Guidehouse

ComEd Business Telecomm Impact Evaluation Report

Energy Efficiency / Demand Response Plan:
Program Year 2020 (CY2020)
(1/1/2020-12/31/2020)

Prepared for:

ComEd

FINAL

March 11, 2021

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1. Introduction

This report presents results from the CY2020 impact evaluation of ComEd's Business Telecomm Program. It summarizes the total energy and demand impacts for the program broken out by relevant measure and program structure details. The appendices provide the impact analysis methodology and details of the total resource cost (TRC) inputs. CY2020 covers January 1, 2020 through December 31, 2020.

2. Program Description

The Business Telecomm Program aims to cost-effectively generate and capture savings from energy efficiency projects undertaken by its telecommunications, cable, and internet service provider customers. It provides specialized energy assessments, energy management planning to help customers increase reliability, improve efficiency, and reduce energy consumption without adversely affecting facility operations. Franklin Energy is the program implementer. Measures in the Telecomm Program during CY2020 include network combing, HVAC controls, airflow management, and equipment optimization.

This program is called Telecommunication Optimization in the deemed NTG Spreadsheet[1]. During CY2020, all of the projects ComEd claimed through the Business Telecomm Program were non-co-location custom projects.

The program had 52 unique participating facilities in CY2020 that completed 58 individual projects as Table 2-1 and Figure 2-1 show.

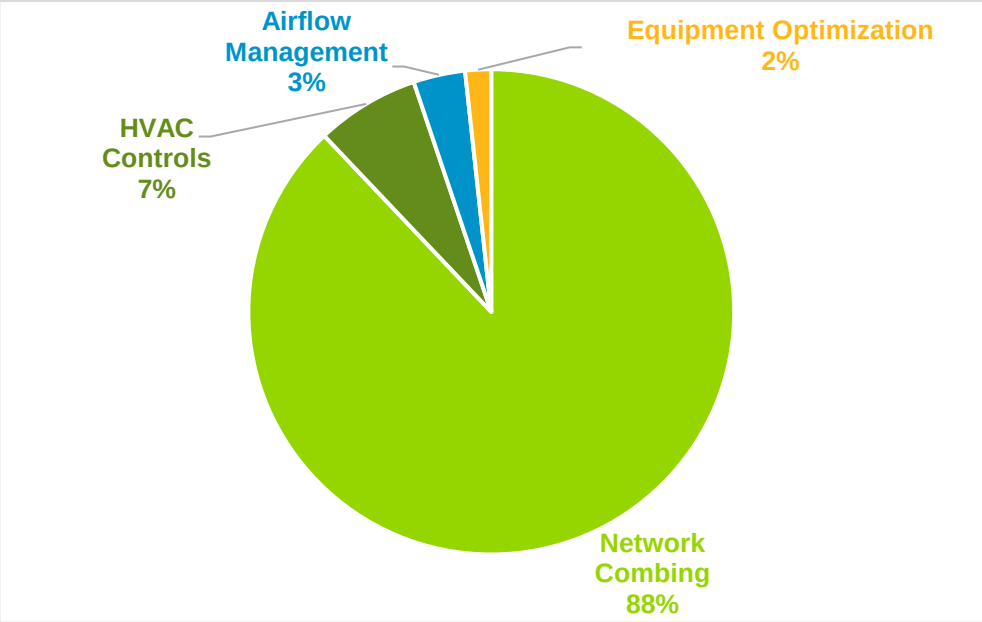
Table 2-1. CY2020 Volumetric Findings Detail

Participation	Total
Participants	52
Network Combing	51
HVAC Controls	4
Airflow Management	2
Equipment Optimization	1
Total Projects	58

Source: ComEd tracking data and evaluation team analysis

[1] ComEd CY2020 NTG values can be found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

Figure 2-1. Number of Measures Installed by Type



Source: ComEd tracking data and evaluation team analysis

3. Program Savings Detail

Table 3-1 summarizes the incremental energy and demand savings the Business Telecomm Program achieved in CY2020. During CY2020, ComEd did not claim any natural gas savings from Business Telecomm projects.

Table 3-1. CY2020 Total Annual Incremental Electric Savings

Savings Category	Energy Savings (kWh)	Summer Peak* Demand Savings (kW)
Electricity		
Ex Ante Gross Savings	10,074,332	1,095
Program Gross Realization Rate	1.00	1.04
Verified Gross Savings	10,094,176	1,142
Program Net-to-Gross Ratio (NTG)	0.67	0.67
Verified Net Savings	6,763,098	765
Converted from Gas		
Ex Ante Gross Savings	0	NA
Program Gross Realization Rate	0.00	NA
Verified Gross Savings	0	NA
Program Net-to-Gross Ratio (NTG)	0.67	NA
Verified Net Savings	0	NA
Total Electric Plus Gas		
Ex Ante Gross Savings	10,074,332	1,095
Program Gross Realization Rate	1.00	1.04
Verified Gross Savings	10,094,176	1,142
Program Net-to-Gross Ratio (NTG)	0.67	0.67
Verified Net Savings	6,763,098	765

NA = not applicable (refers to a piece of data that cannot be produced or does not apply).
* The coincident summer peak period is defined as 1:00 p.m.-5:00 p.m. Central Prevailing Time on non-holiday weekdays, June through August.

Source: ComEd tracking data and evaluation team analysis

4. Cumulative Persisting Annual Savings

Table 4-1 to Table 4-3 show the total verified gross savings for the Business Telecomm Program and the cumulative persisting annual savings (CPAS) for the program in CY2020. Figure 4-1 shows the savings across the useful life of the measures. The electric CPAS across all measures installed in 2020 is 6,763,098 kWh (Table 4-1). During CY2020, there was no additional gas contribution to CPAS; however, there remains historical gas contributions to CPAS from CY2019 (Table 4-2). Adding the gas and electric contributions produces 6,763,098 kWh of total CY2020 contribution to CPAS (Table 4-3). The historic rows in each table are the CPAS contribution back to CY2018. The Program Total Electric CPAS and the Program Total Gas CPAS rows are the sum of the CY2020 contribution and the historic contribution.

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

End Use Type	Research Category	EUL	CY2020 Verified Gross Savings (kWh)	NTG*	Lifetime Net Savings (kWh)†	Verified Net kWh Savings 2018	2019	2020	2021	2022	2023	2024	2025	2026
Telecom	Network Combing	10.0	7,538,134	0.67	50,505,498			5,050,550	5,050,550	5,050,550	5,050,550	5,050,550	5,050,550	5,050,550
Telecom	Equipment Optimization	8.8	2,556,042	0.67	15,070,423			1,712,548	1,712,548	1,712,548	1,712,548	1,712,548	1,712,548	1,712,548
CY2020 Program Total Electric Contribution to CPAS			10,094,176		65,575,921			6,763,098	6,763,098	6,763,098	6,763,098	6,763,098	6,763,098	6,763,098
Historic Program Total Electric Contribution to CPAS‡							3,627,993	3,627,993	3,627,993	3,627,993	3,627,993	3,531,638	3,531,638	3,416,493
Program Total Electric CPAS						-	3,627,993	10,391,091	10,391,091	10,391,091	10,391,091	10,294,736	10,294,736	10,179,591
CY2020 Program Incremental Expiring Electric Savings§									-	-	-	-	-	-
Historic Program Incremental Expiring Electric Savings‡§								-	-	-	-	96,355	-	115,145
Program Total Incremental Expiring Electric Savings§								-	-	-	-	96,355	-	115,145

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Telecom	Network Combing	5,050,550	5,050,550	5,050,550	-	-	-	-	-	-	-	-	-
Telecom	Equipment Optimization	1,712,548	1,370,038	-	-	-	-	-	-	-	-	-	-
CY2020 Program Total Electric Contribution to CPAS		6,763,098	6,420,588	5,050,550	-	-	-	-	-	-	-	-	-
Historic Program Total Electric Contribution to CPAS‡		3,301,349	3,301,349	178,658	178,658	178,658	178,658	178,658					
Program Total Electric CPAS		10,064,446	9,721,937	5,229,208	178,658	178,658	178,658	178,658	-	-	-	-	-
CY2020 Program Incremental Expiring Electric Savings§		-	342,510	1,370,038	5,050,550	-	-	-	-	-	-	-	-
Historic Program Incremental Expiring Electric Savings:		115,145	-	3,122,690	-	-	-	-	178,658	-	-	-	-
Program Total Incremental Expiring Electric Savings§		115,145	342,510	4,492,729	5,050,550	-	-	-	178,658	-	-	-	-

Note: The green highlighted cell shows program total first year electric savings. The gray cells are blank, indicating values irrelevant to the CY2020 contribution to CPAS.

* A deemed value. Source: is found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

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

‡ Historical savings go back to CY2018.

§ Incremental expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n.

Source: Evaluation team analysis

Table 4-2. Cumulative Persisting Annual Savings (CPAS) – Gas

End Use Type	Research Category	EUL	CY2020 Verified Gross Savings (Therms)	NTG*	Lifetime Net Savings (Therms)†	Verified Net Therms Savings 2018	2019	2020	2021	2022	2023	2024	2025	2026
Telecom	Network Combing	10.0	-	0.67	-									
Telecom	Equipment Optimization	8.8	-	0.67	-									
CY2020 Program Total Gas Contribution to CPAS (Therms)			-		-			-	-	-	-	-	-	-
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡						-	-	-	-	-	-	-	-	-
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§							8,646	8,646	8,646	8,646	8,646	8,646	8,646	4,323
Program Total Gas CPAS (kWh Equivalent)‡						-	8,646	8,646	8,646	8,646	8,646	8,646	8,646	4,323
CY2020 Program Incremental Expiring Gas Savings (Therms)||									-	-	-	-	-	-
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡||									-	-	-	-	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§||								-	-	-	-	-	-	4,323
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡||								-	-	-	-	-	-	4,323

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Telecom	Network Combing												
Telecom	Equipment Optimization												
CY2020 Program Total Gas Contribution to CPAS (Therms)		-	-	-	-	-	-	-	-	-	-	-	-
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡		-	-	-	-	-	-	-	-	-	-	-	-
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§													
Program Total Gas CPAS (kWh Equivalent)‡		-	-	-	-	-	-	-	-	-	-	-	-
CY2020 Program Incremental Expiring Gas Savings (Therms)||		-	-	-	-	-	-	-	-	-	-	-	-
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡||		-	-	-	-	-	-	-	-	-	-	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§|		4,323	-	-	-	-	-	-	-	-	-	-	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡||		4,323	-	-	-	-	-	-	-	-	-	-	-

Note: The green highlighted cell shows program total first year gas savings in kWh equivalents. The gray cells are blank, indicating no values or do not contribute to calculating CPAS in CY2020.

* A deemed value. Source: is found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

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

‡ kWh equivalent savings are calculated by multiplying therm savings by 29.31.

§ Historic savings go back to CY2018.

|| Incremental expiring savings are equal to CPAS Yn-1 - CPAS Y_n.

Source: Evaluation team analysis

Table 4-3. Cumulative Persisting Annual Savings (CPAS) – Total

End Use Type	Research Category	EUL	CY2020 Verified Gross Savings (kWh)	NTG*	Lifetime Net Savings (kWh)†	Verified Net kWh Savings (Including Those Converted from Gas Savings) 2018	2019	2020	2021	2022	2023	2024	2025	2026
Telecom	Network Combing	10.0	7,538,134	0.67	50,505,498			5,050,550	5,050,550	5,050,550	5,050,550	5,050,550	5,050,550	5,050,550
Telecom	Equipment Optimization	8.8	2,556,042	0.67	15,070,423			1,712,548	1,712,548	1,712,548	1,712,548	1,712,548	1,712,548	1,712,548
CY2020 Program Total Contribution to CPAS			10,094,176		65,575,921			6,763,098	6,763,098	6,763,098	6,763,098	6,763,098	6,763,098	6,763,098
Historic Program Total Contribution to CPAS‡						-	3,636,639	3,636,639	3,636,639	3,636,639	3,636,639	3,540,284	3,540,284	3,420,816
Program Total CPAS						-	3,636,639	10,399,737	10,399,737	10,399,737	10,399,737	10,303,382	10,303,382	10,183,914
CY2020 Program Incremental Expiring Savings§									-	-	-	-	-	-
Historic Program Incremental Expiring Savings‡§								-	-	-	-	96,355	-	119,468
Program Total Incremental Expiring Savings§								-	-	-	-	96,355	-	119,468

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Telecom	Network Combing	5,050,550	5,050,550	5,050,550	-	-	-	-	-	-	-	-	-
Telecom	Equipment Optimization	1,712,548	1,370,038	-	-	-	-	-	-	-	-	-	-
CY2020 Program Total Contribution to CPAS		6,763,098	6,420,588	5,050,550	-	-	-	-	-	-	-	-	-
Historic Program Total Contribution to CPAS‡		3,301,349	3,301,349	178,658	178,658	178,658	178,658	178,658	-	-	-	-	-
Program Total CPAS		10,064,446	9,721,937	5,229,208	178,658	178,658	178,658	178,658	-	-	-	-	-
CY2020 Program Incremental Expiring Savings§		-	342,510	1,370,038	5,050,550	-	-	-	-	-	-	-	-
Historic Program Incremental Expiring Savings‡§		119,468	-	3,122,690	-	-	-	-	178,658	-	-	-	-
Program Total Incremental Expiring Savings§		119,468	342,510	4,492,729	5,050,550	-	-	-	178,658	-	-	-	-

Note: The green highlighted cell shows program total first year electric savings (including direct electric savings and those converted from gas). The gray cells are blank, indicating no values or do not contribute to calculating CPAS in CY2020.

* A deemed value. Source: is found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

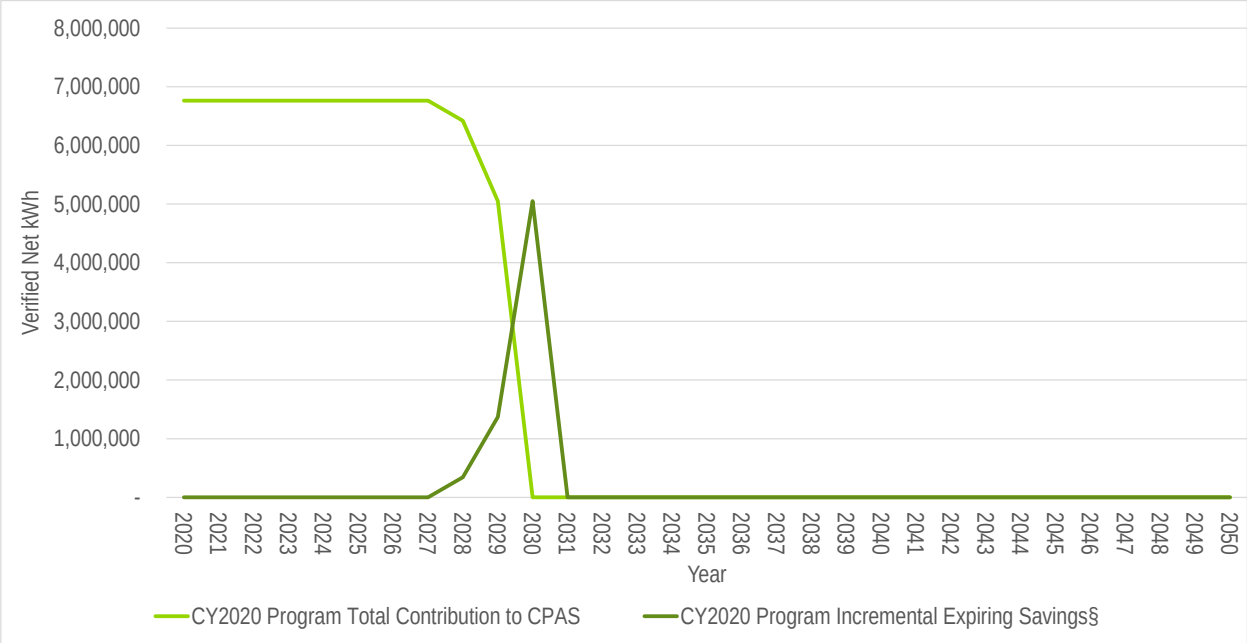
† Lifetime savings are the sum of CPAS savings through the EUL.

‡ Historic savings go back to CY2018.

§ Incremental expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n.

Source: Evaluation team analysis

Figure 4-1. Cumulative Persisting Annual Savings



* Expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n + Expiring Savings Y_{n-1}.

Source: Evaluation team analysis

5. Program Savings by Measure

The evaluation team analyzed savings for the Business Telecomm Program at a strata level and do not have measure-level savings. For more information about strata- and site-level savings, see Appendix B.

6. Impact Analysis Findings and Recommendations

6.1 Impact Parameter Estimates

The evaluation team performed engineering desk reviews of completed project documentation and calculations to determine the Telecomm Program's verified savings. The evaluation team reviewed the data collected during the implementation team's site visits and ensured that the ex ante savings calculations used the data correctly.

Each site-specific evaluation used peak kW savings calculation methodology consistent with PJM summer peak demand requirements[2] to calculate the peak kW reduction. The evaluation team estimated lifetime energy and demand savings by multiplying the verified savings by the effective useful life (EUL) for each measure.

The deemed NTG spreadsheet provides five different NTG values for the Business Telecomm Program, depending on the measure type:

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

- Co-Location: New Construction
- Co-Location: Retrofit
- Non-Co-Location
- Lighting
- Other Standard

The program did not include any co-location, lighting, or other standard projects during CY2020. The evaluation team applied the 0.67 NTG ratio for non-co-location measures from the deemed NTG spreadsheet for all measures in CY2020.

Table 6-1. Savings Parameters

Gross Savings Input Parameters	Value	Units	Deemed or Evaluated?	Source *
Net-to-Gross (NTG)	0.67	%	Deemed*	IL SAG NTG Spreadsheet
Effective Useful Life (EUL)	Varies	Years	Evaluated	TRM v8.0 – Volume 4, Appendix B – EUL for Custom Measures

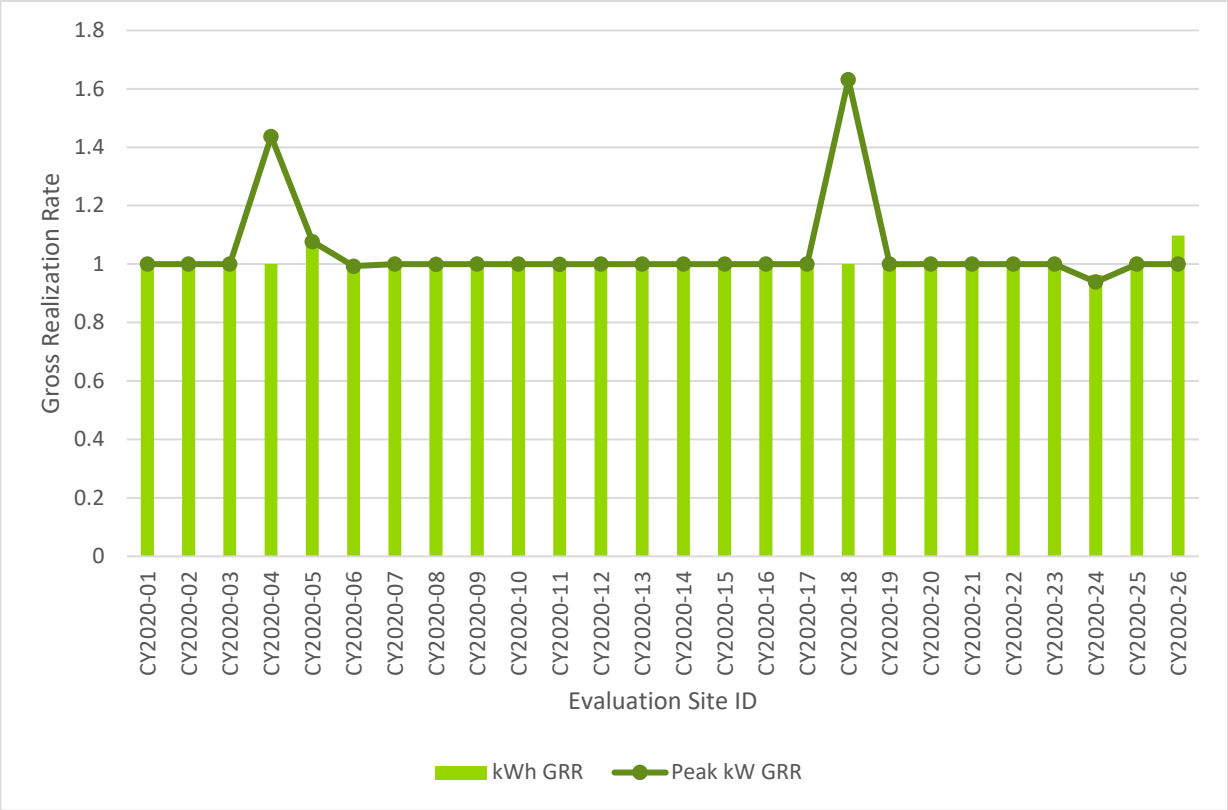
* The NTG values can be found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

Source: ComEd program data and evaluation team analysis

6.2 Other Impact Findings and Recommendations

The evaluation team developed several recommendations based on findings from the CY2020 evaluation. Figure 6-1 compares the energy and demand realization rates for every evaluated site. The CY2020 energy savings realization rates ranged from 0.96 to 1.08, which resulted in a program-level weighted realization rate of 1.00. The gross energy realization rate was at or above 1.0 for 24 of the 26 projects examined. The gross peak demand savings realization rates for the 26 projects in the sample ranged from 0.94 to 1.63, resulting in a program-level realization rate of 1.04.

Figure 6-1. Energy and Peak Demand Realization Rates



Source: ComEd tracking data and evaluation team analysis

6.2.1 Program and Documentation

Finding 1. According to the project calculation notes, one project had data collected with the wrong transducer size indicated in the logger setup file. The data was still usable because the implementer and evaluation team properly scaled the incorrect amp results and compared them to similar metered data for another unit. The incorrect logger size did not have an impact on the savings for this project.

Recommendation 1. In cases where the implementer deploys current transducers or loggers with incorrect settings, the program implementer should redeploy the loggers whenever possible. This will ensure the implementation team captures the most accurate data to support ex ante or verified savings calculations.

6.2.2 Network Combing

Finding 2. One of the network combing projects reviewed had demand and energy savings calculations that were not using the rectifier's measured voltage. The final calculation included the energy and demand savings using the proper rectifier voltage, 52.8 V. The program implementer appeared to use an assumed voltage of 53.0 V to determine the ex ante savings. The adjustment to the voltage reduced the savings for this project 1%.

Recommendation 2. Update kWh and kW savings for network combing measures once the actual amperage reduction is measured. Program implementation staff should also update the

post-inspection calculation to use the actual voltage and amperage of the rectifiers for custom calculations.

Finding 3. The program implementer used custom savings calculations to determine the switch peripheral consolidation and associated HVAC savings for the Business Telecomm Program. Beginning in CY2021, the Illinois Statewide Technical Reference Manual (TRM v9.0) includes a switch peripheral consolidation measure.

Recommendation 3. The program implementer should use the savings methodology outlined in measure 4.8.17 – Switch Peripheral Equipment Consolidation, of the appropriate version of the TRM (TRM v9.0 for CY2021) moving forward.

Finding 4. One of the network combing projects in the sample had a reported measure life of 15 years. This was inconsistent with the remaining network combing projects in CY2020. The evaluation team recommended a 10-year measure life for network combing during the CY2019 evaluation. The switch peripheral equipment consolidation measure in TRM v9.0 also prescribes a 10-year measure life. The lifetime adjustment did not change the verified first year savings. The evaluation team used the 10-year measure life for all network combing projects to calculate CPAS.

Recommendation 4. The program implementer should use a 10-year measure life for switch peripheral equipment consolidation (network combing) measures during CY2021. The measure life should be updated accordingly to match the value prescribed in the appropriate version of the TRM.

6.2.3 Equipment Optimization

Finding 5. Two of the sampled projects did not appropriately include cooling peak demand savings in the ex ante calculations. One project was a calculation reference error, where the implementer calculation did not correctly sum cooling savings. The evaluation team included the cooling impacts in the verified savings. The second was because the implementer assumed cooling savings would not occur during the peak period. Network equipment cooling loads are often independent of outdoor air temperature, making it likely that peak demand savings will occur for Business Telecomm Program projects. The peak demand realization rates for these two projects were 1.63 and 1.44, respectively. These two projects were the most significant cause of the program level peak demand realization rate of 1.04.

Recommendation 5. The program implementer should add a check to program calculators to ensure peak demand savings are claimed. The flag will alert implementation staff to closely examine projects with no demand savings.

Finding 6. One of the reviewed projects included chiller metered data. The metered data showed that the chiller did not run continuously and instead ran 87% of the time. The ex ante savings calculation assumed that the chiller ran 100% of the time. The evaluation team updated the verified savings using 7,586 total hours of operation to account for chiller downtime throughout the year. The reduction in operating hours resulted in an energy savings realization rate of 0.96 for one project.

Recommendation 6. For specific equipment calculations, the program implementer should use the subject equipment's runtime. Even though a plant or system may run continuously,

modifications to a single piece of equipment should use the hours of that specific piece of equipment to ensure savings are as accurate as possible.

Finding 7. One of the participants in the Business Telecomm Program was also a regular participant in the Retrocommissioning Program. The evaluation did not find cases where projects overlapped during CY2020, but overlap could occur in the future.

Recommendation 7. Program implementation staff should document and photograph the unit ID during Business Telecomm Program HVAC upgrades to easily identify the units that are part of program projects and provide information to avoid double counting measures through various programs.

Finding 8. Equipment optimization measures closely resemble retrocommissioning measures. The implementation contractor assumed a 5- or 10-year measure life for the sites reviewed. TRM v8.0 prescribes an 8.8-year measure life for retrocommissioning projects. Moving forward, TRM v.9.0 also specifies an 8.8-year measure life for retrocommissioning projects.

Recommendation 8. Use an 8.8-year measure life for retrocommissioning measures in 2021, consistent with TRM v.9.0. The EUL should also be updated to be consistent with the EUL for retrocommissioning measures documented in the applicable version of the TRM in the future.

Appendix A. Impact Analysis Methodology

Evaluators review gross offering impacts with a project-by-project and measure-by-measure approach. Savings calculation reviews ensure the savings estimates are accurately modeled, use consistent inputs and include reasonable assumptions, as required. The evaluation team also reviewed the documentation to confirm project installation and verify the measure life. In some cases, evaluators verified assumptions using additional resources, such as applicable building codes and TRM v8.0.

Where we found differences, the verified savings were adjusted to reflect those adjustments. ComEd and the implementation contractors provided project files through the program tracking system. Results from the impact evaluation were rolled up by sampling strata and extrapolated to the participant population to determine gross researched impacts. Deemed net-to-gross (NTG) ratios were applied to verified gross results to arrive at net researched impacts.

A.1 Sampling Methodology

The evaluation team used a stratified random sampling approach to select the gross impact sample of 26 projects. The evaluation team stratified the CY2020 sample by customer and project size. During CY2020, one customer accounted for 75% of the energy savings and 51 of the 58 projects. Guidehouse stratified projects completed by this customer into certainty, medium, and small strata. The certainty stratum also included seven projects completed by participants other than the largest customer.

Table A-1 profiles the gross impact sample for the Business Telecomm Program in comparison with the program population. The 26 sampled sites make up approximately 67% of the population ex ante energy savings. Also shown are the ex ante-based kWh sample weights for each of the strata.

The sample design targeted a 90/10 level of confidence and relative precision.

Table A-1. Gross Impact Sample by Strata

Population summary				Sample		
Sample Strata	Numer of Sites (N)	Ex ante kWh	kWh Weights	Number of Sites	Ex ante kWh	Sampled % of Population kWh
Certainty	11	4,521,537	0.45	11	4,521,537	100%
Medium	11	2,734,510	0.27	6	1,339,833	49%
Small	36	2,818,286	0.28	9	926,796	33%
CY2020 Total	58	10,074,332		26	6,788,166	67%

Source: Evaluation team analysis

Appendix B. Impact Analysis Detail

B.1 Savings by Stratum

The Business Telecomm Program sample consisted of 26 sites across three strata. Table B-1 and Table B-2 provide the ex ante and verified energy and peak demand savings for each strata. During CY2020, there were no gas savings from Business Telecomm Program projects.

Table B-1. 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)
Certainty	11	4,521,537	0.99	4,494,179	0.67	3,011,100
Medium	6	2,734,510	1.02	2,781,711	0.67	1,863,746
Small	9	2,818,286	1.00	2,818,286	0.67	1,888,251
CY2020 Total	26	10,074,332	1.00	10,094,176	0.67	6,763,098

* A deemed value. The NTG values can be found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

Source: Evaluation team analysis

Table B-2. Peak Demand Savings by Strata

Sample Strata	Sample Size	Ex ante Gross Savings (kW)	Verified Gross Realization Rate	Verified Gross Savings (kW)	NTG*	Verified Net Savings (kW)
Certainty	11	438	1.10	480	0.67	322
Medium	6	318	1.00	324	0.67	217
Small	9	338	1.00	338	0.67	227
CY2020 Total	26	1,095	1.04	1,142	0.67	765

* A deemed value. The NTG values can be found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

Source: Evaluation team analysis

B.2 Savings by Project

Table B-3 and Table B-4 show the verified energy and peak demand savings for each project.

Table B-3. CY2020 Energy Savings by Site

Evaluation Site ID	Sample Strata	Ex ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)
CY2020-18	certainty	800,722	1.00	800,722	0.67	536,484
CY2020-24	certainty	723,622	0.96	696,265	0.67	466,497
CY2020-01	certainty	530,940	1.00	530,940	0.67	355,730
CY2020-13	certainty	484,461	1.00	484,461	0.67	324,589
CY2020-04	medium	484,424	1.00	484,424	0.67	324,564
CY2020-02	medium	470,695	1.00	470,695	0.67	315,366
CY2020-03	medium	418,655	1.00	418,655	0.67	280,499
CY2020-05	small	309,872	1.08	334,148	0.67	223,879
CY2020-17	small	277,556	1.00	277,556	0.67	185,962
CY2020-14	small	204,477	1.00	204,477	0.67	137,000
CY2020-07	small	197,110	1.00	197,110	0.67	132,064
CY2020-06	certainty	189,904	0.99	188,755	0.67	126,466
CY2020-15	certainty	185,261	1.00	185,261	0.67	124,125
CY2020-16	certainty	180,130	1.00	180,130	0.67	120,687
CY2020-10	medium	167,660	1.00	167,660	0.67	112,332
CY2020-22	medium	164,597	1.00	164,597	0.67	110,280
CY2020-25	medium	161,572	1.00	161,572	0.67	108,253
CY2020-12	certainty	157,164	1.00	157,164	0.67	105,300
CY2020-19	small	151,775	1.00	151,775	0.67	101,689
CY2020-23	small	146,183	1.00	146,183	0.67	97,943
CY2020-26	small	84,805	1.00	84,805	0.67	56,819
CY2020-21	small	73,760	1.00	73,760	0.67	49,419
CY2020-11	small	69,974	1.00	69,974	0.67	46,882
CY2020-20	certainty	67,059	1.00	67,059	0.67	44,929
CY2020-09	certainty	43,927	1.00	43,927	0.67	29,431
CY2020-08	certainty	41,860	1.00	41,860	0.67	28,046

* A deemed value. The NTG values can be found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

Source: Evaluation team analysis

Table B-4. CY2020 Peak Demand Savings by Project

Evaluation Site ID	Sample Strata	Ex ante Gross Savings (kW)	Verified Gross Realization Rate	Verified Gross Savings (kW)	NTG*	Verified Net Savings (kW)
CY2020-18	certainty	47	1.63	76	0.67	51
CY2020-24	certainty	73	0.94	68	0.67	46
CY2020-01	certainty	61	1.00	61	0.67	41
CY2020-13	certainty	55	1.00	55	0.67	37
CY2020-04	medium	38	1.44	55	0.67	37
CY2020-02	medium	54	1.00	54	0.67	36
CY2020-03	medium	50	1.00	50	0.67	33
CY2020-05	small	35	1.08	38	0.67	26
CY2020-17	small	32	1.00	32	0.67	21
CY2020-14	small	23	1.00	23	0.67	16
CY2020-07	small	23	1.00	23	0.67	15
CY2020-06	certainty	22	0.99	22	0.67	14
CY2020-15	certainty	21	1.00	21	0.67	14
CY2020-16	certainty	27	1.00	27	0.67	18
CY2020-10	medium	19	1.00	19	0.67	13
CY2020-22	medium	19	1.00	19	0.67	13
CY2020-25	medium	18	1.00	18	0.67	12
CY2020-12	certainty	10	1.00	10	0.67	7
CY2020-19	small	22	1.00	22	0.67	15
CY2020-23	small	17	1.00	17	0.67	11
CY2020-26	small	9	1.00	9	0.67	6
CY2020-21	small	8	1.00	8	0.67	6
CY2020-11	small	8	1.00	8	0.67	5
CY2020-20	certainty	8	1.00	8	0.67	5
CY2020-09	certainty	5	1.00	5	0.67	3
CY2020-08	certainty	5	1.00	5	0.67	3

* A deemed value. The NTG values can be found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

Source: Evaluation team analysis

We evaluated each measure and project for the sampled sites. The evaluation team adjusted five of the 26 sites evaluated. The details for each adjustment follow:

- CY2020-04: The ex ante peak demand savings did not include demand savings from the reduced cooling load on the IT equipment. The final project calculations determined the cooling savings, but the implementer did not include them in the reported ex ante savings. The evaluation team updated the verified savings to have the cooling savings resulting from network combing.

- CY2020-05: The implementer calculated the ex ante savings using a separate tab of the program calculation databook. The verified savings use the customer calc tab, the same calculator used in all other network consolidation projects. The ex ante cooling savings used the efficiency of a standard air-cooled split system. The evaluation team updated the unit efficiency to a computer room air conditioner from Table 6.8.1K in IECC 2012. The evaluation team and program implementer used this table to specify efficiencies for all other program cooling savings calculations.

- CY2020-06: The ex ante calculations used a system voltage that was slightly higher than observed. The ex ante calculations are consistent with a rectifier voltage of 53.0 V. The project documentation indicated the customer system operates at 52.8 V. The evaluation team updated the voltage to 52.8 V in the verified savings.

- CY2020-18: There were no ex ante demand savings for the return air temperature adjustment. Adjusting the return air temperature changes the operating load of the air handling unit. The implementer indicated that since the unit's maximum kW remains unchanged, there would be no peak demand savings. However, since the project increased the return air temperature to 90°F, the units will operate more efficiently than with 70°F return air during the summer months. Guidehouse updated the verified savings to include peak demand savings associated with reducing return air temperature by taking the difference in the baseline and efficient case summer operating kW and multiplying by the coincidence factor for electric chillers (0.478) from the TRM v8.0.

- CY2020-24: The implementer assumed the chiller hours were 8,760. The metered data collected by the implementer indicated that the chiller ran 87% of the time or 7,586 hours per year. Guidehouse updated the energy and peak demand savings to include the lower operating hours.

Appendix C. Total Resource Cost Detail

Table C-1 shows the TRC 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 the evaluation team later.

Table C-1. Total Resource Cost Savings Summary

End Use Type	Research Category	Units	Quantity	EUL (years)*	ER Flag †	Gross Electric Energy Savings (kWh)	Gross Peak Demand Reduction (kW)	Gross Gas Savings (Therms)	Gross Secondary Savings due to Water Reduction (kWh)	Gross Heating Penalty (kWh)	Gross Heating Penalty (Therms)	NTG (kWh)	NTG (kW)	NTG (Therms)	Net Electric Energy Savings (kWh)	Net Peak Demand Reduction (kW)	Net Gas Savings (Therms)	Net Secondary Savings due to Water Reduction (kWh)	Net Heating Penalty (kWh)	Net Heating Penalty (Therms)
Telecom	Network Combing	Sites	51	10.0	No	7,538,134	901.91	0	NA	NA	NA	0.67	0.67	0.67	5,050,550	604.28	0	NA	NA	NA
Telecom	Equipment Optimization	Sites	7	8.8	No	2,556,042	239.87	0	NA	NA	NA	0.67	0.67	0.67	1,712,548	160.72	0	NA	NA	NA
	Total			9.7		10,094,176	1,142	0	NA	NA	NA	NA	NA	NA	6,763,098	764.99	0	0	0	0

Note: To avoid double counting, the verified gross kWh and net kWh used in the TRC analysis exclude secondary energy savings from water reduction measures. There were no water savings for CY2020 projects.
NA = not applicable (refers to a piece of data that cannot be produced or does not apply)
* The total of the EUL column is the weighted average measure life (WAML), and is calculated as the sum product of the EUL and measure savings divided by total program savings.
† Early Replacement (ER) measures are flagged as YES, otherwise a NO is indicated in the column.
Source: ComEd tracking data and evaluation team analysis