Guidehouse

Combined Utility Single Family Retrofits – Income Eligible Program Impact Evaluation Report

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

Prepared for:
ComEd
Nicor Gas
Peoples Gas
North Shore Gas

FINAL

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Table of Contents

1. Introduction 1
1.1 Program Description 1
2. Single Family Retrofits – CBA 1
2.1 Volumetric Findings 1
2.2 Program Savings Detail 3
2.3 Cumulative Persisting Annual Savings 5
2.4 Program Savings by Measure 12
2.5 Impact Analysis Findings and Recommendations 17
2.5.1 Impact Parameter Estimates 17
2.5.2 ComEd Findings and Recommendations 17
2.5.3 Peoples Gas Findings and Recommendations 21
2.6 Total Cost Resource Test 24
3. Single Family Retrofits – IHWAP 26
3.1 Volumetric Findings 26
3.2 Program Savings Detail 29
3.3 Cumulative Persisting Annual Savings 31
3.4 Program Savings by Measure 38
3.5 Impact Analysis Findings and Recommendations 47
3.5.1 Impact Parameter Estimates 47
3.5.2 ComEd Findings and Recommendations 48
3.5.3 Nicor Gas Findings and Recommendations 50
3.5.4 Peoples Gas and North Shore Gas Findings and Recommendations 53
3.1 Total Cost Resource Test 57

List of Tables and Figures

Figure 2-1. SFR-CBA Share of Measures Installed by End Use 3
Figure 2-2. SFR-CBA Cumulative Persisting Annual Savings 12
Figure 2-3. SFR-CBA ComEd Verified Net Savings by End Use 12
Figure 2-4. SFR-CBA Peoples Gas Verified Net Therm Savings by End Use 13
Figure 3-1. SFR-IHWAP Share of Measures Installed by End Use – ComEd 27
Figure 3-2. SFR-IHWAP Share of Measures Installed by End Use – Nicor Gas 28
Figure 3-3. SFR-IHWAP Share of Measures Installed by End Use – Peoples Gas 28
Figure 3-4. SFR-IHWAP Share of Measures Installed by End Use – North Shore Gas 29
Figure 3-5. SFR-IHWAP Cumulative Persisting Annual Savings 38
Figure 3-6. SFR-IHWAP ComEd Verified Net Savings by End Use – Electric 39
Figure 3-7. SFR-IHWAP Nicor Gas Verified Net Therm Savings by End Use 39
Figure 3-8. SFR-IHWAP Peoples Gas Verified Net Therm Savings by End Use 40
Figure 3-9. SFR-IHWAP North Shore Gas Verified Net Therm Savings by End Use 40

Table 2-1. SFR-CBA CY2020 Volumetric Findings Detail 2
Table 2-2. SFR-CBA CY2020 Total Annual Incremental Electric Savings 4
Table 2-3. SFR-CBA CY2020 Total Annual Incremental Therm Savings..... 4
Table 2-4. SFR-CBA Cumulative Persisting Annual Savings (CPAS) – Electric 6
Table 2-5. SFR-CBA Cumulative Persisting Annual Savings (CPAS) – Gas 8
Table 2-6. SFR-CBA Cumulative Persisting Annual Savings (CPAS) – Total..... 10
Table 2-7. SFR-CBA CY2020 Energy Savings by Measure – Electric..... 13
Table 2-8. SFR-CBA CY2020 Summer Peak Demand Savings by Measure..... 14
Table 2-9. SFR-CBA CY2020 Energy Savings by Measure – Gas – ComEd 14
Table 2-10. SFR-CBA CY2020 Energy Savings by Measure – Total Combining Electricity and Gas – ComEd 15
Table 2-11. SFR-CBA Secondary Energy Savings from Water Reduction by Measure – Electric – ComEd..... 16
Table 2-12. SFR-CBA CY2020 Natural Gas Energy Savings by Measure – Peoples Gas 16
Table 2-13. SFR-CBA Savings Parameters 17
Table 2-14. SFR-CBA Measure-Level Savings and Realization Rates – ComEd 18
Table 2-15. SFR – CBA Programmable Thermostat Coefficients Used..... 20
Table 2-16. SFR-CBA Measure-Level Savings and Realization Rates – Peoples Gas..... 21
Table 2-17. SFR-CBA Total Resource Cost Savings Summary – ComEd..... 24
Table 2-18. SFR-CBA Total Resource Cost Savings Summary – Peoples Gas 25
Table 3-1. SFR-IHWAP CY2020 Volumetric Findings Detail 26
Table 3-2. SFR-IHWAP CY2020 Total Annual Incremental Electric Savings..... 30
Table 3-3. SFR-IHWAP CY2020 Total Annual Incremental Therm Savings 30
Table 3-4. SFR-IHWAP Cumulative Persisting Annual Savings (CPAS) – Electric..... 32
Table 3-5. SFR-IHWAP Cumulative Persisting Annual Savings (CPAS) – Gas..... 34
Table 3-6. SFR-IHWAP Cumulative Persisting Annual Savings (CPAS) – Total..... 36
Table 3-7. SFR-IHWAP CY2020 Energy Savings by Measure – Electric – ComEd..... 41
Table 3-8. SFR-IHWAP CY2020 Summer Peak Demand Savings by Measure – ComEd..... 42
Table 3-9. SFR-IHWAP CY2020 Energy Savings by Measure – Gas – ComEd..... 43
Table 3-10. SFR-IHWAP CY2020 Energy Savings by Measure – Total Combining Electricity and Gas – ComEd 44
Table 3-11. SFR-IHWAP Secondary Energy Savings from Water Reduction by Measure – Electric – ComEd 45
Table 3-12. SFR-IHWAP CY2020 Natural Gas Energy Savings by Measure – Nicor Gas 46
Table 3-13. SFR-IHWAP CY2020 Natural Gas Energy Savings by Measure – Peoples Gas .. 46
Table 3-14. SFR-IHWAP CY2020 Natural Gas Energy Savings by Measure – North Shore Gas 47
Table 3-15. SFR-IHWAP Savings Parameters 48
Table 3-16. SFR-IHWAP Measure-Level Savings and Realization Rates – ComEd..... 49
Table 3-17. SFR-IHWAP Measure-Level Savings and Realization Rates – Nicor Gas 51
Table 3-18. SFR-IHWAP Joint Nicor Gas and ComEd Air Sealing Measures..... 52
Table 3-19. SFR-IHWAP Insulation Measures Needing ComEd Supplemental Tracking Data 53
Table 3-20. SFR-IHWAP Measure-Level Savings and Realization Rates – Peoples Gas 54
Table 3-21. SFR-IHWAP Measure-Level Savings and Realization Rates – North Shore Gas . 55
Table 3-22. SFR-IHWAP Peoples Gas and North Shore Gas Measures Needing ComEd Supplemental Tracking Data..... 56
Table 3-23. SFR-IHWAP Total Resource Cost Savings Summary – ComEd 57
Table 3-24. SFR-IHWAP Total Resource Cost Savings Summary – Nicor Gas..... 58
Table 3-25. SFR-IHWAP Total Resource Cost Savings Summary – Peoples Gas..... 59

Table 3-26. SFR-IHWAP Total Resource Cost Savings Summary – North Shore Gas..... 60

1. Introduction

This report presents impact evaluation results from the CY2020 combined utility Single Family Retrofits – Income Eligible (SFR) Program. It summarizes the total energy and demand impacts for the program broken out by relevant measure and program structure details. Tables and figures throughout the report provide the impact analysis. CY2020 covers January 1, 2020 through December 31, 2020.

1.1 Program Description

The SFR Program provides retrofits to single family households in ComEd service areas with incomes at or below 80% of the area median income. The program offers assessments, direct installation of energy efficiency measures, replacement of inefficient equipment, technical assistance, and educational information for customers to further save money on energy bills through two program components:

- **Single Family Retrofits – CBA**: Franklin Energy Services (Franklin) implements one program component with the Chicago Bungalow Association (CBA). This program component is offered jointly by ComEd and Peoples Gas.
    - Franklin implements a portion of the CBA program component with the Chicagoland Vintage Home Association (CVHA) which is offered outside the City of Chicago. This portion is solely offered by ComEd.
- **Single Family Retrofits – IHWAP:** Resource Innovations implements the other component of the program, leveraging Illinois' Home Weatherization Assistance Program (IHWAP). This program component is offered jointly by ComEd, Peoples Gas, North Shore Gas, and Nicor Gas and is delivered through community action agencies.

Both program components are listed under "Single Family Retrofits" in the net-to-gross (NTG) spreadsheet. The impact results for the CBA and IHWAP components of the program are presented in separate sections of this report.

2. Single Family Retrofits – CBA

2.1 Volumetric Findings

The Single Family Retrofits - CBA (SFR-CBA) program component had 1,432 electric participants and 693 gas participants in CY2020. The participant count is based on the number of unique utility account numbers. There were 21,527 measures that produced energy savings for ComEd and 3,276 measures that produced energy savings for Peoples Gas, as Table 2-1. and Figure 2-1 show.

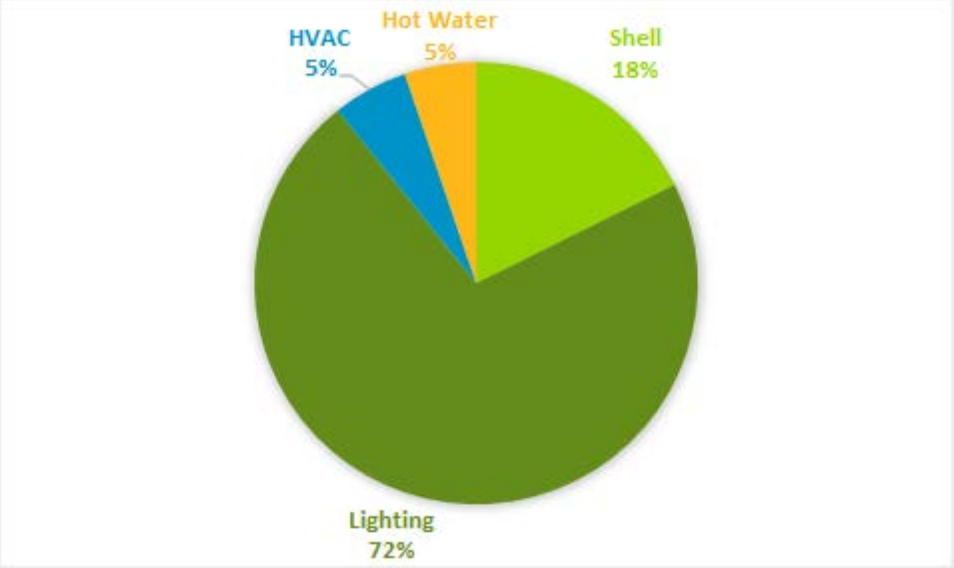
Table 2-1. SFR-CBA CY2020 Volumetric Findings Detail

Participation	ComEd Total	Peoples Gas Total
Participants*	1,432	693
Installed Projects†	21,527	3,276
Total Measures	2,197	930
Advanced Power Strip - Tier 1	711	
Bathroom Exhaust Fan	1,023	
Programmable Thermostat	23	22
Advanced Thermostat	87	69
Hot Water (HW) Pipe Insulation	330	856
Low Flow Faucet Aerator - Bathroom	136	76
Low Flow Faucet Aerator - Kitchen	87	64
Low Flow Showerhead	521	398
LED Specialty Lamp - Exterior	173	
LED Specialty Lamp - Interior	6,897	
LED Omnidirectional Bulb - Exterior	85	
LED Omnidirectional Bulb - Interior	7,612	
Air Sealing‡	1,027	477
Floor Insulation‡	133	76
Wall Insulation‡	1,557	738
Attic Insulation‡	1,024	475
Rim Insulation‡	101	25

Note: Quantities and project counts in this table may overlap between the ComEd and Peoples Gas tracking databases.
*Participants are defined as unique utility account numbers.
† Installed projects are defined as unique Project IDs within each utility's tracking database. Project IDs may overlap between the ComEd and gas utilities' tracking databases.
‡ Each project is counted as one measure quantity.

Source: ComEd and Peoples Gas tracking data and evaluation team analysis

Figure 2-1. SFR-CBA Share of Measures Installed by End Use



Source: ComEd and Peoples Gas tracking data and evaluation team analysis

2.2 Program Savings Detail

Table 2-2 and Table 2-3 summarize the incremental energy and demand savings the SFR-CBA program component achieved in CY2020 for ComEd and gas utilities, respectively. The gas savings in Table 2-2 are only those that ComEd may be able to claim, which excludes savings the gas utilities claim, either via joint or non-joint programs.

Table 2-2. SFR-CBA CY2020 Total Annual Incremental Electric Savings

Savings Category	Energy Savings (kWh)	Summer Peak* Demand Savings (kW)
Electricity		
Ex Ante Gross Savings	1,861,736	660
Program Gross Realization Rate	0.91	0.94
Verified Gross Savings	1,694,493	623
Program Net-to-Gross Ratio (NTG)	1.00	1.00
Verified Net Savings	1,694,493	623
Converted from Gas†		
Ex Ante Gross Savings	7,712,156	NA
Program Gross Realization Rate	1.01	NA
Verified Gross Savings	7,797,142	NA
Program Net-to-Gross Ratio (NTG)	1.00	NA
Verified Net Savings	7,797,142	NA
Total Electric Plus Gas		
Ex Ante Gross Savings	9,573,892	660
Program Gross Realization Rate	0.99	0.94
Verified Gross Savings	9,491,636	623
Program Net-to-Gross Ratio (NTG)	1.00	1.00
Verified Net Savings	9,491,636	623

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.

† Gas savings converted to kilowatt-hours (kWh) by multiplying therms by 29.31 (which is based on 100,000 Btu/therm and 3,412 Btu/kWh). The evaluation determines which gas savings are converted to kWh and counted toward ComEd's electric savings goal while producing the portfolio-wide summary report. According to Section 8-103B(b-25) of the Illinois Public Utilities Act, "In no event shall more than 10% of each year's applicable annual incremental goal as defined in paragraph (7) of subsection (g) of this Section be met through savings of fuels other than electricity."

Source: ComEd tracking data and evaluation team analysis

Table 2-3. SFR-CBA CY2020 Total Annual Incremental Therm Savings

Savings Category	Peoples Gas (Therms)
Natural Gas*	
Ex Ante Gross Savings	235,441
Program Gross Realization Rate	1.01
Verified Gross Savings	236,857
Program Net-to-Gross Ratio (NTG)	1.00
Verified Net Savings	236,857

*Natural gas savings with electric interactive effects removed.

Source: Peoples Gas tracking data and evaluation team analysis

2.3 Cumulative Persisting Annual Savings

Table 2-4 to Table 2-6 show the measure-specific and total verified gross savings for the SFR-CBA program component and the cumulative persisting annual savings (CPAS) for the measures installed in CY2020. Figure 2-2 shows the savings across the useful life of the measures. The electric CPAS across all measures installed in 2020 is 1,694,493 kWh (Table 2-4). The CY2020 gas contribution to CPAS (converted to equivalent electricity) is 7,797,142 kWh (Table 2-5). Adding the gas and electric contributions produces 9,491,636 kWh of total CY2020 contribution to CPAS (Table 2-6). 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 2-4. SFR-CBA 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	2027	2028
Consumer Electronics	Advanced Power Strip - Tier 1	7.0	29,293	1.00	205,052			29,293	29,293	29,293	29,293	29,293	29,293	29,293		
HVAC	Bathroom Exhaust Fan	19.0	27,368	1.00	519,987			27,368	27,368	27,368	27,368	27,368	27,368	27,368	27,368	27,368
HVAC	Programmable Thermostat	8.0	1,261	1.00	10,089			1,261	1,261	1,261	1,261	1,261	1,261	1,261	1,261	
HVAC	Advanced Thermostat	11.0	18,454	1.00	202,999			18,454	18,454	18,454	18,454	18,454	18,454	18,454	18,454	18,454
Hot Water	HW Pipe Insulation	15.0	308	1.00	4,613			308	308	308	308	308	308	308	308	308
Hot Water	Low Flow Faucet Aerator - Bathroom	10.0	105	1.00	1,046			105	105	105	105	105	105	105	105	105
Hot Water	Low Flow Faucet Aerator - Kitchen	10.0	237	1.00	2,368			237	237	237	237	237	237	237	237	237
Hot Water	Low Flow Showerhead	10.0	3,528	1.00	35,282			3,528	3,528	3,528	3,528	3,528	3,528	3,528	3,528	3,528
Lighting	LED Specialty Lamp - Exterior	6.9	15,247	1.00	105,205			15,247	15,247	15,247	15,247	15,247	15,247	13,722		
Lighting	LED Specialty Lamp - Interior	10.0	210,190	1.00	1,837,217			210,190	210,190	210,190	210,190	210,190	210,190	210,190	121,962	121,962
Lighting	LED Omnidirectional Bulb - Exterior	8.0	7,143	1.00	54,072			7,143	7,143	7,143	7,143	7,143	7,143	7,143	4,071	
Lighting	LED Omnidirectional Bulb - Interior	10.0	284,956	1.00	2,481,384			284,956	284,956	284,956	284,956	284,956	284,956	284,956	162,230	162,230
Shell	Air Sealing	20.0	544,232	1.00	9,874,148			544,232	544,232	544,232	544,232	544,232	544,232	544,232	544,232	544,232
Shell	Floor Insulation	20.0	3,827	1.00	70,987			3,827	3,827	3,827	3,827	3,827	3,827	3,827	3,827	3,827
Shell	Wall Insulation	20.0	257,666	1.00	4,716,456			257,666	257,666	257,666	257,666	257,666	257,666	257,666	257,666	257,666
Shell	Attic Insulation	20.0	289,304	1.00	5,281,722			289,304	289,304	289,304	289,304	289,304	289,304	289,304	289,304	289,304
Shell	Rim Insulation	20.0	1,374	1.00	24,691			1,374	1,374	1,374	1,374	1,374	1,374	1,374	1,374	1,374
CY2020 Program Total Electric Contribution to CPAS			1,694,493		25,427,318			1,694,493	1,694,493	1,694,493	1,694,493	1,694,493	1,694,493	1,692,969	1,435,928	1,430,595
Historic Program Total Electric Contribution to CPAS‡						2,041,077	4,258,997	4,257,133	3,841,134	3,841,134	3,831,385	3,548,210	3,486,118	3,425,990	3,423,185	3,020,760
Program Total Electric CPAS						2,041,077	4,258,997	5,951,627	5,535,628	5,535,628	5,525,878	5,242,703	5,180,611	5,118,959	4,859,113	4,451,355
CY2020 Program Incremental Expiring Electric Savings§									-	-	-	-	-	1,525	257,041	5,333
Historic Program Incremental Expiring Electric Savings‡§								1,864	415,999	-	9,749	283,175	62,092	60,128	2,805	402,425
Program Total Incremental Expiring Electric Savings§								1,864	415,999	-	9,749	283,175	62,092	61,653	259,846	407,758

End Use Type	Research Category	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Consumer Electronics	Advanced Power Strip - Tier 1															
HVAC	Bathroom Exhaust Fan	27,368	27,368	27,368	27,368	27,368	27,368	27,368	27,368	27,368	27,368					
HVAC	Programmable Thermostat															
HVAC	Advanced Thermostat	18,454	18,454													
Hot Water	HW Pipe Insulation	308	308	308	308	308	308									
Hot Water	Low Flow Faucet Aerator - Bathroom	105														
Hot Water	Low Flow Faucet Aerator - Kitchen	237														
Hot Water	Low Flow Showerhead	3,528														
Lighting	LED Specialty Lamp - Exterior															
Lighting	LED Specialty Lamp - Interior	121,962														
Lighting	LED Omnidirectional Bulb - Exterior															
Lighting	LED Omnidirectional Bulb - Interior	162,230														
Shell	Air Sealing	544,232	443,182	443,182	443,182	443,182	443,182	443,182	443,182	443,182	443,182	443,182				
Shell	Floor Insulation	3,827	3,272	3,272	3,272	3,272	3,272	3,272	3,272	3,272	3,272	3,272				
Shell	Wall Insulation	257,666	213,980	213,980	213,980	213,980	213,980	213,980	213,980	213,980	213,980	213,980				
Shell	Attic Insulation	289,304	238,868	238,868	238,868	238,868	238,868	238,868	238,868	238,868	238,868	238,868				
Shell	Rim Insulation	1,374	1,095	1,095	1,095	1,095	1,095	1,095	1,095	1,095	1,095	1,095				
CY2020 Program Total Electric Contribution to CPAS		1,430,595	946,527	928,072	928,072	928,072	928,072	927,765	927,765	927,765	927,765	900,397	-	-	-	-
Historic Program Total Electric Contribution to CPAS‡		2,597,578	2,534,744	2,534,744	2,523,683	1,806,806	1,806,806	1,806,806	1,806,806	1,668,799	1,624,171	527,281	527,281	527,281	527,281	-
Program Total Electric CPAS		4,028,173	3,481,271	3,462,816	3,451,755	2,734,879	2,734,879	2,734,571	2,734,571	2,596,564	2,551,936	1,427,678	527,281	527,281	527,281	-
CY2020 Program Incremental Expiring Electric Savings§		-	484,069	18,454	-	-	-	308	-	-	-	27,368	900,397	-	-	-
Historic Program Incremental Expiring Electric Savings‡§		423,182	62,833	-	11,062	716,876	-	-	-	138,007	44,627	1,096,890	-	-	-	527,281
Program Total Incremental Expiring Electric Savings§		423,182	546,902	18,454	11,062	716,876	-	308	-	138,007	44,627	1,124,258	900,397	-	-	527,281

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 found on the Illinois Stakeholder Advisory Group (SAG) website: https://www.ilsag.info/ntg_2020.

† Lifetime savings are the sum of CPAS savings through the effective useful life (EUL).

‡ Historic savings go back to CY2018.

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

Source: Evaluation team analysis

Table 2-5. SFR-CBA 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	2027	2028
Consumer Electronics	Advanced Power Strip - Tier 1	7.0	0	1.00	0											
HVAC	Bathroom Exhaust Fan	19.0	0	1.00	0											
HVAC	Programmable Thermostat	8.0	468	1.00	3,746			468	468	468	468	468	468	468	468	
HVAC	Advanced Thermostat	11.0	1,881	1.00	20,695			1,881	1,881	1,881	1,881	1,881	1,881	1,881	1,881	1,881
Hot Water	HW Pipe Insulation	15.0	168	1.00	2,521			168	168	168	168	168	168	168	168	168
Hot Water	Low Flow Faucet Aerator - Bathroom	10.0	52	1.00	525			52	52	52	52	52	52	52	52	52
Hot Water	Low Flow Faucet Aerator - Kitchen	10.0	61	1.00	610			61	61	61	61	61	61	61	61	61
Hot Water	Low Flow Showerhead	10.0	1,064	1.00	10,638			1,064	1,064	1,064	1,064	1,064	1,064	1,064	1,064	1,064
Lighting	LED Specialty Lamp - Exterior	6.9	0	1.00	0											
Lighting	LED Specialty Lamp - Interior	10.0	0	1.00	0											
Lighting	LED Omnidirectional Bulb - Exterior	8.0	0	1.00	0											
Lighting	LED Omnidirectional Bulb - Interior	10.0	0	1.00	0											
Shell	Air Sealing	20.0	98,301	1.00	1,889,442			98,301	98,301	98,301	98,301	98,301	98,301	98,301	98,301	98,301
Shell	Floor Insulation	20.0	1,369	1.00	26,239			1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369
Shell	Wall Insulation	20.0	84,642	1.00	1,623,881			84,642	84,642	84,642	84,642	84,642	84,642	84,642	84,642	84,642
Shell	Attic Insulation	20.0	77,408	1.00	1,488,400			77,408	77,408	77,408	77,408	77,408	77,408	77,408	77,408	77,408
Shell	Rim Insulation	20.0	609	1.00	11,724			609	609	609	609	609	609	609	609	609
CY2020 Program Total Gas Contribution to CPAS (Therms)			266,023		5,078,421			266,023	266,023	266,023	266,023	266,023	266,023	266,023	266,023	265,555
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡								7,797,142	7,797,142	7,797,142	7,797,142	7,797,142	7,797,142	7,797,142	7,797,142	7,783,418
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§						6,797,742	13,701,383	13,690,425	13,686,773	13,686,773	13,582,746	13,582,746	13,582,746	13,582,746	13,520,398	13,228,907
Program Total Gas CPAS (kWh Equivalent)‡						6,797,742	13,701,383	21,487,568	21,483,915	21,483,915	21,379,889	21,379,889	21,379,889	21,379,889	21,317,541	21,012,325
CY2020 Program Incremental Expiring Gas Savings (Therms)‖									-	-	-	-	-	-	-	468
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖									-	-	-	-	-	-	-	13,725
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖								10,958	3,653	-	104,027	-	-	-	62,348	291,491
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖								10,958	3,653	-	104,027	-	-	-	62,348	305,216

End Use Type	Research Category	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Consumer Electronics	Advanced Power Strip - Tier 1															
HVAC	Bathroom Exhaust Fan															
HVAC	Programmable Thermostat															
HVAC	Advanced Thermostat	1,881	1,881													
Hot Water	HW Pipe Insulation	168	168	168	168	168	168									
Hot Water	Low Flow Faucet Aerator - Bathroom	52														
Hot Water	Low Flow Faucet Aerator - Kitchen	61														
Hot Water	Low Flow Showerhead	1,064														
Lighting	LED Specialty Lamp - Exterior															
Lighting	LED Specialty Lamp - Interior															
Lighting	LED Omnidirectional Bulb - Exterior															
Lighting	LED Omnidirectional Bulb - Interior															
Shell	Air Sealing	98,301	90,859	90,859	90,859	90,552	90,552	90,552	90,552	90,552	90,552	90,552				
Shell	Floor Insulation	1,369	1,256	1,256	1,256	1,254	1,254	1,254	1,254	1,254	1,254	1,254				
Shell	Wall Insulation	84,642	77,905	77,905	77,905	77,678	77,678	77,678	77,678	77,678	77,678	77,678				
Shell	Attic Insulation	77,408	71,605	71,605	71,605	71,359	71,359	71,359	71,359	71,359	71,359	71,359				
Shell	Rim Insulation	609	565	565	565	562	562	562	562	562	562	562				
CY2020 Program Total Gas Contribution to CPAS (Therms)		265,555	244,238	242,357	242,357	241,573	241,573	241,405	241,405	241,405	241,405	241,405	-	-	-	-
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡		7,783,418	7,158,623	7,103,480	7,103,480	7,080,514	7,080,514	7,075,588	7,075,588	7,075,588	7,075,588	7,075,588	-	-	-	-
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§		12,420,732	12,090,818	12,090,818	12,241,411	9,477,707	9,465,780	9,465,780	9,465,780	9,465,780	9,465,780	3,620,999	3,620,999	3,620,999	3,620,999	-
Program Total Gas CPAS (kWh Equivalent)‡		20,204,150	19,249,441	19,194,298	19,344,891	16,558,222	16,546,294	16,541,368	16,541,368	16,541,368	16,541,368	10,696,587	3,620,999	3,620,999	3,620,999	-
CY2020 Program Incremental Expiring Gas Savings (Therms)‖		-	21,317	1,881	-	784	-	168	-	-	-	-	241,405	-	-	-
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖		-	624,795	55,143	-	22,966	-	4,927	-	-	-	-	7,075,588	-	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖		808,176	329,913	-	(150,592)	2,763,703	11,928	-	-	-	-	5,844,781	-	-	-	3,620,999
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖		808,176	954,708	55,143	(150,592)	2,786,669	11,928	4,927	-	-	-	5,844,781	7,075,588	-	-	3,620,999

Note: The green highlighted cell shows program total first-year gas savings in kWh equivalents. The gray cells are blank, indicating no values or no contribution to calculating CPAS in CY2020.

*A deemed value. Source 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 Y_{n-1} - CPAS Y_n.

Source: Evaluation team analysis

Table 2-6. SFR-CBA 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	2027	2028
Consumer Electronics	Advanced Power Strip - Tier 1	7.0	29,293	1.00	205,052			29,293	29,293	29,293	29,293	29,293	29,293	29,293		
HVAC	Bathroom Exhaust Fan	19.0	32,294	1.00	519,987			27,368	27,368	27,368	27,368	27,368	27,368	27,368	27,368	27,368
HVAC	Programmable Thermostat	8.0	2,799	1.00	119,886			14,986	14,986	14,986	14,986	14,986	14,986	14,986	14,986	
HVAC	Advanced Thermostat	11.0	20,242	1.00	809,568			73,597	73,597	73,597	73,597	73,597	73,597	73,597	73,597	73,597
Hot Water	HW Pipe Insulation	15.0	31,487	1.00	78,513			5,234	5,234	5,234	5,234	5,234	5,234	5,234	5,234	5,234
Hot Water	Low Flow Faucet Aerator - Bathroom	10.0	55,247	1.00	16,425			1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642
Hot Water	Low Flow Faucet Aerator - Kitchen	10.0	237	1.00	20,248			2,025	2,025	2,025	2,025	2,025	2,025	2,025	2,025	2,025
Hot Water	Low Flow Showerhead	10.0	17,253	1.00	347,074			34,707	34,707	34,707	34,707	34,707	34,707	34,707	34,707	34,707
Lighting	LED Specialty Lamp - Exterior	6.9	15,247	1.00	105,205			15,247	15,247	15,247	15,247	15,247	15,247	13,722		
Lighting	LED Specialty Lamp - Interior	10.0	210,190	1.00	1,837,217			210,190	210,190	210,190	210,190	210,190	210,190	210,190	121,962	121,962
Lighting	LED Omnidirectional Bulb - Exterior	8.0	7,143	1.00	54,072			7,143	7,143	7,143	7,143	7,143	7,143	7,143	4,071	
Lighting	LED Omnidirectional Bulb - Interior	10.0	284,956	1.00	2,481,384			284,956	284,956	284,956	284,956	284,956	284,956	284,956	162,230	162,230
Shell	Air Sealing	20.0	3,425,421	1.00	65,253,691			3,425,421	3,425,421	3,425,421	3,425,421	3,425,421	3,425,421	3,425,421	3,425,421	3,425,421
Shell	Floor Insulation	20.0	2,272,647	1.00	840,047			43,956	43,956	43,956	43,956	43,956	43,956	43,956	43,956	43,956
Shell	Wall Insulation	20.0	297,795	1.00	52,312,414			2,738,515	2,738,515	2,738,515	2,738,515	2,738,515	2,738,515	2,738,515	2,738,515	2,738,515
Shell	Attic Insulation	20.0	307,161	1.00	48,906,727			2,558,124	2,558,124	2,558,124	2,558,124	2,558,124	2,558,124	2,558,124	2,558,124	2,558,124
Shell	Rim Insulation	20.0	2,482,223	1.00	368,334			19,231	19,231	19,231	19,231	19,231	19,231	19,231	19,231	19,231
CY2020 Program Total Contribution to CPAS			9,491,636		174,275,844			9,491,636	9,491,636	9,491,636	9,491,636	9,491,636	9,491,636	9,490,111	9,233,070	9,214,013
Historic Program Total Contribution to CPAS‡						8,838,818	17,960,380	17,947,559	17,527,907	17,527,907	17,414,131	17,130,956	17,068,864	17,008,737	16,943,583	16,249,667
Program Total CPAS						8,838,818	17,960,380	27,439,194	27,019,543	27,019,543	26,905,767	26,622,592	26,560,500	26,498,848	26,176,653	25,463,680
CY2020 Program Incremental Expiring Savings§									-	-	-	-	-	1,525	257,041	19,057
Historic Program Incremental Expiring Savings‡§								12,822	419,652	-	113,776	283,175	62,092	60,128	65,153	693,916
Program Total Incremental Expiring Savings§								12,822	419,652	-	113,776	283,175	62,092	61,653	322,194	712,973

End Use Type	Research Category	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Consumer Electronics	Advanced Power Strip - Tier 1															
HVAC	Bathroom Exhaust Fan	27,368	27,368	27,368	27,368	27,368	27,368	27,368	27,368	27,368	27,368					
HVAC	Programmable Thermostat															
HVAC	Advanced Thermostat	73,597	73,597													
Hot Water	HW Pipe Insulation	5,234	5,234	5,234	5,234	5,234	5,234									
Hot Water	Low Flow Faucet Aerator - Bathroom	1,642														
Hot Water	Low Flow Faucet Aerator - Kitchen	2,025														
Hot Water	Low Flow Showerhead	34,707														
Lighting	LED Specialty Lamp - Exterior															
Lighting	LED Specialty Lamp - Interior	121,962														
Lighting	LED Omnidirectional Bulb - Exterior															
Lighting	LED Omnidirectional Bulb - Interior	162,230														
Shell	Air Sealing	3,425,421	3,106,245	3,106,245	3,106,245	3,097,249	3,097,249	3,097,249	3,097,249	3,097,249	3,097,249	3,097,249				
Shell	Floor Insulation	43,956	40,077	40,077	40,077	40,036	40,036	40,036	40,036	40,036	40,036	40,036				
Shell	Wall Insulation	2,738,515	2,497,380	2,497,380	2,497,380	2,490,732	2,490,732	2,490,732	2,490,732	2,490,732	2,490,732	2,490,732				
Shell	Attic Insulation	2,558,124	2,337,596	2,337,596	2,337,596	2,330,386	2,330,386	2,330,386	2,330,386	2,330,386	2,330,386	2,330,386				
Shell	Rim Insulation	19,231	17,652	17,652	17,652	17,582	17,582	17,582	17,582	17,582	17,582	17,582				
CY2020 Program Total Contribution to CPAS		9,214,013	8,105,149	8,031,552	8,031,552	8,008,587	8,008,587	8,003,352	8,003,352	8,003,352	8,003,352	7,975,985	-	-	-	-
Historic Program Total Contribution to CPAS‡		15,018,309	14,625,563	14,625,563	14,765,093	11,284,514	11,272,586	11,272,586	11,272,586	11,134,579	11,089,951	4,148,280	4,148,280	4,148,280	4,148,280	-
Program Total CPAS		24,232,322	22,730,712	22,657,115	22,796,645	19,293,100	19,281,173	19,275,939	19,275,939	19,137,931	19,093,304	12,124,265	4,148,280	4,148,280	4,148,280	-
CY2020 Program Incremental Expiring Savings§		-	1,108,864	73,597	-	22,966	-	5,234	-	-	-	27,368	7,975,985	-	-	-
Historic Program Incremental Expiring Savings‡§		1,231,357	392,747	-	(139,531)	3,480,579	11,928	-	-	138,007	44,627	6,941,671	-	-	-	4,148,280
Program Total Incremental Expiring Savings§		1,231,357	1,501,610	73,597	(139,531)	3,503,545	11,928	5,234	-	138,007	44,627	6,969,039	7,975,985	-	-	4,148,280

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 no contribution to calculating CPAS in CY2020.

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

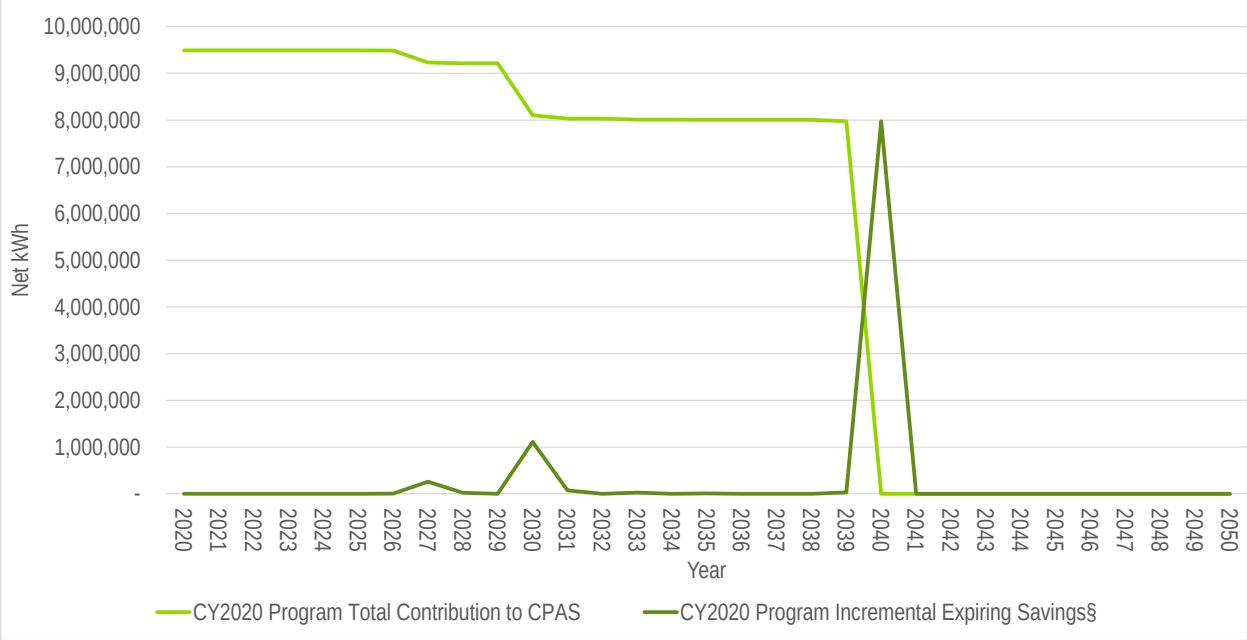
† Lifetime savings are the sum of CPAS savings through the EUL.

‡ Historic savings go back to CY2018.

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

Source: Evaluation team analysis

Figure 2-2. SFR-CBA Cumulative Persisting Annual Savings



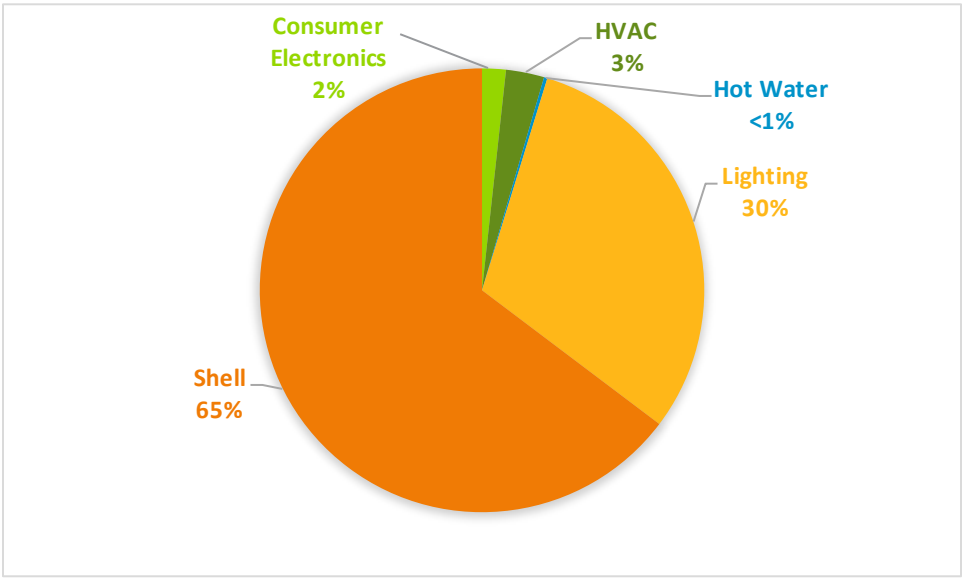
*Expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n

Source: Evaluation team analysis

2.4 Program Savings by Measure

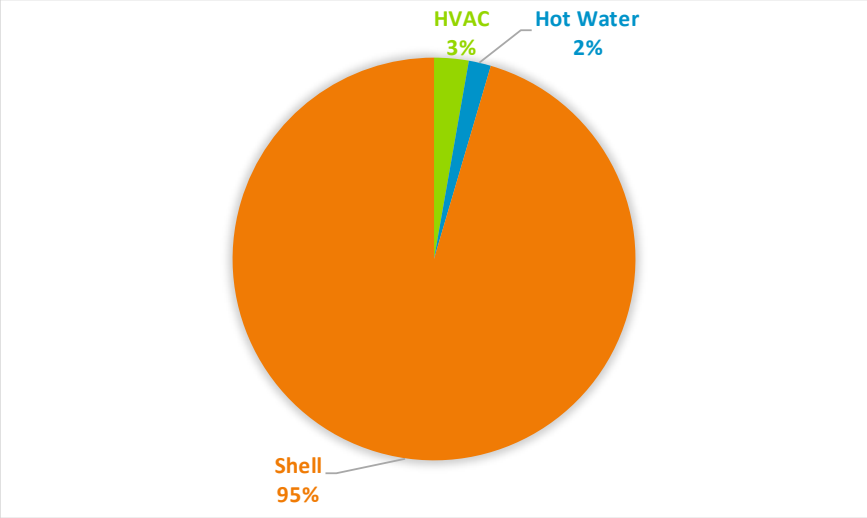
The SFR-CBA program component includes 17 measures shown in the following tables. These 17 measures are distributed across five end use categories. The shell and lighting measures contributed the most savings, respectively (see Figure 2-3 and Figure 2-4).

Figure 2-3. SFR-CBA ComEd Verified Net Savings by End Use



Source: ComEd tracking data and evaluation team analysis

Figure 2-4. SFR-CBA Peoples Gas Verified Net Therm Savings by End Use



Source: Peoples Gas tracking data and evaluation team analysis

Table 2-7. SFR-CBA CY2020 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)	EUL (years)
Consumer Electronics	Advanced Power Strip - Tier 1	29,293	1.00	29,293	1.00	29,293	7.0
HVAC	Bathroom Exhaust Fan	27,367	1.00	27,368	1.00	27,368	19.0
HVAC	Programmable Thermostat	3,963	0.32	1,261	1.00	1,261	8.0
HVAC	Advanced Thermostat	22,457	0.82	18,454	NA†	18,454	11.0
Hot Water	HW Pipe Insulation	309	1.00	308	1.00	308	15.0
Hot Water	Low Flow Faucet Aerator - Bathroom	0	NA	105	1.00	105	10.0
Hot Water	Low Flow Faucet Aerator - Kitchen	65	3.66	237	1.00	237	10.0
Hot Water	Low Flow Showerhead	821	4.30	3,528	1.00	3,528	10.0
Lighting	LED Specialty Lamp - Exterior	18,580	0.82	15,247	1.00	15,247	6.9
Lighting	LED Specialty Lamp - Interior	208,258	1.01	210,190	1.00	210,190	10.0
Lighting	LED Omnidirectional Bulb - Exterior	7,241	0.99	7,143	1.00	7,143	8.0
Lighting	LED Omnidirectional Bulb - Interior	282,716	1.01	284,956	1.00	284,956	10.0
Shell	Air Sealing	542,581	1.00	544,232	1.00	544,232	20.0
Shell	Floor Insulation	4,050	0.95	3,827	1.00	3,827	20.0
Shell	Wall Insulation	366,880	0.70	257,666	1.00	257,666	20.0
Shell	Attic Insulation	345,348	0.84	289,304	1.00	289,304	20.0
Shell	Rim Insulation	1,807	0.76	1,374	1.00	1,374	20.0
	Total	1,861,736	0.91	1,694,493		1,694,493	

Note: The savings in this table include secondary electric energy (kWh) savings from water supply and wastewater treatment plants for measures claimed by ComEd. The savings account for electric heating penalties, where applicable.
NA = Not applicable
*A deemed value. Source found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The TRM v8.0 algorithm calculates net savings for advanced thermostats.

Source: ComEd tracking data and evaluation team analysis

Table 2-8. SFR-CBA CY2020 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)
Consumer Electronics	Advanced Power Strip - Tier 1	3.29	1.00	3.29	1.00	3.29
HVAC	Bathroom Exhaust Fan	3.39	1.00	3.39	1.00	3.39
HVAC	Programmable Thermostat	0.00	NA	0.00	1.00	0.00
HVAC	Advanced Thermostat	6.85	0.81	5.58	NA†	5.58
Hot Water	HW Pipe Insulation	0.00	NA	0.04	1.00	0.04
Hot Water	Low Flow Faucet Aerator - Bathroom	0.00	NA	0.00	1.00	0.00
Hot Water	Low Flow Faucet Aerator - Kitchen	0.01	1.00	0.01	1.00	0.01
Hot Water	Low Flow Showerhead	0.09	1.00	0.09	1.00	0.09
Lighting	LED Specialty Lamp - Exterior	2.05	0.82	1.68	1.00	1.68
Lighting	LED Specialty Lamp - Interior	31.45	1.00	31.44	1.00	31.44
Lighting	LED Omnidirectional Bulb - Exterior	0.80	0.99	0.79	1.00	0.79
Lighting	LED Omnidirectional Bulb - Interior	35.13	1.00	35.14	1.00	35.14
Shell	Air Sealing	279.19	1.09	303.86	1.00	303.86
Shell	Floor Insulation	1.03	1.14	1.17	1.00	1.17
Shell	Wall Insulation	162.81	0.67	109.07	1.00	109.07
Shell	Attic Insulation	132.78	0.95	126.72	1.00	126.72
Shell	Rim Insulation	0.84	0.69	0.58	1.00	0.58
	Total	659.70	0.94	622.84		622.84

NA = Not applicable
*A deemed value. Source found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The TRM v8.0 algorithm calculates net savings for advanced thermostats.

Source: ComEd tracking data and evaluation team analysis

Table 2-9. SFR-CBA CY2020 Energy Savings by Measure – Gas – ComEd

End Use Type	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG*	Verified Net Savings (Therms)	EUL (years)
Consumer Electronics	Advanced Power Strip - Tier 1	0	NA	0	1.00	0	7.0
HVAC	Bathroom Exhaust Fan	0	NA	0	1.00	0	19.0
HVAC	Programmable Thermostat	466	1.00	468	1.00	468	8.0
HVAC	Advanced Thermostat	1,881	1.00	1,881	NA†	1,881	11.0
Hot Water	HW Pipe Insulation	118	1.42	168	1.00	168	15.0
Hot Water	Low Flow Faucet Aerator - Bathroom	52	1.00	52	1.00	52	10.0
Hot Water	Low Flow Faucet Aerator - Kitchen	61	1.00	61	1.00	61	10.0
Hot Water	Low Flow Showerhead	1,064	1.00	1,064	1.00	1,064	10.0
Lighting	LED Specialty Lamp - Exterior	0	NA	0	1.00	0	6.9
Lighting	LED Specialty Lamp - Interior	0	NA	0	1.00	0	10.0
Lighting	LED Omnidirectional Bulb - Exterior	0	NA	0	1.00	0	8.0
Lighting	LED Omnidirectional Bulb - Interior	0	NA	0	1.00	0	10.0
Shell	Air Sealing	96,977	1.01	98,301	1.00	98,301	20.0
Shell	Floor Insulation	1,332	1.03	1,369	1.00	1,369	20.0
Shell	Wall Insulation	83,750	1.01	84,642	1.00	84,642	20.0
Shell	Attic Insulation	76,856	1.01	77,408	1.00	77,408	20.0
Shell	Rim Insulation	566	1.08	609	1.00	609	20.0
	Total Therms	263,124	1.01	266,023		266,023	
	Total kWh Converted from Therms‡	7,712,156	1.01	7,797,142		7,797,142	

NA = Not applicable
*A deemed value. Source found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The TRM algorithm calculates net savings for advanced thermostats.
‡ Gas savings converted to kWh by multiplying therms by 29.31 (which is based on 100,000 Btu/therm and 3,412 Btu/kWh).

Source: ComEd tracking data and evaluation team analysis

Table 2-10. SFR-CBA CY2020 Energy Savings by Measure – Total Combining Electricity and Gas – ComEd

End Use Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)
Consumer Electronics	Advanced Power Strip - Tier 1	29,293	1.00	29,293	1.00	29,293
HVAC	Bathroom Exhaust Fan	27,367	1.00	27,368	1.00	27,368
HVAC	Programmable Thermostat	17,623	0.85	14,986	1.00	14,986
HVAC	Advanced Thermostat	77,600	0.95	73,597	NA†	73,597
Hot Water	HW Pipe Insulation	3,771	1.39	5,234	1.00	5,234
Hot Water	Low Flow Faucet Aerator - Bathroom	1,537	1.07	1,642	1.00	1,642
Hot Water	Low Flow Faucet Aerator - Kitchen	1,852	1.09	2,025	1.00	2,025
Hot Water	Low Flow Showerhead	32,002	1.08	34,707	1.00	34,707
Lighting	LED Specialty Lamp - Exterior	18,580	0.82	15,247	1.00	15,247
Lighting	LED Specialty Lamp - Interior	208,258	1.01	210,190	1.00	210,190
Lighting	LED Omnidirectional Bulb - Exterior	7,241	0.99	7,143	1.00	7,143
Lighting	LED Omnidirectional Bulb - Interior	282,716	1.01	284,956	1.00	284,956
Shell	Air Sealing	3,384,979	1.01	3,425,421	1.00	3,425,421
Shell	Floor Insulation	43,096	1.02	43,956	1.00	43,956
Shell	Wall Insulation	2,821,583	0.97	2,738,515	1.00	2,738,515
Shell	Attic Insulation	2,597,986	0.98	2,558,124	1.00	2,558,124
Shell	Rim Insulation	18,407	1.04	19,231	1.00	19,231
	Total‡	9,573,892	0.99	9,491,636		9,491,636

*A deemed value. Source found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The TRM algorithm calculates net savings for advanced thermostats.
‡ The total includes the electric equivalent of the total therms.
Source: ComEd tracking data and evaluation team analysis

The SFR-CBA program component includes measures that save water. That reduction in water produces secondary kWh savings from water supply and wastewater treatment. Table 2-11 shows the secondary measure-level savings. The savings in this table are included in the electricity savings shown in the previous tables in this section.

Table 2-11. SFR-CBA Secondary Energy Savings from Water Reduction by Measure – Electric – ComEd

End Use Type	Research Category	Ex Ante Annual Water Savings (gallons)	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate (RR_{water})	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)
Consumer Electronics	Advanced Power Strip - Tier 1	0	0	NA	0	1.00	0
HVAC	Bathroom Exhaust Fan - Bathroom	0	0	NA	0	1.00	0
HVAC	Programmable Thermostat	0	0	NA	0	1.00	0
HVAC	Advanced Thermostat	0	0	NA	0	NA†	0
Hot Water	HW Pipe Insulation	0	0	NA	0	1.00	0
Hot Water	Low Flow Faucet Aerator - Bathroom	34,816	104	1.00	105	1.00	105
Hot Water	Low Flow Faucet Aerator - Kitchen	58,116	172	1.00	172	1.00	172
Hot Water	Low Flow Showerhead	914,355	2,707	1.00	2,707	1.00	2,707
Lighting	LED Specialty Lamp - Exterior	0	0	NA	0	1.00	0
Lighting	LED Specialty Lamp - Interior	0	0	NA	0	1.00	0
Lighting	LED Omnidirectional Bulb - Exterior	0	0	NA	0	1.00	0
Lighting	LED Omnidirectional Bulb - Interior	0	0	NA	0	1.00	0
Shell	Air Sealing	0	0	NA	0	1.00	0
Shell	Floor Insulation	0	0	NA	0	1.00	0
Shell	Wall Insulation	0	0	NA	0	1.00	0
Shell	Attic Insulation	0	0	NA	0	1.00	0
Shell	Rim Insulation	0	0	NA	0	1.00	0
	Total	1,007,287	2,984	1.00	2,984		2,984

Note: The savings in this table reflect only secondary electric energy (kWh) savings from water supply and wastewater treatment plants for measures claimed by ComEd, not those claimed by gas utilities.
NA = Not applicable
*A deemed value. Source found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The TRM algorithm calculates net savings for advanced thermostats.

Source: ComEd tracking data and evaluation team analysis

Table 2-12. SFR-CBA CY2020 Natural Gas Energy Savings by Measure – Peoples Gas

End Use Type	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG*	Verified Net Savings (Therms)
HVAC	Programmable Thermostat	1,550	1.00	1,550	1.00	1,550
HVAC	Advanced Thermostat	5,017	1.00	5,017	NA†	5,017
Hot Water	HW Pipe Insulation	339	1.39	470	1.00	470
Hot Water	Low Flow Faucet Aerator - Bathroom	66	1.00	66	1.00	66
Hot Water	Low Flow Faucet Aerator - Kitchen	177	1.00	177	1.00	177
Hot Water	Low Flow Showerhead	3,499	1.00	3,499	1.00	3,499
Shell	Air Sealing	86,492	1.01	87,359	1.00	87,359
Shell	Floor Insulation	1,554	1.00	1,558	1.00	1,558
Shell	Wall Insulation	69,851	1.00	69,854	1.00	69,854
Shell	Attic Insulation	66,682	1.01	67,077	1.00	67,077
Shell	Rim Insulation	213	1.08	230	1.00	230
	Total‡	235,441	1.01	236,857		236,857

NA = Not applicable
*A deemed value. Source found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The TRM algorithm calculates net savings for advanced thermostats.
‡ The total excludes the electric interactive effects on the total therms.

Source: Peoples Gas tracking data and evaluation team analysis

2.5 Impact Analysis Findings and Recommendations

2.5.1 Impact Parameter Estimates

The evaluation team calculated verified gross energy and demand savings using the algorithms in the Illinois Technical Reference Manual (TRM) v8.0 and TRM v8.0 Errata where applicable. Table 2-13 presents the input parameter sources that the team used for each measure. The TRM v8.0 allows for custom or actual values to be used for some of the input parameters. When available, Guidehouse based the custom or actual values on the program tracking database.

The lifetime energy and demand savings are estimated by multiplying the verified savings by the EUL for each measure. The evaluation team calculated verified net energy and demand (coincident peak and overall) savings by multiplying the verified gross savings estimates by a net-to-gross (NTG) ratio set by the SAG consensus process.

Table 2-13. SFR-CBA Savings Parameters

Gross Savings Input Parameters	Value	Units	Deemed or Evaluated?	Source*
Quantity	Varies	No. of measures	Evaluated	ComEd Tracking Data and Guidehouse Evaluation
NTG	Varies		Deemed	Illinois SAG Consensus
Advanced Power Strip - Tier 1	71	Each	Deemed	TRM v8.0 – Section 5.2.01
Bathroom Exhaust Fan	30	Each	Deemed	TRM v8.0 – Section 5.3.09
Programmable Thermostat	Varies	Each	Deemed	TRM v8.0 – Section 5.3.11
Advanced Thermostat	Varies	Each	Deemed	TRM v8.0 – Section 5.3.16
HW Pipe Insulation	Varies	Linear Feet	Deemed	TRM v8.0 – Section 5.4.01
Low Flow Faucet Aerator - Kitchen	Varies	Each	Deemed	TRM v8.0 – Section 5.4.04
Low Flow Faucet Aerator - Bathroom	Varies	Each	Deemed	TRM v8.0 – Section 5.4.04
Low Flow Showerhead	Varies	Each	Deemed	TRM v8.0 – Section 5.4.05
LED Specialty Lamp	Varies	Each	Deemed	TRM v8.0 Errata – Section 5.5.06
LED Omnidirectional Bulb	Varies	Each	Deemed	TRM v8.0 Errata – Section 5.5.08
Air Sealing	Varies	Projects	Deemed	TRM v8.0 – Section 5.6.01
Floor Insulation	Varies	Square Feet	Deemed	TRM v8.0 – Section 5.6.03
Wall Insulation	Varies	Square Feet	Deemed	TRM v8.0 – Section 5.6.04
Attic Insulation	Varies	Square Feet	Deemed	TRM v8.0 – Section 5.6.05
Rim Insulation	Varies	Square Feet	Deemed	TRM v8.0 – Section 5.6.06

*TRM is the Illinois Statewide Technical Reference Manual version 8.0 from http://www.ilsag.info/technical-reference-manual.html. The NTG values can be found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

Sources: ComEd and Peoples Gas tracking data and evaluation team analysis

2.5.2 ComEd Findings and Recommendations

Overall, the evaluation team determined that the implementer accurately calculated the energy savings for the SFR-CBA program component's measures. With that in mind, the evaluation

team developed several recommendations based on findings from the CY2020 evaluation listed below. These recommendations suggest ways to improve the measure-level realization rates. Table 2-14 presents the measure-level realization rates and program savings percentages to give context to the team's recommendations. Air Sealing represents 36% of ComEd SFR-CBA savings and has a realization rate of 1.01 (Table 2-14). Wall Insulation and Attic Insulation represent 29% and 27% of savings, respectively and have realization rates of 0.97 and 0.98, respectively.

Table 2-14. SFR-CBA Measure-Level Savings and Realization Rates – ComEd

Research Category	Realization Rate	Percentage of Verified Net Savings
Air Sealing	1.01	36%
Wall Insulation	0.97	29%
Attic Insulation	0.98	27%
LED Omnidirectional Bulb – Interior	1.01	3%
LED Specialty Lamp - Interior	1.01	2%
Advanced Power Strip – Tier 1	1.00	<1%
Advanced Thermostat	0.95	<1%
Bathroom Exhaust Fan	1.00	<1%
LED Specialty Lamp - Exterior	0.82	<1%
LED Omnidirectional Bulb - Exterior	0.99	<1%
Floor Insulation	1.02	<1%
Low Flow Showerhead	1.08	<1%
Rim Insulation	1.04	<1%
Programmable Thermostat	0.85	<1%
HW Pipe Insulation	1.39	<1%
Low Flow Faucet Aerator – Kitchen	1.09	<1%

Source: ComEd tracking data and evaluation team analysis

2.5.2.1 Air Sealing

Finding 1. The evaluation team found several differences between the implementer's MMDB calculator and/or the tracking data versus Guidehouse's savings algorithms. In CY2018 and CY2019 discussions, the implementer stated that its tracking system is incapable of calculating savings on a project-by-project basis, so an average value is used across all projects. This issue is the cause of these actions taken by the implementer:

- Assumed 80.6% of homes have central air conditioning and 86.1% of homes have gas furnaces instead of using collected data on a project's cooling or heating system type to calculate savings.

- Assumed ηCool is 10.3 and ηHeat is 0.72 for all projects instead of using collected data on each project, where available.

Recommendation 1. We understand that the implementer's tracking system cannot remedy all the listed findings. With this in mind, the evaluation team recommends that the implementer reconsider using a default value for ηHeat = 0.72 and use an average AFUE from CY2020 project data multiplied by the distribution system efficiency if the heating unit is a furnace, per the TRM v8. The distribution system efficiency derates furnace efficiencies by a default 15%. The average AFUE for the existing heating system for air sealing projects in the first half of 2020 without deration was 0.82.

2.5.2.2 Insulation

Finding 2. The evaluation team found several differences between the implementer's Master Measurement Database (MMDB) calculator and the team's savings algorithms for all insulation measures. In CY2018 and CY2019 discussions, the implementer stated that its tracking system is incapable of calculating savings on a project-by-project basis, so an average value is used across all projects. This issue is the cause of these actions taken by the implementer:

- Assumed 80.7%, 69.4%, 96%, and 98% of homes have central air conditioning for all attic, floor/crawlspace, wall, and rim insulation projects, respectively, instead of using collected data on a project's cooling system type.
- Assumed 91.7%, 87%, 94.6%, and 93.9% of homes have gas furnaces for all attic, floor/crawlspace, wall, and rim insulation projects, respectively, instead of using collected data on a project's heating system type.
- Assumed ηCool is 10.7, 10.5, 10.77, and 9.4 for all attic, floor/crawlspace, wall, and rim insulation projects, respectively, instead of using collected data on a project's cooling system efficiency.
- Assumed ηHeat is 0.72 for attic, floor/crawlspace, wall insulation, and rim insulation measures instead of using collected data on each project, where available.

Recommendation 2. Guidehouse understands the implementer's tracking system cannot remedy all of the listed findings. With this in mind, the evaluation team recommends that the implementer:

- Reconsider using the 0.72 default value for ηHeat and use Annual Fuel Utilization Efficiency (AFUE) from this year's project data multiplied by the distribution system efficiency if the heating unit is a furnace, per the TRM v8.0. The distribution system efficiency de-rates furnace efficiencies by a default of 15%.

2.5.2.3 Lighting

Finding 3. The realization rate for lighting varies from 0.82 to 1.01. The implementer used an energy waste heat factor (WHFe) of 1.05 for lighting installed in interior spaces, which is an average of the single family WHFe of 1.06 and the multifamily WHFe of 1.04. The evaluation team used 1.06 for the WHFe for interior lighting because all lights were installed in single family homes.

Recommendation 3. The evaluation team recommends that the implementer determine the WHFe value based on lighting installation location and single family and multifamily household type.

2.5.2.4 Advanced Thermostat

Finding 4. The electric energy realization rate for advanced thermostats is 0.82. The evaluation team conjectures that the implementer used the TRM v8.0 default values of 9.3 for the existing cooling system seasonal energy efficiency ratio (SEER), 33,600 Btu/h for the cooling capacity, and 560.89 for the full-load cooling hours (FLHcool). However, the TRM recommends using collected, actual data when available to more accurately estimate savings for each project. The evaluation team used collected data when available and the above defaults when unavailable to calculate verified savings.

Recommendation 4. The evaluation team recommends that the implementer use collected data for the SEER, cooling capacity, and FLHcool values that reflect the existing cooling system and climate zone of each project and only use the default values when collected data is unavailable.

2.5.2.5 Programmable Thermostat

Finding 5. The kWh realization rate is 0.85 for programmable thermostats because of the savings shown in Record Locator ID a0P0y00000VypQAEAZ. The evaluation team was not able to reconcile how the implementer calculated savings of 92.2 therms. To derive how the kWh savings were calculated, the evaluation team divided the energy savings by the therm savings and found that the implementer multiplied the claimed therms savings of 92.2 by a conversion factor of 29.3 to produce 2,701.6 kWh. This method results in double counting savings and does not follow the deemed TRM method for calculating energy savings for this measure. The evaluation team followed the formula outlined in the TRM v.8 with the values shown in the table below to verify therms savings. According to the TRM v.8, the resulting therms need to be multiplied by the Furnace Fan energy consumption (Fe) to determine total energy savings.

Table 2-15. SFR – CBA Programmable Thermostat Coefficients Used

Record Locator ID	Gas_Heating_Consumption	Heating Reduction	%FossilHeat	HF	Eff_ISR
a0P0y00000VypQAEAZ	1,005	0.062	1	1	1

Source: ComEd tracking data and evaluation team analysis

Recommendation 5. The evaluation team recommends that the implementer follow the outlined formula in the TRM v.8 and multiply the claimed therms by 29.3 and the Fe coefficient.

2.5.2.6 Hot Water Pipe Insulation

Finding 6. The gas realization rate for hot water pipe insulation is 1.42. For gas savings, the implementer calculated the savings by using the average of two nominal pipe diameter sizes: 0.5-inch and 0.75-inch. However, for electric savings, the implementer used the average of three nominal pipe diameter sizes: 0.5-inch, 0.75-inch, and 1-inch. Following the methodology for calculating electric savings, the evaluation team calculated gas and electric savings using the average of three nominal pipe diameter sizes: 0.5-inch, 0.75-inch, and 1-inch.

Recommendation 6. Guidehouse recommends the implementer use an average of three nominal pipe diameter sizes.

Water Efficiency

Finding 7. The realization rate is 1.09 for aerators and 1.08 for showerheads because the program did not account for secondary electric energy savings from water supply and wastewater treatment in the ex ante savings column of the tracking data. In its estimation of verified electric savings, the evaluation team included secondary electric savings from water supply for all measures regardless if installed in a home with an electric or gas domestic hot water heating system.

Recommendation 7. In CY2019, ComEd and Guidehouse agreed that water savings would be reported in gallons, and the evaluation team would convert water savings to kWh as a part of the evaluation work. It is the team's understanding that ComEd and the implementer will work together to incorporate necessary calculations and include secondary kWh savings from water in ex ante savings going forward.

2.5.3 Peoples Gas Findings and Recommendations

Overall, the evaluation team determined that the implementer accurately calculated the gas energy savings for the SFR-CBA program component's measures. With that in mind, the evaluation team developed two recommendations based on findings from the CY2020 evaluation listed below. These recommendations suggest ways to improve two measure-level realization rates. Table 2-16 presents the measure-level realization rates and program savings percentages to give context to the team's recommendations.

Table 2-16. SFR-CBA Measure-Level Savings and Realization Rates – Peoples Gas

Research Category	Realization Rate	Percentage of Verified Net Savings
Air Sealing	1.01	37%
Wall Insulation	1.01	32%
Attic Insulation	1.00	29%
Advanced Thermostat	1.00	<1%
Rim Insulation	1.08	<1%
Floor Insulation	1.00	<1%
Low Flow Showerhead	1.00	<1%
Programmable Thermostat	1.00	<1%
HW Pipe Insulation	1.39	<1%
Low Flow Faucet Aerator – Kitchen	1.00	<1%

Source: Peoples Gas tracking data and evaluation team analysis

2.5.3.1 Air Sealing

Finding 8. The evaluation team found several differences between the implementer's MMDB calculator and/or the tracking data versus Guidehouse's savings algorithms. Namely, the implementer:

- Assumed 80.6% of homes have central air conditioning and 86.1% of homes have gas furnaces instead of using collected data on a project's cooling or heating system type to calculate savings. In CY2018 and CY2019 discussions, the implementer stated that their

tracking system is incapable of calculating savings on a project by project basis, so an average value is used across all projects.

- Assumed ηCool is 10.3 and ηHeat is 0.72 for all projects instead of using collected data on each project, where available. In CY2018 and CY2019 discussions, the implementer stated that their tracking system is incapable of calculating savings on a project by project basis, so an average value is used across all projects.

Recommendation 8. We understand that the implementer's tracking system cannot remedy all the listed findings. With this in mind, the implementer should reconsider using a default value for ηHeat = 0.72 and use an average AFUE from CY2020 project data multiplied by the distribution system efficiency if the heating unit is a furnace, per the TRM v8. The distribution system efficiency derates furnace efficiencies by a default 15%. The average AFUE for the existing heating system for air sealing projects in the first half of 2020 without deration was 0.82.

2.5.3.2 Insulation

Finding 9. The evaluation team found several differences between the implementer's MMDB calculator and the team's savings algorithms for all insulation measures. In CY2018 and CY2019 discussions, the implementer stated that its tracking system is incapable of calculating savings on a project-by-project basis, so an average value is used across all projects. This issue is the cause of these actions taken by the implementer:

- Assumed 91.7%, 87%, 94.6%, and 93.9% of homes have gas furnaces for all attic, floor/crawlspace, wall, and rim insulation projects, respectively, instead of using collected data on a project's heating system type.
- Assumed ηHeat is 0.72 for attic, floor/crawlspace, and wall insulation measures but 0.77 for rim insulation measures instead of using collected data on each project, where available.

Recommendation 9. Guidehouse understands the implementer's tracking system cannot remedy all of the listed findings. With this in mind, the evaluation team recommends that the implementer:

- Update the default ηHeat value for rim insulation measures to match the ηHeat values of the other insulation measures for consistency.
- Reconsider using the 0.72 default value for ηHeat and use an average AFUE from this year's project data multiplied by the distribution system efficiency if the heating unit is a furnace, per the TRM v8.0. The distribution system efficiency de-rates furnace efficiencies by a default of 15%. The average AFUE for the existing heating system for air sealing projects in the first half of 2020 without de-rating was 0.82 (therefore, ηHeat would equal 0.82 * 0.85 which is 0.697).

2.5.3.3 Hot Water Pipe Insulation

Finding 10. The gas realization rate for hot water pipe insulation is 1.39. For gas savings, the implementer calculated the savings by using the average of two nominal pipe diameter sizes: 0.5-inch and 0.75-inch. However, for electric savings, the implementer used the average of three nominal pipe diameter sizes: 0.5-inch, 0.75-inch, and 1-inch. Following the methodology for calculating electric savings, the evaluation team calculated gas and electric savings using the average of three nominal pipe diameter sizes: 0.5-inch, 0.75-inch, and 1-inch.

Recommendation 10. The evaluation team recommends the implementer use an average of three nominal pipe diameter sizes.

2.6 Total Cost Resource Test

Table 2-17 and Table 2-18 show 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) is not included in this table and will be provided to the evaluation team later. and

Table 2-17. SFR-CBA Total Resource Cost Savings Summary – ComEd

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)
Consumer Electronics	Advanced Power Strip - Tier 1	Each	711	7.0	No	29,293	3.29	0	0	0	0	1.00	1.00	1.00	29,293	3.29	0	0	0	0
HVAC	Bathroom Exhaust Fan	Each	1,023	19.0	No	27,368	3.39	0	0	0	0	1.00	1.00	1.00	27,368	3.39	0	0	0	0
HVAC	Programmable Thermostat	Each	23	8.0	No	1,261	0.00	468	0	0	0	1.00	1.00	1.00	1,261	0.00	468	0	0	0
HVAC	Advanced Thermostat	Each	87	11.0	No	18,454	5.58	1,881	0	0	0	1.00	1.00	1.00	18,454	5.58	1,881	0	0	0
Hot Water	HW Pipe Insulation	Linear Feet	330	15.0	No	308	0.04	168	0	0	0	1.00	1.00	1.00	308	0.04	168	0	0	0
Hot Water	Low Flow Faucet Aerator - Bathroom	Each	136	10.0	No	0	0.00	52	105	0	0	1.00	1.00	1.00	0	0.00	52	105	0	0
Hot Water	Low Flow Faucet Aerator - Kitchen	Each	87	10.0	No	65	0.01	61	172	0	0	1.00	1.00	1.00	65	0.01	61	172	0	0
Hot Water	Low Flow Showerhead	Each	521	10.0	No	821	0.09	1,064	2,707	0	0	1.00	1.00	1.00	821	0.09	1,064	2,707	0	0
Lighting	LED Specialty Lamp - Exterior‡	Each	173	6.9	No	15,247	1.68	0	0	0	0	1.00	1.00	1.00	15,247	1.68	0	0	0	0
Lighting	LED Specialty Lamp - Interior‡ †§	Each	6,897	10.0	No	210,190	31.44	0	0	-51	-4,732	1.00	1.00	1.00	210,190	31.44	0	0	-51	-4,732
Lighting	LED Omnidirectional Bulb - Exterior‡	Each	85	8.0	No	7,143	0.79	0	0	0	0	1.00	1.00	1.00	7,143	0.79	0	0	0	0
Lighting	LED Omnidirectional Bulb - Interior‡ †§	Each	7,612	10.0	No	284,956	35.14	0	0	-453	-6,388	1.00	1.00	1.00	284,956	35.14	0	0	-453	-6,388
Shell	Air Sealing‡	Projects	2,658,966	20.0	No	544,232	303.86	98,301	0	0	0	1.00	1.00	1.00	544,232	303.86	98,301	0	0	0
Shell	Floor Insulation‡	Square Feet	22,440	20.0	No	3,827	1.17	1,369	0	0	0	1.00	1.00	1.00	3,827	1.17	1,369	0	0	0
Shell	Wall Insulation‡	Square Feet	1,155,910	20.0	No	257,666	109.07	84,642	0	0	0	1.00	1.00	1.00	257,666	109.07	84,642	0	0	0
Shell	Attic Insulation‡	Square Feet	977,688	20.0	No	289,304	126.72	77,408	0	0	0	1.00	1.00	1.00	289,304	126.72	77,408	0	0	0
Shell	Rim Insulation‡	Square Feet	5,411	20.0	No	1,374	0.58	609	0	0	0	1.00	1.00	1.00	1,374	0.58	609	0	0	0
	Total		4,838,100	16.5		1,691,510	622.84	266,023	2,984	-504	-11,121				1,691,510	622.84	266,023	2,984	-504	-11,121

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. Table 2-17. represents the kWh savings from Table 2-7 minus those shown in Table 2-11.

*The total of the EUL column is the weighted average measure life (WAML) and is calculated as the sum product of 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.

‡ The EUL for this measure varies over time. See Table 2-4 to Table 2-6.

†§ The kWh savings account for electric heating penalties, where applicable. The electric heating penalties columns show the magnitude of adjustments applied to the program savings. Gas heating penalties represent the program therms heating penalties. The therms penalties are not required to be applied to the program savings.

Source: ComEd tracking data and evaluation team analysis

Table 2-18. SFR-CBA Total Resource Cost Savings Summary – Peoples Gas

End Use Type	Research Category	Units	Quantity	EUL (years)*	ER Flag†	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	NTG	Verified Net Savings (Therms)
HVAC	Programmable Thermostat	Each	22	8.0	No	1,550	1,550	1.00	1,550
HVAC	Advanced Thermostat	Each	69	11.0	No	5,017	5,017	1.00	5,017
Hot Water	HW Pipe Insulation	Linear Feet	856	15.0	No	339	470	1.00	470
Hot Water	Low Flow Faucet Aerator - Bathroom	Each	76	10.0	No	66	66	1.00	66
Hot Water	Low Flow Faucet Aerator - Kitchen	Each	64	10.0	No	177	177	1.00	177
Hot Water	Low Flow Showerhead	Each	398	10.0	No	3,499	3,499	1.00	3,499
Shell	Air Sealing	Projects	1,253,501	20.0	No	86,492	87,359	1.00	87,359
Shell	Floor Insulation	Square Feet	12,113	20.0	No	1,554	1,558	1.00	1,558
Shell	Wall Insulation	Square Feet	561,470	20.0	No	69,851	69,854	1.00	69,854
Shell	Attic Insulation	Square Feet	443,615	20.0	No	66,682	67,077	1.00	67,077
Shell	Rim Insulation	Square Feet	1,478	20.0	No	213	230	1.00	230
	Total		2,273,662	19.6		235,441	236,857		236,857

*The total of the EUL column is the WAML and is calculated as the sum product of EUL and measure savings divided by total program savings.
† ER measures are flagged as YES; otherwise a NO is indicated in the column.
Source: Peoples Gas tracking data and evaluation team analysis

3. Single Family Retrofits – IHWAP

3.1 Volumetric Findings

The Single Family Retrofit - IHWAP (SFR-IHWAP) program component had 567 electric and 572 gas participants in CY2020. The participant count is based on the number of unique utility account numbers. There were 17,753 measures distributed across five electric end use categories that produced energy savings for ComEd as Table 3-1 and Figure 3-1 show. There were 7,193 measures distributed across three end use categories that produced energy savings for the gas utilities, as Table 3-1 and Figure 3-2 through Figure 3-4 show.

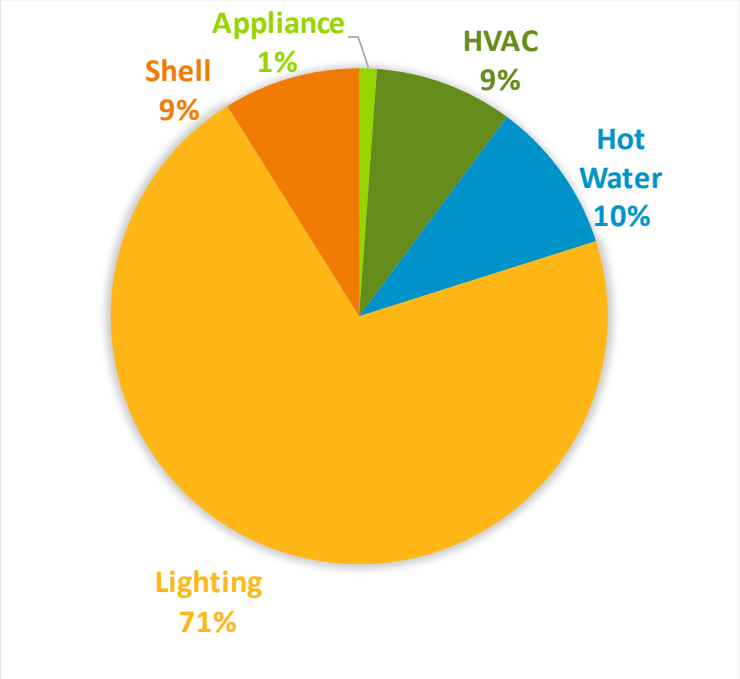
Table 3-1. SFR-IHWAP CY2020 Volumetric Findings Detail

Participation	ComEd Total	Nicor Gas Total	Peoples Gas Total	North Shore Gas Total
Participants*	567	431	117	24
Installed Projects†	582	431	120	24
Total Measures	17,753	4,975	1,910	308
Freezer	30			
Refrigerator – Early Replacement (ER)	116			
Refrigerator – Time of Sale (TOS)	1			
Room Air Conditioner (AC) – ER	56			
Air Source Heat Pump – ER	1			
Central Air Conditioning - ER	230			
Central Air Conditioning - TOS	65			
Duct Insulation and Sealing - Distribution Efficiency	32	18	13	1
Furnace Blower Motor	2			
Gas High Efficiency Boiler - ER	7	4	7	1
Gas High Efficiency Boiler - TOS	5	8	4	
Gas High Efficiency Furnace - ER	298	238	60	5
Gas High Efficiency Furnace - TOS	23	73	9	13
Bathroom Exhaust Fan	578			
Programmable Thermostat	119	112	16	3
Advanced Thermostat	235	164	52	19
HW Pipe Insulation (Linear Feet)	1,488	2,445	1,140	180
Gas Water Heater - ER	55	132	45	8
Gas Water Heater - TOS	4	10	2	1
Low Flow Faucet Aerator - Bathroom	115	379	66	25
Low Flow Faucet Aerator - Kitchen	46	71	36	3
Low Flow Showerhead	63	154	53	
LED Specialty Lamp - Exterior	198			
LED Specialty Lamp - Interior	521			
LED Omnidirectional Bulb - Exterior	177			

Participation	ComEd Total	Nicor Gas Total	Peoples Gas Total	North Shore Gas Total
LED Omnidirectional Bulb - Interior	11,708			
Air Sealing‡	543	412	118	24
Basement Sidewall Insulation‡	87	78	10	2
Floor Insulation‡	47	29	20	1
Wall Insulation‡	169	91	82	
Attic Insulation‡	529	378	154	15
Rim Insulation‡	205	179	23	7

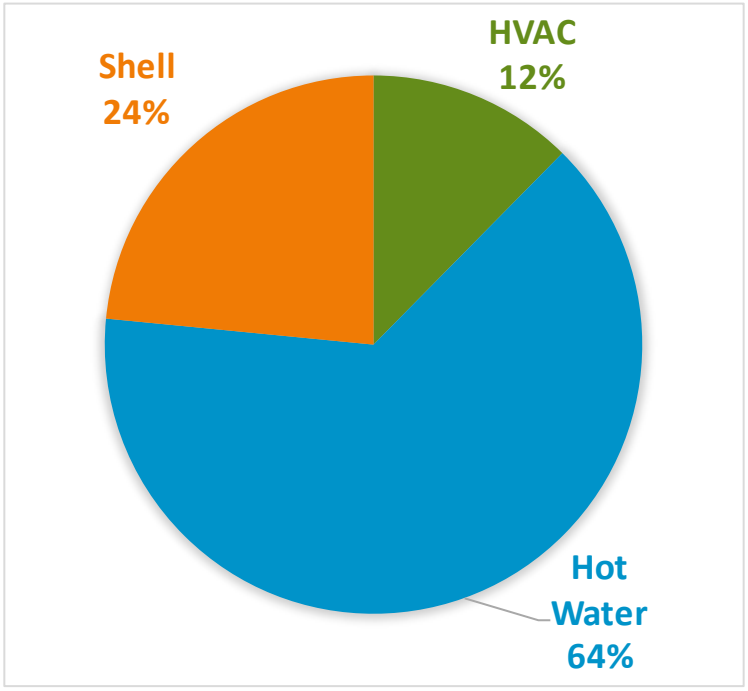
Note: Quantities and project counts in this table may overlap between the ComEd, Nicor Gas, Peoples Gas, and North Shore Gas tracking databases.
*Participants are defined as unique utility account numbers.
† Installed projects are defined as unique Project IDs within each utility's tracking database. Project IDs may overlap between the ComEd and gas utilities' tracking databases.
‡ Each project is counted as one measure quantity.
Source: ComEd, Nicor Gas, Peoples Gas, and North Shore Gas tracking data and evaluation team analysis

Figure 3-1. SFR-IHWAP Share of Measures Installed by End Use – ComEd



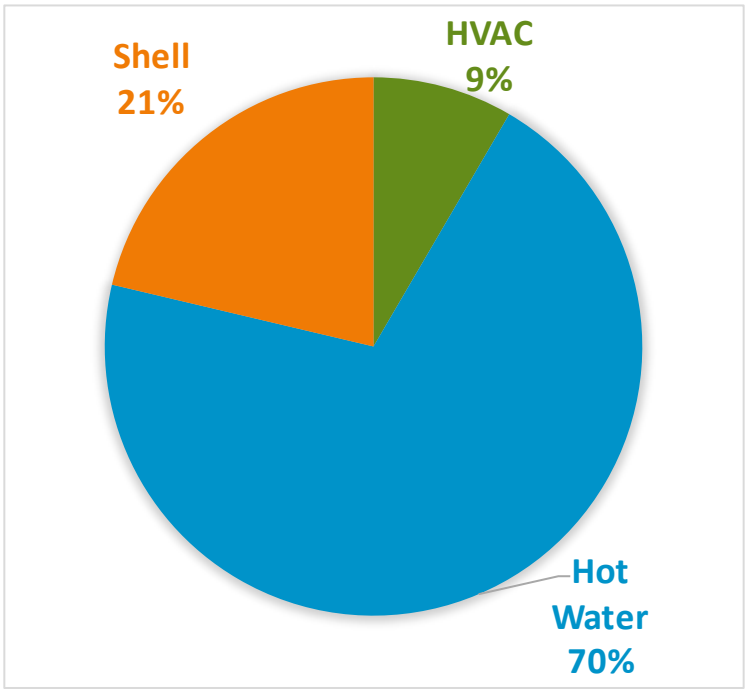
Source: ComEd tracking data and evaluation team analysis

Figure 3-2. SFR-IHWAP Share of Measures Installed by End Use – Nicor Gas



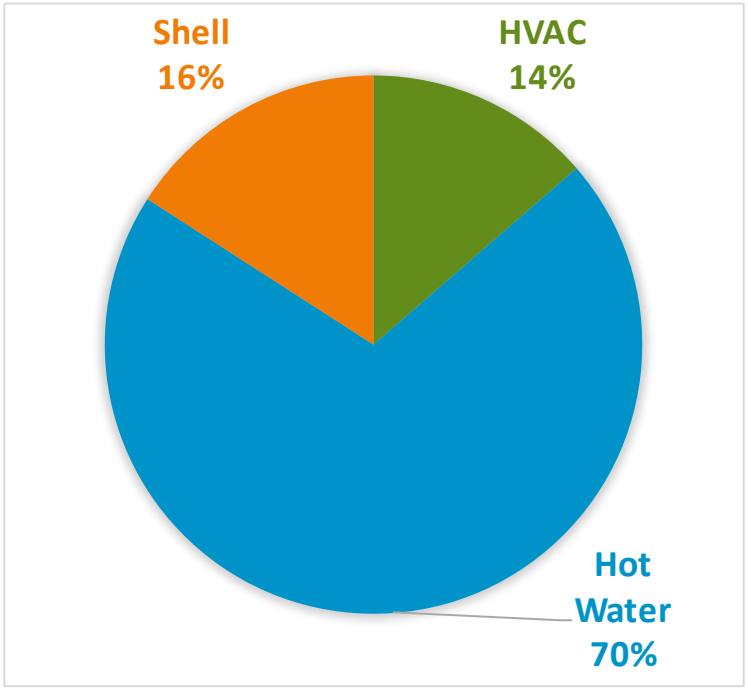
Source: Nicor Gas tracking data and evaluation team analysis

Figure 3-3. SFR-IHWAP Share of Measures Installed by End Use – Peoples Gas



Source: Peoples Gas tracking data and evaluation team analysis

Figure 3-4. SFR-IHWAP Share of Measures Installed by End Use – North Shore Gas



Source: North Shore Gas tracking data and evaluation team analysis

3.2 Program Savings Detail

Table 3-2 and Table 3-3 summarize the incremental energy and demand savings the SFR-IHWAP program component achieved in CY2020 for ComEd and the gas utilities, respectively. The gas savings in Table 3-2 are only those that ComEd may be able to claim, which excludes savings the gas utilities claim, either via joint or non-joint programs.

Table 3-2. SFR-IHWAP CY2020 Total Annual Incremental Electric Savings

Savings Category	Energy Savings (kWh)	Summer Peak* Demand Savings (kW)
Electricity		
Ex Ante Gross Savings	1,795,836	520
Program Gross Realization Rate	1.00	1.00
Verified Gross Savings	1,796,493	522
Program Net-to-Gross Ratio (NTG)	1.00	1.00
Verified Net Savings	1,796,493	522
Converted from Gas†		
Ex Ante Gross Savings	496,184	NA
Program Gross Realization Rate	1.00	NA
Verified Gross Savings	496,185	NA
Program Net-to-Gross Ratio (NTG)	1.00	NA
Verified Net Savings	496,185	NA
Total Electric Plus Gas		
Ex Ante Gross Savings	2,292,020	520
Program Gross Realization Rate	1.00	1.00
Verified Gross Savings	2,292,678	522
Program Net-to-Gross Ratio (NTG)	1.00	1.00
Verified Net Savings	2,292,678	522

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.

† Gas savings converted to kWh by multiplying therms by 29.31 (which is based on 100,000 Btu/therm and 3,412 Btu/kWh). The evaluation determines which gas savings are converted to kWh and counted toward ComEd's electric savings goal while producing the portfolio-wide summary report. According to Section 8-103B(b-25) of the Illinois Public Utilities Act, “In no event shall more than 10% of each year's applicable annual incremental goal as defined in paragraph (7) of subsection (g) of this Section be met through savings of fuels other than electricity.”

Source: ComEd tracking data and evaluation team analysis

Table 3-3. SFR-IHWAP CY2020 Total Annual Incremental Therm Savings

Savings Category	Nicor Gas (Therms)	Peoples Gas (Therms)	North Shore Gas (Therms)
Natural Gas*			
Ex Ante Gross Savings	192,763	63,148	8,682
Program Gross Realization Rate	1.00	1.00	1.00
Verified Gross Savings	192,755	63,149	8,682
Program Net-to-Gross Ratio (NTG)	1.00	1.00	1.00
Verified Net Savings	192,755	63,149	8,682

*Natural gas savings with electric interactive effects removed.

Source: ComEd, Nicor Gas, Peoples Gas, and North Shore Gas tracking data and evaluation team analysis.

3.3 Cumulative Persisting Annual Savings

Table 3-4 to Table 3-6 show the measure-specific and total verified gross savings for the SFR-IHWAP program component and the CPAS for the measures installed in CY2020. Figure 3-5 shows the savings across the useful life of the measures. The electric CPAS across all measures installed in 2020 is 1,796,943 kWh (Table 3-4). The CY2020 gas contribution to CPAS (converted to equivalent electricity) is 496,185 kWh (Table 3-5). Adding the gas and electric contributions produces 2,292,678 kWh of total CY2020 contribution to CPAS (Table 3-6). 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 3-4. SFR-IHWAP 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	2027	2028
Appliance	Freezer	22.0	1,096	1.00	24,108			1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096
Appliance	Refrigerator - ER	17.0	50,058	1.00	356,391			50,058	50,058	50,058	50,058	50,058	50,058	5,095	5,095	5,095
Appliance	Refrigerator - TOS	17.0	37	1.00	629			37	37	37	37	37	37	37	37	37
Appliance	Room AC - ER	12.0	4,607	1.00	23,059			4,607	4,607	4,607	4,607	579	579	579	579	579
HVAC	Air Source Heat Pump - ER	16.0	4,441	1.00	30,758			4,441	4,441	4,441	4,441	4,441	4,441	411	411	411
HVAC	Central Air Conditioning - ER	18.0	327,548	1.00	2,574,203			327,548	327,548	327,548	327,548	327,548	327,548	50,743	50,743	50,743
HVAC	Central Air Conditioning - TOS	18.0	15,337	1.00	276,061			15,337	15,337	15,337	15,337	15,337	15,337	15,337	15,337	15,337
HVAC	Duct Insulation and Sealing - Distribution Efficiency	20.0	15,315	1.00	278,287			15,315	15,315	15,315	15,315	15,315	15,315	15,315	15,315	15,315
HVAC	Furnace Blower Motor	6.0	975	1.00	5,850			975	975	975	975	975	975			
HVAC	Gas High Efficiency Boiler - ER	25.0	0	1.00	0											
HVAC	Gas High Efficiency Boiler - TOS	25.0	0	1.00	0											
HVAC	Gas High Efficiency Furnace - ER	20.0	151,226	1.00	3,024,517			151,226	151,226	151,226	151,226	151,226	151,226	151,226	151,226	151,226
HVAC	Gas High Efficiency Furnace - TOS	20.0	0	1.00	0											
HVAC	Bathroom Exhaust Fan	19.0	73,725	1.00	1,400,784			73,725	73,725	73,725	73,725	73,725	73,725	73,725	73,725	73,725
HVAC	Programmable Thermostat	8.0	9,653	1.00	77,224			9,653	9,653	9,653	9,653	9,653	9,653	9,653	9,653	
HVAC	Advanced Thermostat	11.0	43,653	1.00	480,183			43,653	43,653	43,653	43,653	43,653	43,653	43,653	43,653	43,653
Hot Water	HW Pipe Insulation	15.0	2,217	1.00	33,254			2,217	2,217	2,217	2,217	2,217	2,217	2,217	2,217	2,217
Hot Water	Gas Water Heater - ER	13.0	0	1.00	0											
Hot Water	Gas Water Heater - TOS	13.0	0	1.00	0											
Hot Water	Low Flow Faucet Aerator - Bathroom	10.0	578	1.00	5,780			578	578	578	578	578	578	578	578	578
Hot Water	Low Flow Faucet Aerator - Kitchen	10.0	1,210	1.00	12,105			1,210	1,210	1,210	1,210	1,210	1,210	1,210	1,210	1,210
Hot Water	Low Flow Showerhead	10.0	559	1.00	5,592			559	559	559	559	559	559	559	559	559
Lighting	LED Specialty Lamp - Exterior	6.9	35,593	1.00	245,592			35,593	35,593	35,593	35,593	35,593	35,593	32,034		
Lighting	LED Specialty Lamp - Interior	10.0	18,321	1.00	159,766			18,321	18,321	18,321	18,321	18,321	18,321	18,321	10,506	10,506
Lighting	LED Omnidirectional Bulb - Exterior	8.0	17,888	1.00	135,410			17,888	17,888	17,888	17,888	17,888	17,888	17,888	10,196	
Lighting	LED Omnidirectional Bulb - Interior	10.0	605,623	1.00	5,274,978			605,623	605,623	605,623	605,623	605,623	605,623	605,623	345,205	345,205
Shell	Air Sealing	20.0	196,217	1.00	3,529,232			196,217	196,217	196,217	196,217	196,217	196,217	196,217	196,217	196,217
Shell	Basement Sidewall Insulation	20.0	16,447	1.00	296,438			16,447	16,447	16,447	16,447	16,447	16,447	16,447	16,447	16,447
Shell	Floor Insulation	20.0	3,277	1.00	61,612			3,277	3,277	3,277	3,277	3,277	3,277	3,277	3,277	3,277
Shell	Wall Insulation	20.0	27,772	1.00	514,206			27,772	27,772	27,772	27,772	27,772	27,772	27,772	27,772	27,772
Shell	Attic Insulation	20.0	169,183	1.00	3,087,666			169,183	169,183	169,183	169,183	169,183	169,183	169,183	169,183	169,183
Shell	Rim Insulation	20.0	3,935	1.00	71,398			3,935	3,935	3,935	3,935	3,935	3,935	3,935	3,935	3,935
CY2020 Program Total Electric Contribution to CPAS			1,796,493		21,985,083			1,796,493	1,796,493	1,796,493	1,796,493	1,792,465	1,792,465	1,462,132	1,154,174	1,134,325
Historic Program Total Electric Contribution to CPAS‡						979,006	3,127,173	3,127,173	2,275,747	2,214,538	2,207,013	1,993,667	1,529,598	1,528,792	1,518,328	1,413,392
Program Total Electric CPAS						979,006	3,127,173	4,923,665	4,072,239	4,011,031	4,003,506	3,786,132	3,322,063	2,990,925	2,672,502	2,547,717
CY2020 Program Incremental Expiring Electric Savings§									-	-	-	4,028	-	330,332	307,959	19,849
Historic Program Incremental Expiring Electric Savings‡§								-	851,426	61,208	7,525	213,346	464,069	806	10,464	104,936
Program Total Incremental Expiring Electric Savings§								-	851,426	61,208	7,525	217,374	464,069	331,138	318,423	124,785

End Use Type	Research Category	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Appliance	Freezer	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096		
Appliance	Refrigerator - ER	5,095	5,095	5,095	5,095	5,095	5,095	5,095	5,095							
Appliance	Refrigerator - TOS	37	37	37	37	37	37	37	37							
Appliance	Room AC - ER	579	579	579												
HVAC	Air Source Heat Pump - ER	411	411	411	411	411	411	411								
HVAC	Central Air Conditioning - ER	50,743	50,743	50,743	50,743	50,743	50,743	50,743	50,743	50,743						
HVAC	Central Air Conditioning - TOS	15,337	15,337	15,337	15,337	15,337	15,337	15,337	15,337	15,337						
HVAC	Duct Insulation and Sealing - Distribution Efficiency	15,315	12,514	12,514	12,514	12,514	12,514	12,514	12,514	12,514	12,514	12,514				
HVAC	Furnace Blower Motor															
HVAC	Gas High Efficiency Boiler - ER															
HVAC	Gas High Efficiency Boiler - TOS															
HVAC	Gas High Efficiency Furnace - ER	151,226	151,226	151,226	151,226	151,226	151,226	151,226	151,226	151,226	151,226	151,226				
HVAC	Gas High Efficiency Furnace - TOS															
HVAC	Bathroom Exhaust Fan	73,725	73,725	73,725	73,725	73,725	73,725	73,725	73,725	73,725	73,725					
HVAC	Programmable Thermostat															
HVAC	Advanced Thermostat	43,653	43,653													
Hot Water	HW Pipe Insulation	2,217	2,217	2,217	2,217	2,217	2,217									
Hot Water	Gas Water Heater - ER															
Hot Water	Gas Water Heater - TOS															
Hot Water	Low Flow Faucet Aerator - Bathroom	578														
Hot Water	Low Flow Faucet Aerator - Kitchen	1,210														
Hot Water	Low Flow Showerhead	559														
Lighting	LED Specialty Lamp - Exterior															
Lighting	LED Specialty Lamp - Interior	10,506														
Lighting	LED Omnidirectional Bulb - Exterior															
Lighting	LED Omnidirectional Bulb - Interior	345,205														
Shell	Air Sealing	196,217	156,706	156,706	156,706	156,706	156,706	156,706	156,706	156,706	156,706	156,706				
Shell	Basement Sidewall Insulation	16,447	13,196	13,196	13,196	13,196	13,196	13,196	13,196	13,196	13,196	13,196				
Shell	Floor Insulation	3,277	2,885	2,885	2,885	2,885	2,885	2,885	2,885	2,885	2,885	2,885				
Shell	Wall Insulation	27,772	23,648	23,648	23,648	23,648	23,648	23,648	23,648	23,648	23,648	23,648				
Shell	Attic Insulation	169,183	139,583	139,583	139,583	139,583	139,583	139,583	139,583	139,583	139,583	139,583				
Shell	Rim Insulation	3,935	3,205	3,205	3,205	3,205	3,205	3,205	3,205	3,205	3,205	3,205				
CY2020 Program Total Electric Contribution to CPAS		1,134,325	695,856	652,202	651,623	651,623	651,623	649,407	648,996	643,864	577,784	504,058	1,096	1,096	-	-
Historic Program Total Electric Contribution to CPAS‡		1,256,811	1,194,998	1,194,341	1,192,668	1,078,238	1,070,162	1,068,171	1,017,564	899,410	611,753	88,657	88,657	86,088	86,088	-
Program Total Electric CPAS		2,391,135	1,890,853	1,846,543	1,844,291	1,729,861	1,721,786	1,717,577	1,666,559	1,543,274	1,189,537	592,716	89,753	87,184	86,088	-
CY2020 Program Incremental Expiring Electric Savings§		-	438,469	43,653	579	-	-	2,217	411	5,132	66,080	73,725	502,963	-	1,096	-
Historic Program Incremental Expiring Electric Savings‡§		156,582	61,813	657	1,673	114,430	8,075	1,992	50,607	118,154	287,657	523,096	-	2,569	-	86,088
Program Total Incremental Expiring Electric Savings§		156,582	500,282	44,310	2,252	114,430	8,075	4,209	51,018	123,286	353,736	596,822	502,963	2,569	1,096	86,088

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 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

Table 3-5. SFR-IHWAP 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	2027	2028
Appliance	Freezer	22.0	0	1.00	0											
Appliance	Refrigerator - ER	17.0	0	1.00	0											
Appliance	Refrigerator - TOS	17.0	0	1.00	0											
Appliance	Room AC - ER	12.0	0	1.00	0											
HVAC	Air Source Heat Pump - ER	16.0	0	1.00	0											
HVAC	Central Air Conditioning - ER	18.0	0	1.00	0											
HVAC	Central Air Conditioning - TOS	18.0	0	1.00	0											
HVAC	Duct Insulation and Sealing - Distribution Efficiency	20.0	2,178	1.00	39,809			2,178	2,178	2,178	2,178	2,178	2,178	2,178	2,178	2,178
HVAC	Furnace Blower Motor	6.0	0	1.00	0											
HVAC	Gas High Efficiency Boiler - ER	25.0	180	1.00	3,902			180	180	180	180	180	180	180	180	145
HVAC	Gas High Efficiency Boiler - TOS	25.0	107	1.00	2,677			107	107	107	107	107	107	107	107	107
HVAC	Gas High Efficiency Furnace - ER	20.0	1,962	1.00	19,415			1,962	1,962	1,962	1,962	1,962	1,962	546	546	546
HVAC	Gas High Efficiency Furnace - TOS	20.0	460	1.00	9,195			460	460	460	460	460	460	460	460	460
HVAC	Bathroom Exhaust Fan	19.0	0	1.00	0											
HVAC	Programmable Thermostat	8.0	257	1.00	2,053			257	257	257	257	257	257	257	257	
HVAC	Advanced Thermostat	11.0	896	1.00	9,856			896	896	896	896	896	896	896	896	896
Hot Water	HW Pipe Insulation	15.0	215	1.00	3,231			215	215	215	215	215	215	215	215	215
Hot Water	Gas Water Heater - ER	13.0	662	1.00	6,525			662	662	662	662	431	431	431	431	431
Hot Water	Gas Water Heater - TOS	13.0	32	1.00	413			32	32	32	32	32	32	32	32	32
Hot Water	Low Flow Faucet Aerator - Bathroom	10.0	21	1.00	212			21	21	21	21	21	21	21	21	21
Hot Water	Low Flow Faucet Aerator - Kitchen	10.0	49	1.00	488			49	49	49	49	49	49	49	49	49
Hot Water	Low Flow Showerhead	10.0	45	1.00	455			45	45	45	45	45	45	45	45	45
Lighting	LED Specialty Lamp - Exterior	6.9	0	1.00	0											
Lighting	LED Specialty Lamp - Interior	10.0	0	1.00	0											
Lighting	LED Omnidirectional Bulb - Exterior	8.0	0	1.00	0											
Lighting	LED Omnidirectional Bulb - Interior	10.0	0	1.00	0											
Shell	Air Sealing	20.0	3,900	1.00	74,798			3,900	3,900	3,900	3,900	3,900	3,900	3,900	3,900	3,900
Shell	Basement Sidewall Insulation	20.0	188	1.00	3,622			188	188	188	188	188	188	188	188	188
Shell	Floor Insulation	20.0	97	1.00	1,819			97	97	97	97	97	97	97	97	97
Shell	Wall Insulation	20.0	1,373	1.00	26,679			1,373	1,373	1,373	1,373	1,373	1,373	1,373	1,373	1,373
Shell	Attic Insulation	20.0	4,263	1.00	82,439			4,263	4,263	4,263	4,263	4,263	4,263	4,263	4,263	4,263
Shell	Rim Insulation	20.0	42	1.00	808			42	42	42	42	42	42	42	42	42
CY2020 Program Total Gas Contribution to CPAS (Therms)			16,929		288,396			16,929	16,929	16,929	16,929	16,697	16,697	15,281	15,281	14,989
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡						-	-	496,185	496,185	496,185	496,185	489,395	489,395	447,889	447,889	439,321
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§						1,463,579	2,144,794	2,144,794	2,144,794	2,101,795	2,056,301	1,782,924	1,701,429	1,681,643	1,665,339	1,559,685
Program Total Gas CPAS (kWh Equivalent)‡						1,463,579	2,144,794	2,640,980	2,640,980	2,597,981	2,552,487	2,272,318	2,190,823	2,129,533	2,113,229	1,999,006
CY2020 Program Incremental Expiring Gas Savings (Therms)‖									-	-	-	232	-	1,416	-	292
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖									-	-	-	6,791	-	41,505	-	8,569
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖								-	-	42,999	45,494	273,378	81,495	19,785	16,304	105,654
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖								-	-	42,999	45,494	280,168	81,495	61,291	16,304	114,223

End Use Type	Research Category	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Appliance	Freezer																	
Appliance	Refrigerator - ER																	
Appliance	Refrigerator - TOS																	
Appliance	Room AC - ER																	
HVAC	Air Source Heat Pump - ER																	
HVAC	Central Air Conditioning - ER																	
HVAC	Central Air Conditioning - TOS																	
HVAC	Duct Insulation and Sealing - Distribution Efficiency	2,178	1,803	1,803	1,803	1,803	1,803	1,803	1,803	1,803	1,803	1,803						
HVAC	Furnace Blower Motor																	
HVAC	Gas High Efficiency Boiler - ER	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	
HVAC	Gas High Efficiency Boiler - TOS	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	
HVAC	Gas High Efficiency Furnace - ER	546	546	546	546	546	546	546	546	546	546	546						
HVAC	Gas High Efficiency Furnace - TOS	460	460	460	460	460	460	460	460	460	460	460						
HVAC	Bathroom Exhaust Fan																	
HVAC	Programmable Thermostat																	
HVAC	Advanced Thermostat	896	896															
Hot Water	HW Pipe Insulation	215	215	215	215	215	215											
Hot Water	Gas Water Heater - ER	431	431	431	431													
Hot Water	Gas Water Heater - TOS	32	32	32	32													
Hot Water	Low Flow Faucet Aerator - Bathroom	21																
Hot Water	Low Flow Faucet Aerator - Kitchen	49																
Hot Water	Low Flow Showerhead	45																
Lighting	LED Specialty Lamp - Exterior																	
Lighting	LED Specialty Lamp - Interior																	
Lighting	LED Omnidirectional Bulb - Exterior																	
Lighting	LED Omnidirectional Bulb - Interior																	
Shell	Air Sealing	3,900	3,595	3,595	3,595	3,573	3,573	3,573	3,573	3,573	3,573	3,573						
Shell	Basement Sidewall Insulation	188	174	174	174	174	174	174	174	174	174	174						
Shell	Floor Insulation	97	85	85	85	85	85	85	85	85	85	85						
Shell	Wall Insulation	1,373	1,300	1,300	1,300	1,292	1,292	1,292	1,292	1,292	1,292	1,292						
Shell	Attic Insulation	4,263	3,986	3,986	3,986	3,979	3,979	3,979	3,979	3,979	3,979	3,979						
Shell	Rim Insulation	42	39	39	39	39	39	39	39	39	39	39						
CY2020 Program Total Gas Contribution to CPAS (Therms)		14,989	13,813	12,918	12,918	12,417	12,417	12,201	12,201	12,201	12,201	12,201	252	252	252	252	252	-
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡		439,321	404,874	378,612	378,612	363,933	363,933	357,619	357,619	357,619	357,619	357,619	7,377	7,377	7,377	7,377	7,377	-
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§		1,495,301	1,429,281	1,408,404	1,413,122	1,099,104	1,097,247	1,097,247	1,097,247	1,097,247	837,176	409,957	409,957	409,957	409,957	21,661	-	-
Program Total Gas CPAS (kWh Equivalent)‡		1,934,622	1,834,155	1,787,016	1,791,734	1,463,037	1,461,180	1,454,867	1,454,867	1,454,867	1,194,796	767,576	417,334	417,334	417,334	29,038	7,377	-
CY2020 Program Incremental Expiring Gas Savings (Therms)‖		-	1,175	896	-	501	-	215	-	-	-	-	11,950	-	-	-	-	252
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖		-	34,447	26,261	-	14,679	-	6,314	-	-	-	-	350,242	-	-	-	-	7,377
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡		64,384	66,020	20,877	(4,718)	314,018	1,857	-	-	-	260,071	427,219	-	-	-	388,296	21,661	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖		64,384	100,467	47,139	(4,718)	328,697	1,857	6,314	-	-	260,071	427,219	350,242	-	-	388,296	21,661	7,377

Note: The green highlighted cell shows program total first-year gas savings in kWh equivalents. The gray cells are blank, indicating no values or no contribution to calculating CPAS in CY2020.

*A deemed value. Source 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 3-6. SFR-IHWAP 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	2027	2028	2029
Appliance	Freezer	22.0	1,096	1.00	24,108			1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096
Appliance	Refrigerator - ER	17.0	50,058	1.00	356,391			50,058	50,058	50,058	50,058	50,058	50,058	5,095	5,095	5,095	5,095
Appliance	Refrigerator - TOS	17.0	37	1.00	629			37	37	37	37	37	37	37	37	37	37
Appliance	Room AC - ER	12.0	4,607	1.00	23,059			4,607	4,607	4,607	4,607	579	579	579	579	579	579
HVAC	Air Source Heat Pump - ER	16.0	4,441	1.00	30,758			4,441	4,441	4,441	4,441	4,441	4,441	411	411	411	411
HVAC	Central Air Conditioning - ER	18.0	327,548	1.00	2,574,203			327,548	327,548	327,548	327,548	327,548	327,548	50,743	50,743	50,743	50,743
HVAC	Central Air Conditioning - TOS	18.0	15,337	1.00	276,061			15,337	15,337	15,337	15,337	15,337	15,337	15,337	15,337	15,337	15,337
HVAC	Duct Insulation and Sealing - Distribution Efficiency	20.0	79,157	1.00	1,445,085			79,157	79,157	79,157	79,157	79,157	79,157	79,157	79,157	79,157	79,157
HVAC	Furnace Blower Motor	6.0	975	1.00	5,850			975	975	975	975	975	975				
HVAC	Gas High Efficiency Boiler - ER	25.0	5,286	1.00	114,361			5,286	5,286	5,286	5,286	5,286	5,286	5,286	5,286	4,239	4,239
HVAC	Gas High Efficiency Boiler - TOS	25.0	3,138	1.00	78,450			3,138	3,138	3,138	3,138	3,138	3,138	3,138	3,138	3,138	3,138
HVAC	Gas High Efficiency Furnace - ER	20.0	208,733	1.00	3,593,581			208,733	208,733	208,733	208,733	208,733	208,733	167,228	167,228	167,228	167,228
HVAC	Gas High Efficiency Furnace - TOS	20.0	13,476	1.00	269,515			13,476	13,476	13,476	13,476	13,476	13,476	13,476	13,476	13,476	13,476
HVAC	Bathroom Exhaust Fan	19.0	73,725	1.00	1,400,784			73,725	73,725	73,725	73,725	73,725	73,725	73,725	73,725	73,725	73,725
HVAC	Programmable Thermostat	8.0	17,175	1.00	137,397			17,175	17,175	17,175	17,175	17,175	17,175	17,175	17,175		
HVAC	Advanced Thermostat	11.0	69,914	1.00	769,057			69,914	69,914	69,914	69,914	69,914	69,914	69,914	69,914	69,914	69,914
Hot Water	HW Pipe Insulation	15.0	8,531	1.00	127,959			8,531	8,531	8,531	8,531	8,531	8,531	8,531	8,531	8,531	8,531
Hot Water	Gas Water Heater - ER	13.0	19,412	1.00	191,243			19,412	19,412	19,412	19,412	12,621	12,621	12,621	12,621	12,621	12,621
Hot Water	Gas Water Heater - TOS	13.0	932	1.00	12,111			932	932	932	932	932	932	932	932	932	932
Hot Water	Low Flow Faucet Aerator - Bathroom	10.0	1,198	1.00	11,982			1,198	1,198	1,198	1,198	1,198	1,198	1,198	1,198	1,198	1,198
Hot Water	Low Flow Faucet Aerator - Kitchen	10.0	2,642	1.00	26,416			2,642	2,642	2,642	2,642	2,642	2,642	2,642	2,642	2,642	2,642
Hot Water	Low Flow Showerhead	10.0	1,892	1.00	18,918			1,892	1,892	1,892	1,892	1,892	1,892	1,892	1,892	1,892	1,892
Lighting	LED Specialty Lamp - Exterior	6.9	35,593	1.00	245,592			35,593	35,593	35,593	35,593	35,593	35,593	32,034			
Lighting	LED Specialty Lamp - Interior	10.0	18,321	1.00	159,766			18,321	18,321	18,321	18,321	18,321	18,321	18,321	10,506	10,506	10,506
Lighting	LED Omnidirectional Bulb - Exterior	8.0	17,888	1.00	135,410			17,888	17,888	17,888	17,888	17,888	17,888	17,888	10,196		
Lighting	LED Omnidirectional Bulb - Interior	10.0	605,623	1.00	5,274,978			605,623	605,623	605,623	605,623	605,623	605,623	605,623	345,205	345,205	345,205
Shell	Air Sealing	20.0	310,536	1.00	5,721,555			310,536	310,536	310,536	310,536	310,536	310,536	310,536	310,536	310,536	310,536
Shell	Basement Sidewall Insulation	20.0	21,965	1.00	402,592			21,965	21,965	21,965	21,965	21,965	21,965	21,965	21,965	21,965	21,965
Shell	Floor Insulation	20.0	6,127	1.00	114,941			6,127	6,127	6,127	6,127	6,127	6,127	6,127	6,127	6,127	6,127
Shell	Wall Insulation	20.0	68,026	1.00	1,296,180			68,026	68,026	68,026	68,026	68,026	68,026	68,026	68,026	68,026	68,026
Shell	Attic Insulation	20.0	294,127	1.00	5,503,965			294,127	294,127	294,127	294,127	294,127	294,127	294,127	294,127	294,127	294,127
Shell	Rim Insulation	20.0	5,164	1.00	95,088			5,164	5,164	5,164	5,164	5,164	5,164	5,164	5,164	5,164	5,164
CY2020 Program Total Contribution to CPAS			2,292,678		30,437,983			2,292,678	2,292,678	2,292,678	2,292,678	2,281,859	2,281,859	1,910,022	1,602,063	1,573,645	1,573,645
Historic Program Total Contribution to CPAS‡						2,442,585	5,271,967	5,271,967	4,420,541	4,316,334	4,263,314	3,776,591	3,231,027	3,210,436	3,183,667	2,973,078	2,752,112
Program Total CPAS						2,442,585	5,271,967	7,564,645	6,713,219	6,609,012	6,555,992	6,058,450	5,512,886	5,120,458	4,785,731	4,546,723	4,325,757
CY2020 Program Incremental Expiring Savings§								-	-	-	-	10,819	-	371,838	307,959	28,418	-
Historic Program Incremental Expiring Savings‡§								-	851,426	104,207	53,019	486,724	545,564	20,591	26,768	210,590	220,966
Program Total Incremental Expiring Savings§								-	851,426	104,207	53,019	497,542	545,564	392,429	334,727	239,007	220,966

End Use Type	Research Category	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
Appliance	Freezer	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096	1,096					
Appliance	Refrigerator - ER	5,095	5,095	5,095	5,095	5,095	5,095	5,095										
Appliance	Refrigerator - TOS	37	37	37	37	37	37	37										
Appliance	Room AC - ER	579	579															
HVAC	Air Source Heat Pump - ER	411	411	411	411	411	411											
HVAC	Central Air Conditioning - ER	50,743	50,743	50,743	50,743	50,743	50,743	50,743	50,743									
HVAC	Central Air Conditioning - TOS	15,337	15,337	15,337	15,337	15,337	15,337	15,337	15,337									
HVAC	Duct Insulation and Sealing - Distribution Efficiency	65,352	65,352	65,352	65,352	65,352	65,352	65,352	65,352	65,352	65,352							
HVAC	Furnace Blower Motor																	
HVAC	Gas High Efficiency Boiler - ER	4,239	4,239	4,239	4,239	4,239	4,239	4,239	4,239	4,239	4,239	4,239	4,239	4,239	4,239	4,239		
HVAC	Gas High Efficiency Boiler - TOS	3,138	3,138	3,138	3,138	3,138	3,138	3,138	3,138	3,138	3,138	3,138	3,138	3,138	3,138	3,138		
HVAC	Gas High Efficiency Furnace - ER	167,228	167,228	167,228	167,228	167,228	167,228	167,228	167,228	167,228	167,228							
HVAC	Gas High Efficiency Furnace - TOS	13,476	13,476	13,476	13,476	13,476	13,476	13,476	13,476	13,476	13,476							
HVAC	Bathroom Exhaust Fan	73,725	73,725	73,725	73,725	73,725	73,725	73,725	73,725	73,725								
HVAC	Programmable Thermostat																	
HVAC	Advanced Thermostat	69,914																
Hot Water	HW Pipe Insulation	8,531	8,531	8,531	8,531	8,531												
Hot Water	Gas Water Heater - ER	12,621	12,621	12,621														
Hot Water	Gas Water Heater - TOS	932	932	932														
Hot Water	Low Flow Faucet Aerator - Bathroom																	
Hot Water	Low Flow Faucet Aerator - Kitchen																	
Hot Water	Low Flow Showerhead																	
Lighting	LED Specialty Lamp - Exterior																	
Lighting	LED Specialty Lamp - Interior																	
Lighting	LED Omnidirectional Bulb - Exterior																	
Lighting	LED Omnidirectional Bulb - Interior																	
Shell	Air Sealing	262,087	262,087	262,087	261,419	261,419	261,419	261,419	261,419	261,419	261,419							
Shell	Basement Sidewall Insulation	18,301	18,301	18,301	18,292	18,292	18,292	18,292	18,292	18,292	18,292							
Shell	Floor Insulation	5,371	5,371	5,371	5,366	5,366	5,366	5,366	5,366	5,366	5,366							
Shell	Wall Insulation	61,756	61,756	61,756	61,521	61,521	61,521	61,521	61,521	61,521	61,521							
Shell	Attic Insulation	256,414	256,414	256,414	256,208	256,208	256,208	256,208	256,208	256,208	256,208							
Shell	Rim Insulation	4,347	4,347	4,347	4,344	4,344	4,344	4,344	4,344	4,344	4,344							
CY2020 Program Total Contribution to CPAS		1,100,729	1,030,815	1,030,236	1,015,557	1,015,557	1,007,026	1,006,615	1,001,483	935,403	861,678	8,473	8,473	7,377	7,377	7,377	-	-
Historic Program Total Contribution to CPAS‡		2,624,279	2,602,745	2,605,790	2,177,342	2,167,410	2,165,418	2,114,811	1,996,657	1,448,929	498,614	498,614	496,045	496,045	21,661	-	-	-
Program Total CPAS		3,725,008	3,633,559	3,636,026	3,192,898	3,182,966	3,172,444	3,121,426	2,998,140	2,384,333	1,360,292	507,087	504,518	503,422	29,038	7,377	-	-
CY2020 Program Incremental Expiring Savings§		472,916	69,914	579	14,679	-	8,531	411	5,132	66,080	73,725	853,205	-	1,096	-	-	7,377	-
Historic Program Incremental Expiring Savings‡§		127,832	21,535	(3,045)	428,448	9,932	1,992	50,607	118,154	547,728	950,315	-	2,569	-	474,384	21,661	-	-
Program Total Incremental Expiring Savings§		600,749	91,449	(2,466)	443,127	9,932	10,522	51,018	123,286	613,808	1,024,041	853,205	2,569	1,096	474,384	21,661	7,377	-

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 no contribution to calculating CPAS in CY2020.

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

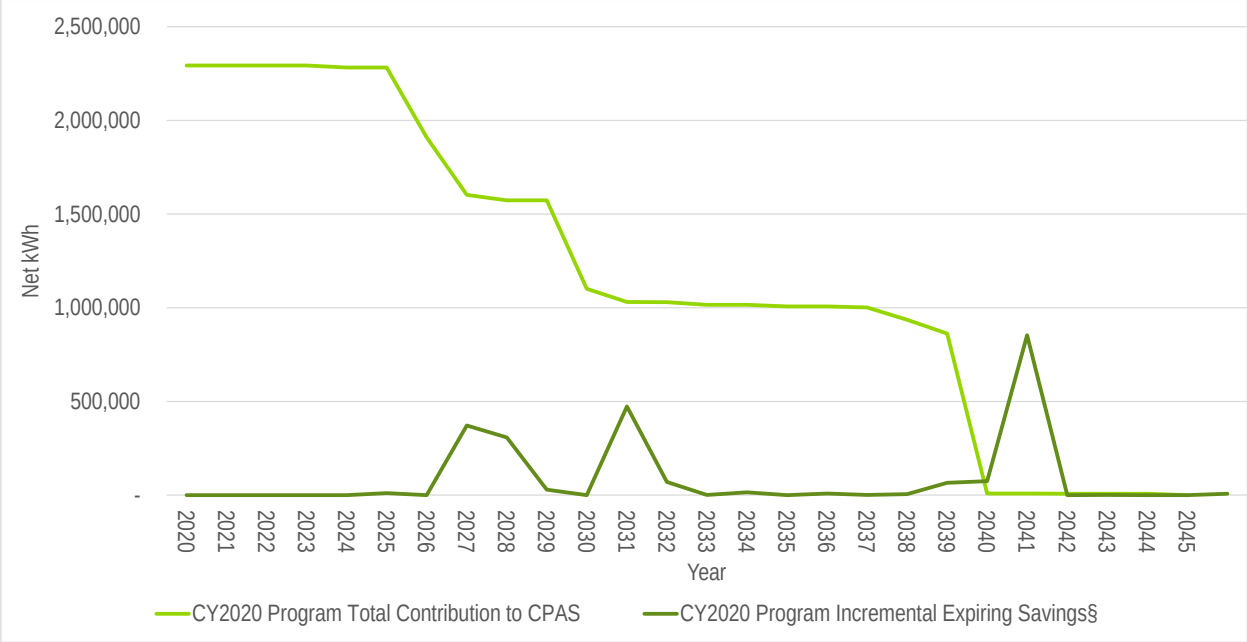
† Lifetime savings are the sum of CPAS savings through the EUL.

‡ Historic savings go back to CY2018.

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

Source: Evaluation team analysis

Figure 3-5. SFR-IHWAP Cumulative Persisting Annual Savings



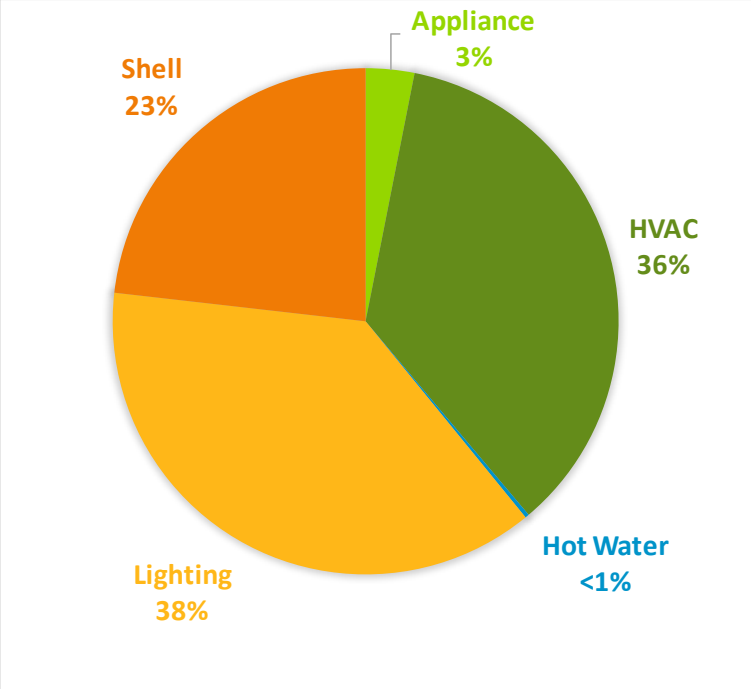
*Expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n.

Source: Evaluation team analysis

3.4 Program Savings by Measure

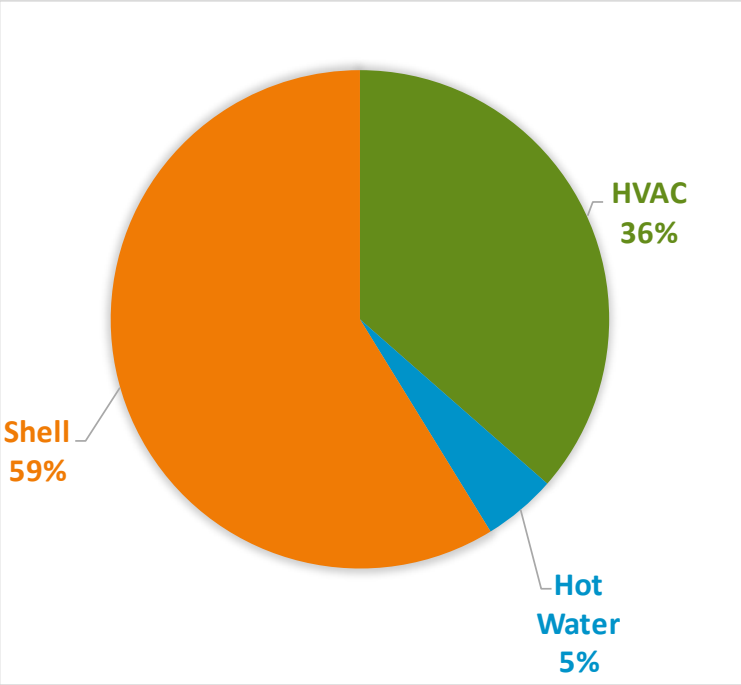
The SFR-IHWAP program component includes 32 measures distributed across five end use categories, all of which contributed to electric savings. Of these 32 measures, 19 measures distributed across three end use categories contributed to gas savings, as the following tables show. The lighting and HVAC measures contributed the most savings for ComEd at 38% and 36% of the combined savings, respectively (see Figure 3-6). For gas utilities, the shell end use contributed to the most savings, ranging 50% to 65% of total gas savings (see Figure 3-7 through Figure 3-9).

Figure 3-6. SFR-IHWAP ComEd Verified Net Savings by End Use – Electric



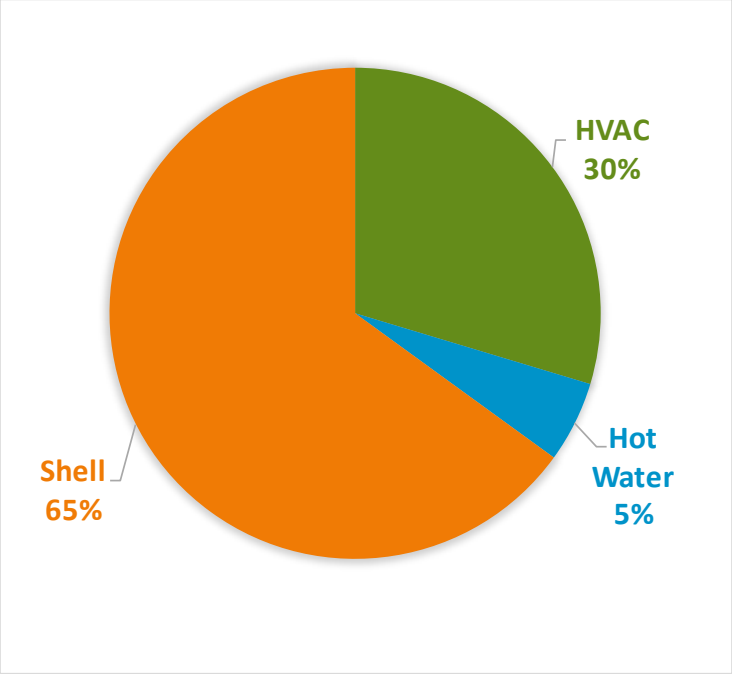
Source: ComEd tracking data and evaluation team analysis

Figure 3-7. SFR-IHWAP Nicor Gas Verified Net Therm Savings by End Use



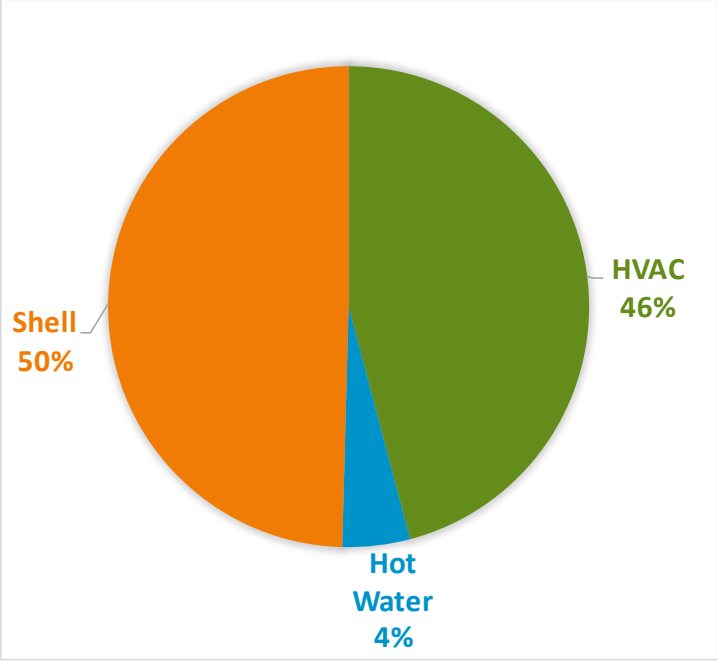
Source: Nicor Gas tracking data and evaluation team analysis

Figure 3-8. SFR-IHWAP Peoples Gas Verified Net Therm Savings by End Use



Source: Peoples Gas and North Shore Gas tracking data and evaluation team analysis

Figure 3-9. SFR-IHWAP North Shore Gas Verified Net Therm Savings by End Use



Source: Peoples Gas and North Shore Gas tracking data and evaluation team analysis

Table 3-7. SFR-IHWAP CY2020 Energy Savings by Measure – Electric – ComEd

End Use Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)	EUL (years)
Appliance	Freezer	1,096	1.00	1,096	1.00	1,096	22.0
Appliance	Refrigerator - ER	50,058	1.00	50,058	1.00	50,058	17.0
Appliance	Refrigerator - TOS	37	1.00	37	1.00	37	17.0
Appliance	Room AC - ER	4,607	1.00	4,607	1.00	4,607	12.0
HVAC	Air Source Heat Pump - ER	4,357	1.02	4,441	1.00	4,441	16.0
HVAC	Central Air Conditioning - ER	327,548	1.00	327,548	1.00	327,548	18.0
HVAC	Central Air Conditioning - TOS	15,337	1.00	15,337	1.00	15,337	18.0
HVAC	Duct Insulation and Sealing - Distribution Efficiency	15,315	1.00	15,315	1.00	15,315	20.0
HVAC	Furnace Blower Motor	975	1.00	975	1.00	975	6.0
HVAC	Gas High Efficiency Boiler - ER	0	NA	0	1.00	0	25.0
HVAC	Gas High Efficiency Boiler - TOS	0	NA	0	1.00	0	25.0
HVAC	Gas High Efficiency Furnace - ER	151,226	1.00	151,226	1.00	151,226	20.0
HVAC	Gas High Efficiency Furnace - TOS	0	NA	0	1.00	0	20.0
HVAC	Bathroom Exhaust Fan	73,725	1.00	73,725	1.00	73,725	19.0
HVAC	Programmable Thermostat	9,653	1.00	9,653	1.00	9,653	8.0
HVAC	Advanced Thermostat	43,653	1.00	43,653	NA†	43,653	11.0
Hot Water	HW Pipe Insulation	2,217	1.00	2,217	1.00	2,217	15.0
Hot Water	Gas Water Heater - ER	0	NA	0	1.00	0	13.0
Hot Water	Gas Water Heater - TOS	0	NA	0	1.00	0	13.0
Hot Water	Low Flow Faucet Aerator - Bathroom	447	1.29	578	1.00	578	10.0
Hot Water	Low Flow Faucet Aerator - Kitchen	905	1.34	1,210	1.00	1,210	10.0
Hot Water	Low Flow Showerhead	426	1.31	559	1.00	559	10.0
Lighting	LED Specialty Lamp - Exterior	35,593	1.00	35,593	1.00	35,593	6.9
Lighting	LED Specialty Lamp - Interior	18,321	1.00	18,321	1.00	18,321	10.0
Lighting	LED Omnidirectional Bulb - Exterior	17,888	1.00	17,888	1.00	17,888	8.0
Lighting	LED Omnidirectional Bulb - Interior	605,623	1.00	605,623	1.00	605,623	10.0
Shell	Air Sealing	196,216	1.00	196,217	1.00	196,217	20.0
Shell	Basement Sidewall Insulation	16,447	1.00	16,447	1.00	16,447	20.0
Shell	Floor Insulation	3,277	1.00	3,277	1.00	3,277	20.0
Shell	Wall Insulation	27,772	1.00	27,772	1.00	27,772	20.0
Shell	Attic Insulation	169,182	1.00	169,183	1.00	169,183	20.0
Shell	Rim Insulation	3,935	1.00	3,935	1.00	3,935	20.0
	Total	1,795,836	1.00	1,796,493	NA	1,796,493	NA

Note: The savings in this table include secondary electric energy (kWh) savings from water supply and wastewater treatment plants for measures claimed by ComEd. The savings account for electric heating penalties, where applicable.
NA = Not applicable
*A deemed value. Source found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The TRM v8.0 algorithm calculates net savings for advanced thermostats.
Source: ComEd tracking data and evaluation team analysis

Table 3-8. SFR-IHWAP CY2020 Summer Peak Demand Savings by Measure – ComEd

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)
Appliance	Freezer	0.18	1.00	0.18	1.00	0.18
Appliance	Refrigerator - ER	7.54	1.00	7.54	1.00	7.54
Appliance	Refrigerator - TOS	0.01	1.00	0.01	1.00	0.01
Appliance	Room AC - ER	6.45	1.00	6.45	1.00	6.45
HVAC	Air Source Heat Pump - ER	0.24	1.00	0.24	1.00	0.24
HVAC	Central Air Conditioning - ER	176.35	1.00	176.35	1.00	176.35
HVAC	Central Air Conditioning - TOS	14.58	1.00	14.58	1.00	14.58
HVAC	Duct Insulation and Sealing - Distribution Efficiency	5.82	1.00	5.82	1.00	5.82
HVAC	Furnace Blower Motor	0.05	1.00	0.05	1.00	0.05
HVAC	Gas High Efficiency Boiler - ER	0.00	NA	0.00	1.00	0.00
HVAC	Gas High Efficiency Boiler - TOS	0.00	NA	0.00	1.00	0.00
HVAC	Gas High Efficiency Furnace - ER	17.73	1.00	17.73	1.00	17.73
HVAC	Gas High Efficiency Furnace - TOS	0.00	NA	1.32	1.00	1.32
HVAC	Bathroom Exhaust Fan	8.46	1.00	8.46	1.00	8.46
HVAC	Programmable Thermostat	0.00	NA	0.00	1.00	0.00
HVAC	Advanced Thermostat	13.89	1.00	13.89	NA†	13.89
Hot Water	HW Pipe Insulation	0.25	1.00	0.25	1.00	0.25
Hot Water	Gas Water Heater - ER	0.00	NA	0.00	1.00	0.00
Hot Water	Gas Water Heater - TOS	0.00	NA	0.00	1.00	0.00
Hot Water	Low Flow Faucet Aerator - Bathroom	0.64	1.00	0.64	1.00	0.64
Hot Water	Low Flow Faucet Aerator - Kitchen	0.30	1.00	0.30	1.00	0.30
Hot Water	Low Flow Showerhead	0.06	1.00	0.06	1.00	0.06
Lighting	LED Specialty Lamp - Exterior	3.93	1.00	3.93	1.00	3.93
Lighting	LED Specialty Lamp - Interior	2.76	1.00	2.76	1.00	2.76
Lighting	LED Omnidirectional Bulb - Exterior	1.97	1.00	1.97	1.00	1.97
Lighting	LED Omnidirectional Bulb - Interior	74.93	1.00	74.93	1.00	74.93
Shell	Air Sealing	98.04	1.00	98.04	1.00	98.04
Shell	Basement Sidewall Insulation	6.12	1.00	6.12	1.00	6.12
Shell	Floor Insulation	0.91	1.00	0.91	1.00	0.91
Shell	Wall Insulation	8.65	1.00	8.65	1.00	8.65
Shell	Attic Insulation	69.08	1.00	69.08	1.00	69.08
Shell	Rim Insulation	1.55	1.00	1.55	1.00	1.55
	Total	520.48	1.00	521.80	NA	521.80

NA = Not applicable
*A deemed value. Source found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The TRM v8.0 algorithm calculates net savings for advanced thermostats.

Source: ComEd tracking data and evaluation team analysis

Table 3-9. SFR-IHWAP CY2020 Energy Savings by Measure – Gas – ComEd

End Use Type	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG*	Verified Net Savings (Therms)	EUL (years)
Appliance	Freezer	0	NA	0	1.00	0	22.0
Appliance	Refrigerator - ER	0	NA	0	1.00	0	17.0
Appliance	Refrigerator - TOS	0	NA	0	1.00	0	17.0
Appliance	Room AC - ER	0	NA	0	1.00	0	12.0
HVAC	Air Source Heat Pump - ER	0	NA	0	1.00	0	16.0
HVAC	Central Air Conditioning - ER	0	NA	0	1.00	0	18.0
HVAC	Central Air Conditioning - TOS	0	NA	0	1.00	0	18.0
HVAC	Duct Insulation and Sealing - Distribution Efficiency	2,178	1.00	2,178	1.00	2,178	20.0
HVAC	Furnace Blower Motor	0	NA	0	1.00	0	6.0
HVAC	Gas High Efficiency Boiler - ER	180	1.00	180	1.00	180	25.0
HVAC	Gas High Efficiency Boiler - TOS	107	1.00	107	1.00	107	25.0
HVAC	Gas High Efficiency Furnace - ER	1,962	1.00	1,962	1.00	1,962	20.0
HVAC	Gas High Efficiency Furnace - TOS	460	1.00	460	1.00	460	20.0
HVAC	Bathroom Exhaust Fan	0	NA	0	1.00	0	19.0
HVAC	Programmable Thermostat	257	1.00	257	1.00	257	8.0
HVAC	Advanced Thermostat	896	1.00	896	NA†	896	11.0
Hot Water	HW Pipe Insulation	215	1.00	215	1.00	215	15.0
Hot Water	Gas Water Heater - ER	662	1.00	662	1.00	662	13.0
Hot Water	Gas Water Heater - TOS	32	1.00	32	1.00	32	13.0
Hot Water	Low Flow Faucet Aerator - Bathroom	21	1.00	21	1.00	21	10.0
Hot Water	Low Flow Faucet Aerator - Kitchen	49	1.00	49	1.00	49	10.0
Hot Water	Low Flow Showerhead	45	1.00	45	1.00	45	10.0
Lighting	LED Specialty Lamp - Exterior	0	NA	0	1.00	0	6.9
Lighting	LED Specialty Lamp - Interior	0	NA	0	1.00	0	10.0
Lighting	LED Omnidirectional Bulb - Exterior	0	NA	0	1.00	0	8.0
Lighting	LED Omnidirectional Bulb - Interior	0	NA	0	1.00	0	10.0
Shell	Air Sealing	3,900	1.00	3,900	1.00	3,900	20.0
Shell	Basement Sidewall Insulation	188	1.00	188	1.00	188	20.0
Shell	Floor Insulation	97	1.00	97	1.00	97	20.0
Shell	Wall Insulation	1,373	1.00	1,373	1.00	1,373	20.0
Shell	Attic Insulation	4,263	1.00	4,263	1.00	4,263	20.0
Shell	Rim Insulation	42	1.00	42	1.00	42	20.0
	Total Therms	16,929	1.00	16,929	NA	16,929	NA
	Total kWh Converted from Therms‡	496,184	1.00	496,185	NA	496,185	NA

NA = Not applicable

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

† The TRM v8.0algorithm calculates net savings for advanced thermostats.

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

Source: ComEd tracking data and evaluation team analysis

Table 3-10. SFR-IHWAP CY2020 Energy Savings by Measure – Total Combining Electricity and Gas – ComEd

End Use Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)
Appliance	Freezer	1,096	1.00	1,096	1.00	1,096
Appliance	Refrigerator - ER	50,058	1.00	50,058	1.00	50,058
Appliance	Refrigerator - TOS	37	1.00	37	1.00	37
Appliance	Room AC - ER	4,607	1.00	4,607	1.00	4,607
HVAC	Air Source Heat Pump - ER	4,357	1.02	4,441	1.00	4,441
HVAC	Central Air Conditioning - ER	327,548	1.00	327,548	1.00	327,548
HVAC	Central Air Conditioning - TOS	15,337	1.00	15,337	1.00	15,337
HVAC	Duct Insulation and Sealing - Distribution Efficiency	79,158	1.00	79,157	1.00	79,157
HVAC	Furnace Blower Motor	975	1.00	975	1.00	975
HVAC	Gas High Efficiency Boiler - ER	5,286	1.00	5,286	1.00	5,286
HVAC	Gas High Efficiency Boiler - TOS	3,138	1.00	3,138	1.00	3,138
HVAC	Gas High Efficiency Furnace - ER	208,733	1.00	208,733	1.00	208,733
HVAC	Gas High Efficiency Furnace - TOS	13,476	1.00	13,476	1.00	13,476
HVAC	Bathroom Exhaust Fan	73,725	1.00	73,725	1.00	73,725
HVAC	Programmable Thermostat	17,175	1.00	17,175	1.00	17,175
HVAC	Advanced Thermostat	69,914	1.00	69,914	NA†	69,914
Hot Water	HW Pipe Insulation	8,531	1.00	8,531	1.00	8,531
Hot Water	Gas Water Heater - ER	19,412	1.00	19,412	1.00	19,412
Hot Water	Gas Water Heater - TOS	932	1.00	932	1.00	932
Hot Water	Low Flow Faucet Aerator - Bathroom	1,067	1.12	1,198	1.00	1,198
Hot Water	Low Flow Faucet Aerator - Kitchen	2,336	1.13	2,642	1.00	2,642
Hot Water	Low Flow Showerhead	1,759	1.08	1,892	1.00	1,892
Lighting	LED Specialty Lamp - Exterior	35,593	1.00	35,593	1.00	35,593
Lighting	LED Specialty Lamp - Interior	18,321	1.00	18,321	1.00	18,321
Lighting	LED Omnidirectional Bulb - Exterior	17,888	1.00	17,888	1.00	17,888
Lighting	LED Omnidirectional Bulb - Interior	605,623	1.00	605,623	1.00	605,623
Shell	Air Sealing	310,534	1.00	310,536	1.00	310,536
Shell	Basement Sidewall Insulation	21,965	1.00	21,965	1.00	21,965
Shell	Floor Insulation	6,127	1.00	6,127	1.00	6,127
Shell	Wall Insulation	68,026	1.00	68,026	1.00	68,026
Shell	Attic Insulation	294,124	1.00	294,127	1.00	294,127
Shell	Rim Insulation	5,164	1.00	5,164	1.00	5,164
	Total‡	2,292,020	1.00	2,292,678	NA	2,292,678

* A deemed value. Source found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The TRM algorithm calculates net savings for advanced thermostats.
‡ The total includes the electric equivalent of the total therms.
Source: ComEd tracking data and evaluation team analysis

The SFR-IHWAP program component includes measures that save water. That reduction in water produces secondary kWh savings from water supply and wastewater treatment. Table 3-11 shows the secondary measure-level savings. The savings in this table are included in the electricity savings shown in the previous tables in this section.

Table 3-11. SFR-IHWAP Secondary Energy Savings from Water Reduction by Measure – Electric – ComEd

End Use Type	Research Category	Ex Ante Annual Water Savings (gallons)	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate (RR_{water})	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)
Appliance	Freezer	0	0	NA	0	1.00	0
Appliance	Refrigerator - ER	0	0	NA	0	1.00	0
Appliance	Refrigerator - TOS	0	0	NA	0	1.00	0
Appliance	Room AC - ER	0	0	NA	0	1.00	0
HVAC	Air Source Heat Pump - ER	0	0	NA	0	1.00	0
HVAC	Central Air Conditioning - ER	0	0	NA	0	1.00	0
HVAC	Central Air Conditioning - TOS	0	0	NA	0	1.00	0
HVAC	Duct Insulation and Sealing - Distribution Efficiency	0	0	NA	0	1.00	0
HVAC	Furnace Blower Motor	0	0	NA	0	1.00	0
HVAC	Gas High Efficiency Boiler - ER	0	0	NA	0	1.00	0
HVAC	Gas High Efficiency Boiler - TOS	0	0	NA	0	1.00	0
HVAC	Gas High Efficiency Furnace - ER	0	0	NA	0	1.00	0
HVAC	Gas High Efficiency Furnace - TOS	0	0	NA	0	1.00	0
HVAC	Bathroom Exhaust Fan	0	0	NA	0	1.00	0
HVAC	Programmable Thermostat	0	0	NA	0	1.00	0
HVAC	Advanced Thermostat	0	0	NA	0	NA†	0
Hot Water	HW Pipe Insulation	0	0	NA	0	1.00	0
Hot Water	Gas Water Heater - ER	0	0	NA	0	1.00	0
Hot Water	Gas Water Heater - TOS	0	0	NA	0	1.00	0
Hot Water	Low Flow Faucet Aerator - Bathroom	35,380	131	1.00	131	1.00	131
Hot Water	Low Flow Faucet Aerator - Kitchen	93,378	305	1.00	305	1.00	305
Hot Water	Low Flow Showerhead	43,883	133	1.00	133	1.00	133
Lighting	LED Specialty Lamp - Exterior	0	0	NA	0	1.00	0
Lighting	LED Specialty Lamp - Interior	0	0	NA	0	1.00	0
Lighting	LED Omnidirectional Bulb - Exterior	0	0	NA	0	1.00	0
Lighting	LED Omnidirectional Bulb - Interior	0	0	NA	0	1.00	0
Shell	Air Sealing	0	0	NA	0	1.00	0
Shell	Basement Sidewall Insulation	0	0	NA	0	1.00	0
Shell	Floor Insulation	0	0	NA	0	1.00	0
Shell	Wall Insulation	0	0	NA	0	1.00	0
Shell	Attic Insulation	0	0	NA	0	1.00	0
Shell	Rim Insulation	0	0	NA	0	1.00	0
	Total	172,641	569	1.00	569	NA	569

Note: The savings in this table reflect only secondary electric energy (kWh) savings from water supply and wastewater treatment plants for measures claimed by ComEd, not those claimed by gas utilities.
NA = Not applicable
*A deemed value. Source found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The TRM algorithm calculates net savings for advanced thermostats.
Source: ComEd tracking data and evaluation team analysis

Table 3-12. SFR-IHWAP CY2020 Natural Gas Energy Savings by Measure – Nicor Gas

End Use Type	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG*	Verified Net Savings (Therms)
HVAC	Duct Insulation and Sealing - Distribution Efficiency	4,300	1.00	4,300	1.00	4,300
HVAC	Gas High Efficiency Boiler - ER	1,232	1.00	1,232	1.00	1,232
HVAC	Gas High Efficiency Boiler - TOS	1,238	1.00	1,238	1.00	1,238
HVAC	Gas High Efficiency Furnace - ER	34,347	1.00	34,347	1.00	34,347
HVAC	Gas High Efficiency Furnace - TOS	10,032	1.00	10,032	1.00	10,032
HVAC	Programmable Thermostat	7,091	1.00	7,091	1.00	7,091
HVAC	Advanced Thermostat	11,954	1.00	11,954	NA†	11,954
Hot Water	HW Pipe Insulation	2,152	1.00	2,152	1.00	2,152
Hot Water	Gas Water Heater - ER§	5,732	1.00	5,733	1.00	5,733
Hot Water	Gas Water Heater - TOS	163	1.00	163	1.00	163
Hot Water	Low Flow Faucet Aerator - Bathroom	376	1.00	376	1.00	376
Hot Water	Low Flow Faucet Aerator - Kitchen	531	1.00	531	1.00	531
Hot Water	Low Flow Showerhead	507	1.00	507	1.00	507
Shell	Air Sealing§	41,086	1.00	41,083	1.00	41,083
Shell	Basement Sidewall Insulation	9,195	1.00	9,193	1.00	9,193
Shell	Floor Insulation	1,599	1.00	1,599	1.00	1,599
Shell	Wall Insulation	7,365	1.00	7,365	1.00	7,365
Shell	Attic Insulation	52,088	1.00	52,084	1.00	52,084
Shell	Rim Insulation	1,773	1.00	1,773	1.00	1,773
	Total‡	192,763	1.00	192,755	NA	192,755

NA = Not applicable
*A deemed value. Source found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The TRM algorithm calculates net savings for advanced thermostats.
‡ The total excludes the electric interactive effects on the total therms.
§ Summed totals differed due to rounding.
Source: Nicor Gas tracking data and evaluation team analysis

Table 3-13. SFR-IHWAP CY2020 Natural Gas Energy Savings by Measure – Peoples Gas

End Use Type	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG*	Verified Net Savings (Therms)
HVAC	Duct Insulation and Sealing - Distribution Efficiency	3,385	1.00	3,385	1.00	3,385
HVAC	Gas High Efficiency Boiler - ER	1,108	1.00	1,108	1.00	1,108
HVAC	Gas High Efficiency Boiler - TOS	645	1.00	645	1.00	645
HVAC	Gas High Efficiency Furnace - ER	8,196	1.00	8,196	1.00	8,196
HVAC	Gas High Efficiency Furnace - TOS	978	1.00	978	1.00	978
HVAC	Programmable Thermostat	1,000	1.00	1,000	1.00	1,000
HVAC	Advanced Thermostat - Manual	3,415	1.00	3,415	NA†	3,415
Hot Water	HW Pipe Insulation	863	1.00	863	1.00	863
Hot Water	Gas Water Heater - ER	1,942	1.00	1,942	1.00	1,942
Hot Water	Gas Water Heater - TOS	82	1.00	82	1.00	82
Hot Water	Low Flow Faucet Aerator - Bathroom	57	1.00	57	1.00	57
Hot Water	Low Flow Faucet Aerator - Kitchen	274	1.00	274	1.00	274
Hot Water	Low Flow Showerhead	156	1.00	156	1.00	156
Shell	Air Sealing	15,174	1.00	15,174	1.00	15,174
Shell	Basement Sidewall Insulation	817	1.00	817	1.00	817
Shell	Floor Insulation	340	1.00	340	1.00	340
Shell	Wall Insulation	6,195	1.00	6,196	1.00	6,196
Shell	Attic Insulation	18,411	1.00	18,411	1.00	18,411
Shell	Rim Insulation	112	1.00	112	1.00	112
	Total‡	63,148	1.00	63,149	NA	63,149

NA = Not applicable

*A deemed value. Source found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The TRM algorithm calculates net savings for advanced thermostats.
‡ The total excludes the electric interactive effects on the total therms.
Source: Peoples Gas tracking data and evaluation team analysis

Table 3-14. SFR-IHWAP CY2020 Natural Gas Energy Savings by Measure – North Shore Gas

End Use Type	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG*	Verified Net Savings (Therms)
HVAC	Duct Insulation and Sealing - Distribution Efficiency	68	1.00	68	1.00	68
HVAC	Gas High Efficiency Boiler - TOS	13	1.00	13	1.00	13
HVAC	Gas High Efficiency Furnace - ER	731	1.00	731	1.00	731
HVAC	Gas High Efficiency Furnace - TOS	1,686	1.00	1,686	1.00	1,686
HVAC	Programmable Thermostat	194	1.00	194	1.00	194
HVAC	Advanced Thermostat - Manual	1,292	1.00	1,292	NA†	1,292
Hot Water	HW Pipe Insulation	136	1.00	136	1.00	136
Hot Water	Gas Water Heater - ER	168	1.00	168	1.00	168
Hot Water	Gas Water Heater - TOS	39	1.00	39	1.00	39
Hot Water	Low Flow Faucet Aerator - Bathroom	25	1.00	25	1.00	25
Hot Water	Low Flow Faucet Aerator - Kitchen	26	1.00	26	1.00	26
Shell	Air Sealing	2,491	1.00	2,491	1.00	2,491
Shell	Basement Sidewall Insulation	339	1.00	339	1.00	339
Shell	Floor Insulation	27	1.00	27	1.00	27
Shell	Attic Insulation	1,370	1.00	1,370	1.00	1,370
Shell	Rim Insulation	78	1.00	78	1.00	78
	Total‡	8,682	1.00	8,682	NA	8,682

NA = Not applicable
*A deemed value. Source found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The TRM algorithm calculates net savings for advanced thermostats.
‡ The total excludes the electric interactive effects on the total therms.
Source: North Shore Gas tracking data and evaluation team analysis

3.5 Impact Analysis Findings and Recommendations

3.5.1 Impact Parameter Estimates

The evaluation team calculated verified gross energy and demand savings using the algorithms in the TRM v8.0 and TRM v8.0 Errata where applicable. Table 3-15 presents the input parameter sources that the team used for each measure. The TRM v8.0 allows for custom or actual values to be used for some of the input parameters. When available, Guidehouse based the custom or actual values on the program tracking database.

The lifetime energy and demand savings are estimated by multiplying the verified savings by the EUL for each measure. The evaluation team calculated verified net energy and demand (coincident peak and overall) savings by multiplying the verified gross savings estimates by a NTG ratio set by the SAG consensus process.

Table 3-15. SFR-IHWAP Savings Parameters

Gross Savings Input Parameters	Value	Units	Deemed or Evaluated?	Source*
Quantity	Varies	No. of measures	Evaluated	ComEd, Nicor, Peoples Gas, North Shore Gas Data and Guidehouse Evaluation
NTG	Varies	%	Deemed	Illinois SAG Consensus
Freezer	Varies	Each	Deemed	TRM v8.0 – Section 5.1.05
Refrigerator	Varies	Each	Deemed	TRM v8.0 Errata – Section 5.1.06
Room AC	Varies	Each	Deemed	TRM v8.0 – Section 5.1.07
Air Source Heat Pump	Varies	Each	Deemed	TRM v8.0 – Section 5.3.01
Central Air Conditioning	Varies	Each	Deemed	TRM v8.0 – Section 5.3.03
Duct Insulation and Sealing	Varies	Each	Deemed	TRM v8.0 – Section 5.3.04
Furnace Blower Motor	2	Each	Deemed	TRM v8.0 – Section 5.3.05
Gas High Efficiency Boiler	Varies	Each	Deemed	TRM v8.0 – Section 5.3.06
Gas High Efficiency Furnace	Varies	Each	Deemed	TRM v8.0 – Section 5.3.07
Bathroom Exhaust Fan	Varies	Each	Deemed	TRM v8.0 – Section 5.3.09
Programmable Thermostat	Varies	Each	Deemed	TRM v8.0 – Section 5.3.11
Advanced Thermostat	Varies	Each	Deemed	TRM v8.0 – Section 5.3.16
HW Pipe Insulation	Varies	Linear Feet	Deemed	TRM v8.0 – Section 5.4.01
Gas Water Heater	Varies	Each	Deemed	TRM v8.0 – Section 5.4.02
Heat Pump Water Heater	Varies	Each	Deemed	TRM v8.0 – Section 5.4.03
Low Flow Faucet Aerator - Bathroom	Varies	Each	Deemed	TRM v8.0 – Section 5.4.04
Low Flow Faucet Aerator - Kitchen	Varies	Each	Deemed	TRM v8.0 – Section 5.4.04
Low Flow Showerhead	Varies	Each	Deemed	TRM v8.0 – Section 5.4.05
LED Specialty Lamps	Varies	Each	Deemed	TRM v8.0 Errata – Section 5.5.06
LED Omnidirectional Bulbs	Varies	Each	Deemed	TRM v8.0 Errata – Section 5.5.08
Air Sealing	Varies	Projects	Deemed	TRM v8.0 – Section 5.6.01
Basement Sidewall Insulation	Varies	Square Feet	Deemed	TRM v8.0 – Section 5.6.02
Floor Insulation	Varies	Square Feet	Deemed	TRM v8.0 – Section 5.6.03
Wall Insulation	Varies	Square Feet	Deemed	TRM v8.0 – Section 5.6.04
Attic Insulation	Varies	Square Feet	Deemed	TRM v8.0 – Section 5.6.05
Rim Insulation	Varies	Square Feet	Deemed	TRM v8.0 – Section 5.6.06

*TRM is the Illinois Statewide Technical Reference Manual version 8.0 from http://www.ilsag.info/technical-reference-manual.html. The NTG values can be found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

Source: ComEd, Nicor Gas, Peoples Gas, North Shore Gas tracking data and evaluation team analysis

3.5.2 ComEd Findings and Recommendations

Overall, the evaluation team determined that the implementer accurately calculated the energy savings for the SFR-IHWAP program component. With that in mind, the evaluation team developed two recommendations based on findings from the CY2020 evaluation. These

recommendations suggest ways to improve the measure-level realization rates. Table 3-16 presents the measure-level realization rates and program savings percentages.

Table 3-16. SFR-IHWAP Measure-Level Savings and Realization Rates – ComEd

Research Category	Realization Rate	Percentage of Verified Net Savings
LED Omnidirectional Bulb - Interior	1.00	26%
Central Air Conditioning - ER	1.00	14%
Air Sealing	1.00	14%
Attic Insulation	1.00	13%
Gas High Efficiency Furnace - ER	1.00	9%
Duct Insulation and Sealing - Distribution Efficiency	1.00	3%
Bathroom Exhaust Fan	1.00	3%
Advanced Thermostat	1.00	3%
Wall Insulation	1.00	3%
Refrigerator – ER	1.00	2%
LED Specialty Lamp - Exterior	1.00	2%
Central Air Conditioning - TOS	1.00	1%
Gas High Efficiency Furnace - TOS	1.00	1%
Programmable Thermostat	1.00	1%
Gas Water Heater - ER	1.00	1%
LED Specialty Lamp - Interior	1.00	1%
LED Omnidirectional Bulb - Exterior	1.00	1%
Basement Sidewall Insulation	1.00	1%
Freezer	1.00	<1%
Refrigerator – TOS	1.00	<1%
Room AC – ER	1.00	<1%
Air Source Heat Pump – ER	1.02	<1%
Furnace Blower Motor	1.00	<1%
Gas High Efficiency Boiler - ER	1.00	<1%
Gas High Efficiency Boiler - TOS	1.00	<1%
HW Pipe Insulation (Linear Feet)	1.00	<1%
Gas Water Heater - TOS	1.00	<1%
Low Flow Faucet Aerator - Bathroom	1.12	<1%
Low Flow Faucet Aerator - Kitchen	1.13	<1%
Low Flow Showerhead	1.08	<1%
Floor Insulation	1.00	<1%
Rim Insulation	1.00	<1%

Source: ComEd tracking data and evaluation team analysis

3.5.2.1 Air Source Heat Pump Measure

Finding 1. The IHWAP component has one air source heat pump measure, and this measure has a realization rate of 1.02. Savings calculations for this measure use an actual or deemed value for the Heating System Performance Factor of the efficient air source heat pump ($HSPF_{ee}$). The evaluation team noted that this value was not provided in the tracking data received on January 14, 2021 and requested the implementer report the actual $HSPF_{ee}$ value of the system. Upon revisiting the project, the implementer reported to the evaluation team that the installed unit's $HSPF_{ee}$ value is 9. The implementer also reported that the ex ante savings were calculated using the TRM deemed $HSPF_{ee}$ value of 8.5 instead of the actual value of 9. The evaluation team verified savings using an actual $HSPF_{ee}$ value of 9.

Recommendation 1. The evaluation team recommends that the implementer populate the HSPFee column of the tracking data with the installed unit's HSPF value in future evaluation data sets.

Low Flow Water Measures

Finding 2. The realization rate is 1.12 and 1.08 for aerators and showerheads, respectively. The ex ante savings did not account for secondary electric energy savings from water supply and wastewater treatment. In its estimation of verified electric savings, the evaluation team included secondary electric savings from water supply for all measures regardless if installed in a home with an electric or gas domestic hot water heating system. During the CY2020 Wave 1 evaluation, the implementer reported that secondary kWh savings from water will be incorporated into ex ante savings in CY2021.

3.5.3 Nicor Gas Findings and Recommendations

Overall, the evaluation team determined that the implementer accurately calculated the energy savings for the SFR-IHWAP program component. With that in mind, the evaluation team developed three recommendations based on findings from the CY2020 evaluation. These recommendations suggest ways to improve the energy savings calculations. Table 3-17 presents the measure-level realization rates and program savings percentages.

Table 3-17. SFR-IHWAP Measure-Level Savings and Realization Rates – Nicor Gas

Research Category	Realization Rate	Percentage of Verified Net Savings
Attic Insulation	1.00	27%
Air Sealing	1.00	21%
Gas High Efficiency Furnace - ER	1.00	18%
Advanced Thermostat	1.00	6%
Gas High Efficiency Furnace - TOS	1.00	5%
Basement Sidewall Insulation	1.00	5%
Wall Insulation	1.00	4%
Programmable Thermostat	1.00	4%
Gas Water Heater - ER	1.00	3%
Duct Insulation and Sealing - Distribution Efficiency	1.00	2%
Gas High Efficiency Boiler – TOS	1.00	1%
Gas High Efficiency Boiler - ER	1.00	1%
HW Pipe Insulation	1.00	1%
Floor Insulation	1.00	1%
Rim Insulation	1.00	1%
Low Flow Showerhead	1.00	<1%
Gas Water Heater - TOS	1.00	<1%
Low Flow Faucet Aerator - Bathroom	1.00	<1%
Low Flow Faucet Aerator - Kitchen	1.00	<1%

Source: Nicor Gas tracking data and evaluation team analysis

3.5.3.1 Air Sealing

Finding 3. The evaluation team used ComEd data to verify CFM50_new, or PostInstall, values for 22 joint air sealing measures, shown in Table 3-18. The PostInstall values for these 22 measures differed between the Nicor Gas tracking data and the ComEd tracking data by varying degrees. Using the ComEd values, the evaluation team calculated verified savings that resulted in a 1.00 realization rate.

Table 3-18. SFR-IHWAP Joint Nicor Gas and ComEd Air Sealing Measures

Measure ID	Nicor Gas PostInstall Value	ComEd PostInstall Value	Difference
MEA-2020.03.19-150834	1,006	1,652	-646
MEA-2020.03.22-157000	1,425	1,902	-477
MEA-2020.03.24-157333	749	1,178	-429
MEA-2019.11.22-121106	1,713	2,132	-419
MEA-2020.03.25-157499	706	1,093	-387
MEA-2020.03.24-157390	2,996	3,237	-241
MEA-2020.03.21-156909	2,000	2,152	-152
MEA-2020.03.22-157011	2,661	2,696	-35
MEA-2020.03.21-156972	1,109	1,138	-29
MEA-2020.03.23-157156	686	706	-20
MEA-2020.03.23-157092	677	691	-14
MEA-2020.03.24-157315	2,133	2,134	-1
MEA-2020.03.23-157142	1,326	1,307	19
MEA-2020.03.24-157431	746	706	40
MEA-2020.03.20-150965	2,778	2,665	113
MEA-2020.03.23-157221	926	758	168
MEA-2020.03.25-157525	1,966	1,750	216
MEA-2020.03.26-157538	1,380	955	425
MEA-2020.03.22-157041	2,665	2,196	469
MEA-2020.03.23-157195	3,479	2,817	662
MEA-2020.05.07-162364	2,000	1,255	745
MEA-2020.03.25-157457	1,933	1,121	812

Source: Nicor Gas tracking data, ComEd tracking data and evaluation team analysis

In addition, when verifying savings using the values reported in the Nicor Gas tracking data, the evaluation team originally determined that three measures (that were not joint between the two utilities) did not have 1.00 realization rates. The evaluation team identified this to be due to a discrepancy in the reported PostInstall values, as discovered in the joint projects. The implementer subsequently provided the evaluation team with the correct values, which were used to verify savings and resulted in 1.00 realization rates for these measures.

Recommendation 3. Guidehouse recommends the implementer ensure the PostInstall Value (CFM50_new) column aligns with ComEd data, when appropriate. The implementer confirmed the ComEd values used to verify savings in Table 3-18 and agreed to ensure the PostInstall Value column aligns between Nicor and ComEd tracking data moving forward.

3.5.3.2 Gas Water Heater - ER

Finding 4. Ex ante savings for 31 early replacement gas water heater measures used the TRM deemed Uniform Energy Factor ($UEF_{baseline}$) value instead of the UEF_{exist} value as required in the TRM formula for early replacement measures. In previous evaluations, the evaluation team received UEF_{exist} values in the PreInstallationEfficiency column of the tracking data, but the

column was blank for these measures. The team reached out to Nicor Gas on February 9, 2021, which confirmed that UEF_{exist} values were passed through the Baseline Efficiency column. However, the values in this column aligned with the $UEF_{baseline}$ value calculated from the measure's tank size. On April 1, 2021, the implementer provided the actual UEF_{exist} values for these measures to the evaluation team. Guidehouse used these updated values to verify savings and found a 1.00 realization rate.

Recommendation 4. The evaluation team recommends that the implementer use the replaced water heater's UEF_{exist} value when available or the TRM deemed value for UEF_{exist} of 0.52 when calculating savings for gas water heater early replacement measures. The implementer agreed to work with Nicor Gas to provide UEF_{exist} deemed or actual inputs for Early Replacement Gas Water Heaters moving forward.

3.5.3.3 Nicor Gas Supplemental Data Pulled from ComEd Data

Finding 5. The evaluation team identified three measures which were joint between Nicor Gas and ComEd but reported different values for the variables needed in savings calculations. The values provided in the Nicor Gas tracking data did not result in a realization rate of 1. The evaluation team compared these values to the ComEd tracking data and used the ComEd values to verify savings. This approach resulted in a realization rate of 1 for these measures for both of the utilities. Table 3-19 provides the measures and specific variables the evaluation team used to verify savings.

Table 3-19. SFR-IHWAP Insulation Measures Needing ComEd Supplemental Tracking Data

Research Category	Measure ID	Variable Needed	Nicor Gas Data	ComEd Data
Basement Sidewall Insulation	MEA-2019.12.10-128163	R_added_BG	7	0
Wall Insulation	MEA-2020.03.24-157382	Area	86	86.44
Wall Insulation	MEA-2020.03.22-157039	Area	123	107

Source: ComEd and Nicor Gas tracking data and evaluation team analysis

Recommendation 5. Guidehouse recommends that the implementer ensure the values in the tracking data align with ComEd data, when appropriate. In April 1 2021, the implementer verified the values from the ComEd data shown in Table 3-19 and agreed to ensure the values in the tracking data align between Nicor and ComEd moving forward.

3.5.4 Peoples Gas and North Shore Gas Findings and Recommendations

Overall, the evaluation team determined that the implementer accurately calculated the energy savings for the SFR-IHWAP program component. With that in mind, the evaluation team developed one recommendation based on findings from the CY2020 evaluation. This recommendation suggests ways to improve the energy savings calculations. Table 3-20 presents the measure-level realization rates and program savings percentages.

Table 3-20. SFR-IHWAP Measure-Level Savings and Realization Rates – Peoples Gas

Research Category	Realization Rate	Percentage of Verified Net Savings
Wall Insulation	1.00	29%
Low Flow Showerhead	1.00	24%
Gas High Efficiency Boiler - TOS	1.00	13%
Floor Insulation	1.00	10%
Duct Insulation and Sealing - Distribution Efficiency	1.00	5%
Programmable Thermostat	1.00	5%
Rim Insulation	1.00	5%
HW Pipe Insulation (Linear Feet)	1.00	3%
Furnace Blower Motor	1.00	2%
Gas High Efficiency Furnace - ER	1.00	2%
Gas High Efficiency Furnace - TOS	1.00	2%
Gas High Efficiency Boiler - ER	1.00	1%
Advanced Thermostat	1.00	1%
Air Sealing	1.00	1%
Basement Sidewall Insulation	1.00	1%
Gas Water Heater - ER	1.00	<1%
Gas Water Heater - TOS	1.00	<1%
Low Flow Faucet Aerator - Bathroom	1.00	<1%
Low Flow Faucet Aerator - Kitchen	1.00	<1%
Attic Insulation	1.00	<1%

Source: Peoples Gas tracking data and evaluation team analysis

Table 3-21. SFR-IHWAP Measure-Level Savings and Realization Rates – North Shore Gas

Research Category	Realization Rate	Percentage of Verified Net Savings
Low Flow Faucet Aerator - Bathroom	1.00	29%
Rim Insulation	1.00	19%
Air Sealing	1.00	16%
Gas High Efficiency Furnace - TOS	1.00	15%
Gas High Efficiency Boiler - ER	1.00	8%
Attic Insulation	1.00	8%
Low Flow Faucet Aerator - Kitchen	1.00	4%
Gas High Efficiency Furnace - ER	1.00	2%
Programmable Thermostat	1.00	2%
Advanced Thermostat	1.00	2%
Duct Insulation and Sealing - Distribution Efficiency	1.00	1%
Basement Sidewall Insulation	1.00	1%
Floor Insulation	1.00	1%
Furnace Blower Motor	1.00	<1%
HW Pipe Insulation (Linear Feet)	1.00	<1%
Gas Water Heater - TOS	1.00	<1%

Source: North Shore Gas tracking data and evaluation team analysis

3.5.4.1 Peoples Gas and North Shore Gas Supplemental Data Pulled from ComEd Data

Finding 6. The evaluation team identified multiple measures which were joint between Peoples Gas or North Shore Gas and ComEd but reported different values for the variables needed in savings calculations. The values provided in the Peoples Gas and North Shore Gas tracking data did not result in a realization rate of 1. The evaluation team compared these values to the ComEd tracking data and used the ComEd values to verify savings. This approach resulted in a realization rate of 1 for these measures for all of the utilities. Table 3-22 provides the measures and specific variables the evaluation team used to verify savings.

Table 3-22. SFR-IHWAP Peoples Gas and North Shore Gas Measures Needing ComEd Supplemental Tracking Data

Research Category	Variable(s) Pulled from ComEd data	Measures Impacted	PG-NSG Data	ComEd Data
Duct Insulation and Sealing	Input Capacity Heat	All	NA	Varies
Gas Water Heater - ER	UEF_{exist}	MEA-2020.07.30-163801 MEA-2020.07.30-163730 MEA-2020.07.24-163421 MEA-2019.09.24-99658	0.52	0.5
Gas Water Heater - All Measures	Tank Size	All	NA	Varies
Low Flow Faucet Aerator	Household Type	MEA-2020.05.01-162021 MEA-2020.02.25-141864	NA	Mobile Homes (impacts FPH and EPG_gas)
Shell Measures	Heating Type (Boiler/Furnace)	All	NA	Varies
Air Sealing	N_heat	All	NA	Varies
Basement Sidewall Insulation	- Insulation Type (Studs/Cavity or Spray Foam) - R_old_BG	All	NA	Varies

Source: Peoples Gas, North Shore Gas and ComEd tracking data and evaluation team analysis

Recommendation 6. The evaluation team recommends the implementer include these variables in its tracking data and ensure the values in the tracking data align with ComEd data, when appropriate. On April 1, 2021, the implementer verified the values from the ComEd data shown in Table 3-22 and ensured they will work to address these discrepancies moving forward.

3.1 Total Cost Resource Test

Table 3-23. through Table 3-26 show 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) is not included in this table and will be provided to the evaluation team later.

Table 3-23. SFR-IHWAP Total Resource Cost Savings Summary – ComEd

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)
Appliance	Freezer	Each	30	22.0	No	1,096	0.18	0	0	0	0	1.00	1.00	1.00	1,096	0.18	0	0	0	0
Appliance	Refrigerator - ER‡	Each	116	17.0	Yes	50,058	7.54	0	0	0	0	1.00	1.00	1.00	50,058	7.54	0	0	0	0
Appliance	Refrigerator - TOS	Each	1	17.0	No	37	0.01	0	0	0	0	1.00	1.00	1.00	37	0.01	0	0	0	0
Appliance	Room AC - ER‡	Each	56	12.0	Yes	4,607	6.45	0	0	0	0	1.00	1.00	1.00	4,607	6.45	0	0	0	0
HVAC	Air Source Heat Pump - ER‡	Each	1	16.0	Yes	4,441	0.24	0	0	0	0	1.00	1.00	1.00	4,441	0.24	0	0	0	0
HVAC	Central Air Conditioning - ER‡	Each	230	18.0	Yes	327,548	176.35	0	0	0	0	1.00	1.00	1.00	327,548	176.35	0	0	0	0
HVAC	Central Air Conditioning - TOS	Each	65	18.0	No	15,337	14.58	0	0	0	0	1.00	1.00	1.00	15,337	14.58	0	0	0	0
HVAC	Duct Insulation and Sealing - Distribution Efficiency	Each	32	20.0	No	15,315	5.82	2,178	0	0	0	1.00	1.00	1.00	15,315	5.82	2,178	0	0	0
HVAC	Furnace Blower Motor	Each	2	6.0	No	975	0.05	0	0	0	-4	1.00	1.00	1.00	975	0.05	0	0	0	-4
HVAC	Gas High Efficiency Boiler - ER‡	Each	7	25.0	Yes	0	0.00	180	0	0	0	1.00	1.00	1.00	0	0.00	180	0	0	0
HVAC	Gas High Efficiency Boiler - TOS	Each	5	25.0	No	0	0.00	107	0	0	0	1.00	1.00	1.00	0	0.00	107	0	0	0
HVAC	Gas High Efficiency Furnace - ER‡	Each	298	20.0	Yes	151,226	17.73	1,962	0	0	-1,548	1.00	1.00	1.00	151,226	17.73	1,962	0	0	-1,548
HVAC	Gas High Efficiency Furnace - TOS	Each	23	20.0	No	0	1.32	460	0	0	-122	1.00	1.00	1.00	0	1.32	460	0	0	-122
HVAC	Bathroom Exhaust Fan	Each	578	19.0	No	73,725	8.46	0	0	0	0	1.00	1.00	1.00	73,725	8.46	0	0	0	0
HVAC	Programmable Thermostat	Each	130	8.0	No	9,653	0.00	257	0	0	0	1.00	1.00	1.00	9,653	0.00	257	0	0	0
HVAC	Advanced Thermostat	Each	237	11.0	No	43,653	13.89	896	0	0	0	1.00	1.00	1.00	43,653	13.89	896	0	0	0
Hot Water	HW Pipe Insulation	Linear Feet	1,488	15.0	No	2,217	0.25	215	0	0	0	1.00	1.00	1.00	2,217	0.25	215	0	0	0
Hot Water	Gas Water Heater - ER‡	Each	55	13.0	Yes	0	0.00	662	0	0	0	1.00	1.00	1.00	0	0.00	662	0	0	0
Hot Water	Gas Water Heater - TOS	Each	4	13.0	No	0	0.00	32	0	0	0	1.00	1.00	1.00	0	0.00	32	0	0	0
Hot Water	Low Flow Faucet Aerator - Bathroom	Each	115	10.0	No	447	0.64	21	131	0	0	1.00	1.00	1.00	447	0.64	21	131	0	0
Hot Water	Low Flow Faucet Aerator - Kitchen	Each	46	10.0	No	905	0.30	49	305	0	0	1.00	1.00	1.00	905	0.30	49	305	0	0
Hot Water	Low Flow Showerhead	Each	63	10.0	No	426	0.06	45	133	0	0	1.00	1.00	1.00	426	0.06	45	133	0	0
Lighting	LED Specialty Lamp - Exterior‡	Each	198	6.9	No	35,593	3.93	0	0	0	0	1.00	1.00	1.00	35,593	3.93	0	0	0	0
Lighting	LED Specialty Lamp - Interior‡ †§	Each	521	10.0	No	18,321	2.76	0	0	-99	-410	1.00	1.00	1.00	18,321	2.76	0	0	-99	-410
Lighting	LED Omnidirectional Bulb - Exterior‡	Each	177	8.0	No	17,888	1.97	0	0	0	0	1.00	1.00	1.00	17,888	1.97	0	0	0	0
Lighting	LED Omnidirectional Bulb - Interior‡ †§	Each	11,708	10.0	No	605,623	74.93	0	0	-3,169	-13,537	1.00	1.00	1.00	605,623	74.93	0	0	-3,169	-13,537
Shell	Air Sealing‡	Projects	543	20.0	No	196,217	98.04	3,900	0	0	0	1.00	1.00	1.00	196,217	98.04	3,900	0	0	0
Shell	Basement Sidewall Insulation‡	Square Feet	32,318	20.0	No	16,447	6.12	188	0	0	0	1.00	1.00	1.00	16,447	6.12	188	0	0	0
Shell	Floor Insulation‡	Square Feet	14,903	20.0	No	3,277	0.91	97	0	0	0	1.00	1.00	1.00	3,277	0.91	97	0	0	0
Shell	Wall Insulation‡	Square Feet	148,475	20.0	No	27,772	8.65	1,373	0	0	0	1.00	1.00	1.00	27,772	8.65	1,373	0	0	0
Shell	Attic Insulation‡	Square Feet	415,969	20.0	No	169,183	69.08	4,263	0	0	0	1.00	1.00	1.00	169,183	69.08	4,263	0	0	0
Shell	Rim Insulation‡	Square Feet	17,961	20.0	No	3,935	1.55	42	0	0	0	1.00	1.00	1.00	3,935	1.55	42	0	0	0
	Total		646,355	12.0		1,795,923	521.80	16,929	569	-3,268	-15,622				1,795,923	521.80	16,929	569	-3,268	-15,622

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. Table 3-23. represents the kWh savings from Table 3-7 minus those shown in Table 3-11.

*The total of the EUL column is the WAML and is calculated as the sum product of EUL and measure savings divided by total program savings.
† ER measures are flagged as YES; otherwise a NO is indicated in the column.
‡ The EUL for this measure varies over time. See Table 3-4 to Table 3-6.
†§ The kWh savings account for electric heating penalties, where applicable. The electric heating penalties columns show the magnitude of adjustments applied to the program savings. Gas heating penalties represent the program therms heating penalties. The therms penalties are not required to be applied to the program savings.

Source: ComEd tracking data and evaluation team analysis

Table 3-24. SFR-IHWAP Total Resource Cost Savings Summary – Nicor Gas

End Use Type	Research Category	Units	Quantity	EUL (years)*	ER Flag†	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	NTG	Verified Net Savings (Therms)
HVAC	Duct Insulation and Sealing - Distribution Efficiency	Each	18	20	No	4,300	4,300	1.00	4,300
HVAC	Gas High Efficiency Boiler - ER	Each	4	25	Yes	1,232	1,232	1.00	1,232
HVAC	Gas High Efficiency Boiler - TOS	Each	8	25	No	1,238	1,238	1.00	1,238
HVAC	Gas High Efficiency Furnace - ER	Each	238	20	Yes	34,347	34,347	1.00	34,347
HVAC	Gas High Efficiency Furnace - TOS	Each	73	20	No	10,032	10,032	1.00	10,032
HVAC	Programmable Thermostat	Each	112	8	No	7,091	7,091	1.00	7,091
HVAC	Advanced Thermostat	Each	165	11	No	11,954	11,954	1.00	11,954
Hot Water	HW Pipe Insulation	Linear Feet	2,445	15	No	2,152	2,152	1.00	2,152
Hot Water	Gas Water Heater - ER	Each	132	13	Yes	5,732	5,733	1.00	5,733
Hot Water	Gas Water Heater - TOS	Each	10	13	No	163	163	1.00	163
Hot Water	Low Flow Faucet Aerator - Bathroom	Each	379	10	No	376	376	1.00	376
Hot Water	Low Flow Faucet Aerator - Kitchen	Each	71	10	No	531	531	1.00	531
Hot Water	Low Flow Showerhead	Each	154	10	No	507	507	1.00	507
Shell	Air Sealing	Projects	412	20	No	41,086	41,083	1.00	41,083
Shell	Basement Sidewall Insulation	Square Feet	27,600	20	No	9,195	9,193	1.00	9,193
Shell	Floor Insulation	Square Feet	12,284	20	No	1,599	1,599	1.00	1,599
Shell	Wall Insulation	Square Feet	71,822	20	No	7,365	7,365	1.00	7,365
Shell	Attic Insulation	Square Feet	335,066	20	No	52,088	52,084	1.00	52,084
Shell	Rim Insulation	Square Feet	16,632	20	No	1,773	1,773	1.00	1,773
	Total		467,625	18.7		192,763	192,755		192,755

*The total of the EUL column is the WAML and is calculated as the sum product of EUL and measure savings divided by total program savings.

† ER measures are flagged as YES; otherwise a NO is indicated in the column.
Source: Nicor tracking data and evaluation team analysis

Table 3-25. SFR-IHWAP Total Resource Cost Savings Summary – Peoples Gas

End Use Type	Research Category	Units	Quantity	EUL (years)*	ER Flag†	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	NTG	Verified Net Savings (Therms)
HVAC	Duct Insulation and Sealing - Distribution Efficiency	Each	13	20	No	3,385	3,385	1.00	3,385
HVAC	Gas High Efficiency Boiler - ER	Each	7	25	Yes	1,108	1,108	1.00	1,108
HVAC	Gas High Efficiency Boiler - TOS	Each	4	25	No	645	645	1.00	645
HVAC	Gas High Efficiency Furnace - ER	Each	60	20	Yes	8,196	8,196	1.00	8,196
HVAC	Gas High Efficiency Furnace - TOS	Each	9	20	No	978	978	1.00	978
HVAC	Programmable Thermostat	Each	21	8	No	1,000	1,000	1.00	1,000
HVAC	Advanced Thermostat - Manual	Each	53	11	No	3,415	3,415	1.00	3,415
Hot Water	HW Pipe Insulation	Linear Feet	1,140	15	No	863	863	1.00	863
Hot Water	Gas Water Heater - ER	Each	45	13	Yes	1,942	1,942	1.00	1,942
Hot Water	Gas Water Heater - TOS	Each	2	13	No	82	82	1.00	82
Hot Water	Low Flow Faucet Aerator - Bathroom	Each	66	10	No	57	57	1.00	57
Hot Water	Low Flow Faucet Aerator - Kitchen	Each	36	10	No	274	274	1.00	274
Hot Water	Low Flow Showerhead	Each	53	10	No	156	156	1.00	156
Shell	Air Sealing	Projects	118	20	No	15,174	15,174	1.00	15,174
Shell	Basement Sidewall Insulation	Square Feet	2,557	20	No	817	817	1.00	817
Shell	Floor Insulation	Square Feet	2,869	20	No	340	340	1.00	340
Shell	Wall Insulation	Square Feet	77,227	20	No	6,195	6,196	1.00	6,196
Shell	Attic Insulation	Square Feet	81,171	20	No	18,411	18,411	1.00	18,411
Shell	Rim Insulation	Square Feet	1,330	20	No	112	112	1.00	112
	Total		166,781	19.1		63,148	63,149		63,149

*The total of the EUL column is the WAML and is calculated as the sum product of EUL and measure savings divided by total program savings.
† ER measures are flagged as YES; otherwise a NO is indicated in the column.
Source: Peoples Gas tracking data and evaluation team analysis

Table 3-26. SFR-IHWAP Total Resource Cost Savings Summary – North Shore Gas

End Use Type	Research Category	Units	Quantity	EUL (years)*	ER Flag†	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	NTG	Verified Net Savings (Therms)
HVAC	Duct Insulation and Sealing - Distribution Efficiency	Each	1	20	No	68	68	1.00	68
HVAC	Gas High Efficiency Boiler - TOS	Each	1	25	No	13	13	1.00	13
HVAC	Gas High Efficiency Furnace - ER	Each	5	20	Yes	731	731	1.00	731
HVAC	Gas High Efficiency Furnace - TOS	Each	13	20	No	1,686	1,686	1.00	1,686
HVAC	Programmable Thermostat	Each	4	8	No	194	194	1.00	194
HVAC	Advanced Thermostat - Manual	Each	19	11	No	1,292	1,292	1.00	1,292
Hot Water	HW Pipe Insulation	Linear Feet	180	15	No	136	136	1.00	136
Hot Water	Gas Water Heater - ER	Each	8	13	Yes	168	168	1.00	168
Hot Water	Gas Water Heater - TOS	Each	1	13	No	39	39	1.00	39
Hot Water	Low Flow Faucet Aerator - Bathroom	Each	25	10	No	25	25	1.00	25
Hot Water	Low Flow Faucet Aerator - Kitchen	Each	3	10	No	26	26	1.00	26
Shell	Air Sealing	Projects	24	20	No	2,491	2,491	1.00	2,491
Shell	Basement Sidewall Insulation	Square Feet	2,832	20	No	339	339	1.00	339
Shell	Floor Insulation	Square Feet	500	20	No	27	27	1.00	27
Shell	Attic Insulation	Square Feet	12,370	20	No	1,370	1,370	1.00	1,370
Shell	Rim Insulation	Square Feet	856	20	No	78	78	1.00	78
	Total		16,842	18.1		8,682	8,682		8,682

*The total of the EUL column is the WAML and is calculated as the sum product of EUL and measure savings divided by total program savings.
† ER measures are flagged as YES; otherwise a NO is indicated in the column.

Source: North Shore Gas tracking data and evaluation team analysis