



Focus on Energy Calendar Year 2018 Evaluation Report

VOLUME I

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Acronyms and Abbreviations

Acronym	Term
CY	Calendar year
NPS	Net promoter score
NTG	Net-to-gross
PSC	Public Service Commission of Wisconsin
PTAC	Packaged terminal air conditioner
PTHP	Packaged terminal heat pump
RIM	Ratepayer impact measure test
TRC	Total resource cost test
TRM	Wisconsin Technical Reference Manual
UAT	Utility administrator cost test

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Executive Summary

This report, presented in three volumes, describes the evaluation findings and impacts achieved by Focus on Energy for calendar year (CY) 2018 and over the CY 2015–CY 2018 quadrennium.

- Volume I (this report) is a summary of findings across all programs and measure categories in the portfolio.
- Volume II provides detailed findings for each Focus on Energy program, including pilot programs.
- The Appendices contain additional details on the evaluation methodologies along with supporting data and evaluation materials.

When appropriate, each volume presents rolled-up quadrennial findings with the annual results. The Wisconsin Focus on Energy Online Reporting tool¹ allows users to review savings by year, program, customer sector, and measure category, and it offers other useful data by county, political district, and utility territory. Additionally, the Quadrennial Achievement Report highlights outcomes over the past four years across all programs and measure categories. It is intended to provide a snapshot of the progress Focus on Energy has made in helping Wisconsin utility customers save energy and money and in achieving benefits for Wisconsin's economy and environment.

All five resources (Volume I, Volume II, the Appendices, the Online Reporting tool, and the Quadrennial Achievement Report) should be read

together to gain a comprehensive perspective of the Focus on Energy portfolio.

Overall, the CY 2018 programs were cost-effective and achieved high participant satisfaction. Altogether, the program achieved its overall energy savings goal, as well as some but not all of its fuel-specific energy savings goals.

SUMMARY OF METHODS

The Evaluation Team² defined key evaluation terms, briefly presented here and described in more detail in the Glossary of Terms in Appendix B:

- **Gross savings:** Program-reported change in energy consumption, demand, or both resulting from an efficiency program
- **Verified gross savings:** Energy savings verified by the independent Evaluation Team
- **Net savings:** Savings directly attributable to program efforts (net of what would have occurred in absence of the program)

To determine verified gross savings, the Evaluation Team reviewed and assessed the technical assumptions used by Focus on Energy to calculate savings, participation levels, and measure installation and retention rates. To determine net savings, the Evaluation Team conducted primary research in CY 2018 and—in a few instances—applied previous years' evaluation results.

¹The Wisconsin Focus on Energy Online Reporting tool is available online: <http://evaluations.focusonenergy.com>

²The Evaluation Team comprises Cadmus, Apex Analytics, and St. Norbert College Strategic Research Institute.

KEY ACHIEVEMENTS

The Public Service Commission of Wisconsin (PSC) adopted four-year (CY 2015 through CY 2018) net annual savings goals of 15,407,384 MMBtu, 2,261,492,068 kWh, 319,838 kW, and 76,911,727 therms.³

Table 1 lists CY 2018 annual gross claimed savings, verified gross savings, and verified net savings for residential, nonresidential, pilot, and rural programs. The pilot program initiative was started early in the quad to test new technologies and approaches before adopting them as new programs or adding them to existing programs as new measures (see the Pilots and Initiative chapter of Volume II). Rural broadband programs were added in CY 2017 in response to a commission directive to target increased program participation in rural areas of the state, as defined by a commission-defined list of rural zip codes (see Appendix M).

Table 1. CY 2018 First-Year Annual Savings by Segment

SAVINGS TYPE	UNIT	RESIDENTIAL	NONRESIDENTIAL	PILOTS	RURAL	TOTAL
Gross	MMBtu	1,430,753	3,721,918	332,155	153,679	5,638,506
	kWh	304,887,712	532,273,799	16,192,807	21,229,197	874,583,515
	kW	39,331	68,983	1,483	1,492	111,289
	therms	3,904,764	19,058,000	2,769,056	812,450	26,544,271
Verified Gross	MMBtu	1,334,112	3,629,900	360,854	118,639	5,443,504
	kWh	277,110,323	513,170,057	19,171,440	18,027,087	827,478,907
	kW	36,298	69,050	1,589	1,472	108,409
	therms	3,886,111	18,789,638	2,954,406	571,303	26,201,458
Verified Net	MMBtu	879,719	2,202,666	356,324	115,566	3,554,275
	kWh	163,136,379	317,458,433	18,485,467	17,469,817	516,550,096
	kW	21,846	43,040	1,488	1,405	67,780
	therms	3,230,979	11,194,976	2,932,520	559,589	17,918,064

Notes: Totals may not match the sum of segment savings due to rounding.

Totals include an extra 144 therms gross from CY 2017 adjustments registered in CY 2018, and an extra 532,833 kWh net from a correction to CY 2016 Home Performance with ENERGY STAR Program air conditioner savings. This was based on: Cadmus. May 22, 2018. Focus on Energy Calendar Year 2017 Evaluation Report, Volume II. p.105. <https://www.focusonenergy.com/sites/default/files/WI%20FOE%20CY%202017%20Volume%20II%20FINAL.pdf>

Some savings from pilots and rural programs reflect program activities in earlier years that are credited to the year in which they were evaluated. See Appendix E, Tables E-13, E-14, and E-15 for more details.

³Public Service Commission of Wisconsin. Amendment 2 to the Contract for Services between the Statewide Energy Efficiency and Renewables Administration and CB&I Government Solutions, Inc. PSC REF#: 283917, Contract Number 9501-FE-120, Amendment 2. http://psc.wi.gov/apps35/ERF_view/viewdoc.aspx?docid=283917

Table 2 lists the verified net savings achieved over the four years of the CY 2015–CY 2018 quadrennial.

Table 2. CY 2015-CY 2018 First-Year Annual Verified Net Savings by Segment

CALENDER YEAR	UNIT	RESIDENTIAL	NONRESIDENTIAL	PILOTS	RURAL	TOTAL
2015	MMBtu	927,346	3,869,846	n/a	n/a	4,797,192
	kWh	206,530,139	351,708,289	n/a	n/a	558,238,428
	kW	24,312	48,869	n/a	n/a	73,180
	therms	2,226,649	26,698,171	n/a	n/a	28,924,820
2016	MMBtu	808,349	2,658,146	24,137	n/a	3,490,631
	kWh	148,369,600	293,179,447	2,114,161	n/a	443,663,207
	kW	21,746	41,663	2,624	n/a	66,033
	therms	3,021,116	16,578,176	169,232	n/a	19,768,524
2017	MMBtu	679,437	2,287,420	167,880	n/a	3,134,737
	kWh	127,922,119	342,364,018	5,534,332	n/a	475,820,469
	kW	16,756	47,230	991	n/a	64,977
	therms	2,429,672	11,192,738	1,489,966	n/a	15,112,376
2018	MMBtu	879,719	2,202,666	356,324	115,566	3,554,275
	kWh	163,136,379	317,458,433	18,485,467	17,469,817	516,550,096
	kW	21,846	43,040	1,488	1,405	67,780
	therms	3,230,979	11,194,976	2,932,520	559,589	17,918,064
Total	MMBtu	4,020,320	11,497,492	548,341	115,566	16,181,719
	kWh	823,732,947	1,361,633,095	26,133,960	17,469,817	2,228,969,819
	kW	106,407	188,551	5,103	1,405	301,467
	therms	12,097,432	68,511,272	4,591,718	559,589	85,760,011

Notes: Totals may not match the sum of residential and nonresidential savings due to rounding.

Totals include an extra 144 therms gross from CY 2017 adjustments registered in CY 2018, and an extra 532,833 kWh net from a correction to CY 2016 Home Performance with ENERGY STAR Program air conditioner savings (Cadmus 2018).

Quadrennial net residential savings include additional savings from market effects, which account for the program's long-term effect on the Wisconsin residential lighting market. Additional details can be found in the Quadrennial Market Effects section of the Retail Lighting and Appliance Program chapter within Volume II. Total quadrennial savings also include nonparticipant spillover and nonresidential Training Program spillover not counted in individual years. Some savings from pilots and rural programs reflect program activities in earlier years that are credited to the year in which they were evaluated. See Appendix E, Tables E-13, E-14, and E-15 for more details.

As shown in Figure 1, Focus on Energy achieved 105% of the MMBtu savings goal, 99% of the electric energy savings goal, 94% of the electric demand reduction goal, and 112% of the natural gas net annual quadrennial savings goal.

Figure 1. Focus on Energy’s Achievement of Four-Year (CY 2015–CY 2018) Net Annual Savings Goal



Note: These are the percentages achieved of PSC’s established net annual goals of 15,407,384 MMBtu, 2,261,492,068 kWh, 319,838 kW, and 76,911,727 therms.

Additionally, the PSC ordered that the Focus on Energy Program Administrator track quadrennial savings goals compared to verified gross lifecycle savings targets. Lifecycle savings represent the savings that programs can realize through measures over their expected useful lives. These targets are 270,978,131 MMBtu, 33,166,224,930 kWh, 422,264 kW, and 1,578,025,700 therms.⁴ Table 3 shows the lifecycle savings achieved by Focus on Energy in CY 2018.

Table 3. CY 2018 Lifecycle Savings by Segment

SAVINGS TYPE	UNIT	RESIDENTIAL	NONRESIDENTIAL	PILOTS	RURAL	TOTAL
Gross	MMBtu	24,334,458	55,215,190	3,656,783	1,672,041	84,878,472
	kWh	5,159,684,303	7,562,648,558	159,743,596	243,131,731	13,125,208,188
	kW	39,331	68,983	1,483	1,492	111,289
	therms	67,296,149	294,114,331	31,117,381	8,424,754	400,952,615
Verified Gross	MMBtu	22,728,347	54,370,366	3,716,892	1,309,942	82,125,547
	kWh	4,700,961,332	7,230,617,097	148,919,608	207,682,845	12,288,180,882
	kW	36,298	69,050	1,589	1,472	108,409
	therms	66,886,674	296,995,006	32,087,779	6,013,281	401,982,740
Verified Net	MMBtu	15,048,155	33,329,024	3,659,987	1,273,397	53,310,563
	kWh	2,761,577,271	4,527,872,955	140,846,381	200,528,240	7,630,824,848
	kW	21,846	43,040	1,488	1,405	67,780
	therms	56,256,535	178,799,219	31,794,187	5,891,946	272,741,888

Notes: Totals may not match the sum of residential and nonresidential savings due to rounding.

Totals include an extra 3,312 therms gross from CY 2017 adjustments registered in CY 2018, and an extra 12,244,869 kWh net from a correction to CY 2016 Home Performance with ENERGY STAR Program air conditioner savings (Cadmus 2018).

⁴ Public Service Commission of Wisconsin. Amendment 4 to the Contract for Services Between the Statewide Energy Efficiency and Renewables Administration and CB&I Government Solutions, Inc. PSC REF#: 338759, Contract Number 9501-FE-120, Amendment 4. https://apps.psc.wi.gov/vs2015/erf_view/viewdoc.aspx?docid=338759

Table 4 lists verified gross lifecycle savings achieved in all four years of the CY 2015–CY 2018 quadrennial.

Table 4. CY 2015-CY 2018 Verified Gross Lifecycle Savings by Segment

CALENDER YEAR	UNIT	RESIDENTIAL	NONRESIDENTIAL	PILOTS	RURAL	TOTAL
2015	MMBtu	15,832,924	61,140,436	n/a	n/a	76,973,360
	kWh	2,223,095,841	6,583,672,339	n/a	n/a	8,806,768,180
	kW	28,896	62,608	n/a	n/a	91,504
	therms	82,477,213	386,769,461	n/a	n/a	469,246,674
2016	MMBtu	19,728,652	52,365,600	254,039	n/a	72,348,291
	kWh	3,199,626,956	6,291,666,334	23,641,640	n/a	9,514,934,930
	kW	29,612	59,101	3,604	n/a	92,316
	therms	88,115,245	308,984,348	1,733,736	n/a	398,833,329
2017	MMBtu	23,537,736	45,551,206	185,023	n/a	69,273,965
	kWh	4,503,849,482	7,204,857,056	10,558,641	n/a	11,719,265,179
	kW	30,921	65,410	1,020	n/a	97,351
	therms	81,706,019	209,682,335	1,489,966	n/a	292,878,320
2018	MMBtu	22,728,347	54,370,366	3,716,892	1,309,942	82,125,547
	kWh	4,700,961,332	7,230,617,097	148,919,608	207,682,845	12,288,180,882
	kW	36,298	69,050	1,589	1,472	108,409
	therms	66,886,674	296,995,006	32,087,779	6,013,281	401,982,740
Total	MMBtu	81,827,660	213,427,608	4,155,953	1,309,942	300,721,163
	kWh	14,627,533,612	27,310,812,826	183,119,889	207,682,845	42,329,149,172
	kW	125,726	256,169	6,213	1,472	389,580
	therms	319,185,152	1,202,431,150	35,311,481	6,013,281	1,562,941,063

Notes: Totals may not match the sum of residential and nonresidential savings due to rounding.

Totals include an extra 3,312 therms gross from CY 2017 adjustments registered in CY 2018, and an extra 12,244,869 kWh net from a correction to CY 2016 Home Performance with ENERGY STAR Program air conditioner savings (Cadmus 2018). Some savings from pilots and rural programs reflect program activities in earlier years that are credited to the year in which they were evaluated. See Appendix E, Tables E-13, E-14, and E-15 for more details.

As shown in Figure 2, Focus on Energy achieved 111% of the MMBtu savings goal, 128% of the electric energy savings goal, 92% of the electric demand reduction goal, and 99% of the natural gas verified gross lifecycle quadrennial savings goal.

Figure 2. Program Administrator’s Achievements of Four-Year (CY 2015–CY 2018) Verified Gross Lifecycle Savings Goal



Note: These are the percentages achieved of the Program Administrator’s established verified gross lifecycle goals of 270,978,131 MMBtu, 33,166,224,930 kWh, 422,264 kW, and 1,578,025,700 therms.

The Program Administrator also has a contractual goal to maximize participant satisfaction. In CY 2018 surveys, participants gave an average customer satisfaction rating of 9.1 on a 0 to 10 point scale, where 10 meant extremely satisfied and 0 meant extremely dissatisfied. The CY 2018 average customer satisfaction rating is statistically higher than the CY 2015 average rating of 8.8,⁵ which was established as the portfolio baseline against which to measure improvement for the CY 2015–CY 2018 quadrennial.⁶

Table 5 lists findings from the Evaluation Team’s benefit/cost analysis of the CY 2018 portfolio. The residential and nonresidential segments and overall portfolio were cost-effective.

Table 5. CY 2018 Cost-Effectiveness Results

FOCUS ON ENERGY BENEFITS AND COSTS		PORTFOLIO BREAKOUT	CORE EFFICIENCY	PILOTS	RURAL	RENEWABLES
Incentives	\$75,892,333		\$59,172,374	\$4,382,328	\$7,886,441	\$4,451,190
Modified TRC Benefits	\$848,145,948		\$740,848,989	\$42,603,163	\$19,729,752	\$44,964,045
Modified TRC Costs	\$231,547,927		\$179,118,048	\$7,875,201	\$13,509,232	\$31,045,446
Portfolio TRC Ratio	3.66	Alone	4.14	5.41	1.46	1.45
		With Core		4.19	3.95	3.74
		With Core and Pilots (All Efficiency)			4.01	3.80
		With Core, Pilots, and Rural				3.66

⁵ $p < 0.05$ using binomial t-test.

⁶ The portfolio baseline was computed as a participation-weighted average of CY 2015 overall satisfaction ratings for each surveyed program in the CY 2015 portfolio, excluding the Appliance Recycling Program (which was suspended at the end of CY 2015). Programs included in the baseline were Multifamily Direct Install, Multifamily Energy Savings, Home Performance with ENERGY STAR, Residential Rewards/Enhanced Rewards, Express Energy Efficiency, Business Incentive, Small Business, Large Energy Users, and Agriculture, Schools, and Government.

Table 6 lists findings from the Evaluation Team’s benefit/cost analysis of the CY 2015–CY 2018 portfolio. The residential and nonresidential segments and overall portfolio were cost-effective.

Table 6. CY 2015–CY 2018 Cost-Effectiveness Results

FOCUS ON ENERGY BENEFITS AND COSTS		PORTFOLIO BREAKOUT	CORE EFFICIENCY	PILOTS	RURAL	RENEWABLES
Incentives	\$248,546,425		\$219,882,994	\$6,188,116	\$7,919,855	\$14,555,461
Modified TRC Benefits	\$3,586,106,847		\$3,383,822,874	\$52,821,883	\$19,729,752	\$129,732,339
Modified TRC Costs	\$989,636,895		\$859,133,455	\$14,784,828	\$13,808,775	\$101,909,836
Portfolio TRC Ratio	3.62	Alone	3.94	3.57	1.43	1.27
		With Core		3.93	3.90	3.66
		With Core and Pilots (All Efficiency)			3.89	3.65
		With Core, Pilots, and Rural				3.62

Introduction

Focus on Energy is Wisconsin's statewide energy efficiency and renewable resource program funded by the state's investor-owned energy utilities—as required under Wisconsin Statute §196.374(2)(a)—and by participating municipal and electric cooperative utilities. The PSC provides oversight of Focus on Energy.

Focus on Energy works with eligible Wisconsin residents and businesses to install cost-effective energy efficiency and renewable energy projects. Information, resources, and financial incentives enable consumers to implement and complete energy projects they otherwise would not have been able to complete or to complete projects ahead of schedule. Focus on Energy helps Wisconsin residents and businesses manage rising energy costs, promotes in-state economic development, protects the environment, and controls Wisconsin's demand for electricity and natural gas.

In December 2014, the PSC contracted with a team of energy consulting and market research firms to verify Focus on Energy savings and evaluate its programs during the CY 2015–CY 2018 quadrennial. These firms, collectively referred to as the Evaluation Team, are Cadmus, Apex Analytics, and St. Norbert College Strategic Research Institute.

The state's investor-owned utilities, with PSC approval, contracted with APTIM (formerly Chicago Bridge & Iron Company, formerly Shaw Environmental & Infrastructure, Inc.) to serve as the Program Administrator for the CY 2015–CY 2018 quadrennial. The Program Administrator, in collaboration with the Program Implementers, is responsible for designing all Focus on Energy programs and for the overall performance of these programs to meet Wisconsin's energy-savings goals. The Program Administrator is also responsible for managing and coordinating individual program offerings, supporting customers and Trade Allies through a customer service center, coordinating with participating utilities, guiding marketing and communication activities, and reporting to the Statewide Energy Efficiency and Renewable Administration and to the PSC.

The Statewide Energy Efficiency and Renewable Administration, formed by the state's investor-owned utilities, is responsible for collecting utility funding for Focus on Energy and for contracting with the Program Administrator.

In CY 2018, Focus on Energy maintained three separate portfolios of programs:

- The residential portfolio, servicing single family and multifamily homes
- The nonresidential portfolio, servicing commercial, industrial, school, government, and agricultural customers
- The rural portfolio, servicing rural communities throughout Wisconsin⁷

⁷ These programs were in various stages of ramp-up in CY 2017. *Ex ante* savings accrued in both CY 2017 and CY 2018.

The residential and nonresidential portfolios also included multiple pilot programs, which are categorized separately from the established programs.

CY 2018 Evaluation

The Evaluation Team investigated the performance of 15 programs that delivered energy savings during CY 2018. Table 7 lists the programs evaluated in the residential and nonresidential portfolios.

Appendix C provides detailed descriptions of these programs.

Table 7. Residential and Nonresidential Programs

Residential Portfolio	Nonresidential Portfolio
Multifamily Energy Savings	Small Business
Multifamily New Construction	Renewable Energy Competitive Incentive
Appliance Recycling Program	Design Assistance–Nonresidential
Home Performance with ENERGY STAR	Business Incentive
New Homes	Agriculture, Schools, and Government
Retail Lighting and Appliance	Large Energy Users
Simple Energy Efficiency	Training
Design Assistance–Residential	

In addition to the standard programs, Focus on Energy delivered six pilot programs (Table 8) and six rural programs (Table 9).

Table 8. Pilot Programs

Residential Pilot Programs	Nonresidential Pilot Programs
Low-E Storm Windows	Strategic Energy Management
Seasonal Savings	Midstream Commercial Kitchen Equipment
ENERGY STAR Retail Products Platform	Midstream Commercial and Industrial Lighting

Table 9. Rural Programs

Residential Rural Programs	Nonresidential Rural Programs
Connected Devices Kits	Communications Providers Initiative
Direct-Mail Home Energy Assessment	Community Small Business Offering
Rural Home Performance	Digital Customer Engagement for Business

Some rural programs were operated as components of the core programs listed above, including Business Incentive (Communications Providers Initiative), Home Performance with ENERGY STAR (Rural Home Performance), Simple Energy Efficiency (Connected Devices Kits), and Small Business (Community Small Business Offering). Several pilot programs were also operated in conjunction with core programs listed above, including Large Energy Users (Strategic Energy Management), and Retail Lighting and Appliance (ENERGY STAR Retail Products Platform). In Volume II, related pilots and rural programs are discussed in their core program chapter, while those without connections to core programs are treated separately in the Pilots and Initiative chapter of Volume II. Appendix C provides detailed descriptions of all programs.

Summary of Measures by Segment

The Evaluation Team assessed the electric and natural gas savings achieved by each measure installed in CY 2018 during its first year of operation, as well as any impacts that each measure can incur during its effective useful life. Reporting on both first-year annual and lifecycle savings provides a full picture of each program’s performance.

Table 10 lists all measure categories in the residential and nonresidential programs.

Table 10. CY 2018 Residential and Nonresidential Program Measure Categories

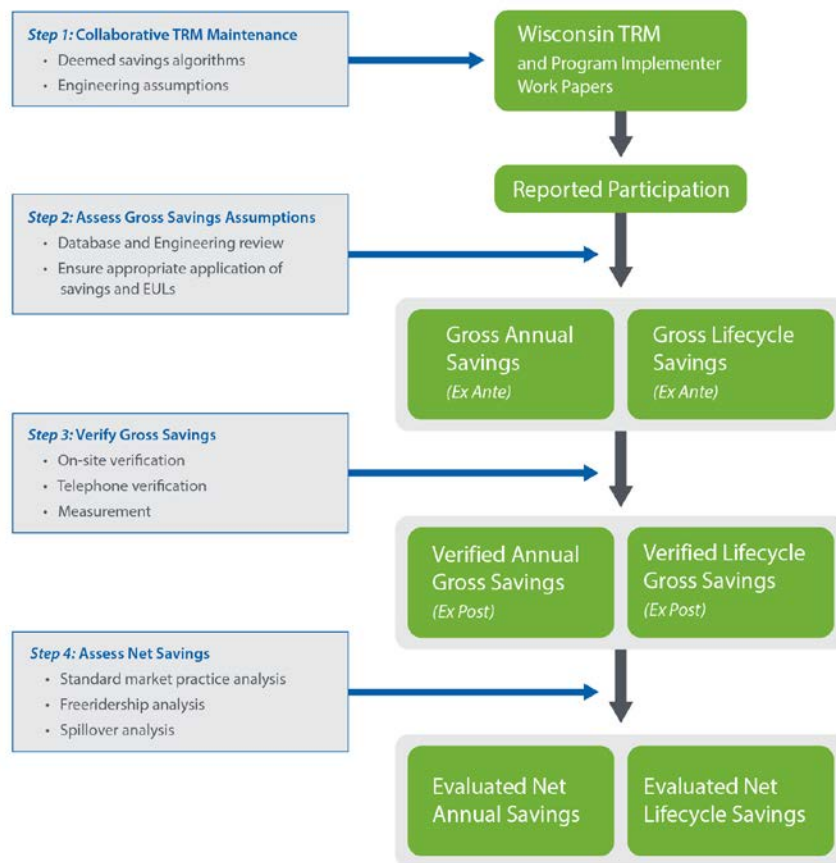
Program Measure Categories	
Residential Only	
Domestic Hot Water - Insulation	New Construction - Whole Building
Motors & Drives - Motor	Renewable Energy - Geothermal
Residential and Nonresidential	
Agriculture - Variable Speed Drive	HVAC - Motor
Boilers & Burners - Boiler	HVAC - Other
Boilers & Burners - Controls	HVAC - Packaged Terminal Unit (PTAC, PTHP)
Boilers & Burners - Insulation	HVAC – Roof-Top Unit/Split System Air Conditioner
Boilers & Burners - Tune-Up/Repair/Commissioning	HVAC - Steam Trap
Boilers & Burners - Variable Speed Drive	HVAC - Tune-Up/Repair/Commissioning
Building Shell - Air Sealing	HVAC - Variable Speed Drive
Building Shell - Insulation	Lighting - Controls
Building Shell - Window	Lighting - Delamping
Domestic Hot Water - Aeration	Lighting - Light Emitting Diode
Domestic Hot Water - Other	New Construction - Design
Domestic Hot Water - Showerhead	Other - Bonus
Domestic Hot Water - Variable Speed Drive	Other - Other
Domestic Hot Water - Water Heater	Refrigeration - Other
HVAC - Chiller	Renewable Energy - Photovoltaics
HVAC - Controls	Training & Special - Other
HVAC - Energy Recovery	Vending & Plug Loads - Controls
HVAC - Furnace	

Program Measure Categories	
Nonresidential Only	
Agriculture - Dryer	Laundry - Clothes Washer
Agriculture - Fan	Laundry - Dryer
Agriculture - Grain Dryer	Lighting - Fluorescent, Linear
Agriculture - Greenhouse	Lighting - Induction
Agriculture - Heat Exchanger	Lighting - Other
Agriculture - Irrigation	Lighting - Reconfigure Equipment
Agriculture - Livestock Waterer	Motors & Drives - Other
Building Shell - Door	Motors & Drives - Variable Speed Drive
Building Shell - Other	Pools - Other
Compressed Air, Vacuum Pumps - Compressor	Pools - Variable Speed Drive
Compressed Air, Vacuum Pumps - Controls	Process - Energy Recovery
Compressed Air, Vacuum Pumps - Dryer	Process - Filtration
Compressed Air, Vacuum Pumps - Energy Recovery	Process - Other
Compressed Air, Vacuum Pumps - Filtration	Process - Process Heat
Compressed Air, Vacuum Pumps - Other	Process - Pump
Compressed Air, Vacuum Pumps - Reconfigure Equipment	Process - Specialty Pulp & Paper
Compressed Air, Vacuum Pumps - Tune-Up/Repair/ Commissioning	Process - Variable Speed Drive
Domestic Hot Water - Energy Recovery	Refrigeration - Compressor
Domestic Hot Water - Pre-Rinse Sprayer	Refrigeration - Controls
Food Service - Controls	Refrigeration - Energy Recovery
Food Service - Dishwasher—Nonresidential	Refrigeration - Heat Exchanger
Food Service - Fryer	Refrigeration - Ice Machine
Food Service - Griddle	Refrigeration - Motor
Food Service - Hot Holding Cabinet	Refrigeration - Reconfigure Equipment
Food Service - Other	Refrigeration - Refrigerated Case Door
Food Service - Oven	Refrigeration - Refrigerator/Freezer—Residential
Food Service - Refrigerator/Freezer—Nonresidential	Refrigeration - Strip Curtain
Food Service - Steamer	Refrigeration - Tune-Up/Repair/Commissioning
HVAC - Air Conditioner—Residential	Renewable Energy - Biogas
HVAC - Fan	Training & Special - Scholarship
HVAC - Filtration	Training & Special - Study
HVAC - Infrared Heater	Vending & Plug Loads - Dehumidifier
HVAC - Scheduling	Vending & Plug Loads - Filtration
HVAC - Unit Heater	Vending & Plug Loads - Other
HVAC - Variable Air Volume	Waste Water Treatment - Aeration
Industrial Ovens and Furnaces - Other	Waste Water Treatment - Other
Information Technology - Other	Waste Water Treatment - Study
Information Technology - Supporting Equipment	Windows and Doors - Window

Overview of Evaluation Activities

Figure 3 depicts the four-step process the Evaluation Team conducted in CY 2018 (further explained after the figure).

Figure 3. Evaluation Steps to Determine CY 2018 Net Savings



Here are additional details of the four-step process the Evaluation Team conducted (as shown in the figure above):

- **Step 1: Collaborative Technical Reference Manual (TRM) Maintenance.** The Evaluation Team collaborated with the PSC and key Focus on Energy program stakeholders to ensure that the programs’ deemed savings, algorithms, and input assumptions are appropriate. Specific activities in this step included developing measure-specific workpapers, preparing deemed savings reports, and updating the TRM.
- **Step 2: Assess Gross Savings Assumptions.** The Evaluation Team reviewed the implementation database to check for entry errors, inconsistencies, ineligible equipment, and any other possible errors. The Evaluation Team reconciled this information with data from the Program Administrator and Program Implementer. This process produced the *ex ante* gross annual and lifecycle savings.
- **Step 3: Verify Gross Savings.** The Evaluation Team verified—either through site visits or phone surveys—the installation of measures and assessed gross savings, which included revisiting baseline assumptions and engineering inputs. The Team also recalculated or measured the actual performance of installed measures, particularly for hybrid and custom projects. The

Evaluation Team applied the data collection and analysis methods appropriate for the specific program and installed measures.

- Step 4: Assess Net Savings.** The Evaluation Team estimated net-to-gross (NTG) ratios that represent the proportion of gross savings directly attributable to the influence of the programs. In deriving these ratios, the Evaluation Team accounted for—and deducted—reported savings that were associated with *freeriders* (participants who would have undertaken the same action and achieved the same savings in absence of a program) and also accounted for—and added—*spillover* (savings that were the result of a program’s influence, but for which no incentive was paid and for which no program had recorded savings). For final quadrennial net savings, the team also added savings for program market effects where it was measured. The Evaluation Team applied NTG ratios to the *ex post* gross savings from Step 3, determining net savings based on self-reported information (conducted via surveys) or using a standard market practice approach. For the standard market practice method, the Team used program data collected through the evaluation process to define the average market baseline and average program-installed energy consumption of specific measure categories.

Table 11 lists the specific data collection activities and sample sizes used in the residential and nonresidential segments for the CY 2018 evaluation and throughout the quadrennial.

Table 11. CY 2018 Evaluation Activities

Evaluation Activity	Residential	Nonresidential	Pilots	Rural	Total CY 2015–CY 2018
On-Site Evaluation, Measurement, and Verification ^a	0	143	15	19	820
Engineering Desk Reviews	0	250	32	46	1,475
Project Audit and Verification Surveys ^b	0	0	0	0	1,090
Participant Surveys	3,665	357	80	450	10,882
Nonparticipant/General Population Surveys	300	140	0	n/a	1,201
Ongoing Participant Satisfaction Surveys ^c	7,112	1,316	29	5,842	29,584
Program Actor Interviews	11	11	4	8	164
Trade Ally and Market Actor Surveys/Interviews	0	17	10	0	588
Regression Modeling/Billing Analyses	0	1	12	0	19
System Energy Monitoring Data Collection	0	2	0	0	4
On-Site Logger Installation	0	1	0	0	24

^a All projects included in on-site evaluation, measurement, and verification also received an engineering desk review.

^b This row is exclusive of project audits conducted for on-site evaluation, measurement, and verification.

^c This row includes only the 10% sample from all Simple Energy Efficiency Program ongoing participant satisfaction survey responses and the 18% sample from all Connected Devices Kits Program ongoing participant satisfaction survey responses that were analyzed for the CY 2018 evaluation.

Evaluation Findings

Table 12 lists the overall net annual MMBtu, electricity, demand, and natural gas savings for Focus on Energy’s portfolio in CY 2015, CY 2016, CY 2017, and CY 2018.

Table 12. Overall Portfolio Net Annual Savings by Calendar Year

Calendar Year	Annual Savings (MMBtu)	Electric Savings (kWh)	Demand Reduction (kW)	Natural Gas Savings (therms)
CY 2015	4,797,192	558,238,428	73,180	28,924,820
CY 2016	3,466,495	441,549,046	63,409	19,599,292
CY 2017	3,134,737	475,820,469	64,977	15,112,376
CY 2018	3,554,275	516,550,096	67,780	17,918,064
Total^a	16,181,719	2,228,969,819	301,467	85,760,011

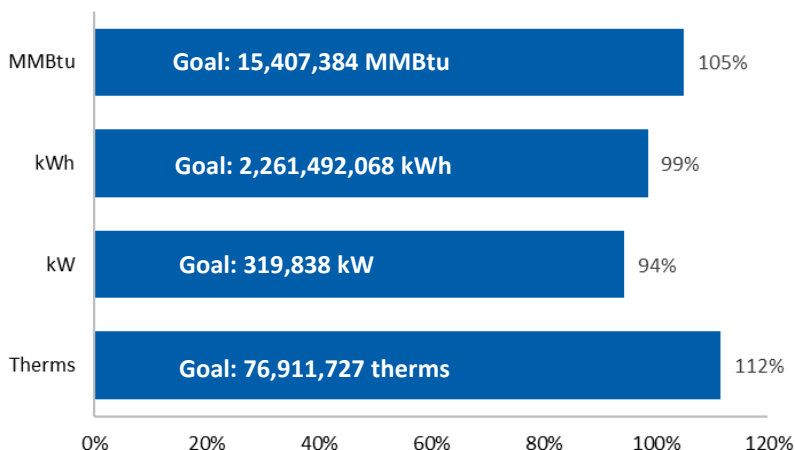
Note: CY 2018 totals include an extra 144 therms gross from CY 2017 adjustments registered in CY 2018, and an extra 532,833 kWh net from a correction to CY 2016 Home Performance with ENERGY STAR Program air conditioner savings (Cadmus 2018).

^a Quadrennial net residential savings include additional savings from market effects, which account for the program’s long-term effect on the Wisconsin residential lighting market. Additional details can be found in the *Quadrennial Market Effects* section of the Retail Lighting and Appliance Program chapter within Volume II. Total quadrennial savings also include nonparticipant spillover and nonresidential Training Program spillover not counted in individual years.

The PSC Order (PSC Ref#: 283917) set four-year net annual savings goals of 15,407,384 MMBtu, 2,261,492,068 kWh, 319,838 kW, and 76,911,727 therms. According to the Order, the PSC must meet the MMBtu savings goal, which is calculated from the electric energy savings and natural gas savings goals. To provide flexibility in the changing markets, the Program Administrator is required to meet only 90% of the electric energy savings and natural gas savings goals. Remaining MMBtu savings above the 90% threshold can be met with either fuel.

The Focus on Energy programs reached 105% of the MMBtu savings goal, 99% of the electric energy savings goal, 94% of the electric demand reduction goal, and 112% of the natural gas quadrennial savings goal to-date. Figure 4 shows a comparison of Focus on Energy’s actual quadrennial savings to the PSC’s established goals and verified gross targets for the full four-year quadrennial.

Figure 4. Focus on Energy’s Achievement of Four-Year (CY 2015–CY 2018) Net Annual Savings Goal



Note: These are the percentages achieved of PSC’s established net annual goals of 15,407,384 MMBtu, 2,261,492,068 kWh, 319,838 kW, and 76,911,727 therms.

Table 13 lists the overall verified gross lifecycle electricity savings, demand reduction, and natural gas savings for the portfolio in CY 2015, CY 2016, CY 2017, and CY 2018.

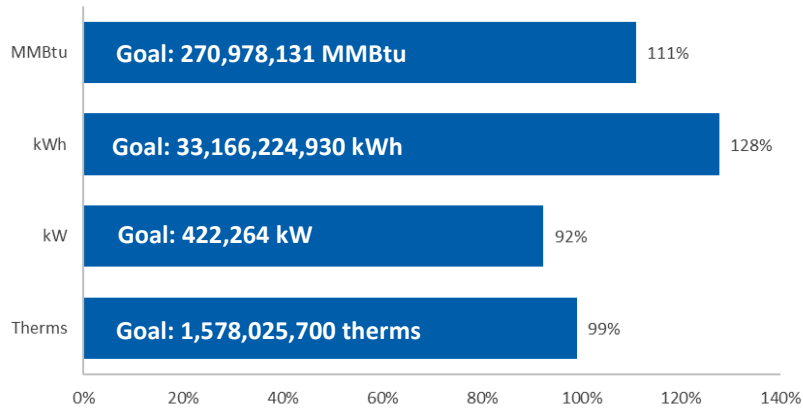
Table 13. Overall Portfolio Verified Gross Lifecycle Savings by Calendar Year

Calendar Year	Annual Savings (MMBtu)	Electric Savings (kWh)	Demand Reduction (kW)	Natural Gas Savings (therms)
CY 2015	76,973,360	8,806,768,180	91,504	469,246,674
CY 2016	72,348,291	9,514,934,930	92,316	398,833,329
CY 2017	69,273,965	11,719,265,179	97,351	292,878,320
CY 2018	82,125,547	12,288,180,882	108,409	401,982,740
Total	300,721,163	42,329,149,172	389,580	1,562,941,063

Note: CY 2018 totals include an extra 144 therms gross from CY 2017 adjustments registered in CY 2018, and an extra 532,833 kWh net from a correction to CY 2016 Home Performance with ENERGY STAR Program air conditioner savings (Cadmus 2018).

The PSC has ordered that the Focus on Energy Program Administrator track quadrennial savings goals compared to verified gross lifecycle savings targets: 270,978,131 MMBtu, 33,166,224,930 kWh, 422,264 kW, and 1,578,025,700 therms (PSC Ref# 338759). Of the quadrennial goals, the Program Administrator reached 111% of the MMBtu savings goal, 128% of the electric energy savings goal, 92% of the demand reduction goal, and 99% of the natural gas savings goal. Figure 5 shows a comparison of the actual quadrennial savings totals to the Programs Administrator’s quadrennial savings goals.

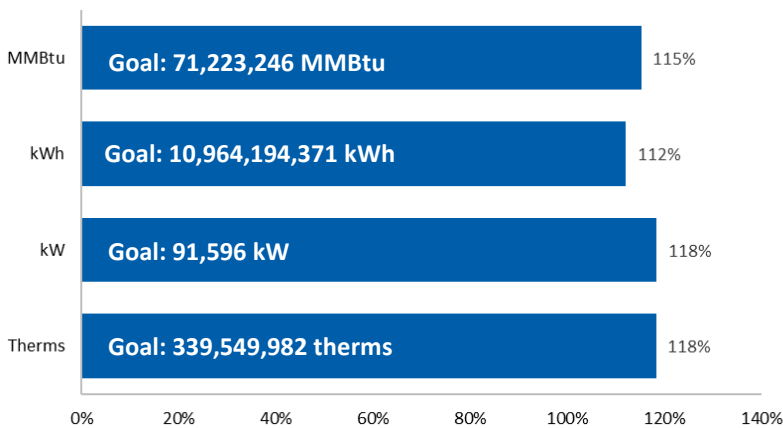
Figure 5. Program Administrator’s Achievement of Four-Year (CY 2015–CY 2018) Verified Gross Lifecycle Savings Goal



Note: These are the percentages achieved of the Program Administrator’s established verified gross lifecycle goals of 270,978,131 MMBtu, 33,166,224,930 kWh, 422,264 kW, and 1,578,025,700 therms.

The Program Administrator also tracks interim annual verified gross lifecycle targets, defined as approximately one-fourth of the overall CY 2015–CY 2018 quadrennial savings goals. In CY 2018, these targets represented 71,223,246 MMBtu, 10,964,194,371 kWh, 91,596 kW, and 339,549,982 therms. The Program Administrator reached 115% of the MMBtu savings goal, 112% of the electric energy savings goal, 118% of the electric demand reduction goal, and 118% of the natural gas verified gross lifecycle savings goal. Figure 6 shows the CY 2018 actual savings totals compared to the Programs Administrator’s CY 2018 savings goals.

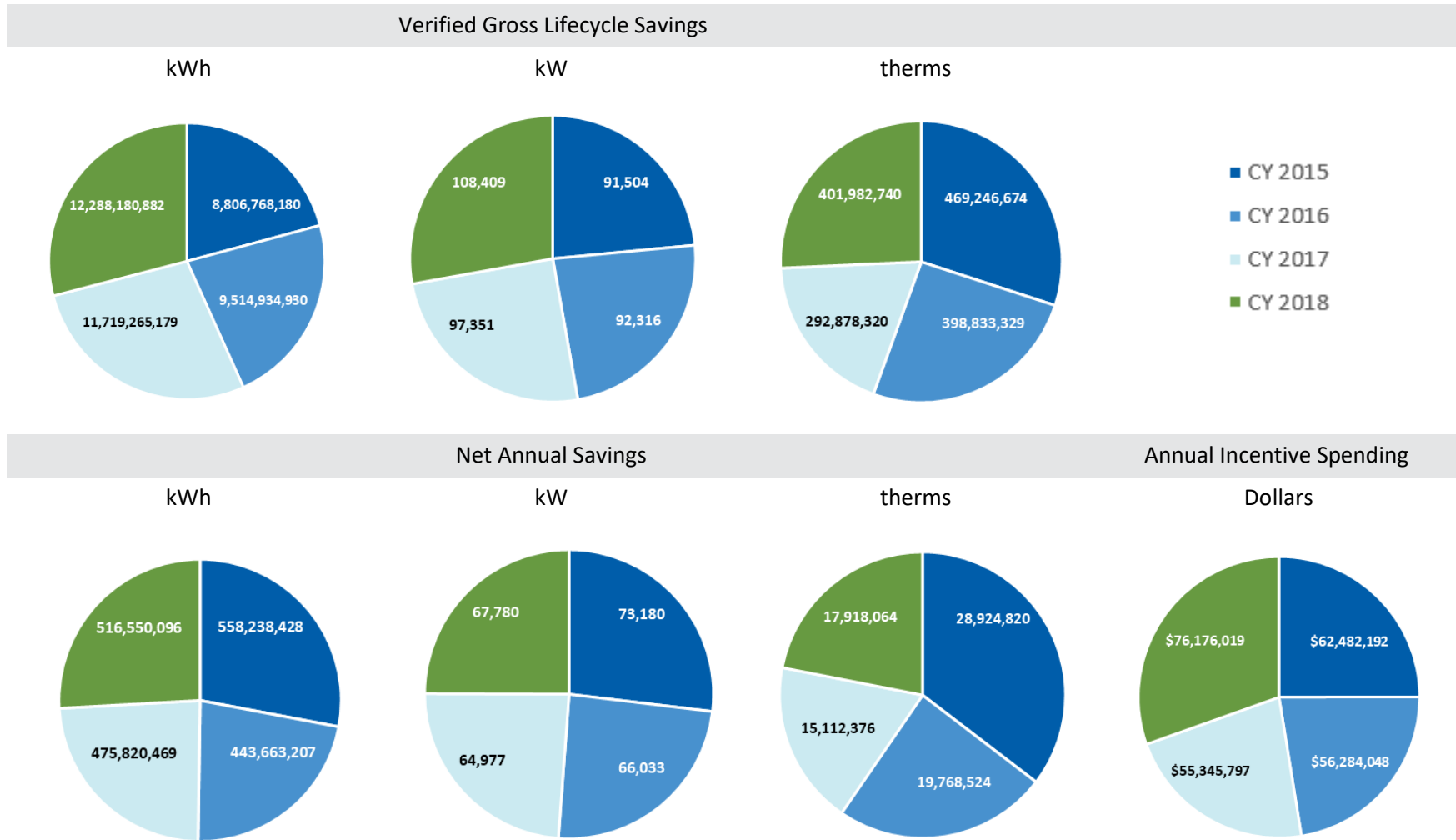
Figure 6. Program Administrator’s Achievement of CY 2018 Verified Gross Lifecycle Savings Goal



Note: These are the percentages achieved of the Program Administrator’s CY 2018 verified gross lifecycle goals of 71,223,246 MMBtu, 10,964,194,371 kWh, 91,596 kW, and 339,549,982 therms.

Figure 7 presents a summary of verified gross lifecycle savings, net annual savings, and annual incentive spending for CY 2015–CY 2018.

Figure 7. Focus on Energy CY 2015–CY 2018 Savings and Spending Progress



Note: CY 2018 totals include an extra 144 therms gross annual (3,312 therms lifecycle) from CY 2017 adjustments registered in CY 2018, and an extra 532,833 kWh net (12,244,869 kWh lifecycle) from a correction to CY 2016 Home Performance with ENERGY STAR Program air conditioner savings (Cadmus 2018).

Summary of Impacts by Program

This section summarizes the CY 2018 savings and participation for each program in the Focus on Energy portfolio. Volume II discusses savings for each program and the approaches used for calculating the savings values. The Evaluation Team varied the calculation approach and activities by program depending on the level of participation, savings achieved, and information available.

Across all programs, the Evaluation Team applied equations for verified gross lifecycle, net annual, and net lifecycle savings:

$$\text{Verified Gross Lifecycle Savings} = \sum(\text{Verified Gross Annual Savings} \times \text{EUL for each measure})$$

$$\text{Verified Net Annual Savings} = \sum(\text{Verified Gross Annual Savings} \times \text{NTG for each measure})$$

$$\text{Verified Net Lifecycle Savings} = \sum(\text{Verified Gross Lifecycle Savings} \times \text{NTG for each measure})$$

Table 14 lists the total CY 2018 participation (measured as number of participating customers) in each program and segment.

Table 14. Total Participation by Program in CY 2018 and CY 2015-CY 2018

Segment	Program	CY 2018 Participation ^a	CY 2015–CY 2018 Participation ^b
Residential	Multifamily Energy Savings	320	1,403
	Multifamily New Construction	43	81
	Appliance Recycling	12,074	40,282
	Home Performance with ENERGY STAR	24,653	91,499
	New Homes	2,403	9,093
	Retail Lighting and Appliance	920,738	3,347,033
	Simple Energy Efficiency	89,367	245,957
	Design Assistance—Residential	25	77
Residential Subtotal^c		128,885	388,392
Nonresidential	Small Business ^d	2,386	7,307
	Renewable Energy Competitive Incentive	58	161
	Design Assistance—Nonresidential	106	265
	Business Incentive	1,519	8,515
	Agriculture, Schools, and Government	1,168	4,576
	Large Energy Users	363	1,539
	Training	535	535
Nonresidential Subtotal		6,135	22,898
Pilot	Low-E Storm Windows	0	2
	Seasonal Savings	43,067	77,795
	ENERGY STAR Retail Products Platform	0	4
	Strategic Energy Management	22	31
	Midstream Commercial Kitchen Equipment	310	315
	Midstream Commercial and Industrial Lighting ^e	0	0

Segment	Program	CY 2018 Participation ^a	CY 2015–CY 2018 Participation ^b
Pilot Subtotal		43,399	78,147
Rural	Connected Devices Kits	54,847	54,847
	Direct-Mail Home Energy Assessment	0	9,580
	Rural Home Performance	317	317
	Digital Customer Engagement for Business	19	19
	Community Small Business Offering ^d	495	502
	Communications Providers Initiative	20	24
Rural Subtotal		55,698	65,289
Total^d		234,117	554,726

^a For CY 2018, the Evaluation Team determined participation for light bulbs using data from the CY 2015 Residential General Population Survey. The survey collected the number of bulbs purchased annually by 609 Wisconsin residents; using the average (5.8 LEDs) and the total number of bulbs purchased (as listed in the Program Implementer’s tracking system), the Evaluation Team estimated the number of households that participated in the program in CY 2018. Similarly, the Retail Lighting and Appliance Program Implementer confirmed that Program participants were likely to purchase 1.5 advanced power strips or four low-E storm windows based on transactional window sales data for special orders. The Team estimated the number of participants for these measures using this purchase information and the total quantity of advanced power strips and low-E storm windows purchased through the Program.

^b CY 2015–CY 2018 participation totals reflect the additive total participants per calendar year. These totals do not account for repeat participation across calendar years.

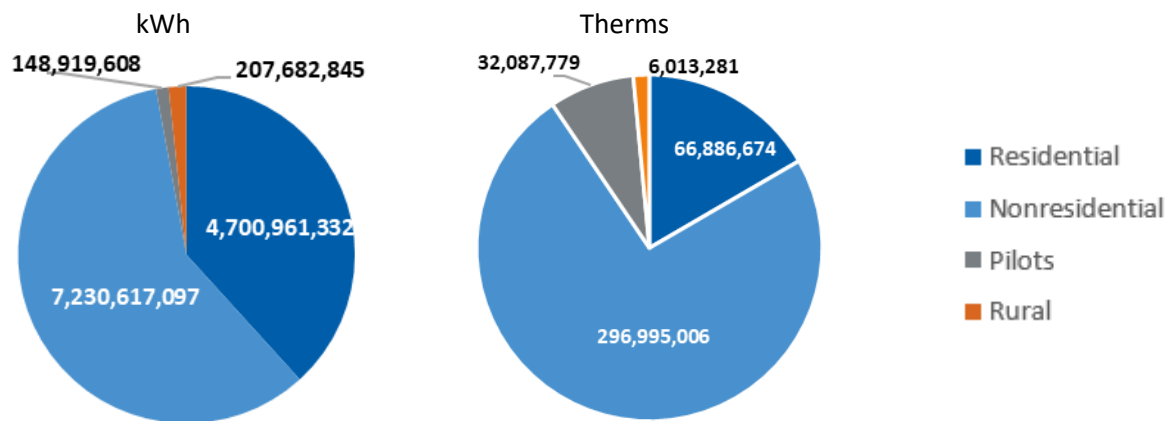
^c This subtotal does not include Retail Lighting and Appliance Program participation. Also, some customers participated in multiple programs; this subtotal represents a unique participant count of each individual program.

^d There was overlap in Small Business Program and the Community Small Business Offering. Individual program participation totals do not account for duplicate participants, but duplicates have been excluded from the overall total.

^e Midstream Commercial and Industrial Lighting had retailer and unit participation but no customer-level participation data.

Figure 8 shows verified gross lifecycle savings by sector.

Figure 8. CY 2018 Verified Gross Lifecycle Savings Impacts by Sector



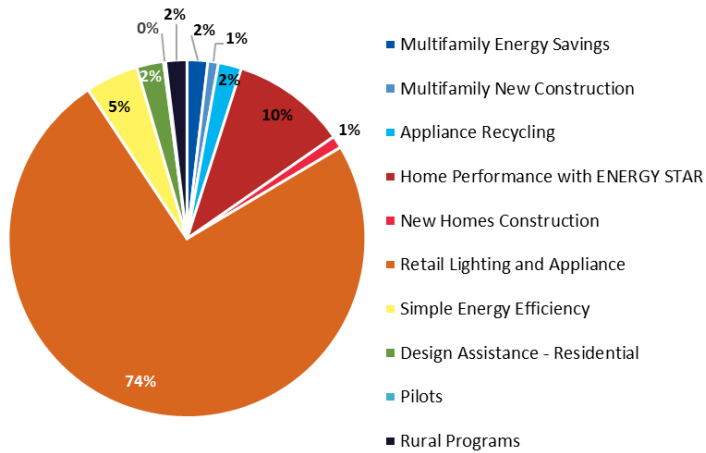
Note: Totals include an extra 3,312 therms gross annual from CY 2017 adjustments registered in CY 2018, and an extra 12,244,869 kWh net from a correction to CY 2016 Home Performance with ENERGY STAR Program air conditioner savings (Cadmus 2018).

Figure 9 and Figure 10 show the verified gross lifecycle electric and natural gas energy savings by program for residential, nonresidential, pilots, and rural programs. There are three key findings:

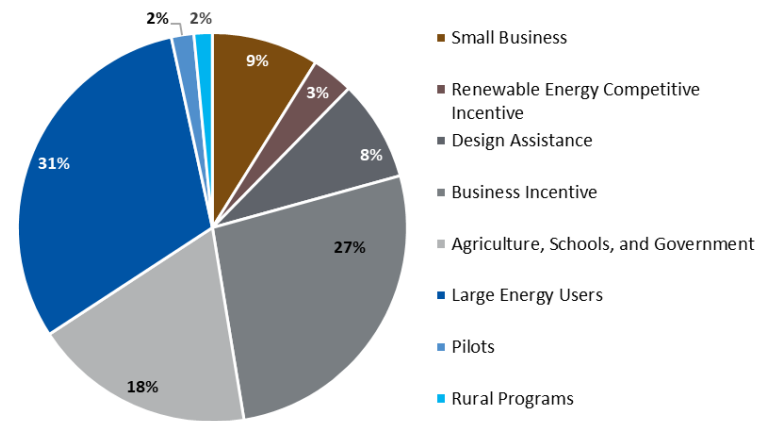
- The Retail Lighting and Appliance Program contributed the greatest amount of electric savings for the residential segment.
- The New Homes and Home Performance with ENERGY STAR programs contributed the greatest amount of natural gas savings for the residential segment.
- The Large Energy Users Program contributed the greatest amount of electric and natural gas savings for the nonresidential segment.

Figure 9. CY 2018 Verified Gross Lifecycle Electric Energy Impacts by Program

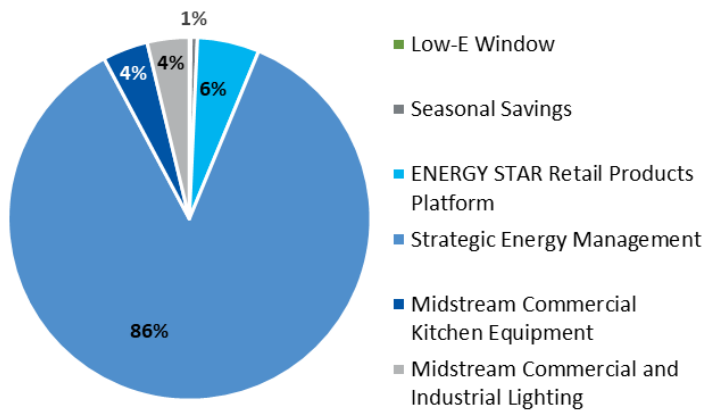
Residential with Pilots and Rural Programs



Nonresidential with Pilots and Rural Programs



Pilots



Rural Programs

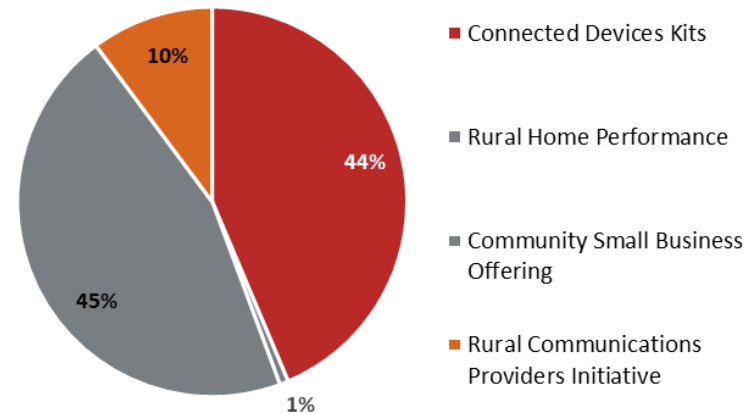


Figure 10. CY 2018 Verified Gross Lifecycle Natural Gas Energy Impacts by Program

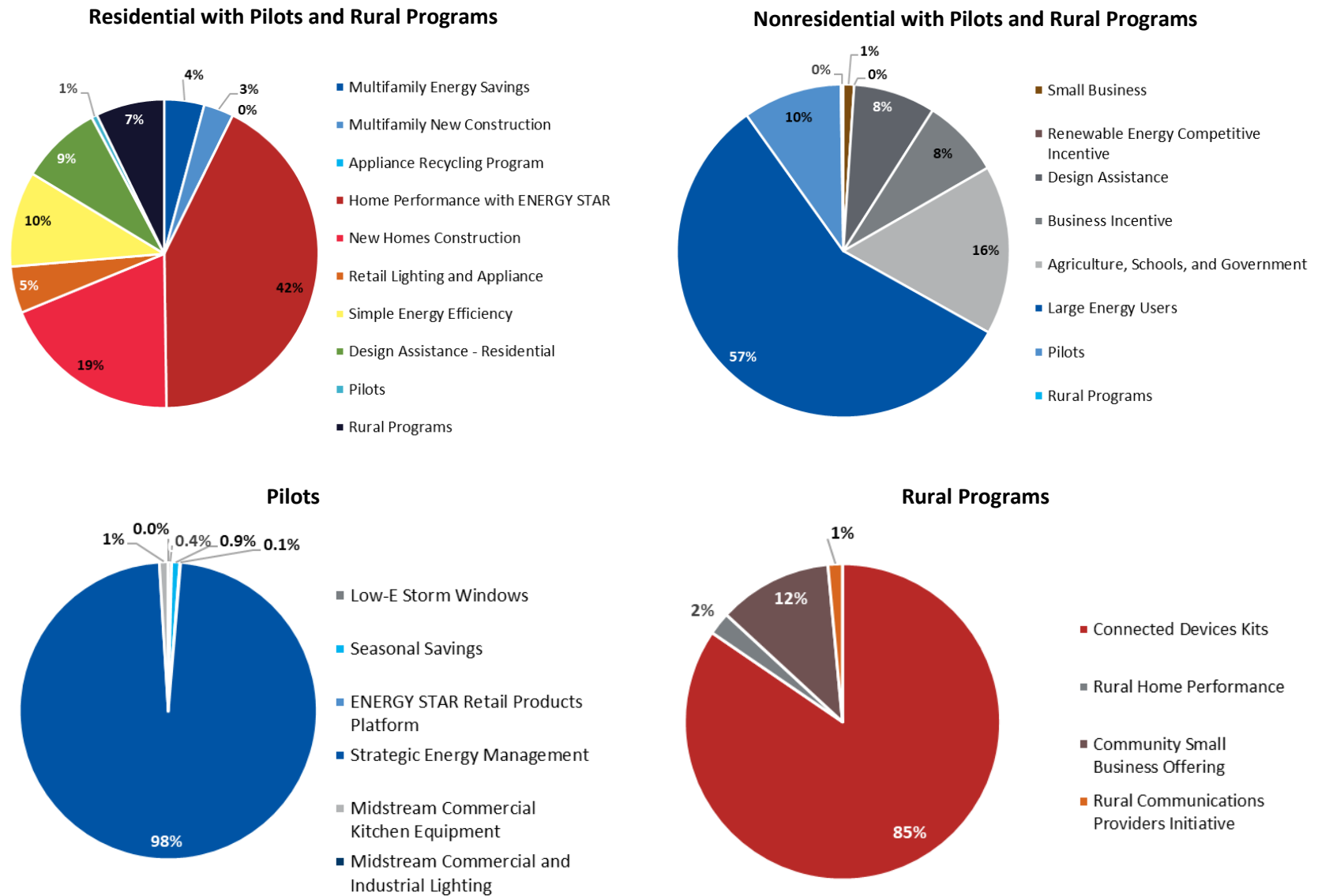


Table 15 lists the first-year annual gross savings, verified gross savings, and verified net demand reduction for electricity and natural gas by program, segment, and overall portfolio.

Table 15. Summary of CY 2018 Annual Savings by Program

Program Name	Gross			Verified Gross			Verified Net		
	kWh	kW	therms	kWh	kW	therms	kWh	kW	therms
Residential Programs									
Multifamily Energy Savings	8,161,856	699	188,270	7,194,050	574	173,462	5,827,180	465	140,511
Multifamily New Construction	3,458,833	497	133,570	3,417,185	497	133,498	2,767,920	402	108,129
Appliance Recycling	12,564,565	1,470	0	10,087,846	1,228	0	5,389,308	654	0
Home Performance with ENERGY STAR	23,398,823	7,307	1,884,696	23,398,357	7,307	1,884,570	18,697,351	5,514	1,453,541
New Homes	1,827,366	571	458,647	1,795,402	571	459,615	1,795,402	571	459,615
Retail Lighting and Appliance	232,879,804	26,461	346,327	208,677,039	23,817	338,886	107,748,877	12,144	260,069
Simple Energy Efficiency	16,757,539	1,566	584,957	16,718,646	1,557	585,484	16,718,646	1,557	585,484
Design Assistance—Residential	5,838,925	761	308,297	5,821,799	747	310,596	4,191,695	538	223,629
Residential Total	304,887,712	39,331	3,904,764	277,110,323	36,298	3,886,111	163,136,379	21,846	3,230,979
Nonresidential Programs									
Small Business	48,646,814	5,649	196,487	50,274,215	5,781	198,605	45,749,536	5,261	180,723
Renewable Energy Competitive Incentive	10,862,258	3,330	0	10,874,655	3,623	0	10,765,908	3,587	0
Design Assistance—Nonresidential	31,392,554	4,404	1,307,271	31,300,475	4,325	1,317,021	22,536,342	3,114	948,255
Business Incentive	159,938,980	20,616	1,551,390	154,912,903	20,346	1,551,120	88,300,355	11,597	884,138
Agriculture, Schools, and Government	97,977,520	14,800	3,513,829	97,963,661	14,690	3,874,477	46,042,921	6,904	1,835,842
Large Energy Users	183,455,672	20,185	12,489,024	167,844,147	20,285	11,848,417	104,063,371	12,577	7,346,018
Nonresidential Total	532,273,799	68,983	19,058,000	513,170,057	69,050	18,789,638	317,458,433	43,040	11,194,976
Pilot Programs									
Low-E Storm Windows	9,125	15	16,692	10,154	11	5,842	2,945	3	1,694
Seasonal Savings	859,956	0	283,662	859,956	0	283,662	859,956	0	283,662

Program Name	Gross			Verified Gross			Verified Net		
	kWh	kW	therms	kWh	kW	therms	kWh	kW	therms
ENERGY STAR Retail Products Platform	0	0	0	708,459	89	1,282	708,459	89	1,282
Strategic Energy Management	14,343,497	1,344	2,443,021	16,599,730	1,353	2,637,573	16,599,730	1,353	2,637,573
Midstream Commercial Kitchen Equipment	547,081	36	25,681	560,007	48	26,047	178,642	15	8,309
Midstream Commercial and Industrial Lighting	433,149	88	0	433,134	88	0	135,735	27	0
Pilot Total	16,192,807	1,483	2,769,056	19,171,440	1,589	2,954,406	18,485,467	1,488	2,932,520
Rural Programs									
Connected Devices Kits	12,492,231	369	749,521	9,542,448	381	508,373	9,516,825	381	506,608
Rural Home Performance	140,381	1	15,785	140,381	1	15,785	107,462	1	8,825
Community Small Business Offering	6,894,063	922	42,698	7,124,693	944	42,698	6,625,964	878	39,709
Rural Communications Providers Initiative	1,702,524	200	4,446	1,219,566	146	4,446	1,219,566	146	4,446
Rural Total	21,229,197	1,492	812,450	18,027,087	1,472	571,303	17,469,817	1,405	559,589
Total All Programs	874,583,515	111,289	26,544,271	827,478,907	108,409	26,201,458	516,550,096	67,780	17,918,064

Note: Evaluated CY 2018 savings for some pilots and rural programs contain claimed savings from other years. For a list of these programs and their annual claimed savings please see Appendix E, Table E-13.

Note: Totals may not sum due to rounding. Totals include an extra 144 therms gross from CY 2017 adjustments registered in CY 2018, and an extra 532,833 kWh net from a correction to CY 2016 Home Performance with ENERGY STAR Program air conditioner savings (Cadmus 2018).

Summary of Impacts by Measure Category

Table 16 lists CY 2018 residential energy savings, demand reduction, and incentive costs by measure category.

Table 16. Summary of CY 2018 Annual Savings by Measure Category in the Residential Segment

Measure Category	Verified Gross						Incentives Dollars	Incentive Dollars Percentage
	kWh	kWh Percentage	kW	kW Percentage	Therms	Therms Percentage		
Agriculture - Energy Recovery	43,912	0.02%	9	0.02%	8,876	0.19%	\$7,824.75	0.02%
Agriculture - Variable Speed Drive	397,693	0.14%	33	0.09%	0	0.00%	\$20,652.60	0.06%
Boilers & Burners - Boiler	0	0.00%	0	0.00%	254,696	5.42%	\$388,516.00	1.15%
Boilers & Burners - Controls	74,039	0.03%	3	0.01%	8,161	0.17%	\$8,507.50	0.03%
Boilers & Burners - Insulation	62,554	0.02%	29	0.08%	19,175	0.41%	\$39,693.66	0.12%
Boilers & Burners - Tune-Up/Repair/Commissioning	0	0.00%	0	0.00%	555	0.01%	\$2,625.00	0.01%
Building Shell - Air Sealing	0	0.00%	0	0.00%	0	0.00%	\$0.00	0.00%
Building Shell - Insulation	0	0.00%	0	0.00%	0	0.00%	\$0.00	0.00%
Building Shell - Other	31,695	0.01%	0	0.00%	58,530	1.24%	\$50,909.00	0.15%
Building Shell - Window	30,328	0.01%	11	0.03%	6,618	0.14%	\$36,456.76	0.11%
Domestic Hot Water - Aeration	644,301	0.22%	44	0.12%	108,780	2.31%	\$49,235.74	0.15%
Domestic Hot Water - Insulation	2,182,031	0.76%	318	0.86%	250,497	5.33%	\$186,825.69	0.55%
Domestic Hot Water - Other	71,063	0.02%	9	0.03%	30,919	0.66%	\$38,943.24	0.12%
Domestic Hot Water - Showerhead	1,383,810	0.48%	59	0.16%	223,933	4.76%	\$223,926.69	0.66%
Domestic Hot Water - Water Heater	17,898	0.01%	-1	0.00%	15,820	0.34%	\$31,700.00	0.09%
HVAC - Air Conditioner—Residential	31,189	0.01%	17	0.05%	0	0.00%	\$63,880.00	0.19%
HVAC - Chiller	426,174	0.15%	25	0.07%	0	0.00%	\$35,769.00	0.11%
HVAC - Controls	12,583,078	4.36%	740	2.01%	1,448,624	30.81%	\$5,022,624.83	14.90%
HVAC - Furnace	7,386,610	2.56%	1,486	4.04%	652,084	13.87%	\$2,654,325.00	7.87%
HVAC - Motor	394,569	0.14%	60	0.16%	0	0.00%	\$5,225.00	0.02%
HVAC - Other	3,705,590	1.29%	880	2.39%	393,241	8.36%	\$1,039,050.00	3.08%
HVAC - Packaged Terminal Unit (PTAC, PTHP)	474,243	0.16%	-3	-0.01%	0	0.00%	\$17,900.00	0.05%
HVAC - Roof-Top Unit/Split System Air Conditioner	76,822	0.03%	119	0.32%	0	0.00%	\$152,350.00	0.45%
HVAC - Steam Trap	0	0.00%	0	0.00%	6,222	0.13%	\$1,800.00	0.01%
HVAC - Tune-Up/Repair/Commissioning	0	0.00%	0	0.00%	4,690	0.10%	\$58,611.00	0.17%
Laundry - Clothes Washer	40,739	0.01%	5	0.01%	0	0.00%	\$364,250.00	1.08%
Laundry - Dryer	560,960	0.19%	59	0.16%	2,745	0.06%	\$1,306,075.00	3.87%
Lighting - Delamping	3,371	0.00%	0	0.00%	0	0.00%	\$50.00	0.00%
Lighting - Light Emitting Diode	224,014,567	77.68%	25,576	69.54%	0	0.00%	\$12,907,575.71	38.28%
Motors & Drives - Motor	48,140	0.02%	9	0.02%	0	0.00%	\$11,600.00	0.03%

Measure Category	Verified Gross						Incentives Dollars	Incentive Dollars Percentage
	kWh	kWh Percentage	kW	kW Percentage	Therms	Therms Percentage		
New Construction - Design	5,821,799	2.02%	747	2.03%	310,596	6.61%	\$715,897.92	2.12%
New Construction - Whole Building	1,795,402	0.62%	571	1.55%	459,615	9.78%	\$1,966,850.00	5.83%
Other - Bonus	0	0.00%	0	0.00%	0	0.00%	\$29,163.40	0.09%
Other - Other	744,993	0.26%	306	0.83%	423,305	9.00%	\$1,794,323.13	5.32%
Refrigeration - Other	10,087,846	3.50%	1,228	3.34%	0	0.00%	\$465,675.00	1.38%
Refrigeration - Refrigerator/Freezer—Residential	57,455	0.02%	6	0.02%	-1,463	-0.03%	\$233,815.00	0.69%
Renewable Energy - Geothermal	346,936	0.12%	70	0.19%	0	0.00%	\$44,200.00	0.13%
Renewable Energy - Photovoltaics	11,210,792	3.89%	3,908	10.63%	0	0.00%	\$1,722,338.90	5.11%
Training & Special - Other	366,370	0.13%	0	0.00%	0	0.00%	\$0.00	0.00%
Vending & Plug Loads - Controls	3,210,042	1.11%	424	1.15%	0	0.00%	\$1,206,760.62	3.58%
Vending & Plug Loads - Dehumidifier	0	0.00%	0	0.00%	0	0.00%	\$230,400.00	0.68%
Vending & Plug Loads - Filtration	15,509	0.01%	2	0.00%	0	0.00%	\$305,325.00	0.91%
Vending & Plug Loads - Other	2,606	0.00%	0	0.00%	0	0.00%	\$201,804.36	0.60%
Windows and Doors - Window	26,594	0.01%	28	0.08%	15,301	0.33%	\$72,077.99	0.21%

Table 17 lists CY 2018 nonresidential savings and incentive costs by measure category.

Table 17. Summary of CY 2018 Annual Savings by Measure Category in the Nonresidential Segment

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars Percentage
	kWh	kWh Percentage	kW	kW Percentage	therms	therms Percentage		
Aeration	3,865,672	0.72%	441	0.62%	9,620	0.04%	\$155,821.83	0.37%
Air Sealing	1,015	0.00%	0	0.00%	148,319	0.69%	\$66,336.37	0.16%
Biogas	2,542,292	0.47%	315	0.44%	0	0.00%	\$364,403.00	0.86%
Boiler	72,063	0.01%	9	0.01%	2,347,471	10.94%	\$1,831,120.54	4.32%
Bonus	0	0.00%	0	0.00%	0	0.00%	\$1,198,873.51	2.83%
Chiller	16,931,548	3.14%	3,231	4.51%	0	0.00%	\$1,196,238.13	2.82%
Compressor	7,214,296	1.34%	1,133	1.58%	0	0.00%	\$361,593.27	0.85%
Controls	30,941,849	5.74%	2,219	3.10%	1,117,340	5.21%	\$2,489,174.43	5.87%
Delamping	2,816,905	0.52%	590	0.82%	0	0.00%	\$80,395.10	0.19%
Design	31,300,475	5.81%	4,325	6.04%	1,317,021	6.14%	\$3,832,136.51	9.04%

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars Percentage
	kWh	kWh Percentage	kW	kW Percentage	therms	therms Percentage		
Dishwasher, Nonresidential	546,020	0.10%	2	0.00%	3,424	0.02%	\$26,980.00	0.06%
Door	951	0.00%	3	0.00%	52,033	0.24%	\$26,410.80	0.06%
Dryer	516,273	0.10%	90	0.13%	58,131	0.27%	\$33,692.50	0.08%
Energy Recovery	1,693,568	0.31%	358	0.50%	3,701,309	17.26%	\$1,995,065.71	4.71%
Fan	2,724,049	0.51%	476	0.66%	22,972	0.11%	\$213,400.89	0.50%
Filtration	-199,488	-0.04%	-57	-0.08%	489,897	2.28%	\$337,012.70	0.80%
Fluorescent, Linear	573,843	0.11%	105	0.15%	0	0.00%	\$32,912.00	0.08%
Fryer	77,626	0.01%	16	0.02%	38,527	0.18%	\$21,380.00	0.05%
Furnace	258,337	0.05%	0	0.00%	113,704	0.53%	\$116,770.00	0.28%
Grain Dryer	3,992	0.00%	0	0.00%	7,271	0.03%	\$4,126.59	0.01%
Greenhouse	0	0.00%	0	0.00%	4,477	0.02%	\$1,168.00	0.00%
Griddle	20,224	0.00%	4	0.01%	0	0.00%	\$900.00	0.00%
Heat Exchanger	798,590	0.15%	5	0.01%	0	0.00%	\$50,786.71	0.12%
Hot Holding Cabinet	35,313	0.01%	8	0.01%	0	0.00%	\$2,080.00	0.00%
Ice Machine	21,681	0.00%	2	0.00%	0	0.00%	\$950.00	0.00%
Induction	46,399	0.01%	0	0.00%	0	0.00%	\$1,437.12	0.00%
Infrared Heater	0	0.00%	0	0.00%	87,143	0.41%	\$20,589.00	0.05%
Insulation	119,606	0.02%	27	0.04%	266,619	1.24%	\$177,710.93	0.42%
Irrigation	11,264	0.00%	0	0.00%	0	0.00%	\$2,925.00	0.01%
Light Emitting Diode	240,465,946	44.61%	35,731	49.89%	0	0.00%	\$15,215,459.74	35.90%
Livestock Waterer	575,847	0.11%	0	0.00%	0	0.00%	\$18,480.00	0.04%
Motor	9,588,122	1.78%	1,249	1.74%	0	0.00%	\$669,248.75	1.58%
Other	38,259,090	7.10%	4,515	6.30%	9,756,839	45.49%	\$5,406,570.65	12.76%
Oven	96,641	0.02%	22	0.03%	42,606	0.20%	\$23,460.00	0.06%
Packaged Terminal Unit (PTAC, PTHP)	807,651	0.15%	0	0.00%	0	0.00%	\$46,000.00	0.11%
Photovoltaics	8,332,363	1.55%	3,308	4.62%	0	0.00%	\$2,314,356.17	5.46%
Pre-Rinse Sprayer	1,633	0.00%	0	0.00%	26	0.00%	\$75.00	0.00%
Process Heat	6,297	0.00%	1	0.00%	0	0.00%	\$432.00	0.00%
Pump	442,454	0.08%	56	0.08%	0	0.00%	\$15,393.12	0.04%
Reconfigure Equipment	1,979,555	0.37%	363	0.51%	0	0.00%	\$74,822.41	0.18%
Refrigerated Case Door	2,305,495	0.43%	137	0.19%	43,488	0.20%	\$73,401.00	0.17%

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars Percentage
	kWh	kWh Percentage	kW	kW Percentage	therms	therms Percentage		
Refrigerator/Freezer—Nonresidential	129,843	0.02%	15	0.02%	0	0.00%	\$32,830.00	0.08%
Roof-Top Unit/Split System Air Conditioner	1,034,254	0.19%	846	1.18%	98,082	0.46%	\$281,687.62	0.66%
Scheduling	3,437,819	0.64%	94	0.13%	487,233	2.27%	\$276,790.20	0.65%
Scholarship	0	0.00%	0	0.00%	0	0.00%	\$13,857.50	0.03%
Showerhead	2,782	0.00%	0	0.00%	8,760	0.04%	\$2,904.00	0.01%
Specialty Pulp & Paper	1,461,227	0.27%	189	0.26%	0	0.00%	\$81,250.00	0.19%
Steam Trap	0	0.00%	0	0.00%	403,525	1.88%	\$67,035.00	0.16%
Steamer	117,594	0.02%	35	0.05%	10,441	0.05%	\$10,450.00	0.02%
Strip Curtain	61,936	0.01%	7	0.01%	0	0.00%	\$1,421.00	0.00%
Study	0	0.00%	0	0.00%	0	0.00%	\$353,789.41	0.83%
Supporting Equipment	1,124,437	0.21%	130	0.18%	0	0.00%	\$95,026.55	0.22%
Tune-Up/Repair/Commissioning	14,223,669	2.64%	408	0.57%	554,843	2.59%	\$226,849.49	0.54%
Unit Heater	0	0.00%	0	0.00%	64,637	0.30%	\$28,840.00	0.07%
Variable Air Volume	1,063,151	0.20%	18	0.02%	71,498	0.33%	\$84,286.40	0.20%
Variable Speed Drive	110,479,427	20.50%	11,186	15.62%	0	0.00%	\$2,240,318.68	5.29%
Water Heater	105,472	0.02%	7	0.01%	30,858	0.14%	\$36,225.00	0.09%
Window	1,513	0.00%	0	0.00%	89,955	0.42%	\$51,721.50	0.12%

Note: This table does not include adjustment measure records. As a result, this sum will not match with other CY 2018 totals.

Residential Segment Process Evaluation Findings

For the CY 2018 process evaluation of residential programs, the Evaluation Team collected information and perspectives from Focus on Energy participants, Program Implementers, and the Program Administrator. The Evaluation Team reached participants through online program-level participant surveys, an online or mailed participant satisfaction survey, or both. Table 18 shows the evaluation activity by residential program.

Table 18. Residential Process Evaluation Activities by Program

	Participant Surveys	Ongoing Participant Satisfaction Surveys	Partial Participant Interviews	Program Actor Interviews	Trade Ally and Market Actor Surveys/Interviews
Multifamily Energy Savings	--	✓	--	✓	--
Multifamily New Construction	--	✓	--	✓	--
Appliance Recycling	--	✓	--	✓	--
Home Performance with ENERGY STAR	--	✓	--	✓	--
New Homes	--	--	--	✓	--
Retail Lighting and Appliance	✓	✓	--	✓	--
Simple Energy Efficiency	✓	✓	--	✓	--
Design Assistance—Residential	--	--	--	✓	--

The Evaluation Team also collected perspectives and information from participating and nonparticipating residential customers through a general population survey.

More than 100,000 residential customers in Wisconsin participated in Focus on Energy’s programs in CY 2018, not including an estimated 900,000 Wisconsin customers who purchased lighting measures through the Retail Lighting and Appliance Program. As listed above in Table 16, residential customers installed energy-efficient measures across a wide range of technologies—which did include products purchased through the Retail Lighting and Appliance Program—and achieved verified gross electricity savings of 288,369,115 kWh and natural gas savings of 4,702,585 therms.

Participant Satisfaction

The Evaluation Team fielded satisfaction surveys online and by mail during CY 2018 and asked program participants to rate how satisfied they were with Focus on Energy’s programs on a scale from 0 to 10, where 10 meant *extremely satisfied* and 0 meant *extremely dissatisfied*. Focus on Energy residential and nonresidential participants completed nearly 22,000 surveys in CY 2018.

Participants in ongoing programs gave higher or equivalent overall satisfaction ratings in CY 2018 compared to CY 2017, except for the Home Performance with ENERGY STAR Program Whole Home path, for which the ratings declined in CY 2018. Participants in new programs also reported high overall satisfaction in CY 2018, with ratings of 9.0 or higher.

The satisfaction ratings for most residential programs in CY 2018 were statistically higher than the portfolio baseline of 8.8, with the exceptions of the Home Performance with ENERGY STAR Program

Whole Home path (8.7) and the Multifamily Energy Savings Program (9.1 based on a small sample size of 37), which both had satisfaction ratings that were not statistically different from the baseline.⁸

The participation-weighted average overall program satisfaction across all surveyed residential programs in CY 2018 was 9.1, which was statistically higher than the portfolio baseline.⁹ Across the entire CY 2015–CY 2018 quadrennial, the participation-weighted average overall satisfaction rating for residential programs was 9.0.

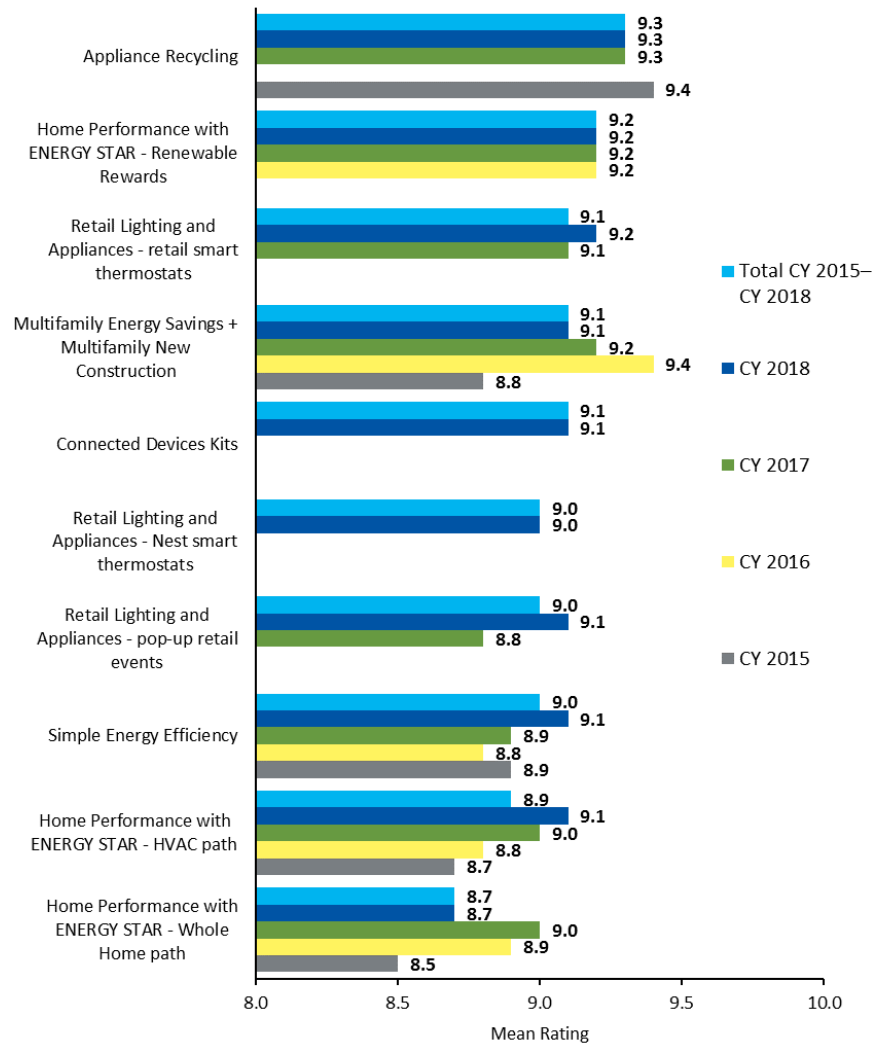
Figure 11 shows surveyed participants’ average satisfaction ratings with residential programs in CY 2018, as well as for the entire CY 2015–CY 2018 quadrennial and the three previous years.¹⁰

⁸ p<0.10 or better using binomial *t*-tests.

⁹ p<0.05 using a binomial *t*-test.

¹⁰ Ongoing participant satisfaction surveys for CY 2018 did not include the New Homes Program. Retail Lighting and Appliance surveys for CY 2018 did not cover the entire Program but were specific to channels or products within the Program (retail smart thermostats rebates, Nest smart thermostat rebates, and pop-up retail events that offered LEDs and power strips). The respondents for the Multifamily Energy Savings and Multifamily New Construction programs’ surveys were the building owners, not the building residents. In CY 2018, Multifamily Energy Savings and Multifamily New Construction participants received the same survey, whereas in CY 2017 these customers received two slightly different surveys.

Figure 11. CY 2018 Average Overall Satisfaction Ratings for Residential Programs



Source: Program Participant Satisfaction Mail/Online Survey Question. “Overall, how satisfied are you with the program?” (Ns varied by program.)

Total CY 2015–CY 2018 is the participation-weighted average for all quadrennial years the program was active.

The Evaluation Team calculated a net promoter score (NPS) for each program based on the likelihood of the participant to recommend the program. The NPS is the percentage of promoters (respondents giving a rating of 9 or 10) minus the percentage of detractors (respondents giving a rating of 0 to 6) and is expressed as an absolute number between -100 and +100. Generally, a positive NPS is interpreted as good, and the closer the NPS is to +100, the more favorable the respondents are toward the program.

The residential programs received universally high ratings from participants, with the Simple Energy Efficiency, Connected Devices Kits, Home Performance with ENERGY STAR (Renewable Rewards), Appliance Recycling, and both smart thermostat components of Retail Lighting and Appliance all having an NPS over +80 for CY 2018. The lowest NPS for any residential program component in CY 2018 was +70 for the pop-up retail events component of Retail Lighting and Appliance.

Awareness of Focus on Energy Programs

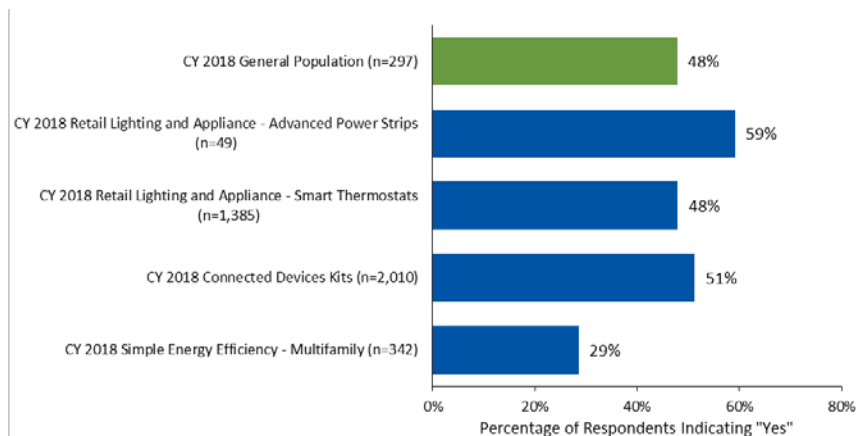
In addition to the ongoing customer satisfaction surveys conducted monthly over the calendar year, the Evaluation Team fielded a single wave of annual online surveys for participants or subsets of participants for certain programs. The Team also fielded a phone survey of the general population to collect information on customer awareness channels and demographics, in addition to information on motivations to participate, specific behaviors related to program measures, and other information. Table 19 describes the groups targeted and the sample size for these annual surveys.

Table 19. Annual Residential Participant Surveys Conducted in CY 2018

Survey Title	n	Mode	Target Group
CY 2018 General Population	300	Phone	General statewide residential population
CY 2018 Retail Lighting and Appliance - Advanced Power Strips	57	Online	Participants who purchased a discounted advanced power strip at a Program pop-up event
CY 2018 Retail Lighting and Appliance - Smart Thermostats	1,430	Online	Participants who received a downstream rebate for a smart thermostat through the Program
CY 2018 Connected Devices Kits	2,111	Online	Program participants who received a kit in CY 2018
CY 2018 Simple Energy Efficiency - Multifamily	399	Online	Multifamily Program participants in CY 2018

As shown in Figure 12, around half the general population had some awareness of Focus on Energy in CY 2018. Similarly, among program participants, around half of respondents in most survey groups were familiar with at least one other Focus on Energy program. However, only 29% of Simple Energy Efficiency multifamily participants were aware of other programs. This group likely includes a high percentage of renters, who may feel less responsible or empowered to make decisions related to home maintenance or efficiency upgrades.

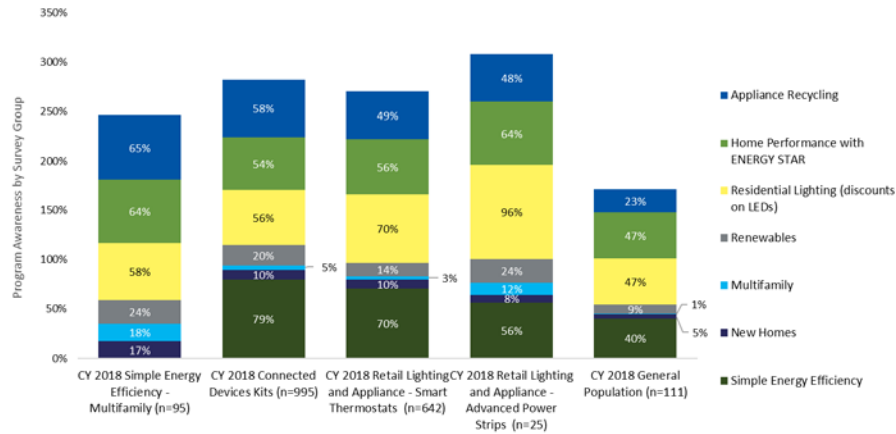
Figure 12. Respondent Awareness of Other Focus on Energy Programs



Source: Participant Online Survey Question. “Are you aware of any other Focus on Energy programs or rebates such as those for LED bulbs, energy-efficient upgrades, or home energy audits?” and General Population Survey Question. “Before today, were you aware of Focus on Energy?”

Figure 13 shows the level of awareness of different programs by survey group. Participants were more likely than the general public to be aware of all programs. The level of awareness varied by program, likely reflecting differences in program delivery and marketing strategies.

Figure 13. Program Awareness by Survey Group

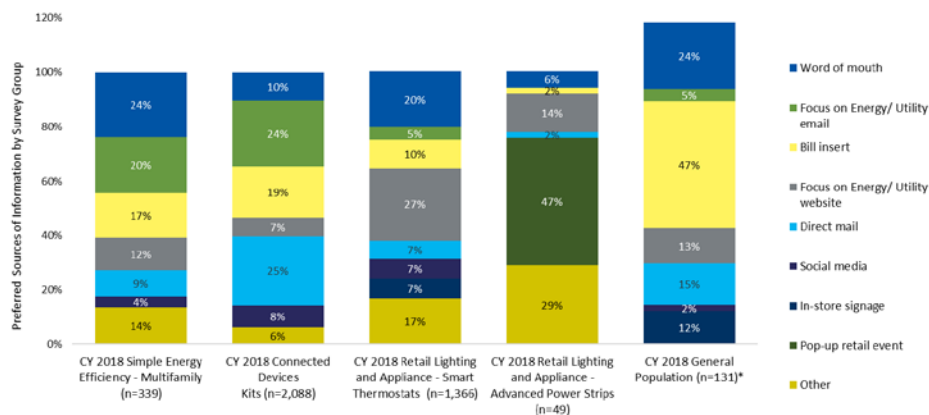


Source: Participant Online Survey Question. “Which programs or rebates are you aware of? Select all that apply.” and General Population Survey Question. “Which Focus on Energy programs, if any, come to mind?” Multiple responses allowed.

Note: Chart shows each survey groups awareness by program; therefore, columns will not sum to 100%.

Figure 14 shows the frequency with which respondents cited different marketing channels as their most recent source of program information (participants) or the percentage of respondents that had received any Focus on Energy information through each information channel (general population survey). The distribution of mentions of each source varied by program. The most commonly referenced source of information by the general population was a bill insert, while program participants were more likely to cite their utility website, a Focus or utility email, or word-of-mouth as a source of information.

Figure 14. Sources of Information about Focus on Energy Programs



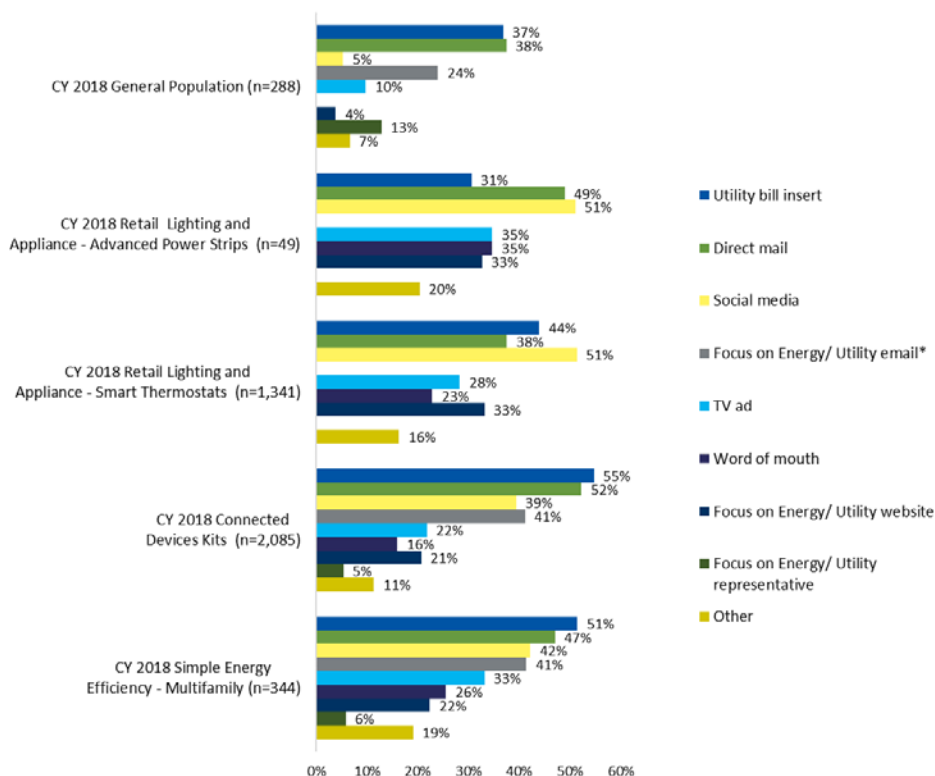
Source: Participant Online Survey Question. “Where did you most recently hear about Focus on Energy’s Simple Energy Efficiency Program?” (single response) and General Population Survey Question. “How have you heard about Focus on Energy’s programs?” Multiple responses allowed.

Note: Chart shows each survey groups awareness by program; therefore, columns will not sum to 100%.

Figure 15 shows the channels respondents selected as their preferred source of information about Focus on Energy programs. Direct mail, bill inserts, and social media were among the most preferred channels of information across all program participants. The general public was much less likely to indicate social media as a preferred option. This difference might be due to survey biases because the general population survey was conducted by phone and program surveys were online.

All respondents were more likely to prefer getting some kind of notification from Focus on Energy—either via physical mail or through an electronic format—relative to looking up information on the Focus on Energy website.

Figure 15. Preferred Sources of Information about Focus on Energy



Source: Participant Online Survey Question. “What do you think is the best way for Focus on Energy to inform the public about energy efficiency programs? Select all that apply.” and General Population Survey Question. “What’s the best way for Focus on Energy to let you know about their incentives and services for energy-efficient improvements?”

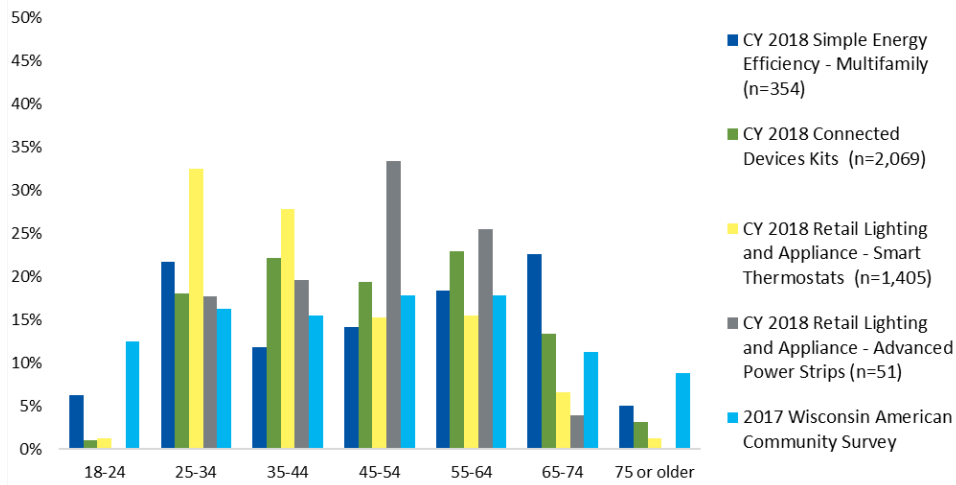
Customer Profile

The Evaluation Team used demographic data from the CY 2018 annual participant online surveys, the general population survey, and data from the U. S. Census Bureau’s American Community Survey in Wisconsin to assess what market segments are participating in each program and to what extent the programs are reaching all segments of the market.

Figure 16 shows the age distribution of survey respondents. The American Community Survey data indicates that the Wisconsin population is relatively evenly distributed across all age ranges. However,

the Retail Lighting and Appliance Program smart thermostat participants were concentrated in the range of 25 to 44 years old, and the advanced power strip participants were concentrated in the range of 35 to 64 years old. The Simple Energy Efficiency multifamily participants were slightly more likely to be 25-34 or 65-74 than the average Wisconsin resident, and the Connected Devices Kits participants were slightly more likely to be 35 to 64 than the average Wisconsin resident.

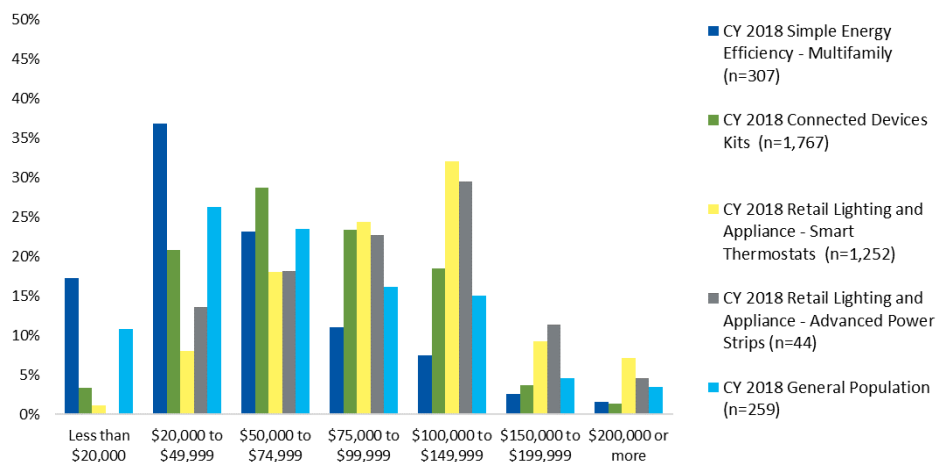
Figure 16. Age of Survey Respondents



Source: Participant Online Survey Question. “Which of the following categories best represents your age?” and U. S. Census American Community Survey data, 2017

Figure 17 shows the income range of participants relative to the general population. Simple Energy Efficiency multifamily participants were more likely than the general population to have an income below \$50,000. Both the smart thermostat and the advanced power strip participants were more likely to have incomes of \$75,000 or above. Of all survey respondents, Connected Devices Kits participants tracked most closely to the general population distribution.

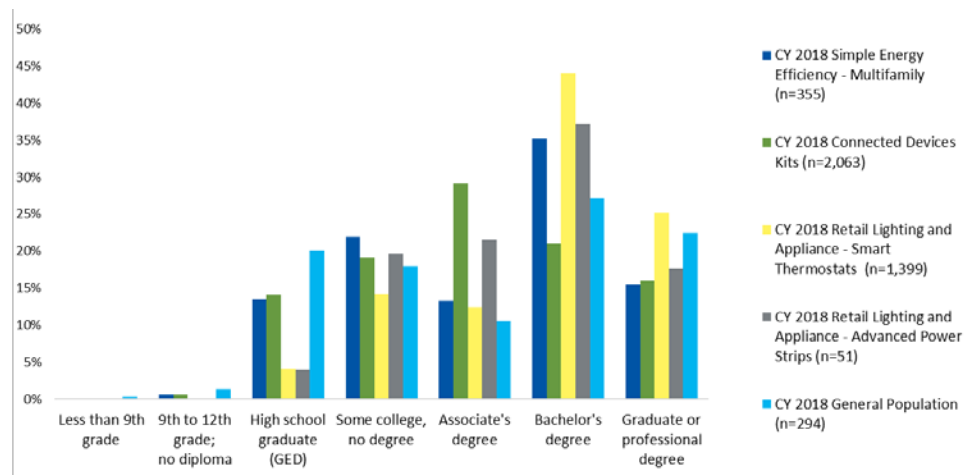
Figure 17. Income Level of Survey Respondents



Source: Participant Online Survey and General Population Survey Question. “Which category best describes your total household income in 2017 before taxes?”

Figure 18 compares the level of education of participants to the general population. Simple Energy Efficiency multifamily participants show a similar distribution of education to the general population. Connected Devices Kits participants were far more likely to have an associate degree than the general population. Smart thermostat and advanced power strip participants were less likely than the general population to have a high school diploma or less education, and more likely to have a bachelor’s degree or more education.

Figure 18. Level of Education of Survey Respondents



Source: Participant Online Survey Question. “What is the highest level of school that you have completed?” and General Population Survey Question. “What is the highest level of school that someone in your home has completed?”

Nonresidential Segment Process Evaluation Findings

For the CY 2018 nonresidential program evaluation, the Evaluation Team collected information and perspectives from customers, the Program Administrator, Program Implementers, and agricultural Trade Allies who served the Agriculture, Schools, and Government Program. This section describes high-level findings across programs where the Evaluation Team was able to aggregate, compare, or contrast findings of interest within the nonresidential sector.

Focus on Energy offers three programs to the general business population with incentives based on energy usage—Business Incentive, Small Business, and Large Energy Users—and offers three programs that provide more tailored support for specific customer types and technologies—Design Assistance, Renewable Energy Competitive Incentive, and Agriculture, Schools, and Government. These programs are targeted to specific customer segments and tailored to optimize participation within that segment. As part of the PSC’s initiative to enhance Focus on Energy services to rural customers, Focus on Energy also provided the Community Small Business Offering and the Communications Providers Initiative in CY 2018.

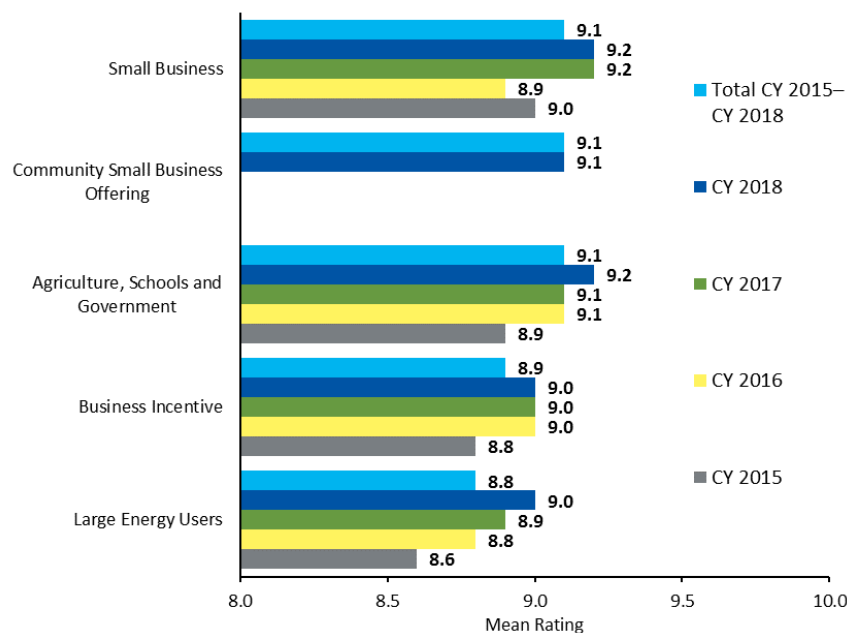
Customer Satisfaction

During CY 2018, the Program Administrator and Evaluation Team fielded satisfaction surveys online and by mail that asked program participants to rate how satisfied they were with Focus on Energy’s

programs. The surveys used a scale from 0 to 10, where 10 meant *extremely satisfied* and 0 meant *not at all satisfied*. Figure 19 shows participants’ average satisfaction ratings with nonresidential programs.

Participants gave the CY 2018 Small Business and Agriculture, Schools, and Government programs average satisfaction ratings of 9.2, making them the highest-rated CY 2018 nonresidential programs. In CY 2018, all nonresidential programs received average satisfaction ratings that were statistically higher than the portfolio baseline of 8.8,¹¹ except for Large Energy Users Program participants, whose average satisfaction ratings of 9.0 was statistically equivalent to the baseline. Across all nonresidential programs surveyed, the participation-weighted average overall program satisfaction rating for CY 2018 was 9.1, which was significantly above the portfolio baseline.¹² Across all four years of the CY 2015–CY 2018 quadrennial, the participation-weighted average overall program satisfaction rating for all nonresidential programs was 9.0. The Program Administrator met the contractual goal set forth by the PSC to meet or exceed the baseline using $p < 0.01$.¹³

Figure 19. CY 2018 Average Overall Satisfaction Ratings for Nonresidential Programs



Source: Program Participant Satisfaction Mail/Online Survey Question. “Overall, how satisfied are you with the program?” Agriculture, Schools, and Government CY 2018 (n=378), CY 2017 (n=482), CY 2016 (n=471), CY 2015 (n=324); Business Incentive CY 2018 (n=272), CY 2017 (n=442), CY 2016 (n=493), CY 2015 (n=372); Small Business CY 2018 (n=461), CY 2017 (n=255), CY 2016 (n=198), CY 2015 (n=256); Community Small Business Offering CY 2018 (n=62); Large Energy Users CY 2018 (n=128), CY 2017 (n=149), CY 2016 (n=170), CY 2015 (n=131). Total CY 2015–CY 2018 is the participation-weighted average for all quadrennial years the program was active.

¹¹ $p < 0.10$ or better using binomial *t*-tests.

¹² $p < 0.05$ using a binomial *t*-test.

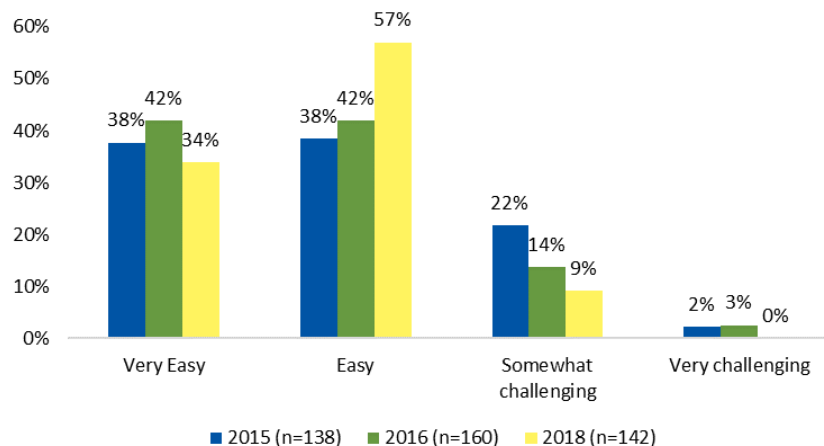
¹³ PSC Order Ref#: 338759, Section 4.2(b).
https://apps.psc.wi.gov/vs2015/erf_view/viewdoc.aspx?docid=338759

The Evaluation Team calculated an NPS for each program based on the likelihood of the participant to recommend the program. Generally, a positive NPS is interpreted as good, and the closer the NPS is to +100, the more favorable the respondents are toward the program. All six nonresidential programs received a high NPS from participants: the Large Energy Users programs had the highest NPS at +87, while the lowest nonresidential program NPS was for Business Incentive at +79.

Application Ease

In addition to high program satisfaction overall, participant surveys also showed a positive trend in how nonresidential customers experience the application process. The Evaluation Team asked participants who handled the incentive application process to rate the ease of that process on a four-point word scale.¹⁴ In CY 2018, 91% of participants rated the application process as *very easy* or *easy*, compared to 76% in CY 2015 (Figure 20).

Figure 20. Application Ease over Time



Source: CY 2015, CY 2016, and CY 2018 Participants Survey Question for Business Incentive, Large Energy Users, Small Business, and Agriculture, Schools, and Government programs. “Thinking about the application you submitted, how easy would you say this paperwork was to complete?” Sample sizes vary by year.

Awareness of Focus on Energy Programs

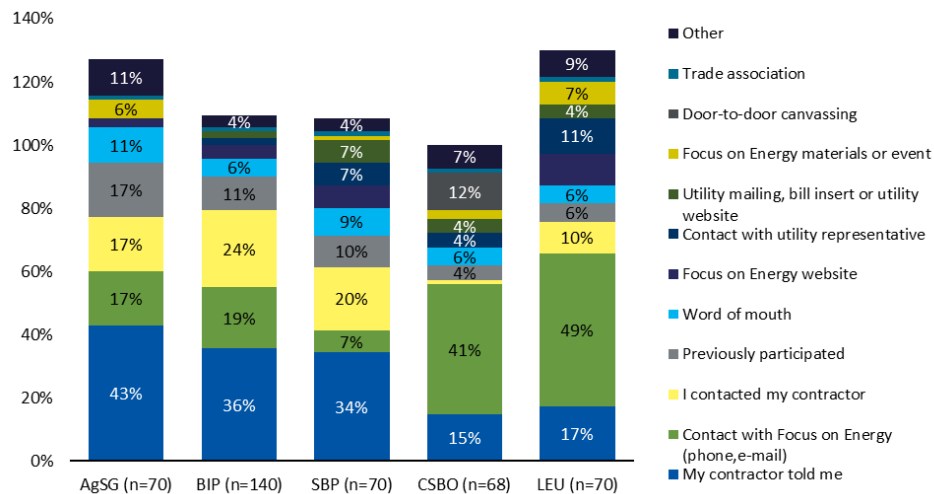
Figure 21 illustrates how nonresidential participants learned about the Focus on Energy programs in CY 2018. The top channel for learning about the program, averaged across programs, was receiving information from a contractor (30%, n=418), followed by communication from a Focus on Energy representative (25%). These proportions were consistent with CY 2016 results.

There were several significant differences between programs, as expected. For example, Small Business Program participants were much less likely than participants of other programs to have heard about programs through a Focus on Energy representative: the majority learned about available incentives

¹⁴ The Evaluation Team aggregated participant responses across the Business Incentive, Large Energy Users, Small Business, and Agriculture, Schools, and Government programs. For purposes of comparing across years, we excluded any additional surveys conducted in one year but not the other from the analysis.

from their contractor or they contacted their contractor directly to inquire. The opposite was true for the Large Energy Users Program, in which, consistent with the Program design, participants most commonly heard from a Focus on Energy representative (significantly more so than for participants of other programs). Door-to-door canvassing was an outreach method unique to the newly launched Community Small Business Offering. (Though 12% of Community Small Business Offering participants heard about the program through door-to-door canvassing, these participants were less likely to proceed with a project. More on this topic is discussed in the Small Business Chapter of Volume II).

Figure 21. How Nonresidential Participants Learned about the Programs in CY 2018



Source: 2018 Participant Survey Question. “How did you company/organization learn about the Focus on Energy incentives available for this project?” Multiple responses allowed. Sample sizes varied by program.

Marketing Messages

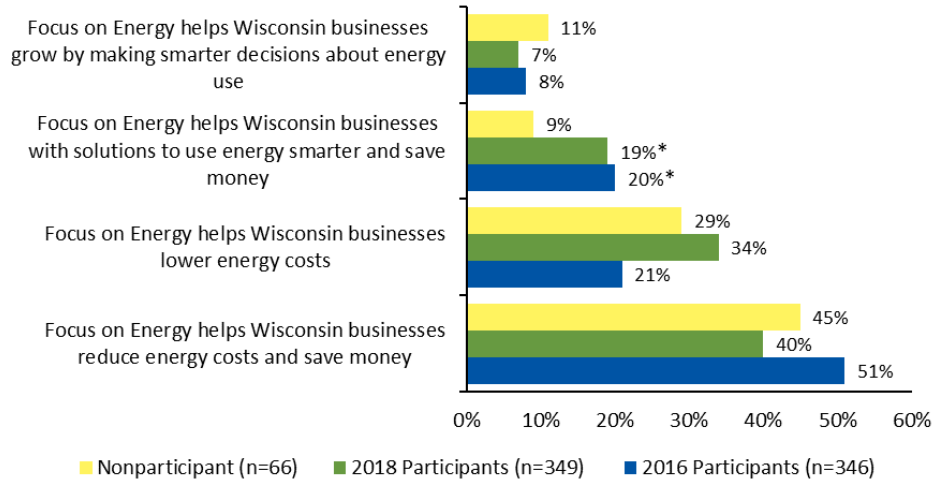
In CY 2018, the Evaluation Team included survey questions to understand which specific messages about Focus on Energy’s mission resonate most with Wisconsin businesses. The Team presented respondents with a choice of four statements and asked which one would make them most interested in learning more about Focus on Energy. This methodology was consistent with that for the CY 2016 surveys, allowing us to draw comparisons across years. The Team included this question for surveys of nonresidential nonparticipants as well (see Appendix L).

Figure 22 shows the four messages presented to respondents, along with results for the top message chosen by CY 2018 participants and nonparticipants and by CY 2016 participants.¹⁵ As the figure illustrates, the trend was the same across all three groups: the top message that would make respondents most interested in learning more about Focus on Energy was, “Focus on Energy helps Wisconsin businesses reduce energy costs and save money.” Participants in both CY 2016 and CY 2018

¹⁵ The Evaluation Team aggregated participant responses across the Business Incentive, Large Energy Users, Small Business, and Agriculture, Schools, and Government programs. For purposes of comparing across years, we excluded any additional surveys conducted in one year but not the other from the analysis.

were significantly more likely than nonparticipants to choose the statement, “Focus on Energy helps Wisconsin businesses with solutions to use energy smarter and save money.”

Figure 22. Business Interest in Marketing Message Statements



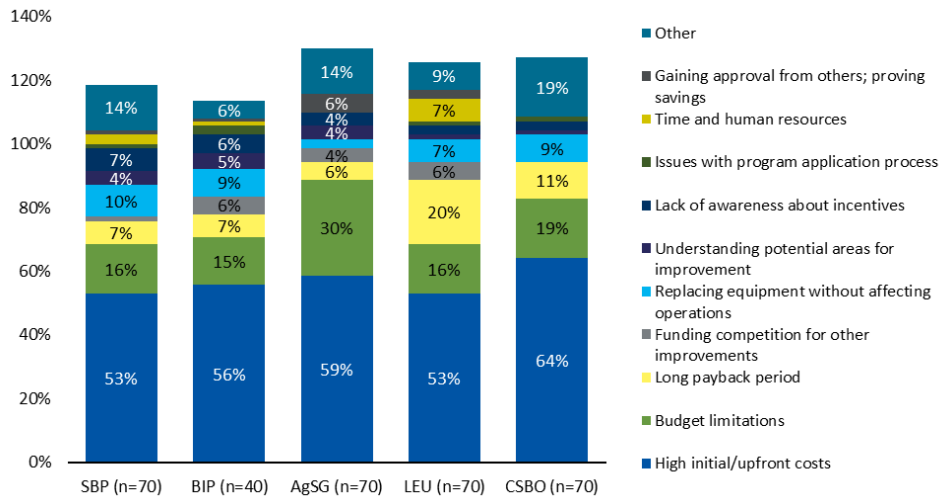
Source: CY 2016 and CY 2018 Participants Survey Question for Business Incentive, Large Energy Users, Small Business, and Agriculture, Schools, and Government programs and CY 2018 Nonparticipant Survey Question. “Which of the following statements would make you most interested in learning more about Focus on Energy?”

* Represents a statistically significant result of $p < 0.05$

Market Barriers

Participants across the nonresidential programs experienced similar challenges with beginning energy efficiency projects at their organizations (Figure 23), citing high initial costs as the greatest challenge. Though the challenges were generally consistent, there were some differences between programs. For example, Agriculture, Schools, and Government participants reported that budget limitations and getting approvals from others in their organization or business were challenges to implementing energy efficiency projects more frequently than participants of other programs. Large Energy Users participants cited payback periods and time and resource constraints as challenges more frequently than participants from other programs.

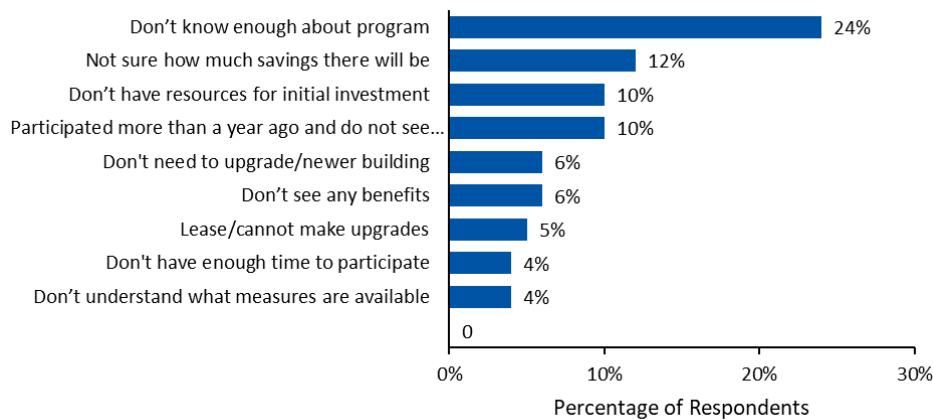
Figure 23. Challenges with Energy Efficiency Projects: CY 2018 Participants



Source: CY 2018 Participants Survey Question for Business Incentive, Large Energy Users, Small Business, Community Small Business Offering, and Agriculture, Schools, and Government programs. “What do so see as the biggest challenges to making energy-efficient improvements inside your company?” Multiple responses allowed.

Though these data represent barriers to improving efficiency, there are additional reasons businesses do not take advantage of Focus on Energy incentive programs that would *help* overcome cost barriers. The Evaluation Team asked nonresidential nonparticipant customers who had heard of Focus on Energy why they had not yet participated. Respondents (n=67) most frequently cited a lack of awareness about Focus on Energy programs (24%), though said they had heard of the organization generally. This was consistent with the CY 2015 nonparticipant survey results. Additionally, 12% of respondents said they were unsure about the amount of savings they would achieve, 10% said they do not have resources for the initial investment, and 10% said they participated more than a year ago but did not see the need to participate again (shown in Figure 24). When asked what would motivate them to participate, 39% of nonparticipants (n=132) said lowering the costs of products or equipment and 28% said higher incentives.

Figure 24. Reasons for Nonparticipation



Source: Nonparticipant Population Survey Question E6. “What are the reasons you have not yet participated in a Focus on Energy program in the past year?” Multiple responses allowed (n=67)

Cost-Effectiveness Findings

With the oversight of—and in collaboration with—the PSC and the Evaluation Team, the Focus on Energy Program Administrator developed a specific cost-effectiveness calculator for the CY 2015–CY 2018 quadrennial. The Program Administrator and Program Implementers used the calculator to assess the cost-effectiveness of programs’ designs prior to their implementation each year.

To maintain consistency between planning and evaluation approaches—critical for understanding program performance compared to expectations—the Evaluation Team used the same calculator as the Program Administrator and Program Implementers to evaluate the cost-effectiveness of the Focus on Energy programs in CY 2018, presented in this section.

As directed by the PSC, the modified total resource cost test (TRC) is considered the primary test in assessing the cost-effectiveness of individual programs and of the entire Focus on Energy portfolio of programs.¹⁶ The PSC also directed that three additional tests be conducted for advisory purposes: an expanded TRC that also includes net economic benefits, the utility administrator cost test (UAT), and the ratepayer impact measure test (RIM).

NTG ratios can be a significant driver of TRC, UAT, and RIM results. NTG ratios are applied to programs’ impacts so they reflect only the gains resulting from the programs. Therefore, NTG ratios account for the energy savings that would have been achieved without the efficiency programs (that is, when the NTG ratio is less than 1.0 savings are removed and when the NTG ratio is greater than 1.0 savings are added). In all cases, the energy savings are multiplied by the NTG ratio.

On the cost side, expenditures that would have occurred without the efficiency effort are also removed. These expenditures include the incremental measure costs and lost revenues, both of which are multiplied by the NTG ratio. Costs that would not have occurred in absence of the programs (such as program and administrative costs) are not impacted by the NTG ratio.

Test Description

The Evaluation Team—as well as the Program Administrator in developing its calculator—used methods adapted from the *California Standard Practice Manual*,¹⁷ the conventional standard of cost-effectiveness analysis for energy efficiency programs in the United States. The modified TRC is described below, and the detailed descriptions and results for the expanded TRC, the UAT, and the RIM are in Appendix F.

The TRC is the most commonly applied test for evaluating the cost-effectiveness of energy efficiency and renewable resource programs around the country. Applications range across states and utility

¹⁶ The PSC directed the use of the modified TRC as the primary cost-effectiveness test. Public Service Commission of Wisconsin. September 5, 2014. *Quadrennium Planning Process II – Final Decision. Order PSC Docket 5-FE-100, REF#: 215245.* http://psc.wi.gov/apps35/ERF_view/viewdoc.aspx?docid=215245

¹⁷ California Public Utilities Commission. July 2002. *California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects.* http://www.calmac.org/events/SPM_9_20_02.pdf

jurisdictions, from the standard TRC to the societal cost test, which expands the test inputs to account for a more holistic societal perspective. Modifications to the standard TRC often include reducing the discount rate or including various environmental and non-energy benefits. The test includes total participant and Program Administrator costs, as well as some non-energy benefits such as emission reduction benefits. Note that incentive costs are not included as TRC costs because they are deemed transfer payments, which is consistent with industry guidelines defining the TRC test. Incentive costs are used for other costs tests, however, such as the UAT.

The modified TRC used for the CY 2018 evaluation defines program cost-effectiveness from a regulatory perspective (as directed by the PSC) and is intended to measure the overall impacts of programs' benefits and costs on the state of Wisconsin. The test compares all benefits and costs to the state that can be measured with a high degree of confidence, including any net avoided emissions that are regulated and that have either well-defined market or commission-established values. The purpose of the modified TRC is to determine if the total costs incurred by residents, businesses, and Focus on Energy for operating the programs are outweighed by the total benefits they receive.

In simple terms, the modified TRC benefit/cost value is the ratio of avoided utility and emission costs from avoided energy consumption to the combination of program administrative costs, program delivery costs, and net participant incremental measure costs:

$$TRC \frac{B}{C} = \frac{[Value\ of\ Gross\ Saved\ Energy + Value\ of\ Gross\ Avoided\ Emissions] * NTG}{[Administrative\ Costs + Delivery\ Costs + (Incremental\ Measure\ Cost * NTG)]}$$

Where:

$$Value\ of\ Gross\ Saved\ Energy = Net\ Gross\ Savings * Utility\ Avoided\ Costs$$

Interpreting Test Results

Because of changes in avoided electric energy and natural gas costs, changes to measure-level incremental costs, and changes to emissions allowance prices for the CY 2015–CY 2018 quadrennial, cost-effectiveness results reported here are not directly comparable to results from the previous quadrennial (CY 2011–CY 2014). The CY 2015, CY 2016, CY 2017, and CY 2018 results are directly comparable.

Value of Net Saved Energy

The value of energy saved, or displaced, equals the net energy saved multiplied by the utility-avoided cost of saving that energy. In the case of energy efficiency and renewable resource programs, the avoided cost is the incremental (or marginal) cost for the additional energy and capacity the utility must generate or purchase rather than pay for the efficient measure that offsets the demand.

The PSC established the methodology to estimate electric energy avoided costs on June 18, 2012, in Order PSC Docket 5-GF-191 (PSC REF#: 166932).¹⁸ The PSC established new natural gas avoided costs for the CY 2015–CY 2018 quadrennial on February 25, 2015, in Order PSC Docket 5-FE-100 (PSC REF#: 232431).¹⁹ These costs are based on Henry Hub price forecasts from the 2014 U.S. Energy Information Administration’s *Annual Energy Outlook*.²⁰

The source for electric energy avoided costs in this CY 2018 evaluation comes from the annualized forecast avoided cost model developed by the Evaluation Team. This model relied on the Midcontinent Independent Transmission System Operator’s locational marginal pricing for nodes in Wisconsin and on forecasts for 2019, 2024, and 2029.²¹

To derive net savings, the Evaluation Team decreased the verified gross energy savings by the conventional attribution factor of the NTG ratio. The Team then increased the net savings by a line loss factor of 8% to account for distribution losses. Table 20 shows the avoided cost assumptions used for the cost-effectiveness tests in CY 2015 through CY 2018.

Table 20. Avoided Cost Comparison between Years

Avoided Cost	CY 2015	CY 2016	CY 2017	CY 2018
Electric Energy (\$/kWh) ^a	\$0.02914- \$0.06871	\$0.03525- \$0.06871	\$0.04136– \$0.06871	\$0.04747– \$0.06871
Electric Capacity (\$/kW year)	130.26	130.26	130.26	130.26
Natural Gas (\$/therm) ^b	\$0.625-\$1.278	\$0.691-\$1.278	\$0.735-\$1.278	\$0.802-\$1.278
Avoided Cost Inflation	0%	0%	0%	0%
Real Discount Rate	2%	2%	2%	2%
Line Loss	8%	8%	8%	8%

^a The CY 2015–CY 2018 cost-effectiveness analyses used a time series that grows from \$0.02914 to \$0.06871 over 14 years in the forecast model.

^b The natural gas avoided costs grow from \$0.625 to \$1.278 over a 25-year period based on growth rates from the 2014 *Annual Energy Outlook*.

¹⁸ Public Service Commission of Wisconsin. June 18, 2012. *Quadrennium Planning Process II – Scope*. Order PSC Docket 5-GF-191, REF#: 166932. http://psc.wi.gov/apps35/ERF_view/viewdoc.aspx?docid=166932

¹⁹ Public Service Commission of Wisconsin. February 25, 2015. *Quadrennium Planning Process II – Scope*. Order PSC Docket 5-FE-100, REF#: 232431. http://psc.wi.gov/apps35/ERF_view/viewdoc.aspx?docid=232431

²⁰ U.S. Energy Information Administration. May 7, 2014. *Annual Energy Outlook*. [https://www.eia.gov/outlooks/aeo/pdf/0383\(2014\).pdf](https://www.eia.gov/outlooks/aeo/pdf/0383(2014).pdf)

²¹ Midcontinent Independent Transmission System Operator, Inc. Last updated 2019. “Day-Ahead Locational Marginal Pricing” <https://www.misoenergy.org/markets-and-operations/real-time--market-data/market-reports/>

Emissions Benefits

The equation to determine emissions benefits requires three key parameters—lifecycle verified net energy savings, emissions factors, and the dollar value of the displaced emissions. Emissions factors are simply the rate at which the pollutants are emitted per unit of energy and are most often expressed in tons of pollutant per energy unit—electric is expressed in tons per megawatt hour (MWh) and natural gas is expressed in tons per thousand therms (MThm). The product of the emissions factor and the net lifecycle energy savings is the total weight of air pollutant displaced by the program. The product of the total tonnage of pollutant displaced and the dollar value of the displaced emissions per ton is the avoided emissions benefit.

The natural gas emissions factor has remained constant since CY 2011 and the electric emissions factors have been stable since CY 2016. Table 21 lists the emissions factors and allowance prices.

Table 21. Emissions Factors and Allowance Price

Service Fuel Type	Carbon Dioxide	Nitrogen Oxide	Sulfur Dioxide
Electric Emissions Factor (Tons/MWh)	0.8855	0.0007	0.0015
Natural Gas Emissions Factor (Tons/MThm)	5.85	n/a	n/a
Allowance Price (\$/Ton)	\$15.00	\$7.50	\$2.00

The Evaluation Team obtained nitrogen oxide and sulfur dioxide emissions allowance prices from near the end of CY 2016 from the U.S. Environmental Protection Agency’s *Cross State Air Pollution Rule*.²² The Team used the carbon dioxide emissions price in PSC Order Docket 5-FE-100 (Ref#: 279739), which states, “For purposes of evaluating the Focus program during the CY 2015–CY 2018 quadrennial, the value of avoided carbon emissions shall be \$15 per ton.”²³

Table 22 lists the emissions benefits for all programs by segment.

Table 22. Total Program Emissions Benefits by Segment

Program Year ^a	Residential	Nonresidential	Pilots	Rural	Total
CY 2015 Emissions Benefits	\$25,236,521	\$85,344,610	n/a	n/a	\$110,581,131
CY 2016 Emissions Benefits	\$33,488,565	\$70,614,708	n/a	n/a	\$104,103,273
CY 2017 Emissions Benefits	\$27,784,615	\$72,107,782	n/a ^b	n/a	\$99,892,397
CY 2018 Emissions Benefits	\$34,598,669	\$67,349,281	\$4,915,161	\$2,838,264	\$109,701,374

^a Reported emissions impacts are based on portfolio-level modeling and are not measure- or project-level specific.

^b CY 2017 emissions benefits from pilots is included in the CY 2017 residential and nonresidential emissions benefits.

²² S&P Global. Accessed April 2017. *Platts MegaWatt Daily*. http://nyarea.org/wp-content/uploads/11_23_16_EARNED-MEDIA_Platts-Megawatt-Daily_King-Coal-to-reign-again-%E2%80%94-for-the-winter-EIA.pdf

²³ Public Service Commission of Wisconsin. December 23, 2015. *Quadrennium Planning Process II – Scope*. Order PSC Docket 5-FE-100, REF#: 279739. http://psc.wi.gov/apps35/ERF_view/viewdoc.aspx?docid=279739

Program Costs

The program costs represent all costs associated with running the efficiency and renewable programs (including administration and delivery costs). The Evaluation Team did not include incentive costs because they are deemed as transfer payments to the customer.²⁴ Focus on Energy’s fiscal agent, Wipfli, provided the CY 2018 program costs used for this evaluation.

Table 23 shows the CY 2015 through CY 2018 program and incentive cost values used for the cost-effectiveness tests.

Table 23. Sector Costs Comparison

Costs	CY 2015	CY 2016	CY 2017	CY 2018 ^a
Residential				
Incentive Costs	\$21,377,732	\$20,313,920	\$21,194,958	\$24,760,071
Administrative Costs	\$4,421,952	\$3,772,429	\$4,505,599	\$972,610
Delivery Costs	\$10,084,023	\$8,873,833	\$10,274,774	\$14,420,186
Total Residential Program Costs	\$35,883,707	\$32,960,182	\$35,975,330	\$40,152,867
Nonresidential				
Incentive Costs	\$40,612,777	\$35,523,227	\$33,631,479	\$38,863,493
Administrative Costs	\$4,070,977	\$4,162,016	\$4,336,290	\$2,178,289
Delivery Costs	\$16,623,494	\$16,995,245	\$17,706,879	\$23,003,392
Total Nonresidential Program Costs	\$61,307,247	\$56,680,488	\$55,674,648	\$64,045,174
Pilots				
Incentive Costs	n/a	n/a	n/a	\$4,382,328
Administrative Costs	n/a	n/a	n/a	\$153,616
Delivery Costs	n/a	n/a	n/a	\$4,733,901
Total Pilots Program Costs	n/a	n/a	n/a	\$9,269,845
Rural				
Incentive Costs	n/a	n/a	n/a	\$7,886,441
Administrative Costs	n/a	n/a	n/a	\$133,862
Delivery Costs	n/a	n/a	n/a	\$5,083,364
Total Rural Program Costs	n/a	n/a	n/a	\$13,103,667
Total for Residential, Nonresidential, Pilots, and Rural Sectors				
Incentive Costs	\$61,990,509	\$55,837,147	\$54,826,436	\$75,892,333
Administrative Costs	\$8,492,929	\$7,934,445	\$8,841,889	\$3,438,377
Delivery Costs	\$26,707,516	\$25,869,078	\$27,981,653	\$47,240,843
Total Program Costs	\$97,190,955	\$89,640,670	\$91,649,978	\$126,571,553

^a Historically, some pilots’ costs were included in residential and nonresidential savings totals. All savings calculated in CY 2018, as well as adjustments made in CY 2018 to savings, are reflected in CY 2018 totals. See Appendix E, Table E-13 for a description of these adjustments.

²⁴ The Evaluation Team included the incentives as an incremental cost but not as a program cost.

Incremental Costs

The gross incremental costs are the additional costs incurred as a result of purchasing efficient equipment over and above purchasing a baseline nonqualified product. The Evaluation Team derived the gross incremental cost values used in this CY 2018 evaluation from the incremental cost study we conducted with the Program Administrator and Program Implementers. This study allowed us to establish up-to-date incremental costs for all measures using the best available data, including historical Focus on Energy program data and independent research from other state programs. The gross incremental costs, similar to the energy savings values used in the cost-effectiveness tests, required the application of attribution factors to account for freeridership.

As in the previous quadrennial evaluation (CY 2011–CY 2014), the Evaluation Team assigned actual CY 2015–CY 2018 project cost values from the program tracking databases to the renewable energy projects. Table 24 shows the CY 2015 through CY 2018 total measure net incremental costs used for the cost-effectiveness tests. Following rising incremental costs in CY 2016 caused by the transition from CFLs to LEDs, incremental costs in CY 2017 dropped as LED costs began to reflect changing market conditions.

Table 24. Net Incremental Measure Cost Comparison

Costs	Residential	Nonresidential
CY 2015 Incremental Costs	\$39,756,677	\$162,338,959
CY 2016 Incremental Costs	\$77,731,522	\$150,762,883
CY 2017 Incremental Costs	\$52,340,833	\$97,863,384
CY 2018 Incremental Costs	\$96,141,415	\$84,727,293

Table 25 lists CY 2018 incentive costs by sector, with renewables incorporated.

Table 25. CY 2018 Incentive Costs by Sector (with Renewables Incorporated)

Costs	Residential	Nonresidential	Total
Incentive Costs	\$34,067,781	\$41,824,552	\$75,892,333

Table 26 lists the findings of the benefit/cost analysis for Focus on Energy’s CY 2018 programs by sector.

Table 26. CY 2018 Benefit and Costs Portfolio Breakout

Focus on Energy Benefits and Costs		Portfolio Breakout	Core Efficiency	Pilots	Rural	Renewables	
Incentives	\$75,892,333		\$59,172,374	\$4,382,328	\$7,886,441	\$4,451,190	
Modified TRC Benefits	\$848,145,948		\$740,848,989	\$42,603,163	\$19,729,752	\$44,964,045	
Modified TRC Costs	\$231,547,927		\$179,118,048	\$7,875,201	\$13,509,232	\$31,045,446	
Portfolio TRC Ratio	3.66	Alone	4.14	5.41	1.46	1.45	
		With Core		4.19		3.95	3.74
		With Core and Pilots (All Efficiency)				4.01	3.80
		With Core, Pilots, and Rural					3.66

Table 27 lists the findings of the benefit/cost analysis for Focus on Energy’s CY 2018 programs by sector, with renewable measures incorporated into each sector for each cost-effectiveness test.

Table 27. CY 2018 Costs, Benefits, and Modified Total Resource Cost Test Results by Sector

	Residential	Nonresidential	Rural	Pilots	Total
Administrative Costs	\$972,610	\$2,178,289	\$133,862	\$153,616	\$3,438,377
Delivery Costs	\$14,420,186	\$23,003,392	\$5,083,364	\$4,733,901	\$47,240,843
Incremental Measure Costs	\$88,239,876	\$81,349,141	\$8,292,007	\$2,987,684	\$180,868,708
Total TRC Costs	\$103,632,672	\$106,530,822	\$13,509,232	\$7,875,201	\$231,547,927
Electric Benefits	\$179,655,302	\$323,757,939	\$12,409,589	\$12,817,952	\$528,640,783
Natural Gas Benefits	\$46,911,621	\$133,540,221	\$4,481,898	\$24,870,049	\$209,803,790
Emissions Benefits	\$34,598,669	\$67,349,281	\$2,838,264	\$4,915,161	\$109,701,374
Total TRC Benefits	\$261,165,592	\$524,647,442	\$19,729,752	\$42,603,163	\$848,145,948
TRC Benefits Minus Costs	\$157,532,920	\$418,116,619	\$6,220,519	\$34,727,962	\$616,598,020
TRC Benefit/Cost Ratio^a	2.52	4.92	1.46	5.41	3.66

^a The TRC ratio equals the total TRC benefits divided by non-incentive costs.

Table 28 lists the CY 2015 through CY 2018 portfolio cost-effectiveness results for the modified TRC.

Table 28. Cost-Effectiveness Results for Focus on Energy Portfolio

Calendar Year	Renewables	Residential	Nonresidential	Renewables	Total
CY 2015	Yes	3.12	3.63	n/a	3.51
	No	3.33	3.93	1.18	3.51
CY 2016	Yes	2.73	3.14	n/a	3.00
	No	2.93	3.36	1.09	3.00
CY 2017	Yes	3.13	4.60	n/a	4.07
	No	3.39	4.89	1.37	4.07
CY 2018	Yes	2.37	4.95	n/a	3.66
	No	2.52	5.60	1.45	3.66

The PSC directed Focus on Energy to perform additional benefit/cost tests for informational purposes:

- The expanded TRC has the same inputs as the modified TRC, plus net economic benefits.
- The UAT measures the net benefits and costs of the programs as a resource option from the perspective of the Focus on Energy Program Administrator.
- The RIM is the ratio of avoided utility costs and the combination of participant incentives, administrative costs, and lost utility revenue.

Table 29 lists the CY 2018 portfolio-level cost-effectiveness results for these additional test perspectives.

Table 29. CY 2018 Portfolio-Level Cost-Effectiveness Results for Additional Benefit/Cost Tests

Test	Residential	Nonresidential	Pilots	Rural	Total
Expanded TRC					5.16
UAT	5.64	7.14	4.07	1.29	5.83
RIM ^a	0.64	1.20			0.94

^a For the CY 2018 cost-effectiveness analysis, the lost revenue portion of the RIM test assumes a fixed utility rate that does not escalate over time, while the avoided energy costs are escalated on a yearly basis, resulting in greater benefits than costs for the nonresidential portfolio.

The inclusion of economic benefits to the expanded TRC results in higher benefit/cost ratios compared to the portfolio-level modified TRC results. For the UAT, the results show that benefits from the residential programs were more than five times the costs, while the benefits from the nonresidential programs outweighed the costs by a factor of 7.14. As expected, the benefit/cost portfolio values from the RIM are close to 1.0. When interpreted within the context of the UAT results, these findings indicate that, although annual Focus on Energy activities will probably induce theoretical upward pressure on future energy rates, total ratepayer energy costs will go down.

For additional details on the different benefit/cost test results and processes used for calculating the cost-effectiveness of the Focus on Energy portfolio, please refer to Appendix F as well as the *Benefit/Cost Analysis CY 2009 Evaluation Report*.²⁵

²⁵ Focus on Energy. November 24, 2009. *Benefit/Cost Analysis CY 2009 Evaluation Report*. Submitted to Public Service Commission of Wisconsin. Submitted by PA Consulting Group and KEMA, Inc. https://focusonenergy.com/sites/default/files/bcanalysiscy09_evaluationreport.pdf

Outcomes and Recommendations

Based on the Evaluation Team’s segment- and portfolio-level findings, this section presents high-level outcomes and recommendations.

CY 2015–CY 2018 Quadrennial Period Outcomes

Across the CY 2015–CY 2018 quadrennial, the Focus on Energy programs were intended to achieve measurable energy savings goals while maintaining high satisfaction levels and remaining cost-effective.

On a portfolio level, the programs surpassed the four-year net annual MMBtu and natural gas energy savings goals set by the PSC. While the programs fell just short of the PSC’s goals for electrical energy savings and electrical demand reduction, the difference was not statistically significant. Focus on Energy achieved 105% of the MMBtu savings goal, 99% of the electric energy savings goal, 94% of the electric demand reduction goal, and 112% of the natural gas net annual quadrennial savings goal. (The programs did meet contractual expectations to achieve 100% of the MMBtu goal and at least 90% of the goals for electric energy and natural gas savings. Although the estimated evaluated electric energy savings fell just short of the PSC’s goal, Cadmus found no statistically significant difference between the evaluated electric energy savings (99%) and the goal (100%)).²⁶

Additionally, PSC Order (PSC Ref#: 338759) requires that Focus on Energy’s Program Administrator and Program Implementers track savings relative to gross lifecycle savings targets: 270,978,131 MMBtu, 33,166,224,930 kWh, 422,264 kW, and 1,578,025,700 therms. Relative to these goals, the Focus on Energy programs achieved 111% of the MMBtu savings goal, 128% of the electric energy savings goal, 92% of the electric demand reduction goal, and 99% of the natural gas verified gross lifecycle quadrennial savings goal. (Again, the programs did meet contractual expectations to achieve 100% of the MMBtu goal and at least 90% of the goals for electric energy and natural gas lifecycle savings. Although the estimated evaluated electric energy savings fell short of the PSC’s goal, Cadmus found no statistically significant difference between the evaluated natural gas gross lifecycle savings (99%) and the goal (100%)).²⁷

The entire savings portfolio was delivered cost-effectively, providing the state of Wisconsin \$3.62 in benefits for every \$1.00 in costs incurred during the quadrennial. When economic benefits are included the portfolio provided \$5.09 in benefits for every \$1.00 in costs incurred during the quadrennial.²⁸

²⁶ Based on estimated savings and variability, a t-test was performed to compare the evaluated first year net electric energy savings (99%) to the goal (100%) resulting in a p-value of 0.35

²⁷ Based on estimated savings and variability, a t-test was performed to compare the evaluated lifecycle gross natural gas savings (99%) to the goal (100%) resulting in a p-value of 0.38

²⁸ As economic impacts have not yet been estimated for CY 2017 and CY 2018, the impact for CY 2016 was used as a proxy for CY 2017 and CY 2018.

The Program Administrator also has a contractual goal to maximize customer satisfaction. Drawing from the portfolio baseline rating of 8.8 out of 10, the programs overall attained an average customer satisfaction of 9.0 over the last three years of the quadrennial (CY 2016–CY 2018), an amount statistically greater than the baseline at the precision level required by PSC Order (PSC Ref#: 338759).²⁹

CY 2018 Outcomes and Recommendations

The Evaluation Team synthesized information from all CY 2018 evaluation activities to inform the following portfolio-level outcomes and recommendations. More information on supporting findings can be found in both this report and in the Volume II program-specific chapters.

Outcome 1. Focus on Energy exceeded its portfolio-level CY 2018 goals, with rural programs and pilots providing a significant contribution toward natural gas savings. The Program Administrator reached 115% of the CY 2018 MMBtu savings goal, 112% of the electric energy savings goal, 118% of the electric demand reduction goal, and 118% of the natural gas verified gross lifecycle savings goal. Rural programs and pilots, specifically the Connected Devices Kits Program and the Strategic Energy Management Pilot, successfully aided the portfolio savings. Together, rural programs and pilots comprised approximately 9.5% of the total lifecycle natural gas savings in CY 2018.

The Strategic Energy Management Pilot achieved both operational savings and therms savings from capital upgrades, demonstrating the Pilot’s value in educating customers about opportunities for deep energy savings in addition to optimizing operations and maintenance. The rural Connected Devices Kits Program accounted for 12% of the residential core program and rural program therms. This Program’s achievement indicates that targeted, rural residential programs can be successful and can make a meaningful contribution to the portfolio savings. The Program was not extended to the CY 2019–CY 2022 Quadrennium; although new rural offerings, such as the Rural Farmhouse Kit program, are designed to replace its savings.

Recommendation 1. New rural offerings, such as the Rural Farmhouse Kit Program, are designed to replace savings from the Connected Devices Kits Program. Monitor savings from rural participants to ensure that new rural programs fill the savings gap from the Connected Devices Kits Program and continue to explore new measures and opportunities that encourage natural gas savings for this segment.

Outcome 2. Residential lighting remains a significant contributor to the residential portfolio, though minimum federal lighting standards mean these savings will not likely remain available long term. LEDs accounted for 77.7% of the residential portfolio’s annual kilowatt-hour savings in CY 2018. While the upcoming Energy Independence and Security Act lighting ruling remains uncertain, if new standards

²⁹ The Order specifies that, to meet the contractual key performance indicator, the portfolio average of program satisfaction ratings across the last three years of the quadrennial must meet or exceed the baseline rating using statistical precision of $p < 0.01$.

take effect in CY 2020 as originally planned, the Evaluation Team's CY 2017 potential study indicated that Focus on Energy would not be able to claim savings after CY 2022.³⁰ The next several years offer an opportunity for Focus on Energy to prepare for this change.

Recommendation 2. Continue to examine new program designs and measures and to explore untapped markets to help fill anticipated savings gap from LEDs. Work with manufacturers, retailers, marketers, and other efficiency programs around the country to collect examples of how similar programs are expanding their portfolios and to review lessons learned from their efforts. Given that the upstream lighting portion of the Retail Lighting and Appliance Program is very high volume, focus attention on similar high-volume midstream and upstream programs.

If the potential study is approved for the next quadrennial, focus on other opportunities that can help fill the lighting savings gap in the CY 2023–CY 2026 quadrennial.

Outcome 3. Though midstream programs offer a promising opportunity to achieve cost-effective savings, attribution may be challenging in the absence of distributor sales data. Focus on Energy successfully launched several midstream pilots, including Low-E Storm Windows, Midstream Commercial Kitchen Equipment, and Midstream Commercial and Industrial Lighting, some of which are moving forward as permanent program offerings or initiatives. Though midstream program incentives can help overcome market barriers associated with upfront costs, the design poses unique challenges in verifying gross and net impacts.

In CY 2018, the average-weighted NTG ratio for evaluated midstream programs was approximately 31%, representing a 45% sales lift. The Evaluation Team relied on self-report data to determine NTG when sales data was unavailable. As midstream offerings begin to scale up, consider assessing the options and opportunities to improve evaluability, net impacts, and the interpretation of results in future years.

Recommendation 3. Analysis of pre- and post-sales data is the most robust approach to estimating midstream program energy savings, but adequate sales data is often unavailable. In the absence of sales data, work with distributors and retailers to improve self-report program attribution by helping end-users understand that their purchase is connected to Focus on Energy. If a distributor attribution survey is also planned, prepare distributors for being asked to estimate how much a program has influenced their sales.

To assist in the translatability of evaluation outcomes, consider adding an estimated sales-lift adjustment to claimed savings that reflect the reality that retailers and distributors would still sell some efficient products in the program's absence. This will improve the overall realization rate and may assist in setting goals and planning.

³⁰ The available savings for CY 2020–CY 2022 represent the anticipated sell-through period.

Outcome 4. Participants are highly satisfied with Focus on Energy programs, and CY 2018 data show a significant improvement over the CY 2015 baseline satisfaction ratings. Despite positive experiences with the programs, nonresidential program participation is dropping. The satisfaction ratings for nearly all residential and nonresidential programs in CY 2018 were statistically higher than the portfolio’s baseline of 8.8 out of 10, except for a few programs that were statistically equivalent to the baseline.³¹ This year, the average satisfaction rating for both the residential and nonresidential sectors was high, at 9.1, and most participants rated themselves as *highly likely* to recommend the program to others.

Though nonresidential participants were highly satisfied, and data indicate improvements in their experiences with the application process, some programs, such as the Business Incentive Program, have experienced participation decline since CY 2015. Moreover, participant and nonparticipant survey findings show that barriers to implementing energy efficiency projects in nonresidential settings remains prevalent. Sixty percent of nonparticipants had not heard of Focus on Energy and, among those who had, the main reason for not participating was not knowing enough about the programs.

Recommendation 4. The Program Administrator has done an excellent job to ensure positive customer experiences with Focus on Energy programs. Where funding allows, opportunities may exist to improve nonresidential customer engagement, recruit new customers, and bolster participation. Among nonparticipants, there is an opportunity to improve awareness of the offerings. Conduct marketing campaigns (through TV, print, digital, and social media) that target the nonresidential sector, driving customers to the website to learn more information, tailored to their specific business or organization.

Target marketing campaigns by analyzing usage data by segment and identifying specific customers with usage higher than average for similar business types.

Outcome 5. The Evaluation Team calculated verified lifecycle energy savings for a few nonresidential measures using a different measure life from that used to calculate *ex ante* reported lifecycle savings. This reduced *ex post* verified lifecycle energy savings and measure realization rates.

Recommendation 5. Consider requiring that lifecycle electric and natural gas energy savings be calculated based on the measure life assigned to the selected MMID in SPECTRUM. This will encourage more accurate MMID selection in SPECTRUM and hopefully will reduce discrepancies between measure lives used in *ex ante* reported and *ex post* verified savings calculations.

Outcome 6. In some cases, the Evaluation Team and the Program Implementers used different versions of the TRM for calculating savings, which created inefficiencies. The Evaluation Team selects the appropriate TRM for evaluation based on the incentive paid dates in SPECTRUM. In some evaluated measures, *ex ante* reported savings were adjusted by the Program Implementer to use different deemed

³¹ The Team measured statistical significance using binomial t-tests with $p < 0.10$ or better. The Home Performance with ENERGY STAR Program Whole Home path (CY 2018 rating of 8.7), Multifamily Energy Savings Program (CY 2018 rating of 9.1), and Large Energy Users Program (CY 2018 rating of 9.0) were statistically equivalent to the baseline.

savings based on a newer TRM version, released subsequently to when the project was paid. In these cases, the adjustments increased energy savings. The Evaluation Team adjusted the initial *ex post* verified savings to reference the same deemed savings calculations; therefore, measure realization rates were not impacted. However, the process could benefit from improved clarity and a consistent protocol.

Recommendation 6. Whenever possible, use the TRM in place at the time the project was paid, or update all projects to reflect the latest TRM (but not both) to determine *ex ante* savings that are based on consistent decision-making criteria. Additionally, to improve coordination, add a data field to SPECTRUM with the TRM version used to calculate *ex ante* reported savings. This will help inform the Evaluation Team about which TRM to use for evaluation activities and will help maintain consistency between reported and evaluated savings. Whichever process is approved, formalize the details in the strategic evaluation plan.