



# ComEd Food Bank LED Distribution Impact Evaluation Report

Energy Efficiency / Demand Response Plan:  
Program Year 2018 (CY2018)  
(1/1/2018-12/31/2018)

Presented to  
ComEd

DRAFT

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## 1. INTRODUCTION

This report presents the results of the impact evaluation of ComEd's CY2018 Food Bank LED Distribution 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. CY2018 covers January 1, 2018 through December 31, 2018.

## 2. PROGRAM DESCRIPTION

The Food Bank LED Distribution Program provides packages of ENERGY STAR certified LEDs and Advanced Power Strips (APS) to select Feeding America food banks. The food banks use their network of local food pantries within ComEd's service territory to distribute the bulbs to utility customers. The LEDs and APSs are distributed at no cost to the food banks, food pantries and their customers. CLEAResult Consulting Inc. ("CLEAResult") implements the program and coordinates program activities, including engaging with the food banks and their participating food pantries. From PY9 to CY2018, the eligible measure changed from ENERGY STAR certified CFLs to ENERGY STAR certified 9W A-Line LED screw based omnidirectional bulbs and 7-plug APS.

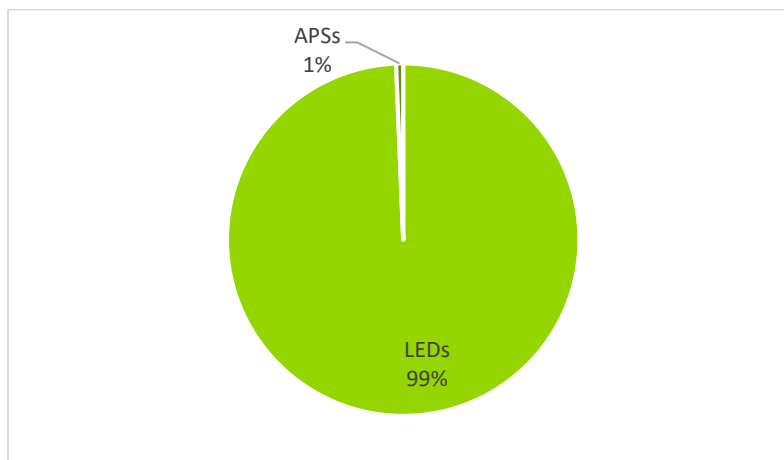
In CY2018 the program distributed a total of 1,700,256 LED bulbs and 11,064 power strips. The following table and graph show the volumetric breakdown by measure type.

**Table 2-1. CY2018 Volumetric Findings Detail**

Participation	Total CY2018 Count
Number of Participating Food Pantries	1,534
Number of LEDs Distributed	1,700,256
Number of APSs Distributed	11,064
Total Number of Measures Distributed	1,711,320

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 DETAIL

Table 3-1 summarizes the incremental energy and demand savings the Food Bank LED Distribution Program achieved in CY2018. There are no gas savings for this program.

**Table 3-1. CY2018 Total Annual Incremental Electric Savings**

Savings Category	Energy Savings (kWh)	Demand Savings (kW)	Summer Peak Demand Savings (kW)
<b>Electricity</b>			
Ex Ante Gross Savings	35,041,376	NR	3,149
Program Gross Realization Rate	1.00	NA	0.98
Verified Gross Savings	35,041,513	42,461	3,095
Program Net-to-Gross Ratio (NTG)	1.00	1.00	1.00
PY9 Verified Net Carryover Savings	4,711,589	5,828	472
Total Verified Net Savings including Carryover	39,753,102	48,289	3,567
<b>Converted from Gas*</b>			
Ex Ante Gross Savings	NA	NA	NA
Program Gross Realization Rate	NA	NA	NA
Verified Gross Savings	NA	NA	NA
Program Net-to-Gross Ratio (NTG)	NA	NA	NA
Verified Net Savings	NA	NA	NA
<b>Total Electric Plus Gas</b>			
Ex Ante Gross Savings	35,041,376	NR	3,149
Program Gross Realization Rate	1.00	NA	0.98
Verified Gross Savings	35,041,513	42,461	3,095
Program Net-to-Gross Ratio (NTG)	1.00	1.00	1.00
PY9 Verified Net Carryover Savings	4,711,589	5,828	472
Total Verified Net Savings including Carryover	39,753,102	48,289	3,567

\* Gas savings converted to kWh by multiplying therms \* 29.31 (which is based on 100,000 Btu/therm and 3,412 Btu/kWh).

NR = Not Reported

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

The measure-specific and total ex ante gross savings for the Food Bank LED Distribution Program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 are shown in the following tables and figure. The total CPAS across all measures is 39,753,102 kWh.

The evaluation team applied the EISA baseline for LED lamps starting in 2021. The EISA baseline shift only applies to LED omnidirectional bulbs. Beginning in 2021, the LED baseline shifts from 43 watts to 20 watts for LED lamps being distributed as a part of the program.

**Table 4-1. Cumulative Persisting Annual Savings (CPAS) – Electric**

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	
Lighting	9W LED bulb	10	34,255,195	1.00	180,343,527	34,255,195	34,255,195	34,255,195	11,082,563	11,082,563	11,082,563	11,082,563	11,082,563	11,082,563	
Consumer															
Electronics	Advanced Power Strip - Tier 1	7	786,318	1.00	5,504,226	786,318	786,318	786,318	786,318	786,318	786,318	786,318	786,318		
Carryover	PY9 Carryover	4§	4,711,589	1.00	15,095,374	4,711,589	4,711,589	4,711,589	138,599	138,599	138,599	138,000	135,603	135,603	
<b>CY2018 Program Total Electric CPAS</b>			<b>39,753,102</b>		<b>200,943,126</b>	<b>39,753,102</b>	<b>39,753,102</b>	<b>39,753,102</b>	<b>12,007,480</b>	<b>12,007,480</b>	<b>12,007,480</b>	<b>12,006,881</b>	<b>11,218,166</b>	<b>11,218,166</b>	
<b>CY2018 Program Expiring Electric Savings‡</b>									<b>27,745,621</b>	<b>27,745,621</b>	<b>27,745,621</b>	<b>27,746,221</b>	<b>28,534,935</b>	<b>28,534,935</b>	

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Lighting	9W LED bulb	11,082,563												
Consumer														
Electronics	Advanced Power Strip - Tier 1													
Carryover	PY9 Carryover	135,603												
<b>CY2018 Program Total Electric CPAS</b>		<b>11,218,166</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>CY2018 Program Expiring Electric Savings‡</b>		<b>28,534,935</b>	<b>39,753,102</b>	<b>39,753,102</b>	<b>39,753,102</b>	<b>39,753,102</b>	<b>39,753,102</b>	<b>39,753,102</b>	<b>39,753,102</b>	<b>39,753,102</b>	<b>39,753,102</b>	<b>39,753,102</b>	<b>39,753,102</b>	<b>39,753,102</b>

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>.

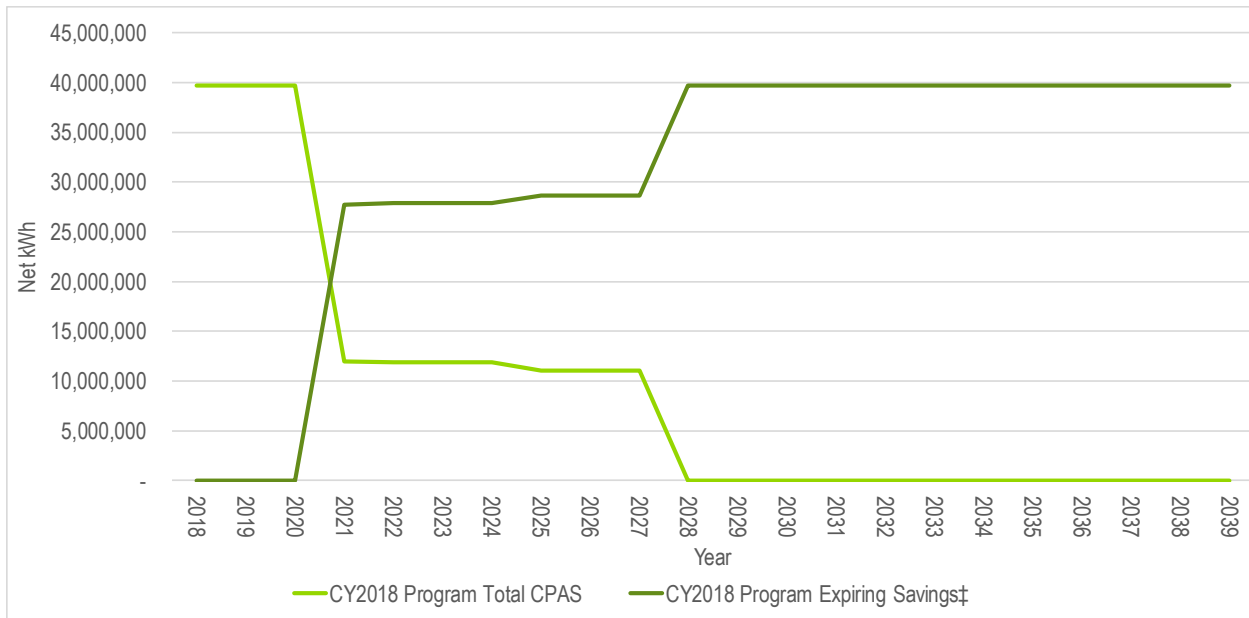
† Lifetime savings are the sum of CPAS savings through the EUL.

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

§ This is the weighted average EUL for all the lamps included in the carryover calculations from PY9. The PY9 carryover savings do not expire until 2027

Source: Navigant analysis

**Figure 4-1. 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 program includes ENERGY STAR certified 9W A-Line LED screw based omnidirectional bulbs and 7-plug APS and the energy and demand savings for each measure is shown in Table 5-1 to Table 5-3. The LED bulbs contributed to 98% of the total energy savings while the APS contributed to the remaining 2% of the energy savings.

**Table 5-1. CY2018 Energy Savings by Measure – Electric**

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
Lighting	9W LED bulb	34,255,058	1.00	34,255,195	1.00	34,255,195	10.0
Consumer Electronics	Advanced Power Strip - Tier 1	786,318	1.00	786,318	1.00	786,318	7.0
Carryover	PY9 Carryover	NR	NA	4,711,589	1.00	4,711,589	3.9
<b>Total</b>		<b>35,041,376</b>		<b>39,753,102</b>		<b>39,753,102</b>	

Note: NR = Not reported by ComEd

\* 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**

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)
Lighting	9W LED bulb	NR	NA	42,351	1.00	42,351
Consumer Electronics	Advanced Power Strip - Tier 1	NR	NA	111	1.00	111
Carryover	PY9 Carryover	NR	NA	5,828	1.00	5,828
<b>Total</b>		<b>NR</b>		<b>48,289</b>		<b>48,289</b>

Note: NR = Not reported by ComEd

\* 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 5-3. CY2018 Summer Peak Demand Savings by Measure**

End Use Type	Research Category	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Peak Demand Reduction (kW)	NTG*	Verified Net Peak Demand Reduction (kW)
Lighting	9W LED bulb	3,060	0.98	3,007	1.00	3,007
Consumer Electronics	Advanced Power Strip - Tier 1	89	1.00	89	1.00	89
Carryover	PY9 Carryover	NR	NA	472	1.00	472
<b>Total</b>		<b>3,149</b>		<b>3,567</b>		<b>3,567</b>

Note: NR = Not reported by ComEd

\* 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.

## 6. IMPACT ANALYSIS FINDINGS AND RECOMMENDATIONS

### 6.1 Impact Parameter Estimates

Table 6-1 and Table 6-2 show the inputs used to calculate the verified energy and demand savings for LED and APS measures respectively along with details about the source of each input.



**Table 6-1. LED Savings Parameters**

Gross Savings Input Parameters	Value	Units	Deemed * or Evaluated?	Source
Quantity	1,700,256	# measures	Evaluated	ComEd Tracking Data
WattsEE	9	W	Deemed	Specifications
WattsBase	43	W	Deemed	IL TRM v6.0 – Section 5.5.8
Hours	847	Hours/year	Deemed	IL TRM v6.0 – Section 5.5.8
WHFe	1.06	-	Deemed	IL TRM v6.0 – Section 5.5.8
WHFd	1.11	-	Deemed	IL TRM v6.0 – Section 5.5.8
CF	0.071	-	Deemed	IL TRM v6.0 – Section 5.5.8
ISR	0.66	-	Deemed	IL TRM v6.0 – Section 5.5.8

\* State of Illinois Technical Reference Manual version 6.0 from <http://www.ilsag.info/technical-reference-manual.html>.  
 Source: ComEd tracking data and Navigant team analysis.

**Table 6-2. APS Savings Parameters**

Gross Savings Input Parameters	Value	Units	Deemed * or Evaluated?	Source
Quantity	11,064	# measures	Evaluated	ComEd Tracking Data
kWh (Annual kWh savings per unit)	103	kWh	Deemed	IL TRM v6.0 – Section 5.2.1
Hours	7129	Hours/year	Deemed	IL TRM v6.0 – Section 5.2.1
CF	0.8	-	Deemed	IL TRM v6.0 – Section 5.2.1
ISR	0.69	-	Deemed	IL TRM v6.0 – Section 5.2.1

\* State of Illinois Technical Reference Manual version 6.0 from <http://www.ilsag.info/technical-reference-manual.html>.  
 Source: ComEd tracking data and Navigant team analysis.

## 6.2 CY2019 Carryover Savings Estimates

Calculation of the Calendar Year 2019 (CY2019) carryover estimate relies upon the IL TRM v7.0 and the PY9 and CY2018 reports. At this time all of these data sources are available and thus it is possible to estimate the gross and net carryover energy savings that the evaluation team recommends for CY2019. The energy and demand savings from these PY9 and CY2018 late installed bulbs are calculated based on the following parameters:

- Delta Watts – calculated for the year of installation (source: IL TRM v7.0, CY2018 program data).
- HOU and Peak CF – IL TRM deemed value from the year of installation (source: IL TRM v7.0).
- Energy and Demand Interactive Effects – IL TRM deemed value from the year of installation (source: IL TRM v7.0.)
- Installation Rate – IL TRM deemed value from the year of purchase (source: IL TRM v7.0).
- NTG – Evaluation research from the year of purchase (source: PY9 and CY2018 Reports).

Table 6-3 shows that in CY2019, 384,232 bulbs, purchased during either PY9 or CY2018, are expected to be installed within ComEd service territory. The table provides both the gross and net energy and demand savings from these bulbs. The total net energy savings is estimated to be 15,399,320 kWh and 111 summer peak kW, which will be counted in CY2019 as LED Distribution Program carryover savings.

**Table 6-3. CY2019 Verified Savings Carryover Estimate**

CY2019 Verified Savings Carryover Estimate	PY9 Bulbs	CY2018 Bulbs	CY2019 Carryover
Carryover Bulbs Installed During CY2019	146,196	238,036	384,232
Average Delta Watts	30.4	34.0	32.6
Average Annual Hours of Use	1,159	1,159	1,159
Energy Interactive Effects	1.06	1.06	1.06
Demand Interactive Effects	1.11	1.11	1.11
Summer Peak Load Coincidence Factor	0.09	0.14	0.12
Carryover Gross Energy Savings (kWh)	5,456,471	9,942,849	15,399,320
Carryover Gross Demand Savings (kW)	4,931	8,983	13,915
Carryover Gross Summer Peak Demand Savings (kW)	399.39	1,212.77	111.07
Net-to-Gross Ratio	1.00	1.00	1.00
Carryover Net Energy Savings (kWh)	5,456,471	9,942,849	15,399,320
Carryover Net Demand Savings (kW)	4,931	8,983	13,915
Carryover Net Summer Peak Demand Savings (kW)	399.39	1,212.77	111.07
Effective Useful Life	4.8	10.0	8.1

Source: ComEd tracking data and Navigant team analysis.

## 6.3 Other Impact Findings and Recommendations

The evaluation team has developed the following recommendations based on findings from the CY2018 evaluation:

**Finding 1.** The ex ante calculations do not include the carryover savings from previous evaluation years.

**Recommendation 1.** Navigant recommends including the carryover savings from previous evaluation years in the ex ante energy and demand savings.

**Finding 2.** The realization rate for the peak demand savings without including the PY9 carryover is 98% due to rounding errors in the per unit ex ante demand savings for the LED bulbs.

**Recommendation 2.** Navigant recommends using five significant digits when calculating the kW per unit because using fewer number leads to inaccurate overall demand and energy savings when the quantity is large.

**Finding 3.** The units of the quantity provided in the final end of year tracking data was not number of LEDs and APSs distributed and no information about the unit was provided. The database quantities needed to be multiplied by 96 and 24 for LED and APS measures respectively to determine the actual measure quantities.

**Recommendation 3.** Navigant recommends providing the unit information in the tracking data or providing actual number of bulbs or APSs.

## 7. APPENDIX 1. IMPACT ANALYSIS METHODOLOGY

Navigant used Equation 1 and Equation 2 along with measure level inputs deemed by the IL TRM v6.0 to calculate the energy and demand savings for LED and APS measures respectively.

### Equation 1. LED Savings Equation and Inputs, IL TRM v6.0 Section 5.5.8

$$\text{Verified Gross Annual kWh Savings} = ((\text{WattsBase} - \text{WattsEE}) / 1000) * \text{ISR} * \text{Hours} * \text{WHFe} * \text{Quantity}$$

$$\text{Verified Gross Annual kW Savings} = ((\text{WattsBase} - \text{WattsEE}) / 1000) * \text{ISR} * \text{WHFd} * \text{CF} * \text{Quantity}$$

Where:

- WattsBase* = Actual wattage of LED purchased / installed. If unknown, use default provided
- WattsEE* = Actual wattage of LED purchased / installed. If unknown, use default provided
- ISR* = In service rate, the percentage of units rebated that are actually in service
- Hours* = Average hours of use per year
- WHFe* = Waste heat factor for energy to account for cooling energy savings from efficient lighting
- WHFd* = Waste heat factor for demand to account for cooling savings from efficient lighting
- CF* = Summer peak coincidence Factor for measure
- Quantity* = total number of bulbs distributed in CY2018

### Equation 2. APS Savings Equation and Inputs, IL TRM v6.0 Section 5.2.1

$$\text{Verified Gross Annual kWh Savings} = \text{kWh} * \text{ISR}$$

$$\text{Verified Gross Annual kW Savings} = \text{kWh} * \text{ISR} * \text{CF} / \text{Hours}$$

Where:

- kWh* = Assumed annual kWh savings per unit
- ISR* = In service rate, the percentage of units rebated that are actually in service
- Hours* = Average hours of use per year
- CF* = Summer peak coincidence Factor for measure
- Quantity* = total number of APS units distributed in CY2018

## 8. APPENDIX 3. TOTAL RESOURCE COST DETAIL

Table 8-1, 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.

**Table 8-1. Total Resource Cost Savings Summary**

End Use Type	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (kWh)	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Savings (kWh)	Verified Gross Peak Demand Reduction (kW)
Lighting	LED Lighting	Lamp	1,700,256	10.0	34,255,058	3,060	34,255,195	3,007
Advanced Power Strip (APS)	(APS) Tier 1	Each	11,064	7.0	786,318	89	786,318	89
Carryover	PY9 Carryover	Each	1,329,057	3.9	NR	NR	4,711,589	472

Source: ComEd tracking data and Navigant team analysis.