



ComEd Custom Program 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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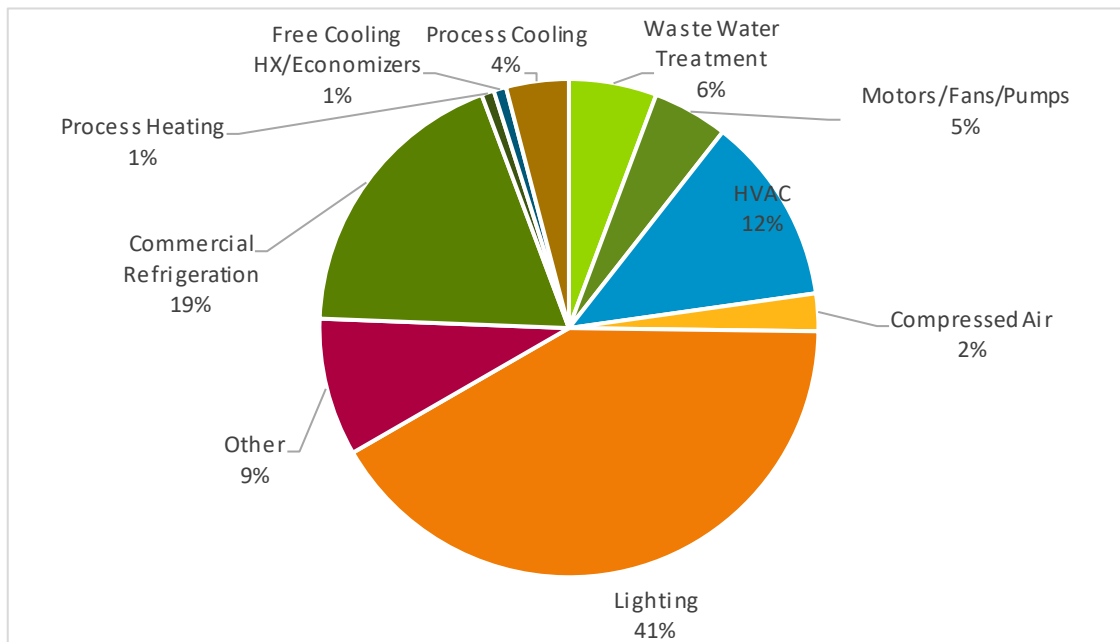
1. INTRODUCTION

This report presents ComEd’s CY2018 Custom Program impact evaluation results. 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 ComEd Custom Program provides a custom incentive, based on a formula, for less common or more complex energy-saving measures installed in qualified retrofit and equipment replacement projects for commercial and industrial customers. The Custom Program primarily consists of lighting, refrigeration and HVAC projects. They also had some very large waste water treatment projects which represented 6% of the total projects, but approximately 33% of the total ex ante energy savings in CY2018. Figure 2-1 below provides the distribution of projects by measure group.

Figure 2-1. Distribution of Projects by Measure Type



Source: Evaluation analysis

3. PROGRAM SAVINGS DETAIL

Table 3-1 summarizes the incremental energy and demand savings the Custom Program achieved in CY2018. The verified net savings for CY2018 is 15,240,535 kWh. ComEd did not claim any gas savings for this program, however, project (50042) may have gas savings. Any gas savings for that project have not been finalized at the time of drafting of this report and the evaluation team is working with the implementation team to finalize any potential gas savings. Any gas savings attributable to the program would be updated in the final version of this evaluation report.

Table 3-1. CY2018 Total Annual Incremental Electric Savings¹

Savings Category	Energy Savings (kWh)	Demand Savings (kW)	Summer Peak Demand Savings (kW)
Electricity			
Ex Ante Gross Savings	28,969,667	NA	3,046
Program Gross Realization Rate	0.91	NA	1.23
Verified Gross Savings	26,276,785	NA	3,744
Program Net-to-Gross Ratio (NTG)	0.58	NA	0.70
Verified Net Savings	15,240,535	NA	2,621
Converted from Gas*			
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
Total Electric Plus Gas			
Ex Ante Gross Savings	28,969,667	NA	3,046
Program Gross Realization Rate	0.91	NA	1.23
Verified Gross Savings	26,276,785	NA	3,744
Program Net-to-Gross Ratio (NTG)	0.58	NA	0.70
Verified Net Savings	15,240,535	NA	2,621

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

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 Custom 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 for CY2018 is 15,240,535 kWh, as shown in Table 4-1. The Custom Program did not achieve any gas savings in CY2018.

¹ Ex post savings for some of the projects have not been finalized and are subject to change based on the comments from the implementers. The program gross realization rate might change in the next version of the evaluation report based on changes made to site reports for the individual projects.

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

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	
Custom	Waste Water Treatment	13.0	8,542,389	0.58	64,409,611	4,954,585	4,954,585	4,954,585	4,954,585	4,954,585	4,954,585	4,954,585	4,954,585	4,954,585	
Custom	Motors/Fans/Pumps	20.0	2,673,013	0.58	31,006,950	1,550,347	1,550,347	1,550,347	1,550,347	1,550,347	1,550,347	1,550,347	1,550,347	1,550,347	
Custom	HVAC	13.0	3,419,953	0.58	25,786,447	1,983,573	1,983,573	1,983,573	1,983,573	1,983,573	1,983,573	1,983,573	1,983,573	1,983,573	
Custom	Compressed Air	13.0	1,851,163	0.58	13,957,770	1,073,675	1,073,675	1,073,675	1,073,675	1,073,675	1,073,675	1,073,675	1,073,675	1,073,675	
Custom	Lighting	15.0	6,154,551	0.58	53,544,590	3,569,639	3,569,639	3,569,639	3,569,639	3,569,639	3,569,639	3,569,639	3,569,639	3,569,639	
Custom	Other	13.0	1,850,032	0.58	13,949,241	1,073,019	1,073,019	1,073,019	1,073,019	1,073,019	1,073,019	1,073,019	1,073,019	1,073,019	
Custom	Commercial Refrigeration	13.0	817,616	0.58	6,164,827	474,217	474,217	474,217	474,217	474,217	474,217	474,217	474,217	474,217	
Custom	Process Heating	13.0	293,606	0.58	2,213,788	170,291	170,291	170,291	170,291	170,291	170,291	170,291	170,291	170,291	
Custom	Free Cooling HX/Economizers	16.0	177,148	0.58	1,643,937	102,746	102,746	102,746	102,746	102,746	102,746	102,746	102,746	102,746	
Custom	Process Cooling	23.0	497,314	0.58	6,634,163	288,442	288,442	288,442	288,442	288,442	288,442	288,442	288,442	288,442	
CY2018 Program Total Electric CPAS			26,276,785		219,311,325	15,240,535	15,240,535	15,240,535	15,240,535	15,240,535	15,240,535	15,240,535	15,240,535	15,240,535	
CY2018 Program Expiring Electric Savings‡							-	-	-	-	-	-	-	-	

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Custom	Waste Water Treatment	4,954,585	4,954,585	4,954,585	4,954,585	-	-	-	-	-	-	-	-
Custom	Motors/Fans/Pumps	1,550,347	1,550,347	1,550,347	1,550,347	1,550,347	1,550,347	1,550,347	1,550,347	1,550,347	1,550,347	1,550,347	-
Custom	HVAC	1,983,573	1,983,573	1,983,573	1,983,573	-	-	-	-	-	-	-	-
Custom	Compressed Air	1,073,675	1,073,675	1,073,675	1,073,675	-	-	-	-	-	-	-	-
Custom	Lighting	3,569,639	3,569,639	3,569,639	3,569,639	3,569,639	3,569,639	-	-	-	-	-	-
Custom	Other	1,073,019	1,073,019	1,073,019	1,073,019	-	-	-	-	-	-	-	-
Custom	Commercial Refrigeration	474,217	474,217	474,217	474,217	-	-	-	-	-	-	-	-
Custom	Process Heating	170,291	170,291	170,291	170,291	-	-	-	-	-	-	-	-
Custom	Free Cooling HX/Economizers	102,746	102,746	102,746	102,746	102,746	102,746	102,746	-	-	-	-	-
Custom	Process Cooling	288,442	288,442	288,442	288,442	288,442	288,442	288,442	288,442	288,442	288,442	288,442	288,442
CY2018 Program Total Electric CPAS		15,240,535	15,240,535	15,240,535	15,240,535	5,511,175	5,511,175	1,941,535	1,838,789	1,838,789	1,838,789	1,838,789	288,442
CY2018 Program Expiring Electric Savings‡		-	-	-	-	9,729,360	9,729,360	13,299,000	13,401,746	13,401,746	13,401,746	13,401,746	14,952,093

End Use Type	Research Category	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Custom	Waste Water Treatment	-	-	-	-	-	-	-	-	-	-	-	-
Custom	Motors/Fans/Pumps	-	-	-	-	-	-	-	-	-	-	-	-
Custom	HVAC	-	-	-	-	-	-	-	-	-	-	-	-
Custom	Compressed Air	-	-	-	-	-	-	-	-	-	-	-	-
Custom	Lighting	-	-	-	-	-	-	-	-	-	-	-	-
Custom	Other	-	-	-	-	-	-	-	-	-	-	-	-
Custom	Commercial Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-
Custom	Process Heating	-	-	-	-	-	-	-	-	-	-	-	-
Custom	Free Cooling HX/Economizers	-	-	-	-	-	-	-	-	-	-	-	-
Custom	Process Cooling	288,442	288,442	-	-	-	-	-	-	-	-	-	-
CY2018 Program Total Electric CPAS		288,442	288,442	-	-	-	-	-	-	-	-	-	-
CY2018 Program Expiring Electric Savings‡		14,952,093	14,952,093	15,240,535	15,240,535	15,240,535	15,240,535	15,240,535	15,240,535	15,240,535	15,240,535	15,240,535	15,240,535

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

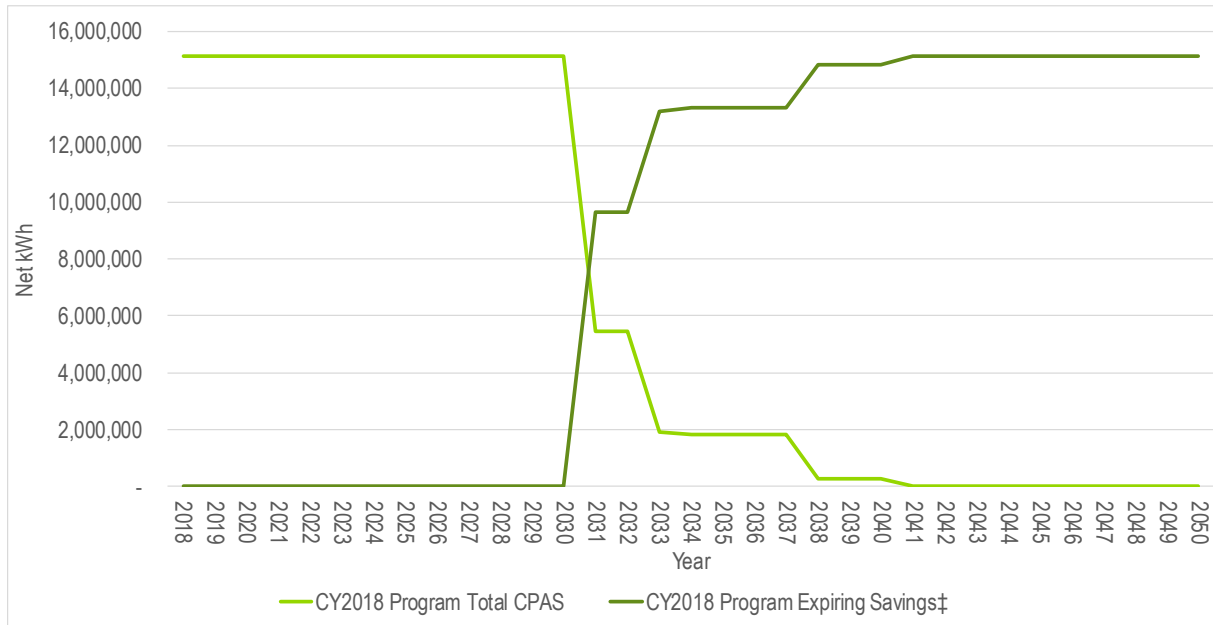
* A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

† 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.

Source: Navigant analysis

Figure 4-1. Total 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 evaluation analyzed savings for the Custom Program at a strata level rather than the measure level or installation type. For more information about strata- and site-level savings see Appendix 2. The tables below show savings by measure type, but reflect the gross realization rate for the program, as the evaluation did not calculate a measure-level gross realization rate. The evaluation did not calculate gas savings.

Table 5-1. CY2018 Energy Savings by Measure

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
Custom	Waste Water Treatment	9,417,825	0.91	8,542,389	0.58	4,954,585	13.0
Custom	Motors/Fans/Pumps	2,946,947	0.91	2,673,013	0.58	1,550,347	20.0
Custom	HVAC	3,770,435	0.91	3,419,953	0.58	1,983,573	13.0
Custom	Compressed Air	2,040,873	0.91	1,851,163	0.58	1,073,675	13.0
Custom	Lighting	6,785,278	0.91	6,154,551	0.58	3,569,639	15.0
Custom	Other	2,039,626	0.91	1,850,032	0.58	1,073,019	13.0
Custom	Commercial Refrigeration	901,407	0.91	817,616	0.58	474,217	13.0
Custom	Process Heating	323,695	0.91	293,606	0.58	170,291	13.0
Custom	Free Cooling HX/Economizers	195,303	0.91	177,148	0.58	102,746	16.0
Custom	Process Cooling	548,279	0.91	497,314	0.58	288,442	23.0
Total		28,969,667	0.91	26,276,785	0.58	15,240,535	14.4

* 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 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)
Custom	Waste Water Treatment	1,288	1.23	1,583	0.70	1,108
Custom	Motors/Fans/Pumps	42	1.23	52	0.70	36
Custom	HVAC	290	1.23	357	0.70	250
Custom	Compressed Air	220	1.23	270	0.70	189
Custom	Lighting	692	1.23	851	0.70	596
Custom	Other	222	1.23	273	0.70	191
Custom	Commercial Refrigeration	64	1.23	79	0.70	55
Custom	Process Heating	111	1.23	136	0.70	95
Custom	Free Cooling HX/Economizers	24	1.23	30	0.70	21
Custom	Process Cooling	92	1.23	113	0.70	79
Total		3,046	1.23	3,744	0.70	2,621

* 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

The evaluation team performed engineering calculations to derive evaluated gross energy and demand savings based on data collected during the on-site M&V visit or the desk review process. The savings are site specific and therefore require site-specific calculators and algorithms in conjunction with data collected from the site. The evaluation team used the data obtained during the M&V efforts to verify measure installation, determine installed measure characteristics, assess operating hours and relevant modes of operation, identify the characteristics of the replaced equipment support the selection of baseline conditions and perform ex post savings calculations. Each site-specific evaluation used peak kW savings calculation methodology consistent with PJM summer peak demand requirements² to calculate the peak kW reduction. The lifetime energy and demand savings are estimated by multiplying the verified savings by the effective useful life for each measure.

The EM&V team conducted research to validate the non-deemed parameters for the Custom Program that were not specified in the Illinois Technical Reference Manual (IL TRM). The results are shown in Table 6-1

² PJM defines the coincident summer peak period as 1:00-5:00 PM Central Prevailing Time on non-holiday weekdays, during the months of June through August.

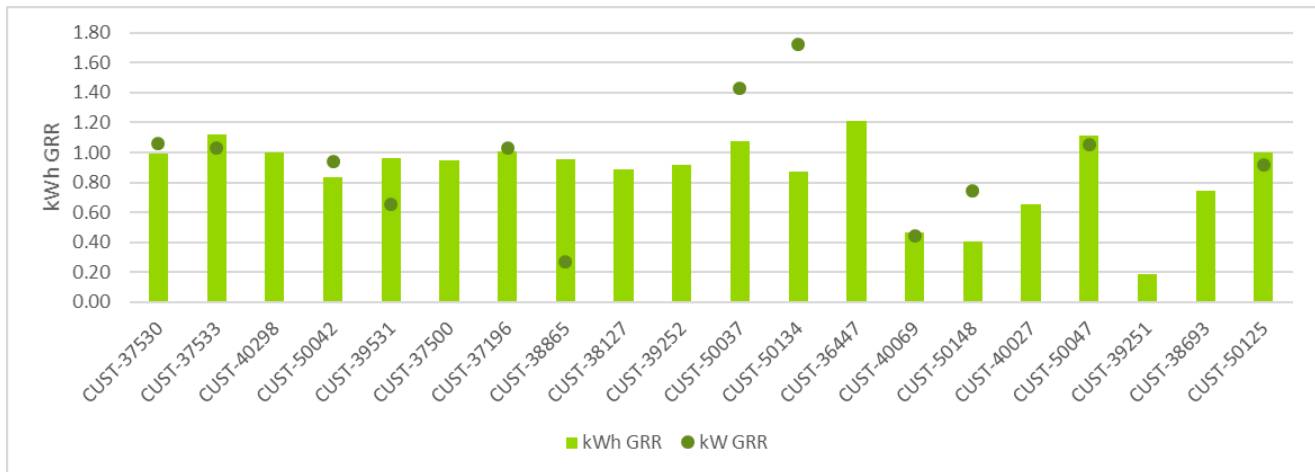
Table 6-1. Verified Gross Savings Parameters

Gross Savings Input Parameters	Value	Deemed * or Evaluated?
Gross Energy Savings Realization Rate	0.91	Evaluated
Gross Peak Demand Savings Realization Rate	1.23	Evaluated
NTG Ratio (kWh)	0.58	Deemed*
NTG Ratio (kW)	0.70	Deemed*
Net Energy Savings (kWh)	15,240,535	Evaluated
Net Peak Demand Savings (kW)	2,621	Evaluated

† 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>.

Figure 6-1 shows a comparison of the energy and demand realization rates for every site. The CY2018 energy savings realization rate results ranged from 0.19 to 1.21, which resulted in a program level weighted realization rate of 0.91. The energy gross realization rate was at or above 1.0 for six of the 20 projects examined. For another 10 projects, the energy gross realization rates were within 10% of one for the energy savings. There were only three projects with energy gross realization rates of less than 0.5. The demand savings realization rates for the twenty projects in the gross sample ranged from 0.27 to 1.72, resulting in a program level realization rate of 1.23.

Figure 6-1. Energy and Demand Realization Rates



6.2 Other Impact Findings and Recommendations

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

Finding 1: There were a few projects (50042, 50148 and 40027) with some issues surrounding the methodology or assumptions used in the ex ante savings calculation.

Recommendation 1: The evaluation team recommends using additional quality control procedures to identify the deficiencies in the ex ante calculations. Whenever possible, the savings should be validated using an alternate approach as a validity check. If there are any doubts about the methodology or savings calculations, the implementation team should pass it through the evaluation team for early feedback before the savings are finalized.

Finding 2: Installed equipment for 39251 did not have all of the efficiency measures that were claimed in the application.

Recommendation 2: The implementation team should ensure that all the measures are installed as per the scope of the project. The equipment specification should be validated by vendor literature or through confirmation from the vendor or manufacturer.

Finding 3: There are lot of measures in the end of year population tracking document that do not match with the Effective Useful Life (EUL) listed in the guidance document³ provided by Navigant.

Recommendation 3: The measure-level EULs claimed by the program should match the EUL provided in the Navigant EUL guidance memo. Similarly, the measure description should be indicative of what EUL is being claimed. If there are measures in the program where no EUL guidance is provided, ComEd should work with Navigant to determine how the EUL should be claimed for that measure.

Finding 4: Based on previous recommendations, the implementation team has been claiming ex ante demand savings for projects. However, there were three projects in the 2018 evaluation sample where the ex ante demand savings were not claimed. For these three projects, the evaluation team found non-zero savings.

Recommendation 4: Savings should be claimed for all projects that save energy over the PJM peak summer period of 1:00-5:00 P.M. Central Prevailing Time on non-holiday weekdays, during the months of June through August and reported in the tracking system.

7. APPENDIX 1. IMPACT ANALYSIS METHODOLOGY

7.1 Gross Impact (M&V) Sample

Consistent with the evaluation plan, the evaluation team used a stratified random sampling approach to select the gross impact sample of 20 projects. The evaluation team sorted projects based upon the level of ex ante kWh savings and placed the projects in three strata.

Table 7-1 provides a profile of the gross impact M&V sample for the Custom Program in comparison with the program population. Shown below is the resulting sample that was drawn that consists of 20 projects. These projects make up approximately 15 million kWh, which represents 51% of the ex ante impact claim for the program population. Also shown are the ex ante-based kWh sample weights for each of the three strata.

Table 7-1. CY2018 Gross Impact Sample by Strata

Sampling Strata	Population Summary			Sample		
	Number of Tracking Records (N)	Ex ante kWh Impact Claimed	kWh Weights	Number of Tracking Records (n)	Ex ante kWh	Sampled % of Population kWh
1	4	9,860,019	0.34	4	9,860,019	100%
2	20	9,847,860	0.34	8	4,042,003	41%
3	99	9,261,787	0.32	8	890,425	10%
CY2018 Total	123	28,969,667	-	20	14,792,448	51%

Source: Navigant

³ Navigant memo to ComEd “Effective Useful Life of Custom and Data Center Measures” dated Aug 30, 2018.

7.2 Roll-up of Savings

There are two basic statistical methods for combining individual gross realization rates from the sample projects into an estimate of verified gross kWh savings for the population when stratified random sampling. These two methods are referred to as “separate” and “combined” ratio estimation.⁴ In the case of a separate ratio estimator, a separate gross kWh savings realization rate is calculated for each stratum and then combined. In the case of a combined ratio estimator, evaluation completes a single gross kWh savings realization rate calculation without first calculating separate gross realization rates by stratum.

The evaluation team used the separate ratio estimation technique to estimate verified gross impacts for the Custom Program. The separate ratio estimation technique follows the steps outlined in the California Evaluation Framework⁵, which identifies best practices in program evaluation. The evaluation team matched these steps to the stratified random sampling method that they used to create the sample for the program. The evaluation team used the standard error to estimate the error bound around the estimate of verified gross impacts.

8. APPENDIX 2. IMPACT ANALYSIS DETAIL

8.1 Savings by Strata

The Custom Program sample includes 20 sites, across three strata. Breakdown of energy and demand savings by strata are shown in Table 8-1 and Table 8-2

Table 8-1. CY2018 Energy Savings by Strata

Sample Strata	Sample Size	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG *	Verified Net Savings (kWh)
1	4	9,860,019	1.02	10,047,424	0.58	5,827,506
2	8	9,847,860	0.96	9,414,722	0.58	5,460,539
3	8	9,261,787	0.74	6,814,638	0.58	3,952,490
Total		28,969,667	0.91	26,276,785	0.58	15,240,535

Source: Navigant

* 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>.

⁴ A full discussion and comparison of separate vs. combined ratio estimation can be found in Sampling Techniques, Cochran, 1977, pp. 164-169.

⁵ Tec Market Works, “The California Evaluation Framework,” Prepared for the California Energy Commission, June 2004. Available at <http://www.calmac.org>

Table 8-2. CY2018 Demand Savings by Strata

Sample Strata	Sample Size	Ex Ante Gross Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Demand Reduction (kW)	NTG*	Verified Net Demand Reduction (kW)
1	4	1,125	1.04	1,166	0.70	816
2	8	894	1.17	1,044	0.70	731
3	8	1,027	1.49	1,534	0.70	1,073
Total		3,046	1.23	3,744	0.70	2,621

Source: Navigant

* 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>.

8.2 Savings by Project

The Custom Program sample consists of 20 projects. Table 8-3 provides the ex ante and ex post energy savings for all the projects in the sample.

Table 8-3. CY2018 Energy Savings by Project

Sampled Application ID	Sample Strata	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG *	Verified Net Savings (kWh)
CUST-37530	1	3,870,929	0.99	3,834,868	0.58	2,224,223
CUST-37533	1	3,312,721	1.12	3,711,811	0.58	2,152,850
CUST-40298	1	1,608,318	1.00	1,608,318	0.58	932,824
CUST-50042	1	1,068,052	0.84	892,427	0.58	517,608
CUST-39531	2	880,195	0.96	846,823	0.58	491,157
CUST-37500	2	869,295	0.95	824,531	0.58	478,228
CUST-37196	2	488,247	1.01	491,722	0.58	285,199
CUST-38865	2	395,041	0.96	378,740	0.58	219,669
CUST-38127	2	369,948	0.89	327,676	0.58	190,052
CUST-39252	2	353,473	0.92	325,148	0.58	188,586
CUST-50037	2	352,492	1.07	378,324	0.58	219,428
CUST-50134	2	333,312	0.87	291,260	0.58	168,931
CUST-36447	3	228,320	1.21	277,349	0.58	160,862
CUST-40069	3	205,359	0.47	96,360	0.58	55,889
CUST-50148	3	147,491	0.41	60,175	0.58	34,902
CUST-40027	3	122,850	0.65	80,223	0.58	46,529
CUST-50047	3	78,921	1.11	87,779	0.58	50,912
CUST-39251	3	58,859	0.19	11,124	0.58	6,452
CUST-38693	3	25,588	0.75	19,111	0.58	11,084
CUST-50125	3	23,036	1.00	23,036	0.58	13,361
Total		14,792,448	NA	14,566,805	0.58	8,448,747

Source: Navigant

* 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>.

Table 8-4 provides the ex ante and ex post demand savings for all the projects in the sample.

Table 8-4. CY2018 Demand Savings by Project

Sampled Application ID	Sample Strata	Ex-Ante Gross Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Demand Reduction (kW)	NTG*	Verified Net Demand Reduction (kW)
CUST-37530	1	594	1.06	628	0.70	440
CUST-37533	1	410	1.03	424	0.70	297
CUST-40298	1	-		-	0.70	-
CUST-50042	1	122	0.94	115	0.70	80
CUST-39531	2	220	0.65	144	0.70	101
CUST-37500	2	-		-	0.70	-
CUST-37196	2	148	1.03	152	0.70	106
CUST-38865	2	109	0.27	30	0.70	21
CUST-38127	2	-		-	0.70	-
CUST-39252	2	-		-	0.70	-
CUST-50037	2	33	1.43	47	0.70	33
CUST-50134	2	55	1.72	95	0.70	67
CUST-36447	3	-		-	0.70	-
CUST-40069	3	40	0.44	18	0.70	13
CUST-50148	3	26	0.74	20	0.70	14
CUST-40027	3	-		-	0.70	-
CUST-50047	3	17	1.05	18	0.70	13
CUST-39251	3	-		-	0.70	-
CUST-38693	3	-		-	0.70	-
CUST-50125	3	3	0.92	3	0.70	2
Total		1,778	NA	-	0.70	1,185

Source: Navigant

* 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>.

The evaluation team has provided ComEd with site-specific M&V reports for each verified project. These site-specific impact evaluation reports summarize the ex ante savings in the end of year summary submitted, as well as the ex post M&V plan, data collected at the site, and all the calculations and parameters used to estimate savings. Table 8-3 and Table 8-4 above summarize the results for each project. The evaluation team uncovered some issues in seven of the 20 projects, which resulted in energy realization rates with a discrepancy of greater than 15% from a realization rate of 1.0. Some key observations from these site-specific evaluation results are discussed below for each project that saw large differences in savings.

- Project 50042: Ex ante analysis derated the original calculated savings from the eQuest model by 25% to account for the interactive effects between various measures. Based on the billing analysis performed by the evaluation team the interactive factor reduced the savings by closer to 50% of the total savings. Ex post energy savings were estimated using the billing analysis for this project.

- Project 36447: Ex post savings for this lighting project increased by around 20% because of the adjustment made to the hours of operation based on the customer interview.
- Project 40069: Allowable Lighting Power Density for office space was changed from 1.55 to 0.82 based on the International Energy Conservation Code 2015 (IECC 2015). The ex post savings for this project decreased by more than 50% for this project based on that change.
- Project 50148: Ex post savings for this lighting project decreased by around 60% of the ex ante savings. The main reason is due to an electric heating penalty in the ex post calculations. This was not claimed in the ex ante calculations as the heating fuel was recorded as gas, but the evaluation team determined that the actual heating system uses electricity.
- Project 40027: Ex ante savings were estimated based on the trend data for a summer month (June). The evaluation team included data for winter months (February and March) in the post-retrofit period. Because of the low load on the chiller during the winter months, the average annual load on the chiller dropped from 68% (ex ante estimate based on June) to 46% and that change decreased savings by 35%.
- Project 39251: Ex post savings for this project were reduced as the measures were not installed as expected. The new evaporators did not have Variable Frequency Drives (VFDs) and the refrigeration units did not have floating head pressure controls as assumed in the ex ante analysis. The new units do have VFDs on the condenser fan, which are modulated to maintain the head pressure. The savings for the condenser fan VFD are considered in the ex post calculations and it resulted in energy gross realization rate of 20% for this project.
- Project 38693: The ex post energy savings are lower than the ex ante savings because of the changes made to the baseline. Based on the interview with the customer, the existing equipment was reported to be old and not meeting space requirements. The ex post analysis treated this project as replace on burnout and used new rooftop units as the baseline.

9. 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.

Table 9-1. 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)
Custom	Waste Water Treatment	Measures	7	13.0	9,417,825	1,288	8,542,389	1,583
Custom	Motors/Fans/Pumps	Measures	6	20.0	2,946,947	42	2,673,013	52
Custom	HVAC	Measures	15	13.0	3,770,435	290	3,419,953	357
Custom	Compressed Air	Measures	3	13.0	2,040,873	220	1,851,163	270
Custom	Lighting	Measures	51	15.0	6,785,278	692	6,154,551	851
Custom	Other	Measures	11	13.0	2,039,626	222	1,850,032	273
Custom	Commercial Refrigeration	Measures	23	13.0	901,407	64	817,616	79
Custom	Process Heating	Measures	1	13.0	323,695	111	293,606	136
Custom	Free Cooling HX/Economizer	Measures	1	16.0	195,303	24	177,148	30
Custom	Process Cooling	Measures	5	23.0	548,279	92	497,314	113