

# Focus on Energy Calendar Year 2022 Evaluation Report

**VOLUME I**

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# Acronyms and Abbreviations

Acronym	Term
<b>AVERT</b>	AVoided Emissions and geneRation Tool
<b>CY</b>	Calendar year
<b>EPA</b>	Environmental Protection Agency
<b>HVAC</b>	Heating, ventilation, and air conditioning
<b>kW</b>	Kilowatt
<b>kWh</b>	Kilowatt per hour
<b>LED</b>	Light-emitting diode
<b>MMBtu</b>	Million British thermal unit
<b>MMID</b>	Master measure identifier
<b>MThm</b>	Thousand therms
<b>MWh</b>	Megawatt per hour
<b>NPS</b>	Net promoter score
<b>NTG</b>	Net-to-gross
<b>PSC</b>	Public Service Commission of Wisconsin
<b>PTAC</b>	Packaged terminal air conditioner
<b>PTHP</b>	Packaged terminal heat pump
<b>RECIP</b>	Renewable Energy Competitive Incentive Program
<b>RIM</b>	Ratepayer impact measure test
<b>SEER</b>	Seasonal Energy Efficiency Ratio
<b>SPECTRUM</b>	Statewide Program for Energy Customer Tracking, Resource Utilization, and Data Management
<b>T&amp;D</b>	Transmission and Distribution
<b>TRC</b>	Total resource cost test
<b>TRM</b>	Technical reference manual
<b>UAT</b>	Utility administrator cost test

# Executive Summary

This report, presented in three volumes, describes the evaluation findings and impacts achieved by Focus on Energy for calendar year (CY) 2022 and over the CY 2019-CY 2022 quadrennium. When appropriate, each volume presents rolled up quadrennium findings with the annual results.

- Volume I (this report) is a summary of findings across all solutions, offerings, and measure categories in the portfolio.
- Volume II provides detailed findings for each Focus on Energy solution and offering.
- Volume III provides the appendices with additional details on the evaluation methodologies along with supporting data and evaluation materials.

The Wisconsin Focus on Energy Evaluation Dashboard is another tool that allows users to review energy savings by year, customer sector, and measure category.<sup>1</sup> Additionally, the *Quadrennial Achievement Report* highlights outcomes over the past four years across all Focus on Energy solutions 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, Volume III, the online Evaluation Dashboard tool, and the *Quadrennial Achievement Report*) should be read together to gain a comprehensive perspective of the Focus on Energy portfolio.

## SUMMARY OF METHODS

Each year, the evaluation produces results for three consistent research areas—impact analysis, customer satisfaction, and cost-effectiveness—in addition to more targeted research that varies annually and is designed to meet Focus on Energy's specific program evaluation needs. The three ongoing research areas of the evaluation are briefly described here. Specific annual evaluation efforts are described in the solution chapters of Volume II.

### Impact Analysis

The evaluation team defines key terms, briefly presented here and described in more detail in the Glossary of Terms in Appendix B (Volume III):

- **Gross savings:** Reported change in energy consumption, demand, or both resulting from an efficiency offering
- **Verified gross savings:** Energy savings verified by the independent evaluation team<sup>2</sup>
- **Net savings:** Savings directly attributable to offering efforts (net of what would have occurred in absence of the offering)

<sup>1</sup>The Wisconsin Focus on Energy Evaluation Dashboard tool is available here: <https://focusonenergy.com/evaluation-dashboard>

<sup>2</sup>The independent evaluation team comprises Cadmus, Apex Analytics, and Resource Innovations.

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 2022 and applied evaluation results from previous years.

## Customer Satisfaction

To monitor participants' satisfaction with Focus on Energy and its offerings, the evaluation team analyzes ongoing participant surveys, which the program administrator distributes to all participants for whom it has contact information. The team reports on various satisfaction topics, including overall satisfaction with the offering, with Focus on Energy as a whole, and a net promotor score (NPS). These analyses are further described in specific solution chapters of Volume II.

## Cost-Effectiveness

The evaluation team used a Focus on Energy cost-effectiveness calculator to determine the cost-effectiveness of individual solutions and offerings as well as of the entire Focus on Energy portfolio. Results are provided in Volume I for the primary test, the modified total resource cost (TRC) test. Results of all five tests conducted as part of Focus on Energy's evaluation—including the modified TRC—are provided in Appendix I. Cost-Effectiveness and Emissions Methodology and Analysis in Volume III.

# KEY ACHIEVEMENTS

Table 1 lists CY 2022 annual gross claimed savings, verified gross savings, and verified net savings for residential, nonresidential, and midstream channels.

**Table 1. CY 2022 First-Year Annual Savings by Channel**

SAVINGS TYPE	UNIT	RESIDENTIAL	NONRESIDENTIAL	MIDSTREAM	TOTAL
<b>Gross</b>	MMBtu	1,419,534	2,353,414	39,631	<b>3,812,579</b>
	kWh	249,083,058	362,363,197	2,417,069	<b>613,863,324</b>
	kW	28,744	51,496	455	<b>80,695</b>
	therms	5,696,626	11,170,309	313,841	<b>17,180,775</b>
<b>Verified Gross</b>	MMBtu	1,423,128	2,315,870	39,631	<b>3,778,629</b>
	kWh	251,066,542	360,370,006	2,417,089	<b>613,853,637</b>
	kW	31,133	51,148	455	<b>82,736</b>
	therms	5,664,887	10,862,878	313,841	<b>16,841,606</b>
<b>Verified Net</b>	MMBtu	898,311	1,760,853	28,640	<b>2,687,805</b>
	kWh	134,552,827	274,220,682	1,782,568	<b>410,556,078</b>
	kW	14,074	38,530	270	<b>52,873</b>
	therms	4,392,171	8,252,121	225,580	<b>12,869,872</b>

*Note: Totals may not match the sum of channel savings due to rounding.*



Table 2 lists the verified net savings achieved in CY 2019, CY 2020, CY 2021, and CY 2022..

**Table 2. CY 2019, CY 2020, CY 2021, and CY 2022 First-Year Annual Verified Net Savings by Channel**

CALENDAR YEAR	UNIT	RESIDENTIAL	NONRESIDENTIAL	MIDSTREAM	TOTAL
<b>CY 2019</b>	MMBtu	582,347	2,857,821	N/A	<b>3,440,169</b>
	kWh	102,989,753	368,814,108	N/A	<b>471,803,861</b>
	kW	13,480	47,828	N/A	<b>61,307</b>
	therms	2,309,463	15,994,275	N/A	<b>18,303,738</b>
<b>CY 2020</b>	MMBtu	592,742	2,585,561	35,381	<b>3,213,684</b>
	kWh	99,974,109	349,002,995	656,841	<b>449,633,945</b>
	kW	13,874	49,314	211	<b>63,399</b>
	therms	2,516,308	13,947,625	331,400	<b>16,795,333</b>
<b>CY 2021</b>	MMBtu	695,690	2,331,434	48,245	<b>3,075,370</b>
	kWh	123,385,300	324,752,442	2,859,897	<b>450,997,640</b>
	kW	13,053	44,912	263	<b>58,229</b>
	therms	2,746,998	12,233,791	384,868	<b>15,365,657</b>
<b>CY 2022</b>	MMBtu	898,311	1,760,853	28,640	<b>2,687,805</b>
	kWh	134,552,827	274,220,682	1,782,568	<b>410,556,078</b>
	kW	14,074	38,530	270	<b>52,873</b>
	therms	4,392,171	8,252,121	225,580	<b>12,869,872</b>
<b>Quad III Totals</b>	<b>MMBtu</b>	<b>3,644,901</b>	<b>9,555,153</b>	<b>112,266</b>	<b>13,312,320</b>
	<b>kWh</b>	<b>672,538,016</b>	<b>1,319,688,112</b>	<b>5,299,306</b>	<b>1,997,525,435</b>
	<b>kW</b>	<b>80,792</b>	<b>181,279</b>	<b>744</b>	<b>262,814</b>
	<b>therms</b>	<b>13,502,025</b>	<b>50,523,778</b>	<b>941,848</b>	<b>64,967,651</b>

*Note: Totals may not match the sum of residential, nonresidential, and midstream savings due to rounding.*

*Total quadrennial net residential savings include additional savings from market effects, which account for the program's long-term effect on the Wisconsin residential lighting and new construction markets. Additional details can be found in the Quadrennial Market Effects section of the Direct to Customer and Residential New Construction chapters within Volume II. Total quadrennial net savings also include residential nonparticipant spillover and nonresidential Commercial Training offering spillover not counted in individual years.*

The Public Service Commission of Wisconsin (PSC) ordered that the administrator of the Focus on Energy solutions and offerings track quadrennium savings achievements with respect to verified gross lifecycle savings targets.<sup>3</sup> Lifecycle savings represent the savings that offerings can realize through measures over their expected useful lives. The PSC set an overall gross lifecycle savings goal for Focus in the 2019-2022 quadrennium in millions of British thermal units (MMBtu). The PSC also established a quadrennium demand savings goal as well as minimum goal thresholds for kWh and therm savings. The minimum goal thresholds were set to achieve a balance in meeting the overall MMBtu goal using both types of savings. These goals were updated in the fall of 2021.<sup>4</sup>

The 2019-2022 quadrennium gross lifecycle MMBtu savings goal set by the PSC is 282,794,224 MMBtu. The 2019-2022 quadrennium kW savings goal set by the PSC is 360,784 kW.

This report presents kWh and therms savings achievement relative to the overall goals and in comparison to the 90% minimum goal thresholds.

The overall quadrennium gross lifecycle savings targets for electric and natural gas presented in this report are 33,909,564,245 kWh and 1,670,948,583 therms, respectively.

Table 3 shows the lifecycle savings achieved by Focus on Energy in CY 2022.

**Table 3. CY 2022 Lifecycle Savings by Channel**

SAVINGS TYPE	UNIT	RESIDENTIAL	NONRESIDENTIAL	MIDSTREAM	TOTAL
<b>Gross</b>	MMBtu	17,161,541	35,479,373	639,977	<b>53,280,891</b>
	kWh	2,477,268,231	5,476,936,313	38,775,745	<b>7,992,980,288</b>
	kW	28,744	51,496	455	<b>80,695</b>
	therms	87,091,017	167,920,663	5,076,743	<b>260,088,423</b>
<b>Verified Gross</b>	MMBtu	17,262,796	34,742,821	639,978	<b>52,645,595</b>
	kWh	2,483,080,424	5,444,218,647	38,776,105	<b>7,966,075,175</b>
	kW	31,133	51,148	455	<b>82,736</b>
	therms	87,905,255	161,671,468	5,076,743	<b>254,653,466</b>
<b>Verified Net</b>	MMBtu	11,104,204	26,459,762	479,193	<b>38,043,160</b>
	kWh	1,457,255,724	4,135,279,814	29,613,039	<b>5,622,148,576</b>
	kW	14,074	38,530	270	<b>52,873</b>
	therms	61,320,479	123,501,877	3,781,536	<b>188,603,893</b>

<sup>3</sup> Public Service Commission of Wisconsin. June 6, 2018. Quadrennial Planning Process III – Final Decision. PSC Docket 5-FE-101, PSC REF#: 343909 [http://apps.psc.wi.gov/vs2015/ERF\\_view/viewdoc.aspx?docid=343909](http://apps.psc.wi.gov/vs2015/ERF_view/viewdoc.aspx?docid=343909)

<sup>4</sup> Public Service Commission of Wisconsin. October 21, 2021. Quadrennial Planning Process III – Final Decision. PSC Docket 5-FE-101, PSC REF#: 423549. <https://apps.psc.wi.gov/ERF/ERFview/viewdoc.aspx?docid=423549>

Table 4 lists verified gross lifecycle savings achieved in CY 2019, CY 2020, CY 2021, and CY 2022.

**Table 4. CY 2019, CY 2020, CY 2021, and CY 2022 Verified Gross Lifecycle Savings by Channel**

CALENDAR YEAR	UNIT	RESIDENTIAL	NONRESIDENTIAL	MIDSTREAM	TOTAL
<b>CY 2019</b>	MMBtu	19,866,612	59,051,663	N/A	<b>78,918,274</b>
	kWh	4,120,568,612	7,571,848,059	N/A	<b>11,692,416,671</b>
	kW	32,950	67,532	N/A	<b>100,481</b>
	therms	58,072,316	332,165,170	N/A	<b>390,237,486</b>
<b>CY 2020</b>	MMBtu	21,000,820	49,352,516	489,340	<b>70,842,676</b>
	kWh	4,456,602,415	6,866,908,785	8,351,599	<b>11,331,862,798</b>
	kW	35,738	65,004	211	<b>100,953</b>
	therms	57,948,924	259,226,228	4,608,448	<b>321,783,600</b>
<b>CY 2021</b>	MMBtu	16,119,330	49,516,438	753,010	<b>66,388,778</b>
	kWh	2,817,322,462	6,494,125,244	43,336,920	<b>9,354,784,626</b>
	kW	32,514	59,379	263	<b>92,157</b>
	therms	65,066,257	273,584,829	6,051,445	<b>344,702,531</b>
<b>CY 2022</b>	MMBtu	17,262,796	34,742,821	639,978	<b>52,645,595</b>
	kWh	2,483,080,424	5,444,218,647	38,776,105	<b>7,966,075,175</b>
	kW	31,133	51,148	455	<b>82,736</b>
	therms	87,905,255	161,671,468	5,076,743	<b>254,653,466</b>
<b>Quad III Totals</b>	<b>MMBtu</b>	<b>74,249,558</b>	<b>192,663,438</b>	<b>1,882,328</b>	<b>268,795,323</b>
	<b>kWh</b>	<b>13,877,573,913</b>	<b>26,377,100,735</b>	<b>90,464,624</b>	<b>40,345,139,270</b>
	<b>kW</b>	<b>132,335</b>	<b>243,063</b>	<b>929</b>	<b>376,327</b>
	<b>therms</b>	<b>268,992,752</b>	<b>1,026,647,695</b>	<b>15,736,636</b>	<b>1,311,377,083</b>

Figure 1 shows achievement toward the 2019-2022 quadrennium savings goals. Focus on Energy achieved 95% of the MMBtu savings goal, 119% of the electric energy savings goal, 104% of the electric demand reduction goal, and 78% of the natural gas savings goal. Focus on Energy met the kWh-specific minimum threshold of achieving 90% of the quadrennial kWh goal but fell short of the same therms-specific minimum threshold.

**Figure 1. Administrator's Achievement of Four-Year (CY 2019-CY 2022) Verified Gross Lifecycle Savings Goal**



The administrator also has a contractual goal to maximize participant satisfaction. In CY 2022 surveys, participants gave an average customer satisfaction rating of 9.5 on a 0- to 10-point scale, where 10 meant extremely satisfied and 0 meant extremely dissatisfied. The CY 2022 average customer satisfaction rating was statistically higher, at 9.5,<sup>5</sup> than the portfolio target of 8.9.<sup>6</sup>

The administrator has a goal to ensure that the portfolio passes a benefit/cost analysis, specifically the modified TRC test. Table 5 lists findings from the evaluation team's benefit/cost analysis of the CY 2022 portfolio. The residential and nonresidential channels and overall portfolio were cost-effective.

**Table 5. CY 2022 Cost-Effectiveness Results**

FOCUS ON ENERGY BENEFITS AND COSTS		PORTFOLIO BREAKOUT	CORE EFFICIENCY	RURAL	RENEWABLES
Incentives	\$53,367,567		\$44,886,131	\$4,084,339	\$4,460,461
Modified TRC Benefits	\$585,853,396		\$462,704,477	\$51,369,364	\$66,999,950
Modified TRC Costs	\$248,613,990		\$182,229,919	\$13,991,552	\$49,404,937
Portfolio TRC Ratio	2.36	Alone	2.54	3.67	1.36
		With Core		2.62	2.29
		With Core and Rural			2.37
		With Core and Rural and Renewables			2.36

Table 6 lists findings from the Evaluation Team's benefit/cost analysis of the CY 2019–CY 2022 portfolio. The residential and nonresidential segments and overall portfolio were cost-effective.

**Table 6. CY 2019–CY 2022 Cost-Effectiveness Results**

FOCUS ON ENERGY BENEFITS AND COSTS		PORTFOLIO BREAKOUT	CORE EFFICIENCY, MARKET EFFECTS, AND SPOILOVER	RURAL	RENEWABLES
Incentives	\$225,602,211		\$195,640,878	\$12,862,070	\$16,820,075
Modified TRC Benefits	\$2,806,385,208		\$2,428,049,232	\$157,848,293	\$214,590,979
Modified TRC Costs	\$1,051,728,688		\$854,758,477	\$37,825,881	\$155,479,754
Portfolio TRC Ratio	2.67	Alone	2.84	4.17	1.38
		With Core, Market Effects, and Spillover		2.90	2.62
		With Core, Market Effects, Spillover, and Rural			2.67
		With Core, Market Effects, Spillover, Rural, and Renewables			2.67

*Note: Focus on Energy Portfolio Breakout totals do not fully sum to Focus on Energy Benefits and Costs due to some programs falling under multiple portfolios. Quadrennial cost-effectiveness results account for additional market effects savings from the residential lighting and new construction offerings, residential nonparticipant spillover, and nonresidential Commercial Training offering spillover not counted in individual years.*

<sup>5</sup>  $p < 0.05$  using binomial t-test.

<sup>6</sup> The administrator's contract established a portfolio target of 8.9 to maintain or increase customer satisfaction.

## Introduction

Focus on Energy, Wisconsin’s statewide energy efficiency and renewable resource program, is 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 Public Service Commission of Wisconsin (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 helps manage Wisconsin’s demand for electricity and natural gas.

The state’s investor-owned utilities, with PSC approval, contracted with APTIM to administer the calendar year (CY) 2019-CY 2022 quadrennium. The administrator, in collaboration with the implementers, is responsible for designing all Focus on Energy solutions and for the overall performance of these solutions to meet Wisconsin’s energy-savings goals. The administrator is also responsible for managing and coordinating individual 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 administrator.

In CY 2022, Focus on Energy maintained three separate program delivery channels:

- The **residential channel** serves single-family, individual multifamily units, and multifamily buildings consisting of one to three units.
- The **nonresidential channel** serves multifamily (common areas and buildings with four or more units), commercial, industrial, school, government, and agribusiness customers.
- The **midstream channel** serves residential and nonresidential customers via distributors of eligible equipment.

## CY 2022 Evaluation

The evaluation team investigated the performance of nine solutions and 19 offerings that delivered energy savings during CY 2022.<sup>7</sup>

Table 7 lists the solutions and offerings evaluated in the residential and nonresidential sectors.

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<sup>7</sup> The independent evaluation team comprises Cadmus, Apex Analytics, and Resource Innovations.

**Table 7. Residential and Nonresidential Solutions and Offerings**

Sector	Solution	Offering
Residential	Direct to Customer	Online Marketplace Packs Retail/Rural Retail
	Trade Ally	Heating and Cooling Insulation and Air Sealing Renewable Energy, Residential Solar PV
	Pilots	Save to Give Trade Ally Solutions – Multifamily SEM
	New Construction	Residential New Construction
Residential and Nonresidential	Midstream	HVAC Commercial Kitchen
Nonresidential	Business and Industry	Agriculture Commercial and Industrial Large Industrial
	Schools and Government	Government Schools
	New Construction	Prescriptive Energy Design Assistance/Review
	Trade Ally	Renewable Energy, Nonresidential Solar PV

## Summary of Measures by Channel

The evaluation team assessed the electric and natural gas savings achieved by each measure installed in CY 2022 during its first year of operation as well as any impacts incurred by each measure during its effective useful life. Reporting on both first-year annual and lifecycle savings provides a full picture of each solution's performance.

Table 8 lists all measure categories in the residential, nonresidential, and midstream solutions.

**Table 8. CY 2022 Residential, Nonresidential, and Midstream Measure Categories**

Measure Categories	
Residential Only	
Building Shell - Bonus	HVAC - Air Conditioner - Residential
Domestic Hot Water - Aeration	HVAC - Bonus
Domestic Hot Water - Bonus	HVAC - Tune-up/Repair/Commissioning
Domestic Hot Water - Insulation	Motors & Drives - Motor
Domestic Hot Water - Other	Vending & Plug Loads - Filtration
Domestic Hot Water - Showerhead	

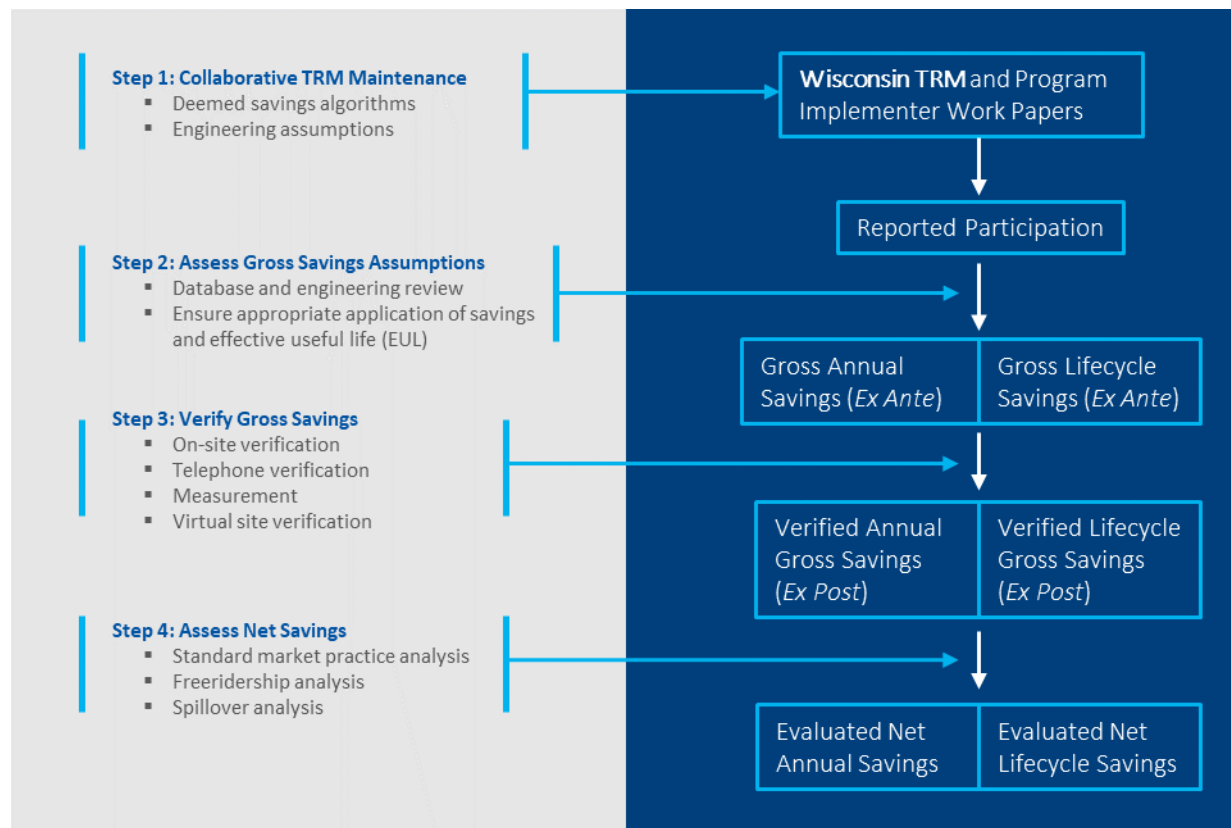
Measure Categories	
Residential and Nonresidential	
Boilers & Burners - Boiler	HVAC - Packaged Terminal Unit (PTAC, PTHP)
Boilers & Burners - Controls	HVAC - Rooftop Unit/Split System AC
Boilers & Burners - Tune-up/Repair/Commissioning	Lighting - Light Emitting Diode (LED)
Building Shell - Air Sealing	New Construction - Whole Building
Building Shell - Insulation	Renewable Energy - Photovoltaics
HVAC - Controls	Vending & Plug Loads - Controls
HVAC - Furnace	
Nonresidential Only	
Agriculture - Dryer	HVAC - Rooftop Unit/Split System AC
Agriculture - Fan	HVAC - Scheduling
Agriculture - Greenhouse	HVAC - Steam Trap
Agriculture - Heat Exchanger	HVAC - Unit Heater
Agriculture - Irrigation	Industrial Ovens and Furnaces - Other
Agriculture - Livestock Waterer	Information Technology - Supporting Equipment
Agriculture - Tune-up/Repair/Commissioning	Lighting - Controls
Agriculture - Variable Speed Drive	Lighting - Delamping
Agriculture - Water Heater	Lighting - Other
Boilers & Burners - Energy Recovery	Lighting - Reconfigure Equipment
Boilers & Burners - Insulation	Motors & Drives - Other
Boilers & Burners - Variable Speed Drive	Motors & Drives - Variable Speed Drive
Compressed Air, Vacuum Pumps - Compressor	New Construction - Design
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 - Pump
Compressed Air, Vacuum Pumps - Nozzle	Process - Specialty Pulp & Paper
Compressed Air, Vacuum Pumps - Other	Process - Variable Speed Drive
Compressed Air, Vacuum Pumps - Reconfigure Equipment	Process - Welder
Compressed Air, Vacuum Pumps - System Isolation	Refrigeration - Controls
Compressed Air, Vacuum Pumps - Tune-up/Repair/Commissioning	Refrigeration - Economizer
Domestic Hot Water - Energy Recovery	Refrigeration - Energy Recovery
Food Service - Controls	Refrigeration - Heat Exchanger
HVAC - Air Turnover Unit	Refrigeration - Motor
HVAC - Chiller	Refrigeration - Other
HVAC - Direct Fired Heating	Refrigeration - Reconfigure Equipment
HVAC - Energy Recovery	Refrigeration - Refrigerated Case Door
HVAC - Fan	Refrigeration - Tune-up/Repair/Commissioning
HVAC - Filtration	Renewable Energy - Biogas
HVAC - Infrared Heater	Renewable Energy - Other
HVAC - Motor	Renewable Energy - Solar Thermal
	Wastewater Treatment - Aeration
	Wastewater Treatment - Other
Nonresidential and Midstream	
HVAC - Variable Speed Drive	

Measure Categories	
Midstream Only	
Food Service - Dishwasher, Commercial	Food Service - Oven
Food Service - Fryer	Food Service - Steamer
Food Service - Hot Holding Cabinet	Refrigeration - Ice Machine
Residential, Nonresidential, and Midstream	
Domestic Hot Water - Water Heater	Other - Bonus
HVAC - Other	Other - Other

## Overview of Evaluation Activities

Figure 2 depicts the four-step process the evaluation team conducted in CY 2022. This process is further explained below.

**Figure 2. Evaluation Steps to Determine CY 2022 Net Savings**



**Step 1: Collaborative Technical Reference Manual (TRM) Maintenance.** The evaluation team collaborated with the PSC and key Focus on Energy stakeholders to ensure that the solutions' 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 Wisconsin Focus on Energy 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 team



reconciled this information with data from the administrator and the implementers. This process produced the *ex ante* gross annual and lifecycle savings.

**Step 3: Verify Gross Savings.** The evaluation team verified the installation of measures—either through site visits or phone surveys—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 team applied the data collection and analysis methods appropriate for the specific solutions, offerings, and installed measures. This process produced the *ex post* gross annual and lifecycle savings.

**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 solutions. In deriving these ratios, the 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 an offering) and also accounted for—and added—*spillover* (savings that were the result of an offering’s influence, but for which no incentive was paid and for which no solution had recorded savings).

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 comparisons between program activity and standard market activity. Some examples of comparisons with standard market activity include sales data analysis of participating and nonparticipating stores and billing data analysis of program and non-program participants.

Table 9 lists the specific data collection activities and sample sizes used in the residential, midstream, and nonresidential channels for the CY 2022 evaluation.

**Table 9. CY 2022 Evaluation Activities and Sample Sizes by Channel**

Evaluation Activity	Residential	Nonresidential	Midstream	Total CY 2022
On-Site, and Virtual Site Visits Evaluation, Measurement, and Verification <sup>a</sup>	0	165	0	<b>165</b>
Engineering Desk Reviews and Interviews	0	276	0	<b>276</b>
Participant Surveys and Interviews	55	0	0	<b>55</b>
Ongoing Participant Satisfaction Surveys <sup>b</sup>	5,383	302	0	<b>5,685</b>
Program Actor Interviews	6	0	0	<b>6</b>
Regression Modeling/Billing Analyses	4,802	8	0	<b>4,810</b>
System Energy Monitoring Data Collection	0	29	0	<b>29</b>
Commercial Training Offering Surveys	0	87	0	<b>87</b>
Delphi Panel <sup>c</sup>	0	0	14	<b>14</b>

<sup>a</sup> All projects included in the on-site and virtual evaluation, measurement, and verification also received an engineering desk review.

<sup>b</sup> This row includes only the 12% sample from all Packs Offering ongoing participant satisfaction survey responses that were analyzed for the CY 2022 evaluation.

<sup>c</sup> Seven participants each for Commercial Kitchen Equipment and HVAC.

## Evaluation Findings

Table 10 lists the overall net lifecycle MMBtu, electricity, demand, and natural gas savings for Focus on Energy's portfolio in CY 2019, CY 2020, CY 2021, and CY 2022.

**Table 10. Overall Portfolio Net Lifecycle Savings by Calendar Year**

Calendar Year	Overall Savings (MMBtu)	Electric Savings (kWh)	Demand Reduction (kW)	Natural Gas Savings (therms)
CY 2019	52,150,133	6,988,011,090	61,307	283,070,389
CY 2020	47,245,270	6,864,758,985	63,399	238,227,128
CY 2021	47,278,224	6,377,760,233	58,229	255,173,062
CY 2022	38,043,160	5,622,148,576	52,873	188,603,893
<b>Quad III Total</b>	<b>201,235,709</b>	<b>29,212,458,509</b>	<b>265,648</b>	<b>1,015,628,105</b>

Note: Total quadrennial net residential savings include additional savings from market effects not counted in individual years. These market effect savings account for the program's long-term effect on the Wisconsin residential lighting and new construction markets. Additional details can be found in the *Quadrennial Market Effects* section of the Direct to Customer and Residential New Construction chapters within Volume II. Total quadrennial net savings also include residential nonparticipant spillover and nonresidential Commercial Training Offering spillover not counted in individual years.

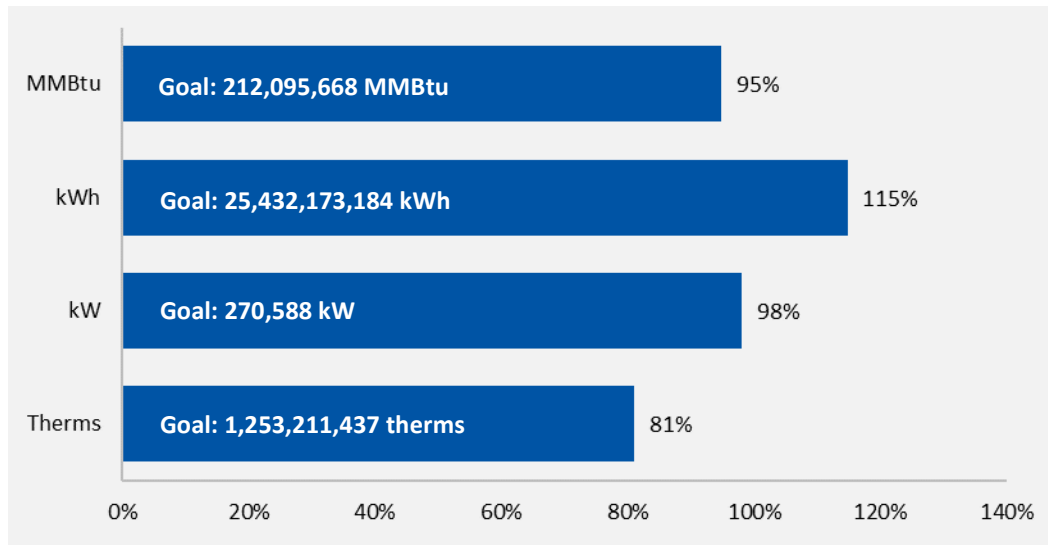
The PSC Final Decision for Quadrennial Planning Process III (PSC Ref#: 423549) set revised four-year net lifecycle savings goals for the PSC of 212,095,668 MMBtu, 25,432,173,184 kWh, 270,588 kW, and 1,253,211,437 therms. The portfolio is required to meet only 90% of the electric energy savings and natural gas savings goals over the full quadrennium. Remaining MMBtu savings above the 90% threshold can be met with either fuel. These minimum thresholds were established to provide flexibility in offering delivery in the changing markets.

This report presents kWh and therm savings achievement relative to the overall goals and in comparison to the 90% minimum goal thresholds.

The Focus on Energy offerings reached 95% of the MMBtu net savings goal, 115% of the electric energy net savings goal, 98% of the electric net demand reduction goal, and 81% of the natural gas quadrennium net savings goal to date. Focus on Energy met the kWh-specific minimum threshold of achieving 90% of the quadrennial kWh goal but fell short of the same therms-specific minimum threshold.

Figure 3 shows a comparison of Focus on Energy's actual quadrennium verified net savings to the PSC's established verified net savings goals for the full four-year quadrennium.

**Figure 3. Focus on Energy’s Achievement of Four-Year (CY 2019 - CY 2022) Net Lifecycle Savings Goal**



Note: Percentages represent achievement to date (CY 2022) of PSC’s established overall net lifecycle goals for the quadrennium.

Table 11 lists the overall verified gross lifecycle electricity savings, demand reduction, and natural gas savings for the portfolio in CY 2019, CY 2020, CY 2021, and CY 2022.

**Table 11. Overall Portfolio Verified Gross Lifecycle Savings for CY 2019, CY 2020, CY 2021, and CY 2022**

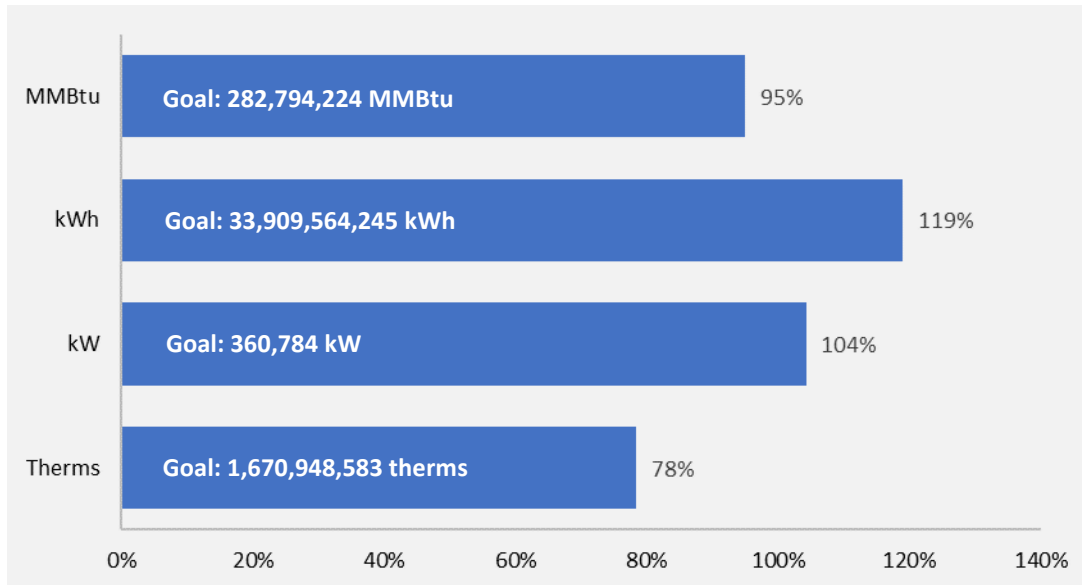
Calendar Year	Annual Savings (MMBtu)	Electric Savings (kWh)	Demand Reduction (kW)	Natural Gas Savings (therms)
CY 2019	78,918,274	11,692,416,671	100,481	390,237,486
CY 2020	70,842,676	11,331,862,798	100,953	321,783,600
CY 2021	66,388,778	9,354,784,626	92,157	344,702,531
CY 2022	52,645,595	7,966,075,175	82,736	254,653,466
<b>Quad III Total</b>	<b>268,795,323</b>	<b>40,345,139,270</b>	<b>376,327</b>	<b>1,311,377,083</b>

The PSC has ordered that the Focus on Energy administrator track quadrennium savings goals compared to verified gross lifecycle savings targets: 282,794,224 MMBtu, 33,909,565,245 kWh, 360,784 kW, and 1,670,948,583 therms (PSC Ref#: 423549). This report presents kWh and therm savings achievement relative to the overall goals and in comparison to the 90% minimum goal thresholds.

Of the quadrennium goals, the administrator reached 95% of the MMBtu savings goal, 119% of the electric energy savings goal, 104% of the demand reduction goal, and 78% of the natural gas savings goal. Focus on Energy met the kWh-specific minimum threshold of achieving 90% of the quadrennial kWh goal but fell short of the same therms-specific minimum threshold.

Figure 4 shows a comparison of the actual quadrennium savings totals to the administrator’s quadrennium savings goals.

**Figure 4. Focus on Energy Administrator's Achievement of Four-Year (CY 2019-CY 2022) Verified Gross Lifecycle Savings Goal**



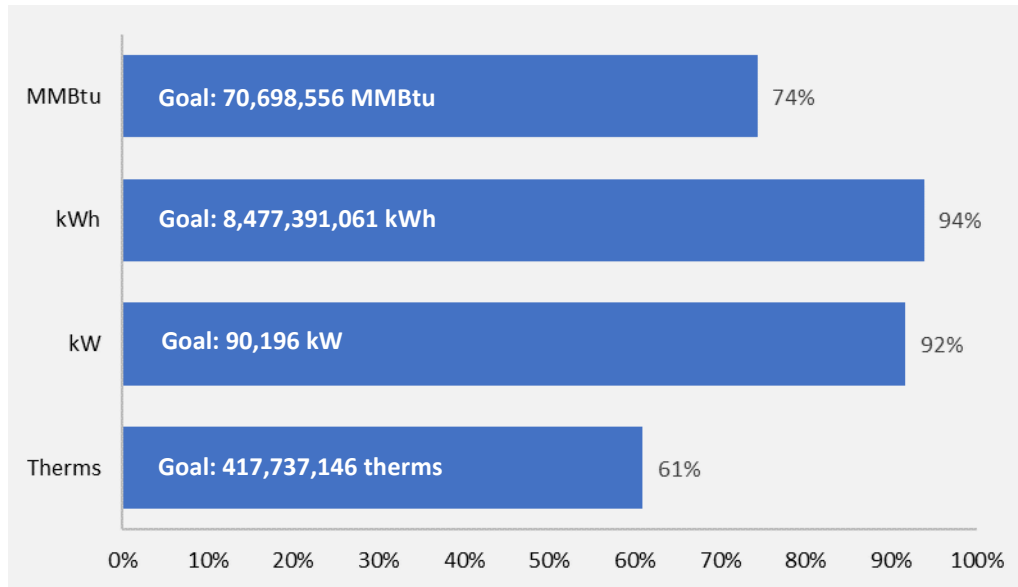
Note: Percentages represent achievements to date (CY 2022) of the administrator's established overall verified gross lifecycle goals for the quadrennium.

The administrator also tracks interim annual verified gross lifecycle targets, defined as approximately one-fourth of the overall CY 2019-CY 2022 quadrennium savings goals. In CY 2022, these targets represented 70,698,556 MMBtu, 8,477,391,061 kWh, 90,196 kW, and 417,737,146 therms.

The administrator reached 74% of the CY 2022 MMBtu savings goal, 94% of the CY 2022 electric energy savings goal, 92% of the CY 2022 electric demand reduction goal, and 61% of the CY 2022 natural gas verified gross lifecycle savings goal.

Figure 5 shows the CY 2022 actual savings totals compared to the administrator's CY 2022 savings goals.

**Figure 5. Focus on Energy Administrator's Achievement of  
CY 2022 Verified Gross Lifecycle Savings Goal**



Note: Percentages represent achievements of the administrator's verified gross lifecycle goals for CY 2022.

### Summary of Impacts by Offering

This section summarizes the CY 2022 savings and participation for each offering in the Focus on Energy portfolio. Volume II presents more detail on savings for each offering and the approaches used for calculating these savings. The evaluation team varied the calculation approach and activities by offering depending on the level of participation, savings achieved, and information available.

Across all offerings, 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 12 lists the total CY 2022 participation (measured as number of participating customers) in each offering and channel.

**Table 12. Total Participation by Offering in CY 2022**

Channel	Offering	CY 2022 Participation
Residential	Online Marketplace	27,798
	Packs	140,519
	Retail <sup>a</sup>	745,035
	Rural Retail	14,680
	Heating and Cooling	26,812
	Insulation and Air Sealing	1,744
	Renewable Energy	2,300
	Residential New Construction	2,418
	Save to Give	525
	Multifamily SEM	5
<b>Residential Subtotal</b>		<b>961,836</b>
Midstream	HVAC and Commercial Kitchen	1,649
<b>Midstream Subtotal</b>		<b>1,649</b>
Nonresidential	Agriculture	771
	Commercial and Industrial	1,746
	Large Industrial	231
	Schools and Government	732
	New Construction Prescriptive	120
	New Construction Design Assistance	146
	Renewable Energy	156
<b>Nonresidential Subtotal</b>		<b>3,902</b>
<b>Total</b>		<b>967,387</b>

<sup>a</sup> Of the CY 2022 Retail Offering participants, 3,626 were not Retail Lighting or Income-Qualified.

Figure 6 shows verified gross lifecycle savings by channel.

**Figure 6. CY 2022 Verified Gross Lifecycle Savings Impacts by Channel**

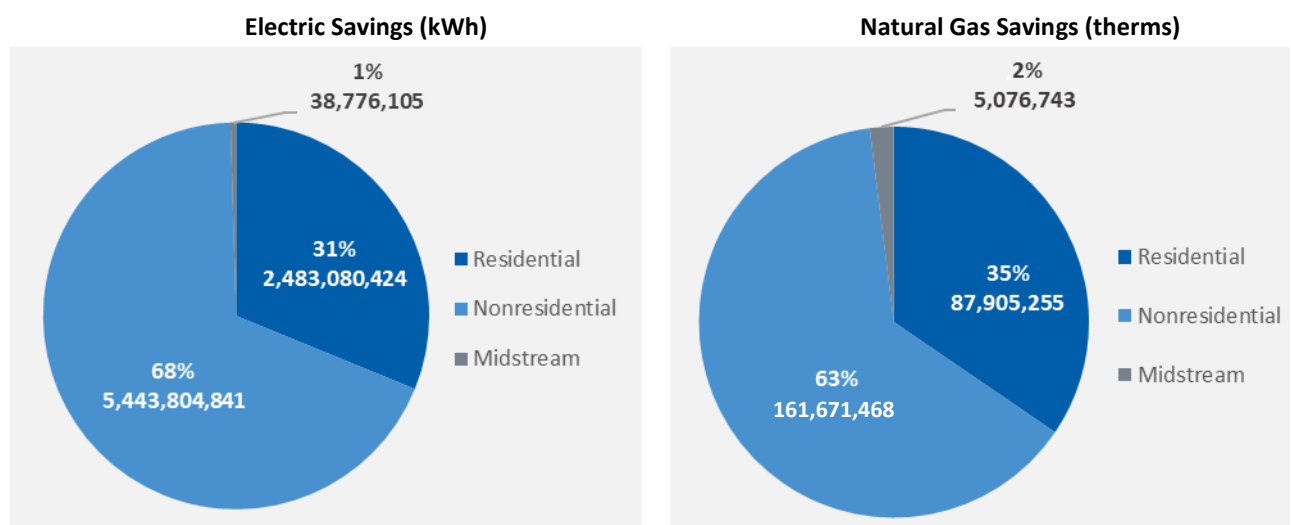
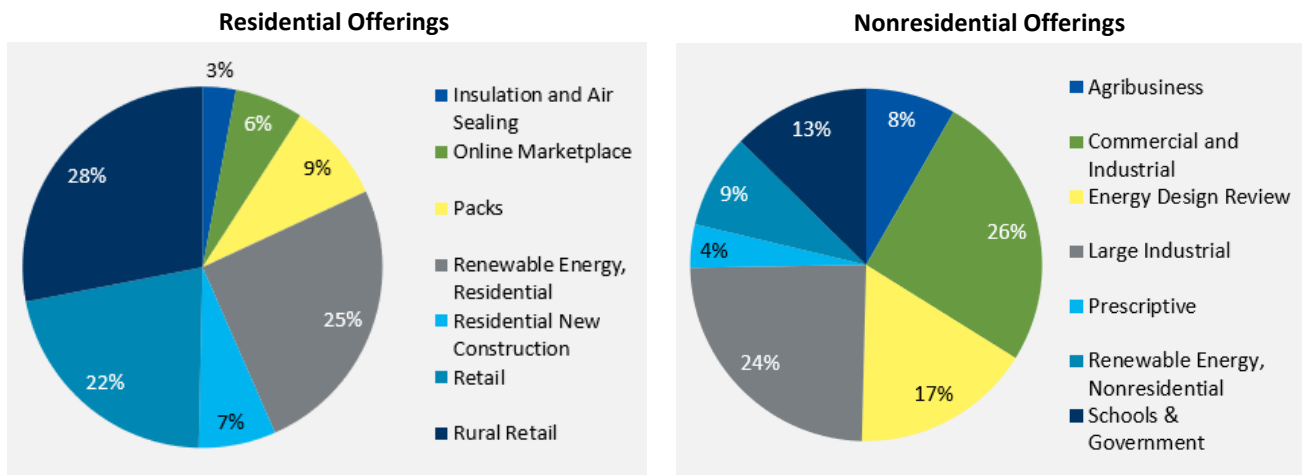


Figure 7 and Figure 8 show the verified gross lifecycle electric and natural gas energy savings by offering for residential, nonresidential, and midstream.

**Figure 7. CY 2022 Verified Gross Lifecycle Electric Energy Impacts by Offerings**



**Figure 8. CY 2022 Verified Gross Lifecycle Natural Gas Energy Impacts by Offerings**

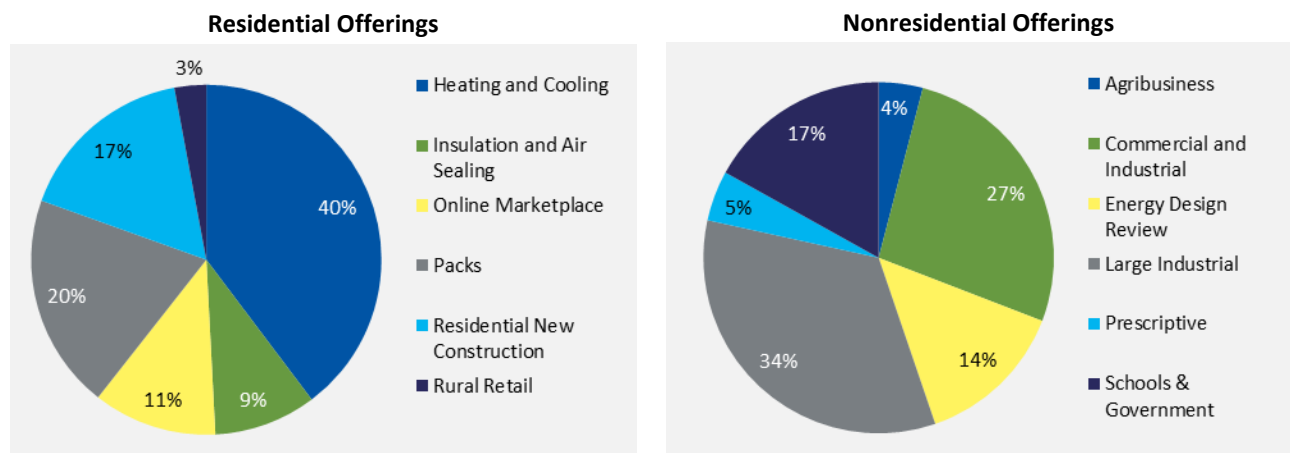


Table 13 lists the first-year annual gross savings, verified gross savings, and verified net demand reduction for electricity and natural gas by offering, channel, and overall portfolio.

**Table 13. Summary of CY 2022 Annual Savings by Offering**

Solution Name	Offering Name	Gross			Verified Gross			Verified Net		
		kWh	kW	therms	kWh	kW	therms	kWh	kW	therms
Residential Offerings										
Direct to Customer	Online Marketplace	16,740,428	199	999,616	17,873,874	232	1,107,894	15,273,386	191	951,490
	Packs	30,385,486	3,047	1,695,540	30,259,352	3,030	1,556,721	26,011,219	2,618	1,501,806
	Retail	164,534,387	14,594	86,913	164,912,251	17,086	86,913	74,682,368	6,595	69,948
	Rural Retail	2,050,687	265	201,192	1,988,329	142	184,705	1,794,254	125	182,668
Trade Ally	Heating and Cooling	1,683,622	206	1,896,961	2,340,051	207	1,913,230	3,193,512	114	1,334,840
	Insulation and Air Sealing	2,847,166	789	331,472	2,851,402	789	330,492	2,897,290	812	327,171
	Renewable Energy, Residential Solar PV	25,094,243	8,493	-	25,094,243	8,493	-	10,700,798	3,620	-
New Construction	Residential New Construction	5,747,040	1,153	484,933	5,747,040	1,153	484,933	-	-	24,247
Residential Total		249,083,058	28,744	5,696,626	251,066,542	31,133	5,664,887	134,552,827	14,074	4,392,171
Midstream Offerings										
Midstream	Midstream	2,417,069	455	313,841	2,417,089	455	313,841	1,782,568	270	225,580
Midstream Total		2,417,069	455	313,841	2,417,089	455	313,841	1,782,568	270	225,580



Solution Name	Offering Name	Gross			Verified Gross			Verified Net		
		kWh	kW	therms	kWh	kW	therms	kWh	kW	therms
Nonresidential Offerings										
Business and Industry	Agribusiness	26,733,789	3,700	376,034	26,733,789	3,700	364,600	22,988,764	3,182	313,600
	Commercial and Industrial	103,701,111	13,373	2,861,285	102,664,100	13,106	2,861,285	79,051,357	10,091	2,203,189
	Renewable Energy, Nonresidential	2,520	0	369	2,495	0	369	1,921	0	284
	Large Industrial	94,649,556	11,137	4,258,467	94,649,556	11,248	4,002,959	70,040,671	8,324	2,962,190
Schools and Government	Government	34,930,863	3,894	527,343	34,930,863	3,894	442,968	25,499,530	2,842	323,367
	Schools	24,971,335	3,827	1,692,262	24,471,908	3,827	1,675,340	17,864,493	2,793	1,222,998
	Schools & Government	1,032,699	35	14,081	1,017,402	35	11,828	742,703	25	8,634
New Construction	Prescriptive	13,891,146	2,274	389,434	13,891,146	2,297	389,434	11,251,828	1,860	315,442
	Whole Building Review	44,143,170	7,133	1,051,034	43,701,738	6,919	1,114,096	35,398,408	5,605	902,418
Trade Ally	Renewable Energy, Nonresidential Solar PV	18,307,008	6,124	0	18,307,008	6,124	0	11,381,006	3,807	0
Nonresidential Total		362,363,197	51,496	11,170,309	360,370,006	51,148	10,862,878	274,220,682	38,530	8,252,121
Total All Offerings		613,863,324	80,695	17,180,775	613,853,637	82,736	16,841,606	410,556,078	52,873	12,869,872

## Summary of Impacts by Measure Category

Table 14 lists CY 2022 residential energy savings, demand reduction, and incentive costs by measure category.

**Table 14. Summary of CY 2022 Annual Savings by Measure Category in the Residential Channel**

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars %
	kWh	kWh %	kW	kW %	Therms	Therms %		
Boilers & Burners-Boiler	0	0.00%	0	0.00%	165,540	2.92%	\$289,925	1.19%
Boilers & Burners-Controls	2,548	0.00%	0	0.00%	559	0.01%	\$650	0.00%
Boilers & Burners-Tune-up/Repair/Commissioning	0	0.00%	0	0.00%	185	0.00%	\$621	0.00%
Building Shell-Air Sealing	226,307	0.09%	11	0.03%	37,994	0.67%	\$864,453	3.56%
Building Shell-Bonus	0	0.00%	0	0.00%	0	0.00%	\$112,800	0.46%
Building Shell-Insulation	2,639,031	1.05%	778	2.50%	315,029	5.56%	\$1,099,027	4.52%
Domestic Hot Water-Aeration	4,884,530	1.95%	258	0.83%	961,912	16.98%	\$483,144	1.99%
Domestic Hot Water-Bonus	0	0.00%	0	0.00%	0	0.00%	\$167,500	0.69%
Domestic Hot Water-Insulation	3,862,995	1.54%	706	2.27%	459,860	8.12%	\$444,853	1.83%
Domestic Hot Water-Other	209,463	0.08%	28	0.09%	85,959	1.52%	\$174,595	0.72%
Domestic Hot Water-Showerhead	1,609,359	0.64%	79	0.25%	314,226	5.55%	\$344,082	1.42%
Domestic Hot Water-Water Heater	0	0.00%	0	0.00%	36,090	0.64%	\$115,100	0.47%
HVAC-Air Conditioner - Residential	1,497	0.00%	3	0.01%	0	0.00%	\$2,218	0.01%
HVAC-Bonus	0	0.00%	0	0.00%	0	0.00%	\$750	0.00%
HVAC-Controls	20,714,902	8.25%	0	0.00%	1,401,443	24.74%	\$2,235,783	9.20%
HVAC-Furnace	2,395,290	0.95%	0	0.00%	773,331	13.65%	\$2,550,800	10.50%
HVAC-Other	-5,529,453	-2.20%	191	0.61%	625,823	11.05%	\$1,420,747	5.85%
HVAC-Packaged Terminal Unit (PTAC, PTHP)	100,510	0.04%	12	0.04%	0	0.00%	\$4,600	0.02%
HVAC-Tune-up/Repair/Commissioning	0	0.00%	0	0.00%	2,002	0.04%	\$17,338	0.07%
Lighting-Light Emitting Diode (LED)	185,790,531	74.00%	18,985	60.98%	0	0.00%	\$7,806,469	32.12%
Motors & Drives-Motor	6,640	0.00%	1	0.00%	0	0.00%	\$400	0.00%
New Construction-Whole Building	5,747,040	2.29%	1,153	3.70%	484,933	8.56%	\$2,096,362	8.63%
Other-Bonus	0	0.00%	0	0.00%	0	0.00%	\$993,013	4.09%
Renewable Energy-Photovoltaics	25,094,243	10.00%	8,493	27.28%	0	0.00%	\$2,150,386	8.85%
Vending & Plug Loads-Controls	3,201,577	1.28%	422	1.36%	0	0.00%	\$904,752	3.72%
Vending & Plug Loads-Filtration	109,532	0.04%	12	0.04%	0	0.00%	\$21,050	0.09%

Table does not include adjustment measure records. As a result, this sum will not match with other CY 2022 totals.

Table 15 lists CY 2022 nonresidential savings and incentive costs by measure category.

**Table 15. Summary of CY 2022 Annual Savings by Measure Category in the Nonresidential Channel**

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars %
	kWh	kWh %	kW	kW %	Therms	Therms %		
Aeration	192,781	0.05%	22	0.04%	0	0.00%	\$9,912	0.02%
Air Sealing	0	0.00%	0	0.00%	12,821	0.12%	\$5,560	0.01%
Air Turnover Unit	2,430	0.00%	0	0.00%	5,738	0.05%	\$4,689	0.01%
Biogas <sup>a</sup>	0	0.00%	0	0.00%	0	0.00%	\$12,000,000	29.47%
Boiler	0	0.00%	0	0.00%	1,613,024	14.85%	\$1,654,901	4.06%
Bonus	0	0.00%	0	0.00%	0	0.00%	\$1,825,028	4.48%
Chiller	1,773,786	0.49%	271	0.53%	0	0.00%	\$193,457	0.48%
Compressor	8,417,196	2.34%	1,377	2.69%	0	0.00%	\$292,580	0.72%
Controls	11,414,911	3.17%	665	1.30%	667,816	6.15%	\$828,290	2.03%
Delamping	282,951	0.08%	58	0.11%	0	0.00%	\$17,305	0.04%
Design	18,674,437	5.18%	3,199	6.25%	370,961	3.41%	\$2,092,247	5.14%
Direct Fired Heating	0	0.00%	0	0.00%	105,088	0.97%	\$67,950	0.17%
Dryer	1,466,602	0.41%	200	0.39%	335,012	3.08%	\$619,011	1.52%
Economizer	343,392	0.10%	40	0.08%	0	0.00%	\$6,868	0.02%
Energy Recovery	200,385	0.06%	148	0.29%	2,066,955	19.03%	\$1,423,991	3.50%
Fan	5,923,190	1.64%	1,069	2.09%	0	0.00%	\$275,795	0.68%
Filtration	249,770	0.07%	-242	-0.47%	625,982	5.76%	\$472,710	1.16%
Furnace	12,045	0.00%	0	0.00%	46,805	0.43%	\$34,140	0.08%
Greenhouse	0	0.00%	0	0.00%	33,225	0.31%	\$15,736	0.04%
Heat Exchanger	1,273,478	0.35%	0	0.00%	0	0.00%	\$79,029	0.19%
Infrared Heater	0	0.00%	0	0.00%	12,316	0.11%	\$18,048	0.04%
Insulation	0	0.00%	0	0.00%	88,636	0.82%	\$58,971	0.14%
Irrigation	65,732	0.02%	28	0.05%	0	0.00%	\$7,475	0.02%
Light Emitting Diode (LED)	157,639,244	43.74%	20,827	40.72%	0	0.00%	\$6,938,064	17.04%
Livestock Waterer	347,776	0.10%	0	0.00%	0	0.00%	\$9,520	0.02%
Motor	759,191	0.21%	105	0.20%	0	0.00%	\$20,780	0.05%
Nozzle	93,393	0.03%	22	0.04%	0	0.00%	\$ 690	0.00%

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars %
	kWh	kWh %	kW	kW %	Therms	Therms %		
Other	37,739,333	10.47%	4,264	8.34%	2,573,844	23.69%	\$4,437,795	10.90%
Packaged Terminal Unit (PTAC, PTHP)	630,325	0.17%	30	0.06%	0	0.00%	\$20,415	0.05%
Photovoltaics	18,307,008	5.08%	6,124	11.97%	0	0.00%	\$2,210,297	5.43%
Pump	554,220	0.15%	79	0.15%	0	0.00%	\$29,943	0.07%
Reconfigure Equipment	3,320,299	0.92%	673	1.32%	0	0.00%	\$169,231	0.42%
Refrigerated Case Door	2,402,234	0.67%	363	0.71%	193,708	1.78%	\$168,900	0.41%
Rooftop Unit/Split System AC	1,828,871	0.51%	596	1.17%	131,025	1.21%	\$343,177	0.84%
Scheduling	1,016,198	0.28%	20	0.04%	50,015	0.46%	\$65,519	0.16%
Solar Thermal	2,495	0.00%	0	0.00%	369	0.00%	\$1,623	0.00%
Specialty Pulp & Paper	752,666	0.21%	90	0.18%	0	0.00%	\$35,000	0.09%
Steam Trap	0	0.00%	0	0.00%	603,338	5.55%	\$78,453	0.19%
Supporting Equipment	167,178	0.05%	14	0.03%	0	0.00%	\$6,808	0.02%
System Isolation	324,053	0.09%	0	0.00%	0	0.00%	\$6,481	0.02%
Tune-up/Repair/Commissioning	11,406,149	3.17%	0	0.00%	508,317	4.68%	\$180,941	0.44%
Unit Heater	192,444	0.05%	0	0.00%	732	0.01%	\$7,820	0.02%
Variable Speed Drive	46,082,597	12.79%	7,034	13.75%	0	0.00%	\$1,211,658	2.98%
Water Heater	13,258	0.00%	1	0.00%	20,574	0.19%	\$42,556	0.10%
Welder	76,918	0.02%	9	0.02%	0	0.00%	\$3,955	0.01%
Whole Building	26,421,067	7.33%	4,065	7.95%	796,579	7.33%	\$2,722,191	6.69%

Table does not include adjustment measure records. As a result, this sum will not match with other CY 2022 totals.

<sup>a</sup>The information presented for the biogas category represents the incentive payment made to BC Organics LLC for achieving substantial completion status of an integrated anaerobic digester project first approved through a competitive grant awarded by the PSC in 2017 in docket 5-FE-100. (PSC REF#: 331578.) Focus on Energy is not claiming energy savings for this project.

Table 16 lists CY 2022 midstream savings and incentive costs by measure category.

**Table 16. Summary of CY 2022 Annual Savings by Measure Category in the Midstream Channel**

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars %
	kWh	kWh %	kW	kW %	Therms	Therms %		
Bonus	0	0.00%	0	0.00%	0	0.00%	\$5,550	0.80%
Dishwasher, Commercial	354,705	14.67%	17	3.80%	0	0.00%	\$10,850	1.56%
Domestic Hot Water-Water Heater	3,312	0.14%	0	0.03%	271	0.09%	\$3,200	0.46%
Fryer	0	0.00%	0	0.00%	76,738	24.45%	\$85,400	12.27%
Hot Holding Cabinet	3,262	0.13%	1	0.22%	0	0.00%	\$600	0.09%
HVAC-Other	1,600,470	66.21%	122	26.74%	200,718	63.96%	\$411,500	59.10%
Ice Machine	4,415	0.18%	1	0.11%	0	0.00%	\$200	0.03%
Other	33,792	1.40%	17	3.83%	17,236	5.49%	\$30,000	4.31%
Other-Bonus	0	0.00%	0	0.00%	0	0.00%	\$45,900	6.59%
Oven	23,428	0.97%	5	1.18%	15,554	4.96%	\$19,200	2.76%
Steamer	166,960	6.91%	278	61.05%	726	0.23%	\$23,600	3.39%
Variable Speed Drive	226,745	9.38%	14	3.03%	0	0.00%	\$47,050	6.76%
Water Heater	0	0.00%	0	0.00%	2,598	0.83%	\$13,200	1.90%

Note: Table does not include adjustment measure records. As a result, this sum will not match with other CY 2022 totals.

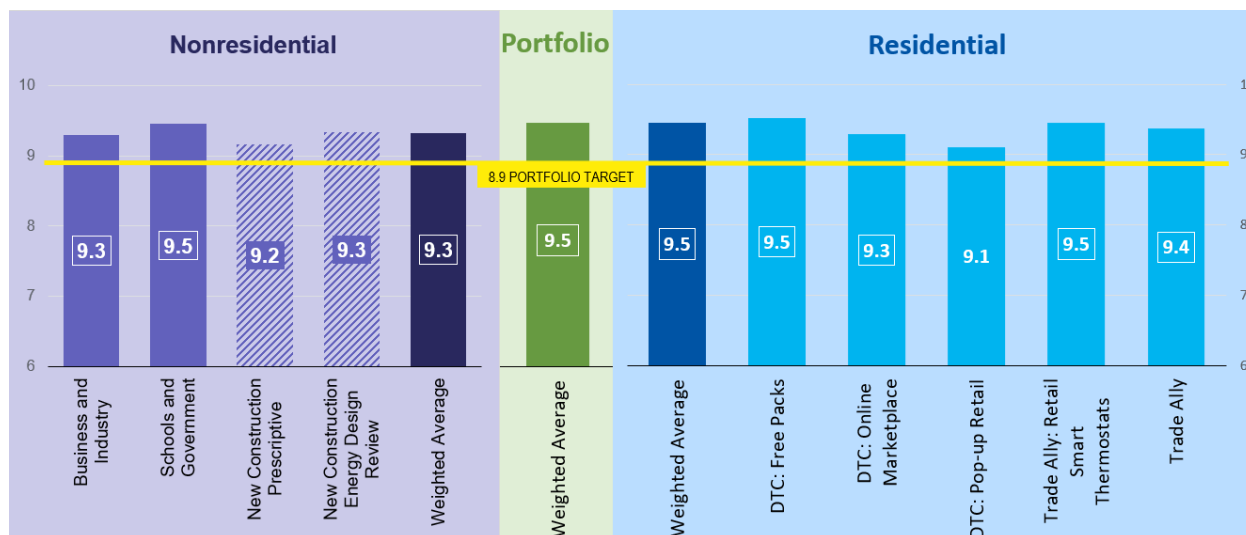
<sup>a</sup> HVAC-Other in the Midstream Channel is made up of exclusively ductless mini-split heat pumps.

## Portfolio Participant Satisfaction Findings

The administrator fielded online customer satisfaction surveys throughout CY 2022 to residential and nonresidential program participants. Across all offerings surveyed in CY 2022, the average participation-weighted overall satisfaction rating for the portfolio was 9.5, which was significantly higher than the portfolio target of 8.9. The participation-weighted averages for the Residential (9.5) and Nonresidential (9.3) programs were also significantly above the portfolio target in CY 2022, as were the overall satisfaction ratings for all but three offerings surveyed. Pop-Up Retail and the two New Construction Business offerings had overall satisfaction ratings that were statistically equivalent to the portfolio target.

Figure 9 shows the average overall satisfaction ratings for the CY 2022 portfolio.

**Figure 9. CY 2022 Portfolio Average Overall Satisfaction Ratings**



Source: Ongoing Participant Satisfaction Mail/Online Survey Question. "Overall, how satisfied are you with your most recent experience with Focus on Energy?" Business Incentive CY 2022 (n=193); Schools and Government CY 2022 (n=100); New Construction Business Prescriptive CY 2022 (n=6); New Construction Business Energy Design Review CY 2022 (n=3); Packs CY 2022 (n=1,239); Pop-up Events CY 2022 (n=137); Online Marketplace CY 2022 (n=2,176); Retail Smart Thermostats CY 2022 (n=287); Trade Ally Solutions CY 2022 (n=1,524).

The portfolio, residential, and nonresidential averages are weighted by total participation in the offerings surveyed.

Textured bars represent results from less than 20 surveys, interpret with caution.

## Residential Process Evaluation Findings

For the CY 2022 process evaluation of residential offerings, the evaluation team collected information and perspectives from Focus on Energy participants, the administrator, and the implementers (program actors). The team reached participants through an online participant satisfaction survey.

Table 17 shows the evaluation activity by residential offering.

**Table 17. CY 2022 Residential Process Evaluation Activities by Solution and Offering**

Solution	Offering	Ongoing Participant Satisfaction Surveys	Program Actor Interviews
Direct to Customer	Online Marketplace	✓	✓
	Packs	✓	✓
	Retail <sup>a</sup>	✓	✓
Trade Ally	Heating and Cooling	✓	✓
	Insulation and Air Sealing	✓	✓
	Renewable Energy		✓
New Construction	Residential New Construction		✓

<sup>a</sup> The Retail Offering includes Retail Products (gas water heaters), Retail Lighting, Pop-Up Retail, and Income Qualified.

In CY 2022, more than 960,000 residential customers in Wisconsin participated in Focus on Energy's offerings. Of these participants, an estimated 740,000 Wisconsin customers purchased lighting measures through the Retail and Rural Retail offerings.

As listed in the summary of CY 2022 annual savings (Table 13 above), residential customers installed energy-efficient measures across a wide range of technologies and achieved verified gross electricity savings of 251,066,542 kWh and natural gas savings of 5,664,887 therms.

## Residential Participant Satisfaction

The administrator fielded online customer satisfaction surveys throughout CY 2022 for Trade Ally Solutions (Heating and Cooling and Insulation and Air Sealing), Retail Smart Thermostats, and three Direct to Customer offerings and sub-offerings (Packs, Online Marketplace, and Pop-Up Retail). More than 17,000 Focus on Energy residential participants completed a survey in CY 2022.<sup>8</sup>

Participants were asked to rate how satisfied they were with Focus on Energy's offerings on a scale from 0 to 10, where 10 means *extremely satisfied* and 0 meant *extremely dissatisfied*. Participants in most surveyed offerings gave equivalent overall satisfaction ratings in CY 2022 compared with CY 2021. For all offerings in CY 2022, average satisfaction ratings were 9.1 or higher. The only statistically significant changes were for Direct to Customer Pop-Up Retail (satisfaction decreased to 9.1 in CY 2022 from 9.5 in CY 2021) and Trade Ally Solutions (satisfaction decreased to 9.4 in CY 2022 from 9.5 in CY 2021, though

<sup>8</sup> The evaluation team reports ratings only to the first decimal place; therefore, it randomly sampled surveys with substantially more than 2,500 responses so the precision level for statistical significance tests would not be narrower than 0.1 rating points, the minimum for a reported change in ratings. Without sampling, significance tests could indicate that two numbers that appear the same (to the first decimal place) are significantly different. The random sampling used a Monte Carlo technique so that reported ratings for the random sample and the ratings for the larger population are identical to the first decimal place. For the Packs offering, a total of 12,854 customers completed a survey; the Energy Savings Packs offering was the only survey with more than 2,500 responses in CY 2022. After removing duplicates and applying this sampling technique, a total of 5,383 residential customers completed the satisfaction surveys analyzed for CY 2022 reporting.

was still higher than 9.2 in CY 2020).<sup>9</sup> The average satisfaction rating for every residential offering in CY 2022 was statistically equivalent to or higher than the portfolio target of 8.9.<sup>10</sup>

The participation-weighted average satisfaction across all surveyed residential offerings was 9.5 in CY 2022, which was the same as CY 2021 and statistically higher (in aggregate) than the portfolio target.<sup>11</sup> Figure 10 shows average satisfaction ratings of surveyed participants for residential offerings in CY 2022 compared with ratings from CY 2021, CY 2020, and CY 2019.<sup>12</sup>

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<sup>9</sup>  $p < 0.10$  or better using a binomial  $t$ -test.

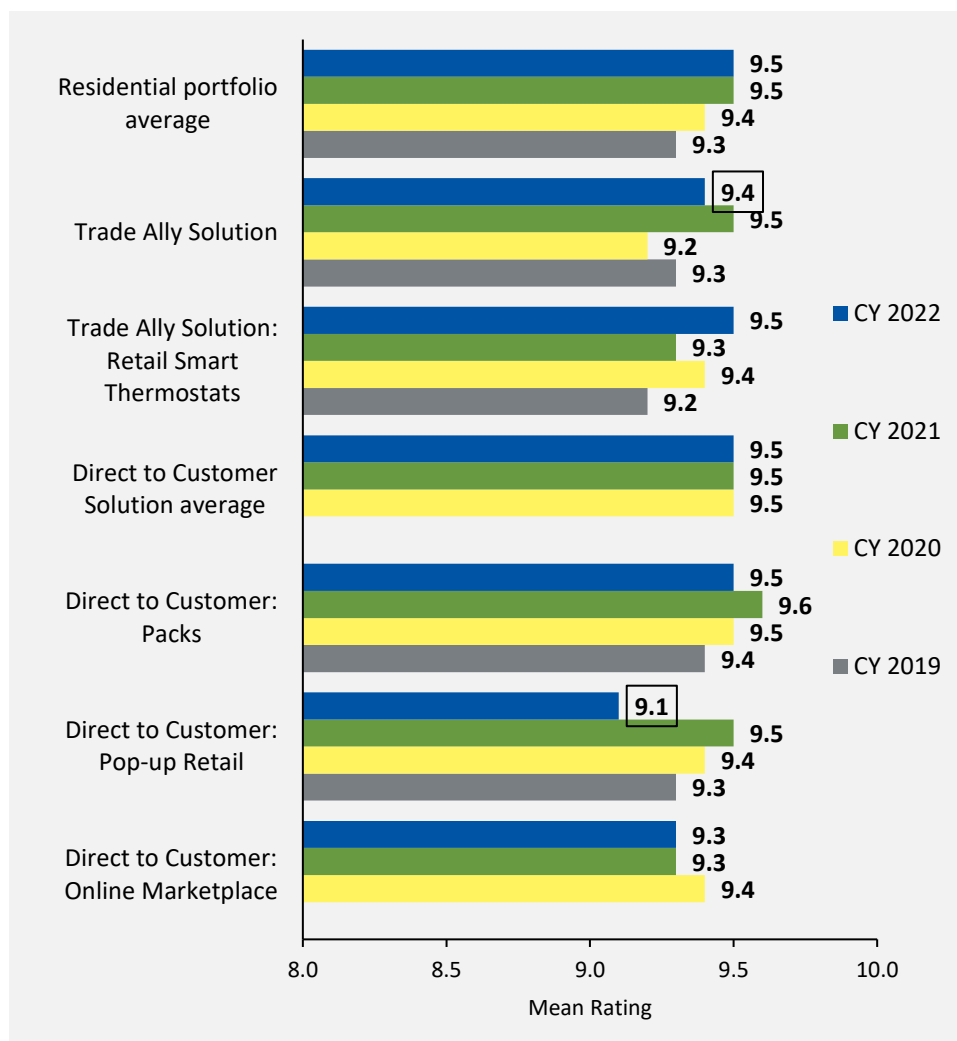
<sup>10</sup>  $p < 0.05$  using binomial  $t$ -tests.

<sup>11</sup>  $p < 0.05$  using binomial  $t$ -tests.

<sup>12</sup> Ongoing participant satisfaction surveys were restructured in CY 2020 to match the restructuring of the portfolio. Results for the CY 2019 Trade Ally Solutions survey are a weighted average of results from the precursor programs (Home Performance with ENERGY STAR Whole Home and HVAC path surveys and the Renewable Rewards survey) that were consolidated into the Trade Ally Solutions. All offerings in the Direct to Customer Solution were compared with their equivalent CY 2019 predecessor programs. In CY 2022, Retail Smart Thermostats were moved from the Direct To Customer to Trade Ally Solution; this offering was included in Direct To Customer Solution averages in CY 2021 and CY 2020.



**Figure 10. CY 2022 Average Overall Satisfaction Ratings for Residential Offerings**



Source: Ongoing Participant Satisfaction Mail/Online Survey Question. "Overall, how satisfied are you with your most recent experience with Focus on Energy?" Trade Ally Solutions CY 2019 (n=1,854 weighted average of three predecessor programs), CY 2020 (n=1,344), CY 2021 (n=1,409), CY 2022 (n=1,524); Packs CY 2019 (n=1,336), CY 2020 (n=1,199), CY 2021 (n=1,377), CY 2022 (n=1,239); Retail Smart Thermostats CY 2019 (n=804), CY 2020 (n=428), CY 2021 (n=158), CY 2022 (n=287); Pop-Up Retail CY 2019 (n=175), CY 2020 (n=801), CY 2021 (n=398), CY 2022 (n=137); Online Marketplace CY 2020 (n=1,069), CY 2021 (n=1,720), CY 2022 (n=2,176). The Online Marketplace survey was not fielded before CY 2020. The Direct to Customer Solution average was not calculated for years prior to CY 2020. The residential portfolio average and Direct to Customer Solution average are the averages of all offerings surveyed during the year weighted by total participation. Boxes around percentages indicate a statistically significant difference from CY 2021 result at  $p < 0.10$  using a t-test.

### Net Promoter Score

The evaluation team calculated a net promoter score (NPS) for each offering based on the likelihood of the participant to recommend it. 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.

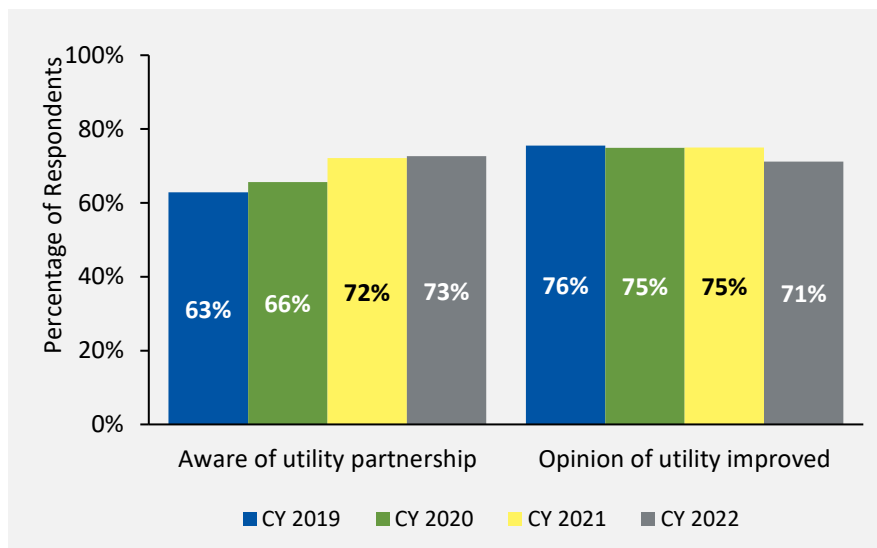
Generally, a positive NPS is interpreted as good, indicating a higher proportion of promoters to detractors. High NPS scores (+70 or higher) are theoretically predictive of customer behaviors, such as participating in another offering, implementing additional home energy improvements, and referring Focus on Energy offerings to others. The closer the NPS is to +100, the more favorable the respondents are toward the offering. NPS scores over +80 are considered excellent, while scores that dip below +50 warrant investigation into a possible opportunity for improvement.

Residential offerings received high scores from participants, with an NPS higher than +80 for all but one CY 2022 offering. Pop-Up Retail had an NPS of +75 in CY 2022 (down from +87 in CY 2021), while the other offerings had NPS scores that were within four points of their scores in CY 2021. The highest score for a residential offering in CY 2022 was +88 NPS for Energy Savings Packs.

## Awareness and Opinion of Utility

In 2022, most residential participants were aware that Focus on Energy offerings were offered in partnership with their local energy utility. The percentage of participants who were aware has risen over the four-year period, from 63% in CY 2019 to 73% in CY 2022 (Figure 11). Most participants also reported that Focus on Energy offerings made their opinion of their utility *much more favorable* or *somewhat more favorable*, though the percentage declined to 71% in CY 2022 from 75% to 76% in CY 2019 to CY 2021. Both findings are consistent with the growing maturity of Focus on Energy: awareness has spread over time, but the offerings may not seem as innovative as when first introduced. Participants may also come to expect that their utility will offer solutions to help them manage energy costs and use.

**Figure 11. Awareness and Opinion of Utility Partnerships with Focus on Energy**



Offering source: Participant Satisfaction Survey Questions. “The Focus on Energy program you participated in is offered in partnership with your local energy utility. Before taking this survey, was this something you were aware of?”

(All residential surveys combined: CY 2019 n=4,149; CY 2020 n=4,807; CY 2021 n=5,013; CY 2022 n=5,323).

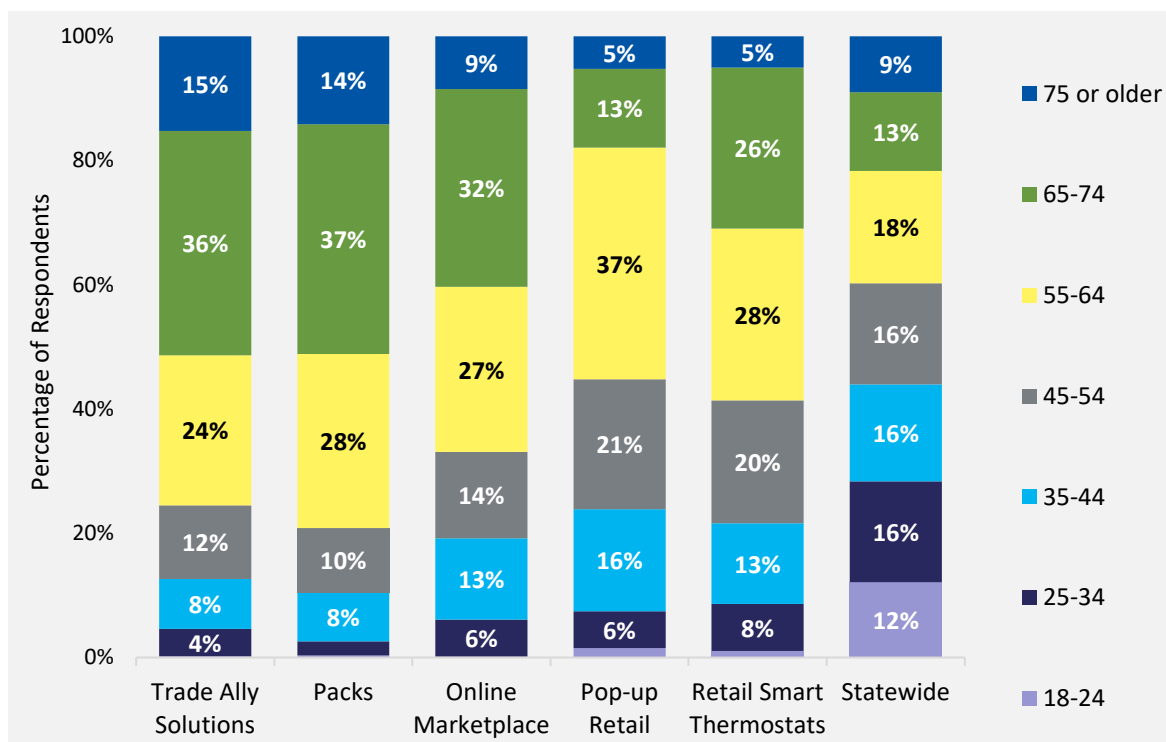
“How have these offerings affected your opinion of your energy utility, if at all?” (All residential surveys combined: CY 2019 n=3,937; CY 2020 n=4,496; CY 2021 n=4,694; CY 2022 n=4,949).

## Residential Participant Profile

The evaluation team assessed what market segments are participating in each offering and to what extent the offerings are reaching all segments of the market. The team used demographic data from ongoing participant satisfaction surveys and data from the U. S. Census Bureau’s 2020 American Community Survey in Wisconsin.

Figure 12 shows the age distribution of survey respondents by offering and of Wisconsin residents, according to the 2020 American Community Survey data.<sup>13</sup> The American Community Survey data indicate that the Wisconsin adult population is relatively evenly distributed across all age ranges. However, most of Focus on Energy’s participants were aged 55 to 74 (50% to 65% by offering).

**Figure 12. Age of Survey Respondents**



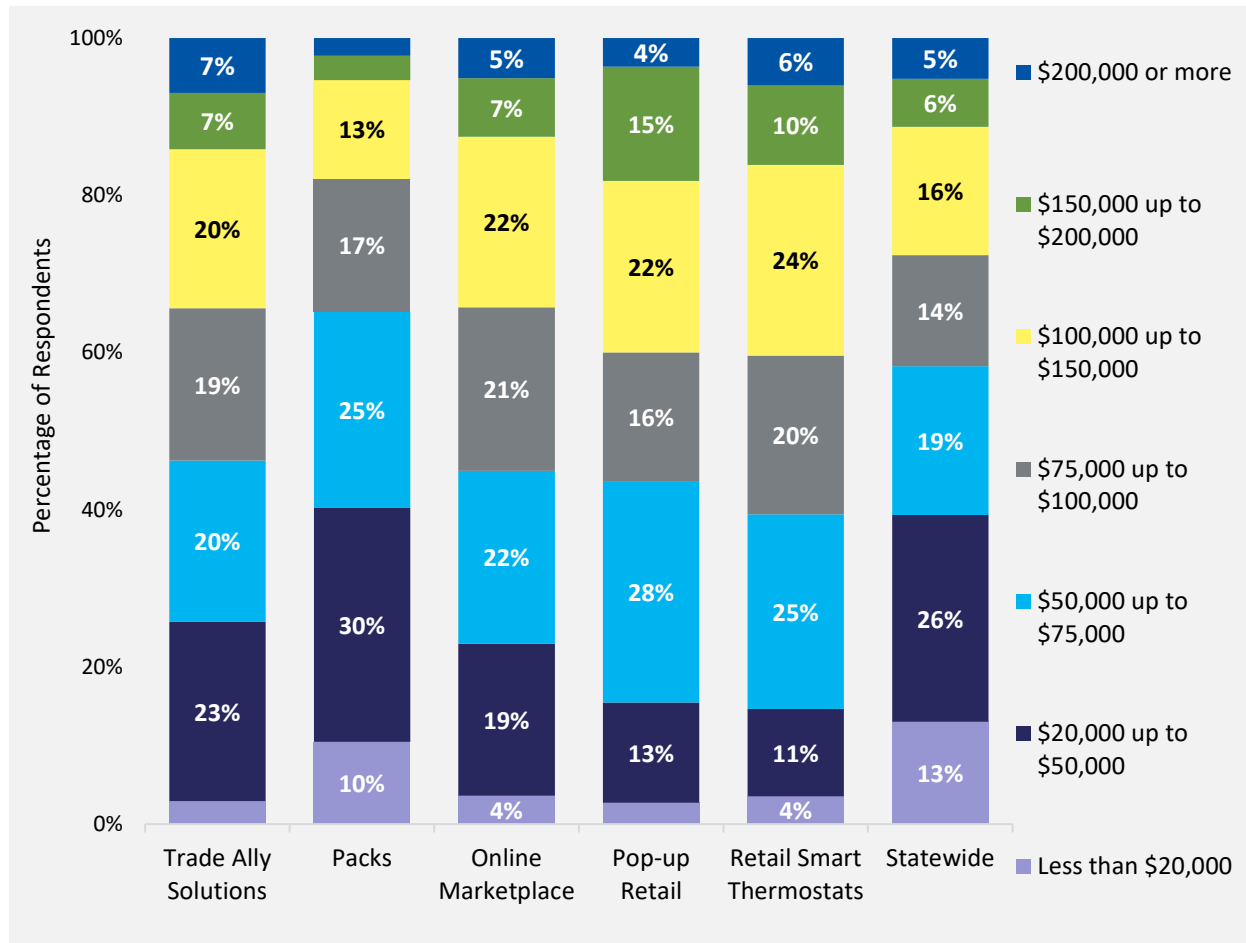
Offering source: Participant Satisfaction Survey Question. “Which of the following categories best represents your age?” Trade Ally Solutions (n=1,471), Packs (n=1,195), Online Marketplace (n=2,117), Pop-Up Retail (n=134), Retail Smart Thermostats (n=278). Statewide source: Census 2020 American Community Survey, Selected Social Characteristics in the United States. Percentages of 3% or less are not labeled in the figure.

Figure 13 shows the household income range of participants relative to the general population. The American Community Survey data show that Wisconsin households are evenly distributed across all income levels up to \$150,000, with smaller percentages of households above \$150,000. Focus on Energy offerings reflect this distribution well except that most offerings are less likely to include customers in

<sup>13</sup> U.S. Census. “Wisconsin.” Accessed March 2022. <https://data.census.gov/cedsci/profile?g=0400000US55>

the lowest income bracket. Participants in the Packs Offering were the most likely to be in lower income brackets (40% under \$75,000) and the least likely to be in higher income brackets (5% over \$150,000).

**Figure 13. Income Level of Survey Respondents**



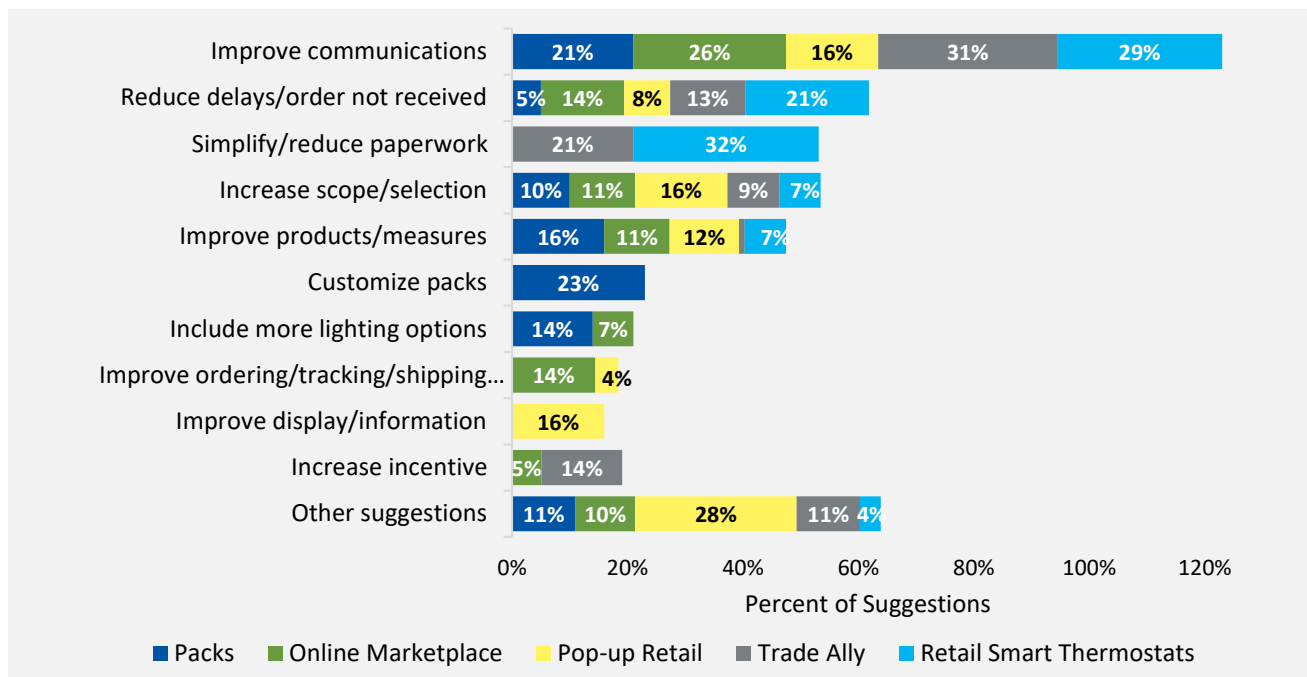
Offering source: Participant Satisfaction Survey Question. "Which category best describes your total household income before taxes?" Trade Ally Solutions (n=1,088), Packs (n=880), Online Marketplace (n=1,602), Pop-Up Retail (n=110), Retail Smart Thermostats (n=198). Statewide source: Census 2020 American Community Survey, Selected Social Characteristics in the United States. Percentages of 3% or less are not labeled in the figure.

### Participant Recommendations

The evaluation team analyzed open-ended comments and suggestions made by satisfaction survey respondents. For every offering surveyed in CY 2022, most comments were positive or complimentary, ranging from 53% of Retail Smart Thermostat comments up to 64% of Packs comments. The remaining comments were suggestions for improvement, which are summarized in Figure 14.

Across all residential offerings, the most common suggestion was to improve communications by providing more information about offerings and promoting them more effectively (16% to 31% of suggestions by offering). Some suggestions were unique to specific offerings. Simplifying and reducing paperwork was mentioned only by Trade Ally Solutions (21%) and Retail Smart Thermostat respondents (32%), while 23% of Packs suggestions were about customizing the items in the packs, and 16% of Pop-Up Retail suggestions related to improving the display of information on products at the events.

**Figure 14. Suggestions for Improving Residential Offerings**



Offering source: Participant Satisfaction Survey Question. "Please tell us more about your experience and any suggestions for improvement." (Total suggestions for improvement Packs n=115, Online Marketplace n=257, Pop-Up Retail n=25, Trade Ally n=173, Retail Smart Thermostats n=28).

Note: Unlabeled segments represent 3% or less of respondents.

## Nonresidential Process Evaluation Findings

For the CY 2022 process evaluation of nonresidential offerings, the evaluation team collected information and perspectives from Focus on Energy participants, the administrator, and the implementers (program actors). The team reached participants through an online participant satisfaction survey.

## Nonresidential Participant Satisfaction

During CY 2022, the administrator fielded online surveys that asked participants in the Business and Industry, Schools and Government, and New Construction solutions to rate how satisfied they were with Focus on Energy's offerings and to provide recommendations for improving the solutions. In CY 2022, 302 Focus on Energy nonresidential participants completed a survey.

The surveys used a satisfaction scale from 0 to 10, where 10 meant *extremely satisfied* and 0 meant *not at all satisfied*. Figure 15 shows a four-year comparison of participants' average satisfaction ratings with nonresidential offerings.<sup>14</sup>

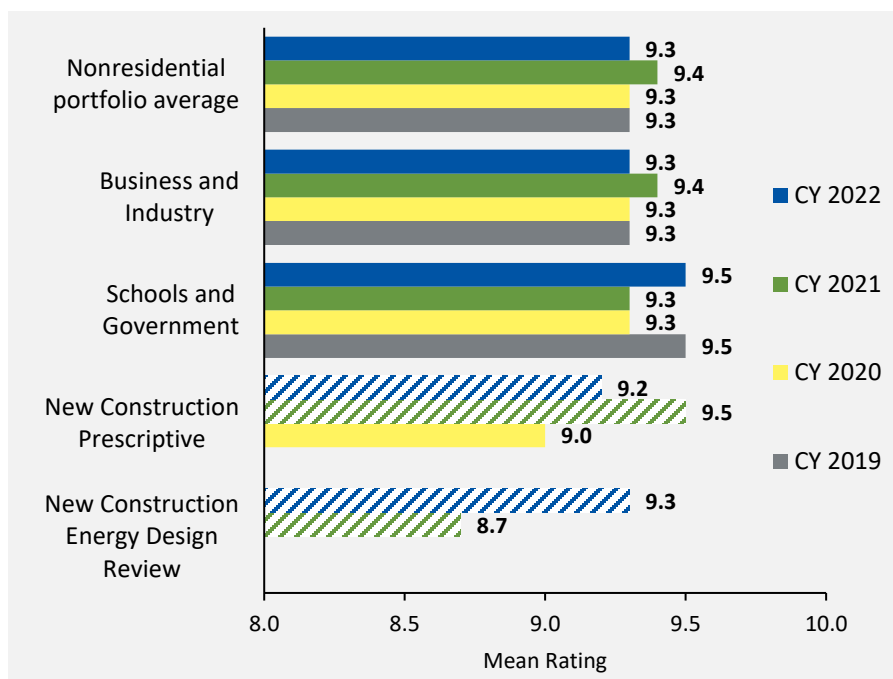
In CY 2022, across all nonresidential offerings surveyed, the participation-weighted average overall satisfaction rating was 9.3, similar to the average ratings from the previous three years (9.3 to 9.4). Average ratings in CY 2022 were 9.3 for the Business and Industry Solution and 9.5 for the Schools and Government Solution, both significantly above the portfolio target of 8.9. Average ratings for the Nonresidential New Construction Offering were statistically equivalent to the target.<sup>15</sup>

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<sup>14</sup> Ongoing participant satisfaction surveys were restructured in CY 2020 to match the new portfolio structure. The CY 2019 results for the Business and Industry Solution survey are a weighted average of results from the precursor programs consolidated into the solution (Business Incentive, Large Energy Users, Small Business, Multifamily Energy Savings, and Agribusiness programs). The CY 2019 results of the Schools and Government Solution survey are from the precursor program called Agriculture, Schools and Government. The New Construction Prescriptive survey was fielded for the first time in CY 2020, and the New Construction Energy Design Review survey was fielded for the first time in CY 2021.

<sup>15</sup>  $p < 0.05$  using binomial *t*-tests.

**Figure 15. CY 2022 Average Overall Satisfaction Ratings for Nonresidential Offerings**



Source: Ongoing Participant Satisfaction Mail/Online Survey Question. “Overall, how satisfied are you with your most recent experience with Focus on Energy?” Business Incentive CY 2019 (n=1,339 weighted average of three predecessor programs), CY 2020 (n=848), CY 2021 (n=360), CY 2022 (n=193; Schools and Government CY 2019 (n=263), CY 2020 (n=208), CY 2021 (n=92), CY 2022 (n=100); New Construction Business Prescriptive CY 2020 (n=25), CY 2021 (n=11), CY 2022 (n=6); New Construction Business Energy Design Review CY 2021 (n=7), CY 2022 (n=3). New Construction Business Prescriptive survey was not fielded before CY 2020, and New Construction Business Energy Design Review survey was not fielded before CY 2021. The nonresidential portfolio average is the average of all programs surveyed during the year weighted by total program participation.

Textured bars represent results from less than 20 surveys, interpret with caution.

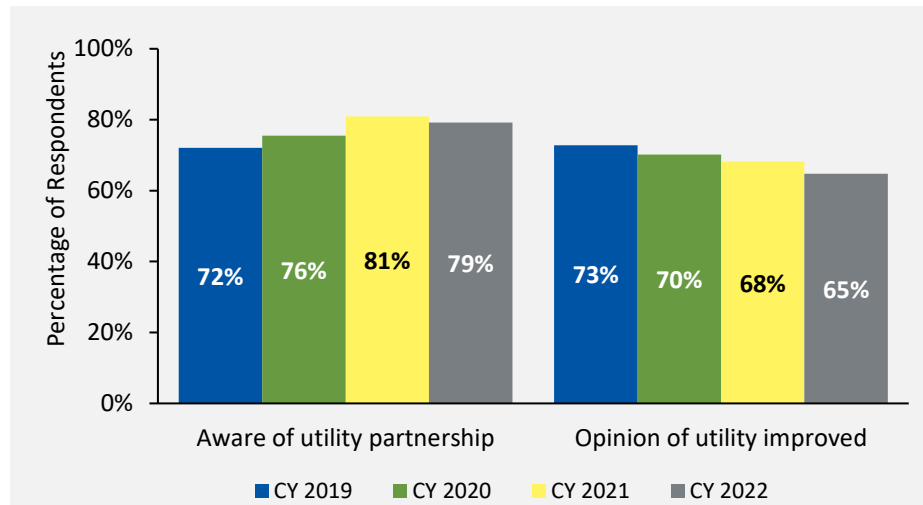
### Net Promoter Score

The evaluation team calculated an NPS score for each offering based on the likelihood of the participant to recommend it. Generally, a positive NPS score of +60 or better is interpreted as good, and the closer the NPS is to +100, the more favorable the respondents are toward the offering. All three nonresidential offerings surveyed received a high NPS. The Schools and Government Solution had the highest NPS at +87, and the New Construction Prescriptive Offering had the lowest NPS at +50.

### Awareness and Opinion of Utilities’ Role

Most nonresidential participants were aware that Focus on Energy offerings were offered in partnership with their local energy utility, and the percentage aware rose over the four-year period from 72% in CY 2019 to 79% in CY 2022 (Figure 16). Most participants also reported that Focus on Energy offerings made their opinion of their utility *much more favorable* or *somewhat more favorable*, though the percentage steadily declined from 73% in CY 2019 to 65% in CY 2022. Both findings are consistent with the growing maturity of Focus on Energy: awareness has spread over time, but the offerings may not seem as innovative as when they were first introduced.

**Figure 16. Awareness and Opinion of Utility Partnerships with Focus on Energy**



Offering source: Participant Satisfaction Survey Questions. “The Focus on Energy program you participated in is offered in partnership with your local energy utility. Before taking this survey, was this something you were aware of?”

(All nonresidential surveys combined: CY 2019 n=1,538; CY 2020 n=1,066; CY 2021 n=461; CY 2022 n=298).

“How have these offerings affected your opinion of your energy utility, if at all?”

(All nonresidential surveys combined: CY 2019 n=1,431; CY 2020 n=997; CY 2021 n=447; CY 2022 n=278).

### *Participant Recommendations*

The evaluation team analyzed open-ended comments and suggestions made by satisfaction survey respondents. Most comments given by survey respondents were complimentary and expressed a positive experience with the offering they participated in (89% of School and Government comments, 75% of Nonresidential New Construction, and 67% of Business and Industry comments).

Business and Industry respondents were the only CY 2022 respondents who offered a substantial number of suggestions for improving the offering. Their most frequent suggestions were to improve communications (22%, n=27), increase the incentives (22%), simplify or reduce application paperwork (19%), and improve customer service from the energy advisors (19%). The specific suggestions to improve communication focused on making it easier to obtain the information required to submit applications, receiving faster or more regular responses from the energy advisors, and setting appropriate expectations for incentives.

Only four Schools and Government respondents made suggestions in CY 2022. Two of these suggested increasing the scope of the offering to further promote conservation and emissions reductions, though neither respondent mentioned any specific technologies. Other Schools and Government suggestions were to increase incentives and to improve communications by having energy advisors visit facilities in person more often. Only one New Construction participant (Prescriptive) provided a suggestion for improvement and it was to simplify application and reporting requirements.



## Cost-Effectiveness Findings

With the oversight of and in collaboration with the PSC and the evaluation team, the Focus on Energy administrator developed a specific cost-effectiveness calculator for the CY 2019-CY 2022 quadrennium. The administrator and implementers used the calculator to assess the cost-effectiveness of solutions' designs prior to their implementation each year.

Maintaining consistency between planning and evaluation approaches is critical to understand how performance compares with expectations, so the evaluation team used the same calculator as the administrator and implementers to evaluate the cost-effectiveness of the Focus on Energy solutions in CY 2022, as presented in this section.

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

NTG ratios can have a significant effect on TRC, UAT, RIM, and societal test results. The evaluation team applied NTG ratios to impacts to measure the gains resulting from Focus on Energy activities. NTG ratios account for the energy savings that would have been achieved without the efficiency solutions (when the NTG ratio is less than 1.0, savings are reduced, and when the NTG ratio is greater than 1.0, savings are increased).

On the cost side, the team removed expenditures that would have occurred without the efficiency effort. These expenditures include incremental measure costs and lost revenues, both of which are multiplied by the NTG ratio. The evaluation team did not apply the NTG ratio to costs that would not have occurred in absence of the solution (such as solution and administrative costs).

### Test Description

The evaluation team—as well as the administrator in developing its calculator—used methods adapted from the California Standard Practice Manual,<sup>17</sup> 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, RIM, and societal test are in Appendix I. Cost-Effectiveness and Emissions Methodology and Analysis in Volume III.

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

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<sup>16</sup> Public Service Commission of Wisconsin. June 6, 2018. *Quadrennial Planning Process III – Final Decision*. PSC Docket 5-FE-101, PSC REF#: 343909. [http://apps.psc.wi.gov/vs2015/ERF\\_view/viewdoc.aspx?docid=343909](http://apps.psc.wi.gov/vs2015/ERF_view/viewdoc.aspx?docid=343909)

<sup>17</sup> 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](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 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 included in other costs tests, however, such as the UAT.

The modified TRC used for the CY 2022 evaluation defines solution cost-effectiveness from a regulatory perspective (as directed by the PSC) and is intended to measure the overall impact of the solutions' 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 solutions 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 solution administrative costs, solution 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, measure-level incremental costs, and emissions allowance prices for the CY 2019-CY 2022 quadrennium, cost-effectiveness results reported here are not directly comparable with results from the previous quadrennium (CY 2015-CY 2018). The changes in avoided costs tended to decrease the benefit/cost test results across all solutions, when compared with the avoided costs used in the previous quadrennium.

Additionally, changes in the calculation of incremental measure costs further reduce the comparability between quadrennia, as the measure cost calculation approach for many measures, including most custom measures, was revised between CY 2018 and CY 2019. As with avoided costs, these changes often decreased the benefit/cost ratio at the portfolio level compared with the previous quadrennium. These externalities have an impact on solution and overall portfolio cost-effectiveness; however, they do not directly reflect the overall performance of the Focus on Energy solutions.

## Value of Net Saved Energy

The value of energy saved, or displaced, equals the net energy saved multiplied by the utility-avoided cost of not having to generate or purchase 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 first established the methodology to estimate electric energy avoided costs in its June 18, 2012, Order under Docket 5-GF-191 (PSC REF#: 166932).<sup>18</sup> The PSC first established the methodology to estimate natural gas avoided costs in its Order of February 25, 2015, under Docket 5-FE-100 (PSC REF#: 232431).<sup>19</sup> The methodologies established under the aforementioned PSC Orders were maintained by the PSC in its Final Decision for the Quadrennial Planning Process III.<sup>20</sup>

The source for electric energy avoided costs in this CY 2022 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.<sup>21</sup>

The source for natural gas avoided costs in this CY 2022 evaluation are based on Henry Hub price forecasts from the 2018 U.S. Energy Information Administration's *Annual Energy Outlook*.<sup>22</sup>

In its Final Decision of June 1, 2020, the PSC directed the Evaluation Work Group (EWG) to propose to the PSC a method for calculating avoided transmission and distribution (T&D) costs to be used for the purpose of evaluating Focus on Energy (PSC REF#: 390566). The PSC established the methodology to estimate avoided electric T&D costs for the CY 2019-CY 2022 quadrennium, under PSC docket 5-FE-101 (PSC REF#: 406591), with the direction to revisit avoided T&D costs in the Quadrennial Planning Process IV. Avoided T&D costs are calculated based on a running average of costs associated with T&D

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<sup>18</sup> Public Service Commission of Wisconsin. June 18, 2012. *Quadrennium Planning Process II – Scope*. PSC Docket 5-GF-191, PSC REF#: 166932. [http://psc.wi.gov/apps35/ERF\\_view/viewdoc.aspx?docid=166932](http://psc.wi.gov/apps35/ERF_view/viewdoc.aspx?docid=166932)

<sup>19</sup> Public Service Commission of Wisconsin. February 25, 2015. *Quadrennium Planning Process II – Scope*. PSC Docket 5-FE-100, PSC REF#: 232431. [http://psc.wi.gov/apps35/ERF\\_view/viewdoc.aspx?docid=232431](http://psc.wi.gov/apps35/ERF_view/viewdoc.aspx?docid=232431)

<sup>20</sup> Public Service Commission of Wisconsin. June 6, 2018. *Quadrennial Planning Process III – Final Decision*. PSC Docket 5-FE-101, PSC REF#: 343909. [http://apps.psc.wi.gov/vs2015/ERF\\_view/viewdoc.aspx?docid=343909](http://apps.psc.wi.gov/vs2015/ERF_view/viewdoc.aspx?docid=343909)

<sup>21</sup> 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/#t=10&p=0&s=MarketReportPublished&sd=desc>

<sup>22</sup> U.S. Energy Information Administration. February 6, 2018. *Annual Energy Outlook*. <https://www.eia.gov/outlooks/archive/aeo18/pdf/AEO2018.pdf>

infrastructure as reported to the PSC. This value is then escalated to align with projected increases in construction costs.<sup>23</sup>

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 18 shows the avoided cost assumptions used for the cost-effectiveness tests in CY 2019, CY 2020, CY 2021, and CY 2022.

**Table 18. Avoided Cost Comparison of CY 2019, CY 2020, CY 2021, and CY 2022**

Avoided Cost	CY 2019	CY 2020	CY 2021	CY 2022
Electric Energy (\$/kWh)	\$0.03093–\$0.04878	\$0.03093–\$0.05015	\$0.03093–\$0.05291	\$0.03093–\$0.05429
Electric Capacity (\$/kW year)	\$117.43–\$174.17	\$124.75–\$176.99	\$128.06–\$179.83	\$131.38–\$182.67
Natural Gas (\$/therm)	\$0.538–\$0.764	\$0.524–\$0.777	\$0.524– \$0.785	\$0.546–\$0.797
Transmission and Distribution (\$/kW year)	N/A	\$66.34–\$68.61	\$66.40–\$68.74	\$66.47–\$68.88
Avoided Cost Inflation	0%	0%	0%	0%
Real Discount Rate	2%	2%	2%	2%
Line Loss	8%	8%	8%	8%

## 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 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 U.S. Environmental Protection Agency’s (EPA’s) AVOIDed Emissions and geneRation Tool (AVERT) was used to calculate the electric emissions. This tool uses emissions factors specific to Wisconsin to get more tailored figures. Previously to obtain emissions by program, the evaluation team mapped site zip code and utilities to AVERT regions; however, the EPA updated the regions so now all of Wisconsin falls into a single region. With all savings allocated to one region the team aggregated them by solution and offering and ran them through the AVERT tool to get the electric emissions benefits.

<sup>23</sup> Public Service Commission of Wisconsin. March 10, 2021. *Quadrennial Planning Process III*. Order PSC Docket 5-FE-101, REF#: 406591. <https://apps.psc.wi.gov/ERF/ERFview/viewdoc.aspx?docid=406591>.

The evaluation team obtained emissions allowance prices for nitrogen oxide and sulfur dioxide from near the end of CY 2016 from the EPA’s Cross State Air Pollution Rule.<sup>24</sup>

The team used the carbon dioxide emissions price established by the PSC in its Final Decision for Quadrennial Planning Process III (PSC Ref#: 343909), which states, “The Commission finds it reasonable for Focus cost-effectiveness tests to continue valuing avoided carbon dioxide emissions using a market-based value of \$15.00 per ton.”<sup>25</sup>

Table 19 lists the emissions benefits for all offerings by channel.

**Table 19. Total Program Emissions Benefits by Channel**

Program Year <sup>a</sup>	Residential	Nonresidential	Midstream	Rural	Total <sup>b</sup>
CY 2019 Emissions Benefits	\$25,422,131	\$91,289,103	N/A	\$2,092,656	<b>\$118,803,890</b>
CY 2020 Emissions Benefits	\$26,004,128	\$89,940,588	\$520,240	\$7,006,188	<b>\$123,471,144</b>
CY 2021 Emissions Benefits	\$20,085,064	\$82,221,328	\$1,124,349	\$6,455,256	<b>\$109,885,997</b>
CY 2022 Emissions Benefits	\$24,980,488	\$59,520,395	\$737,740	\$8,409,650	<b>\$93,649,181</b>

<sup>a</sup> Reported emissions impacts are based on the sum of project-level benefits for both electric and natural gas.

<sup>b</sup> Sector subtotals may not sum due to overlapping programs in rural and renewable categories.

## 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 to be transfer payments to the customer.<sup>26</sup> Focus on Energy’s fiscal agent, Wipfli, provided the CY 2022 solution costs used for this evaluation.

Table 20 shows the CY 2019, CY 2020, CY 2021, and CY 2022 solution and incentive cost values used for the cost-effectiveness tests.

**Table 20. Sector Costs Comparison**

Costs	CY 2019	CY 2020	CY 2021	CY 2022
<b>Residential</b>				
Incentive Costs	\$23,490,150	\$22,892,753	\$20,223,116	\$23,475,533
Administrative Costs	\$2,775,789	\$1,319,419	\$1,254,180	\$1,258,964
Delivery Costs	\$10,438,711	\$11,806,913	\$9,704,213	\$12,604,191
<b>Total Residential Program Costs</b>	<b>\$36,704,651</b>	<b>\$36,019,085</b>	<b>\$31,181,509</b>	<b>\$37,338,688</b>

<sup>24</sup> Focus on Energy. December 11, 2020. *Carbon Pricing Methods*. Submitted to Public Service Commission of Wisconsin [https://www.focusonenergy.com/sites/default/files/inline-files/Potential\\_Study-Research-Carbon\\_Pricing.pdf](https://www.focusonenergy.com/sites/default/files/inline-files/Potential_Study-Research-Carbon_Pricing.pdf)

<sup>25</sup> Public Service Commission of Wisconsin. June 6, 2018. *Quadrennial Planning Process III – Final Decision*. PSC Docket 5-FE-101, PSC REF#: 343909. [http://apps.psc.wi.gov/vs2015/ERF\\_view/viewdoc.aspx?docid=343909](http://apps.psc.wi.gov/vs2015/ERF_view/viewdoc.aspx?docid=343909)

<sup>26</sup> The evaluation team included incentives as an incremental cost but not as a program cost.

Costs	CY 2019	CY 2020	CY 2021	CY 2022
<b>Nonresidential</b>				
Incentive Costs	\$40,345,267	\$28,976,029	\$26,582,145	\$25,111,444
Administrative Costs	\$2,135,458	\$1,279,291	\$1,240,528	\$1,289,393
Delivery Costs	\$21,263,700	\$15,956,836	\$15,968,398	\$17,437,698
<b>Total Nonresidential Program Costs</b>	<b>\$63,744,426</b>	<b>\$46,212,156</b>	<b>\$43,791,071</b>	<b>\$43,838,535</b>
<b>Midstream</b>				
Incentive Costs	N/A	\$401,575	\$718,575	\$696,250
Administrative Costs	N/A	\$9,657	\$45,810	\$37,339
Delivery Costs	N/A	\$525,541	\$585,951	\$373,822
<b>Total Midstream Program Costs</b>	<b>N/A</b>	<b>\$936,773</b>	<b>\$1,350,336</b>	<b>\$1,107,411</b>
<b>Rural</b>				
Incentive Costs	\$1,875,588	\$3,199,158	\$3,530,287	\$4,084,339
Administrative Costs	\$27,111	\$201,959	\$163,990	\$211,482
Delivery Costs	\$1,388,404	\$2,233,296	\$2,411,751	\$2,714,450
<b>Total Rural Program Costs</b>	<b>\$3,291,103</b>	<b>\$5,634,413</b>	<b>\$6,106,028</b>	<b>\$7,010,271</b>
<b>Total</b>				
Incentive Costs	\$65,711,006	\$55,469,515	\$51,054,123	\$53,367,567
Administrative Costs	\$4,938,358	\$2,788,738	\$2,704,508	\$2,797,178
Delivery Costs	\$33,090,816	\$30,544,175	\$28,670,313	\$33,130,161
<b>Total Program Costs</b>	<b>\$103,740,180</b>	<b>\$88,802,428</b>	<b>\$82,428,944</b>	<b>\$89,294,906</b>

## Incremental Costs

The gross incremental costs are the additional costs incurred as a result of purchasing efficient equipment over and above a baseline nonqualified product. The evaluation team derived the gross incremental cost values used in this CY 2022 evaluation from the incremental cost study it conducted with the administrator and implementers. The incremental cost study allowed the evaluation team 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 used in the cost-effectiveness tests, required the application of attribution factors to account for freeridership.

As in the evaluation of the previous quadrennium (CY 2015-CY 2018), the evaluation team assigned actual CY 2022 project costs from the solution tracking databases to the renewable energy projects. Table 21 shows the CY 2019, CY 2020, CY 2021, and CY 2022 total measure net incremental costs used for the cost-effectiveness tests.

**Table 21. Net Incremental Measure Cost Comparison**

Costs	Residential	Nonresidential	Midstream
CY 2019 Incremental Costs	\$62,647,981	\$134,864,170	N/A
CY 2020 Incremental Costs	\$75,928,043	\$172,974,089	\$2,118,513
CY 2021 Incremental Costs	\$78,610,182	\$169,406,055	\$3,828,757
CY 2022 Incremental Costs	\$85,398,671	\$124,229,177	\$3,058,802

Table 22 lists CY 2022 incentive costs by sector, with renewables incorporated.

**Table 22. CY 2022 Incentive Costs by Sector (with Renewables Incorporated)**

Costs	Residential	Nonresidential	Midstream	Total
Incentive Costs	\$24,248,627	\$28,422,690	\$696,250	\$53,367,567

Table 23 lists the findings of the benefit/cost analysis for Focus on Energy's CY 2022 programs by sector.

**Table 23. CY 2022 Benefit and Costs Portfolio Breakout**

Focus on Energy Benefits and Costs		Portfolio Breakout	Core Efficiency	Rural	Renewables
Incentives	\$53,367,567		\$44,886,131	\$4,084,339	\$4,460,461
Modified TRC Benefits	\$585,853,396		\$462,704,477	\$51,369,364	\$66,999,950
Modified TRC Costs	\$248,613,990		\$182,229,919	\$13,991,552	\$49,404,937
Portfolio TRC Ratio	2.36	Alone	2.54	3.67	1.36
		With Core		2.62	2.29
		With Core and Rural			2.37
		With Core & Rural & Renewables			2.36

Table 24 lists the findings of the benefit/cost analysis for Focus on Energy's CY 2022 programs by sector, with rural measures incorporated into each sector for each cost-effectiveness test.

**Table 24. CY 2022 Costs, Benefits, and Modified Total Resource Cost Test Results by Sector**

	Residential	Nonresidential	Midstream	Renewables	Total
Administrative Costs	\$1,181,238	\$1,344,500	\$37,339	\$234,102	\$2,797,178
Delivery Costs	\$11,826,031	\$18,182,952	\$373,822	\$2,747,356	\$33,130,161
Incremental Measure Costs	\$54,659,905	\$108,544,464	\$3,058,802	\$46,423,479	\$212,686,651
<b>Total Non-Incentive Costs</b>	<b>\$67,667,175</b>	<b>\$128,071,915</b>	<b>\$3,469,963</b>	<b>\$49,404,937</b>	<b>\$248,613,990</b>
Electric Benefits	\$59,379,444	\$226,288,311	\$1,705,596	\$48,641,236	\$336,014,587
Gas Benefits	\$33,735,123	\$67,981,083	\$2,087,676	\$3,163	\$103,807,046
Emissions Benefits	\$21,666,072	\$63,671,512	\$737,740	\$7,573,857	\$93,649,181
T&D Benefits	\$7,031,358	\$34,320,937	\$248,592	\$10,781,694	\$52,382,582
<b>Total TRC Benefits</b>	<b>\$121,811,997</b>	<b>\$392,261,844</b>	<b>\$4,779,605</b>	<b>\$66,999,950</b>	<b>\$585,853,396</b>
<b>TRC Benefits Minus Costs</b>	<b>\$54,144,823</b>	<b>\$264,189,928</b>	<b>\$1,309,642</b>	<b>\$17,595,013</b>	<b>\$337,239,405</b>
<b>TRC Ratio</b>	<b>1.80</b>	<b>3.06</b>	<b>1.38</b>	<b>1.36</b>	<b>2.36</b>
<b>TRC Ratio without T&amp;D Benefits</b>	<b>1.70</b>	<b>2.79</b>	<b>1.31</b>	<b>1.14</b>	<b>2.15</b>

<sup>a</sup> The TRC ratio equals the total TRC benefits divided by non-incentive costs.

Table 25 lists CY 2019, CY 2020, CY 2021, and CY 2022 portfolio cost-effectiveness results for the modified TRC.

**Table 25. Cost-Effectiveness Results for Focus on Energy Portfolio**

Calendar Year	Residential	Nonresidential	Midstream	Renewables	Total
CY 2019: Modified TRC Test Result with Renewables	1.70	2.99	N/A	N/A	<b>2.58</b>
CY 2019: Modified TRC Test Result Renewables Excluded	1.79	3.11	N/A	1.51	<b>2.58</b>
CY 2020: Modified TRC Test Result with Renewables	1.70	2.78	1.45	N/A	<b>2.43</b>
CY 2020: Modified TRC Test Result Renewables Excluded	2.07	2.86	1.45	1.24	<b>2.43</b>
CY 2021: Modified TRC Test Result with Renewables	1.49	2.78	1.52	N/A	<b>2.35</b>
CY 2021: Modified TRC Test Result Renewables Excluded	1.65	2.82	1.52	1.48	<b>2.35</b>
CY 2022: Modified TRC Test Result with Renewables	1.55	2.93	1.38	N/A	<b>2.36</b>
CY 2022: Modified TRC Test Result Renewables Excluded	1.80	3.06	1.38	1.36	<b>2.36</b>

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, presented above, 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 administrator.



- The RIM is the ratio of avoided utility costs and the combination of participant incentives, administrative costs, and lost utility revenue.
- The societal test has the same inputs as the expanded TRC, plus non-energy benefits

Table 26 lists the CY 2022 portfolio-level cost-effectiveness results for these additional test perspectives.

**Table 26. CY 2022 Portfolio-Level Cost-Effectiveness Results for Additional Benefit/Cost Tests**

Test	Residential	Nonresidential	Midstream	Rural	Renewables	Total
Expanded TRC						<b>4.55</b>
UAT	3.35	7.24	3.65	6.13	7.99	<b>5.51</b>
RIM	0.42	1.05	0.96			<b>0.75</b>

The inclusion of economic benefits in the expanded TRC produces higher benefit/cost ratios compared with the portfolio-level modified TRC results. For the UAT, the results show that benefits from the residential programs were more than three times the costs, while the benefits from the nonresidential programs outweighed the costs by more than a factor of seven.

As expected, the benefit/cost portfolio values from the RIM test are below 1.0 in most cases, though they do slightly exceed 1.0 for the nonresidential portfolio. When interpreted within the context of the UAT results, these findings indicate that, although annual Focus on Energy activities will probably exert 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 I. Cost-Effectiveness and Emissions Methodology and Analysis in Volume III as well as the Benefit/Cost Analysis CY 2009 Evaluation Report.<sup>27</sup>

<sup>27</sup> 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](https://focusonenergy.com/sites/default/files/bcanalysiscy09_evaluationreport.pdf)

## Outcomes and Recommendations

Based on the evaluation team’s findings, this section presents high-level outcomes and recommendations. The team synthesized information from all CY 2022 evaluation activities to inform the following portfolio-level outcomes and recommendations. More information on supporting findings can be found in this report and in the solution chapters in Volume II.

**Outcome 1. Participants continue to report high levels of satisfaction with Focus on Energy offerings, and their ratings have increased over the last four years.** Overall, CY 2022 respondents gave the offerings they participated in an average satisfaction rating of 9.5, which was the same as in CY 2021 and a statistically significant increase from 9.4 in CY 2020 and 9.3 in CY 2019. The satisfaction ratings for all residential and nonresidential offerings in CY 2022 were statistically equivalent to or higher than the portfolio target of 8.9.<sup>28</sup>

### Residential

**Outcome 2. Focus on Energy’s enduring presence in Wisconsin’s retail lighting and new construction markets has induced additional, impactful net savings for the residential portfolio.** Throughout the quadrennium, the evaluation team conducted research to calculate market effects for the long-standing retail lighting (under Direct to Customer Solution) and Residential New Construction offerings. In CY 2022, the team applied market effects savings to these offerings for the first time in this quadrennium. These market effects savings are new savings realized across the quadrennium—they represent program-induced energy savings in the Wisconsin market that have not previously been attributed to program spending (past or present). New market effects savings significantly improved the quadrennium MMBtu NTG ratios for the Direction to Customer Solution (from 53% to 67%) and the Residential New Construction Offering (from 4% to 91%).

These additional savings should not be considered static, as they are based on current market conditions. Changes to federal lighting standards in 2023 will eliminate retail lighting market effects savings that can be claimed in future years since stricter efficiency standards will prohibit the manufacture, distribution, and sale of most incandescent and halogen lamps. Naturally occurring shifts in markets related to new construction, such as heating and cooling, will affect the amount of market effects savings the Residential New Construction Offering can claim in future years.

**Recommendation 1.** Monitor residential new construction practices to ensure Focus on Energy continues to advance the most efficient building practices through its offerings.

**Recommendation 2.** When reviewing other long-standing programs for potential market effects impacts, Focus on Energy should develop logic models that clearly outline how the program designs induce market effects. Furthermore, Focus on Energy should work with the evaluation team to verify

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<sup>28</sup> The evaluation team measured statistical significance using binomial *t*-tests with  $p < 0.10$  or better. All surveyed offerings were statistically higher than the portfolio target except for Nonresidential New Construction offerings (CY 2021 rating of 9.2 based on 18 surveys), which was statistically equivalent to the portfolio target.

theories of market change outlined in the logic models and to collect measurable, relevant data to quantify market effects savings.

**Outcome 3. Residential solutions made meaningful changes during the third quadrennium (Quad III) to address changing markets and increase savings.** In response to evolving residential HVAC technologies that have made heat pumps a smarter choice for many Wisconsin residents, the Heating and Cooling Offering successfully grew the dual fuel air-source heat pump measure by 416% between 2021 and 2022 by adding bonus incentives and increasing engagement with heat pump trade allies. By restructuring incentives for solar PV, Focus on Energy increased participation in the Renewable Energy Offering and boosted savings over 200% between CY 2019 and CY 2022. Similarly, redesigned Residential New Construction incentives shifted participation to more efficient tiers, which increased the kWh savings per home about 200% over the quadrennium.

**Outcome 4. Smart thermostats continue to provide energy-saving opportunities and potential for growth.** The CY 2022 smart thermostat billing analysis revealed that smart thermostats distributed through all Focus on Energy offerings continue to save energy, with verified savings slightly exceeding deemed savings in the 2022 TRM, which were based on a 2017 billing analysis. At the same time, the number of smart thermostats rebated in CY 2022 through the Heating and Cooling and Online Marketplace offerings increased 32% and 250%, respectively, compared to CY 2021, despite a somewhat complex menu of smart thermostat measures that give participants multiple options depending on delivery channel (retail or contractor), sector (single-family or multifamily), and HVAC equipment age (new or existing).

**Recommendation 3.** Consider ways to reduce the number of thermostat measures currently available in the TRM, which would simplify the application process for customers and data entry for the implementer. Because the latest billing analysis results are applicable to all residential customers, the current TRM measures could be reduced to simplify measure selection by the customer or contractor filling out the application. Reducing the number of options would also simplify data entry for the implementer and reduce the possibility of data errors.

**Outcome 5. Similar to CY 2020 and CY 2021, in CY 2022, the Direct to Customer Solution implementer introduced several new master measure identifiers (MMIDs) in the SPECTRUM database that did not go through the prescribed TRM review and approval process.<sup>29</sup>** Without knowing savings sources for these new measures, it was challenging for the evaluation team to apply the appropriate savings for these measure or to understand the assumptions for *ex ante* savings.

**Recommendation 4.** Revisit the revised TRM approval process. In CY 2022, the evaluation team, program administrator, and PSC staff implemented an updated TRM process that sets clear steps for when and how implementers can add new measures to SPECTRUM. The evaluation team encourages

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<sup>29</sup> MMID refers to master measure identifier, which is used in the SPECTRUM database to identify measures by unique characteristics, such equipment type, delivery path, and sector.

the implementer and administrator to follow this process and SPECTRUM new measure publication dates in the future.

## *Nonresidential*

**Outcome 6. Data tracking remained a challenge for the administrator and the evaluation team, with errors and misclassification in the nonresidential sector posing a risk to producing accurate evaluation results.** Specifically, classifying new projects under solutions and offerings in the SPECTRUM database requires considerable manual data entry by the implementers. In CY 2022, the evaluation team found that several projects were misclassified, possibly because some data fields may be out of date. To address these misclassifications, the team developed a complex and cumbersome mapping methodology to generate accurate offering-level impact summaries, which in turn could affect the ability to replicate results.

Not having clear SPECTRUM designations also increases the chances that the implementation team could misclassify a project under the wrong offering. For example, the evaluation team cannot identify projects in the small and medium Commercial Offering or small and medium Industrial Offering without a data field to distinguish small businesses and large energy users. The team’s mapping approach is a manual process applied to a large dataset, so incorrectly classified data in SPECTRUM could fall into the incorrect offering for evaluation. For example, in CY 2022, some Schools and Government projects were designated under “Virtual Commissioning, Discretionary and Tribal,” which necessitated additional review and reclassification by the evaluation team.

**Recommendation 5.** Consider uniformly updating the SPECTRUM database with current and accurate headings for the solution, offering, and sub-offering. If reprogramming new entry fields is not feasible in the near term, some existing entry fields could be temporarily reclassified to represent these designators. If reprogramming or reclassification of any kind is not feasible, the evaluation team and the administrator should discuss the filtering methodology early in the new year to ensure that all 2022 projects are correctly classified for the CY 2023 evaluation and analysis activities.

**Outcome 7. The COVID-19 pandemic continues to affect performance across nonresidential solutions.** Overall, energy savings in the nonresidential solutions declined 21% from CY 2021. Lower participation rates contributed to lower electric and gas savings compared with 2022 savings targets, particularly for the Business and Industry channel, which achieved 55% of its 2022 MMBtu goal.

As reported in the 2021 nonresidential general population survey (see Appendix K. Survey and Interview Instruments by Offering in Volume III), lower participation rates could be partly attributed to factors such as business closures, supply chain delays resulting in deferred or cancelled energy upgrade projects, lower revenues, and staffing and occupancy reductions. More hospitality, retail, or healthcare survey respondents reported being impacted by these factors than did industrial or agriculture respondents in the Large Industrial and Agribusiness offerings.

The effects of COVID-19 on business operations and energy efficiency activities continued to be present in CY 2021; however, participants surveyed in CY 2021 appear to be planning to return to more normal

operations in CY 2022. In CY 2021, 78% of general population respondents said they had already returned or planned to return to pre-pandemic levels of operation. Of the 29 nonparticipating respondents who reported delaying energy efficiency projects in 2020, 79% planned to complete those projects by the end of 2022.

**Outcome 8. Several factors created discrepancies between *ex ante* and verified savings for nonresidential projects. Many of the issues cited in the CY 2021 evaluation and corresponding recommendations still apply to CY 2022.**

CY 2020-21 Conclusion (Summary)	CY 2020 Recommendation (Summary)	CY 2021 Recommendation	CY 2022 Recommendation
Some large and complex projects lacked detailed savings calculations, reporting, and data collection, which caused discrepancies with verified savings, particularly when the evaluation team used power metering to gather data on the site.	Provide more comprehensive review and analysis of project savings for larger custom projects that could be more complex and variable. Evaluation team recommends setting a minimum requirement that involves a technical analysis summary report, in which the implementer details the methodologies used and assumptions made to calculate savings. Evaluation team also recommends writing a verification report, in addition to the verification sheet, in which assumptions in the technical analysis summary report are verified, pictures and invoices collected, and any project changes accounted for. Whenever possible, include any meter or trend data in the analysis.	<b>Same as CY 2020.</b> The evaluation team recommends a more comprehensive review and analysis of project savings for large custom projects that could be more complex and variable than usual. Develop a standard protocol for developing savings estimates for these types of projects. This should also include a standard list of documentation required, such as project descriptions, invoices, photos, list of assumptions, etc. Suggested protocol elements are presented in the recommendations for the Business and Industry Solution.	<b>Same as CY 2020 and 2021.</b> The evaluation team recommends developing an approach that uses trend data, utility billing data, and metering data, as available. The team also recommends grounding assumptions through referencing best practices, taking spot measurements, and using actual weather data from the location of projects.

**Outcome 9. The evaluation found that some larger projects either operated differently or were unable to achieve the design parameters of the original project design due to several risk factors that were present before and after the project was implemented.** Differences between the original design and real-world operation resulted in project-level realization rates that varied from 100%.

**Recommendation 6.** Identify and attempt to address risk factors that might change operating parameters of a project or impede successful implementation of custom projects while the project is under development. Risk factors might include the following:

- Not being aware of expected operational changes that could occur in the first year after the project is implemented and shift the operational parameters of the project.
- A single skilled operator is expected to remain on the site to operate the equipment rather than using automation to meet the operational needs.

- Reliance on planned future automation upgrades to drive savings of the current project scope instead of planning for and incorporating incentivized automation upgrades.
- Not understanding the operational limitations on the equipment, process, or business type that will set hard upper limits on the potential savings.

## Midstream

**Outcome 9. The Midstream Solution induced savings beyond program participation in the first four years of operation.** In CY 2022, the evaluation team convened a Delphi Panel of program and market experts for the two most prolific Midstream offerings—Commercial Kitchen Equipment and HVAC. The panel determined that the two offerings not only achieved net savings, but they also influenced the commercial kitchen equipment and ductless heat pump markets beyond program participation. The panel concluded that, accounting for annual NTG and long-term market effects, the Commercial Kitchen Equipment and HVAC offerings achieved NTG scores of 48% and 82%, respectively. Comparatively, NTG ratios without market effects were 39% for Commercial Kitchen Equipment and 65% for HVAC. The program was particularly effective at inducing an increase in net savings through pricing and upselling, though stocking new equipment was less of a driver of net savings, given challenges related to COVID-19 for three years of the quadrennium.

Focus on Energy also offered circulator pumps and water heaters through the Midstream Offering in CY 2022; however, the evaluation team did not conduct NTG research for those measures due to low participation.

**Recommendation 7.** Monitor program participation for all Midstream Solution measures to determine if greater participation warrants additional NTG research for other Midstream measures in the CY 2023-CY 2026 quadrennium.

**Recommendation 8.** As ductless heat pumps move to the downstream channel in CY 2023, monitor the related change in NTG to determine if the delivery change impacts net savings ratios.

## Cost-Effectiveness

**Outcome 10. The Residential, Nonresidential, Midstream, Rural, and Renewable portfolios all passed the mTRC test, as they have in every year of the quadrennium.** While the overall portfolio's cost-effectiveness ratio dropped slightly each year from CY 2019 to CY 2021, the portfolio itself remains stable and highly cost-effective in CY 2022, delivering \$2.36 in benefits for each dollar spent. When accounting for downstream economic benefits, the portfolio is even more effective, delivering \$4.55 per dollar spent. When including non-energy benefits through the societal test, the program delivers \$5.12 per dollar spent. However, there was a substantial drop in savings for nonresidential programs between CY 2021 and CY 2022, primarily because of lingering supply chain issues, labor shortages, delays for preapproved projects, and lower demand from large nonresidential customers for installing major energy-efficient equipment.

**Recommendation 9.** Monitor the nonresidential portfolio for continued declines in savings from this channel and work to encourage larger, more cost-effective projects.