown in the table below. The sources of the parameters used to calculate the second and third year carryover are presented in the carryover section (Section 7.3).

The lifetime energy and demand savings are estimated by multiplying the verified savings by the effective useful life for each measure.⁴

³ The Winter Peak Period is defined by PJM as the period from 6-8 am and 5-7 pm, Central Time Zone, between January 1 and February 28.

⁴ Standard lamps (CFL and LED) receive baseline adjustments in lifetime savings starting 2021 to account for the implementation of the EISA efficiency standards for these measures.

Table 6-1. Lamp, Fixture, String Lighting Savings Parameters

Gross Savings Input Parameters	Deemed * or Evaluated?	Source – LEDs and Fixtures	Source – Holiday String Lighting
Program Bulbs	Evaluated	CY2018 Program Tracking Data	CY2018 Program Tracking Data
Delta Watts	Deemed	Illinois TRM v6	Illinois TRM v7
Installation Rate	Deemed	Illinois TRM v6	Illinois TRM v7
Leakage	Evaluated	Illinois TRM v6 Errata	Illinois TRM v7
Res / Non-Res Split	Deemed	Illinois TRM v6	Illinois TRM v7
Hours of Use (HOU)	Deemed	Illinois TRM v6	Illinois TRM v7
Summer Peak Coincidence Factor	Deemed	Illinois TRM v6	Illinois TRM v7
Winter Peak Coincidence Factor	Evaluated	Memo to ComEd	NA
Waste Heat Factor (Energy)	Deemed	Illinois TRM v6	Illinois TRM v7
Waste Heat Factor (Demand)	Deemed	Illinois TRM v6	Illinois TRM v7
NTG†	Deemed	IL SAG Consensus	Evaluator Recommendation

* State of Illinois Technical Reference Manual version 6.0 and Technical Reference Manual version 7.0 from <http://www.ilsag.info/technical-reference-manual.html>.

† A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

6.1.2 Tier 1 Advanced Power Strips

Energy and demand⁵ savings for Tier 1 advanced power strips are estimated using the following formula as specified in the TRM:

Verified Gross Annual ΔkWh = kWh * ISR

Verified Gross Annual ΔkW = ΔkWh / Hours

Verified Gross Annual Summer Peak ΔkW = ΔkWh / Hours * Summer Peak CF

The source of the verified first-year gross and net savings parameters are shown in the below.

The lifetime energy and demand savings are estimating by multiplying the verified savings by the effective useful life for each measure.⁶

Table 6-2. Tier 1 Advanced Power Strip Savings Parameters

Gross Savings Input Parameters	Deemed * or Evaluated?	Source
Advanced Power Strips	Evaluated	CY2018 Program Tracking Data
Energy Savings	Deemed	Illinois TRM v7
Installation Rate	Deemed	Illinois TRM v7
Hours of Use (HOU)	Deemed	Illinois TRM v7
Summer Peak Coincidence Factor	Deemed	Illinois TRM v7
NTG†	Deemed	Evaluator Recommendation

* State of Illinois Technical Reference Manual version 7.0 from <http://www.ilsag.info/technical-reference-manual.html>.

† A deemed value. Source: ComEd Holiday Light Exchange CY2019 Evaluation Plan.docx

⁵ Winter demand savings were not calculated for Tier 1 Advanced Power Strips as there is no Winter Peak coincidence factor for this measure.

⁶ Standard lamps (CFL and LED) receive baseline adjustments in lifetime savings starting 2021 to account for the implementation of new EISA efficiency standards for these measures.

6.2 Other Impact Findings and Recommendations

The evaluation team has developed several recommendations based on findings from the CY2018 evaluation, as follows:

6.2.1 Residential Lighting Discounts

Finding 1. The gross realization rate for the Residential Lighting Discounts Program is 97.2%. The main source of the discrepancies between the ex ante and verified savings estimates results from differences in the gross savings calculations. The evaluation team includes interactive effects (WHFe and WHFd), in-service rates (ISR) and program leakage into the final savings calculations per the IL TRM v6, however, the ex ante gross savings did not include the application of these parameters.

Recommendation 1. The evaluation team recommends that ex ante gross savings be calculated using all parameters included in the TRM estimated savings equations.

Finding 2. The evaluation team noted several differences in baseline wattage values applied to program lamps. These differences include:

Finding 2a. For R Reflector LEDs, the evaluation team found differences between the ex ante and verified baseline wattages. Roughly 3,250 records of R20 lamps in the tracking data were mapped using the R, BR, and ER category for lamps with diameters less than or equal to 2.25 inches. However, all R20 lamps sold through the program have a diameter of 2.5 inches.⁷ The second cause for discrepancies in R20 lumen mapping results from roughly 4,500 R20 records that have lumens less than 720 but are not using the TRM specified R20 exceptions for lower lumen categories.

Recommendation 2a. The evaluation team recommends that the baseline wattages for R20 lamps with 720 lumens and above be mapped to the “R, ER, BR with medium screw bases with diameter >2.25 inches and the baseline wattages of R20 lamps with lumens less than 720 be mapped using the appropriate exceptions category included in the TRM.

Finding 2b. The evaluation team found that PAR lamps in the tracking data were grouped with other reflector types⁸ and assigned baseline wattages based on lumen mappings of those groupings as opposed to using the ENERGY STAR Center Beam Candle Power tool specified for PAR lamps in the TRM. Applying this formula to calculate the verified baseline wattages for PAR lamps yielded differences in baseline wattages ranging from 10 to 55 watts from the ex ante baseline wattages.

Recommendation 2b. The evaluation team recommends that all PAR baseline wattages be determined using the ENERGY STAR Center Beam Candle Power tool specified for PAR lamps in the TRM.

Finding 2c. The evaluation team found roughly 1,800 records of Decorative - Candelabra Base lamps that were mapped to a lower wattage bin than specified in the TRM.

Recommendation 2c. The evaluation team recommends that all lamps should be mapped using the defined lumen ranges in the TRM.

Finding 2d. The evaluation team found discrepancies between the ex ante and verified baseline wattage assignments for roughly 28,000 hardwired fixture records (87% of these records are

⁷ The diameter of a reflector can be calculated based on the numeric portion of the reflector type. The number is a measurement in eighths of an inch and so an R20 is $20/8 = 2.5$ ”.

⁸ Other reflector types refer to TRM lumen mapping descriptions of “R, BR, and ER with medium screw bases w/ diameter ≤ 2.25 in” and “All reflector lamps below lumen ranges specified above”

one of two models). The evaluation team could not identify a reason as to why these records did not align with the TRM lumen mapping. The evaluation team used the assumption that all hardwired fixtures were mapped to R, ER, BR with medium screw bases with diameter >2.25 inches for baseline wattage assignments.

Recommendation 2d. The evaluation team recommends that an additional hardwired fixture variable be added to the tracking data that specifies the fixture type and the associated baseline category.

Finding 3. There are no differences in ex ante and verified hours of use (HOU) values with the exception of retrofit kits. The evaluation team applied a residential and non-residential HOU value of 891 and 3,612 (respectively) to retrofit kits. This results in a residential/non-residential weighted average HOU equal to 1,027, whereas the residential/non-residential weighted average HOU included in the tracking data is equal to 1,015. Since the tracking data only contains a weighted average HOU values, it is not possible to verify what HOU value was used for each market sector.

Recommendation 3. The evaluation team recommends the same HOU values that are applied to interior hardwired fixtures be applied to retrofit kits.

Finding 4. The tracking data parameters used to calculate energy savings are provided as a residential and non-residential weighted average based on the program residential/non-residential split. Because only a single weighted value is provided, it is not possible for the evaluation team to verify the actual values used to calculate ex ante savings based on the tracking data alone.

Recommendation 4. The evaluation team recommends that residential and non-residential values for each parameter be included in the tracking data starting in CY2019.

6.2.2 Holiday Light Exchange

Finding 1. The gross realization rate for the Holiday Light Exchange Program is 114%. The source of the discrepancies in the gross energy savings estimates results from differences in the per-unit savings value applied to holiday string lights that were exchanged during program events. The evaluation team assumed a baseline string length of 100 bulbs per string for mini string lights and 50 bulbs per string for C7/C9 string lights.⁹ The efficient products distributed to the participants were 70-bulb LED string lights. This results in an estimated savings of 50.52 kWh per string for C7/C9 exchanges and 8.61 kWh per string for mini exchanges. The per unit ex ante savings estimates were 23.77 kWh for C7/C9 exchanges and 7.92 kWh for mini exchanges. The ex ante savings estimates assumed a 100-bulb replacement string and a 25-bulb C7/C9 string.

Recommendation 1. The evaluation team recommends that the approximate bulbs per string for exchanged holiday lights be recorded during program events and included in the tracking data. Additionally, details on the holiday lights given away should also be included in the tracking data (at a minimum, the number of bulbs per string). Including these two variables in the tracking data will allow for increased accuracy in the estimation of program savings.

Finding 2. The evaluation team estimated program leakage for holiday string lights and advanced power strips using the participant zip codes found in the tracking data. Evaluation determined the leakage for holiday string lights to be 1.6% and the leakage for Tier 1 advanced power strips to be 3.0%.

⁹ The holiday string light baseline assumptions were agreed upon in a meeting between ComEd, the evaluation team, and the implementation team on 11/19/2018.

Recommendation 2a. The evaluation team recommends that program participants be identified as ComEd customers to get a more accurate picture of program leakage specific to each program year.

Recommendation 2b. The evaluation team recommends that the actual program leakage should be used when calculating program savings, rather than the TRM deemed leakage value. While the CY2018 evaluation included a deemed leakage value from the TRM in savings estimates, it is more accurate to use the annual verified leakage from participants at events.

7. APPENDIX 1. IMPACT ANALYSIS METHODOLOGY

7.1 Verified Gross Program Savings Analysis Approach Estimates

The evaluation team calculated verified savings for all measures with available data. For CY2018, the evaluation team calculated verified savings for omni-directional LEDs, directional LEDs, specialty LEDs, LED fixtures, holiday string lights, and Tier 1 advanced power strips. The data used to estimate the verified gross program savings came from the CY2018 program tracking data,¹⁰ and the Illinois Statewide Technical Reference Manual for Energy Efficiency Versions 6.0 and 7.0 (Illinois TRM v6 and v7).

7.2 Verified Net Program Savings Analysis Approach

Verified net energy and demand (coincident peak and overall) savings are calculated by multiplying the verified gross savings estimates by a net-to-gross (NTG) ratio. For the CY2018 Residential Lighting Discounts Program, the NTG ratio estimates are 0.58 for standard, specialty and directional LEDs, and 0.73 for LED fixtures. These NTG ratio estimates are based on past evaluation research and approved through the Illinois Stakeholder Advisory Group (IL SAG) consensus process. The NTG value estimates for CY2018 Holiday Light Exchange Program (for holiday string lights and Tier 1 advanced power strips) are set equal to 0.80 per the evaluation plan and as recommended by the evaluation team.

7.3 Carryover Savings Estimation

7.3.1 CY2018 Carryover Savings

The evaluation team calculated the CY2018 carryover savings estimates using the Illinois TRM (v4, v5, and v6) and the PY8 and PY9 Impact Evaluation Reports. The energy and demand savings from third year PY8 and second year PY9 installations are calculated based on the following parameters:

- Delta Watts – Verified savings estimate from the year of installation (source: Illinois TRM v6)
- Residential/Non-Residential Split – Evaluation research from the year of purchase (PY8 and PY9 Reports)
- HOU and Peak CF – Verified savings estimate from the year of installation (source: Illinois TRM v6)
- Energy and Demand IE – Verified savings estimate from the year of installation (source: Illinois TRM v6)
- Installation Rate – Verified savings estimate from the year of purchase (source: IL TRM v4 and Illinois TRM v5)
- NTG – Evaluation research from the year of purchase (source: PY7 and PY8 Reports)

¹⁰ The Evaluation Team received the final CY2018 tracking data on January 18, 2019: RLD_2018_EOY_Data_Rev1_01182019.xlsx.

Table 7-1 shows that in CY2018 a total of 1,516,223 bulbs, purchased during PY8 or PY9, are expected to be installed within ComEd's service territory. The table below provides both the gross and net energy and demand savings from these carryover bulbs attributable to the CY2018. Total CY2018 net carryover savings are estimated to be 31,779,269 kWh, 29,089 kW, 3,478 Summer Peak kW, and 3,857 Winter Peak kW.

Table 7-1. CY2018 Carryover Savings

CY2018 Carryover Savings	PY8 Bulbs	PY9 Bulbs	Total CY2018 Carryover
Carryover Bulbs Installed During CY2018	899,919	616,304	1,516,223
Average Delta Watts	31.7	34.6	NA
Average Daily Hours of Use	2.64	2.64	NA
Summer Peak Load Coincidence Factor	0.102	0.133	NA
Winter Peak Load Coincidence Factor	0.132	1.061	NA
Installation Rate	6.9%	3.1%	NA
Energy Interactive Effects	1.06	1.06	NA
Demand Interactive Effects	1.12	1.12	NA
Gross kWh Impact Per Unit	32.6	34.8	NA
Gross kW Impact Per Unit	0.032	0.034	NA
Carryover Gross Energy Savings (kWh)	29,330,127	21,466,431	50,796,558
Carryover Gross Demand Savings (kW)	28,544	17,983	46,527
Carryover Gross Summer Peak Demand Savings (kW)	3,418	2,148	5,566
Carryover Gross Winter Peak Demand Savings (kW)	3,768	2,395	6,163
Net-to-Gross Ratio	0.60	0.65	NA
Carryover Net Energy Savings (kWh)	17,705,189	14,074,080	31,779,269
Carryover Net Demand Savings (kW)	17,234	11,855	29,089
Carryover Net Summer Peak Demand Savings (kW)	2,063	1,415	3,478
Carryover Net Winter Peak Demand Savings (kW)	2,276	1,581	3,857
EUL Res	3.7	6.5	4.9
EUL NonRes	3.1	4.1	3.5

NA = Not applicable

Source: ComEd tracking data and Navigant team analysis.

7.3.2 CY2019 Preliminary Carryover Savings

The evaluation team calculated a preliminary CY2019 carryover estimate using the Illinois TRM (v5, v6, and v7) and the PY9 and CY2018 Impact Evaluation Reports. The energy and demand savings from these PY9 third year and CY2018 second year installations are calculated based on the following parameters:

- Delta Watts – Verified savings estimate from the year of installation (source: Illinois TRM v7)
- Residential/Non-Residential Split – Verified savings from the year of purchase (source: Illinois TRM v5 and v6)
- HOU and Peak CF – Verified savings estimate from the year of installation (source: Illinois TRM v7)

- Energy and Demand IE – Verified savings estimate from the year of installation (source: Illinois TRM v7)
- Installation Rate – Verified savings estimate from the year of purchase (source: Illinois TRM v5 and v6)
- NTG – The deemed net-to-gross values from the year of purchase.

Table 7-2 shows that in CY2019 a total of 868,832 bulbs that were purchased in PY9 or CY2018 are expected to be installed within ComEd’s service territory. The table below provides both the gross and net energy and demand savings from these bulbs. Total **preliminary** net energy savings estimate is expected to be 20,937,700 kWh, 19,079 kW, 2,707 Summer Peak kW, and 2,488 Winter Peak kW.

Table 7-2. CY2019 Preliminary Carryover Savings Estimates from PY9 and CY2018 Bulb Sales

Preliminary CY2019 Carryover Savings	PY9 Bulbs	CY2018 Bulbs	Total CY2019 Carryover
Carryover Bulbs Installed During CY2018	530,377	338,455	868,832
Average Delta Watts	34.6	38.9	NA
Average Daily Hours of Use	2.78	2.78	NA
Summer Peak Load Coincidence Factor	0.117	0.419	NA
Winter Peak Load Coincidence Factor	0.133	0.133	NA
Energy Interactive Effects	1.06	1.06	NA
Demand Interactive Effects	1.12	1.12	NA
Gross kWh Impact Per Unit	36.4	42.9	NA
Gross kW Impact Per Unit	0.034	0.038	NA
Carryover Gross Energy Savings (kWh)	19,302,204	16,797,279	36,099,483
Carryover Gross Demand Savings (kW)	17,983	14,911	32,894
Carryover Gross Summer Peak Demand Savings (kW)	2,464	2,203	4,667
Carryover Gross Winter Peak Demand Savings (kW)	2,399	1,890	4,289
Net-to-Gross Ratio	0.58	0.58	NA
Carryover Net Energy Savings (kWh)	11,195,278	9,742,422	20,937,700
Carryover Net Demand Savings (kW)	10,430	8,649	19,079
Carryover Net Summer Peak Demand Savings (kW)	1,429	1,278	2,707
Carryover Net Winter Peak Demand Savings (kW)	1,391	1,096	2,488
EUL Res	6.7	3.8	5.3
EUL NonRes	10.0	5.1	8.7

Note: CY2019 Preliminary Carryover excludes roughly 700 fixtures that are expected to be installed in Non-Res location

NA = Not applicable

Source: Navigant team analysis

7.3.3 CY2020 Preliminary Partial Carryover Savings from CY2018

The evaluation team calculated a preliminary partial CY2020 carryover savings estimate based on the bulbs sold during CY2018 (CY2019 sales are not known at this time) that are estimated to be installed in CY2020. We are calling these preliminary as several of the parameters used to estimate CY2020 carryover savings are based on deemed parameters from the year of install (Delta Watts, HOU and Peak CF, and Waste Heat Factors of Energy and Demand) which for CY2020 would be IL TRM v8. Since IL TRM v8 is not yet finalized, the evaluation team used v7 of the IL TRM to estimate these parameters. Hence the **preliminary** parameters for the partial CY2020 carryover savings are taken from:

- Delta Watts – Verified savings estimate from the year of installation (source: Illinois TRM v7¹¹) – this value is subject to change and will ultimately use the values from Illinois TRM v8.
- Residential/Non-Residential Split – Verified savings from the year of purchase (source: Illinois TRM v6) – this value is not subject to change.
- HOU and Peak CF – Verified savings estimate from the year of installation (source: Illinois TRM v7) – this value is subject to change and will ultimately use the values from Illinois TRM v8.
- Energy and Demand IE – Verified savings estimate from the year of installation (source: Illinois TRM v7) – this value is subject to change and will ultimately use the values from Illinois TRM v8.
- Installation Rate – Verified savings estimate from the year of purchase (source: Illinois TRM v6) – this value is not subject to change.
- NTG – The deemed net-to-gross values from the year of purchase – this value is not subject to change.

Table 7-3 shows that in CY2020 a total of 315,491 bulbs that were purchased in CY2018 are expected to be installed within ComEd’s service territory in CY2020. The table below provides both the gross and net energy and demand savings from these bulbs. The total preliminary net energy savings is estimated to be 8,451,628 kWh, 7,480 kW, 1,112 Summer Peak kW, and 1,073 Winter Peak kW which will be counted in CY2020.

¹¹ Since the IL TRM v8 is not yet finalized v7 was used as a proxy. It is for this reason these CY2020 savings are label as “preliminary”.

Table 7-3. CY2020 Preliminary Carryover Savings Estimates from CY2018 Bulb Sales

Preliminary Partial CY2020 Carryover Savings	CY2018 Bulbs
Carryover Bulbs Installed During CY2019	315,491
Average Delta Watts	38.9
Average Daily Hours of Use	2.78
Summer Peak Load Coincidence Factor	0.419
Winter Peak Load Coincidence Factor	0.133
Energy Interactive Effects	1.06
Demand Interactive Effects	1.12
Gross kWh Impact Per Unit	43.1
Gross kW Impact Per Unit	0.038
Carryover Gross Energy Savings (kWh)	14,571,772
Carryover Gross Demand Savings (kW)	12,896
Carryover Gross Summer Peak Demand Savings (kW)	1,918
Carryover Gross Winter Peak Demand Savings (kW)	1,850
Net-to-Gross Ratio	0.58
Carryover Net Energy Savings (kWh)	8,451,628
Carryover Net Demand Savings (kW)	7,480
Carryover Net Summer Peak Demand Savings (kW)	1,112
Carryover Net Winter Peak Demand Savings (kW)	1,073
EUL Res	10.0
EUL NonRes	5.1

Note: CY2020 Preliminary Carryover excludes roughly 230 fixtures that are expected to be installed in Non-Res locations.

Source: Navigant team analysis

8. APPENDIX 2. IMPACT ANALYSIS DETAIL

8.1 Program Volumetric Detail

During the CY2018 Residential Lighting Discounts Program a total of 11,251,649 lamps and fixtures were sold through the program, which is a 44% decrease from the bulbs and fixtures sold during the ninth program year (PY9). However, it is important to note that PY9 was a 19-month program year and with normalization, the total sales in PY9 fell by only 11%. CY2018 is the first year to fully exclude CFL lamps from the residential lighting program, which began phasing out in PY9.

Table 8-1 shows the volume of bulbs, by bulb type, incentivized through the Residential Lighting Discounts Program in PY3 through CY2018 (PY9 numbers represent sales over a 19-month period).

Table 8-1. PY3 – CY2018 Volumetric Findings Detail¹²

Program Year	Standard CFLs	Specialty CFLs	CFL Fixtures	LED Omni-Dir	LED Dir	LED Specialty	LED Fixtures	Coupons	Total
CY2018 Sales	0	0	0	7,800,621	1,905,419	866,560	679,049	0	11,251,649
PY9 Sales	2,625,479	0	0	11,905,275	3,309,608	1,388,782	831,268	0	20,060,412
PY8 Sales	7,205,656	0	0	3,896,077	1,578,687	*	302,241	0	12,982,661
PY7 Sales	10,347,580	989,999	0	471,710	427,824	*	0	0	12,237,113
PY6 Sales	8,965,546	2,125,179	0	0	0		0	0	11,090,725
PY5 Sales	9,633,227	1,197,896	8,767	9,472	18,758		24,268	5,506	10,897,894
PY4 Sales	11,419,752	1,097,670	84,539	2,592	22,327		16,551	5,599	12,649,030
PY3 Sales	9,893,196	1,217,723	86,943	0	0		0	0	11,197,862

* Prior to PY9 LED specialty bulbs were included in the LED Directional category.

Source: ComEd tracking data and Navigant team analysis.

9. APPENDIX 3. TOTAL RESOURCE COST DETAIL

Table 9-1, below, shows the Total Resource Cost (TRC) table. It includes only the cost-effectiveness analysis inputs available at the time of finalizing this 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 later.

¹² PY9 consisted of a 19-month program year, all prior program years consisted of 12 months.

Table 9-1. Total Resource Cost Savings Summary

Program	End Use Type	Research Category	Measure	Quantity	Effective Useful Life	Verified Gross Savings (kWh)	Verified Gross Peak Demand Reduction (kW)	Gross Heating Penalty (Therms)	NTG	Verified Net Savings (kWh)	Verified Net Peak Demand Reduction (kW)	Net Heating Penalty (Therms)
Residential Lighting Discounts	Lighting	LED Lighting	Standard LED (Res)*	7,410,590	10.0	212,526,024	21,283	(8,256,297.28)	0.58	123,265,094	12,344	(4,788,652.42)
	Lighting	LED Lighting	Standard LED (Non-Res)*	390,031	4.6	52,215,054	10,461	(1,817,037.61)	0.58	30,284,731	6,068	(1,053,881.81)
	Lighting	LED Lighting	Directional LED (Res)	1,810,148	10.0	83,866,938	9,265	(3,258,096.87)	0.58	48,642,824	5,374	(1,889,696.18)
	Lighting	LED Lighting	Directional LED (Non-Res)	95,271	6.1	18,833,376	3,773	(655,384.81)	0.58	10,923,358	2,189	(380,123.19)
	Lighting	LED Lighting	Specialty LED (Res)	823,232	10.0	32,702,443	3,521	(1,270,437.80)	0.58	18,967,417	2,042	(736,853.92)
	Lighting	LED Lighting	Specialty LED (Non-Res)	43,328	4.4	6,223,484	1,247	(216,571.73)	0.58	3,609,621	723	(125,611.60)
	Lighting	LED Lighting	LED Fixtures (Res)	645,097	15.0	39,383,480	4,350	(1,068,879.01)	0.73	28,749,940	3,176	(780,281.68)
	Lighting	LED Lighting	LED Fixtures (Non-Res)	33,952	13.8	7,276,370	1,513	(188,067.17)	0.73	5,311,750	1,104	(137,289.03)
	Lighting	LED Lighting	Carryover (Res)*	1,449,907	4.9	42,945,862	4,104	(1,540,864.22)	0.63	26,969,909	2,577	(967,659.41)
	Lighting	LED Lighting	Carryover (Non-Res)*	61,539	3.5	7,850,696	1,476	(260,853.69)	0.61	4,809,360	901	(159,799.75)
Holiday Light Exchange	Holiday String Lighting	Holiday Lighting	Exchanged Incand C7/C9 Strands	170	7.0	8,590	0	0	0.80	6,872	0	0
	Holiday String Lighting	Holiday Lighting	Exchanged Incand Mini Strands	3,378	7.0	29,092	0	0	0.80	23,274	0	0
	Advanced Power Strips	Advanced Power Strip	Tier 1 Advanced Power Strip	440	7.0	17,160	1.94	NA	0.80	13,728.00	1.55	NA

* The CY2018 contribution to CPAS for these measures varies over time. See the CPAS tables in Section 4.

Source: ComEd tracking data and Navigant team analysis.