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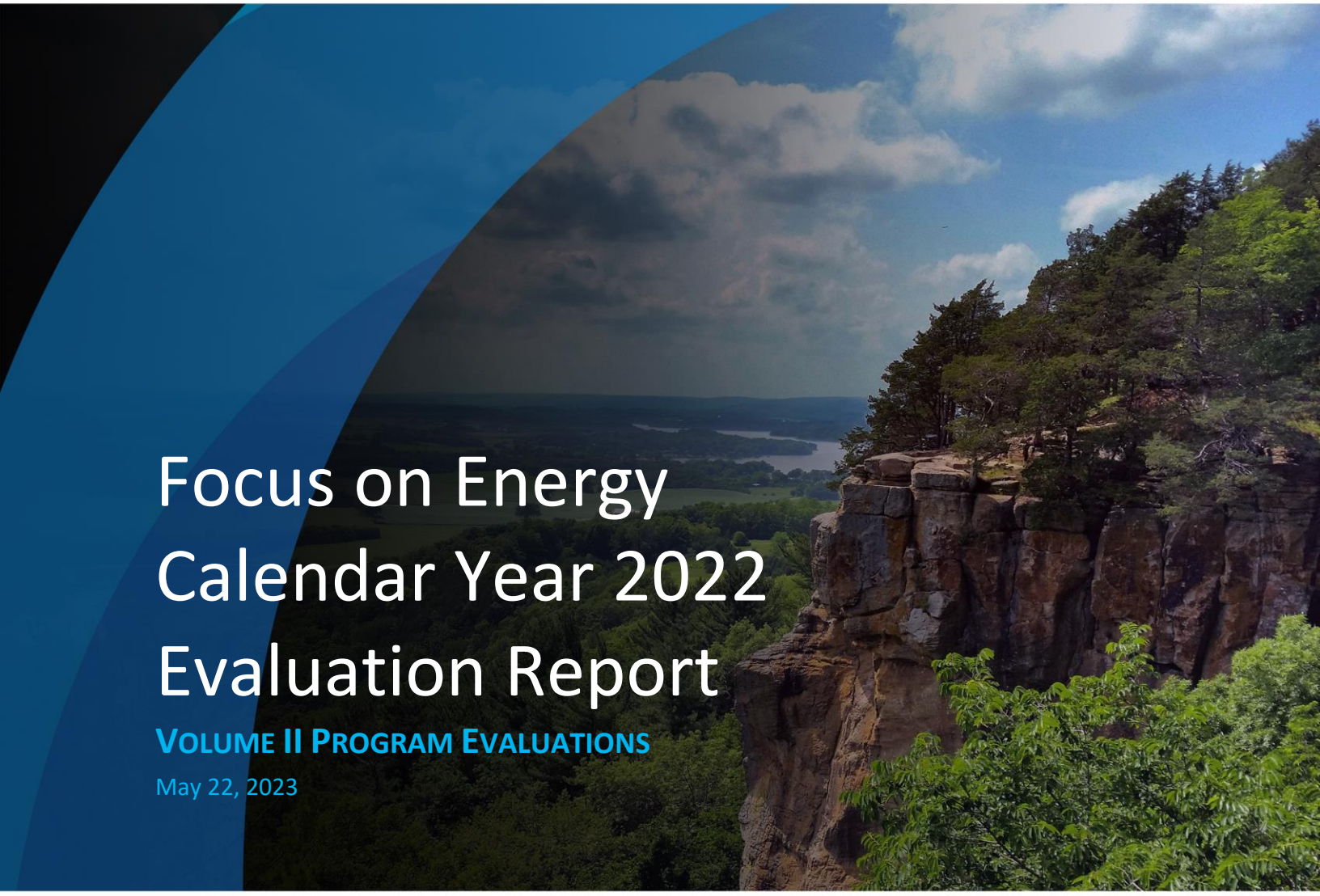

Focus on Energy Calendar Year 2022 Evaluation Report

VOLUME II PROGRAM EVALUATIONS

May 22, 2023

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Table of Contents

Tables

Figures

Acronyms

Acronym	Term
ACS	American Community Survey
AFUE	Annual fuel utilization efficiency
AHRI	Air-Conditioning, Heating, & Refrigeration Institute
AIA	American Institute of Architects
BOD	Biological oxygen demand
BPC	Building performance consultant
Btu	British thermal unit
Btu/h	British thermal unit per hour
C&I	Commercial and Industrial
CARES Act	Coronavirus Aid, Relief, and Economic Security Act
CDD	Cooling degree day
CEE	Center for Energy and Environment
CMAR	Compliance Annual Maintenance Report
CY	Calendar year
DHW	Domestic hot water
DIY	Do-it-yourself
DNR	Department of Natural Resources
DOE	Department of Energy
DSM	Demand-side management
ECM	Electronically commutated motor
EISA	Energy Independence and Security Act
EUL	Expected useful life
GSL	General service lamps
HBA	Home builder association
HDD	Heating degree day
H-PEM	Healthcare Practical Energy Management
ISR	In-service rate
kW	Kilowatt
kWh	Kilowatt hour
LED	Light-emitting diode
Mbtu	Thousand British thermal units
Mbtu/h	Thousand British thermal units per hour
MF	Multifamily
MGD	Million gallons per day

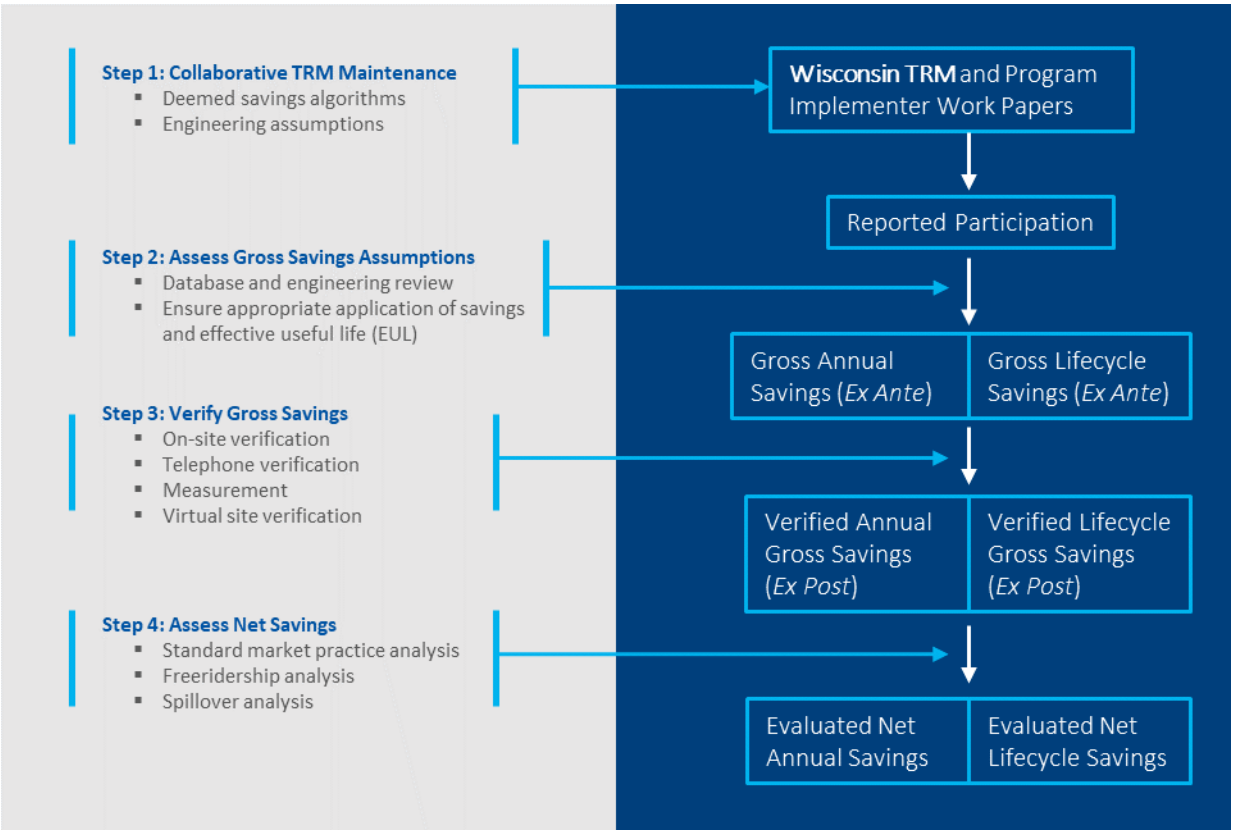
Acronym	Term
MMBtu	Million British thermal units
MMBtu/h	Million British thermal units per hour
MMID	Master measure identifier
MW	Megawatt
MWh	Megawatts per hour
NG	Non-gas
NPS	Net promoter score
NTG	Net-to-gross
OLM	Online Marketplace
PEM	Practical Energy Management
POS	Point of sale
PSC	Public Service Commission of Wisconsin
PV	Photovoltaic
RECIP	Renewable Energy Competitive Incentive Program
RISE	Rural Industrial Striving for Efficiency
ROI	Return on investment
SCADA	Supervisory control and data acquisition
SEER	Seasonal energy efficiency rating
SEM	Strategic Energy Management
SMP	Standard market practice
SPECTRUM	Statewide Program for Energy Customer Tracking, Resource Utilization, and Data Management
T&D	Transmission and distribution
TAS	Technical analysis summary
TRC	Total resource cost test
TRM	Technical reference manual
UMP	Uniform Methods Project
VEIC	Vermont Energy Investment Corporation
VFD	Variable frequency drive
VSD	Variable speed drive
WRWA	Wisconsin Rural Water Association
WWTP	Wastewater treatment plant
WUDC	Wisconsin Uniform Dwelling Code

Introduction

Volume II of the Focus on Energy calendar year (CY) 2022 evaluation report presents offering-specific evaluation findings and details about the evaluation approaches and results for the residential, midstream, and nonresidential offerings. This introduction presents additional information on the overall roles and responsibilities of the evaluation team as well as descriptions of standard evaluation practices and approaches the team used across multiple offering evaluations.[1]

The diagram presented here as Figure 1 in Volume II, and as Figure 2 in Volume I, is a useful summary of the steps involved in the calculation of net savings from the gross savings recorded in the offering tracking databases. In addition to these steps, there are many planning and coordination activities that are a part of the evaluation process. Following this introduction, Volume II presents offering-specific evaluation findings and greater details about evaluation approaches and results.

Figure 1. Evaluation Steps to Determine CY 2022 Net Savings



To accomplish evaluation steps 1 through 3, the evaluation team coordinates with staff from the Public Service Commission of Wisconsin (PSC), the program administrator, and program implementers to assess the measures expected to be installed across offerings in future years. To determine priorities for additional research, the evaluation team also reviews the deemed savings or algorithms contained in the

[1] The evaluation team comprises Cadmus, Apex Analytics, and Resource Innovations.

technical reference manual (TRM) and entered into Statewide Program for Energy Customer Tracking, Resource Utilization, and Data Management (SPECTRUM), the offering tracking database.

The evaluation team prioritizes measures for evaluation, measurement, and verification that demonstrate the highest priority by meeting one or more of the following criteria:

- New to the offerings
- Expected to contribute an increasing share of savings
- Experienced technical or other market changes (such as increased energy codes or standards)
- Have significant uncertainty around the savings calculation (independent measurement of key assumptions are dated)

The team then applies the findings from these activities to the savings calculations summarized in the evaluation report, which ultimately end up in the TRM.

Wisconsin Focus on Energy Technical Reference Manual

The Wisconsin Focus on Energy TRM is a document managed collaboratively by the program administrator, program implementers, evaluation team, and PSC staff. The information contained in the TRM presents the consensus calculations of the electric and gas energy savings and the electric demand reductions achieved from installing the energy efficiency and renewable energy technologies supported by Focus on Energy offerings. The TRM is publicly available on the Focus on Energy website.[2]

The values presented in the TRM fall into one of two categories:

- **Deemed savings.** Specific per-unit savings (or demand reduction) the program administrator, program implementers, evaluation team, and the PSC have accepted as reliable because the measures, and the uses for these measures, are consistent and because sound research supports the savings achieved.
- **Savings algorithms.** The equations used for calculating savings (or demand reductions) based upon project- and measure-specific details. The TRM also makes these calculations transparent by identifying and justifying all relevant formulas, variables, and assumptions.

The TRM is also a reference guide for how offering stakeholders classify measures in SPECTRUM, the offerings' tracking database. The evaluation team revises the document annually to account for any changes to the offerings and technologies.

Work Papers

Instead of a deemed savings report, the implementers prepare work papers to present the savings assumptions for new measures or, when appropriate, revisions to the savings calculations for existing measures. They submit these work papers to the administrator, who forwards them to the evaluation

[2] Public Service Commission of Wisconsin. February 2022. Wisconsin *Focus on Energy 20221 Technical Reference Manual.* Prepared by Cadmus. https://assets.focusonenergy.com/production/inline-files/Focus_on_Energy_2022_TRM.pdf

team and the PSC for review, comment, and approval. Once a work paper receives final approval from the PSC, the evaluation team incorporates the work paper into the next iteration of the TRM.

Standard Evaluation Methods

The evaluation team uses several standard methods across evaluation cycles to assess the impact of Focus on Energy offerings: tracking database review, project audits, and on-site inspections. This introduction details each of these methods. The individual offering chapters that follow specify when the evaluation team applied these (or other methods) during the current or previous evaluation cycles.

Tracking Database Review

For each offering, the evaluation team reviews the tracking database, SPECTRUM, for completeness and quality of data. The review includes the following activities:

- Download and review data for projects completed during the offering year (January 1 to December 31 for each calendar year, based on the "payment approved date" in SPECTRUM)
- Check offering totals against offering status reports generated by SPECTRUM
- Verify the presence and completeness of key data fields (savings, incentives, quantities, etc.)
- Check for duplicate entries
- Reassign adjustment measures to original application IDs (where possible) using supplemental tracking databases from the program administrator

Project Audits (Engineering Desk Review)

The evaluation team reviews SPECTRUM for complete and accurate key project documentation, including the following information:

- Project applications
- Savings workbooks
- Savings calculations performed by participants or third-party contractors (if applicable)
- Energy audits or feasibility studies
- Customer metered data
- Customer billing data (monthly utility bills)
- Invoices for equipment or contracting services
- Other documentation submitted to Focus on Energy

Site Visit Inspections

For nonresidential projects selected for evaluation, the evaluation team conducts virtual or on-site inspections to verify the presence of equipment at a project site. For virtual site visits, inspectors conduct video calls with participant facility staff during which inspectors receive a virtual tour of the project, along with video or photographic information to verify nameplate data and any necessary operating parameters. The inspectors may supplement these video conversations with additional options, such as allowing the customer to upload photographs and videos. The inspectors also work

closely with the customer to ensure the process is streamlined and conducted efficiently to minimize the burden on the customer.

For on-site inspections, evaluation team inspectors verify the presence of equipment at a project site and collect data through a variety of methods, such as installing data loggers or taking spot measurements of power usage. Inspectors may also gather data by reviewing daily operations and maintenance logs, gathering operations data from central energy management systems, and reviewing historical trend data. Inspectors may also ask customers to initiate trends during a site visit to collect real-time energy consumption data and then follow up with the customer several weeks later to obtain the results.

RESIDENTIAL SOLUTIONS

This section presents the evaluation results for CY 2022 for these residential solutions and their offerings.

Direct to Customer Solution

- Online Marketplace
- Packs
- Retail
- Rural Retail

Trade Ally Solutions

- Insulation and Air Sealing
- Heating and Cooling
- Renewable Energy

New Construction Solution

- Residential New Construction

Direct to Customer Solution

Focus on Energy offers the Direct to Customer Solution, a variety of energy-saving opportunities targeted to residential and rural utility customers. The solution provides customers with free energy-efficient products and services as well as incentives for purchasing efficient products through these three statewide offerings and one rural offering:

- **Online Marketplace** offers discounted efficient products through an online store.
- **Packs** provides free packs of efficient products to residential customers. In CY 2022, the offering added a limited-time pack for businesses.
- **Retail** provides discounts and rebates to customers who purchase efficient products through designated retailers or through special events coordinated by Focus on Energy. Retailers and special events comprised Retail Lighting (upstream lighting), Retail Products (non-lighting measures), Pop-up Retail (in-person and virtual pop-up sales), and Income Qualified (free and discounted products distributed to limited-income customers).
- **Rural Retail** provides free packs of efficient products to income-qualified customers through food banks and offers discounted packs of efficient products to participating business employees or through community events in designated rural zip codes.

In CY 2022, Focus on Energy transitioned Farmhouse Kits from the Direct to Customer Solution to the Business and Industry Solution, under the Agribusiness Offering, as a way to increase kit uptake. Farmhouse Kits offer free packs of efficient products and insulation measures to customers in designated rural zip codes.

APTIM administers the Direct to Customer Solution. ICF, the implementer, conducts the day-to-day operations with the assistance of subcontractors TechniArt and Crossmark. Additional details about each offering under the Direct to Customer Solution are provided in the *Process Evaluation* section of this chapter.

Table 1 summarizes the impacts for CY 2022 for statewide and rural offerings as well as total impacts for the Direct to Customer Solution.

Table 1. CY 2022 Direct to Customer Solution Summary

Item	Units	CY 2022			Quad (CY 2019-CY 2022) Total Direct to Customer Solution[a]
		Statewide Offerings	Rural Offerings	Total Solution	
Incentive Spending	$	$12,497,463	$231,239	$12,728,702	$47,579,626
Participation	Number of Participants	913,352	14,680	928,032	4,040,892
Verified Gross Lifecycle Savings	kWh	1,592,824,357	15,326,163	1,608,150,520	10,753,636,516
	kW	20,349	142	20,491	95,253
	therms	28,396,356	1,861,066	30,257,422	68,890,786
Verified Gross Lifecycle Realization Rate	% (MMBtu)	101%	93%	101%	99%
Annual Net-to-Gross (NTG) Ratio	% (MMBtu)	65%[b]	97%[b]	65%[b]	67%[c]
Net Annual Savings	kWh/year	115,966,972	1,794,254	117,761,227	562,239,205[c]
	kW	9,404	125	9,529	55,873[c]
	therms/year	2,523,245	182,668	2,705,913	5,727,588[c]
Net Lifecycle Savings	MMBtu	6,256,857	232,349	6,489,207	29,199,468[c]
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio with Transmission and Distribution (T&D) Benefits	3.32	8.59	3.32	4.17

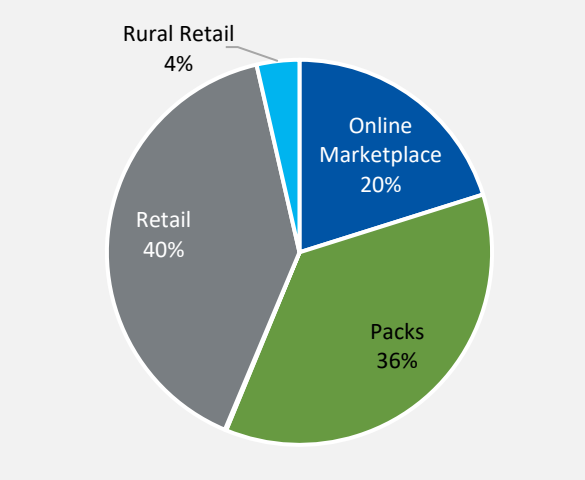
[a] In CY 2020, Focus on Energy combined multiple programs under the Direct to Customer Solution. The quadrennium total includes the individual CY 2019 programs that were rolled into the Direct to Customer Solution and the CY 2020-CY 2022 Direct to Customer Solution.

[b] Does not include market effects.

[c] The quadrennial net savings and annual NTG ratio include LED market effects savings, which are not reported in the yearly values. These additional savings account for the offering's historical, long-term impact on the Wisconsin residential lighting market. See the *Quadrennial Upstream Lighting Market Effects* section for additional details.

Figure 2 shows the proportion of savings by offering. In CY 2022, the Retail Offering accounted for the largest share of net lifecycle MMBtu savings (40%) in the Direct to Customer Solution, followed closely by the Packs Offering (36%). By comparison, in CY 2021, the Retail Offering accounted for 58% and the Packs Offering accounted for 23% of the savings.

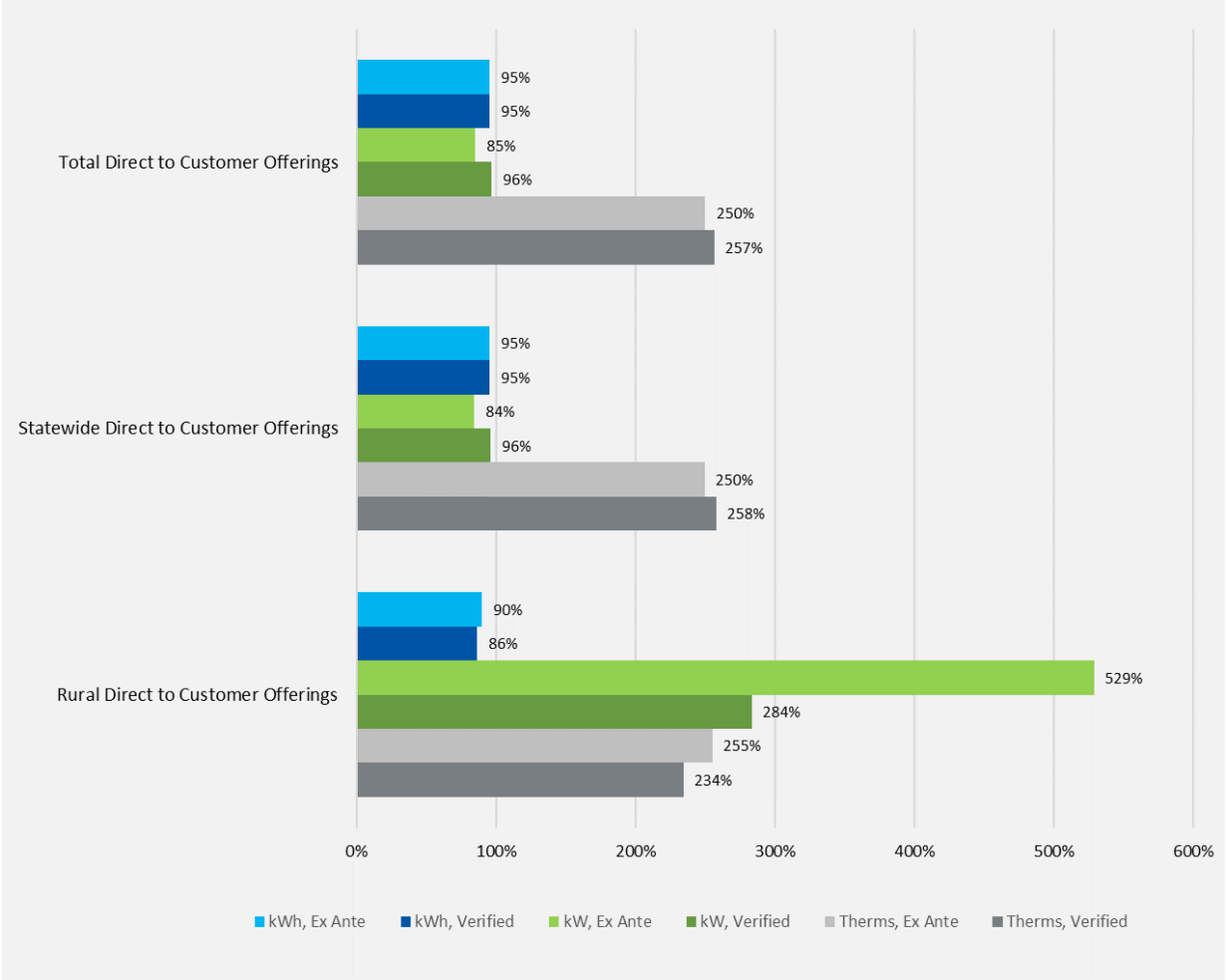
Figure 2. CY 2022 Direct to Customer Solution Net Lifecycle Savings by Offering



Achievement Against Goals

Figure 3 shows the percentage of gross lifecycle savings goals achieved by the Direct to Customer Solution, by total, statewide, and rural offerings, in CY 2022. The total solution did not achieve its kWh or kW goals but exceeded its therms goals. Smart thermostats that were processed in early CY 2022 from a late CY 2021 promotion helped boost therms savings above goals, while newly added packs distributed through food banks in CY 2022 boosted the rural savings above goals.

Figure 3. Direct to Customer Solution Achievement of CY 2022 Gross Lifecycle Savings Goals



The 100% *ex ante* gross lifecycle savings reflects the implementer's contract goals for CY 2022. Verified gross lifecycle savings contribute to the administrator's portfolio-level goals.

Impact Evaluation

This section contains the findings for the CY 2022 impact evaluation at the solution level, followed by a discussion of each offering.

Impact Evaluation Methodology

The CY 2022 impact evaluation activities are shown in Table 2. Additional details about these activities and the associated findings can be found in the offering-specific discussions below and in *Appendix G. Net Savings Analysis* in Volume III. To calculate gross verified savings, the evaluation team relied on the 2022 TRM and previous evaluation results.

Table 2. CY 2022 Evaluation Activities and Sample Sizes – Impact Evaluation

Activity	Online Marketplace	Packs	Retail	Rural Retail
Tracking Database Review	Census	Census	Census	Census
Delta Watts Analysis	N/A	N/A	Census	Census
Upstream Lighting Market Effects Calculation	N/A	N/A	Census	N/A

Verified Gross Savings Results for Direct to Customer Solution

Table 3 lists the first-year and lifecycle realization rates for CY 2022, and Table 4 lists verified first-year and lifecycle savings by offering. Overall, the solution achieved a first-year evaluated realization rate of 100%, weighted by total (MMBtu) energy savings. Detailed findings for each offering, including factors affecting the realization rates, are discussed in the next section.

Table 3. CY 2022 Direct to Customer First-Year and Lifecycle Realization Rates

Offering	First-Year Realization Rate				Lifecycle Realization Rate		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
Online Marketplace	107%	117%	111%	109%	106%	111%	109%
Packs	100%	100%	92%	95%	100%	100%	100%
Packs, Business	95%	93%	-	95%	97%	-	97%
Retail	100%	117%	100%	100%	99%	100%	99%
Rural Retail	97%	54%	92%	93%	96%	92%	93%
Total	**101%**	**113%**	**98%**	**100%**	**100%**	**103%**	**101%**

Table 4. CY 2022 Direct to Customer First-Year and Lifecycle Verified Gross Energy Savings Summary

Offering	Verified First-Year Savings				Verified Lifecycle Savings		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
Online Marketplace	17,873,874	232	1,107,894	171,775	152,870,093	10,022,524	1,523,845
Packs	29,906,693	2,968	1,556,721	257,714	219,768,111	17,428,061	2,492,655
Packs, Business	352,660	62	0	1,203	2,871,424	0	9,797
Retail	164,912,251	17,086	86,913	571,372	1,217,314,729	945,772	4,248,055
Rural Retail	1,988,329	142	184,705	25,255	15,326,163	1,861,066	238,399
Overall Energy Savings	**215,033,806**	**20,491**	**2,936,232**	**1,027,319**	**1,608,150,520**	**30,257,422**	**8,512,752**

Online Marketplace: Verified Gross Savings Results

The evaluation team relied on the 2022 TRM, recently approved workpapers, and results of the CY 2021 Online Marketplace participant survey to assess savings from measures sold through the Online Marketplace in CY 2022. Using actual CY 2022 participation data, the team developed weighted average unit savings that reflect the distribution of single-family and multifamily participation. For lighting measures, the team updated the delta watt assumptions in the 2022 TRM by looking up model numbers and matching lumens, the same process described in the *Tracking Database Review* section under *Retail and Rural Retail: Verified Gross Savings Results.*

Table 5 shows the *ex ante* and *ex post* verified savings for the offering. The offering achieved a lifecycle MMBtu realization rate of 109%.

Table 5. CY 2022 Online Marketplace *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First-Year Gross Savings	16,740,428	199	999,616	17,873,874	232	1,107,894
Lifecycle Gross Savings	144,190,068	199	9,050,992	152,870,093	232	10,022,524

Tracking Database Review

The evaluation team reviewed the tracking database of all measures sold through the Online Marketplace, and data were generally clean and in good order. The team offers these findings:

- In CY 2022, Focus on Energy added two new measures to the Online Marketplace: room air cleaners and connected LEDs. To assess both measures, the evaluation team followed guidance in workpapers that were approved in CY 2022.
- For the *ex ante* lifecycle savings for connected LEDs, the implementer applied an effective useful life (EUL) of five years, but for verified savings, the evaluation team applied an EUL of three years from the approved workpaper. This difference resulted in a lifecycle savings realization rate below 100% for this measure.
- For *ex ante* demand savings for the thermostatic shut-off valve, the implementer applied 0.006 kW per unit, instead of 0.0006 kW from the 2022 TRM. This difference resulted in a low demand realization rate for the measure.

In-Service Rates

To account for measures installed and in use by participants, the evaluation team applied in-service rates (ISRs) to gross savings. Except for measures new in CY 2022, the team applied ISRs from the CY 2021 survey because they were more recent than the ISRs used in the 2022 TRM. For new measures, the team applied ISRs from the approved workpapers.

In CY 2022, as in previous years, the team did not apply an ISR to smart thermostats because its savings are based on a billing analysis and these savings include an ISR adjustment.

Table 6 shows the *ex ante* and verified lifetime ISRs used in the CY 2022 impact evaluation, along with sources for the verified ISRs.

Table 6. ISRs for Online Marketplace Measures

Measure Name	*Ex Ante* Lifetime ISR	Verified Lifetime ISR	Verified ISR Source
Advanced Power Strip, Tier 1	93%	88%	2021 Participant Survey
Advanced Power Strip, Tier 2	70%	88%	2021 Participant Survey
Showerhead	85%	77%	2021 Participant Survey
ShowerStart Thermostatic Shut-Off Valve	85%	78%	2021 Participant Survey
Faucet Aerator	82%	82%	2021 Participant Survey
LED, Connected	84%	84%	2022 Workpaper
LED, Omnidirectional, Single-Family	84%	86%	2021 Participant Survey
LED, Omnidirectional, Multifamily	84%	84%	2021 Participant Survey
LED, Reflector, Single-Family	89%	86%	2021 Participant Survey
LED, Reflector, Multifamily	89%	80%	2021 Participant Survey
LED, Globe, Single-Family	84%	85%	2021 Participant Survey
LED, Globe, Multifamily	84%	88%	2021 Participant Survey
LED, Decorative, Single-Family	84%	87%	2021 Participant Survey
LED, Decorative, Multifamily	84%	84%	2021 Participant Survey
LED, 3-way, Single-Family	84%	87%	2021 Participant Survey
LED, 3-way, Multifamily	84%	84%	2021 Participant Survey
Room Air Cleaner	100%	100%	2022 Workpaper

Smart Thermostats

In CY 2022, the evaluation team conducted two billing analyses (electric and gas) to update gross savings for smart thermostats installed across all Focus on Energy offerings. The team used regression models to evaluate the pre- and post-installation energy consumption, accounting for weather, to measure the impact of smart thermostats on participant consumption. The analysis included customers who received a Focus on Energy smart thermostat rebate or discount between January 1, 2020, and September 31, 2021.

Table 7 shows final results of the billing analysis alongside the *ex ante* savings for smart thermostat measures in the Online Marketplace Offering. Additional details of the analysis can be found in *Verified Gross Savings Results for Direct to Customer Solution* and in the *Verified Gross Savings Results for Trade Ally Solutions*, and full details are available in *Appendix F. Measure Analysis* in Volume III.

Table 7. CY 2022 Smart Thermostat *Ex Ante* and Verified Savings

HVAC System	*Ex Ante* kWh	Verified kWh Cooling	Verified kWh Heating	Total Verified kWh	*Ex Ante* Therms	Verified Therms
Smart Thermostat, Existing Natural Gas Furnace	SF: 439 MF: 254	260	207	467	SF: 30 MF: 16	32
Smart Thermostat, Existing Natural Gas Furnace, Retail Purchase	SF: 457 MF: 265	260	207	467	SF: 28 MF: 15	32
Smart Thermostat, Existing Natural Gas Boiler	SF: 325 MF: 172	196	0	196	SF: 53 MF: 28	43
Smart Thermostat, Existing Natural Gas Boiler, Retail Purchase	SF: 86 MF: 45	196	0	196	SF: 53 MF: 28	43
Smart Thermostat, Existing Air Source Heat Pump	SF: 440 MF: 233	264	509	773	SF: 0 MF: 0	0
Smart Thermostat, Existing Air-Source Heat Pump, Retail Purchase	SF: 909 MF: 481	264	509	773	SF: 10 MF: 5.3	0

Packs: Verified Gross Savings Results

The evaluation team applied deemed savings from the 2022 TRM to measures rebated through the Packs Offering. As Table 8 shows, the Packs realization rate decreased from 101% in CY 2021 to 95% in CY 2022. Business Packs, a limited-time offering in CY 2022, achieved a realization rate of 94%. The drivers of these realization rates are described below.

Table 8. First-Year Realization Rates by Packs Offering (MMBtu)

Offering	First-Year Realization Rates		
	CY 2022	CY 2021	CY 2020
Packs	95%	101%	102%
Business Packs	95%	N/A	N/A

Table 9 lists the CY 2021 *ex ante* and verified gross first-year and lifecycle savings for the Packs Offering. Savings by measure can be found in *Appendix E. Detailed Findings* in Volume III.

Table 9. CY 2021 Packs *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
Statewide Packs Offering						
First-Year Gross Savings	30,012,488	2,981	1,695,540	29,906,693	2,968	1,556,721
Lifecycle Gross Savings	220,334,635	2,981	17,471,828	219,768,111	2,968	17,428,061
Business Packs Offering						
First-Year Gross Savings	372,998	66	-	352,660	62	-
Lifecycle Gross Savings	2,962,530	66	-	2,871,424	62	-
Total Packs and Business Packs						
First-Year Gross Savings	30,385,486	3,047	1,695,540	30,259,352	3,030	1,556,721
Lifecycle Gross Savings	223,297,165	3,047	17,471,828	222,639,535	3,030	17,428,061

Tracking Database Review

The evaluation team conducted a database review of all measures distributed through the Packs Offering in CY 2022, and data were generally in good order. The team offers the following findings for Packs and Business Packs.

Packs

For bathroom aerators, the implementer applied the kitchen aerator therms savings from the 2022 TRM. Because kitchen aerator therms savings are much higher than bathroom aerator savings, this error led to a first-year therms realization rate of 30%. The *ex ante* lifecycle therms savings for bathroom aerators also used a three-year EUL, instead of the 10-year EUL in the 2022 TRM. This error offset the mistaken *ex ante* per-unit savings, leading to a lifecycle realization rate of 100% for this measure.

The offering added several new master measure identifiers (MMIDs) in CY 2022. Though most new measures had similar counterparts in the 2022 TRM, savings for some were based on a workpaper approved in CY 2022. Sources of verified savings for new measures in the Packs Offering are listed in Table 10.

Table 10. New Measure Verified Savings Sources – Packs Offering

New MMID	Measure Name	Verified Savings Source
5411	LED, Pack-Based, 9 Watt	Existing MMID 4277
5412	Connected Lighting Pack, Non-Hub, Omnidirectional A-19, Pack-Based	CY 2022 Workpaper
5413	LED, Pack-Based, 9 Watt	Existing MMID 4277
5414	Showerhead, Handheld, 1.5 GPM, Pack-based	Existing MMID 4274
5415	Faucet Aerator, Kitchen, 1.5 GPM, Pack-based	Existing MMID 5312
5416	Faucet Aerator, Bathroom, 1.0 GPM, Pack-based	Existing MMID 3863
5417	Insulation, DHW Pipe, Pack-based	Existing MMID 4272
5418	DHW Temperature Turn Down, Pack-based	Existing MMID 4271
5419	Weather Stripping, Door Sweep, Pack-based	CY 2022 Workpaper
5420	Weather Stripping, Door, Pack-based	CY 2022 Workpaper
5421	Weather Stripping, Window, Pack-based	CY 2022 Workpaper

Business Packs

Business Packs included four measures that have not previously been evaluated through the Direct to Customer Solution. To calculate verified savings for these measures, the team relied on the 2022 TRM, 2021 TRM, and a workpaper approved in CY 2022. Table 11 lists the measures and sources for verified savings.

Table 11. New Measure Verified Savings Sources – Business Packs

MMID	Measure Name	Verified Savings Source
4684	7 Outlet Advanced Power Strip, Business, Pack-Based	2022 TRM
4686	LED Lamp, ENERGY STAR, Replacing Omnidirectional and Decorative Incandescent or CFL, 800 Lumens, Pack-Based	2021 TRM
4687	LED, Exit Sign, Retrofit, Pack-Based	2022 TRM
5422	LED Downlights, Interior, Pack-based	CY 2022 Workpaper

Realization rates were 100% for three of these measures, but *ex ante* savings for the LED lamp (MMID 4686) did not include an ISR adjustment, which led to a realization rate of 84% and drove down the overall Business Packs' realization rate.

In-Service Rates

To calculate CY 2022 verified savings for the Packs Offering, the evaluation team applied measure-level ISRs derived in CY 2020 from the Packs participant survey results. As in past years, the team weighted ISRs based on the number of measures distributed through various packs in CY 2022 and number of packs distributed to single-family or multifamily households. The resulting verified, weighted ISRs match ISRs in the 2022 TRM.

As survey data were not available for the new measures, ISRs were applied from the verified savings sources noted in Table 10 and Table 11.

Retail and Rural Retail: Verified Gross Savings Results

The evaluation team assessed savings from all measures sold through the Retail and Rural Retail offerings in CY 2022. Where possible, the team calculated verified savings following algorithms and inputs in the 2022 TRM. For measures that were not in the 2022 TRM, the team relied on inputs and algorithms used for the same measures in similar programs and on CY 2020 participant survey results.

Table 12 lists new income-qualified measures in the CY 2022 Rural Retail offering tracking data. The table notes the reference measures the team used to calculate savings for measures not in the 2022 TRM as well as adjustments made to the reference measure assumptions.

Table 12. New Rural Retail Measure Savings Algorithm Sources

MMID	Measure	Verified Savings Source
5408	Showerhead, Handheld, 1.5 GPM, Income Qualified	Existing MMID 5314, Pop-Up Retail equivalent
5409	Faucet Aerator, Bathroom, 1.0 GPM, Income Qualified	Existing MMID 5313, Pop-Up Retail equivalent
5410	Faucet Aerator, Kitchen, 1.5 GPM, Income Qualified	Existing MMID 5311, Pop-Up Retail equivalent

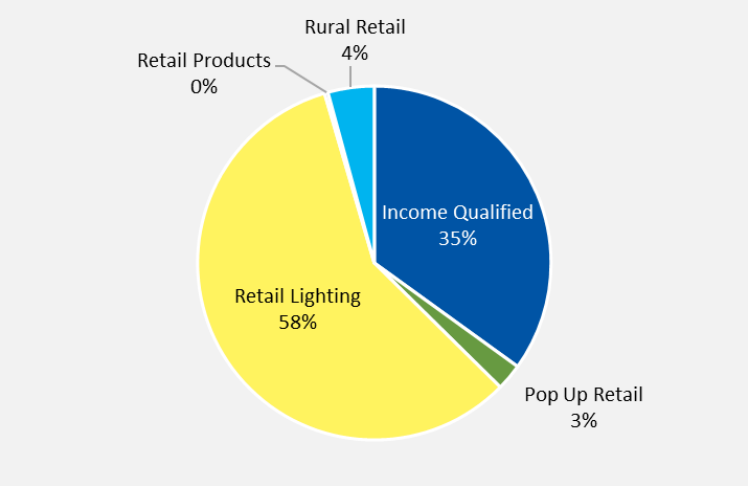
Table 13 lists the CY 2022 *ex ante* and verified gross first-year and lifecycle savings for the Retail and Rural Retail offerings. Savings by measure can be found in *Appendix E. Detailed Findings* in Volume III.

Table 13. CY 2022 Retail Offerings *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
Retail Offerings						
First-Year Gross Savings	164,534,387	14,594	86,913	164,912,251	17,086	86,913
Lifecycle Gross Savings	1,225,994,502	14,594	945,822	1,217,314,729	17,086	945,772
Rural Retail Offerings						
First-Year Gross Savings	2,050,687	265	201,192	1,988,329	142	184,705
Lifecycle Gross Savings	15,917,735	265	2,025,858	15,326,163	142	1,861,066
Total Retail and Rural Retail Offerings						
First-Year Gross Savings	166,585,073	14,859	288,104	166,900,579	17,228	271,617
Lifecycle Gross Savings	1,241,912,237	14,859	2,971,680	1,232,640,892	17,228	2,806,837

Figure 4 shows the breakdown of total first-year verified gross energy savings by Retail offering. Most savings are from lighting and income-qualified lighting. Realization rates are over 98% for all offerings.

Figure 4. Verified Gross First-Year MMBtu Savings by Retail Offering



Tracking Database Review

The evaluation team conducted a tracking database review of all measures distributed through the Retail and Rural Retail offerings, and the data were generally clean and in good order. The team offers these findings:

- *Ex ante* demand savings for faucet aerators delivered through the Pop-Up Retail Offering mistakenly applied 0.009 kW per unit, instead of 0.0009 kW per unit as deemed in the 2022 TRM. This difference led to a 10% realization rate for this measure.
- Thermostatic shut-off valves distributed through the Pop-Up Retail Offering mistakenly applied 0.005 kW per units, instead of 0.0005 kW from the 2022 TRM. This measure had a 10% realization rate.

Delta Watts Analysis for Retail Lighting

The evaluation team employed the lumen equivalence methodology to determine the baseline wattage for each bulb distributed through the Retail offerings. The difference between the baseline and efficient wattages provided the delta watts input.

Using model numbers and unique ENERGY STAR® ID numbers, the team matched individual bulbs from the implementer's tracking database to its corresponding listing in the ENERGY STAR-qualified product database. The ENERGY STAR database provided other product details for each bulb, including lumen output, rated wattage, type, and ENERGY STAR certification status. If these data were not available, the team used the values for lumens, efficient wattage, or both from the implementer's database or searched the internet based on product make and model numbers.

To determine the corresponding MMID, the evaluation team then categorized each bulb into specific bins based on the bulb lumen output and type. Each bin had an assumed baseline wattage for use in the delta watts calculation. The Uniform Methods Project (UMP) provides lumen bins for standard, decorative, globe, and Energy Independence and Security Act (EISA)-exempt lamps.[3] For example, the bins and associated baseline halogen watts for standard bulbs are shown in Table 14.

Table 14. EISA (Phase 1) Lumen Bins and Baseline Watts for Standard Bulbs

Lumen Bin	CY 2020 EISA Baseline	EISA
0–309	25	Not impacted by EISA
310–449	25	Impacted by EISA
450–799	29	
800–1,099	43	
1,100–1,599	53	
1,600–1,999	72	
2,000–2,600	72	
2,601–3,300	150	Not impacted by EISA
3,301–4,815	200	

Source: December 19, 2007. *Energy Independence and Security Act of 2007*. Public Law 110-140-. 121 Stat. 1492. https://www.gpo.gov/fdsys/pkg/PLAW-110publ140/pdf/PLAW-110publ140.pdf

Note that the Department of Energy's Office of Energy Efficiency and Renewable Energy has codified a 45-lumen per-watt standard applicable to all general service lamps. The rule will take effect in June 2023.

EISA affects bulbs only in the 310 to 2,600 lumen output range. The evaluation team applied a similar methodology to categorize specialty bulbs, reflectors, and EISA-exempt bulbs into their respective bins with different lumen ranges and different baselines.

[3] National Renewable Energy Laboratory. February 2015. *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures.* "Chapter 21: Residential Lighting Evaluation Protocol." Prepared by Apex Analytics, LLC. http://energy.gov/sites/prod/files/2015/02/f19/UMPChapter21-residential-lighting-evaluation-protocol.pdf

To determine the lumen bins for reflectors, the evaluation team used the Mid-Atlantic TRM, which defines lumen bins for six categories of reflector types and diameters based on federal requirements.[4]

The average delta watts for each category compared to the *ex ante* delta watts are shown in Table 15. The evaluation team based *ex ante* delta watts on values deemed in the 2022 TRM and not directly on the sales data, which can vary within each measure category. The team calculated the average verified gross delta watts by subtracting the wattage of the efficient bulb from the baseline wattage as determined from its lumen bin; this caused the variation shown between the *ex ante* delta watts and the evaluated delta watts. Similar to CY 2021, the comparison shows strong agreement between the verified and *ex ante* delta watts for most categories.

For CY 2022, reflectors, globes, candelabras, and three-way bulbs are all separate categories. The EISA-exempt thee-way and high wattage omnidirectional bulbs have substantial deviation in delta watts, which resulted in higher than expected savings and realization rates.

Table 15. CY 2022 Retail Offering *Ex Ante* and Verified Gross Delta Watts

Measure	*Ex Ante* Delta Watts	Average Verified Gross Delta Watts – Retail Offering	Average Verified Gross Delta Watts – Rural Retail Offering
LED, Reflector	52	53	51
LED, Globe	35	37	38
LED, Decorative	41	38	36
LED, 3-Way	46	82	84
LED, Omnidirectional, 310–749 Lumens	23	23	22
LED, Omnidirectional, 750–1,049 Lumens	34	34	34
LED, Omnidirectional, 1,050–1,489 Lumens	42	43	42
LED, Omnidirectional, 1,490–2,600 Lumens	56	57	58
LED, Omnidirectional, 2,601–5,000 Lumens	97	137	148

In-Service Rates

The evaluation team applied ISRs from the 2022 TRM, with the exception of showerheads and bathroom and kitchen aerators distributed to food bank customers through the Rural Retail offering. For these three measures, the team assumed that ISRs are 10% lower than ISRs for equivalent measures distributed through the Pop-Up Retail Offering. The team based this reduction on the same assumption in the TRM for Income Qualified Offering LEDs and previous Cadmus research that found LEDs distributed through food banks have a 10% lower ISR than LEDs distributed through the upstream channel. Table 16 lists the measure-specific ISRs that the team applied for Income Qualified Offering faucets and aerators.

[4] Northeast Energy Efficiency Partnership. October 2020. *Mid-Atlantic Technical Reference Manual*. Version 10.0. Mid-Atlantic Technical Reference Manual (TRM) V10 | Northeast Energy Efficiency Partnerships (neep.org)

Table 16. New Measure In-Service Rates – Income Qualified Offering

Offering	Measure	*Ex Ante* Lifetime ISR	Verified Lifetime ISR
Income Qualified	Showerheads	55%	50%
	Faucet Aerator: Bathroom	40%	36%
	Faucet Aerator: Kitchen	42%	38%

Verified Net Savings Results for Direct to Customer Solution

The evaluation team relied on a variety of historical evaluation results to calculate measure-level NTG ratios for offerings in the Direct to Customer Solution. The team selected a source based on the measure type and the level of project data available for the delivery channel. Table 17 summarizes NTG sources by offering.

Table 17. CY 2022 Direct to Customer Solution NTG Sources

Offering	Measure	NTG Source
Online Marketplace	All measures	Self-report from CY 2021 participant survey
Packs/Business Packs	All measures	Self-report from CY 2020 Packs participant survey
Retail Lighting	All measures	National lighting sales model, 2021 analysis
Income Qualified (Statewide and Rural)	All measures	Assumed 100% NTG
Pop-Up Retail (Statewide and Rural)	All measures	Self-report from CY 2020 participant survey
Retail Products	Water heaters	Self-report from CY 2015 participant survey

The evaluation team calculated an overall NTG estimate of 65% for the solution in CY 2022. This reflects an increase from CY 2021, when the overall NTG was 51%. The change is largely due to the solution shifting away from upstream LEDs, which have a low NTG ratio. Table 18 shows the weighted average NTG ratio by offering as well as the total first-year gross and net savings.

Table 18. CY 2022 Direct to Customer Solution First-Year Net Savings and NTG

Offering	First-Year Gross Verified Savings (MMBtu)	First-Year Net Savings (MMBtu)	NTG Ratio
Online Marketplace	171,775	147,262	86%
Packs	257,714	237,961	92%
Packs, Business	1,203	970	81%
Retail	571,372	261,811	46%
Rural Retail	25,255	24,389	97%
Total	**1,027,319**	**672,393**	**65%**

Table 19 lists measure-level NTG ratios and sources for all measures in the Direct to Customer Solution. The evaluation team did not research new measures introduced in CY 2022 because of their limited participation and impact on the Direct to Customer Solution. Instead, the team applied verified NTG ratios for similar measures or historical research for similar measures.

Table 19. Measure-Level NTG Ratios by Offering

Measure	NTG	NTG Source
Online Marketplace		
Advanced Power Strips	86%	CY 2021 participant survey
Faucet Aerators	84%	CY 2021 participant survey
LEDs, Omnidirectional	80%	CY 2021 participant survey
LEDs, Reflectors	85%	CY 2021 participant survey
LEDs, 3-way	79%	CY 2021 participant survey
LEDs, Decorative	89%	CY 2021 participant survey
LEDs, Globe	82%	CY 2021 participant survey
Room Air Cleaners	86%	Thermostat NTG, CY 2021 Online Marketplace participant survey
Showerheads	82%	CY 2021 participant survey
Smart Thermostats	86%	CY 2021 participant survey
Packs		
Advanced Power Strips	90%	CY 2020 participant survey
Faucet Aerators	98%	CY 2020 participant survey
Water Heater Temperature Turndown	100%	Assume 100%
Pipe Insulation	94%	CY 2020 participant survey
Showerhead, Upgraded	97%	CY 2020 participant survey
Showerhead, Handheld	95%	CY 2020 participant survey
LED, 5W, G25	94%	CY 2020 participant survey
LED, 5W, B11	95%	CY 2020 participant survey
LED, 8W, BR30	93%	CY 2020 participant survey
LED, 9W	74%	CY 2020 participant survey
LED, 11W	74%	CY 2020 participant survey
Connected LED	80%	Average NTG of all other LEDs distributed through Packs
Weather Stripping, Door Sweep, Pack-Based	94%	Pipe insulation NTG, CY 2020 Packs participant survey
Weather Stripping, Door, Pack-Based		
Weather Stripping, Window, Pack-Based		
Business Packs		
7 Outlet Advanced Power Strip, Business, Pack-Based	90%	Advanced power strip NTG from Packs
LED Lamp, ENERGY STAR, Replacing Omnidirectional and Decorative Incandescent or CFL, 800 Lumens, Pack-Based	80%	Average NTG of LEDs distributed through Packs
LED, Exit Sign, Retrofit, Pack-Based		
LED Downlights, Interior, Pack-Based		
Retail		
Gas Water Heaters	29%	2015 Focus on Energy water heater NTG
Upstream LEDs	12%	CY 2021 National Sales Data Model
Faucet Aerators, Pop-Up	103%	CY 2020 participant survey
LEDs, Omnidirectional, Pop-Up	76%	CY 2020 participant survey
LEDs, Reflector, Pop-Up	91%	CY 2020 participant survey
LEDs, 3-way, Pop-Up	91%	CY 2020 participant survey
LEDs, Candelabras, Pop-Up	94%	CY 2020 participant survey

Measure	NTG	NTG Source
LEDs, Globes, Pop-Up	94%	CY 2020 participant survey
LEDs, Desk Lamps, Pop-Up	103%	CY 2020 participant survey
Water Heater Temperature Turndown, Pop-Up	100%	Assume 100%
Pipe Insulation, Pop-Up	84%	CY 2020 participant survey
Showerheads, Pop-Up	94%	CY 2020 participant survey
Income Qualified, All Measures	100%	Assume 100%

Quadrennial Upstream Lighting Market Effects

The evaluation team calculated longer-term market effects for upstream lighting in CY 2019, CY 2020, and CY 2021 using the same national sales data model used to calculate first-year NTG. By adjusting program age in the NTG model, the team was able to calculate the upstream lighting offering's impact on the market over the years.

Focus on Energy uses incentives and marketing to raise customer awareness and demand for energy-efficient lighting as well as to encourage retailers to stock and promote efficient lighting. Program age can be a proxy to measure long-term effects of these efforts. Focus on Energy's efforts should reflect positively, rather than negatively, in the NTG ratios.

Table 20 shows the most recent NTG results from CY 2021, using 2021 spending on upstream lighting and setting the program age counterfactual to zero.

Table 20. CY 2021 LED Net-to-Gross Calculations with Past Influence

Calculation Term	Current and Past Influence	Current Offering Spending and Age Influence
Total (All technologies) Wisconsin Bulbs 2021 (A)	23,876,096	23,876,096
Offering $ per Household Actual (B)	$2.65	$2.65
Offering $ per Household Counterfactual (C)	$0.00	$0.00
Offering Age Actual (D)	19	19
Offering Age Counterfactual (E)	0	18
LED Market Share Counterfactual (F)	70.3%	75.6%
LED Market Share Modeled (G)	77.8%	77.8%
LED Market Share Actual (H)	87.0%	87.0%
Ratio Actual: Modeled (I = H/G)	1.119	1.119
Adjusted LED Market Share Counterfactual (J)	78.6%	84.6%
LED Qty Counterfactual (K = A*J)	18,772,525	20,195,584
LED Qty Actual (L)	20,769,836	20,769,836
Net LEDs Modeled (M = L-K)	1,997,311	574,252
Claimed Bulbs 2021 (N)	4,975,935	4,975,935
NTG Modeled (O = M/N)	**40.1%**	**11.5%**
Market Effects (P = Difference of NTG of columns)	**28.6%**	**N/A**
Market Effects Lamps (Q = N*P)	**1,423,060**	**N/A**

CY 2021 market effects is the difference between NTG with past program influence (40.1%) and NTG with current program influence (11.5%), or 28.6%. These savings should be considered new, realized in CY 2021, the year of the sales data analyzed in the sales model. The change in market share due to prior Direct to Customer Solution activities was realized in CY 2021 (as prior activities increased the current market share). This represents greater sales of LEDs in CY 2021 that were not counted in prior years and, if not claimed in the current year, sales induced by the Direct to Customer Solution that were never credited at any time to its past or current spending.

The Evaluation Working Group agreed that market effects should not be reported annually throughout the quadrennium but should be applied cumulatively to quadrennial results. To calculate market effects, the evaluation team first determined the number of lamps sold each year in the marketplace as a result of the upstream lighting offering (i.e., market effects lamps). Table 21 shows market effects lamps for the CY 2019-CY 2022 quadrennium. The team did not calculate CY 2022 market effects for this report. Instead, the team estimated CY 2022 market effects using the CY 2021 market effects findings.

Table 21. Lighting Market Effects by Year

Calendar Year	Total Program LEDs	Market Effects[a]	Market Effects LEDs[b]
CY 2019	5,621,136	40.0%	2,248,454
CY 2020	5,387,507	19.4%	1,045,176
CY 2021	4,975,935	28.6%	1,423,117
CY 2022	2,947,848	28.6%	843,085
Quadrennium	**18,932,426**	**29.4%**	**5,559,833**

[a] Market effects represents the difference of first-year NTG and NTG that includes past participation.
[b] Market effects LEDs are calculated by multiplying total solution LEDs by the market effects percentage.

Next, the evaluation team applied average first-year and lifecycle savings per lamp to each market effects LED. Table 22 shows market effects savings for LEDs for the CY 2019-CY 2022 quadrennium.

Table 22. First-Year and Lifecycle Market Effects Savings for LEDs

Calendar Year	First-Year Market Effects				Lifecycle Market Effects			
	kWh	kW	Therms	MMBtu	kWh	kW	Therms	MMBtu
CY 2019	76,095,726	8,873	-	259,639	1,218,617,456	8,873	-	4,157,923
CY 2020	37,441,632	4,340	-	127,751	596,729,357	4,340	-	2,036,041
CY 2021	40,360,880	4,625	-	137,711	305,948,385	4,625	-	1,043,896
CY 2022	29,046,285	3,381	-	99,106	153,342,375	3,381	-	523,204
Quadrennium	**182,944,524**	**21,219**	**-**	**624,207**	**2,274,637,574**	**21,219**	**-**	**7,761,063**

Finally, the team added market effects savings to first-year verified net savings that have been reported for the Direct to Customer Solution throughout the quadrennium and calculated a final NTG ratio that accounts for all net savings reported throughout the quadrennium and market effects.

Table 23 shows verified gross savings, verified net and market effects savings, and final NTG ratios for the total Direct to Customer Solution, including *all* measures offered.

Table 23. Verified Gross Savings, Net First-Year Savings and Market Effects, and Net-to-Gross Ratios for Direct to Customer Solution

Calendar Year	Verified Gross Savings (First-Year MMBtu)	Total Verified Net Savings and Market Effects (First-Year MMBtu)	NTG Ratio
CY 2019[a]	816,856	584,112	72%
CY 2020	944,555	509,550	54%
CY 2021	952,173	626,001	66%
CY 2022	1,027,314	771,494	75%
Quadrennium	**3,740,897**	**2,491,158**	**67%**

[a] The Direct to Customer Solution launched in CY 2020, combining stand-alone programs previously offered through the residential sector. For CY 2019 market effects savings, the evaluation team included savings for the programs that were later merged under the Direct to Customer Solution.

Process Evaluation

Few changes were made in the Direct to Customer Solution in CY 2022, the final year of the quadrennium, so the evaluation team conducted only stakeholder interviews and a customer satisfaction survey.

Process Evaluation Methodology

Table 24 lists the data collection activities and sample sizes for completed stakeholder interviews and customer satisfaction surveys included in the evaluation team's participant satisfaction analysis. Process activities and findings are described further below.

Table 24. CY 2022 Data Collection Activities and Sample Sizes – Process Evaluation

Activity	Online Marketplace	Packs	Retail	Rural Retail	Total
Stakeholder Interviews	2 across all offerings				**2**
Customer Satisfaction Survey	2,184	1,246	138	Combined with Retail	**3,568**

Administrator and Implementer Interviews

In September 2022, the evaluation team interviewed the administrator and the implementer about how the Direct to Customer Solution was working and to assess its objectives, performance, and implementation challenges and resolutions. The team also asked about marketing, engagement with customers, and lingering impacts from the COVID-19 pandemic.

Ongoing Participant Satisfaction Surveys

Throughout CY 2022, the administrator emailed participants in the Direct to Customer Solution a link to the web-based satisfaction survey. The survey covered the same topics for all offerings and included questions about overall satisfaction, satisfaction with solution staff and trade allies, likelihood of recommending Focus on Energy, and other feedback.

The survey had two objectives:

- Understand customer satisfaction on an ongoing basis and respond to any changes in satisfaction before the end of the annual reporting schedule
- Help facilitate timely follow-up with customers to clarify and address service concerns

The number of completed surveys reported by offering are shown above in Table 24. The team randomly selected a subset of 1,246 completed surveys for Packs Offering for evaluation reporting.[5]

Design and Delivery

This section describes the design and delivery of the Online Marketplace, Packs, Farmhouse Kits, and Retail offerings in CY 2022.

Online Marketplace

The Online Marketplace Offering used an online shopping platform through which residential customers could purchase efficient products. The Online Marketplace targeted customers who prefer to shop online or who have limited access to Focus on Energy discounts offered at physical retail locations. There were no major changes to the design in CY 2022 from previous years. The implementer's subcontractor, TechniArt, fulfilled Online Marketplace orders and maintained the Online Marketplace platform. In CY 2022, the same measures were offered as in CY 2021, with the additions of new connected LEDs and air purifiers.

Table 25 shows the energy efficiency products and discounts that were available through the Online Marketplace during CY 2022.

Table 25. CY 2022 Online Marketplace Products and Discounts

Measure	Discount
Smart Thermostats	$50
Advanced Power Strips	Tier 1: $18 Tier 2: $50
LEDs, Connected, Omnidirectional, Specialty, and Reflector Models	$1.75-$3.20, varies by model
Low-Flow Showerheads	$2.00-$17, varies by model
Faucet Aerators	$0.25-$1, varies by model
Air Purifier	$30, $40, and $50 during Labor Day season

[5] A total of 10,656 customers completed a Packs Offering survey. The evaluation team reported ratings only to the first decimal place; therefore, a survey with a very large number of responses (well over 2,000) was randomly sampled so the precision for statistical significance tests would not be narrower than 0.1 rating points, the minimum size of a reported change in ratings. Otherwise, significance tests could indicate that two numbers reported as the same to the first decimal place differed significantly. The random sampling used a Monte Carlo technique so reported ratings for the random sample and ratings for the larger population were identical to the first decimal place.

In CY 2022, the Online Marketplace changed from offering limited-time product bundles, as in CY 2021, to short, limited-time bonuses in addition to existing air purifier and smart thermostat discounts (Table 26).

Table 26. CY 2022 Online Marketplace Limited-Time Discounts

Product Discounts	Month of Offering
Air Purifier	Labor Day season, October with reduced discounts
Smart Thermostats	Q1 and November

In CY 2022, the offering sold roughly two-thirds fewer measures than it sold in CY 2021. Notably, customers purchased fewer LEDs, aerators, and showerheads—measures for which customers tend to purchase multiple quantities. However, the offering processed more smart thermostats in CY 2022 than in CY 2021. Smart thermostat participants included customers who purchased measures during a CY 2022 limited time offer or during a CY 2021 bonus promotion. The larger savings for these smart thermostats boosted total Online Marketplace MMBtu savings for CY 2022 above CY 2021 savings, despite fewer total measures sold through the offering in CY 2022.

Packs and Business Packs

The Packs Offering gave single-family and multifamily customers the option to order one of six free energy-saving packs, each of which contained an assortment of energy-efficient items. Customers could request a pack through Focus on Energy's online web portal or call center. TechniArt processed, shipped, and delivered pack orders within four weeks of receipt of the request. The main design change in CY 2022 was that customers were eligible to receive a pack once every 12 months rather than once every calendar year. Solution staff noted a sizeable increase in participation after making this change.

Standard packs contained general service and specialty LEDs; water-saving faucet aerators and low-flow showerheads; and pipe wrap insulation. In CY 2022, Focus on Energy also added a new pack with an advanced power strip.

In CY 2022, Focus on Energy introduced Business Packs, which contained an advanced power strip, LED downlights, LED lamps, and an LED exit sign retrofit kit. Focus on Energy ran the Business Packs promotion after several utility partners encountered limited participation and expressed interest in developing new ways to engage their business customers with Focus on Energy. The administrator and implementer reported that coordinating with utilities to identify and collect contact information from potential business participants was challenging and that uptake by contacted business customers was lower than expected. Focus on Energy will reassess the design of this promotion for CY 2023.

Some customers eligible to receive the standard packs were also eligible for farmhouse kits, which contained weatherization measures such as weatherstripping, switch outlet covers, and gasket outlet covers. Due to low participation in previous years, in CY 2022 Focus on Energy moved the Farmhouse Kits Offering to the Business and Industry Solution, under the Agribusiness Offering to better connect outreach staff with this target audience and increase uptake.

Table 27 shows the quantity of measures in the standard Packs (statewide) and Farmhouse Kits (rural zip codes). [6]

Table 27. Packs Offering Contents by Pack Type

Measure	Standard Kits						Business Packs
	Lightbulb	Focused on Shower	Focused on Bath	Flood	Decorative	Advanced Power Strip	
LED A19 (800 lumens)	4	2			2		
LED A19 (1,100 lumens)	2						
LED BR30 Reflector				6			
LED G25 Globe		3	3				
LED B11 Candelabra					6		
Pipe Wrap (15 ft. roll)	1	1	1				
Fixed Showerhead		1					
Hand-Wand Showerhead			1				
Faucet Aerator	1	3	3	1	1	1	
DHW Temperature Card	1	1	1	1	1		
Advanced Power Strip						1	1
LED Downlights (Interior)							6
LED Lamp (800 lumens)							4
LED Exit Sign							2

Retail

The Retail Offering provided point-of-sale discounts, downstream rebates, and free products through Retail Lighting, Retail Products (i.e., non-lighting measures), Pop-up Retail, and Income Qualified offerings. In CY 2022, these offerings were delivered through various channels, including brick-and-mortar retail stores, discounts through participating manufacturer websites, pop-up retail events for targeted customer groups (e.g., community groups or companies), and organizations that target limited-income customers such as food banks.

As part of the PSC's initiative to enhance Focus on Energy services to rural customers, the administrator assigned a separate budget to cover Rural Retail offerings and tracked the results against a separate savings target. In CY 2021, Rural Retail continued to offer rural pop-up retail events that were managed the same way as standard pop-up retail events. In an effort to boost Rural Retail savings, Focus on Energy also added packs of efficient measures distributed through rural food banks in CY 2022. These packs included a handheld showerhead, bathroom faucet aerator, and kitchen faucet aerator.

[6] Following the transition from in-person to online delivery of Farmhouse Kits, the implementer allowed customers who did not live in designated rural zip codes to participate after verifying that the customers were agricultural.

In CY 2021, the implementer held virtual pop-up events for the entire year and resumed in-person pop-up events at the beginning of CY 2022. However, due to extremely low sales (about 10% of expected sales), the implementer returned to the virtual format in summer.

In CY 2022, Focus on Energy added new retail products that were popular in other marketplaces and utility programs. The new measures were distributed through the following channels:

- Connected bulbs were offered through the Pop-Up Shop and Focus Online Marketplace
- Natural gas storage water heater added to Lowe's and The Home Depot

Table 28 lists measures, incentive types, and delivery channels available through the CY 2022 Retail Offering channel.

Table 28. Retail Offering Eligible Products by Incentive Type and Delivery Channel

Product	Incentive Type/Retail Channel					
	POS Discount Brick-and-Mortar Stores	POS Discount Pop-Up Events	POS Discount Virtual Pop-Up Events	POS Instant Discount Manufacturer Websites	Downstream Rebate Any Retail Location	Free Distribution
LEDs	✓	✓	✓	✓		✓
Smart Thermostats				✓	✓	
Faucet Aerators			✓			✓[a]
Showerheads			✓			✓[a]
Pipe Insulation			✓			
Natural Gas Storage Water Heater	✓[b]					
Water Heater Temperature Turndown			✓			

[a] Offered only through Rural Retail.
[b] Offered only at Lowe's and The Home Depot.
POS = point-of-sale

Marketing and Outreach

In CY 2022, the implementer focused marketing engagement efforts on retaining existing customers and encouraging continued participation in Direct to Customer Solution offerings. Overall, most marketing strategies were continued from CY 2021 with the exception of the purchased advertisement, which did not perform as expected.

The marketing goal for the Online Marketplace was to spread awareness through new products and e-commerce promotional tactics. The implementer continued to use digital marketing strategies, such as targeted emails, and in CY 2022 developed a targeted email campaign for a loyalty group, that is, people who had previously purchased from the Online Marketplace.

In CY 2022, Focus on Energy encouraged utilities to develop an outreach package for the Packs Offering. The implementer reported that this effort was successful. In addition, the Packs Offering collaborated with the Schools and Government Offering to promote packs through the Renew Our Schools energy

challenge campaigns. Schools could earn points for the challenge when students ordered free packs using a promo code specific to their school.

A goal for the Retail Offering was to increase marketing efforts among new audiences to gain customers through Pop-Up Retail offerings and target income-eligible populations. Ongoing marketing strategies, such as point-of-sale materials and social media advertising, remained successful, and the implementer added new materials for the new measures in the offering.

Customer Satisfaction Results for the Direct to Customer Solution

Throughout CY 2022, the administrator invited Direct to Customer Solution participants in the Packs, Online Marketplace, and Retail Pop-Up Events offerings to take a web-based satisfaction survey. Respondents answered questions related to satisfaction and the likelihood to recommend Focus on Energy on a scale of 0 to 10, where 10 indicated the highest degree of satisfaction or likelihood to recommend and 0 the lowest.[7]

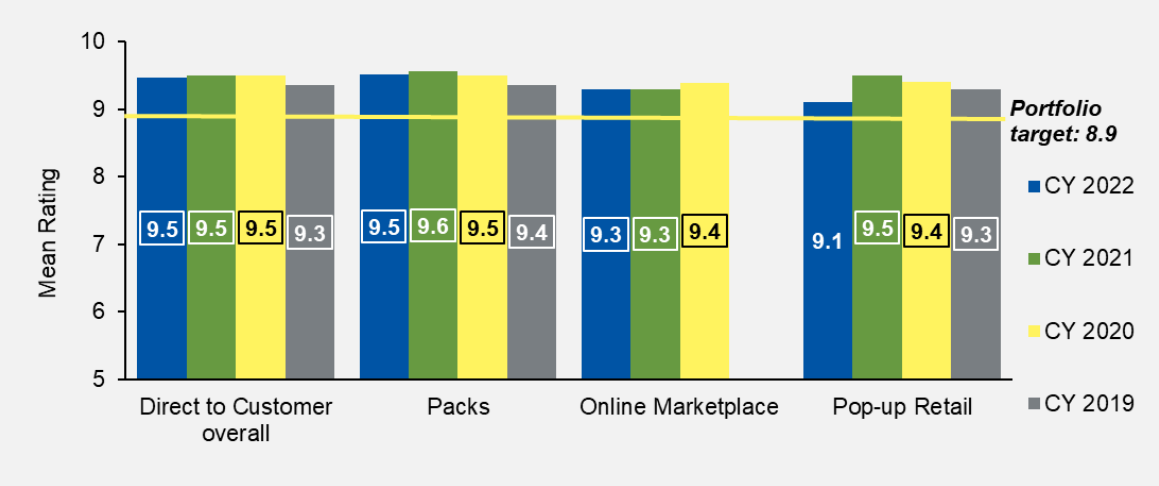
Figure 5 shows that Direct to Customer Solution participants gave overall satisfaction ratings of 9.1 or higher in CY 2022 for the offerings they participated in. All ratings except for Pop-Up Retail were statistically higher than the CY 2022 portfolio target of 8.9.[8] Satisfaction ratings for Pop-Up Retail were significantly lower in CY 2022 than in CY 2021; ratings for all the other offerings in CY 2022 were statistically equivalent to CY 2021 ratings and consistent across the entire CY 2019-CY 2022 quadrennium. The participation-weighted average satisfaction rating was 9.5 for all Direct to Customer Solution offerings for CY 2022.

Direct to Customer overall ratings for CY 2021 and CY 2020 included Retail Thermostats and Appliance Recycling, which were no longer offered through the solution in CY 2022. The Direct to Customer overall rating for CY 2019 was not previously reported and is the participation-weighted average of the precursor Packs and Pop-Up Retail offerings.

[7] The number of participants who completed a survey does not always match the number of responses for each question, as some participants skipped or did not know answers to questions.

[8] The administrator's contract established a portfolio target of 8.9 to maintain or increase customer satisfaction.

Figure 5. Overall Satisfaction with Direct to Customer Solution Offerings

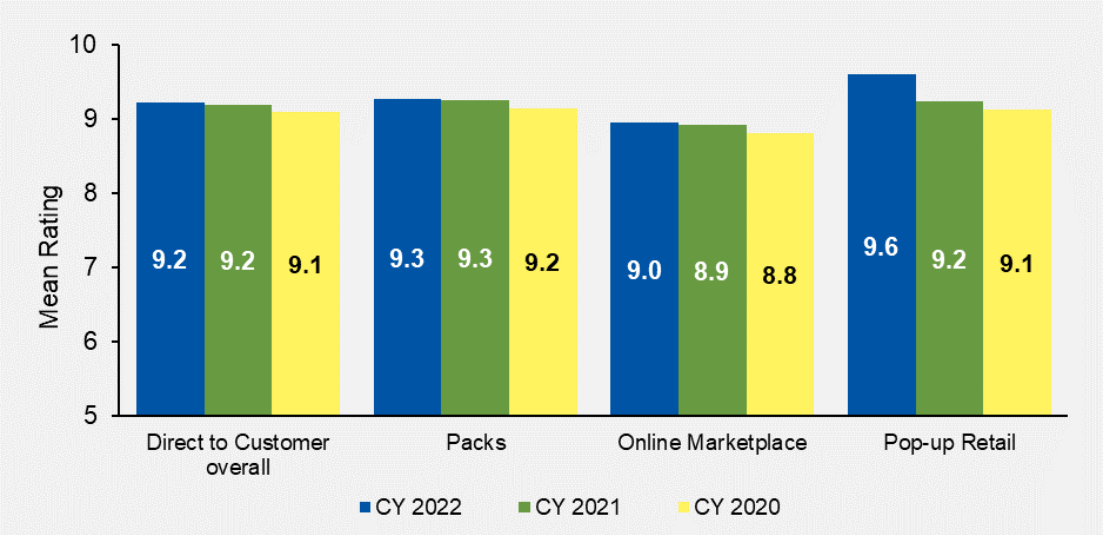


Source: Packs, Online Marketplace, Retail Smart Thermostats, and Pop-Up Retail Participant Satisfaction Survey Question. "Overall, how satisfied are you with your most recent experience with Focus on Energy?" (CY 2022 Packs n=1,239, Online Marketplace n=2,176, Pop-Up Retail n=127; CY 2021 Packs n=1,377, Online Marketplace n=1,720, Pop-Up Retail n=398; CY 2020 Packs n=1,199, Online Marketplace n=1,069, Pop-Up Retail n=801; CY 2019 Packs n=1,336, Pop-Up Retail n=801, Online Marketplace was not surveyed in CY 2019).
"Direct to Customer overall" is the participation-weighted average of all surveyed Direct to Customer offerings.
Boxes around ratings indicate a statistically significantly difference from the portfolio target ($p<0.05$ using t-tests).

Figure 6 shows that satisfaction with Focus on Energy staff was high across all offerings in CY 2022, averaging 9.2 overall and ranging from 9.0 to 9.6 by offering among respondents who had such contact.[9] CY 2022 ratings were statistically equivalent to CY 2021 ratings for all offerings.

[9] All surveys gave respondents the opportunity to rate staff, though they were not required to give a rating since their participation in an offering may not have involved any contact with staff.

Figure 6. Satisfaction with Focus on Energy Staff for Direct to Customer Solution Offerings

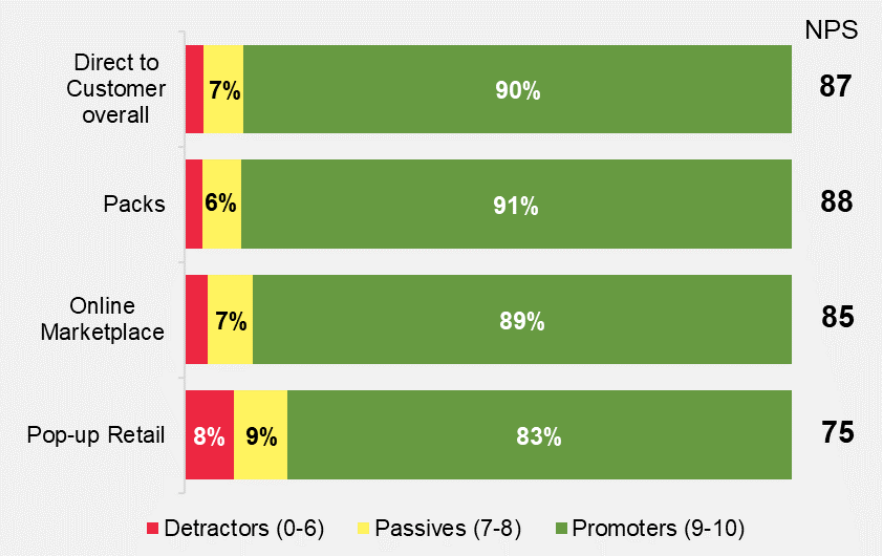


Source: Packs, Online Marketplace, Retail Smart Thermostats, and Pop-Up Retail Offering Participant Satisfaction Survey Questions. "How satisfied are you with the Energy Advisor or Focus on Energy staff member who assisted you with your project (or order)?" (CY 2022 Packs n=130, Online Marketplace n=311, Pop-Up Retail n=43; CY 2021 Packs n=164, Online Marketplace n=305, Pop-Up Retail n=69; CY 2020 Packs n=113, Online Marketplace n=102, Pop-Up Retail n=137).
"Direct to Customer overall" is the participation-weighted average of all surveyed Direct to Customer offerings.
This rating question was not included in surveys prior to CY 2020.

CY 2022 participants gave high ratings for their likelihood to recommend Focus on Energy, averaging 9.6 across all Direct to Customer Solution offerings. Using these survey data, the evaluation team calculated a net promoter score (NPS) based on customers' likelihood to recommend Focus on Energy. The NPS is expressed as an absolute number between -100 and +100 that represents the difference between the percentage of promoters (respondents giving a rating of 9 or 10) and detractors (respondents giving a rating of 0 to 6).

Direct to Customer Solution offerings consistently received a high NPS between +75 and +88 in CY 2022. Ratings for Packs and the Online Marketplace were in the same range of NPS for these offerings in CY 2020 and CY 2021; however, for Pop-Up Retail the NPS dropped from +87 in CY 2021 to +75 in CY 2022. The weighted average NPS for the Direct to Customer Solution was +87 overall, identical to the weighted average NPS in CY 2021. Net promoter scores and the distribution of promoters and detractors are shown in Figure 7.

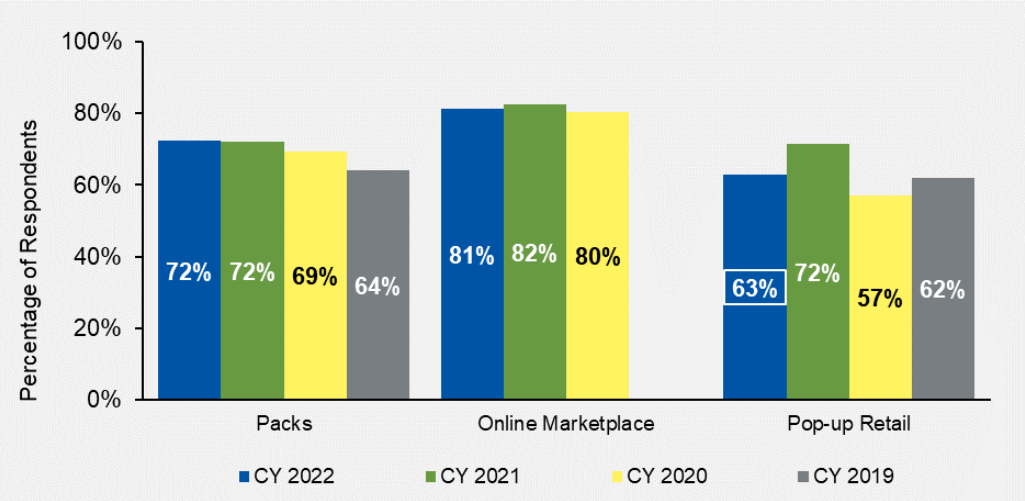
Figure 7. Net Promoter Scores for Direct to Customer Solution Offerings



Source: Packs, Online Marketplace, Retail Smart Thermostats, and Pop-Up Retail Offering Participant Satisfaction Survey Question. "How likely are you to recommend Focus on Energy to others?" (Packs n=1,238, Online Marketplace n=2,174, Pop-Up Retail n=137). "Direct to Customer overall" is the participation-weighted average of all surveyed Direct to Customer offerings. Note: Unlabeled segments represent 4% or less of respondents.

CY 2022 respondents were asked if they were aware, before receiving the satisfaction survey, that the offering they participated in was delivered in partnership with their local utility (Figure 8). Most were aware of their utility's partnership with Focus on Energy, ranging from 63% for Pop-Up Retail to 81% for Online Marketplace respondents. The percentage of Pop-Up Retail respondents who were aware in CY 2022 (63%) decreased significantly from CY 2021 (72%) and was statistically equivalent to the percentage who were aware in CY 2020 (57%) and CY 2019 (62%). Packs respondents were significantly more likely to be aware of their utility's partnership with Focus on Energy in CY 2022 and CY 2021 (both 72%) than they were in CY 2019 (64%). Awareness among Online Marketplace respondents has remained consistent since the survey was begun in CY 2020 (ranging from 80% to 82%).

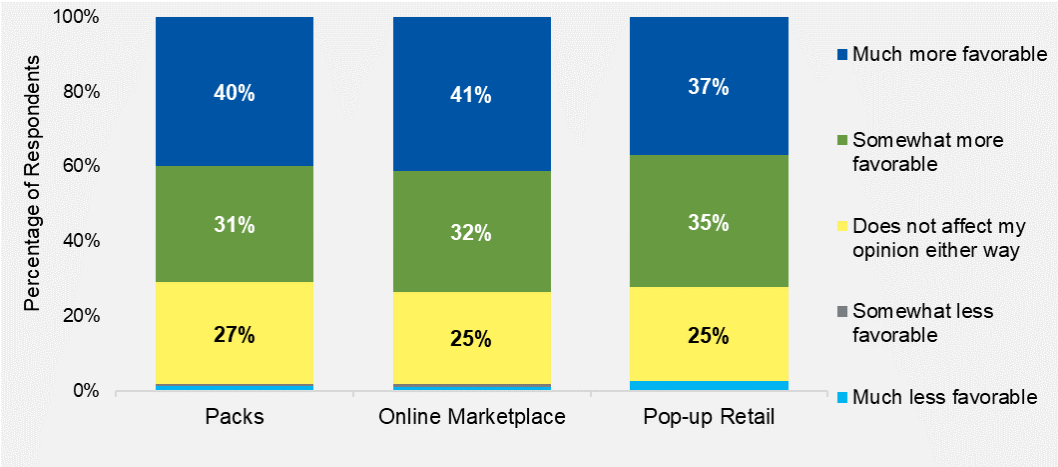
Figure 8. Awareness of Utility Partnership for Direct to Customer Solution Offerings



Source: Packs, Online Marketplace, Retail Smart Thermostats, and Pop-Up Retail Offering Participant Satisfaction Survey Question. "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?" (CY 2022 Packs n=1,229, Online Marketplace n=2,162, Pop-Up Retail n=135; CY 2021 Packs n=1,363, Online Marketplace n=1,704, Pop-Up Retail n=395; CY 2020 Packs n=1,197, Online Marketplace n=1,065, Pop-Up Retail n=797; CY 2019 Packs n=1,320, Pop-Up Retail n=172, Online Marketplace was not surveyed in CY 2019).. Boxes around ratings indicate a statistically significantly difference between CY 2022 and 2021 ($p<0.25$ using t-tests)

CY 2022 participants were asked if the Direct to Customer offerings affected their opinion of their utilities (Figure 9), and 71% to 73% (by offering) said their opinion had become *much more favorable* or *somewhat more favorable*. Very few respondents said their opinion of their utility became less favorable; only 2% or 3% (by offering) of responses were *much less favorable* or *somewhat less*.

Figure 9. Effect of Direct to Customer Solution Offerings on Participants' Opinion of Utilities



Source: Packs, Online Marketplace, Retail Smart Thermostats, and Pop-Up Retail Offering Participant Satisfaction Survey Question. "How have these offerings affected your opinion of your energy utility, if at all?"
(Packs n=1,158, Online Marketplace n=2,107, Pop-Up Retail n=119).
Note: Unlabeled segments represent 3% or less of respondents.

Participant Feedback and Suggestions for Improvement

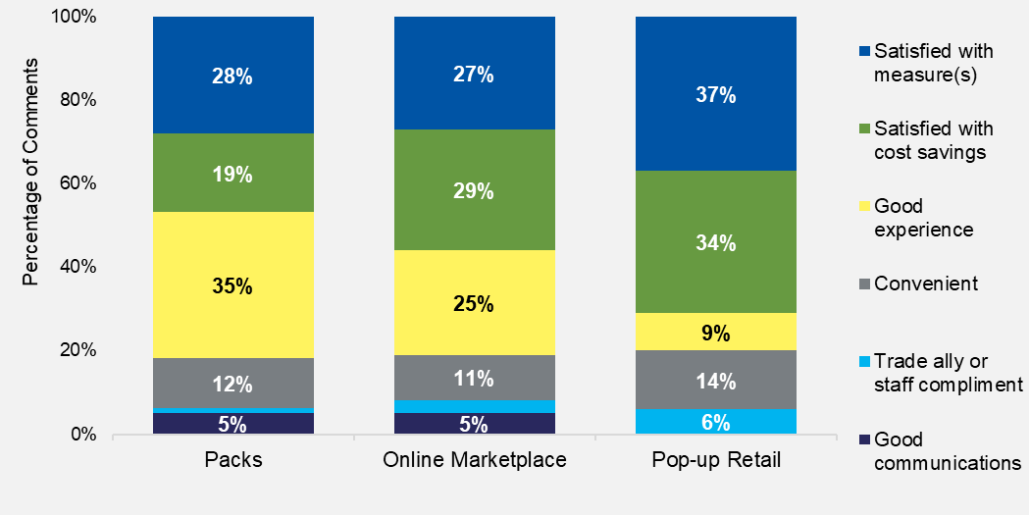
The evaluation team asked participants for comments and suggestions to improve the offerings, which the team then coded into mentions. Table 29 summarizes the number and types of comments and suggestions by offering. Most respondents did not offer any comments or suggestions; the most likely to do so were Pop-Up Retail participants (29%). Most comments were positive (58% to 64%, by offering).

Table 29. Customer Comments and Suggestions for Direct to Customer Solution by Offering

Offering	Total Completed Survey	Gave Comments	Gave Comments (%)	Total Mentions	Positive Comments (%)	Suggestions for Improvement (%)
Packs	1,246	273	22%	320	64%	36%
Online Marketplace	2,184	445	20%	623	59%	41%
Pop-Up Retail	138	40	29%	60	58%	42%

Positive mentions for each offering are shown in Figure 10. About 80% of positive comments across all the offerings reflected satisfaction with the measures they received, satisfaction with cost savings (e.g., incentives, discounts, and lower utility bills), or a generally positive experience (e.g., non-specific comments such as "all is good" and "thanks for this offering").

Figure 10. Positive Comments about Direct to Customer Solution Offerings



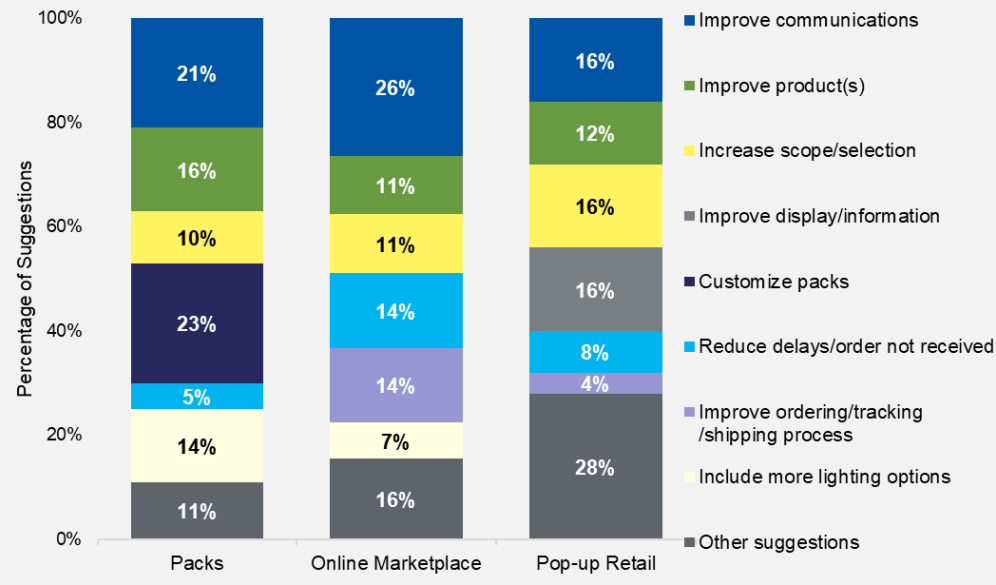
Source: Packs, Online Marketplace, and Pop-Up Retail Offering Participant Satisfaction Survey Question. "Please tell us more about your experience and any suggestions for improvement."
(Total positive mentions Packs n=205, Online Marketplace n=366, Pop-Up Retail n=35).
Note: Unlabeled segments represent 3% or less of respondents.

Figure 11 shows suggestions for improvement. The most common suggestion from Online Marketplace respondents (26%) was to improve communications about the offering, which was also the second most common suggestion from Packs respondents (21%). Suggestions about improving communications typically focused on follow-up to orders, more or clearer information about items offered, requests for more information about saving energy, and more promotion for Focus on Energy offerings. Many Online

Marketplace respondents' suggestions to improve communications specifically related to installation instructions and compatibility issues with smart thermostats.

The most common suggestion from Packs respondents in CY 2022 was to allow participants to customize the items in the packs they order (23%). These results were consistent with CY 2021 suggestions for these offerings. In CY 2022, no suggestions dominated responses from Pop-Up Retail participants, whereas in CY 2021 the most common suggestion was to increase the scope and selection of products offered (44%, n=39). Only 16% of Pop-Up Retail suggestions in CY 2022 related to increasing scope and selection. Suggestions categorized as "other" included increasing incentives and discounts, allowing more frequent participation, and improving customer service.

Figure 11. Suggestions for Improving Direct to Customer Solution Offerings



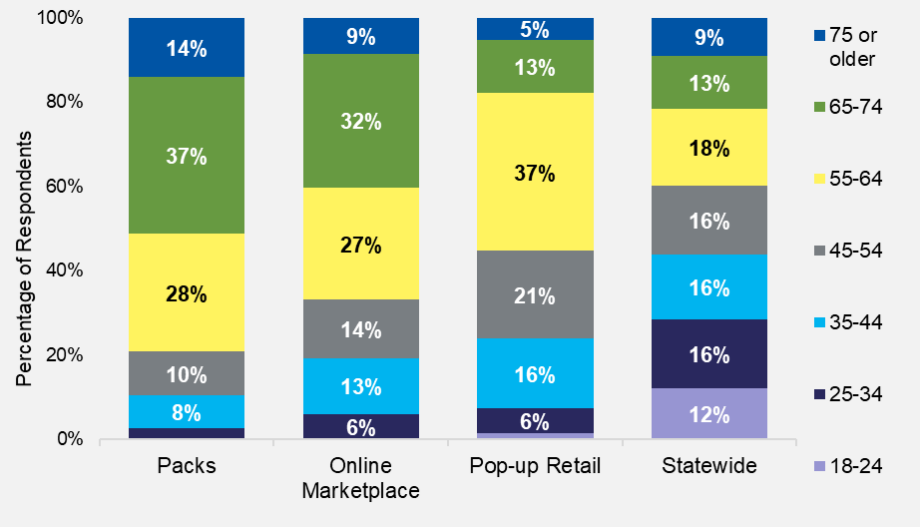
Source: Packs, Online Marketplace, Retail Smart Thermostats, and Pop-Up Retail Offering Participant Satisfaction Survey Question. "Please tell us more about your experience and any suggestions for improvement."
(Total suggestions for improvement Packs n=115, Online Marketplace n=257, Pop-Up Retail n=25).
Note: Unlabeled segments represent 3% or less of respondents.

Demographics

The customer satisfaction survey asked respondents their age (Figure 12), income (Figure 13), and how many people lived in their household. Of all Direct to Customer Solution offerings, Pop-Up Retail respondents had the highest percentage of age 54 or younger (45%) though less than the statewide average (60%). Pop-Up Retail and Online Marketplace respondents in CY 2022 tended to be younger (45% and 33% age 54 or younger, respectively) than in CY 2021 (35% and 24%, respectively). The distribution by age for Packs respondents was nearly identical in CY 2022 and CY 2021.

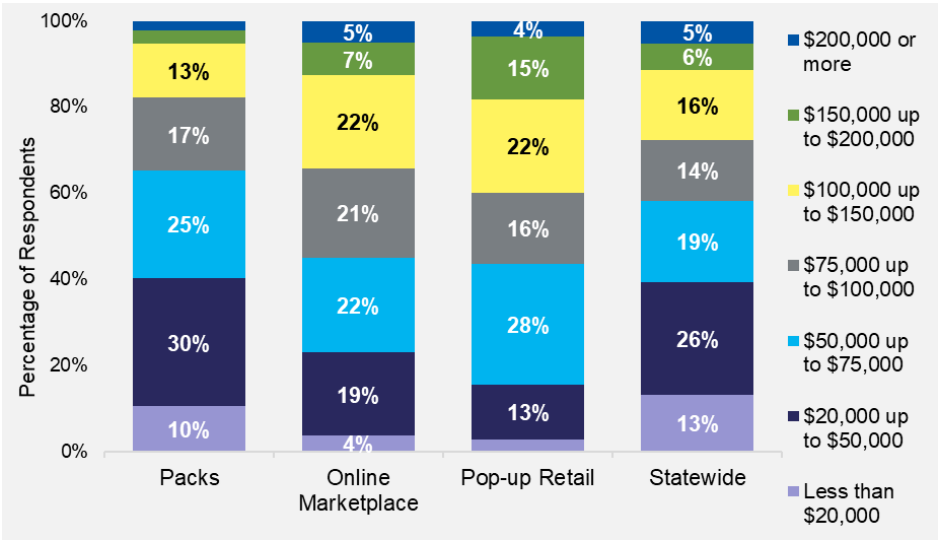
Packs respondents were the most likely to have incomes under $50,000 (40%), and their income distribution was near the statewide distribution (39%).

Figure 12. Direct to Customer Solution Participants' Age



Source: Packs, Online Marketplace, Retail Smart Thermostats, and Pop-Up Retail Offering Participant Satisfaction Survey Question. "Which of the following categories best represents your age?" (Packs n=1,195, Online Marketplace n=2,117, Pop-Up Retail n=134). U.S. Census 2020 American Community Survey (ACS), Selected Social Characteristics in the United States.
Note: Unlabeled segments represent 3% or less of respondents.

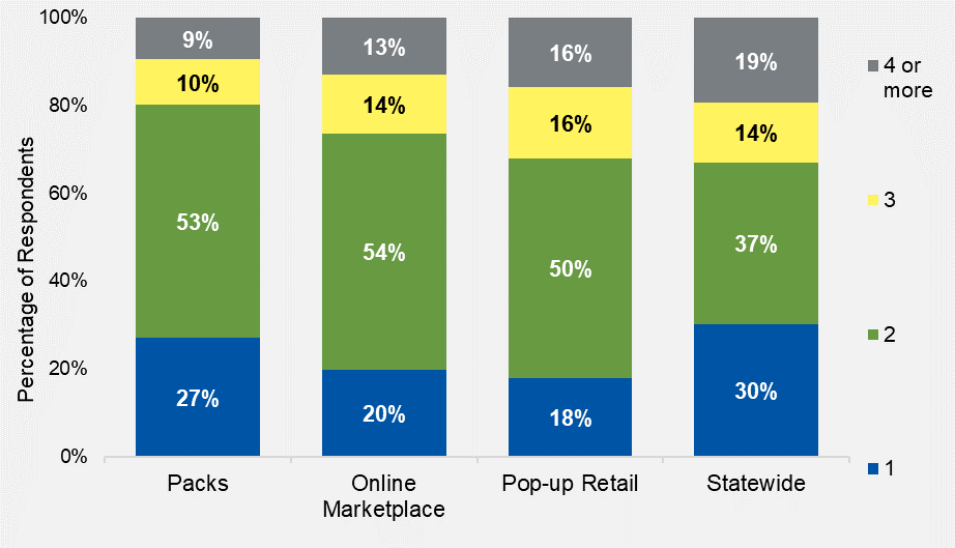
Figure 13. Direct to Customer Solution Participants' Income



Source: Packs, Online Marketplace, Retail Smart Thermostats, and Pop-Up Retail Offering Participant Satisfaction Survey Question. "Which category best describes your total household income before taxes?" (Packs n=880, Online Marketplace n=1,602, Pop-Up Retail n=110).
U.S. Census 2020 American Community Survey (ACS), Selected Social Characteristics in the United States.
Note: Unlabeled segments represent 3% or less of respondents.

Of all Direct to Customer offerings, 50% to 53% by offering were two-person households, higher than the statewide average (37%). Packs respondents were the most likely to live in single-person households (27%), and Pop-Up Retail participants were the most likely to live in households with three or more people (32%).

Figure 14. Direct to Customer Solution Participants' Household Size



Source: Packs, Online Marketplace, Retail Smart Thermostats, and Pop-Up Retail Offering Participant Satisfaction Survey Question. "Counting yourself, how many people live in your household on a full-time basis today? Please include everyone who lives in your home and exclude anyone just visiting or children who may be away at college or in the military." (Packs n=1,198, Online Marketplace n=2,108, Pop-Up Retail n=134). U.S. Census 2020 American Community Survey (ACS), Selected Social Characteristics in the United States.

Cost-Effectiveness

Evaluators commonly use cost-effectiveness tests to compare the benefits and costs of a demand-side management (DSM) offering. The benefit/cost test used in Wisconsin is a modified version of the total resource cost (TRC) test. *Appendix I. Cost-Effectiveness and Emissions Methodology and Analysis* in Volume III includes a description of the TRC test. Table 30 lists the CY 2022 incentive costs for the Direct to Customer Solution.

Table 30. CY 2022 Direct to Customer Incentive Costs

Offerings	Incentive Costs
Lighting	$2,787,962
Online Marketplace	$2,616,696
Business Packs	$49,138
Retail	$93,625
Pop Up Retail	$353,797
Packs	$3,358,189
Income Qualified	$3,469,296
Total	**$12,728,702**

The evaluation team found that the CY 2022 Direct to Customer Solution was cost-effective when including the T&D benefits (3.32), and when excluding them (3.11). Table 31 lists the evaluated costs and benefits.

Table 31. CY 2022 Direct to Customer Costs and Benefits

Cost and Benefit Category	Total
Costs	
Administrative Costs	$682,512
Delivery Costs	$6,841,876
Incremental Measure Costs	$19,850,599
Total Non-Incentive Costs	**$27,374,987**
Benefits	
Electric Benefits (kWh)	$39,494,106
Electric Benefits (kW)	$12,759,422
T&D Benefits (kW)	$5,764,339
Gas Benefits	$15,607,636
Emissions Benefits	$17,283,691
Total TRC Benefits with T&D benefits	**$90,909,194**
Net TRC Benefits with T&D benefits	**$63,534,207**
TRC Benefit/Cost Ratio with T&D benefits	**3.32**

Outcomes and Recommendations

The evaluation team offers the following outcomes and recommendations based on the CY 2022 evaluation.

Outcome 1. Customer satisfaction remains high across all Direct to Customer offerings. CY 2022 satisfaction ratings for the Packs (9.5) and Online Marketplace (9.3) offerings were statistically equivalent to CY 2021 and maintained the high ratings for these offerings. However, satisfaction ratings for Pop-Up Retail were significantly lower in CY 2022 (9.1) compared with CY 2021 (9.5). There were also fewer respondents to the Pop-Up Retail survey than in past years (140 in CY 2022 compared with about 400 in CY 2021), which could be related to the lower satisfaction in CY 2022.

Outcome 2. The Direct to Customer Solution successfully began shifting away from LEDs in CY 2022 in anticipation of new federal lighting standards that will nearly eliminate claimable savings for LEDs starting August 1, 2023. New federal regulations finalized in April 2022 prohibit the production and sales of general service lamps (GSLs) that do not meet a 45 lumen per-watt minimum efficiency after July 31, 2023.[10] In anticipation of this change, the Direct to Customer Solution began shifting its savings away from upstream lighting in CY 2022, with only 40% of its net savings coming from upstream lighting compared with 58% in CY 2021. The Packs Offering also distributed nearly 50,000 new Advanced Power Strip packs, which were introduced to offset upcoming lighting changes.

[10] Specifically, the Department of Energy rules expand the definition of GSLs to include reflectors and candelabras that were previously exempt from the standards and requires all GSLs to meet a 45 lumen/watt minimum efficiency. Companies are allowed to produce and import noncompliant bulbs until January 2023 and retailers are allowed to sell them until July 31, 2023. Source: Enforcement Policy Statement—General Service Lamps, issued April 26, 2022. GSL_EnforcementPolicy_4_25_22.pdf (energy.gov)

Outcome 3. The upstream lighting channel achieved a quadrennial market effects ratio of nearly 30%, equivalent to roughly 5.5 million additional LEDs sold in Wisconsin throughout the CY2019-CY2022 quadrennium as a result of Focus on Energy's historical upstream lighting efforts. These LEDs account for an additional 7.7 million MMBtu attributable to the Retail Offering that have not been reported in previous annual evaluation reports. The evaluation team added these market effects savings to the Direct to Customer Solution's quadrennial net savings, which boosted the quadrennial MMBtu NTG from 53% to 67%.

Outcome 4. Smart thermostats continue to be a productive source of energy savings for the Online Marketplace Offering. In CY 2022, the Online Marketplace sold about one-third of the measures it sold in CY 2021. However, total CY 2022 MMBtu savings surpassed CY 2021 savings because more smart thermostats were rebated in CY 2022 and those thermostats achieved more savings than the types of measures where participation decreased, such as aerators and LEDs. The evaluation team's CY 2022 smart thermostat billing analysis also found that overall smart thermostat savings are slightly higher than savings previously determined through the CY 2017 billing analysis.

Outcome 5. In CY 2022, the implementer introduced several new MMIDs in SPECTRUM that did not go through the prescribed TRM review and approval process. Not understanding sources for these new measures made it challenging for the evaluation team to identify appropriate savings for these measures or to understand *ex ante* savings assumptions.

Recommendation 1. Revisit the revised TRM approval process. The evaluation team, administrator, and PSC implemented an updated TRM process in CY 2022 that set clear steps for when and how implementers can add new measures to SPECTRUM. The evaluation team encourages the implementer and administrator to follow this process and the SPECTRUM new measure publication dates moving forward.

Outcome 6. Income Qualified measures in the Retail and Rural Retail offerings accounted for over 20% of verified first-year gross MMBtu savings for Direct to Customer Solution in CY 2022 and CY 2021. Verified gross savings for Income Qualified measures rely on TRM assumptions that were calculated for measures delivered through other channels. These TRM assumptions may not reflect real-world conditions for measures distributed through the Income Qualified Offering because neither the implementer nor the evaluation team have been able to collect critical information about Income Qualified recipients or what they do with the measures, such as what types of homes recipients live in, how many people live in the homes, and whether the recipients install the measures. It would also be useful to understand if recipients are offered the opportunity to take measures only if they are interested in them or if measures are provided to all people receiving assistance from the organization.

Recommendation 2. Starting in CY 2023, Focus on Energy will deliver food bank and similar measures through the Midstream Solution. If the Income Qualified path is expected to continue contributing a large share of the Midstream or Direct to Customer savings in the future, the implementer and evaluation team should collaborate to obtain key information, such as installation rates and distribution practices, from measure recipients and food banks to improve the reliability of these savings.

Trade Ally Solutions

Through Trade Ally Solutions, certified trade allies encourage residential customers to make energy-saving home improvements and assist them in making those improvements. The solution provides incentives to single-family and multifamily customers who make efficiency upgrades through three statewide offerings:

- **Insulation and Air Sealing** incentives for contractor-assisted or do-it-yourself residential insulation and air sealing improvements
- **Heating and Cooling** incentives for residential HVAC equipment improvements
- **Renewable Energy** incentives for residential and business solar photovoltaic (PV) installations, including a Rural Renewables bonus for residential customers in designated rural zip codes

APTIM administered Trade Ally Solutions with support from CLEAResult, the implementer, who conducted the day-to-day operations. Additional details about each offering under Trade Ally Solutions are provided in the *Process Evaluation* section of this chapter.

Table 32 presents a summary of the impacts for the Trade Ally Solutions for CY 2022, including impacts for statewide, rural, and pilot offerings as well as total impacts for the whole solution.

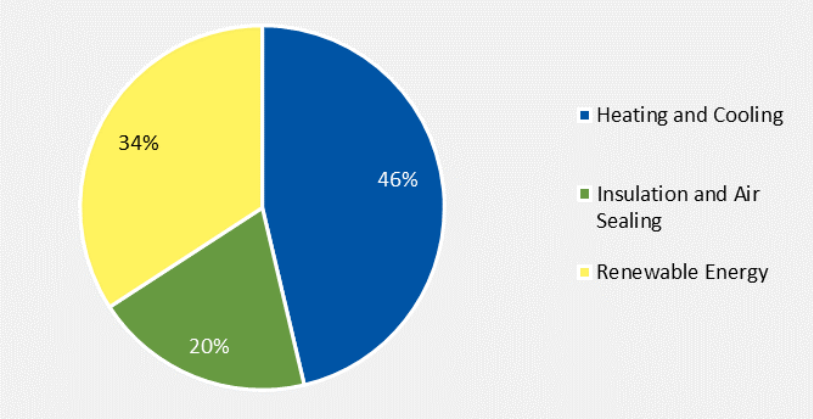
Table 32. CY 2022 Trade Ally Solutions Summary

Item	Units	CY 2022				Quad (CY 2019-CY 2022) Total Trade Ally Solutions
		Heating and Cooling/ Insulation and Air Sealing Offerings	Renewable Energy Offering, Residential	Renewable Energy Offering, Commercial	Total Trade Ally Solutions	
Incentive Spending	$	$6,898,934	$2,225,941	$2,213,947	$11,350,672	$40,719,765
Participation	Number of Participants	28,556	2,300	156	31,012	119,034
Verified Gross Lifecycle Savings	kWh	74,822,699	627,662,303	457,675,208	1,160,160,209	3,715,386,450
	kW	996	8,493	6,124	15,613	48,270
	therms	43,110,523	0	0	43,110,523	136,397,305
Verified Gross Lifecycle Realization Rate	% (MMBtu)	101%	100%	100%	100%	100%
Annual Net-to-Gross (NTG) Ratio	% (MMBtu)	77%	43%	62%	67%	72%
Net Annual Savings	kWh/year	6,090,802	10,700,798	11,381,006	28,172,606	102,641,108
	kW	926	3,620	3,807	8,352	28,811
	therms/year	1,662,011	0	0	1,662,011	5,827,243
Net Lifecycle Savings	MMBtu	3,629,094	913,217	970,800	5,513,111	18,820,793
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio with T&D Benefits	**0.79**	**1.02**	**1.99**	**1.11**	**1.03**

[a] Residential Renewable Energy spending includes $466,690 paid for Rural Bonuses and $76,355 paid for Pilot Bonuses. The Commercial Renewable Energy incentives include $212,920 paid for Rural Bonuses.
[b] Residential Renewable Energy savings include savings for Pilot measures.

Figure 15 shows the percentage of savings by offering for Trade Ally Solutions. The Heating and Cooling Offering contributed the largest net lifecycle MMBtu savings to Trade Ally Solutions.

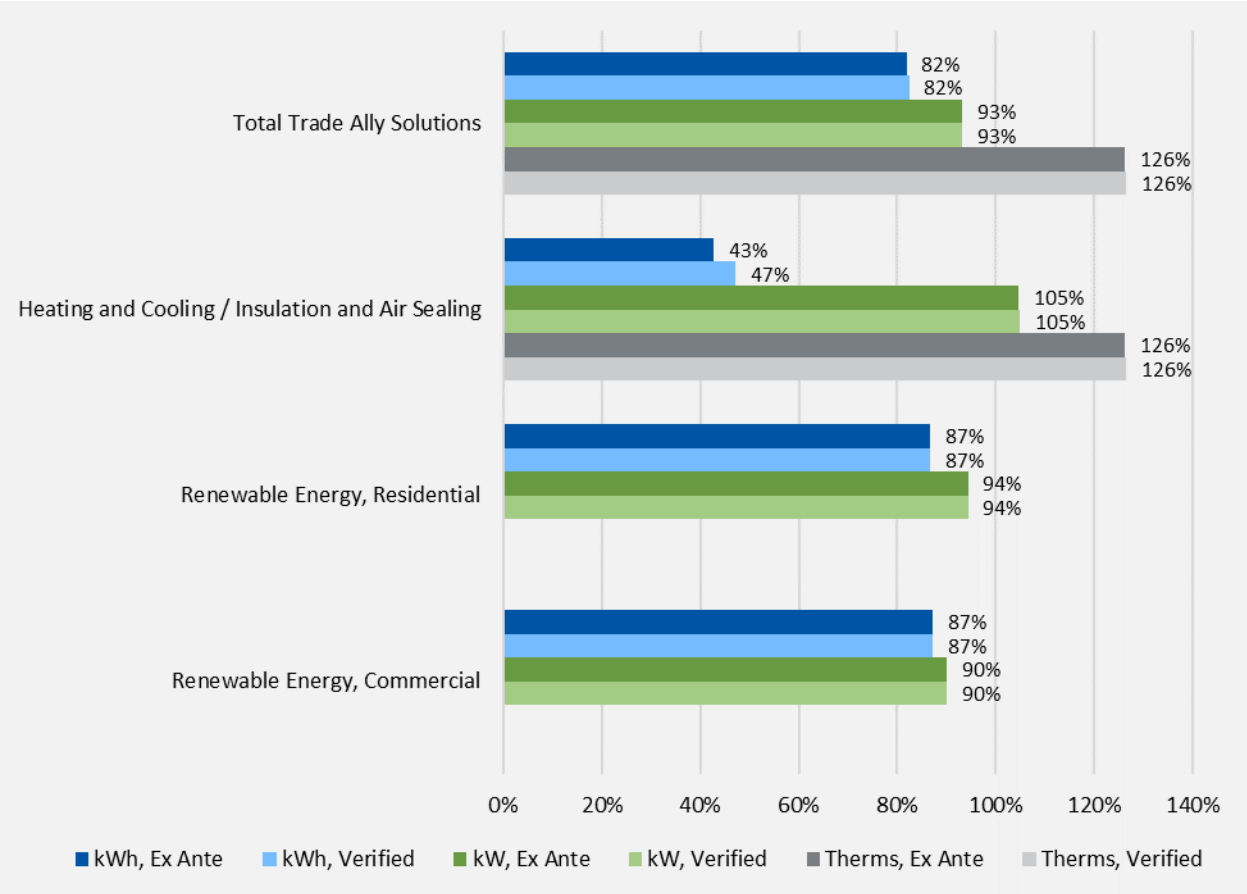
Figure 15. Net Lifecycle Savings by Offering



Achievement Against Goals

Figure 16 shows the percentage of gross lifecycle savings goals achieved by Trade Ally Solutions and each of its offerings in CY 2022. Overall, Trade Ally Solutions exceeded its therm savings goal but did not meet its kWh or kW savings goals. The overall kW and kWh results are driven by the Residential and Commercial Renewable Energy offerings, which contributed 94% of the total gross kWh savings and 94% of the total gross kW impact.

Figure 16. Trade Ally Solutions –
Achievement of CY 2022 Gross Lifecycle Savings Goals



The 100% ex ante gross lifecycle savings reflects the implementer's contract goals for CY 2022.
Verified gross lifecycle savings contribute to the administrator's portfolio-level goals.
Note: Focus on Energy had separate goals for the commercial and residential components of the Renewable Energy Offering and a combined goal for the Heating and Cooling and Insulation and Air Sealing Offerings.

Impact Evaluation

This section contains the findings for the CY 2022 impact evaluation at the solution level followed by a discussion of each offering.

Impact Evaluation Methodology

The evaluation team conducted an impact evaluation of the CY 2022 Trade Ally Solutions using a combination of primary and secondary data. Table 33 lists specific data collection activities and sample sizes used in the CY 2022 evaluation. Additional details about these activities and their findings can be found in the offering-specific discussions below and in *Appendix F. Measure Analysis* in Volume III.

Table 33. CY 2022 Data Collection Activities and Sample Sizes for Impact Evaluation

Activity	Heating and Cooling	Insulation and Air Sealing	Renewable Energy, Residential	Renewable Energy, Commercial	Total
Tracking Database Review	Census	Census	Census	Census/Random	**Census**
Thermostat Billing Analysis	4,277	N/A	N/A	N/A	**4,277**
Desk Reviews	N/A	10	N/A	N/A	**10**

Verified Gross Savings Results for Trade Ally Solutions

Table 34 lists the first-year and lifecycle realization rates for CY 2022, and Table 35 lists verified first-year and lifecycle savings by offering. Overall, Trade Ally Solutions achieved a first-year evaluated realization rate of 100%, weighted by total (MMBtu) energy savings. Detailed findings for each offering, including factors affecting the realization rates, are discussed in detail in the next sections.

Table 34. CY 2022 Trade Ally Solutions First-Year and Lifecycle Realization Rates

Offering	First-Year Realization Rate				Lifecycle Realization Rate		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
Heating and Cooling, Standard	140%	101%	101%	102%	19%	100%	101%
Heating and Cooling, Income Qualified	117%	0%	96%	97%	117%	97%	97%
Heating and Cooling, Pilots	105%	-	99%	99%	105%	98%	98%
Heating and Cooling, Total	**139%[a]**	**101%**	**101%**	**102%**	**-13%[a]**	**100%**	**101%**
Insulation and Air Sealing, Standard	100%	100%	100%	100%	100%	100%	100%
Insulation and Air Sealing, Income Qualified	100%	100%	100%	100%	100%	101%	100%
Insulation and Air Sealing, Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Renewable Energy, Residential	100%	100%	-	100%	100%	-	100%
Renewable Energy, Residential Pilots	100%	100%	-	100%	100%	-	100%
Renewable Energy, Commercial	100%	100%	-	100%	100%	-	100%
Renewable Energy, Total	**100%**	**100%**	**-**	**100%**	**100%**	**-**	**100%**
Overall Realization Rate	**101%**	**100%**	**101%**	**101%**	**101%**	**100%**	**100%**

[a] Heating and Cooling kWh realization rates notably diverge from 100% because of the substantial negative kWh savings attributed to air-source heat pumps replacing gas heating systems. These measures also achieve significant therms savings, resulting in overall positive MMBtu savings for the measure. The MMBtu realization rates in this table represent an accurate estimation of the offering's realization rates.

Table 35. CY 2022 Trade Ally Solutions First-Year and Lifecycle Verified Gross Energy Savings Summary

Offering	Verified First-Year Savings				Verified Lifecycle Savings		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
Heating and Cooling, Standard	2,222,405	207	1,759,269	183,510	-1,564,568	31,594,129	3,154,075
Heating and Cooling, Income Qualified	110,593	0	151,032	15,481	2,302,658	3,171,884	325,045
Heating and Cooling, Pilots	7,053	0	2,929	317	86,477	57,276	6,023
Heating and Cooling, Total	2,340,051	207	1,913,230	199,307	824,568	34,823,289	3,485,142
Insulation and Air Sealing, Standard	2,615,047	674	281,532	37,076	68,240,979	7,095,039	942,342
Insulation and Air Sealing, Income Qualified	236,355	115	48,960	5,702	5,757,152	1,192,195	138,863
Insulation and Air Sealing, Total	2,851,402	789	330,492	42,778	73,998,131	8,287,234	1,081,205
Renewable Energy, Residential	24,816,283	8,402	0	84,673	620,713,321	0	2,117,874
Renewable Energy, Residential Pilots	277,959	91	0	948	6,948,982	0	23,710
Renewable Energy, Commercial	18,307,008	6,124	0	62,464	457,675,208	0	1,561,588
Renewable Energy, Total	43,401,251	14,616	0	148,085	1,085,337,511	0	3,703,172
Overall Savings	**48,592,704**	**15,613**	**2,243,722**	**390,171**	**1,160,160,209**	**43,110,523**	**8,269,519**

Heating and Cooling: Verified Gross Savings Results

For the Heating and Cooling Offering, the evaluation team conducted a database review, a TRM review, and a smart thermostat billing analysis to inform verified gross savings. The offering had a gross lifecycle realization rate of 101% MMBtu.

Table 36 lists the CY 2022 *ex ante* and verified gross first-year and lifecycle savings for the Heating and Cooling Offering. Savings by measure can be found in *Appendix E. Detailed Findings* in Volume III.

Table 36. CY 2022 Heating and Cooling *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
Heating and Cooling Offering, Standard						
First-Year Gross Savings	1,582,426	206	1,737,446	2,222,405	207	1,759,269
Lifecycle Gross Savings	(8,262,565)	206	31,438,416	(1,564,568)	207	31,594,129
Heating and Cooling Offering, Income Qualified						
First-Year Gross Savings	94,504	-	156,548	110,593	-	151,032
Lifecycle Gross Savings	1,974,142	-	3,280,684	2,302,658	-	3,171,884
Heating and Cooling Offering, Pilots						
First-Year Gross Savings	6,692	-	2,967	7,053	-	2,929
Lifecycle Gross Savings	82,152	-	58,395	86,477	-	57,276
Total Heating and Cooling Offering						
First-Year Gross Savings	1,683,622	206	1,896,961	2,340,051	207	1,913,230
Lifecycle Gross Savings	(6,206,271)	206	34,777,495	824,568	207	34,823,289

The gross lifecycle kWh savings for the Heating and Cooling Standard Offering are negative because of the high volume of air-source heat pumps that replaced gas furnaces. These heat pumps produce negative kWh savings because they add to the home's electric load. The heat pump measures' first-year negative kWh savings are offset by positive kWh savings from other measures in the offering, resulting in first-year verified savings that are positive. However, the estimated useful life (EUL) for air-source heat pumps (18 years) is longer than that of other measures producing high electric savings, such as smart thermostats (nine years). Therefore, the offering's total lifecycle savings are negative because the negative kWh savings from heat pumps are greater than positive savings from other measures over their lifetimes.

For the Standard Heating and Cooling Offering, there is a notable difference between verified and *ex ante* lifecycle kWh savings because furnaces and thermostats have higher kWh realization rates (both above 100%) than air-source heat pumps. The additional positive verified kWh savings from furnaces and thermostats reduce the negative kWh impact from heat pumps.

The evaluation team calculated energy and demand savings for most measures following guidance in the 2022 TRM, which was effective February 11, 2022. For measures where TRM savings or inputs changed between the 2021 and 2022 TRMs, the team applied savings from the version in which the measure was rebated.

For the six heating and cooling measures that were not included in the 2022 TRM but that had claimed savings in CY 2022 tracking data, the team calculated savings using guidance in previous years' TRMs:

- Residential ground source heat pumps (MMIDs 2820 and 2821) – Applied 2021 TRM savings
- Multi-family air-source heat pumps (MMIDs 5191, 5192, and 5193) – Applied 2021 TRM savings
- Furnace ECM motor replacement (MMID 2989) – Applied 2019 TRM savings

No workpaper existed for indirect water heaters (MMID 2658), so the team set verified gross savings and incremental costs equal to *ex ante* savings and incremental costs. In future evaluation years, MMID 2658 will be discontinued, and indirect water heater units will be tracked under MMIDs 5267, 5268, 1988, 3784, or 5084.

All other exceptions to TRM guidance are noted below. For CY 2022, these exceptions consist of updates to efficiency values for air-source heat pumps, updates to installed natural gas furnace savings based on actual equipment efficiency and capacity ratings, and updates to smart thermostat savings based on a CY 2022 billing analysis.

Air-Source Heat Pumps

In CY 2022, the implementer identified that many air-source heat pump systems are not verifiable in the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) database for various reason. Reasons are that the heat pump market is growing so quickly that AHRI has not had a chance to catch up with the new models and also that heat pumps can be installed with older air handlers that AHRI cannot include in its verification testing.

To accommodate these untested systems, the evaluation team, administrator, and implementer agreed to adjust savings for rebated air-source heat pumps that are not AHRI-certified. These uncertified heat pumps are tracked under the same MMID as standard air-source heat pumps and identified under an optional equipment field in the tracking data. Savings for these measures assume that the new heat pump is 10% less efficient than a federal baseline unit, which allows the solution to claim natural gas savings for switching from natural gas heat but acknowledges that there is some uncertainty in the new system's efficiency. In CY 2022, this adjustment impacted only 2% (20 out of 948) of the air-source heat pump units.

The evaluation team and the implementer agreed to monitor the number of rebated heat pump systems receiving this adjustment in the future. The implementer will continue efforts to minimize the need for an adjustment by training contractors about the importance of verifying system combinations in AHRI and by providing AHRI navigation assistance. The evaluation team will monitor the prevalence of non-certified heat pump systems in the Heating and Cooling Offering. If non-certified systems represent growing shares of Heating and Cooling Offering savings, the team will consider additional research to determine actual system efficiencies and savings.

Natural Gas Furnaces

To calculate gross savings for natural gas furnaces, the evaluation team combined furnace make and model information from the program tracking data with annual fuel utilization efficiency (AFUE) rating and input capacity (MMBtu/h) data from AHRI.[11] The team then calculated weighted AFUE and capacity ratings for each furnace MMID based on the quantity of each make and model in the MMID.

The team used manufacturer and model number information from rebated units to determine the actual output capacities and AFUEs of installed units. Next, the team calculated gross verified therms savings based on differences in consumption between actual installed units and baseline units. For baseline units, the team adopted TRM-deemed AFUEs by participant sector. The TRM-deemed baseline AFUE for single-family residents was 92.8% in both the 2021 and 2022 TRMs. However, the multifamily baseline AFUE increased from 80% in the 2021 TRM to 86.7% in the 2022 TRM. The team calculated natural gas savings using both the 2021 and 2022 baseline AFUE values and weighting the results by units approved both prior to and after the 2022 TRM update. The team assumed both baseline and actual installed furnaces had the same output capacities.

Table 37 shows the average capacities, efficient and baseline AFUEs, efficient and baseline energy consumption, and savings for each furnace MMID. Note that the table shows the 2022 TRM baseline AFUE values and savings calculated using the 2022 TRM values. As noted above, overall savings used a combination of 2021 and 2022 TRM values, based on when the unit was rebated. The capacities and actual installed AFUEs reflect weighted averages according to the actual units installed in each MMID.

[11] Using make and model information, the evaluation team successfully matched AHRI data to 97.9% of installed standard natural gas furnaces and 98.0% of income qualified natural gas furnaces.

Table 37. CY 2022 Natural Gas Furnace Input Capacity and AFUE Ratings

Measure Name	MMID	Average Actual Capacity[a]	Reported Baseline		Average Actual Installed		Verified Therm Savings
			AFUE	Therms[b]	AFUE	Therms[b]	
Standard Furnace Measures							
MF NG Furnace, Multistage+, 95% AFUE	4950	59.0	86.7	553.2	95.0	487.8	**65.4**
MF NG Furnace, Multistage+, 96% AFUE	4951	56.9	86.7	577.7	96.1	506.3	**71.4**
MF NG Furnace, Multistage+, 97% AFUE	4952	67.3	86.7	691.0	97.2	596.2	**94.7**
MF NG Furnace, Multistage+, 98%+ AFUE	4953	60.0	86.7	568.6	98.0	478.0	**90.6**
MF NG Furnace, Single-stage, 95% AFUE	4958	52.0	86.7	497.8	95.0	440.1	**57.6**
MF NG Furnace, Single-stage, 96% AFUE	4959	53.2	86.7	556.9	96.2	489.1	**67.8**
NG Furnace, Multistage+, 95% AFUE	4962	61.4	92.8	531.7	95.0	514.9	**16.9**
NG Furnace, Multistage+, 96% AFUE	4963	69.6	92.8	665.5	96.1	636.9	**28.7**
NG Furnace, Multistage+, 97% AFUE	4964	77.0	92.8	744.1	97.1	702.5	**41.6**
NG Furnace, Multistage+, 98%+ AFUE	4965	73.6	92.8	720.3	98.1	671.2	**49.0**
NG Furnace, Single-stage, 95% AFUE	4970	65.2	92.8	607.6	95.0	589.6	**18.0**
NG Furnace, Single-stage, 96% AFUE	4971	64.8	92.8	627.7	96.2	600.1	**27.6**
Income Qualified Furnace Measures							
MF NG Furnace, Multistage+, Tier 2, 96% AFUE	4955	55.2	80.0	589.0	96.1	460.5	**128.5**
MF NG Furnace, Multistage+, Tier 2, 97% AFUE	4956	80.0	80.0	990.2	97.2	791.0	**199.2**
MF NG Furnace, Single-stage, Tier 2, 95% AFUE	4960	48.0	80.0	502.6	95.0	398.4	**104.2**
MF NG Furnace, Single-stage, Tier 2, 96% AFUE	4961	46.0	80.0	513.6	96.1	406.8	**106.9**
NG Furnace, Multistage+, Tier 2, 95% AFUE	4966	60.6	80.0	636.2	95.0	504.6	**131.6**
NG Furnace, Multistage+, Tier 2, 96% AFUE	4967	63.0	80.0	703.0	96.1	556.2	**146.8**
NG Furnace, Multistage+, Tier 2, 97% AFUE	4968	70.3	80.0	797.8	97.1	624.2	**173.6**
NG Furnace, Multistage+, Tier 2, 98%+ AFUE	4969	63.4	80.0	721.0	98.2	554.1	**166.9**
NG Furnace, Single-stage, Tier 2, 95% AFUE	4972	58.1	80.0	634.7	95.0	508.5	**126.1**
NG Furnace, Single-stage, Tier 2, 96% AFUE	4973	61.3	80.0	704.4	96.1	561.2	**143.2**

[a] Average actual capacity (MMBtu/h) is based on capacity of units installed and rebated in CY 2022.

[b] All furnace therm savings assume 1,158 estimated full load hours.

MF = multifamily; NG = non-gas

For multistage natural gas furnaces, the evaluation team used furnace make and model information to assign AHRI average annual auxiliary electrical energy consumption (E_{AE}) values to actual installed units.[12] The team calculated kWh savings as the difference between MMID-average E_{AE} values and TRM-deemed baseline E_{AE} values. For each multistage furnace MMID, Table 38 shows the average E_{AE} derived from AHRI and tracking data as well as the TRM baseline E_{AE} value (which is the same for single-family and multifamily participants).

[12] Using make and model information, the evaluation team successfully matched AHRI data to 97.9% of installed standard natural gas furnaces and 98.0% of income qualified natural gas furnaces.

Table 38. CY 2022 Multistage Natural Gas Furnace EAE Ratings

Measure Name	MMID	Reported Baseline E_{AE}	Average Actual Installed E_{AE}[a]	Verified kWh Savings
Standard Furnace Measures				
MF NG Furnace, Multistage+, 95% AFUE	4950	482.8	334.3	**148.6**
MF NG Furnace, Multistage+, 96% AFUE	4951	482.8	305.6	**177.2**
MF NG Furnace, Multistage+, 97% AFUE	4952	482.8	313.6	**169.2**
MF NG Furnace, Multistage+, 98%+ AFUE	4953	482.8	284.3	**198.5**
NG Furnace, Multistage+, 95% AFUE	4962	482.8	328.0	**154.8**
NG Furnace, Multistage+, 96% AFUE	4963	482.8	355.9	**126.9**
NG Furnace, Multistage+, 97% AFUE	4964	482.8	357.6	**125.2**
NG Furnace, Multistage+, 98%+ AFUE	4965	482.8	321.4	**161.5**
Income Qualified Furnace Measures				
MF NG Furnace, Multistage+, Tier 2, 96% AFUE	4955	468.5	267.3	**201.2**
MF NG Furnace, Multistage+, Tier 2, 97% AFUE	4956	468.5	408.0	**60.5**
NG Furnace, Multistage+, Tier 2, 95% AFUE	4966	468.5	342.7	**125.8**
NG Furnace, Multistage+, Tier 2, 96% AFUE	4967	468.5	322.4	**146.1**
NG Furnace, Multistage+, Tier 2, 97% AFUE	4968	468.5	296.9	**171.6**
NG Furnace, Multistage+, Tier 2, 98%+ AFUE	4969	468.5	304.9	**163.6**

[a] Average Actual Installed E_{AE} is based on units installed and rebated in CY 2022.

Verified Gross Savings Adjustment Summary

The CY 2022 verified savings for furnace measures were much closer to *ex ante* savings than in previous years. The average total energy (MMBtu) realization rate was 0.98 for standard furnace measures and 1.04 for income qualified furnace measures in CY 2022, compared with 1.08 and 0.89, respectively, in CY 2021. The improved realization rates are a result of the 2022 TRM including MMID-specific deemed capacity, efficient AFUE, and efficient E_{AE} input values, compared with previous TRMs, which used one set of deemed-input values for all multifamily furnaces and another set for all single-family furnaces. For CY 2022 furnaces with adjusted savings, the small differences between *ex ante* and verified gross savings can be explained by differences between actual and TRM-deemed capacities and efficiencies. Though all furnace MMIDs had a different weighted average actual capacity than the TRM-deemed capacity, most actual and deemed efficiency values (AFUE) were the same.[13]

Smart Thermostats

The evaluation team conducted a billing analysis to update gross savings for smart thermostat measures in the Heating and Cooling Offering and i the Online Marketplace Offering under the Direct to Customer Solution. The analysis included all residential smart thermostat customers who received a rebate or discount through any residential Focus on Energy solution or offering between January 1, 2020, and September 30, 2021. This timeframe allowed the team to collect one year of pre-participation billing data and one year of post-participation billing data. The team used PRISM models to estimate savings

[13] See Table 37 for actual installed efficiencies for all furnace MMIDs, respectively.

and standard errors from the billing analysis. *Appendix F. Measure Analysis* in Volume III contains additional details on the smart thermostat billing analysis methodology, attrition, and results.

The evaluation team identified a future participant group of customers who received smart thermostat rebates or discounts between October 1, 2021, and June 30, 2022. These customers were not included in the participant group for the billing analysis because the timing of their purchases did not allow a year of post-installation billing data. The team intended to use this group to estimated adjusted gross savings by comparing the difference in energy consumption between participants and future participants. However, the future participant group's consumption increased substantially during the analysis period due to COVID-19. As a result, comparing data from the two groups did not prove to be meaningful. Therefore, the team did not account for future participants in the final results.

Table 39, Table 40, and Table 41 present summaries of savings, including precision and other key values, for the electric cooling, electric heating, and natural gas heating analyses, respectively. Previous CY 2017 smart thermostat billing analysis results are provided in grey for comparison. The pre-period normalized annual consumption (PRENAC) values reported in each table are the assumed pre-installation weather-normalized energy consumption values. The reported precision values are the relative precision of the verified savings; a higher precision value indicates a larger error bound. Generally, larger sample sizes will result in better precision and smaller error bounds. Because far fewer participants use boiler or air-source heat pump (ASHP) systems than those using other heating systems, the savings estimates for boiler and heat pump systems are less precise than the overall ±6% precision at the 90% confidence level. However, the point estimates still provide a good representation of savings based on actual Focus on Energy participants.

As shown in Table 39, smart thermostat participants saved an average of 258 kWh in cooling, compared with the 2017 billing analysis estimate of 325 kWh. With an average pre-installation period cooling usage of 1,612 kWh, the gross savings represent a 16% reduction in cooling usage. The overall relative precision at the 90% confidence level is ±6%.

Table 39. CY 2022 Smart Thermostat Verified Gross Electric Cooling Savings

Evaluation Year	Heating System Type	Participant Count	Verified Cooling Savings (kWh)	Precision at 90% Level	Cooling PRENAC (kWh)	Verified Percentage Savings
2017	All	2,110	325	8%	1,587	20.7%
2022	**All**	**4,703**	**258**	**6%**	**1,612**	**16.0%**
2022	Furnace	4,127	260	6%	1,616	16.1%
2022	Boiler	159	196	46%	1,729	11.3%
2022	ASHP	254	264	30%	1,476	17.9%

As shown in Table 40, participants installing smart thermostats saved an average of 224 kWh in electric heating, compared with the 2017 billing analysis estimate of 115 kWh. With an average pre-installation period heating usage of 1,362 kWh, the gross savings represent a 16.5% reduction in heating usage. The overall relative precision at the 90% confidence level is ±7%.

Table 40. CY 2022 Smart Thermostat Verified Gross Electric Heating Savings

Evaluation Year	Group	Participant Count	Verified Heating Savings (kWh)	Precision at 90% Level	Heating PRENAC (kWh)	Verified Percentage Savings
2017	All	2,110	115	24%	810	14.2%
2022	**All**	**4,544**	**224**	**7%**	**1,362**	**16.5%**
2022	Furnace	4,290	207	12%	1,204	17.2%
2022	HP	254	509	31%	4,030	12.6%

As shown in Table 41, participants installing smart thermostats saved an average of 32 therms in natural gas heating, compared with the 2017 billing analysis estimate of 31 therms. With average pre-installation period heating usage of 706 therms, the gross savings represent a 4.5% reduction in natural gas heating usage. The overall relative precision at the 90% confidence level is ±8%.

Table 41. CY 2022 Smart Thermostat Verified Gross Natural Gas Heating Savings

Evaluation Year	Group	Participant Count	Verified Savings (Therms)	Precision at 90% Level	Weather Sensitive PRENAC (Therms)	Verified Percentage Savings
2017	All	2,427	31	9%	670	4.6%
2022	**All**	**4,277**	**32**	**8%**	**706**	**4.5%**
2022	Furnace	4,127	32	7%	692	4.6%
2022	Boiler	150	43	35%	1,087	3.9%

Insulation and Air Sealing: Verified Gross Savings Results

For the Insulation and Air Sealing Offering, the evaluation team conducted a database review and consulted the 2022 TRM to inform verified gross savings. The offering had a gross lifecycle realization rate of 100% MMBtu.

For multifamily air sealing measures, the team conducted desk reviews of 10 projects to verify *ex ante* savings according to each project's information and inputs. Assuming a coefficient of variation of 0.2, a sample size of 10 for the population of 112 air sealing projects provides a 90% confidence interval with 10% relative precision. The team found one discrepancy in which *ex ante* savings incorrectly used the home's total square footage rather than the square footage of the improved attic area. This resulted in a 50% realization rate for the project. However, all other air sealing reviews used the correct square footage to calculate savings, and the low realization rate for the one error did not have a notable effect on the measures' overall realization rates. Because projects in the desk review were randomly sampled and assumed to be representative of the population, the team applied realization rates from the desk reviews to all multifamily air sealing measures.

Table 42 lists the CY 2022 *ex ante* and verified gross first-year and lifecycle savings for the Insulation and Air Sealing Offering. Savings by measure can be found in *Appendix E. Detailed Findings* in Volume III.

Table 42. CY 2022 Insulation and Air Sealing *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
Insulation and Air Sealing, Standard						
First-Year Gross Savings	2,611,007	674	282,460	2,615,047	674	281,532
Lifecycle Gross Savings	68,191,182	674	7,096,873	68,240,979	674	7,095,039
Insulation and Air Sealing, Income Qualified						
First-Year Gross Savings	236,159	115	49,012	236,355	115	48,960
Lifecycle Gross Savings	5,776,645	115	1,184,840	5,757,152	115	1,192,195
Insulation and Air Sealing, Total						
First-Year Gross Savings	2,847,166	789	331,472	2,851,402	789	330,492
Lifecycle Gross Savings	73,967,827	789	8,281,713	73,998,131	789	8,287,234

Renewable Energy: Verified Gross Savings Results

The engineering desk reviews of and in-person site visits to 50 residential and 22 commercial projects in CY 2021 found one error in claimed savings. The source of the error was corrected in the 2022 TRM, which made the realization rate adjustment from the CY 2021 evaluation no longer applicable. Therefore, CY 2022 *ex ante* savings were carried through as verified gross savings results with a 100% realization rate for all sectors.

Table 43 shows the *ex ante* and *ex post* verified savings for the Renewable Energy Offering by sector and overall. The table also calls out savings specific to the Renewable Energy Pilots (Affordable Housing and Tribal Nations).

Table 43. CY 2022 Renewable Energy *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
Renewable Energy, Residential						
First-Year Gross Savings	24,816,283	8,402	-	24,816,283	8,402	-
Lifecycle Gross Savings	620,713,321	8,402	-	620,713,321	8,402	-
Renewable Energy, Residential Pilots						
First-Year Gross Savings	277,959	91	-	277,959	91	-
Lifecycle Gross Savings	6,948,982	91	-	6,948,982	91	-
Renewable Energy, Commercial						
First-Year Gross Savings	18,307,008	6,124	-	18,307,008	6,124	-
Lifecycle Gross Savings	457,675,208	6,124	-	457,675,208	6,124	-
Total Renewable Energy						
First-Year Gross Savings	43,401,251	14,616	-	43,401,251	14,616	-
Lifecycle Gross Savings	1,085,337,510	14,616	-	1,085,337,511	14,616	-

Verified Net Savings Results for Trade Ally Solutions

The evaluation team used a variety of NTG analyses to calculate measure-level NTG ratios for offerings in Trade Ally Solutions. The team selected the NTG approach based on the project type and the data available for measures in the offering, as shown in Table 44. The team's analyses are further detailed in the following sections.

Table 44. CY 2022 Trade Ally Solutions NTG Approaches

Offering	NTG Approach
Heating and Cooling, Standard	CY 2020 standard market practice (SMP) analysis Self-report responses from CY 2020 participant surveys
Heating and Cooling, Income Qualified	Assumed 100% NTG
Heating and Cooling, Pilots	Assumed 100% NTG
Insulation and Air Sealing, Standard and Income Qualified	Weighted average NTGs based on 100% NTG for projects completed after 2/11/2022 and NTGs from CY 2020 billing analysis results for projects approved prior to 2/11/2022
Renewable Energy, Residential	Self-report responses from CY 2021 participant surveys
Renewable Energy, Commercial	Self-report responses from CY 2021 participant surveys
Renewable Energy, Residential Pilots	Assumed 100% NTG

The evaluation team calculated an overall lifecycle NTG estimate of 67% for CY 2022. Table 45 shows the weighted average NTG ratio by offering.

Table 45. CY 2022 Trade Ally Solutions First-Year Net Savings and NTG

Offering	Total First-Year Verified Gross Savings (MMBtu)	Total First-Year Net Savings (MMBtu)	NTG Ratio
Heating and Cooling, Standard	183,510	128,583	70%
Heating and Cooling, Income Qualified	15,481	15,481	100%
Heating and Cooling, Pilots	317	317	100%
Heating and Cooling, Total	199,307	144,380	**72%**
Insulation and Air Sealing, Standard	37,076	37,013	100%
Insulation and Air Sealing, Income Qualified	5,702	5,589	98%
Insulation and Air Sealing, Total	**42,778**	**42,603**	**100%**
Renewable Energy, Residential	84,673	35,563	42%
Renewable Energy, Residential Pilots	948	948	100%
Renewable Energy, Commercial	62,464	38,832	62%
Renewable Energy, Total	**148,085**	**75,343**	**51%**
Total Trade Ally Solutions	**390,171**	**262,326**	**67%**

Heating and Cooling Offering

The evaluation team used a combination of historical standard market practice (SMP) and self-report freeridership analyses to estimate NTG for the Heating and Cooling Offering.

Standard Market Practice

In CY 2020, the evaluation team analyzed 2019 market and home assessment data using SMP analysis to calculate NTG ratios for furnaces. The team also administered a participant survey to solicit information that informed freeridership and spillover estimates for all other measures, such as boilers, heat pumps, and smart thermostats, in the Heating and Cooling Offering. The team carried forward the results of the CY 2020 SMP analysis to inform the market-based baseline efficiency ratings used to calculate net verified energy and demand savings for natural gas furnaces in the CY 2022 evaluation.[14]

Table 46 lists the averages of actual AFUE values, market savings (therms), and market-based freeridership scores for natural gas furnaces rebated through the offering. Efficient AFUE values represent actual installed furnaces tracked in SPECTRUM, while market baseline AFUE values are from the CY 2020 SMP analysis. The table also shows baseline AFUE values deemed by the 2022 TRM, but it is important to note that the baseline AFUE for furnace measures was updated from 80 in the 2021 TRM to 86.7 in the 2022 TRM. The team calculated savings by measure using both the 2021 and the 2022 baseline AFUEs then weighting the results by units approved before and after the TRM update (February 11, 2022). The savings shown in this table are based on the TRM 2022 AFUE baseline.

Table 46. CY 2022 Natural Gas Furnace Therm Savings and Market-Based Freeridership

Measure Name	MMID	Efficient AFUE [a]	Actual Installed		Market		Market-Based Freeridership
			Baseline AFUE [b]	Therm Savings	Baseline AFUE [c]	Therm Savings	
MF NG Furnace, Multistage+, 95% AFUE	4950	95.0	86.7	65.4	90.05	37.6	43%
MF NG Furnace, Multistage+, 96% AFUE	4951	96.1	86.7	71.4	90.05	44.2	38%
MF NG Furnace, Multistage+, 97% AFUE	4952	97.2	86.7	94.7	90.05	62.2	34%
MF NG Furnace, Multistage+, 98%+ AFUE	4953	98.1	86.7	97.2	90.05	66.0	32%
MF NG Furnace, Single-stage, 95% AFUE	4958	95.0	86.7	57.6	90.05	33.1	43%
MF NG Furnace, Single-stage, 96% AFUE	4959	96.2	86.7	67.8	90.05	42.3	38%
NG Furnace, Multistage+, 95% AFUE	4962	95.0	92.8	16.9	93.4	12.2	28%
NG Furnace, Multistage+, 96% AFUE	4963	96.1	92.8	28.7	93.4	23.3	19%
NG Furnace, Multistage+, 97% AFUE	4964	97.1	92.8	41.6	93.4	35.6	14%
NG Furnace, Multistage+, 98%+ AFUE	4965	98.1	92.8	49.0	93.4	43.2	12%
NG Furnace, Single-stage, 95% AFUE	4970	95.0	92.8	18.0	93.4	13.0	28%
NG Furnace, Single-stage, 96% AFUE	4971	96.2	92.8	27.6	93.4	22.6	18%

[a] Efficient AFUE derived from actual installed furnaces tracked in SPECTRUM; used as the efficient case to calculate verified gross and net savings.
[b] Baseline AFUE deemed by the 2022 TRM; used as the base case to calculate verified gross savings.
[c] Market baseline AFUE determined using CY 2020 SMP methodology; used as the base case to calculate verified net savings. Note that for multifamily measures, the market baseline AFUE is taken calculated as the average of the TRM-deemed baseline AFUE (86.7) and the baseline AFUE from the 2020 SMP methodology (93.4). Multifamily residents lag in technology adoption compared with the rest of the market, so the market baseline is adjusted down to account for this.

[14] For more information about the CY 2020 SMP analysis, see the Trade Ally Solutions chapter in the CY 2020 annual report. Cadmus. May 21, 2021. *Focus on Energy Calendar Year 2020 Evaluation Report. Volume II Program Evaluations.* Prepared for Public Service Commission of Wisconsin. https://www.focusonenergy.com/sites/default/files/inline-files/Evaluation_Report-2020-Volume_II.pdf

Self-Report Freeridership

For all non-furnace measures in the standard track, the evaluation team applied NTG results from a CY 2020 participant survey. The survey included questions that allowed the team to calculate freeridership (measures that would have been purchased without the offering's influence) and spillover (offering-induced energy-saving actions). To calculate the NTG, the team combined self-reported freeridership and participant spillover results using the following equation:

$$NTG = 1 - Freeridership\ Ratio + Participant\ Spillover\ Ratio$$

Table 47 shows the NTG results applied to the Heating and Cooling Standard Offering in CY 2022.

Table 47. Heating and Cooling Freeridership and Spillover Results

Measure	Freeridership	Spillover	NTG (1 – Freeridership + Spillover)
Air-Source Heat Pump Boiler Ductless Minisplit Heat Pump ECM Ground Source Heat Pump Tune Ups Water Heater, Indirect	46%	1%	55%
Smart Thermostats	31%	1%	70%

Insulation and Air Sealing;

In CY 2020, the evaluation team conducted a billing analysis of completion projects rebated through the Insulation and Air Sealing Offering. As shown in Table 48, the study found that deemed electric savings for homes with natural gas heat tended to be understated, and other deemed savings tended to be overstated.

Table 48. CY 2020 Insulation and Air Sealing NTG Results

Offering Track	Completion Measure	Savings Type	NTG
Standard	Natural Gas Heat	Electricity	133%
Standard	Natural Gas Heat/Natural Gas Heat Only	Natural Gas	90%
Standard	Electric Heat	Electricity	97%
Income Qualified	Natural Gas Heat	Electricity	126%
Income Qualified	Natural Gas Heat/Natural Gas Heat Only	Natural Gas	78%
Income Qualified	Electric Heat	Electricity	97%

The 2022 TRM was updated to address findings from the CY 2020 billing analysis. Therefore, the team assumed that projects rebated under the 2022 TRM (beginning February 11, 2022) had an NTG of 100%. For projects under the 2021 TRM, the team applied NTG results from Table 48.

Renewable Energy Offering Net-to-Gross

To calculate NTG for the Renewable Energy Offering, the evaluation team applied NTG results from a CY 2021 participant survey. The survey included questions that allowed the team to calculate

freeridership (measures that would have been purchased without the offering's influence) and spillover (offering-induced energy-saving actions). The results from the CY 2021 participant survey were used in the CY 2022 evaluation, with the exception of the Affordable Housing and Tribal Nations Pilots, where NTG was assumed to be 100% because of the significant incentives and the targeted outreach of these pilots.

To calculate measures' final NTG ratios, the evaluation team combined self-report freeridership and spillover using the following equation.

$$NTG = 1 - Freeridership\ + Participant\ Spillover$$

Table 49 shows the self-report freeridership , spillover, and final NTGs that were applied to the Renewable Energy Offering in CY 2022.

Table 49. Renewable Energy Freeridership and Spillover Results by Sector

Sector	Freeridership	Spillover	NTG (1 – Freeridership + Spillover)
Residential	58%	0%	42%
Residential Pilots	0%	0%	100%
Commercial	38%	0%	62%

Process Evaluation

Because CY 2022 is the final year of the quadrennium and had very few changes, the evaluation team conducted only stakeholder interviews and customer satisfaction surveys for Trade Ally Solutions.

Process Evaluation Methodology

Table 50 summarizes the stakeholder interview and customer satisfaction survey activities and their sample sizes. Process activities and findings are described in the discussion below.

Table 50. CY 2022 Data Collection Activities and Sample Sizes – Process Evaluation

Activity	Insulation and Air Sealing	Heating and Cooling	Renewable Energy, Residential	Renewable Energy, Commercial	Total
Stakeholder Interviews	2 across all offerings				**2**
Customer Satisfaction Surveys	1,527 across all offerings			0	**1,527**
Customer Satisfaction Surveys, Retail Thermostats	0	288	0	0	**288**

Administrator and Implementer Interviews

The evaluation team interviewed the administrator and the implementer in September 2022 to learn how well the Trade Ally Solutions' offerings were working and to assess objectives, performance, and implementation challenges and resolutions. The team also asked about marketing, engagement with trade allies and customers, and lingering impacts from the COVID-19 pandemic.

Ongoing Participant Satisfaction Surveys

Throughout CY 2022, the administrator emailed Trade Ally Solutions participants links to the web-based satisfaction surveys.

There were two objectives for these satisfaction surveys:

- Understand customer satisfaction on an ongoing basis and respond to any changes in satisfaction before the end of the annual reporting schedule
- Help to facilitate timely follow-up with customers to clarify and address service concerns

Using contact information stored in SPECTRUM, the administrator ran web-based satisfaction surveys throughout the year to CY 2022 participants. The number of completed surveys reported are shown in Table 50. The survey covered several topics including overall satisfaction, satisfaction with offering staff and trade allies, and likelihood of recommending Focus on Energy.

Solution Design and Delivery

Trade Ally Solutions provided incentives through three offerings (Insulation and Air Sealing, Heating and Cooling, and Renewable Energy) to reduce the upfront cost of efficient home upgrades and the installation of efficient heating and cooling equipment or solar PV systems. Certified trade allies worked with customers to complete these improvements and apply for incentives. Business customers could also participate by installing a solar PV system through the Renewable Energy Offering.

Focus on Energy increased incentives and bonuses for several measures under Trade Ally Solutions during CY 2022. More details about the design and delivery of the Insulation and Air Sealing, Heating and Cooling, and Renewable Energy Offerings in CY 2022 and several pilots that Focus on Energy tested are presented in the following sections.

Insulation and Air Sealing Offering

This offering provides incentives for installing efficient building shell measures. Single-family and multifamily customers can participate through two paths:

- **Trade Ally Installed.** Customers can hire a Focus on Energy trade ally contractor to conduct a home energy assessment and identify areas for improvement. Following the energy assessment, customers choose which insulation and air sealing improvements to make and work with a trade ally to complete the project and apply for incentives. Customers can opt to forego the assessment and air sealing incentive and still receive an incentive for having insulation installed by a trade ally contractor. Customers wishing to receive an incentive for completing ENERGY STAR–qualified air sealing must complete an energy assessment to receive the incentive.
- **Do-It-Yourself (DIY).** Customers can self-install attic insulation and air sealing to receive a $200 cashback incentive. Both attic insulation and air sealing must be installed according to Focus on Energy's DIY Guide to Insulation and Air Sealing. In addition, at least 600 square feet of attic area must be improved to an insulation level of R-42 or greater. This incentive is available only to one-, two-, or three-unit buildings.

The Insulation and Air Sealing Offering provides two incentive tiers: standard and income qualified. Customers qualify for income qualified incentives if their household income is at or below 80% of the state median income by household size. Customers who live in single-family homes or own multifamily buildings with three or fewer units under one roof are eligible for a flat incentive for each measure. Customers who own multifamily dwellings of four or more units under a single roof are eligible for incentives based on the square footage of their spaces. Table 51 shows measures and tiered incentives for single-family and multifamily participants in buildings with three or fewer units.

Table 51. Single-Family and Multifamily (three or fewer units) Insulation and Air Sealing Measures and Incentives

Measure	January 1 – December 31, 2022	
	Standard Incentive	Income Qualified Incentive
ENERGY STAR-Qualified Air Sealing	$450	$750
Attic Insulation	$350	$450
Foundation Insulation	$100	$150
Wall Insulation	$300	$300
Duct Sealing and Insulation	$50	$50
DIY Attic Insulation and Air Sealing	$200	$200

In CY 2022, Focus on Energy increased the bonus for multifamily customers installing insulation and air sealing measures. This change was designed to increase participation and get closer to reaching the offering's goals. Though participation did not increase, the bonus increase was well received by trade allies. The implementer said trade allies are using the bonus increase as a sales tool.

Insulation and Air Sealing Pilots

Focus on Energy operated three pilots in CY 2022 as part of the Insulation and Air Sealing Offering:

- Healthy Homes
- Income Qualified
- Manufactured Homes

Healthy Homes Pilot. Launched in CY 2020, this pilot partners with hospitals to target homes of juvenile patients with asthma and allergies. The pilot offers traditional insulation and air sealing packages with a focus on indoor air quality. Measures in this package include fans, dehumidifiers, air purifiers, additional filtration for forced-air systems, and loggers to track indoor air quality over time. In CY 2021, the implementer reported difficulties in finding participants because the COVID-19 pandemic created staffing and resource shortages for healthcare providers who identify eligible households. The implementer partnered with one healthcare system in October 2022; however, that partnership did not fully materialize due to staff turnover at the partnering institution. This pilot will not continue in CY 2023 unless a healthcare system partner agrees to work with Focus on Energy to mutually fund the health-related measures of the home upgrade process.

Income Qualified Pilot. Through this pilot, Focus on Energy collaborated with the Department of Administration to assess how Focus on Energy can support weatherization work for income-qualified customers. The pilot faces challenges with cost-effectiveness and budget constraints. Despite collaboration efforts with the Department of Administration, the pilot remained inactive. One area of potential collaboration that was explored was in covering deferrals in the Weatherization Assistance Program (WAP), but discussions revealed little need to cover deferrals due to recent budgetary and programmatic changes in the WAP at the federal level. Upon discovering these changes, the implementer pivoted to partner with Superior Water, Light & Power to launch an income-qualified offering for its customers, where Focus on Energy covered the costs for all weatherization work. The offering was launched at the end of CY 2022 and quickly gained popularity, with a full waitlist and a significant number of trade allies eager to participate. Despite this success, the need for make-ready repairs has posed a significant challenge to moving projects forward. Discussions for potential collaborations with the Department of Administration, including for solar installations, are ongoing in CY 2023, but the future of the Superior Water, Light & Power offering is uncertain without additional funding.

Manufactured Homes Pilot. This pilot, designed to weatherize manufactured homes, had a slow start and made limited progress in CY 2022. The pilot was ultimately integrated into the Tribal Nations Pilot (see the *Heating and Cooling Pilots* section below). However, the implementer found it was difficult to integrate a new housing type into the already complex Tribal Nations Pilot, and only a few manufactured homes were weatherized in CY 2022 as part of this effort. The implementer is creating a materials and installation standard guide for manufactured homes, but the pilot's continuation in CY 2023 will be determined by budget availability and energy-savings needs.

Heating and Cooling Offering

This offering provides incentives to customers in single-family homes looking to upgrade their HVAC equipment. Multifamily dwellings of four or more units under a single roof are also eligible if the heating or cooling equipment is for a single unit. Eligible equipment includes furnaces, dual fuel heat pumps, air-source heat pumps, boilers, geothermal or ground source heat pumps, and smart thermostats. Customers work with trade allies to identify equipment eligible through the offering and apply for an incentive.

The Heating and Cooling Offering provides two incentive tiers: standard and income qualified. To qualify for income qualified incentives, the annual or monthly household income must be at or below 80% of the state median income by household size. Table 52 shows the CY 2022 incentives by tier type for the Heating and Cooling Offering.

Table 52. Heating and Cooling Measures and Incentives

Measure	January 1– December 31, 2022	
	Standard Incentive	Income Qualified Incentive
Smart Thermostats		
ENERGY STAR Smart Thermostat	$50	$50
Natural Gas Furnaces		
97%+ AFUE Multistage Furnace	$150	$550
96% AFUE Furnace	$100	$450
95% AFUE Furnace	$50	$350
ECM Blower Fan Replacement (must replace existing PSC motor)	$25	$25
Natural Gas Boilers		
95%+ AFUE Combination Boiler	$500	$700
90-94% AFUE Combination Boiler	$400	$600
95%+ AFUE Standard Boiler	$400	$550
90-94% AFUE Standard Boiler	$300	$450
Indirect Water Heater (installed at same time as a qualifying boiler)	$100	$150
Heat Pumps		
Ducted Dual Fuel Heat Pump (offsetting existing natural gas, 15+ SEER, 8.5+ HSPF) *June 1 through December 31, 2022, an additional bonus of $500 for qualifying systems.*	$1,000	$1,000
Ducted or Dual Fuel Heat Pump (offsetting existing liquid propane, fuel oil, or electric resistance, 15+ SEER, 8.5+ HSPF)	$300	$300
Mini-split or Multi-split Heat Pump (offsetting natural gas or electric usage, 18+ SEER, 9.0+ HSPF)	Starts at $300	Starts at $300
Certified Geothermal or Ground Source Heat Pump, without natural gas service to home	$750	$750
Certified Geothermal or Ground Source Heat Pump, with natural gas service to home *June 1 through December 31, 2022, an additional bonus of $500 for qualifying systems*	$1,000	$1,000
Multifamily-Only Equipment	**Standard Incentive**	
Single Package Vertical Unit *(*Natural Gas, 90%+ Thermal Efficiency, 10.0+ EER Cooling)	$150	
Single Package Vertical Unit (Natural Gas, 90%+ Thermal Efficiency, 10.0+ EER Cooling)	$150	
Packaged Terminal Heat Pump	$100	

In CY 2022, Focus on Energy made two notable changes to the Heating and Cooling Offering. First, to optimize program offerings the Retail Smart Thermostat measure was moved from the Direct to Customer Solution to Trade Ally Solutions to allow all downstream heating and cooling measures to be on the same application.

Second, ground source heat pump incentives were increased to $1,000 and bonuses of $500 were offered for ground source heat pumps and dual fuel heat pumps from June through December 2022. These changes were made to align with ENERGY STAR and changes in the TRM and to improve the marketing approach. The implementer said trade allies reacted positively to the changes. Indeed, there was a significant increase in dual fuel heat pump installations, with 887 units rebated in CY 2022 compared to 172 units in CY 2021.

Heating and Cooling Pilots

Focus on Energy offered one pilot under the Heating and Cooling Offering in CY 2022. The Tribal Nations Pilot was designed to engage with tribal communities and provide higher incentives for the completion of weatherization, HVAC, and renewable energy projects. In May 2022, four out of the 11 federally recognized tribal nations in Wisconsin had committed to participating. The pilot faced challenges such as the preference of the tribal nations for earlier notification to allow more time to complete projects and supply chain issues faced by the Forest County Potawatomi that impacted their solar projects. This pilot will continue through the upcoming CY 2023-CY 2026 quadrennium, although the design may change as Focus on Energy continues to assess how best to work with and support the tribal nations. In addition to the Tribal Nations Pilot under the Heating and Cooling Offering, in CY 2022 Focus on Energy also offered a Tribal Nations Solar Pilot, which is further discussed below under *Renewable Energy Pilots*.

Renewable Energy Offering

This offering provides incentives to residential customers living in a single-family home and to businesses that install a solar PV system. Customers work with trade allies to verify that their system meets eligibility requirements and to reserve an incentive. Customers apply to receive their reserved incentive after their solar electric system installation is complete. Residential rural customers in eligible zip codes receive a bonus of up to $500 for installing a qualified system. Business customers classified as agricultural producers also qualify for an incentive match of up to $10,000.

Table 53 and Table 54 show residential and business Renewable Energy incentives for CY 2022.

Table 53. Renewable Energy Incentives, Residential

Incentive	Rural Residential Bonus[a]
$500 per system	$500

[a] Rural residential customers living in eligible zip codes can receive a $500 bonus for installing a qualified system.

Table 54. Renewable Energy Incentives, Business

System Size in kW (DC)	Incentive	Maximum Incentive
Up to 5 kW	$200 per kW (DC)	$1,000
5 kW-10 kW	$1,000 + $150 per kW above 5 kW	$1,750
10 kW-100 kW	$1,750 + $125 per kW above 10 kW	$13,000
100 kW-300 kW	$13,000 + $100 per kW above 100 kW	$33,000
300 kW-500 kW[a]	$33,000 + $85 per kW above 300 kW	$50,000

[a] Solar PV systems 500 kW and above were capped at the maximum incentive of $50,000.

Focus on Energy implemented one significant change to the Renewable Energy Offering in CY 2022. The Special Sector Solar Pilot became a branch of the offering, rather a stand-alone pilot. The Renewable Energy Offering provides higher incentives to help organizations that do not qualify for the solar investment tax credit—such as nonprofits, schools, government, and Tribal Nations—by offsetting the cost of installing solar electric systems. Special sector organizations that install qualifying equipment are eligible to receive up to $81,000 in incentives. The implementer reported 31 installations by November

2022, totaling 5,190 kW, and 52 reservations for incentives totaling another 6,236 kW. Focus on Energy will not continue the pilot in CY 2023 as the federal Inflation Reduction Act of 2022 expanded the solar investment tax credit to include these entities, but projects with reservations will be honored into CY 2023.

Renewable Energy Pilots

Under the Renewable Energy Offering, Focus on Energy operated the Tribal Nations Solar Pilot and the Affordable Housing Solar PV Pilot.

Tribal Nations Solar Pilot. In addition to the Tribal Nations Pilot (discussed above under *Heating and Cooling Pilots*), in CY 2022 Focus on Energy launched the Tribal Nations Solar Pilot to provide higher incentives for tribal nations to install solar on member- and nation-owned homes. However, despite the efforts of the tribes to secure contractors for installations at $2,500 per kW by leveraging large commercial projects, the pilot was not successful in completing any systems before the end of CY 2022. This was due to supply chain issues faced by the most active participant, Forest County Potawatomi. The solar pilot officially ended in December 2022, and its future will be determined based on budget availability and savings goals.

Affordable Housing Solar PV Pilot. Also referred to as the New Construction Income Qualified Solar Pilot, this pilot aims to promote collaboration between affordable housing developers, builders, and Focus on Energy to install solar PV systems on income-qualified new construction homes. The pilot offers higher incentives for these installations. According to the implementer, roughly half of the 81 potential systems were completed by the end of CY 2022. Habitat for Humanity worked with the Midwest Renewable Energy Association to secure competitive pricing of $2,500 per kW through Arch Solar, but implementation has faced delays due to difficulties in securing agreement among local Habitat for Humanity chapters. To address this, Focus on Energy is developing a new incentive structure with lower incentives, in coordination with Affordable Housing Providers, for CY 2023.

Marketing and Outreach

In CY 2022, the Trade Ally Solutions marketing and outreach efforts focused on promoting the benefits of the offerings and sharing customer testimonials.

To market Heating and Cooling, there was a continued focus on digital promotion with targeted emails and digital ads, as well as cross-promotion. The digital strategies were reported to be successful, except for an advertisement on the website, Next Door. For Insulation and Air Sealing, the main marketing approach was targeted email. The implementer created a series of explanatory videos that generated high engagement and yielded good results.

Trade Allies

The number of participating trade allies increased slightly, to 960 in CY 2022 from 940 in CY 2021. The implementer reported receiving satisfactory feedback from trade allies during CY 2022. Property Assessed Clean Energy (PACE) Wisconsin and the Building Performance Institute provided new training

on financing and certification, respectively, for building analysts. Focus on Energy also launched the Trade Ally Training Initiative Pilot during CY 2022.

Trade Ally Training Initiative Pilot. Focus on Energy launched this pilot, also known as the HVAC Career Exploration Program, in March 2022. The goal of the pilot is to support the trade ally network by providing training for students in the HVAC, renewables, insulation, and air sealing industries. The pilot offers flexible and scalable training options to enable collaboration with trade allies and school districts, with the goal of filling technical support gaps in the industry and developing a talent pipeline for trade allies. During CY 2022, the pilot developed career videos in HVAC solar and collaborated with the Wisconsin Technology Education Association (WTEA) to disseminate information to technical education high school teachers throughout the state. Teachers, the WTEA, and HVAC trade allies all provided positive feedback about the pilot. Focus on Energy will continue with the pilot in CY 2023.

Customer Satisfaction Results for the Trade Ally Solution

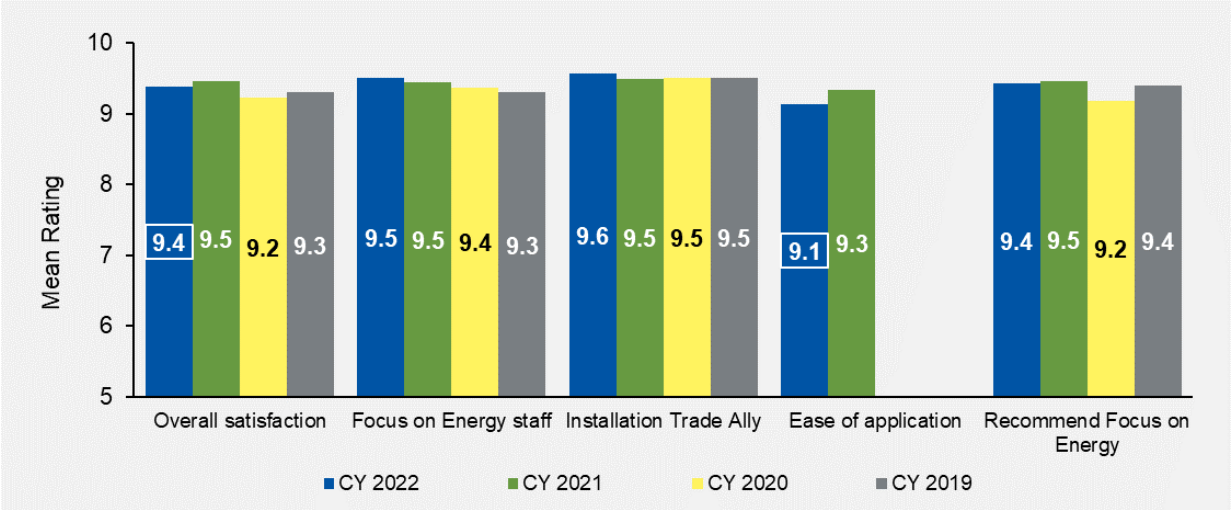
Throughout CY 2022, the Trade Ally Solutions administrator invited participants in the three main offerings to take web-based satisfaction surveys. There was also a survey for customers who received rebates for purchasing smart thermostats. Respondents answered questions related to satisfaction and the likelihood to recommend Focus on Energy on a scale of 0 to 10, where 10 indicated the highest degree of satisfaction or likelihood to recommend and 0 the lowest.[15]

Figure 17 shows that Trade Ally Solutions participants gave the offerings they participated in an average overall satisfaction rating of 9.4 in CY 2022, which was statistically lower than CY 2021 ratings for this solution (9.5), but higher than CY 2020 (9.2). For the entire quadrennium, satisfaction with Trade Ally Solutions was statistically higher than the portfolio target (8.9).[16] CY 2022 ratings for the ease of applying for incentives (9.1) also decreased significantly from CY 2021 (9.3). Respondents gave high average satisfaction ratings for Focus on Energy staff (9.5) and the trade allies they worked with (9.6) in CY 2022, consistent with ratings from previous years.

[15] The number of participants who completed a survey does not always match the number of responses for each question, because some participants skipped or did not know answers to questions.

[16] The administrator's contract established a portfolio target of 8.9 to maintain or increase customer satisfaction.

Figure 17. Satisfaction Ratings for Trade Ally Solutions

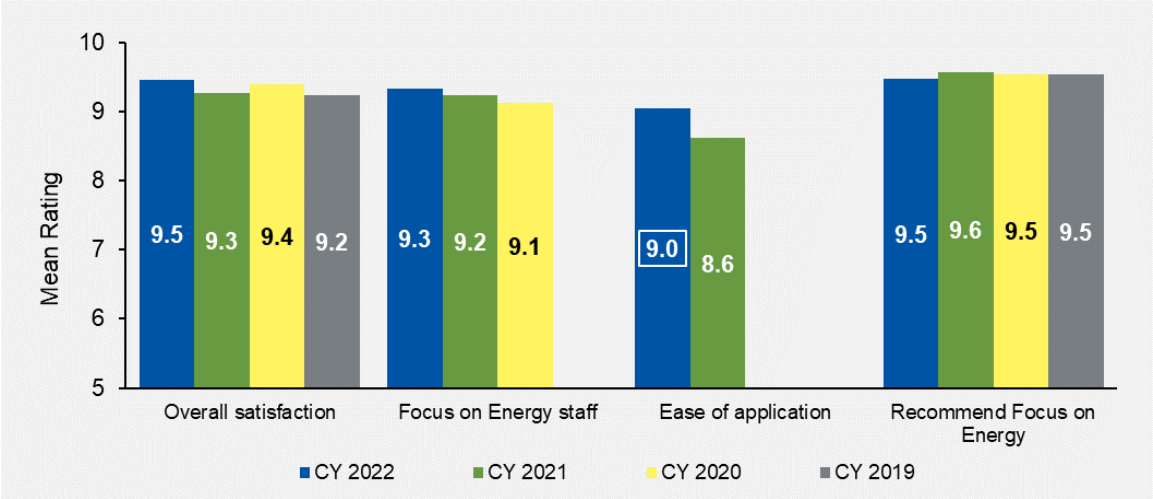


Source: Trade Ally Solutions Participant Satisfaction Survey Questions. "Overall, how satisfied are you with your most recent experience with Focus on Energy?" (CY 2022 n=1,524; CY 2021 n=1,409; CY 2020 n=1,344; CY 2019 n=1,854). "How satisfied are you with the Energy Advisor or Focus on Energy staff member who assisted you with your project?" [17] (CY 2022 n=565; CY 2021 n=479; CY 2020 n=434; CY 2019 n=711). "How satisfied are you with the contractor that provided your home upgrades?" (CY 2022 n=1,402; CY 2021 n=1,260; CY 2020 n=1,163; CY 2019 n=1,809). "How satisfied are you with the ease of submitting your rebate application?" (CY 2022 n=1,511; CY 2021 n=1,193; this question was not asked in prior surveys). "How likely are you to recommend Focus on Energy to others?" (CY 2022 n=1,520; CY 2021 n=1,405; CY 2020 n=1,343; CY 2019 n=1,835). Boxes around ratings indicate a statistically significant difference from the portfolio target ($p<0.10$ using t-tests).

Figure 18 shows that Retail Smart Thermostat participants were highly satisfied with the offering overall in CY 2022 (9.5), and this rating was statistically higher than the portfolio goal (8.9). There was a significant improvement for the ease of applying for rebates to 9.0 in CY 2022, up from 8.6 in CY 2021.

[17] All surveys gave respondents the opportunity to rate staff, though they were not required to give a rating since their participation in an offering may not have involved any contact with staff.

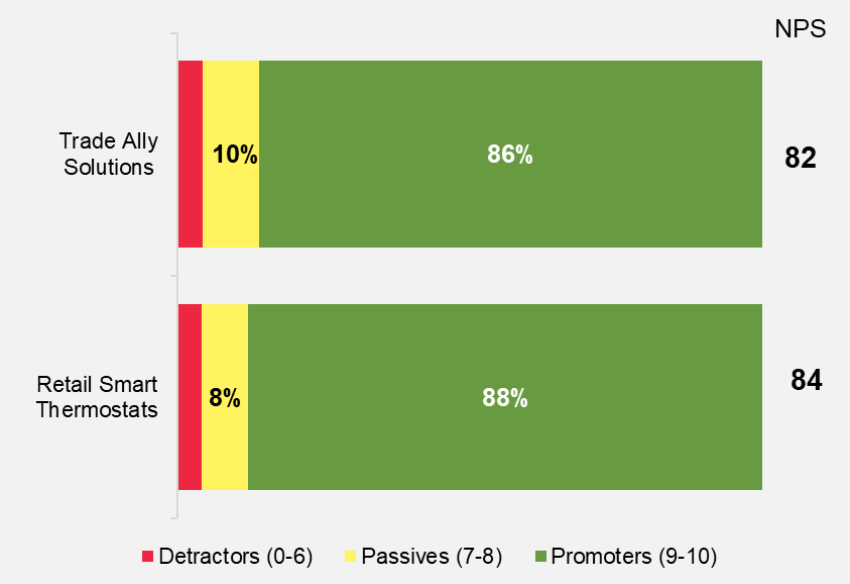
Figure 18. Satisfaction Ratings for Retail Smart Thermostats



Source: Retail Smart Thermostats Participant Satisfaction Survey Questions. "Overall, how satisfied are you with your most recent experience with Focus on Energy?" (CY 2022 n=287; CY 2021 n=158; CY 2020 n=428; CY 2019 n=804). "How satisfied are you with the Energy Advisor or Focus on Energy staff member who assisted you with your project?" (CY 2022 n=83; CY 2021 n=34; CY 2020 n=103; this question was not asked in prior surveys). "How satisfied are you with the ease of submitting your rebate application?" (CY 2022 n=286; CY 2021 n=158; this question was not asked in prior surveys). "How likely are you to recommend Focus on Energy to others?" (CY 2022 n=288; CY 2021 n=155; CY 2020 n=426; CY 2019 n=803). Boxes around ratings indicate a statistically significant difference between CY 2022 and CY 2021 ($p<0.05$ using t-tests).

CY 2022 participants gave high ratings for their likelihood to recommend Focus on Energy, averaging 9.4 for Trade Ally Solutions and 9.5 for Retail Smart Thermostats. Using these survey data, the evaluation team calculated a net promoter score (NPS) based on customers' likelihood to recommend Focus on Energy. The NPS is expressed as an absolute number between -100 and +100 that represents the difference between the percentage of promoters (respondents giving a rating of 9 or 10) and detractors (respondents giving a rating of 0 to 6). Trade Ally Solutions received a high NPS of +82 in CY 2022, equivalent to the NPS of +84 for CY 2021. The NPS for Retail Smart Thermostats was also high, at +84 in CY 2022 and equivalent to the CY 2021 NPS of +88. Net promoter scores and the distribution of promoters and detractors are shown in Figure 19.

Figure 19 Net Promoter Scores for Trade Ally Solutions and Retail Smart Thermostats

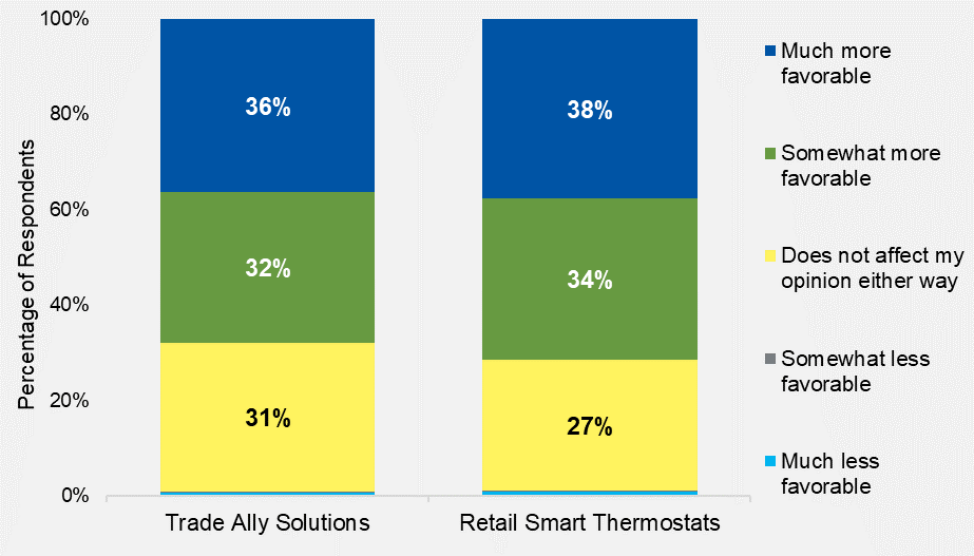


Source: Trade Ally Solutions and Retail Smart Thermostats Participant Satisfaction Survey Question. "How likely are you to recommend Focus on Energy to others?" (Trade Ally Solutions n=1,520; Retail Smart Thermostats n=288).
Note: Unlabeled segments represent 4% or less of respondents.

Most respondents were aware that the offering in which they participated was offered in partnership with their local utility before receiving the satisfaction survey. Among Trade Ally Solutions survey respondents, 62% (n=1,514) were aware in CY 2022, similar to CY 2021 (59%, n=1,397). Among Retail Smart Thermostat respondents, 71% (n=283) were aware in CY 2022, similar to CY 2021 (75%, n=154).

CY 2022 participants were asked if Focus on Energy offerings affected their opinion of their utilities (Figure 20), and 68% of Trade Ally Solutions and 71% of Retail Smart Thermostat respondents reported that their opinion had become *much more favorable* or *somewhat more favorable*. Very few respondents indicated that their opinion of their utility became less favorable; for both offerings, only 1% of respondents' opinions became *much less favorable* or *somewhat less*.

Figure 20. Focus on Energy Offerings Impact on Trade Ally Solutions Participants' Opinion of Utilities



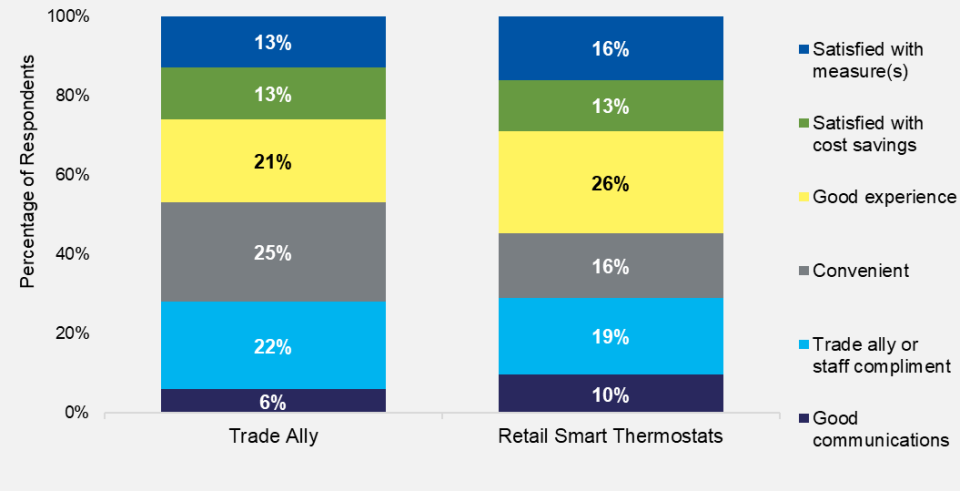
Source: Trade Ally Solutions and Retail Smart Thermostats Participant Satisfaction Survey Question. "How have these offerings affected your opinion of your energy utility, if at all?" (Trade Ally Solutions n=1,392, Retail Smart Thermostats n=263). Note: Unlabeled segments represent 3% or less of respondents.

Participant Feedback and Suggestions for Improvement

In the customer satisfaction survey, the evaluation team asked participants if they had any comments or suggestions for improving Trade Ally Solutions. Of the 1,527 participants who responded, 22% provided open-ended feedback, which the team coded into a total of 428 mentions. Of these mentions, 255 were positive or complimentary comments (60%), and 173 were suggestions for improvement (40%). Of the 288 participants who responded to the Retail Smart Thermostat survey, 15% provided open-ended feedback, which the team coded into a total of 59 mentions. Of these mentions, 31 were positive or complimentary comments (53%), and 28 were suggestions for improvement (47%).

The positive responses are shown in Figure 21. The most common responses from Trade Ally Solutions respondents reflected the convenience and simplicity of participating in the offerings (25%) and appreciation for trade allies and Focus on Energy staff (22%); these were also the most common positive comments in CY 2021. Among Retail Smart Thermostat respondents, the most common positive comments reflected a generally positive experience (26%) and appreciation for trade allies and Focus on Energy staff (19%).

Figure 21. Positive Comments about Trade Ally Solutions and Retail Smart Thermostats



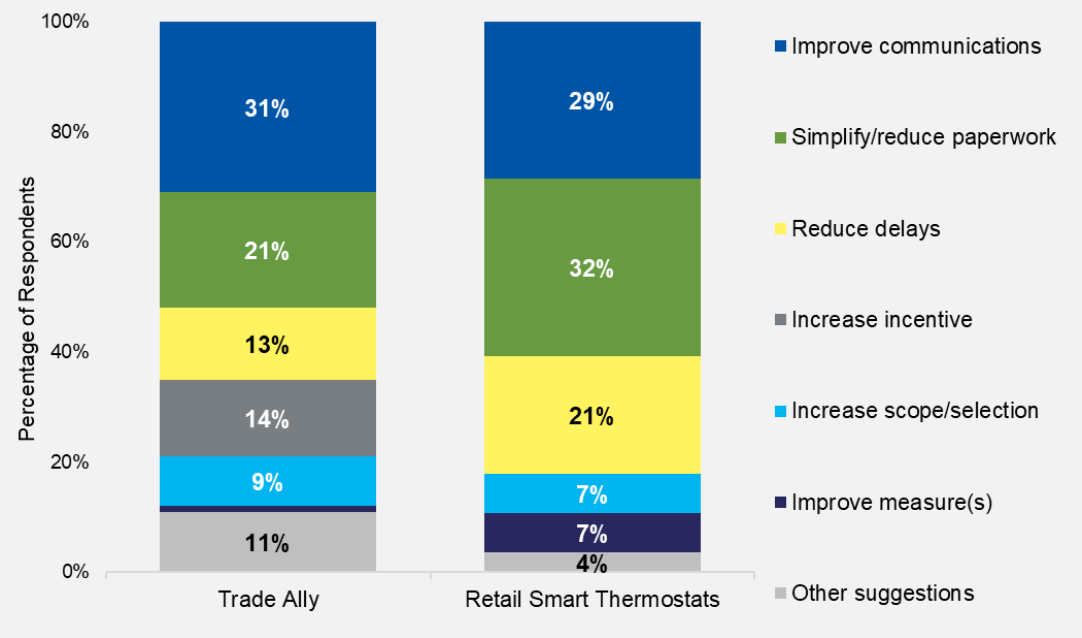
Source: Trade Ally Solutions and Retail Smart Thermostats Participant Satisfaction Survey Question. "Please tell us more about your experience and any suggestions for improvement." (Total positive mentions Trade Ally n=255, Retail Smart Thermostats n=31)

Suggestions for improvement are shown in Figure 22. The two most common suggestions were the same for both Trade Ally Solutions and Retail Smart Thermostat respondents: to improve communications about the offering (31% and 29%, respectively) and to simplify or reduce application paperwork and verification requirements (21% and 32%, respectively). CY 2022 respondents made these suggestions at rates similar to CY 2021 respondents. Reducing delays in application approval and rebate delivery were also common in CY 2022 (21% Retail Smart Thermostats, 13% Trade Ally). None of the Retail Smart Thermostat respondents suggested increasing incentive amounts, but 14% of Trade Ally Solutions responded with this suggestion. However, these were less frequent than the rate of Trade Ally Solutions suggestions to increase incentives In CY 2021 (22%, n=115).

Suggestions about improving communications typically focused on follow-up communication about rebate applications, amounts, and qualifications. Other common themes included requests for more information about saving energy and specific technologies and more promotion for Focus on Energy offerings. Some suggestions about increasing incentives were from customers who thought they should be eligible for higher incentive levels, and many suggestions along these lines noted that the amount of the incentive was a very small percentage of the price when purchasing heating and cooling equipment.

Many Trade Ally Solutions suggestions about simplifying and reducing paperwork indicated that these respondents filled out or submitted their own application forms, whereas many positive comments praising trade allies and the convenience of the offering indicated that the trade ally had filled out forms for the respondent. Other suggestions about reducing paperwork mentioned that the respondent found the income qualification information burdensome or had difficulties submitting supporting materials online. Retail Smart Thermostat suggestions about reducing paperwork mainly focused on difficulties submitting receipts and serial numbers online.

Figure 22. Suggestions for Improving the Trade Ally Solutions and Retail Smart Thermostats



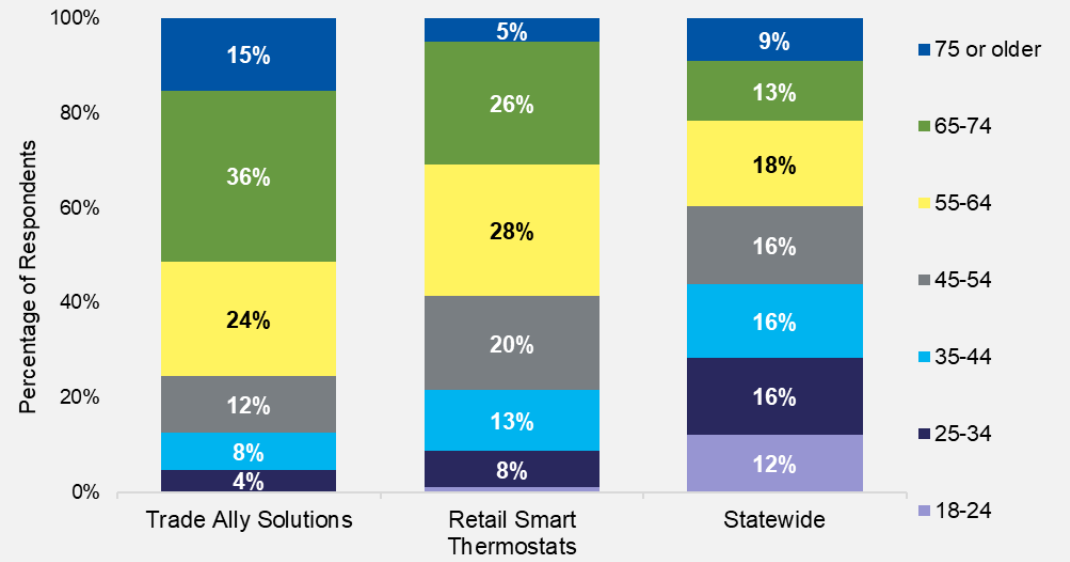
Source: Trade Ally Solutions and Retail Smart Thermostats Participant Satisfaction Survey Question. "Please tell us more about your experience and any suggestions for improvement." (Total suggestions for improvement mentions Trade Ally n=173, Retail Smart Thermostats n=28). Note: Unlabeled segments represent 3% or less of respondents.

Demographics

The customer satisfaction survey asked respondents their age (Figure 23) and income (Figure 24). The self-reported age distribution of CY 2022 Trade Ally Solutions participants was very similar to the distribution in CY 2021, with respondents reporting a median age between 65 and 74. Seventy-six percent of respondents were age 55 or older, indicating that participants tended to be older than the statewide average (40% age 55 or older). Retail Smart Thermostat respondents also reported very similar age distributions in CY 2022 and CY 2021, and they also tend to be older than the statewide average (59% age 55 or older compared to 40% statewide).

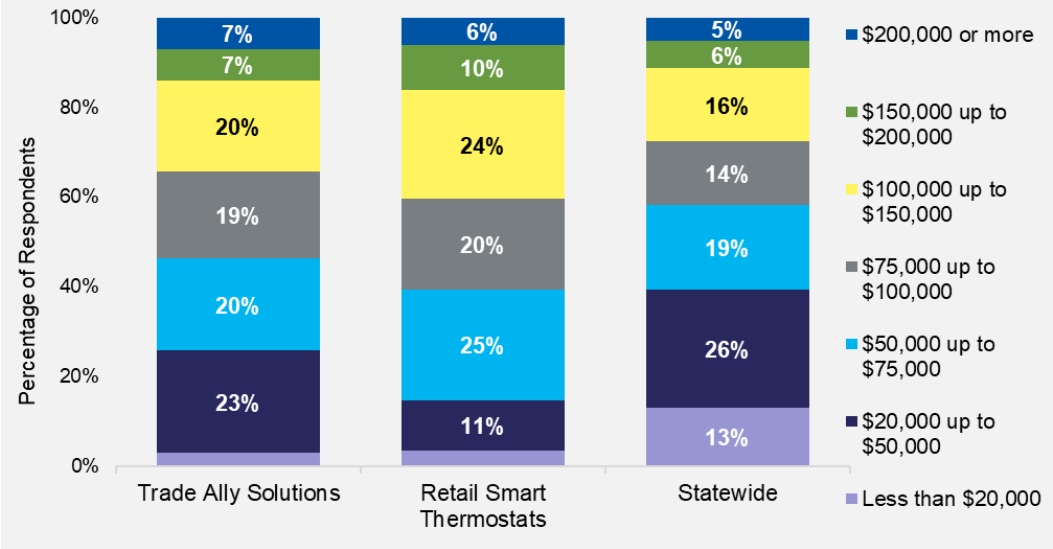
Trade Ally Solutions respondents' self-reported household income distribution was similar in CY 2022 and CY 2021, with a median income between $50,000 and $75,000. More Retail Smart Thermostat respondents in CY 2022 reported household incomes under $75,000 (39%) than in CY 2021 (27%), while the percentage reporting incomes over $100,000 declined from 50% in CY 2021 to 40% in CY 2022.

Figure 23. Trade Ally Solutions and Retail Smart Thermostats Participants' Age



Source: Trade Ally Solutions and Retail Smart Thermostats Participant Satisfaction Survey Question. "Which of the following categories best represents your age?" (Trade Ally n=1,471, Retail Smart Thermostats n=278). U.S. Census 2020 ACS, Selected Social Characteristics in the United States.
Note: Unlabeled segments represent 3% or less of respondents.

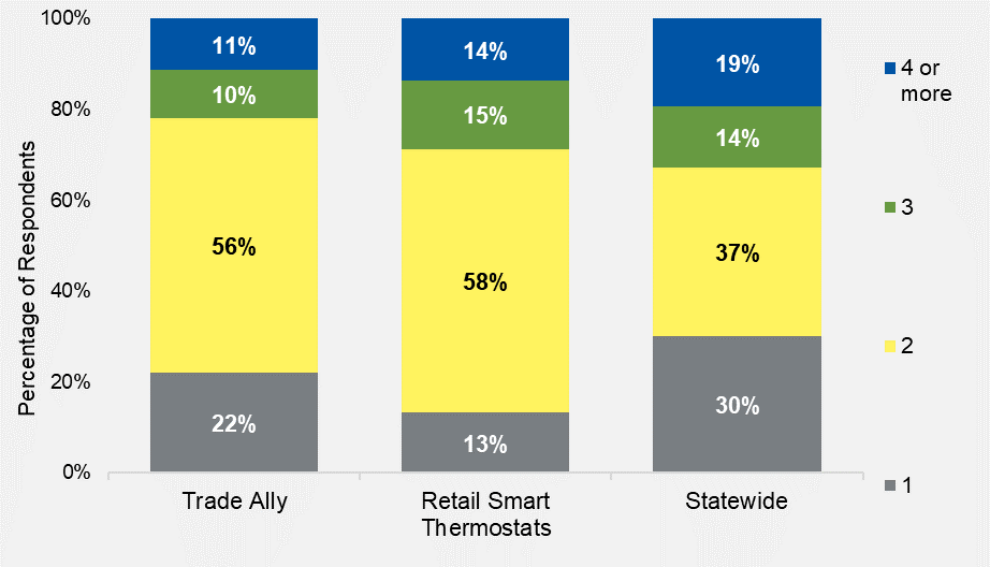
Figure 24. Trade Ally Solutions and Retail Smart Thermostats Participants' Income



Source: Trade Ally Solutions and Retail Smart Thermostats Participant Satisfaction Survey Question. "Which category best describes our total household income before taxes?" (Trade Ally n=1,088, Retail Smart Thermostats n=198). U.S. Census 2020 ACS, Selected Social Characteristics in the United States.
Note: Unlabeled segments represent 3% or less of respondents.

Most respondents lived in two-person households (56% Trade Ally Solutions, 58% Retail Smart Thermostat), which was higher than the statewide rate (37%), as shown in Figure 25.

Figure 25. Trade Ally Solutions Participants' Household Size



Source: Trade Ally Solutions and Retail Smart Thermostats Participant Satisfaction Survey Question. "Counting yourself, how many people live in your household on a full-time basis today? Please include everyone who lives in your home and exclude anyone just visiting or children who may be away at college or in the military." (Trade Ally n=1,459, Retail Smart Thermostats n=272). U.S. Census 2020 ACS, Selected Social Characteristics in the United States.

Cost-Effectiveness

Evaluators commonly use cost-effectiveness tests to compare the benefits and costs of DSM offering. The benefit/cost test used in Wisconsin is a modified version of the TRC test. *Appendix I. Cost-Effectiveness and Emissions Methodology and Analysis* in Volume III includes a description of the TRC test.

Table 55 lists the CY 2022 incentive costs for the Trade Ally Solution.

Table 55. CY 2022 Trade Ally Solution Incentive Costs

Offering	Incentive Costs
Heating and Cooling/Insulation and Air Sealing	$6,898,934
Tribes	$8,700
Residential Renewables	$2,221,631
Commercial Renewables	$2,221,407
Total	**$11,350,672**

The evaluation team found that the CY 2022 Trade Ally Solution was cost-effective when including the T&D benefits (1.11), but not when excluding them (0.97). Table 56 lists the evaluated costs and benefits.

Table 56. Trade Ally Solution Costs and Benefits

Cost and Benefit Category	Total
Costs	
Administrative Costs	$603,653
Delivery Costs	$6,444,144
Incremental Measure Costs	$81,199,147
Total Non-Incentive Costs	**$88,246,945**
Electric Benefits (kWh)	$25,920,792
Electric Benefits (kW)	$29,985,707
T&D Benefits (kW)	$12,074,959
Gas Benefits	$17,755,220
Emissions Benefits	$11,891,947
Total TRC Benefits with T&D benefits	**$97,587,928**
Net TRC Benefits with T&D benefits	**$9,381,801**
TRC Benefit/Cost Ratio with T&D benefits	**1.11**

Outcomes and Recommendations

The evaluation team presents the following outcomes and recommendations based on the CY 2022 evaluation.

Outcome 1. Focus on Energy successfully grew the dual fuel air-source heat pump measure in CY 2022, increasing the number of rebated systems in the standard Heating and Cooling Offering by 416% between 2021 and 2022. This increased in participation can be attributed to a $500 bonus offered in the second half of the year and increasing engagement with heat pump trade allies. Dual fuel heat pumps will become increasingly important in the CY 2023-CY 2026 quadrennium as the PSC has set directives for Focus on Energy to make measurable progress toward greater emphasis on reducing carbon emissions and positioning the program to take on a larger role in promoting beneficial electrification. In CY 2022, the large number of rebated heat pumps contributed to negative lifecycle kWh savings for the Heating and Cooling Standard Offering, but increased therms savings from the measure led to overall MMBtu savings.

Recommendation 1. Consider extending the success of the air-source heat pump efforts to other technologies that will shift residential customers away from natural gas usage. Heat pump water heaters replacing natural gas water heaters are another main source of carbon reductions for residential customers. Focus on Energy currently offers all water heaters, including heat pump water heaters, through the Midstream Solution. However, the TRM does not currently include savings for replacing a natural gas water heater. Focus on Energy should consider calculating savings for natural gas water heater replacements to include in future TRMs. Focus on Energy should also assess whether the current midstream delivery channel is an effective way to deliver a gas water heater replacement measure—that is, whether the program can provide adequate support to customers and contractors to encourage

gas water heater replacements and collect sufficient documentation to confirm the replaced water heater fuel type.

Outcome 2. 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 CY 2017 billing analysis. At the same time, the number of smart thermostats rebated through the standard Heating and Cooling Offering increased 32% from 2021 to 2022, despite a somewhat complex menu of smart thermostat measures that provides multiple options for smart thermostat participation depending on delivery channel (retail or contractor), sector (single-family or multifamily), and HVAC equipment age (new or existing).

Recommendation 2. Consider ways to reduce the number of thermostat measures currently available in the TRM to 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 3. Increased incentives for ground source heat pumps and multifamily insulation had minimal impact on participation in CY 2022 but show potential for an increase in CY 2023. The Heating and Cooling Offering increased its incentives for ground source heat pumps and added a bonus for the measure. The additional incentives led to a modest increase in ground source heat pumps from 74 in 2021 to 78 in CY 2022. The Insulation and Air Sealing Offering also increased incentives for multifamily insulation. Although participation in the offering did not increase in CY 2022, the pipeline of projects increased from 46 projects in the first quarter of CY 2022 to 83 projects in the first quarter of CY 2023.

Outcome 4. Many of the pilots offered through Trade Ally Solutions struggled to gain traction. While some pilots, like the Healthy Homes Pilot, continued to face implementation challenges due to difficulties partnering with or gaining support from stakeholders, others like the Income Qualified Pilot successfully attracted the attention of trade allies and future participants struggled with cost-effectiveness or met funding barriers. While Focus on Energy ended many of these pilots at the end of CY 2022, it will continue to explore funding and implementation options for some, such as the Tribal Nations and Income Qualified Pilots.

Outcome 5. Pilot designations are not always clearly labeled in SPECTRUM data, making it difficult to easily identify participation and savings associated with each pilot. While some pilots are identified in the program or offering name within SPECTRUM, others are only identifiable by specific labels appended to existing fields.

Recommendation 3. Improve tracking practices to clearly label pilot projects in the tracking data and identify which pilot they are part of. Improved tracking data will allow the evaluation team to more easily and more accurately report on activity within each pilot.

Residential New Construction Solution

The Residential New Construction offering provides Wisconsin builders with technical training and support, as well as incentives, to construct homes that meet Focus on Energy's prescriptive performance and modeled energy performance requirements. Additional details about the offering are provided in the *Process Evaluation* section of this chapter.

The Residential New Construction offering is administered by APTIM and implemented by Willdan. Delivery of the offering is subcontracted to Performance Systems Development (PSD).

Table 57 lists actual spending, savings, participation, and cost-effectiveness of the Residential New Construction offering in CY 2022.

Table 57. CY 2022 Residential New Construction Offering Summary

Item	Units	CY 2022	Quad (CY 2019-CY 2022)
Incentive Spending	$	$2,375,298	$6,825,556
Participation	Number of Participants	2,418	9,547
Verified Gross Lifecycle Savings	kWh	172,444,902	480,681,679
	kW	1,153	3,631
	Therms	14,537,310	56,466,953
Verified Gross Lifecycle Realization Rate	% (MMBtu)	100%	100%
Annual NTG Ratio	% (MMBtu)	4%[a]	91%[b]
Net Annual Savings	kWh/year	0	21,661,640[b]
	kW	0	4,220[b]
	Therms/year	24,247	1,472,597[b]
Net Lifecycle Savings	MMBtu	72,687	6,635,015[b]
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio	0.31	0.25

[a] Does not include market effects.
[b] The quadrennial net savings and annual NTG ratio include market effects savings, which are not reported in the yearly values. These additional savings account for the offering's historical, long-term impact on the Wisconsin residential new construction market. See the *Quadrennial Market Effects* section for additional details.

Achievement Against Goals

Figure 26 shows the percentage of gross lifecycle savings goals achieved by the Residential New Construction offering in CY 2022. This offering achieved 85% of its kWh goal, 86% of its kW goal, and 96% of its natural gas (therms) savings goal.

Figure 26. CY 2022 Residential New Construction Offering
Achievement of Gross Lifecycle Savings Goals

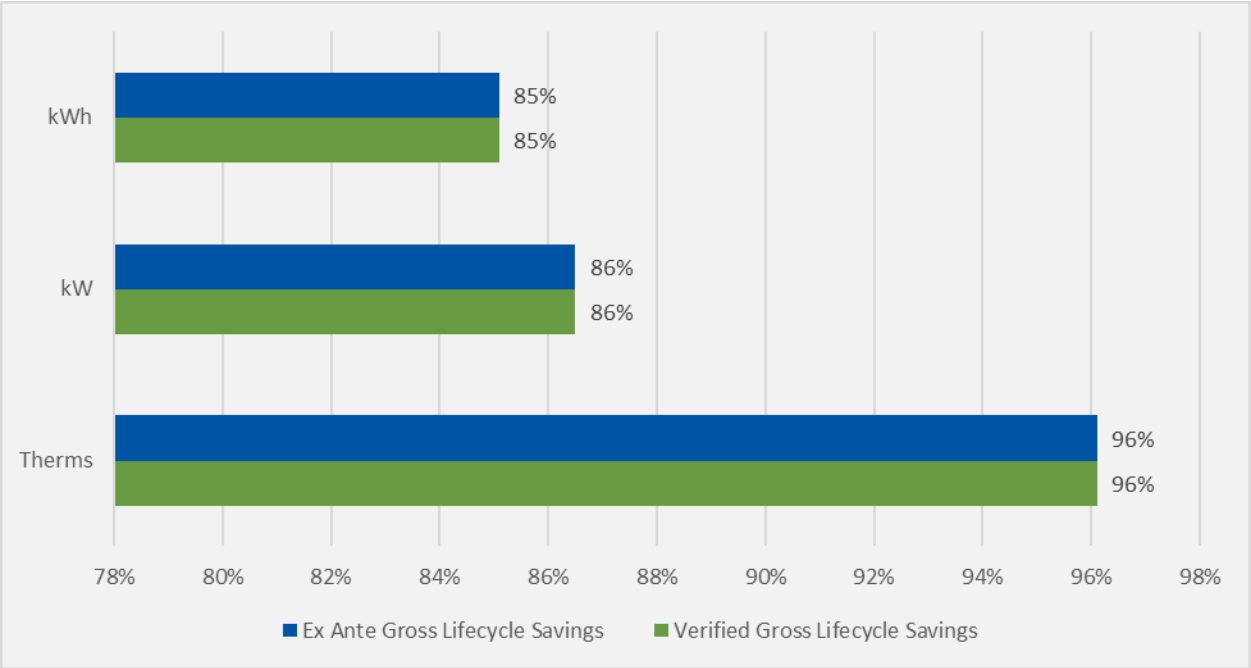


Figure represents goals and achievement for the Residential New Construction offering and the Electric New Homes Pilot.
The 100% *ex ante* gross lifecycle savings reflect the implementer's contract goals for CY 2022.
Verified gross lifecycle savings contribute to the administrator's portfolio-level goals.

Impact Evaluation

This section describes the methodology the evaluation team used to evaluate the Residential New Construction offering and presents the findings from the CY 2022 impact evaluation.

Impact Evaluation Methodology

Table 58 lists the specific data collection activity and sample size used in the impact evaluation. In CY 2022, the evaluation team conducted a tracking database review and also relied on findings from the CY 2019 evaluation to determine verified savings.

Table 58. Residential New Construction Offering
CY 2022 Data Collection Activity and Sample Size, Impact Evaluation

Activity	Sample Size
Tracking Database Review	Census
Market Effects Application	Census

Gross Savings Approach

The evaluation team reviewed the tracking data in the SPECTRUM database to verify gross savings of the Residential New Construction offering. The review involved two tasks:

- Ensuring that totals in SPECTRUM matched totals reported by the administrator
- Checking for complete and consistent application of data fields (including measure names, application of first-year savings, and application of effective useful lives)

Net Savings Approach

In CY 2022, the evaluation team applied the electric and natural gas NTG ratios calculated in the CY 2019 evaluation. The CY 2019 evaluation included a comprehensive analysis of energy consumption data (billing data) of newly constructed Focus on Energy–certified and noncertified homes.

Table 59 lists the electric and natural gas NTG ratios estimated during the CY 2019 billing analysis.

Table 59. CY 2019 Residential New Construction Offering
Billing Analysis Results

Savings Type	NTG Rate
Electric	0%
Natural Gas	5%

Verified Gross Savings Results for Residential New Construction

Table 60 lists the CY 2022 first-year and lifecycle realization rates for the Residential New Construction offering. Overall, the offering achieved a first-year evaluated realization rate of 100%, weighted by total energy savings (MMBtu).

Table 60. CY 2022 Residential New Construction Offering
First-Year and Lifecycle Realization Rates

First-Year Realization Rate				Lifecycle Realization Rate		
kWh	kW	Therms	MMBtu	kWh	Therms	MMBtu
100%	100%	100%	100%	100%	100%	100%

Table 61 lists verified first-year and lifecycle savings for the offering.

Table 61. CY 2022 Residential New Construction Offering
First-Year and Lifecycle Gross Verified Energy Savings Summary

Verified First-Year Savings				Verified Lifecycle Savings		
kWh	kW	Therms	MMBtu	kWh	Therms	MMBtu
5,747,040	1,153	484,933	68,102	172,444,902	14,537,310	2,042,113

Verified Net Savings Results for Residential New Construction

The evaluation team calculated an overall NTG estimate of 4% for the offering in CY 2022. Table 62 also shows total first-year gross and net savings.

Table 62. CY 2022 Residential New Construction Offering First-Year Net Savings and NTG

Total First-Year Gross Verified Savings (MMBtu)	Total First-Year Net Savings (MMBtu)	NTG Ratio
68,102	2,425	4%

Quadrennial Market Effects

In CY 2019 and CY 2020, the evaluation team conducted research to calculate market effects for the Residential New Construction offering. The team calculated the kWh, kW, and therms per-home market effects for a standard non-program home constructed in Wisconsin.[18] To determine these per-home market effects, the team convened an expert Delphi panel to understand if building practices for standard non-program new homes were affected by the offering.[19] Using feedback from the Delphi panel, the team created characteristics of a counterfactual non-program home—that is, a non-program home that would have been built without any influence from the program—and modeled the energy use of that counterfactual home.

Per-home market effects are the difference between the modeled energy consumption of the counterfactual non-program home and the modeled energy consumption of a standard non-program home. These savings should be considered new savings realized across the quadrennium—they represent program-induced energy savings in the Wisconsin residential new construction market that have not previously been attributed to program spending (past or present).

Table 63 shows the per-home first-year market effects savings as determined by modeling the energy consumption of standard and counterfactual non-program homes. The overall per-home market effects savings are 770 kWh, 0.15 kW, and 49 therms per year. Electric savings were driven primarily by efficient lighting, and gas savings were driven primarily by savings in the heating end use.

Table 63. Per-Home First-Year Market Effects Savings

Electric/Natural Gas	Standard Non-Program Home Consumption	Counterfactual Non-Program Home Consumption	Market Effects Savings
kWh	8,996	9,766	770
kW	2.56	2.72	0.15
Therms	771	820	49

[18] The term "standard non-program home" refers to a typical newly constructed Wisconsin home that did not participate in the Residential New Construction offering.

[19] Full details about the Delphi panel process are available in the *CY 2020 Focus on Energy Evaluation Report*.

To calculate quadrennial market effects for the offering, the evaluation team multiplied per-home market effects savings by the total number of non-program homes constructed in Wisconsin each year of the quadrennium. Following previous guidance from the Evaluation Work Group, the team applied market effects cumulatively to quadrennial results.

Table 64 shows the number of non-program homes constructed from CY 2019 to CY 2022 to which the team applied per-home market effects, along with the per-year savings in kWh, kW, therms, and MMBtu. The number of non-program homes has grown steadily over the quadrennium, meaning first-year market effects savings have risen as well.

Table 64. First-Year Market Effects Savings

Calendar Year	Non-Program Homes Permitted[a]	First-Year Market Effects Savings			
		kWh	kW	therms	MMBtu[b]
CY 2019	5,986	4,609,220	898	293,314	45,058
CY 2020	6,577	5,064,290	987	322,273	49,507
CY 2021	7,231	5,567,870	1,085	354,319	54,429
CY 2022	8,338	6,420,260	1,251	408,562	62,762
Total	**28,132**	**21,661,640**	**4,220**	**1,378,468**	**211,756**

[a] New home permits by county sourced from the United States Department of Housing and Urban Development's Office of Policy Development and Research. Permit data available here: https://www.huduser.gov/portal/datasets/socds.html
[b] MMbtu calculated based on kWh and therms savings: MMBtu = kWh*0.003412 + therms * 0.1

Next, the team added market effects savings from Table 64 to the first-year verified net savings reported throughout the quadrennium. Table 65 shows total verified net savings and market effects savings for the Residential New Construction offering. The electric NTG was 0% and the natural gas NTG was 5% for each year of the quadrennium. Therefore, the kWh and kW values in Table 65 represent only market effects savings, and the majority of therms and MMBtu savings are from market effects.

Table 65. Market Effects Savings and Verified Net Savings

Calendar Year	First-Year Verified Net Savings + Market Effects				Lifecycle Verified Net Savings + Market Effects			
	kWh	kW	therms	MMBtu Savings	kWh	kW	therms	MMBtu Savings
CY 2019	4,609,220	898	316,649	47,391	138,276,600	898	9,499,463	1,421,744
CY 2020	5,064,290	987	344,505	51,730	151,928,700	987	10,335,140	1,551,905
CY 2021	5,567,870	1,085	378,635	56,861	167,036,100	1,085	11,359,059	1,705,819
CY 2022	6,420,260	1,251	432,809	65,187	192,607,800	1,251	12,983,726	1,955,547
Total	21,661,640	4,220	1,472,597	221,169	649,849,200	4,220	44,177,387	6,635,015

Finally, the team calculated a final quadrennium NTG ratio by dividing total verified net savings and market effects savings (from Table 65) by verified gross savings. Table 66 shows these verified savings and total quadrennium NTG ratios for the Residential New Construction offering.

Table 66. Verified Gross and Net First-Year Savings, Market Effects, and Total Quadrennium Net-to-Gross Ratios

Calendar Year	Verified Gross Savings (First-Year MMBtu)	Total Verified Net Savings and Market Effects (First-Year MMBtu)	Total Quadrennium NTG Ratio
CY 2019	56,427	47,391	84%
CY 2020	55,092	51,730	94%
CY 2021	63,307	56,861	90%
CY 2022	68,102	65,187	96%
Total	**242,928**	**221,169**	**91%**

Process Evaluation

The evaluation team designed the CY 2022 process evaluation activities to monitor participating home construction practices and the performance of the Residential New Construction offering. This section details the evaluation activities and findings.

Process Evaluation Methodology

In CY 2022, the evaluation team interviewed the administrator and the implementer. The team also processed the REM/Rate[20] files of participating homes to update trends in building characteristics. Table 67 summarizes CY 2022 process evaluation activities.

Table 67. CY 2022 Residential New Construction Offering Process Evaluation Data Collection Activities and Sample Sizes

Activity	Sample Size
Stakeholder Interviews	2
Offering Home Database Update	2,396 homes

Offering Design and Delivery

Focus on Energy delivers the Residential New Construction offering throughout Wisconsin through the administrator, implementer, implementer subcontractor, participating trade allies (home builders), and building performance consultants (BPCs) affiliated with the offering. Participating home builders can certify homes that are between 25% and 100% more efficient than homes built to meet the minimum requirements of the Wisconsin Uniform Dwelling Code (WUDC) and can receive incentives for homes that are at least 30% more efficient than code.

Participating homes are classified into four incentive tiers based on their performance compared with homes meeting the minimum requirements of the WUDC. Though efficiency is expressed as a specific percentage better than code, since CY 2018, Focus on Energy has measured the energy savings of participating homes from a market characteristics baseline using results from the 2017 market

[20] REM/Rate is the modeling software used to calculate the energy consumption and energy savings of homes certified by the Residential New Construction offering.

characterization study.[21] The percentage improvement in home efficiency over the baseline code-compliant home is calculated by the BPCs in REM/Rate during their analysis.

The evaluation team completed a market characterization study in 2022, which provided updated baseline characteristics. Focus on Energy is using the results of the study to review and update baseline home characteristics in 2023 and will begin using the new baseline characteristics to measure modeled savings in 2024.

Participating home builders are paired with BPCs, who guide them on using better building techniques and model and verify the new homes' energy performance using REM/Rate. Focus on Energy also offers training on advanced building techniques to help home builders meet offering requirements and construct more-efficient homes. This training is also open to nonparticipating builders and subcontractors.

Residential New Construction Pilots

Focus on Energy operated the Electric New Homes and Building Performance Consultant Training pilots in CY 2022 under the Residential New Construction offering.

Electric New Homes Pilot. This pilot aims to expand the reach of Focus on Energy into rural territories by promoting the use of heat pump technologies and electric appliances in new construction homes. Specifically, the pilot offered a new heat pump water heater bonus of $500 for installation in an all-electric home (in addition to the standard heat pump water heater bonus), as well as bonuses for more-advanced heat pumps and solar-ready homes.

Trade ally training and education sessions raised awareness about heat pump technologies and encouraged builders to take advantage of enhanced incentives. The implementer reported that most reservation slots for ground source heat pumps, cold climate air source heat pumps, heat pump water heaters, and net zero ready homes had been reserved and the equipment had been installed by the end of CY 2022. Despite having filled most reservation slots, supply chain and product availability issues delayed some installations. Focus on Energy will not continue with the pilot in CY 2023 but will incorporate some of its elements into the Residential New Construction offering.

Building Performance Consultant Training Pilot. To address concerns from previous years about a shortage of BPCs and to build on previous efforts to recruit BPCs, Focus on Energy launched a pilot in CY 2021 to recruit and train new BPCs for the Residential New Construction offering. This pilot establishes a training and apprenticeship program to expand the BPC network into areas of the state that traditionally have been underserved by the offering and transfer program knowledge and expertise from BPCs preparing to retire to new BPCs.

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[21] Seventhwave. October 2017. *New Homes Baseline and Market Characterization Study.* https://www.focusonenergy.com/sites/default/files/2018-04/New%20Homes%20Baseline%20and%20Market%20Characterization%20Study.pdf

Ten BPC candidates participated in the Residential Energy Services Network (RESNET) training program in CY 2022. Three of these students passed their exams and qualified for the apprenticeship phase, with one achieving RESNET Rater accreditation and the other two having scheduled their remaining probationary ratings. BPC hosts reported positively on their apprentices; however, some current BPCs expressed concerns that the pilot is "training their competition." Some initial target students had difficulty participating in the spring trainings because they were scheduled around local school spring breaks.

Focus on Energy will integrate this pilot into the Residential New Construction offering in CY 2023, including any adjustments based on participant feedback.

Participation

Table 68 lists incentives and participation for each home certification level. Incentives vary by performance level and by whether a participating electric or natural gas utility delivered the space heating fuel (on average, incentives are higher for homes that received heating fuel from a participating utility). In CY 2022, most participating homes were certified in the two middle performance tiers: homes between 30% and 39.9% more efficient than minimum code requirements.

Table 68. CY 2022 Residential New Construction Certification Level Incentives and Participation

Certification Level	CY 2022 Incentives [a]		CY 2022 Participation	
	Fixed	Per-MMBtu Savings	Space Heating Fuel Provided by Participating Utility	Space Heating Fuel Not Provided by Participating Utility
25%-29.9% more efficient than code	$0	$0	162	4
30%-34.9% more efficient than code	$150/$350	$15	976	21
35%-39.9% more efficient than code	$200/$550	$30	900	18
40%-100% more efficient than code	$200/$1,000	$40	323	14

[a] The first fixed incentive amount is for homes that receive heating fuel from a participating utility, and the second amount is for homes that did not receive heating fuel from a participating utility. Only participants who received space heating fuel from a participating utility received a per-MMBtu incentive.

Table 69 lists incentives and participation by bonus measure for the Residential New Construction offering and the Electric New Homes pilot. In CY 2022, the offering paid bonuses for more than double the number of heat pump water heaters, slightly more continuous exterior insulation installations, and fewer high-efficiency furnaces than in CY 2021.

Of the five new bonuses in CY 2022, the most popular was the heat pump water heater bonus under the Electric New Homes pilot, which could be paid in addition to the existing $200 heat pump water heater bonus under the Residential New Construction offering.

Table 69. CY 2022 Residential New Construction Bonus Incentives and Participation

Offering	Bonus Type	CY 2022 Fixed Incentive	CY 2022 Participation
Residential New Construction	98% AFUE Furnace Bonus	$150	5
	Heat Pump Water Heater Bonus	$200	750
	Continuous Exterior Insulation Bonus	$400	282
	BPC Training Pilot (Apprenticeship Support)	$15/hour	10
	Solar Ready Bonus	$400	2
Electric New Homes Pilot	Bonus - Cold Climate Air Source Heat Pump	$3,000	4
	Bonus - Ground Source Heat Pump	$5,000	5
	Bonus - Heat Pump Water Heater	$500	35
	Bonus - Zero Energy Ready Home	$10,000	1

Approximately 40% of participating homes received bonuses in CY 2022, similar to the 45% in CY 2021. Nearly half of the bonuses were paid for homes in the second highest tier (35% to 39.9% above code) and over one-quarter of bonuses were paid in the highest tier. Homes in these two tiers were also the most likely to receive multiple bonuses. Like CY 2021, the heat pump water heater bonus remained the most popular bonus; however, the continuous exterior insulation gained traction in CY 2022, especially in the highest tier.

Table 70 shows the percentage of homes that received bonuses by certification level and bonus type.

Table 70. Number of Homes Receiving Bonuses

Certification Level	25%-29.9% Above Code	30%-34.5% Above Code	35%-39.9% Above Code	40%+ Above Code
Total Certified Homes	166	997	918	337
Received Only 1 Bonus	7%	24%	54%	29%
Received Multiple Bonuses	0%	0%	2%	30%
Did not Receive Bonus	93%	76%	44%	41%
Residential New Construction				
98% AFUE Furnace	0.60%	0.20%	0.11%	0.30%
Heat Pump Water Heater	0%	14%	49%	49%
Continuous Exterior Insulation	6%	9%	7%	35%
Solar Ready Bonus	0%	0%	0%	0.59%
Electric New Homes Pilot				
Cold Climate Air Source Heat Pump	0%	0.10%	0%	0.89%
Ground Source Heat Pump	0%	0%	0%	1%
Heat Pump Water Heater	0%	1%	2%	2%
Zero Energy Ready	0%	0%	0%	0.30%

Decimal places are provided when percentages are less than 1.0%.

Marketing

In CY 2022, the implementer marketed to homebuyers using digital campaigns for targeted areas and content in utility bill inserts and the Focus on Energy newsletter. Focus on Energy markets to home

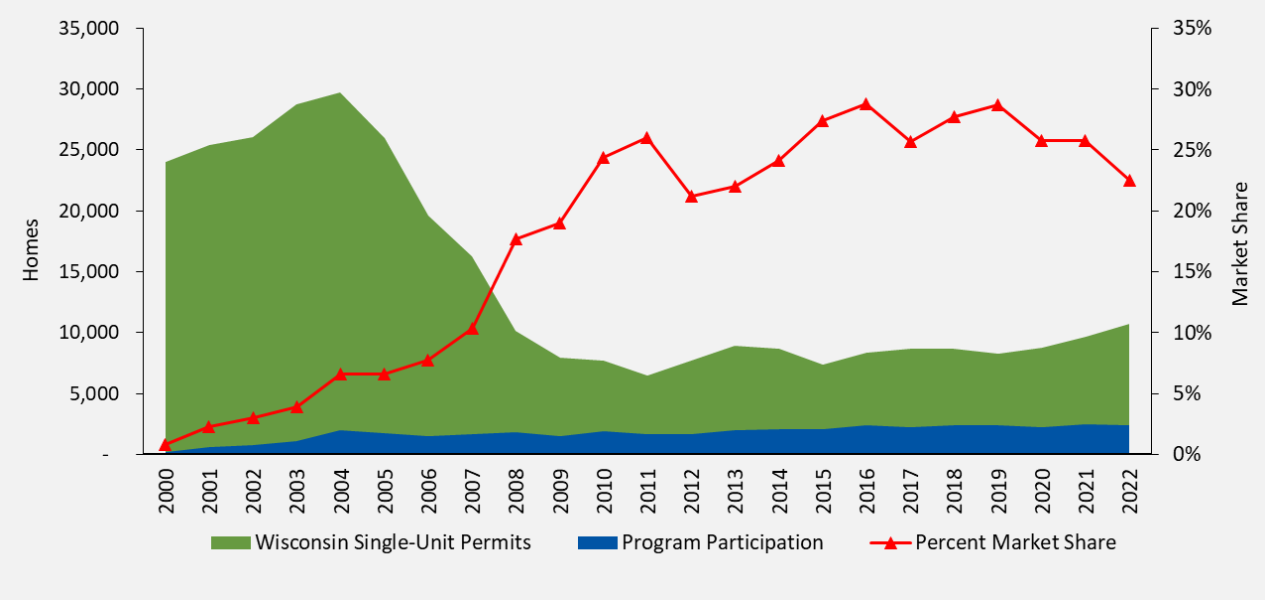
builders through the six home builders associations (HBAs) that it is a member of—one in each geographical region of Wisconsin—using HBA member rosters to identify and recruit builders not yet participating in the offering.

Construction Activity

The evaluation team tracks market share and other new construction metrics as part of the Residential New Construction market effects evaluation.

Figure 27 shows the historical participation rate and market share of the Residential New Construction offering as a percentage of single-family new construction permits since CY 2000. Though the administrator and implementer reported that COVID-19 slowed the pace of new construction in CY 2020, permits had decreased in CY 2019 prior to the pandemic and began to rebound in CY 2020.

Figure 27. Residential New Construction Offering Participation and Market Share (CY 2000-CY 2022)



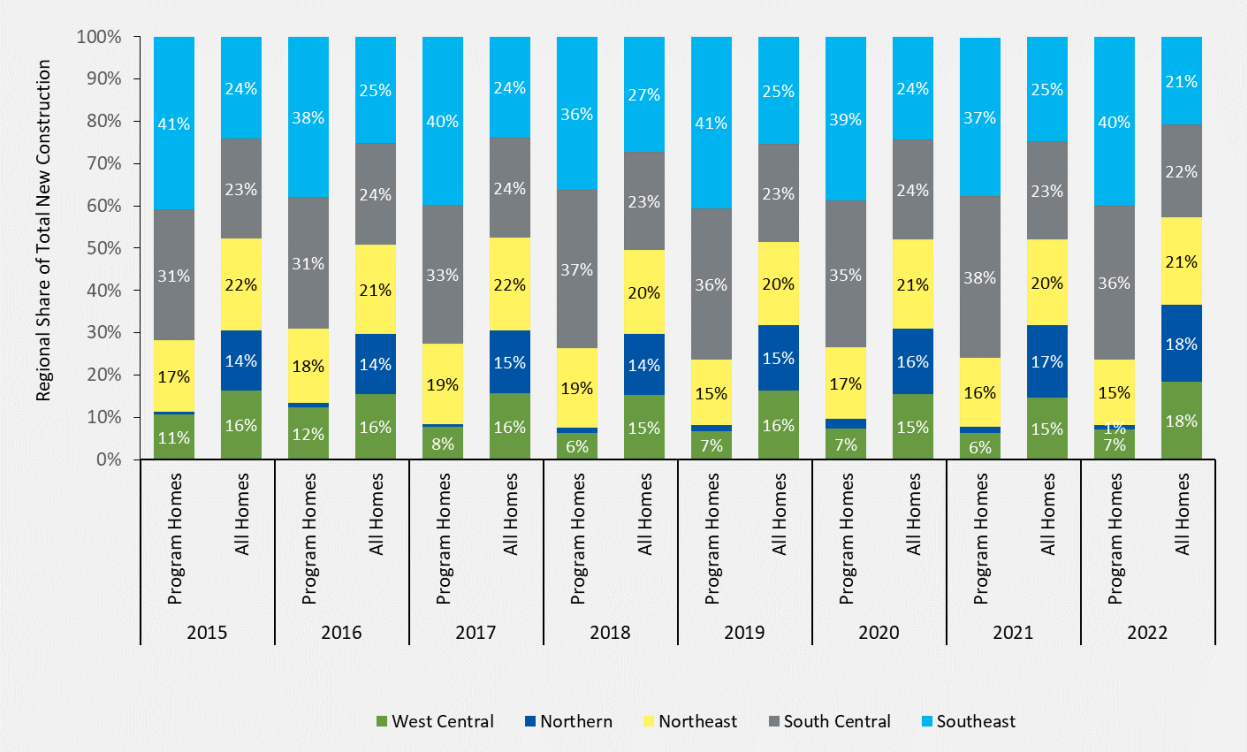
Participation in the Residential New Construction offering has been relatively consistent since CY 2004, whereas the overall new construction market has fluctuated during the same time period. Participation as a percentage of market share has been approximately 25% since CY 2010. The implementer said that no builders had stopped participating in the offering in CY 2022 and that the participation of major builders has been steady over many years.

Since CY 2015, between 71% and 74% of statewide residential new construction has been in urban counties.[22] In comparison, between 89% and 91% of Focus on Energy-certified homes have been built in urban areas during the same period. Figure 28 shows the overall regional share of Residential New

[22] The evaluation team used urban/rural county designations from the Wisconsin Department of Health Services. "WISH: Urban and Rural Counties." Accessed April 2022. www.dhs.wisconsin.gov/wish/urban-rural.htm

Construction homes and overall new construction in Wisconsin. The figure illustrates that Residential New Construction homes are disproportionally concentrated in Southeast and South Central Wisconsin, which include the large urban areas of Milwaukee (Southeast) and Madison (South Central). Northern and West Central Wisconsin have a smaller percentage of Residential New Construction homes compared with the overall market.

Figure 28. Regional Share of the New Construction Market (CY 2015-CY 2022)



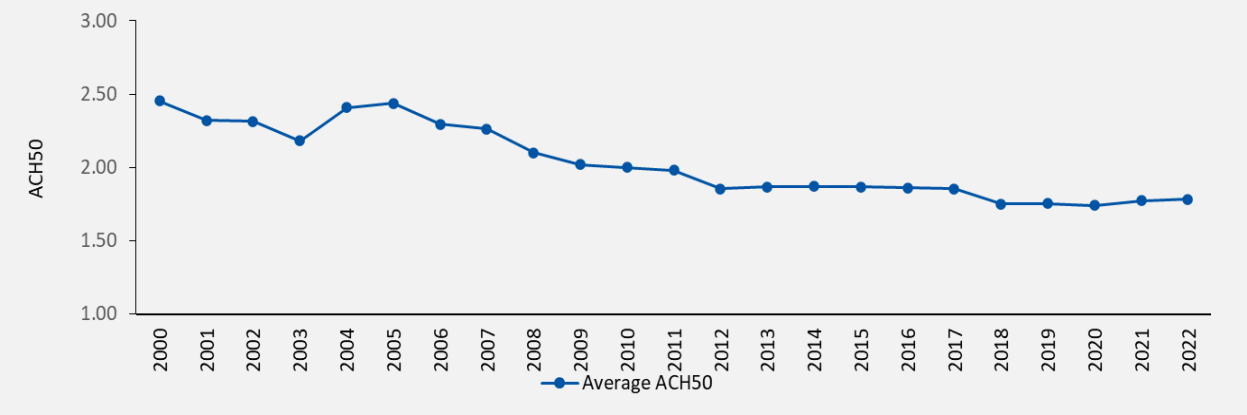
To expand participation in the Residential New Construction offering, Focus on Energy conducts outreach with builders through HBAs and conducts targeted recruitment. In CY 2022, outreach focused on builders in rural areas of Wisconsin.

Building Practices

In CY 2019, the evaluation team created a database of historical participating home REM/Rate files. Since then, the team has updated this database annually to show how characteristics of these homes evolve over time.

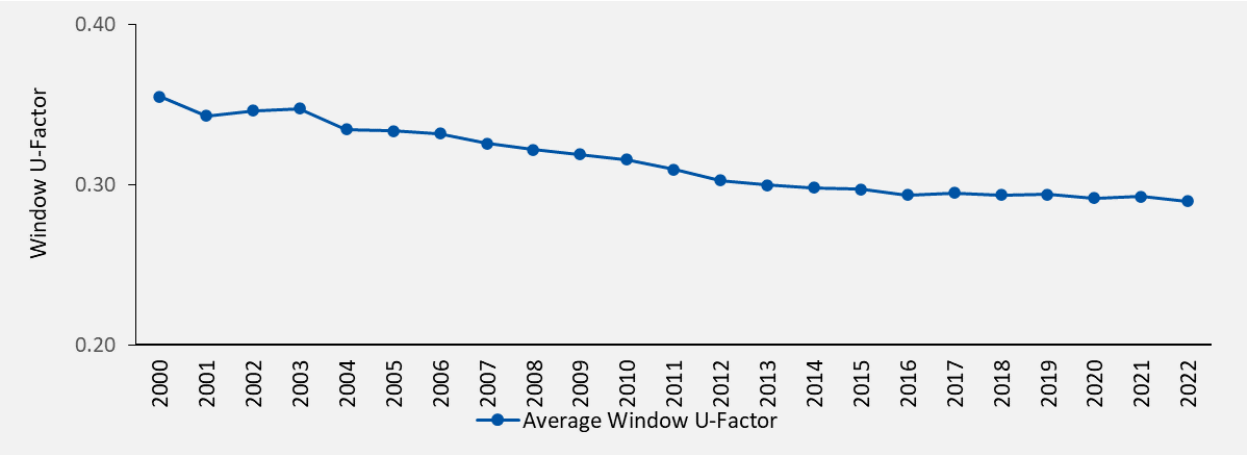
In CY 2022, homes participating in the Residential New Construction offering showed a slight decrease in airtightness, despite the introduction of the continuous exterior wall insulation bonus incentive in CY 2021 (continuous exterior insulation can decrease air leakage). However, overall airtightness, as measured in ACH50, has been consistent since CY 2018 and has improved significantly since CY 2005 (Figure 29).

Figure 29. Residential New Construction Offering
Average Home Airtightness (CY 2000-CY 2022)



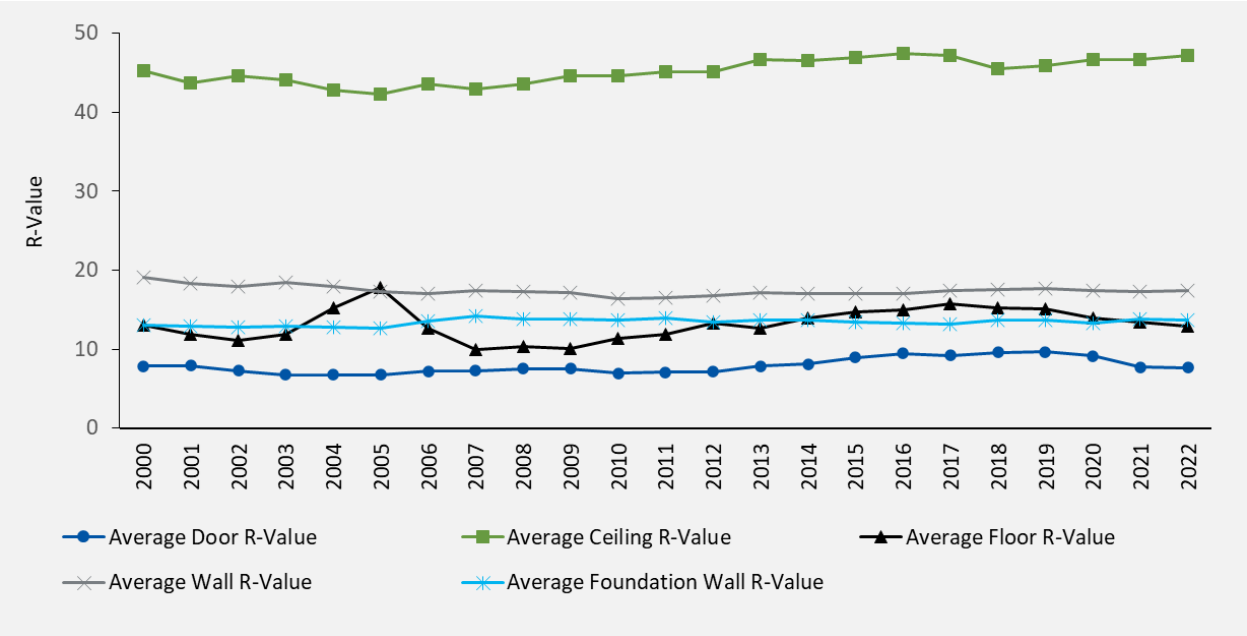
Window efficiency has improved for participating homes since CY 2000, as shown by decreases in average window U-factors (Figure 30). However, the efficiency of windows has been relatively consistent since CY 2016.

Figure 30. Residential New Construction Offering
Average Window U-Factor (CY 2000-CY 2022)



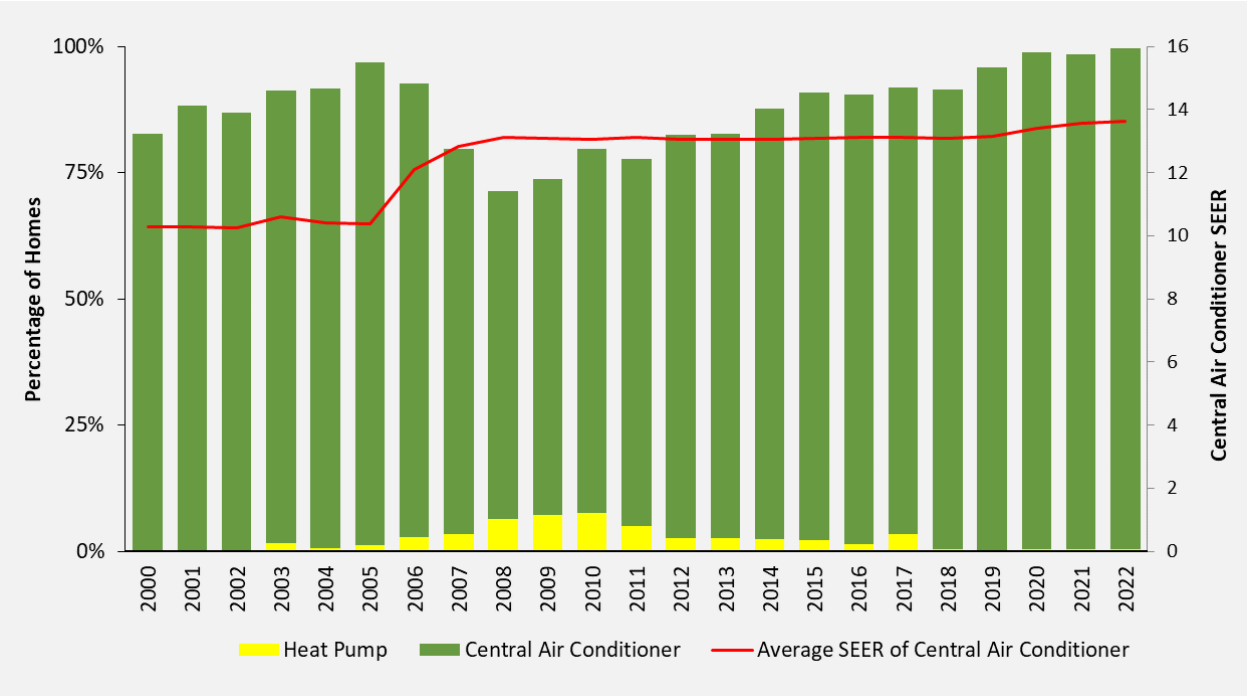
As with other participating home characteristics, various measures of home insulation levels have remained steady through CY 2022 (Figure 31).

Figure 31. Residential New Construction Offering
Average Home Insulation Levels (CY 2000-CY 2022)



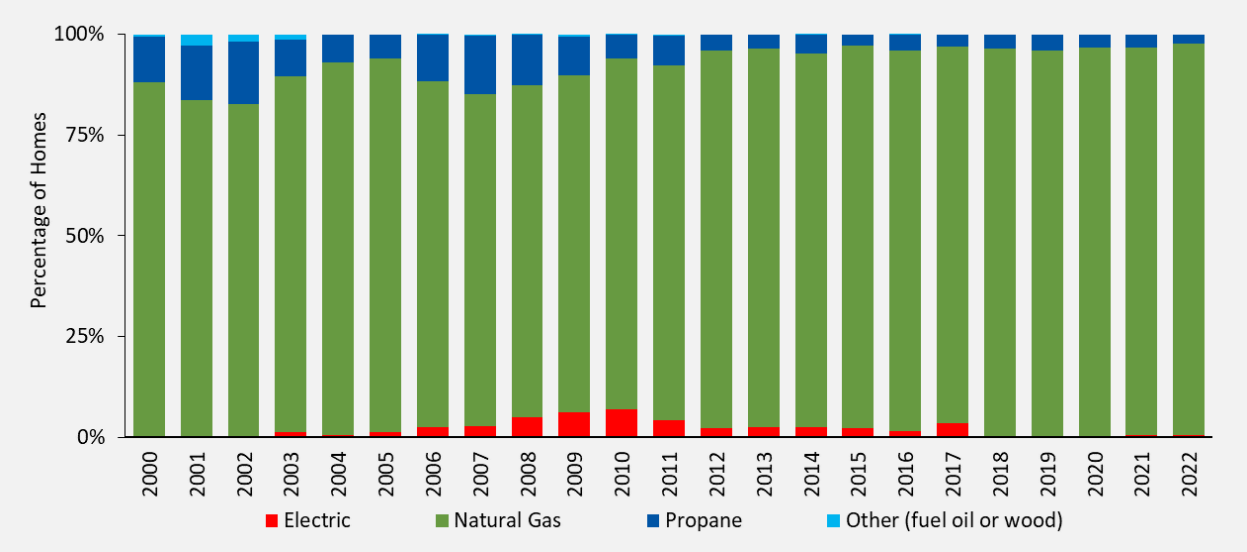
In CY 2022, homes participating in the Residential New Construction offering showed a slight increase in central air conditioner installations, from 98% in CY 2021 to 99% in CY 2022 (Figure 32). The figure also shows that, since CY 2020, average efficiency of central air conditioners in participating homes has increased compared with the federal minimum standard of SEER 13, whereas between CY 2007 and CY 2019, the SEER value of central air conditioners aligned with the federal standard.

Figure 32. Residential New Construction Offering
Average Home Cooling Systems Central Air Conditioner SEER Level (CY 2000-CY 2022)



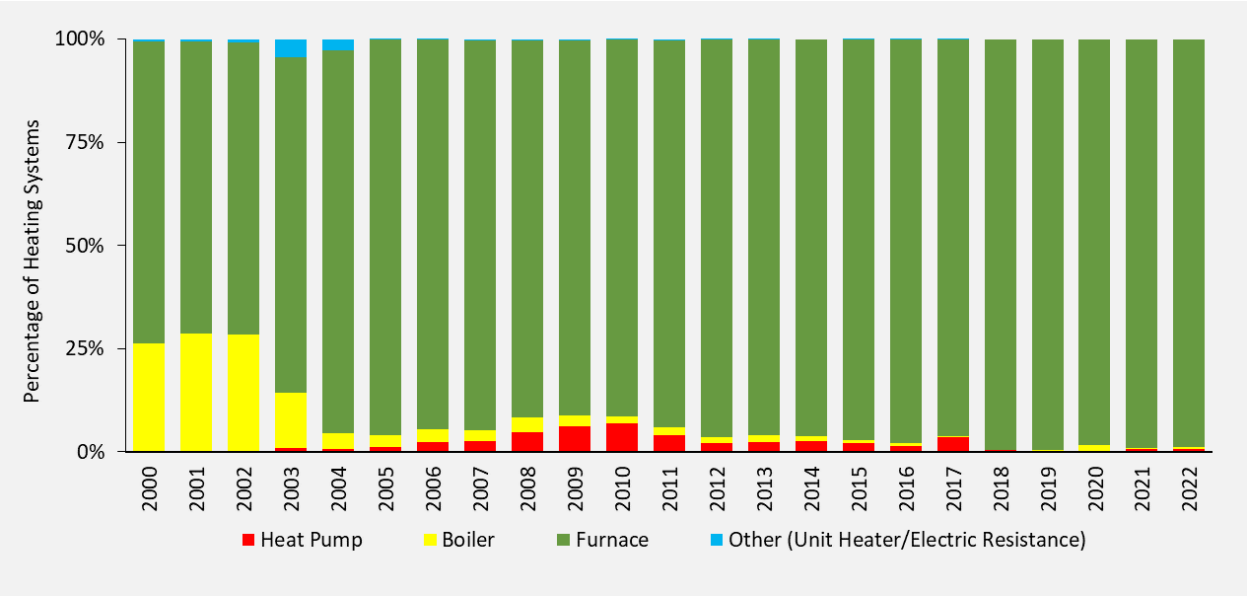
In CY 2022, most participating homes were heated primarily by natural gas (Figure 33). Only 2% of participating homes were heated by propane and 1% by electricity.

Figure 33. Residential New Construction Offering
Home Heating Fuel Type (CY 2000-CY 2022)



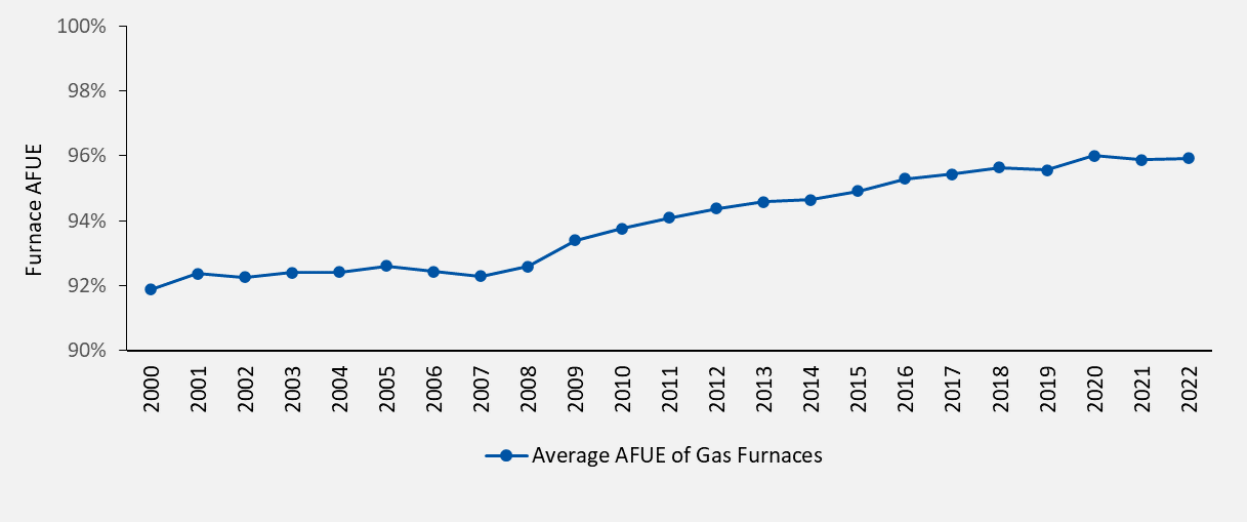
In CY 2022, as in previous years, the primary equipment type for heating participating homes was a furnace, though about 1% of participating homes also used heat pumps or boilers (Figure 34).

Figure 34. Residential New Construction Offering
Space Heating System in Participating Homes (CY 2000-CY 2022)



Participating homes are heated primarily by natural gas–powered furnaces and have remained steady at 96% AFUE since CY 2018, despite the introduction of a bonus incentive for highly efficient furnaces in CY 2021. Furnace efficiency has continued to improve since CY 2007 (Figure 35).

Figure 35. Residential New Construction Offering
Average Homes Furnace AFUE (CY 2000-CY 2022)

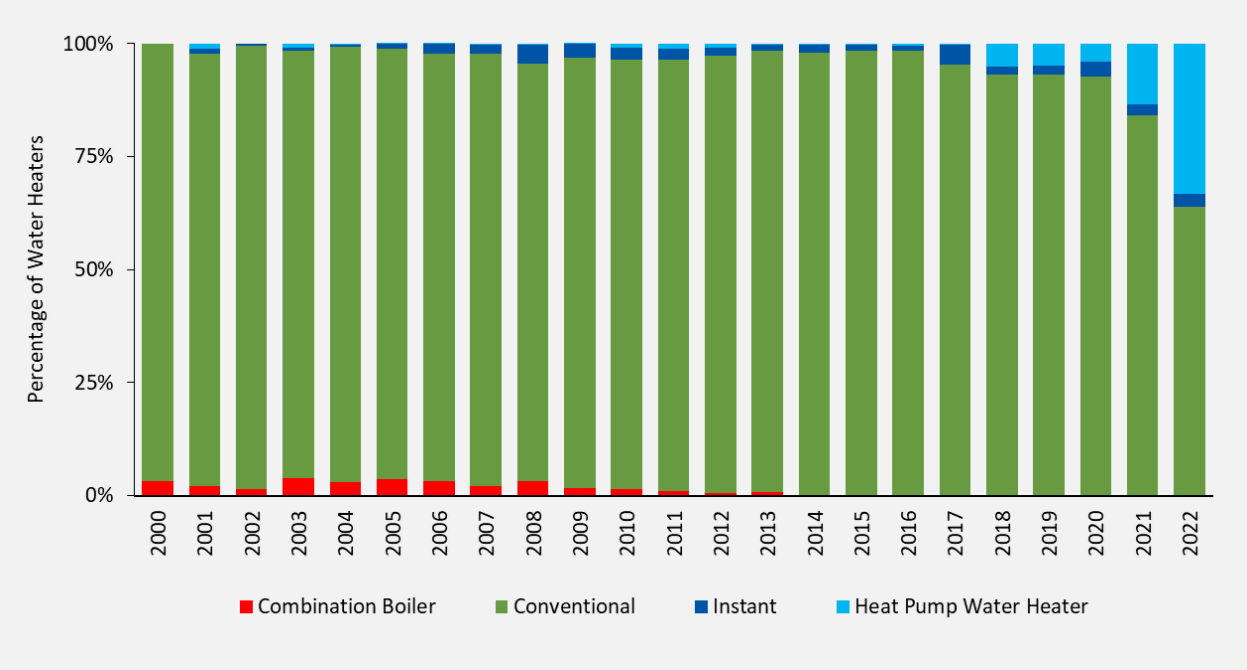


The prevalence of heat pump water heaters in participating homes increased almost threefold, from 13% in CY 2021 to 33% in CY 2022 (Figure 36). The increasing share of heat pump water heaters in 2021 and 2022 coincides with the introduction of Focus on Energy's bonus incentive for this measure in CY 2021. Despite the increased use of heat pump water heaters, the majority of participating homes

have continued to use conventional tank water heating systems, and a small proportion of homes also used tankless water heaters.

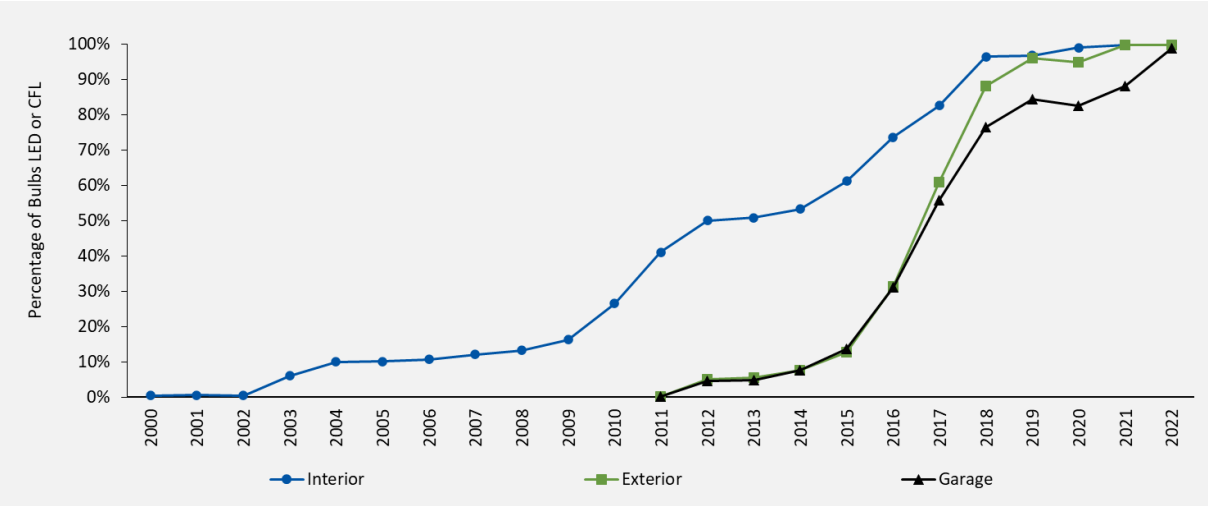
The most common implementer training programs (all electric and zero energy ready homes) put an emphasis on heat pump water heaters, and the implementer has convinced one of its largest builders to use heat pump water heaters as the standard in all new homes.

Figure 36. Residential New Construction Offering Homes' Water Heating System (CY 2000-CY 2022)



In CY 2022, almost 100% of interior and exterior lighting fixtures in participating homes had efficient LED or CFL bulbs (the industry standard is 100% LED). Light fixtures with efficient bulbs in garages had a big increase, from 88% in CY 2021 to 99% in CY 2022. As shown in Figure 37, efficient lighting technology has steadily increased in participating homes since CY 2002.

Figure 37. Residential New Construction Offering Homes' Lighting Types (CY 2000-CY 2022)



For the CY 2022 evaluation, the team also extracted details about participating homes' mechanical ventilation systems. According to REM/Rate data, all homes still used mechanical ventilation systems, which can increase electric load, even though the offering no longer requires these systems for participation. Eleven percent of homes used balanced mechanical ventilation systems with air intake and exhaust, and 89% of homes used exhaust-only systems. The average outdoor air fan operating time is eight hours per day for balanced systems and nine hours per day for exhaust-only systems. The REM/Rate data do not include details on where a system is installed (such as part of bathroom ventilation system) or if the systems are heat recovery systems, which can improve the efficiency of a home.

Quadrennial Achievements

Over the course of the CY 2019-CY 2022 quadrennium, the Residential New Construction offering has experienced an increase in the average savings per certified home. Table 71 shows the number of homes certified by the offering, verified lifecycle savings for each year of the quadrennium, and average verified total savings (MMBtu) per home. Though both increased over the four years, electric savings (kWh) increased more than natural gas savings (therms).

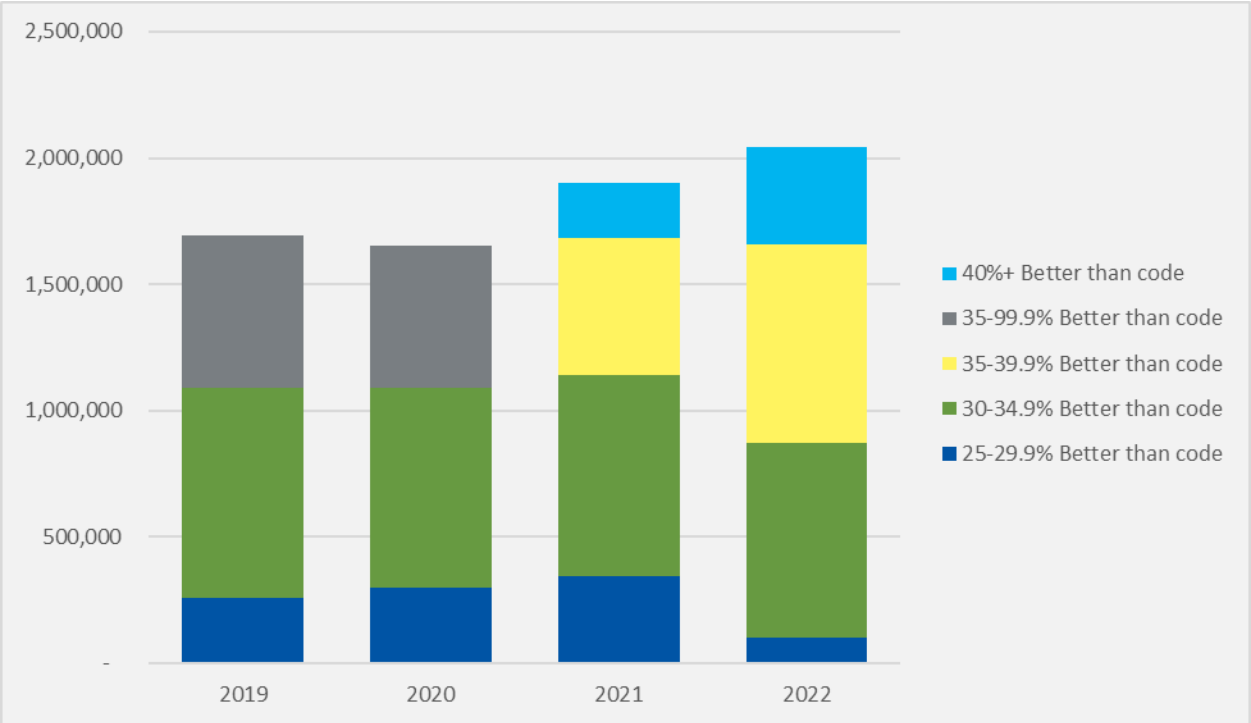
Table 71. Verified Lifecycle Energy Savings (MMBtu) per Home by Offering Year

Offering Year	Number of Homes Certified	Verified Lifecycle kWh Savings	Verified kW Savings	Verified Lifecycle Therms Savings	Total Verified Lifecycle MMBtu Savings	Average Verified Lifecycle MMBtu per Home
CY 2019	2,382	85,789,920	765	14,000,850	1,692,800	711
CY 2020	2,259	93,451,159	759	13,339,004	1,652,756	732
CY 2021	2,488	128,995,699	955	14,589,788	1,899,112	763
CY 2022	2,418	172,444,902	1,153	14,537,310	2,042,113	845

Offering savings increased most notably in CY 2021, which coincides with the redesign of the offering's incentive structure to include a fixed incentive based on the energy savings tier and a variable incentive based on MMBtu savings within the tier. In the same year, the offering also introduced bonus incentives for highly efficient furnaces, heat pump water heaters, and continuous exterior insulation.

Figure 38 shows verified gross lifecycle savings by certification tier over the quadrennium. Coinciding with the updated incentive structure and bonus incentives in CY 2021, offering savings began shifting from the lowest certification tier (25% to 29.9% better than code) to the highest tiers (over 35% better than code).

Figure 38. Verified Gross Lifecycle Energy Savings (MMBtu) by Certification Tier



Cost-Effectiveness

Evaluators commonly use cost-effectiveness tests to compare the benefits and costs of a demand-side management (DSM) offering. The benefit/cost test used in Wisconsin is a modified version of the TRC test. *Appendix I. Cost-Effectiveness and Emissions Methodology and Analysis* in Volume III includes a description of the TRC test.

Table 72 lists the CY 2022 incentive costs for the New Construction.

Table 72. CY 2022 New Construction Incentive Costs

Offering	Incentive Costs
Renewables	$800
Residential New Construction	$2,374,498
Total	**$2,375,298**

The evaluation team found that the CY 2022 Residential New Construction Solution was not cost-effective (0.31). Table 73 lists the evaluated costs and benefits.

Table 73. New Construction Costs and Benefits

Cost and Benefit Category	Total
Costs	
Administrative Costs	$127,384
Delivery Costs	$1,275,316
Incremental Measure Costs	$-
Total Non-Incentive Costs	**$1,402,700**
Electric Benefits (kWh)	$-
Electric Benefits (kW)	$-
T&D Benefits (kW)	$-
Gas Benefits	$372,268
Emissions Benefits	$63,782
Total TRC Benefits with T&D benefits	**$436,050**
Net TRC Benefits with T&D benefits	**($966,650)**
TRC Benefit/Cost Ratio with T&D benefits	**0.31**

Outcomes and Recommendations

The evaluation team identified the following outcomes and recommendations for the Residential New Construction offering.

Outcome 1. The new incentive structure implemented in CY 2021 appears to be encouraging participating builders to build more-efficient homes. The offering redesigned incentives in CY 2021 to pay variable incentives based on MMBtu savings along with fixed incentives per tier. At the same time, the offering introduced bonuses for efficient equipment and practices. Since implementing these changes, the offering has certified higher shares of the top-tiered homes and increased total energy savings per home.

Outcome 2. The Residential New Construction offering continued to increase the adoption of heat pump water heaters in participating homes, while other building metrics have stayed relatively consistent with previous years. As in CY 2021, the offering saw a significant increase in the number of homes with heat pump water heaters in CY 2022. The measure's rapid uptake has coincided with the onset of the offering's heat pump water heater bonus. At the same time, other bonus measures and

other equipment features have remained relatively constant over time. The success of the heat pump water heater bonus demonstrates the potential of targeted training by the offering and increased incentives for specific equipment.

Recommendation 1. Consider additional bonus incentives to further influence building practices. Consider if other technology-specific incentives could influence the building practices of home builders and improve the energy efficiency of homes. These bonus incentives should be selected based on likely builder uptake, widespread feasibility, and energy-savings potential.

Outcome 3. Participation in the Residential New Construction offering has been stable over the last 18 years and is disproportionately concentrated in southern Wisconsin and urban areas. Since CY 2004, the number of homes certified by Focus on Energy has remained consistent, despite great fluctuations in overall market activity. The offering has a stable group of core participating builders who construct a large share of the Focus on Energy–certified homes. However, participation has largely been concentrated in southern Wisconsin and urban areas. To increase the number of participating builders, Focus on Energy conducts targeted outreach and has gained membership in HBAs across the state. Focus on Energy is also using the BPC Training Pilot to recruit BPCs in underserved areas of the state to provide builder support in those areas.

Outcome 4. Despite low annual NTG results, evaluation research conducted between CY 2019 and CY 2021 indicated that the offering induced market effects across the state, leading to a strong quadrennial NTG ratio. The evaluation team's logic model of the offering, created in CY 2019, indicated that the Residential New Construction offering contributes to the greater efficiency of Wisconsin homes through interactions between the offering's BPCs and market actors such as contractors and builders. The team's CY 2020 Delphi panel results supported these findings, confirming that the offering impacted the wider new construction market and has led to more-energy-efficient building practices. These market effects, quantified for the quadrennium in this report, boosted the offering's final first-year NTG ratio from 4% (NTG without market effects) to 91% (NTG plus market effects).

Outcome 5. Quickly evolving markets may change the offering's market impacts. The primary sources of additional market effects savings were efficient lighting for electric savings and heating end use for natural gas savings. These two markets are rapidly changing due to federal lighting enforcements in 2023 and a growing heat pump market. Changes in these markets may affect the offering's current market effects impact.

Recommendation 2. Monitor market activity that may affect market effects savings. The implementer should monitor lighting and HVAC practices in new construction homes and adjust training, as necessary to continue promoting energy savings in the market. The evaluation team should similarly monitor markets and reassess the offering's impact to maintain an accurate estimate of the offering's total net impact.

Midstream Solution

The Midstream Solution is administered by APTIM and implemented by ICF. The Midstream Solution provides incentives to residential and commercial distributors who promote and sell efficient equipment through the four statewide offerings described here:[23]

- **Commercial Kitchen Equipment Offering** provides incentives to support the sales of commercial food service equipment, including, but not limited to, fryers, hot food holding cabinets, steamers, dishwashers, ice makers, and refrigerators.
- **HVAC Equipment Offering** provides incentives to support the sales specifically of ductless mini-split heat pumps. The offering is primarily intended for residential use, though some units are installed in small business settings.
- **Water Heaters Offering** provides incentives to support the sales of high-efficiency heat pump water heaters. This offering was launched in 2020, though sales have been slow through CY 2022. In CY 2022, standard design high efficiency natural gas water heaters were also added to the offering.
- **Circulator Pumps Offering** provides incentives to support the sales of high-efficiency hot water variable speed circulator pumps, which are often used to move water in large buildings for heating or hot water end uses.

Table 74 summarizes the impacts of the Midstream Solution's core measures for CY 2022.

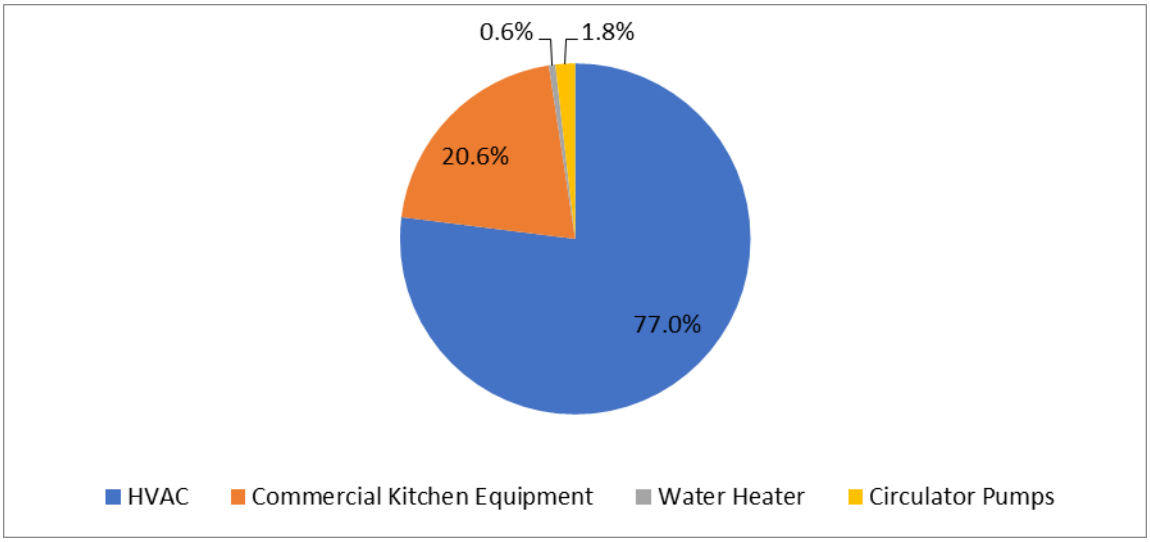
Table 74. CY 2022 Midstream Solutions Summary

Item	Units	CY 2022	CY 2019 – 2022 Quad Report
Incentive Spending	$	$696,250	$1,860,750
Participation	Number of Participants	1,649	4,076
Verified Gross Lifecycle Savings	kWh	38,776,105	94,477,322
	kW	455	455
	therms	5,076,743	15,904,216
Verified Gross Lifecycle Realization Rate	% (MMBtu)	100%	100%
Annual NTG Ratio	% (MMBtu)	77%	77%
Net Annual Savings	kWh/year	1,782,568	5,417,343
	kW	270	789.32
	therms/year	225,580	946,303
Net Lifecycle Savings	MMBtu	479,193	1,458,750.09
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio	1.38	1.46

[23] Residential and commercial distributors must past 60% of incentives received through the Midstream Solution to end-use participants.

Figure 39 shows the percentage of Midstream Solution savings by measure. HVAC equipment contributed the most gross lifecycle MMBtu savings (524,871 MMBtu) with kitchen equipment coming in second (148,862 MMBtu). Circulator pumps contributed only 1.7% (11,564 MMBtu) of savings and heat pump water heaters only 0.6% (3,878 MMBtu) of savings.

Figure 39. Percentage of Gross Lifecycle Savings by Measure



Achievement Against Goals

Table 75 shows the percentage of gross lifecycle savings goals achieved by the Midstream Solution in CY 2022. The solution did not achieve its electricity (kWh), or therms goals, but did meet its demand (kW) goal.

Table 75. CY 2022 Gross Achievement Against Goal for Midstream Solution

Category	Gross Goals	*Ex Post* Gross Savings
Lifecycle kWh	39,566,237	38,776,105
kW	320	455
Lifecycle Therms	10,550,000	5,076,743

Solution Design and Delivery

The Midstream Solution launched in CY 2020, combining with the Commercial Kitchen Equipment Pilot from CY 2019 and expanding to include incentives for HVAC equipment, heat pump water heaters, and circulator pumps. The implementer helped distributors who had participated in the pilot transition their processes to the new system and recruited new distributors across all channels now offered through the Midstream Solution.

The Midstream Solution focuses on outreach and training to encourage distributors to increase their stock and promotion of qualifying equipment. Distributors then recruit contractors to participate. Both

distributors and contractors use an online portal provided and maintained by the implementer to check eligibility of equipment and incentive levels and to submit sales and customer data[24].

Incentives are paid directly to distributors, who have some discretion regarding how much of the incentive to pass to the purchaser. Distributors can keep up to 40% of the incentive to cover administrative costs related to participation or offer spiffs to encourage sales staff to promote qualifying equipment. In CY 2022, as in CY 2021, most distributors reported passing the full value of incentives on to the equipment's final purchaser. The implementer allocated an incentive budget for each distributor, based on the distributor's forecasted sales of qualifying equipment.

In CY 2022, participation in the HVAC and Commercial Kitchen Equipment offerings was relatively high, considering the lingering supply chain impacts related to the COVID-19 pandemic. The HVAC, Commercial Kitchen Equipment, and Circulator Pumps offerings represented over 99% of sales by measure quantity.

However, sales through the Heat Pump Water Heaters Offering remained comparatively minimal. This offering was impeded by significant supply chain issues and was unable to distribute any units in CY 2020 and only nine units in CY 2021. Six units were sold through the offering in CY 2022. In addition to lingering supply chain issues, the price point compared to less efficient options which can run between two and four times as expensive as a standard resistance-heat-only unit, skepticism among relevant trade allies (such as plumbing and HVAC contractors), and other factors (such as ventilation and physical space requirements) will continue to be barriers to adoption for heat pump water heaters. Standard natural gas water heaters were added to the offering in CY 2022.

Impact Evaluation

This section contains the findings for the CY 2022 impact evaluation for the Midstream Solution. Findings are reported by individual offering. A discussion of each offering follows.

Impact Evaluation Methodology

The evaluation team designed its evaluation, measurement, and verification approach to integrate multiple perspectives in assessing the performance of each offering and of the Midstream Solution as a whole. Table 76 lists specific data collection activities and sample sizes used in the evaluation. Additional details about these activities for specific offerings are presented below and in *Appendix K. Net Savings Analysis* in Volume III.

The CY 2022 Midstream Solution was somewhat negatively affected by the continuing effects of the COVID-19 pandemic, though to a lesser extent than in CY 2020 and CY 2021. Nevertheless, the offering was still able to offer incentives for many measures, including a large number of commercial kitchen measures, to non-restaurant businesses, local governments, and school districts.

[24] Some measures, including small circulator pumps and natural gas water heaters, do not use the portal. Instead, they rely on a wholesale application process, which gathers less detailed customer information.

Table 76. CY 2022 Data Collection Activities and Sample Sizes – Impact Evaluation

Activity	Commercial Kitchen Equipment	HVAC Equipment	Heat Pump Water Heaters	Circulator Pumps
Tracking Database Review	Census	Census	Census	Census
Market Actor Interviews [a]	7	7	0	0

[a] First-round Delphi Panel participants.

Verified Gross Savings Results for Midstream Solution

Table 77 lists the first-year and lifecycle realization rates for CY 2022 by offering, and Table 78 lists the verified first-year and lifecycle savings by offering. Overall, the Midstream Solution achieved a first-year evaluated realization rate of 100%, weighted by total (MMBtu) energy savings. Detailed findings for each offering, including factors affecting the realization rates, are discussed in the next section.

Table 77. CY 2022 Midstream First-Year and Lifecycle Realization Rates

Offering	First-Year Realization Rate				Lifecycle Realization Rate		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
Commercial Kitchen Equipment	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HVAC Equipment	100.0%	99.9%	100.0%	100.0%	100.0%	100.0%	100.0%
Water Heaters	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Circulator Pumps	100.0%	100.0%	N/A	100.0%	100.0%	N/A	100.0%
Overall Realization Rate	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Table 78. CY 2022 Midstream First-Year and Lifecycle Verified Gross Energy Savings Summary

Offering	Verified Gross First-Year Savings				Verified Gross Lifecycle Savings		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
Commercial Kitchen Equipment	552,770	302	93,018	11,188	5,915,166	1,116,256	131,808
HVAC Equipment	1,634,262	139	217,954	27,372	29,416,716	3,923,172	492,687
Water Heaters	3,312	0	2,869	298	43,056	37,315	3,878
Circulator Pumps	226,745	14	N/A	774	3,401,167	N/A	11,605
Total Solution	**2,417,089**	**455**	**313,841**	**39,631**	**38,776,105**	**5,076,743**	**639,978**

Commercial Kitchen Equipment: Verified Gross Savings Results

For Commercial Kitchen Equipment Offering, the evaluation team conducted a database review and a TRM review. The team found very close alignment between *ex ante* and *ex post* gross savings for each measure. For CY 2022, the offering had a gross lifecycle realization rate of 100.0%. There were no deviations between *ex ante* and *ex post* gross savings for the offering.

Table 79 lists the CY 2022 *ex ante* and verified gross first-year and lifecycle savings for the Commercial Kitchen Equipment Offering.

Table 79. CY 2022 Commercial Kitchen Equipment *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First Year Gross Savings	552,770	301.90	93,018	552,770	301.90	93,018
Lifecycle Gross Savings	5,915,166	N/A	1,116,256	5,915,166	N/A	1,116,256

HVAC Equipment: Verified Gross Savings Results

For HVAC Equipment, the evaluation team conducted a database review and a TRM review. The team found high fidelity between *ex ante* and *ex post* gross savings for the one measure (ductless mini-split heat pump). The offering had a gross lifecycle realization rate of 100%. There were no substantial deviations between *ex ante* and *ex post* gross savings for the offering.

Table 80 lists the CY 2022 *ex ante* and verified gross first-year and lifecycle savings for the HVAC Equipment Offering.

Table 80. CY 2022 HVAC Equipment *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First Year Gross Savings	1,634,242	139.17	217,954	1,634,262	139.10	217,954
Lifecycle Gross Savings	29,416,356	N/A	3,923,172	29,416,716	N/A	3,923,172

Water Heaters: Verified Gross Savings Results

For Standard Natural Gas and Heat Pump Water Heaters, the evaluation team conducted a database review and a TRM review. The team found high fidelity between *ex ante* and *ex post* gross savings for the measure. The offering had a gross lifecycle realization rate of 100.0%. There were no deviations between *ex ante* and *ex post* gross savings for the offering.

Table 81 lists the CY 2022 *ex ante* and verified gross first-year and lifecycle savings for the Water Heaters Offering.

Table 81. CY 2022 Water Heaters *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First Year Gross Savings	3,312	0.16	222	3,312	0.16	2,869
Lifecycle Gross Savings	43,056	N/A	2,886	43,056	N/A	37,315

Circulator Pumps: Verified Gross Savings Results

For the Circulator Pumps, the evaluation team conducted a database review and a TRM review. The team found high fidelity between *ex ante* and *ex post* gross savings for this offering. The offering had a gross lifecycle realization rate of 100.0%. There were no substantial deviations between *ex ante* and *ex post* gross savings.

Table 82 lists the CY 2022 *ex ante* and verified gross first-year and lifecycle savings for the Circulator Pumps Offering.

Table 82. CY 2022 Circulator Pumps *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	Therms	kWh	kW	therms
First Year Gross Savings	226,745	13.79	N/A	226,745	13.79	N/A
Lifecycle Gross Savings	3,401,175	N/A	N/A	3,401,175	N/A	N/A

Verified Net Savings Results for Midstream Solution

In the Midstream Solution, the implementer works with distributors and, for some measures, with contractors to provide instant discounts for customers purchasing qualifying energy-saving equipment. This market intervention design seeks to overcome barriers to sales of high-efficiency equipment and to accelerate the adoption of energy-efficient products to achieve long-term and sustainable market transformation.

Quantification of attributable net savings considers the impact of the solution on the broader market over an extended period, usually multiple years. The evaluation team, in consultation with the PSC, the implementer, and other stakeholders, determined the approach to identify freeridership and spillover attributable to the solution for CY 2022. Data collection for that effort was completed at the start of CY 2023.

The evaluation team employed a multimodal approach to generating NTG ratios for the Midstream Solution. The first component comprised distributor and contractor interviews and an end-use customer survey that were completed during CY 2021. Results of the interviews were presented to Delphi Panel experts, who were given the opportunity to revise the aggregate estimate of net savings for the Commercial Kitchen Equipment and HVAC Equipment offerings.

The evaluation team recruited two sets of panels, each comprising experts in the field related to either commercial kitchen equipment or HVAC equipment. These experts included manufacturers, independent (nonparticipating) distributors, contractors, and evaluators in other jurisdictions. Panel participants were charged with determining an appropriate NTG ratio, or attribution score, for each offering. In addition, panelists were asked to revise that estimate to account for market effects stemming from the Midstream Solution.

Results from the combined rounds of the Delphi Panel are presented in Table 83.

Table 83. CY 2022 Delphi Panel Results

Offering	Survey Based Attribution Score/NTG Ratio	Final Round NTG Ratio (without Market Effects)	Final Round NTG Ratio (with Market Effects)
Commercial Kitchen Equipment	39%	39%	48%
HVAC	44%	65%	82%

Finally, the savings weighted average NTG ratios for commercial kitchen equipment and HVAC measures were applied to circulator pumps and water heaters in CY 2022.

Process Evaluation

The evaluation team conducted a process evaluation to assess the success of the Midstream Solution in meeting its objectives. The process evaluation is designed to incorporate perspectives from the administrator and implementer as well as participating distributors, contractors, and customers.

Net to Gross Evaluation Methodology

Table 84 lists the process evaluation activities for the offerings in the CY 2022 Midstream Solution. Customer, distributor, and trade ally surveys were completed in CY 2021. The sample population represents the total number of participating distributors, contractors, and customers with valid contact information and does not include any who did not provide contact information.

Table 84. CY 2021 Midstream Solution Process Evaluation Activities

Activity	CY 2021 Sample Population	CY 2021 Completes
Tracking Database Review	Census	N/A
Commercial Kitchen Equipment Distributor In-Depth Interviews	14	12
HVAC Equipment Distributor In-Depth Interviews	15	9
Commercial Kitchen Equipment Customer Survey	41	5
HVAC Equipment Customer Survey	418	56
HVAC Equipment Contractor Survey	23	17
Commercial Kitchen Equipment Delphi Panel Survey	N/A	5
HVAC Equipment Delphi Panel Survey	N/A	5

Causal Pathway NTG Methodology for Commercial Kitchen Equipment and HVAC Offerings

Cadmus used a distributor, contractor (HVAC only), and end-user causal pathway NTG methodology to estimate attribution scores (NTG ratios) for the Commercial Kitchen Equipment and HVAC offerings. This methodology informs NTG ratios for the entire Midstream Solution at the end of CY 2022, which is also the end of the quadrennium. This approach is based on methods used in California and other states for similar upstream/midstream offerings, most recently described in detail in the California Public Utilities Commission (CPUC) impact evaluation report on the HVAC sector for CY 2018.[25]

Table 85 presents the question themes associated with the three causal pathways—stocking, upselling, and pricing—for distributors, contractors, and end-use buyers.

[25] California Public Utilities Commission (CPUC). April 20, 2020. *Impact Evaluation Report HVAC Sector – Program Year 2018*. CALMAC Study ID: CPU0209.01. http://www.calmac.org/publications/Year2_CPUC_Group_A_HVAC_Report_Final_CALMAC_20200420.pdf

Table 85. Question Themes Associated with the Three Causal Pathways

Causal Pathways	Distributor/Contractor Question Theme	End User Question Theme
Stocking	1. What was the offering's influence on distributor stock?	1. How did the mix of equipment in stock influence the end user?
Upselling	2. What was the offering's influence on encouraging the distributor/contractor to promote or upsell the units?	2. How did distributor/contractor upselling influence the end user's decision?
Pricing	3. Did the distributor/contractor pass on some or all of the incentive to buyers?	3. How did price influence the end user's decision?

Each of the causal pathways is dependent on distributors changing their behavior in response to the solution and, in turn, that change in behavior influencing the decision-making of their contractors and end-use buyers. Each causal pathway is independently based on the assumption that if the solution failed to show attribution through the distributors, contractors, or end-use buyers, then the solution did not affect the equipment sale on that particular causal pathway. This does not mean that the solution had no influence on the sale, only that any influence it had was not through this particular pathway. If another causal pathway did show solution influence, then the sale was determined to be at least partially solution-attributable.

The evaluation team calculated the overall causal pathway attribution score (NTG ratio) for each offering in the Midstream Solution by averaging survey scores for lifecycle energy savings, weighted by end users, distributors, and (where applicable) contractors along each causal pathway, as shown in Table 86. In addition, the table presents NTG ratios as a sales lift percentage (NTG ratio divided by 1 minus the NTG ratio), which indicates a 64% sales lift for the Commercial Kitchen Equipment Offering and a 79% sales lift for the HVAC Equipment Offering. These ratios were reviewed and revised by a Delphi Panel of experts. For a detailed description of NTG analysis methodology and findings, refer to *Appendix K. Net Savings Analysis* in Volume III.

Table 86. Causal Pathway Attribution Scores/NTG Ratios

Offering	Stocking Attribution	Upselling Attribution	Pricing Attribution	Overall Attribution Score/NTG Ratio	Percent Sales Lift [NTG Ratio ÷ (1 - NTG Ratio)]
Commercial Kitchen Equipment	15%	27%	74%	**39%**	**64%**
HVAC Equipment	10%	40%	83%	**44%**	**79%**

Table 87 presents the average of the Delphi panelists' attribution score estimates without and with market effects for the Commercial Kitchen Equipment Offering. The panelists came to a consensus during round two, and the final attribution estimates (NTG ratios) for the Commercial Kitchen Equipment Offering are 39% without market effects and 48% with market effects.

Table 87. CY 2022 Midstream Commercial Kitchen Equipment Offering Delphi Panel Results

Offering	Round	n	Attribution Score without Market Effects	Attribution Score with Market Effects
Commercial Kitchen Equipment	1	5	39%	50%
	2	5	39%	48%

Two panelists provided the same response when asked to explain their scores for the Commercial Kitchen Offering. Both agreed that the 39% estimated from the causal pathway approach were in line with their expectations given the market in Wisconsin.

Table 88 presents the average of the Delphi panelists' attribution estimates without and with market effects for the HVAC Offering. The panelists came to a consensus during round three, and the final attribution score estimates (NTG ratios) for the HVAC Offering are 65% without market effects and 82% with market effects.

Table 88. CY 2022 Midstream HVAC Offering Delphi Panel Results

Offering	Round	n	Attribution Score without Market Effects	Attribution Score with Market Effects
HVAC Equipment	1	7	59%	66%
	2	4	65%	77%
	3	5	65%	82%

Four panelists provided the same responses when asked to explain their scores without market effect for the HVAC Offering. Two panelists said the rebates are an important selling point and help their sales staff close sales with customers. The other two simply noted that the consensus estimates from other panelists were consistent with their own expectations and understanding of the market.

When considering market effects, two panelists said customers want to save on their energy bills and reduce their environmental impacts and that the Midstream Solution rebates help make these decisions easier and more economical for customers. Another said that one of the major manufacturers is aware of the solution incentives and that rebates are "heavily weighted" by the manufacturer. One said "[The firm has] invested time to educate our distributors and contractors and provide resources of eligible systems."

Cost-Effectiveness

Evaluators commonly use cost-effectiveness tests to compare the benefits and costs of a demand-side management (DSM) offering. The benefit/cost test used in Wisconsin is a modified version of the total resource cost (TRC) test. *Appendix I. Cost-Effectiveness and Emissions Methodology and Analysis* in Volume III includes a description of the TRC test.

Table 89 lists the CY 2022 incentive costs for the Midstream Solution.

Table 89. CY 2022 Midstream Incentive Costs

Offering	Incentive Costs
Commercial Kitchen Equipment	$139,850
HVAC Equipment	$439,500
Water Heaters	$16,400
Circulator Pumps	$47,050
Distributor Bonus	$53,450
Total	**$696,250**

The evaluation team found that the CY 2022 Midstream Solution was cost-effective (1.38). Table 90 lists the evaluated costs and benefits.

Table 90. Midstream Solution Costs and Benefits

Cost and Benefit Category	Total
Costs	
Administration Costs	$37,339
Delivery Costs	$373,822
Incremental Measure Costs	$3,058,802
Total Non-Incentive Costs	**$3,469,963**
Benefits	
Electric Benefits (kWh)	$1,130,670
Electric Benefits (kW)	$574,927
T&D Benefits (kW)	$248,592
Gas Benefits	$2,087,676
Emissions Benefits	$737,740
Total TRC Benefits	**$4,779,605**
Net TRC Benefits	**$1,309,642**
TRC B/C Ratio	**1.38**

Outcomes and Recommendations

Outcome 1: The CY 2022 Delphi Panel concluded that, after accounting for market effects, the Midstream Solution should be given attribution scores of 48% for the Commercial Kitchen Equipment Offering and 82% for the HVAC Offering (ductless mini-split heat pump). These are relatively high scores for a midstream program, especially for ductless mini-split heat pumps, indicating significant evidence of market transformation.

Recommendation 1: Apply the 48% NTG to CY 2022 Commercial Kitchen Equipment Offering savings and 82% to CY 2022 HVAC Equipment Offering savings. Apply a lifetime MMBtu savings-weighted NTG of 77% to Circulator Pumps and Heat Pump Water Heaters offerings savings. Monitor measure mix to determine if additional NTG research, potentially including a Delphi panel, is needed in the upcoming quadrennium.

NONRESIDENTIAL SOLUTIONS

This section presents the evaluation results for CY 2022 for these nonresidential solutions and their offerings.

Business and Industry

- Commercial and Industrial
- Large Industrial
- Agribusiness

Schools and Government

- Schools
- Government

Nonresidential New Construction

- Energy Design Assistance/Energy Design Review
- Prescriptive
- Multifamily Product and Equipment Performance

Commercial Training Offering

Business and Industry Solution

Through the Business and Industry Solution, Focus on Energy offers technical assistance and prescriptive and custom incentives for nonresidential customers who install energy-efficient measures.

The solution administrator is APTIM. The solution implementer, Franklin Energy, oversees management and delivery, and its subcontractors—Leidos Engineering, CESA 10, and CleanTech Partners—provide subject matter expertise. With support from trade allies and the administrator, the implementer's energy advisors promote and deliver the Business and Industry Solution to customers.

The Business and Industry Solution is divided into three offerings: Commercial and Industrial, Large Industrial, and Agribusiness, all briefly described below and further detailed in this chapter:

- **Commercial and Industrial** supports commercial and small- and medium-size industrial customers.
- **Large Industrial** supports industrial customers whose average monthly demand exceeds 1,000 kW of electricity or 100,000 thermschs of natural gas per month and whose combined utility bills were at least $60,000 in any month of the preceding year.
- **Agribusiness** supports agricultural producers engaged in growing and producing grain, livestock, milk, poultry, fruits, vegetables, greenhouses, bees and honey, fish, shellfish, or other common agricultural products that are living organisms in Wisconsin.

The rural offering, another component of the Business and Industry Solution, supports increased geographic equity across Focus on Energy participants through additional offerings. Industrial and healthcare customers in rural areas, as designated by ZIP code, can access additional assistance through the Staffing Incentive, the Rural Industrial Striving for Efficiency [RISE] Initiative, and Healthcare Practical Energy Management (H-PEM).

- The **Staffing Incentive** offers rural customers 20% more than its standard prescriptive and custom incentives and up to 100% of the project cost, or $25,000 total, to offset the administrative costs of implementing an energy-efficient project.
- The **RISE Initiative** provides rural industrial customers with guided interactive workshops to help them better understand their energy use and to develop a project list. Customers can receive up to $15,000 in incentives, including a $1,500 incentive for successfully completing the guided workshops and $1,000 for each no- or low-cost measure implemented from the project list.
- **H-PEM** works with healthcare facilities to establish and deploy an energy management plan, with up to $1,200 in incentives for regular building benchmarking and additional financial incentives for attending energy-related trainings and promoting the success of an energy management plan.

Agribusiness is also a part of the rural offering. Participants can receive incentives for agricultural equipment such as grain dryers and milking equipment, and trade allies can receive bonus incentives when their customers implement agribusiness projects. In CY 2022, Focus on Energy also moved Farmhouse Kits from the Direct to Customer Solution to the Agribusiness Offering. These kits include

easy-to-install residential energy-saving measures and are available to agricultural customers with residences on the property (farmhouse)

All customers eligible for Business and Industry Solution incentives also have access to prescriptive solar electric incentives through the Renewable Rewards Program. Other renewable technologies—biogas, biomass, wind, and solar thermal—are eligible for incentives through the solution's custom incentives and are tracked under the Business and Industry – Renewable program. Legacy projects approved through the Renewable Energy Competitive Incentive Program (RECIP) were migrated to the Renewable program, although no rounds of RECIP funding were offered in 2022.

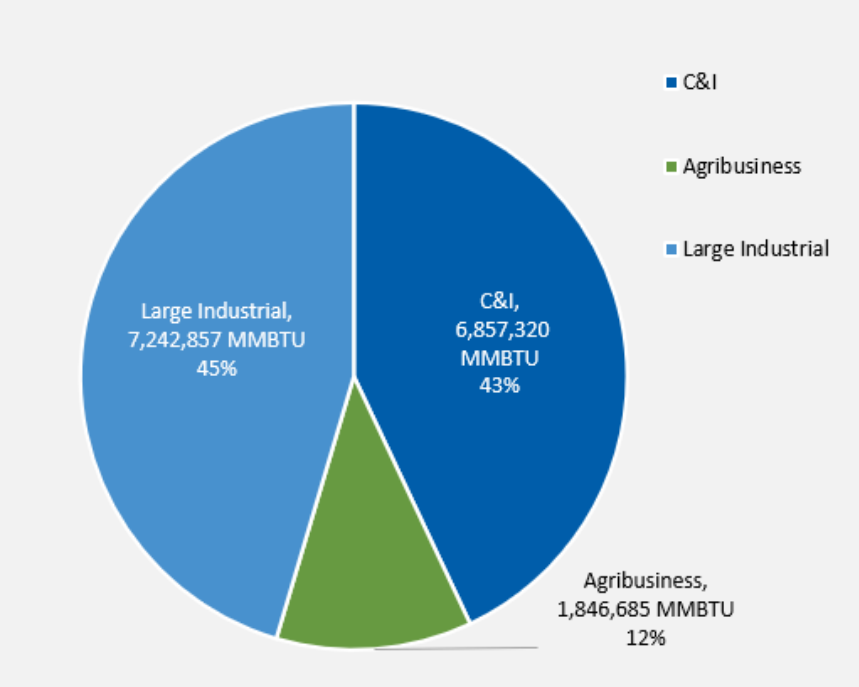
Table 91 summarizes the performance and savings impacts of the Business and Industry Solution in CY 2022.

Table 91. CY 2022 Business and Industry Solution Summary

Item	Units	CY 2022	Quad (CY 2019-CY 2022)
Incentive Spending	$	$15,076,059	$58,742,691
Participation	Number of Participants	2,748	11,822
Verified Gross Lifecycle Savings	kWh	3,076,940,219	13,702,719,372
	kW	28,054	122,593
	therms	103,415,626	465,404,118
Verified Gross Lifecycle Realization Rate	% (MMBtu)	98%	97%
Annual NTG Ratio	% (MMBtu)	76%	71%
Net Annual Savings	kWh/year	172,082,714	717,708,650
	kW	21,597	90,507
	therms/year	5,479,263	23,908,457
Net Lifecycle Savings	MMBtu	15,946,530	69,467,707
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio with T&D Benefits	3.34	3.48

Figure 40 shows the proportion of savings by offering: Large Industrial contributed 45%, Commercial and Industrial contributed 43%, and Agribusiness contributed 12%.

Figure 40. CY 2022 Proportion of Business and Industry Solution Net Lifecycle Savings by Offering



Achievement Against Goals

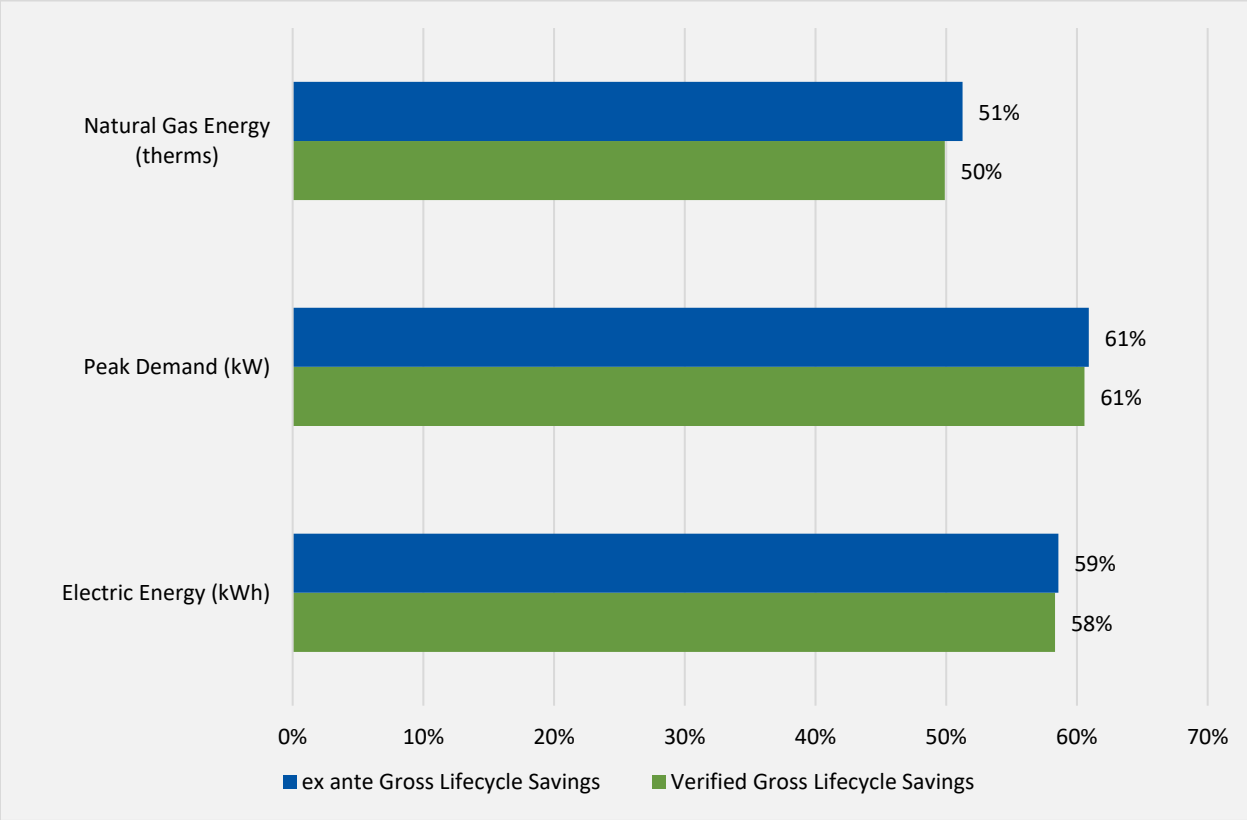
As shown in Table 92, in CY 2022, the Business and Industry Solution achieved 59% of its electric energy savings goal, 51% of its therm savings goal, and 61% of its peak demand savings goal based on *ex ante* lifecycle savings at the solution level. Figure 41 shows the percentage of gross lifecycle savings goals achieved for the Business and Industry Solution in CY 2022.

Table 92. CY 2022 Business and Industry Solution Achievement of Gross Lifecycle Savings Goals

Savings	*Ex Ante* Gross Lifecycle Savings		Verified Gross Lifecycle Savings		*Ex Ante* Achieved (%)	Verified Gross Achieved (%)
	Goal	Actual	Goal	Actual[a]		
Electric Energy (kWh)	5,275,690,419	3,090,593,958	5,275,690,419	3,076,940,219	59%	58%
Peak Demand (kW)	46,316	28,210	46,316	28,054	61%	61%
Natural Gas Energy (therms)	207,263,280	106,219,373	207,263,280	103,415,626	51%	50%
Total Energy (MMBtu)[a]	**38,726,984**	**21,167,044**	**38,726,984**	**20,840,083**	55%	54%

[a] Verified kWh and therm savings may not sum to verified MMBtu values due to conversion/rounding associated with the measure-level application of realization rates.

Figure 41. CY 2022 Business and Industry Solution Achievement of Gross Lifecycle Savings Goals



100% *ex ante* gross lifecycle savings reflect the implementer's contract goals for CY 2022. Verified gross lifecycle savings contribute to the administrator's portfolio-level goals.

Impact Evaluation

This section presents the findings from the CY 2022 impact evaluation at the solution level, followed by a discussion of each offering.

Impact Evaluation Methodology

The evaluation team conducted an impact evaluation of the CY 2022 Business and Industry Solution. The team designed its evaluation, measurement, and verification approach to integrate multiple perspectives into its assessment of performance for each offering and the solution as a whole.

The team used several approaches to measure the impact of the Business and Industry Solution:

- Tracking database review
- Engineering desk reviews
- Virtual verification site visits and interviews
- Engineering savings calculations (Farmhouse Kits)

Table 93 lists the specific data collection activities and sample sizes used in the evaluation. Additional details about these activities and their findings can be found in the offering-specific discussions below.

Table 93. CY 2022 Business and Industry Solution Impact Activities

Offering	Suboffering	Total Measures	Impact Evaluation Sample		
			Desk Reviewed Measures	Virtually Verified Measures	% Sampled (by *Ex Ante* MMBtu savings)
Commercial and Industrial	Small and Medium Industrial	1,377	33	16	37%
	Small and Medium Commercial	6,418	36	24	1%
	Large Commercial	256	29	23	47%
Large Industrial	N/A	1,605	60	49	27%
Agribusiness	Agribusiness	2,360	33	20	5%
	Farmhouse Kits (Packs)	151	N/A	0	N/A
Total		**12,167**	**191**	**312**	**21%**

[a] Farmhouse Kits were not sampled as part of the standard Business and Industry desk review and virtual verification process. Instead, the evaluation team calculated verified savings using deemed savings in the 2022 TRM.

Engineering Desk Reviews

The evaluation team reviewed all available project documentation in SPECTRUM for a sample of 191 measures offered through the CY 2022 Business and Industry Solution. This review included an assessment of the savings calculations and methodology applied by the implementer. The team relied on the applicable TRMs and other relevant secondary sources as needed. Secondary sources included energy codes and standards, case studies, and energy efficiency program evaluations of comparable measures (based on geography, sector, measure application, and date of issue).

For prescriptive measures, the team used the Focus on Energy 2021 and 2022 TRMs and associated work papers as the primary sources to determine methodology and data in nearly all cases. For hybrid and custom measures, the team reviewed the SPECTRUM savings analysis workbooks and adjusted inputs and methodologies as necessary based on engineering judgment and project documentation.

To conduct the impact analysis of the offering, the evaluation team selected a representative sample of measures to evaluate and then extrapolated the random sample findings to the larger population. In CY 2022, this process used purposive and proportional sampling, by the following process:

- **Census sampling** selected the measures with the largest savings by offering (called census measures). The team used a percentage distribution analysis to determine the threshold of savings since this varied by offering. The census sample included most measures larger than 5% each offering's MMBtu lifecycle savings by sampling wave. Because these measures were sampled with certainty (100% of eligible highest saving measures were sampled), the team did not extrapolate the results to the offering population.
- **Random sampling** randomly selected measures from the population of offering measures (called randomly sampled measures). The team extrapolated the cumulative realization rate of randomly sampled measures by offering to the remainder of the offering population.

On-Site and Virtual Verification Site Visits

The evaluation team conducted 89 virtual verification site visits, including interviews with the site contact, using several remote technology interfaces. The team verified the type and quantity of equipment installed, determined how the installed equipment is controlled, and documented the operating hours of the installed equipment. The team then verified savings calculation input parameters based on operational and occupancy schedules, claimed and observed setpoints, trend data, utility data, and any other relevant details identified before contact with the site.

Verified Gross Savings Results for Business and Industry Solution

Table 94 lists the first-year and lifecycle realization rates for the CY 2022 Business and Industry Solution. Table 95 lists verified first-year and lifecycle savings by offering. The sampled projects represent 21% of Business and Industry Solution lifecycle MMBtu savings. Overall, the solution achieved a first-year evaluated realization rate of 97%, weighted by total energy savings (MMBtu). The team determined realization rates by strata, such as census and sample strata, and summed claimed and verified savings to the offering level to arrive at savings and realization rates. Detailed findings for each offering, including factors affecting the realization rates, are discussed in the next section of this chapter.

Table 94. CY 2022 Business and Industry Solution First-Year and Lifecycle Realization Rates

Offering	First-Year Realization Rate				Lifecycle Realization Rate		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
Commercial and Industrial (C&I)	99%	98%	100%	99%	99%	102%	101%
Large Industrial	100%	101%	94%	95%	100%	94%	95%
Agribusiness	100%	100%	97%	99%	100%	97%	99%
Business and Industry Solution	**100%**	**99%**	**96%**	**98%**	**100%**	**97%**	**98%**

Table 95. CY 2022 Business and Industry Solution
First-Year and Lifecycle Verified Energy Savings Summary

Offering	Verified First-Year Savings				Verified Lifecycle Savings		
	kWh	kW	therms	MMBtu [a]	kWh	therms	MMBtu[a]
C&I	102,666,595	13,106	2,861,654	636,464	1,351,675,367	42,935,052	8,905,611
Large Industrial	94,649,556	11,248	4,002,959	723,240	1,287,211,558	53,954,986	9,787,645
Agribusiness	26,733,789	3,700	364,600	127,679	438,053,295	6,525,588	2,147,258
Business and Industry Solution	**224,049,940**	**28,054**	**7,229,212**	**1,487,383**	**3,076,940,219**	**103,415,626**	20,840,513

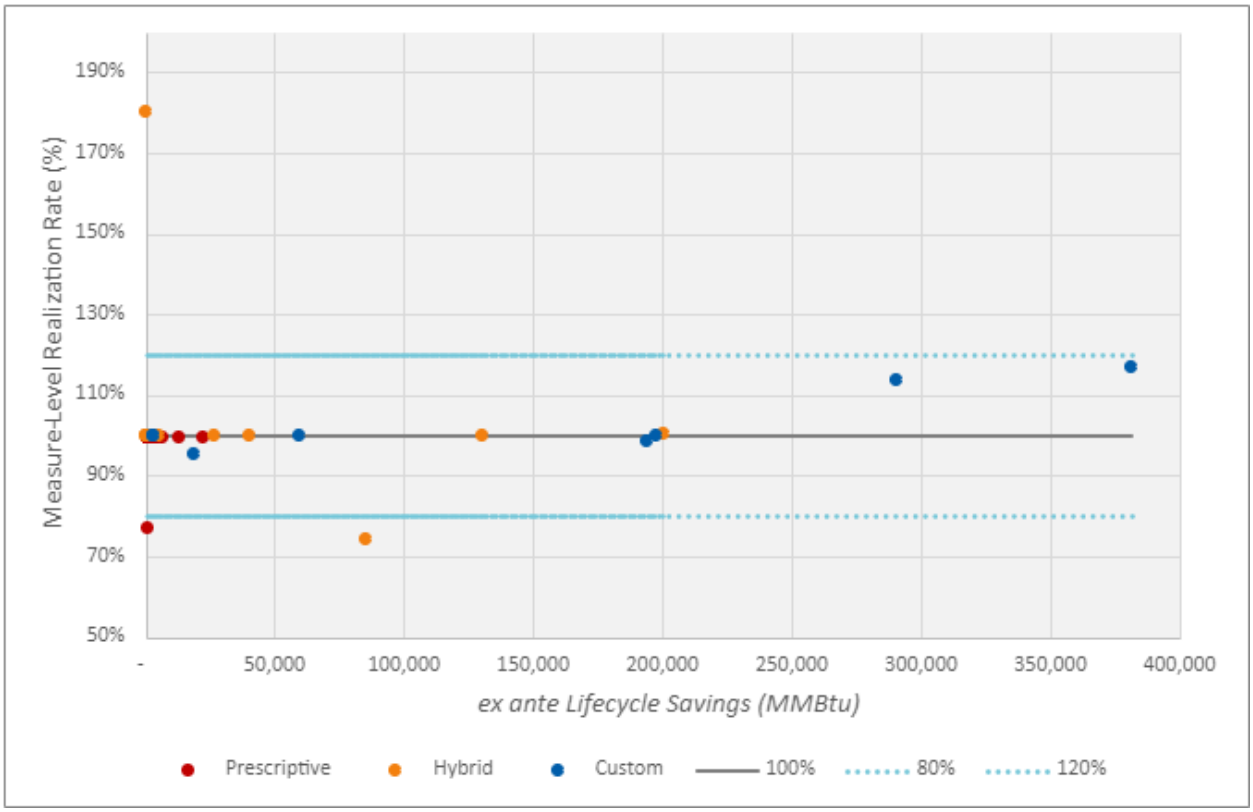
[a] Verified kWh and therm savings may not sum to verified MMBtu values due to conversion/rounding associated with measure-level application of realization rates.

Commercial and Industrial: Verified Gross Savings Results

For the Commercial and Industrial Offering, the evaluation team conducted a database review, desk reviews, interviews, and virtual site visits to inform verified gross savings. The sampled projects represent 19.4% of the offering's lifecycle MMBtu savings. The offering had a gross lifecycle realization

rate of 101%. Figure 42 illustrates the magnitude of and associated realization rates for reported MMBtu savings of the sampled projects.

Figure 42. CY 2022 Commercial and Industrial Offering Sampling Results



As Figure 42 shows, very few of the *ex post* savings calculations deviated from *ex ante* savings in the Commercial and Industrial Offering sample and were primarily in the custom measures. The following describes the main factors affecting the realization rate:

- For one sampled prescriptive measure, the evaluation team adjusted the baseline wattage used in the lighting *ex ante* savings calculations to the actual value determined from the project data. The reduced baseline wattage reduced the MMBtu realization rate of the measure to 77%.
- The team adjusted a hybrid variable frequency drive (VFD) HVAC fan measure to reflect the specific reported project operation hours, as determined through an on-site visit with the customer. The unit ran 5,100 annual hours to match store open hours. *Ex post* verified MMBtu savings increased to 180% realization as a result.
- The team adjusted the claimed savings from an implemented retrocommissioning measure to reflect the current operation and schedule of several main air-handling units (AHUs), based on site observations. The measure specified off-hours for several primary HVAC units that could be scheduled to turn off or down during overnight hours. After the implementation and verification of the measures, the team changed several of the units back to the original design parameters established to meet the customer's needs. The adjustment resulted in a fuel-neutral MMBtu realization rate of 74%

- The team adjusted a custom ventilation system measure to reflect the actual horsepower of an installed fan. The customer needed to make a last-minute change that deviated from the motor horsepower specified in the application materials. The increased fan horsepower resulted in slightly lower realized electric savings (96%).
- The team adjusted one custom boiler measure for first-year savings only, resulting in a very minor impact on the lifecycle electric saving (99% realization) over the 20-year measure life of the project. To more accurately reflect the ramp-up period observed on site and data from the customer, the team adjusted first-year savings to approximately 50% realization.
- The team adjusted one custom ventilation measure to reflect the roof-top unit efficiency and specifications found during an on-site visit, which deviated slightly from the application specification. The increased efficiency resulted in an increased therm realization rate of 114%.
- For one sampled custom measure, the team adjusted the *ex ante* calculation assumptions, including heating hours for the region and measure-specific heating and cooling setpoints, based on data provided by the customer. As a result, *ex post* verified electric savings decreased and therm savings increased. The net effect resulted in a fuel-neutral MMBtu realization rate of 117%.

Table 96 lists the CY 2022 *ex ante* and verified gross savings by segment for the Commercial and Industrial Offering.

Table 96. CY 2022 Commercial and Industrial Offering *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
Overall Commercial and Industrial						
First-Year Gross Savings	103,703,631	13,373	2,861,654	102,666,595	13,106	2,861,654
Lifecycle Gross Savings	1,365,328,653	13,373	42,093,188	1,351,675,367	13,106	42,935,052
Small and Medium Industrial						
First-Year Gross Savings	103,703,631	13,373	2,861,654	102,666,595	13,106	2,861,654
Lifecycle Gross Savings	1,365,328,653	13,373	42,093,188	1,351,675,367	13,106	42,935,052
Small and Medium Commercial						
First-Year Gross Savings	63,654,555	8,453	1,046,817	63,018,009	8,284	1,046,817
Lifecycle Gross Savings	837,428,811	8,453	16,940,501	829,054,523	8,284	17,279,311
Large Commercial*						
First-Year Gross Savings	10,888,007	865	592,857	10,779,126	847	592,857
Lifecycle Gross Savings	77,467,601	865	5,283,461	76,692,925	847	5,389,131

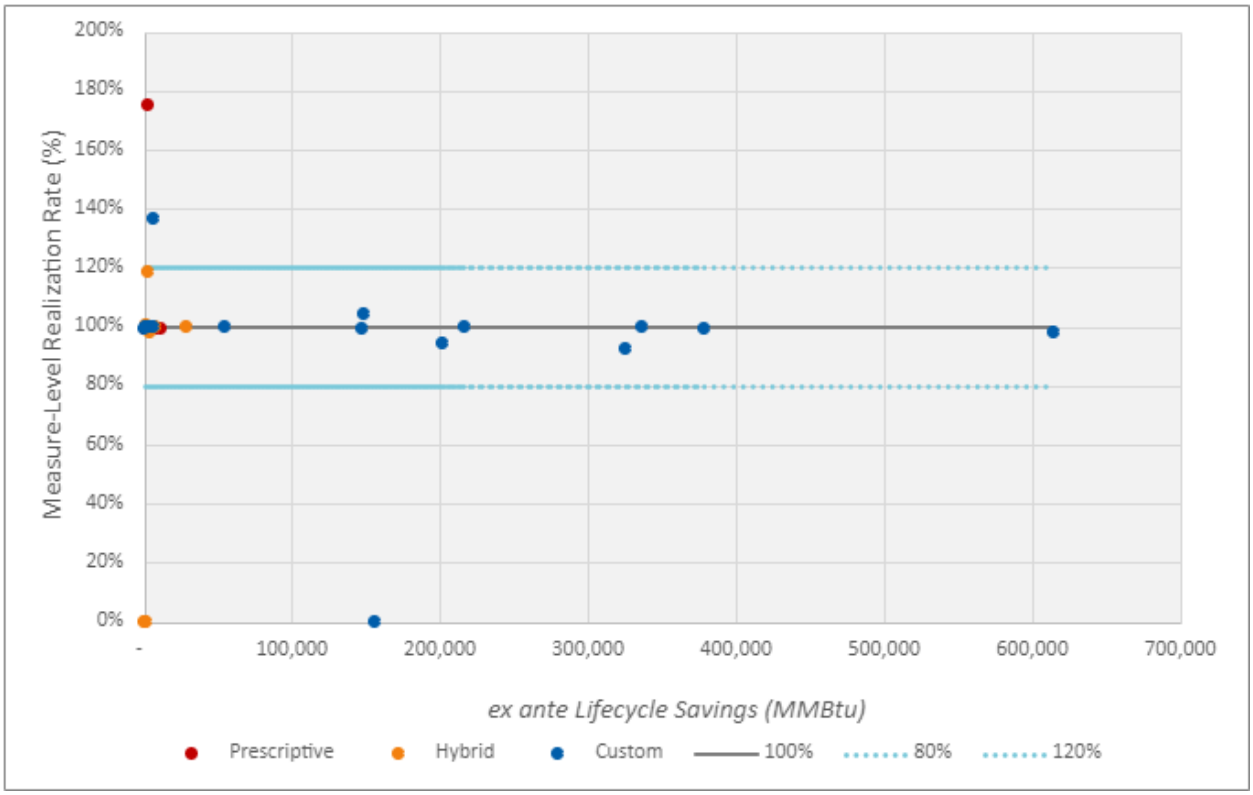
**Ex ante* and verified gross kW savings include one large renewable energy project in the Business and Industry population.

Large Industrial: Verified Gross Savings Results

For the Large Industrial Offering, the evaluation team conducted a database review, desk reviews, interviews, and virtual site visits to inform verified gross savings. The sampled projects represent 27% of Large Industrial Offering's lifecycle MMBtu savings. The offering had a gross lifecycle realization rate of

95% MMBtu. Figure 43 illustrates the magnitude of and associated realization rates for reported MMBtu savings of the sampled projects.

Figure 43. CY 2022 Large Industrial Offering Sample Results



As Figure 43 shows, the prescriptive and custom projects generally maintained within ±5% of a 100% realization rate, with minor fluctuations. The sampled hybrid measures had more variability. Most of the projects with the highest variability were associated with relatively low savings.

The following describes the main factors that affected the measure realization rates:

- For one measure, the deemed prescriptive calculation included an incorrect value for cubic feet per minute (cfm). The evaluation team adjusted this value using the 2022 WI TRM deemed value for this MMID, which resulted in a 175% electric realization rate.
- For two hybrid VFD process fan measures, the team adjusted measure savings to 0 kWh based on the operation data obtained during an on-site visit. The customer locked out all incentivized VFD motors at 60 Hz (100% speed) to meet the operational needs of the facility.
- For one hybrid VFD process pump measure, customer data showed that the operating hours were slightly higher than claimed in the *ex ante* application data. The adjusted hours of use resulted in an 119% electric realization rate.
- For one custom measure sampled, the evaluation team adjusted the *ex ante* calculation assumptions based on customer-provided data, including heating hours for the region and

measure-specific heating setpoints. The adjustment reduced *ex post* verified electric savings and increased therms savings. The net effect resulted in a fuel-neutral MMBtu realization of 137%.

- The team adjusted one custom process measure based on the actual motor efficiency observed on site. This resulted in an electric realization rate of 105%.
- For one large custom project, the team modified equipment hours of use from 7488 (24/6/52) to 7072 (24/5.67/52) based on customer-confirmed operational feedback. This resulted in realization rates of 142% (electric) and 100% (therms); cumulatively, this resulted in a net fuel-neutral realization rate of 93%.
- The team modified one custom process heat recovery measure based on data collected from the customer during virtual and on-site visits as well as a different technical reference for the baseline metric. A modification to the baseline input resulted in a therms realization rate of 94%.
- For one large custom process measure, data collected on site from the customer confirmed a slightly reduced utilization of the equipment than originally designed (which had been in place since measure implementation). The customer did not foresee any immediate change to this value. This adjustment resulted in first-year and lifecycle therms realization rate of 98%.
- For one large industrial furnace measure, the team collected several data points that confirmed the natural gas savings claimed for the measure had not been realized during the first year of operation. Natural gas consumption data normalized for production and weather demonstrated a potential increase in natural gas consumption rather than the decrease the project aimed to achieve. The *ex ante* analysis used marketing materials provided by the vendor, which were not entirely project specific. As a result, this measure received a therms realization rate of 0%. This was sampled as a census project and findings were not extrapolated to the full population.

Table 97 lists the CY 2022 *ex ante* and verified gross savings by segment for the Large Industrial Offering.

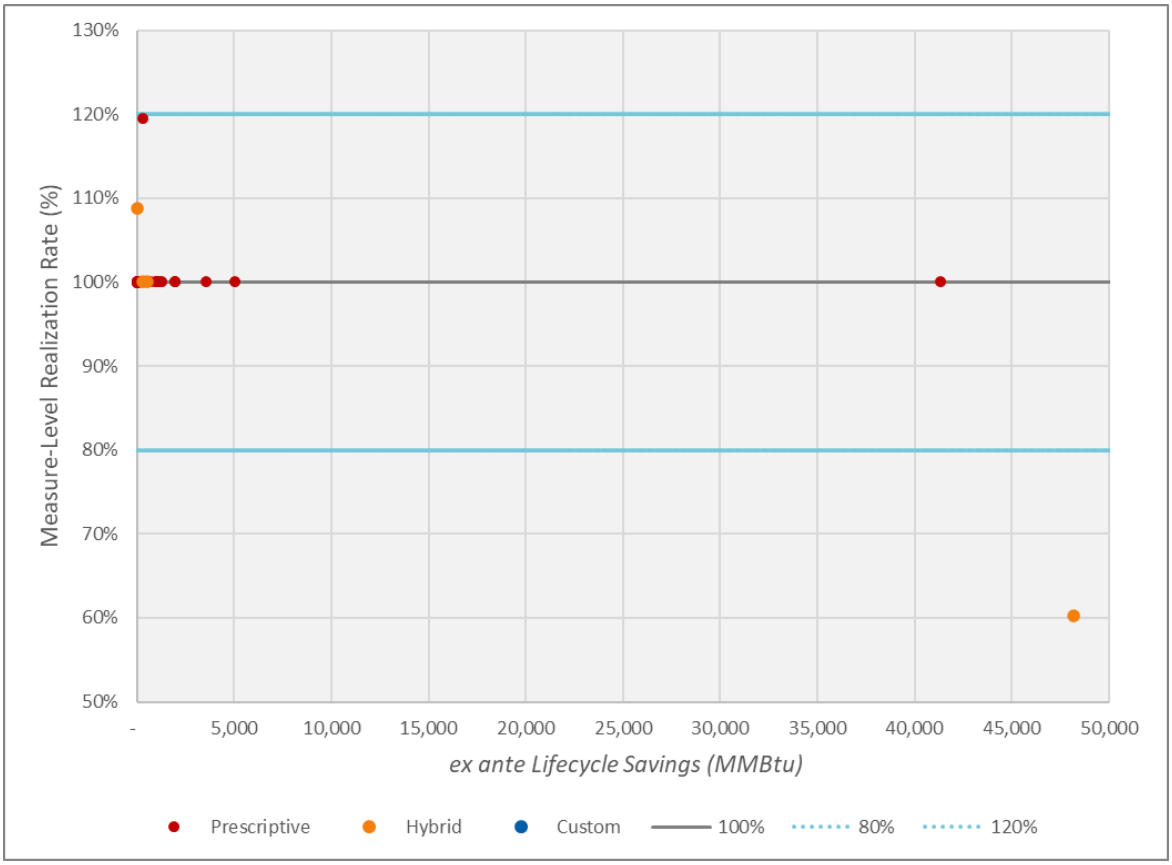
Table 97. CY 2022 Large Industrial Offering *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First-Year Gross Savings	94,649,556	11,137	4,258,467	94,649,556	11,248	4,002,959
Lifecycle Gross Savings	1,287,211,558	11,137	57,398,921	1,287,211,558	11,248	53,954,986

Agribusiness: Verified Gross Savings Results

For the Agribusiness Offering, the evaluation team conducted a database review, desk reviews, interviews, and virtual site visits to inform verified gross savings. The sampled projects represent 5% of Agribusiness Offering lifecycle MMBtu savings. The offering had a gross lifecycle realization rate of 99% MMBtu. Figure 44 illustrates the magnitude of and associated realization rates for reported MMBtu savings of the sampled projects.

Figure 44. CY 2022 Business and Industry Solution Agribusiness Offering Sample Results



As Figure 44 shows, most sampled measures received realization rates clustered around 100%. In CY 2022, there were three instances of *ex post* savings calculations deviating from *ex ante* savings. The following describes the main factors that affected the realization rate:

- One prescriptive project involved a VFD dairy vacuum pump project where *ex ante* calculations used the incorrect MMID (3987) for the project specifications. The evaluation team determined that MMID 5231 fit the project specifications best. MMID 5231 did not have any deemed kW savings associated with the measure, so the demand savings realization rate for this measure was 0%. The application of deemed savings from MMID 5231 resulted in higher electric savings (realization of 119%) in *ex post* verified savings.
- For one small hybrid project, the evaluation team modified the final output therms value from a rounded value to an actual value, which resulted in a therm realization rate of 109%.
- One large hybrid project involved an energy-efficient grain dryer project in which *ex ante* calculations used an input of 2,000 growing acres. During the customer interview, the evaluation team determined that for the crop that used the dryer the acreage was closer to 1,200. The remaining acreage, while present, does not produce a crop that is dried and therefore should not factor into the calculation. *Ex post* savings calculations used 1,200 acres as an input, which resulted in a therm realization of 60%.

Farmhouse Kits

In CY 2022, Focus on Energy moved Farmhouse Kits from the Direct to Customer Solution to the Agribusiness Offering. With this transition, Focus on Energy began tracking savings for Farmhouse Kits under new MMIDs that encompassed savings for all measures in the kit, depending on whether they were delivered to homes with electric or natural gas water heaters. To ensure the proper application of measure savings and in-service rates (ISRs), the evaluation team applied savings from each individual measure in the kit. Table 98 lists this equipment and the associated MMID.

Table 98. Farmhouse Kit Measures and Savings Sources

Measure Name	Source MMID	Savings Source
Faucet Aerator, Bathroom, 1.0 GPM, Pack-based	3863	2022 TRM
Insulation, DHW Pipe, Pack-based	4272	2022 TRM
Showerhead, Upgraded, 1.5 GPM, Pack-based	4273	2022 TRM
LED, Pack-Based, 9 Watt	4277	2022 TRM
LED, Pack-Based, 11 Watt	4278	2022 TRM
High Performance EDPM Weatherstripping – Farmhouse Kit	4906	No *ex ante* or verified savings applied, same as previous years
Outlet Gaskets (8) and Switch Gaskets (4) – Farmhouse Kit	4907	
LED Nightlight – Farmhouse Kit	4908	

The offering-level achieved electric realization rates of 100%; however, the therms realization rate was 71% because *ex ante* savings for bath aerators mistakenly applied kitchen aerator savings, causing lower verified savings than *ex ante* savings. The overall MMBtu realization rate for the offering was 93%.

Table 99 lists the CY 2022 *ex ante* and verified gross savings by segment for the Agribusiness Offering.

Table 99. CY 2022 Agribusiness Offering *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
Standard Agribusiness						
First-Year Gross Savings	26,681,996	3,695	375,440	26,681,996	3,695	364,177
Lifecycle Gross Savings	437,689,385	3,695	6,722,529	437,689,385	3,695	6,520,853
Farmhouse Kits						
First-Year Gross Savings	51,793	5	594	51,793	5	423
Lifecycle Gross Savings	364,363	5	4,735	363,910	5	4,735
Total Agribusiness Offering						
First-Year Gross Savings	26,733,789	3,700	376,034	26,733,789	3,700	364,600
Lifecycle Gross Savings	438,053,748	3,700	6,727,264	438,053,295	3,700	6,525,588

Verified Net Savings Results for the Business and Industry Solution

The evaluation team did not conduct a participant survey in CY 2022. Instead, it used CY 2020 NTG data to assess net savings for the Business and Industry Solution by offering. The team weighted CY 2020

offering-level NTG estimates by CY 2022 total population lifecycle MMBtu savings to calculate an overall NTG ratio of 76% for the CY 2022 solution.

Verified Net Savings Results

The evaluation team calculated freeridership and participant spillover by offering for the CY 2022 Business and Industry Solution using findings from the Business and Industry and Direct to Customer Packs Offering participant survey conducted in CY 2020. To calculate the NTG for each offering in CY 2020, the team combined the self-reported freeridership and participant spillover results using the following equation:

$$NTG = 1 - Freeridership\ Ratio + Participant\ Spillover\ Ratio$$

Table 100 shows the CY 2020 NTG results for offerings in the Business and Industry Solution, which the evaluation team applied in CY 2022. The 2020 Evaluation Report contains the full detailed analysis of NTG completed in CY 2020.

Table 100. CY 2020 Business and Industry Solution NTG Ratios by Offering

Offering	Freeridership	Spillover	NTG Ratio
Commercial and Industrial	24% [a]	1%	77%
Large Industrial	28% [a]	2%	74%
Agribusiness	15% [a]	1%	86%
Farmhouse Kits [b]	28% [a]	10%	82%

[a] Weighted by lifecycle gross verified MMBtu savings.
[b] Farmhouse Kits freeridership and NTG ratios represent kit-level values based on measure-specific NTGs for contents of the Farmhouse Kit.

Table 101 shows the weighted average NTG ratio by offering as well as the total lifecycle gross verified savings and lifecycle net savings in CY 2022. The evaluation team calculated an overall NTG estimate of 76% for the solution in CY 2022.

Table 101. CY 2022 Business and Industry Lifecycle Net Savings and NTG

Offering	Total Lifecycle Gross Verified Savings (MMBtu)	Total Lifecycle Net Savings (MMBtu)	NTG Ratio
Commercial and Industrial	8,905,611	6,857,175	77%
Large Industrial	9,787,645	7,242,724	74%
Agribusiness	2,147,258	1,846,632	86%
Total Business and Industry Solution	**20,840,513**	**15,946,530**	**76%**

Process Evaluation

The CY 2022 process evaluation of the Business and Industry Solution focused on these key topics:

- Solution design, delivery, and goals
- Participant satisfaction and experience

Process Evaluation Methodology

In CY 2022, the evaluation team conducted a process evaluation of the Business and Industry Solution, designing its evaluation approach to assess solution performance as well as to understand any changes from CY 2021. Table 102 lists specific data collection activities and sample sizes used in the evaluation.

Table 102. CY 2022 Business and Industry Solution Process Evaluation Activities and Sample Sizes

Activity	Measure Group or Offering	CY 2022 Sample Size (n)
Administrator and Implementer Interviews	N/A	2
Ongoing Participant Satisfaction Surveys	All	193

In September 2022, the evaluation team interviewed the administrator and the implementer to learn how the new Business and Industry Solution structure was working and to assess its objectives, performance, and implementation challenges and resolutions. The team also asked the administrator and the implementer about their marketing, outreach, and training efforts for engaging trade allies and customers.

Ongoing Participant Satisfaction Surveys

Using contact information stored in SPECTRUM, the solution administrator oversaw web-based satisfaction surveys throughout the year to CY 2022 participants. There were two objectives for these satisfaction surveys:

- Understand customer satisfaction on an ongoing basis and respond to any changes in satisfaction before the end of the annual reporting schedule.
- Help to facilitate timely follow-up with customers to clarify and address service concerns.

A total of 193 Business and Industry Solution participants responded to the CY 2022 survey. The survey covered several topics, including overall satisfaction, satisfaction with offering staff and trade allies, likelihood of recommending Focus on Energy, and other feedback.

Solution Design and Delivery

The Business and Industry Solution offers incentives for prescriptive measures and custom projects that address a broad range of building and customer energy efficiency applications. Customers apply for incentives directly to Focus on Energy or through their trade ally, with support from energy advisors, the implementer, and occasionally from Wisconsin utility account representatives. In CY 2022, Focus on Energy transitioned the implementation of the Farmhouse Kits from the residential Direct to Consumer Solution's implementation staff to the Agribusiness implementation staff with the intent of increasing kit uptake.

Offering Updates

In CY 2022, Focus on Energy introduced limited-time offers, implemented changes to incentives, and began claiming savings for the Farmhouse Kits under the Business and Industry Solution. Focus on Energy introduced the following new limited-time offers in CY 2022:

- **Market Relief Bonus.** The Focus on Energy market relief bonus provided businesses 25% in additional incentives for equipment installed between July 4, 2022, and December 2, 2022.
- **Planning Bonus.** Customers who received project preapproval by September 30, 2022, before initiating their project were eligible for a 10% planning bonus.
- **90x90 offering.** Customers received 90% of the cost of their operational improvements reimbursed if initiated within 90 days of receiving an energy-saving opportunity (ESO) report from their energy advisor for compressed air leak survey and repair, steam trap survey, and steam trap repair.
- **Low Payback Projects.** If the project was pre-approved within 90 days of receiving an ESO report, customers were offered custom incentives based on their first-year energy savings.

Focus on Energy implemented the following changes to incentives in CY 2022:

- Increased incentives for three boiler measures: linkageless boiler controls, HVAC and process system steam trap repair/replacement, and ECM evaporator fan motor for cooler and freezer cases. Decreased incentives on select screw-in LED omnidirectional and decorative lamps.
- Added incentives for exterior networked lighting controls
- Transitioned incentives for residential-type water heaters for businesses to the Midstream Solution
- Eliminated exterior omnidirectional, decorative, and directional LED lamps for new construction projects
- Added fitness centers as an eligible facility type for high-use commercial water heaters and networked lighting controls option for new construction lighting

In CY 2022, Focus on Energy moved Farmhouse Kits from the Direct to Customer Solution to the Agribusiness offering. Agribusiness representatives deliver these kits to participants who have a home on their property during a site visit. Kit contents include the following:

- 4 9-watt LEDs
- 4 11-watt LEDs
- 1 showerhead
- 2 bathroom faucet aerators
- 1 roll of hot water pipe insulation
- 1 roll of weatherstripping
- 8 outlet gaskets
- 4 switch gaskets
- 2 LED nightlights

Challenges

The implementer and administrator reported that, though COVID-19 did not continue to impact solution delivery or participation in CY 2022, inflation and supply chain shortages impacted both. Because of lessened concerns about COVID-19 in CY 2022, the implementer resumed on-site assessments and

in-person post-installation inspections in CY 2022. Virtual assessment and inspections were used on an as-needed basis. Inflation and supply shortages impacted the solution activity in two ways:

- **Reduced trade ally activity.** Participation by commercial trade allies declined by 38% from CY 2021 (1,088 trade allies) to CY 2022 (674 trade allies). Results from a trade ally survey conducted by the implementer in CY 2022 revealed that supply chain issues and rising equipment costs drove lower trade ally participation from CY 2021 to CY 2022. The implementer reported that some customers completed self-installations to save on project costs or purchased more readily available, less efficient and/or nonqualifying equipment instead of waiting for more efficient equipment to be stocked.
- **Longer project timelines.** Project timelines were also impacted by supply chain issues and lack of labor. In addition to being unable to get equipment on site in a typical timeframe, the implementer said customers experienced a hard time finding qualified trade allies due to labor shortages or turnover in their own organizations.

Marketing and Outreach

Similar to previous years, the implementer led most of the customer and trade ally marketing and outreach activities and material development, while the administrator managed the Focus on Energy website and oversaw the outreach strategy. Focus on Energy continued to coordinate marketing efforts with utilities through regular meetings; a shared marketing calendar; and cobranded bill inserts, postcards, and mailings available through an online collateral portal. The website and all marketing materials directed nonresidential customers to one Focus on Energy phone number and one email address. The implementer routed inquiries from these sources to energy advisors who work with customers on project opportunities.

The administrator and implementer employed a variety of customer marketing strategies in CY 2022. Trade ally outreach saw more in-person meetings and annual update videos. Live instructor-led webinars continued in CY 2022, in-person sessions targeted advanced network lighting controls with Design Lights Consortium, building automation systems with the University of Wisconsin–Madison, and industrial refrigeration with the University of Wisconsin.

The market engagement plan for the Business and Industry Solution identified three primary target markets for CY 2022, and the implementer planned the following strategies to target each of these specific market segments:

- **Healthcare.** Conduct direct outreach to past participants and nonparticipants, promote Focus on Energy through regional and statewide healthcare-related organizations, and coordinate with utilities on rural healthcare outreach
- **Metals manufacturers.** Target outreach to investor-owned (IOU) and non-IOU utility representatives who serve metal manufacturing businesses through webinars and check-in meetings
- **Non-dairy agriculture.** Coordinate energy advisor outreach to an identified list of heating trade allies and trade allies serving poultry farms, conduct lunch-and-learn workshops and attend

industry events with heating trade allies, and create e-blast campaigns and case studies aimed at grain dryer distributors

Trade allies are also critical to ensuring customers are aware of and benefiting from Focus on Energy's offerings. The implementer maintained internal goals to retain trade allies who participated in the previous year, which encouraged outreach staff to keep trade allies engaged throughout CY 2021 and CY 2022.

Ongoing Participant Satisfaction Surveys

Throughout CY 2022, the administrator invited participants to take a web-based satisfaction survey.

Awareness

The participant satisfaction survey asked respondents how they learned about the Business and Industry Solution. In CY 2022, most respondents said they learned about it from previous experience with Focus on Energy offerings (32%, n=188), followed by trade allies (27%) and Focus on Energy advisors and staff (14%). These results are similar to those from the CY 2021 participant survey. However, fewer CY 2022 respondents mentioned manufacturers and distributors (4%) compared with CY 2021 respondents (11%, n=345).

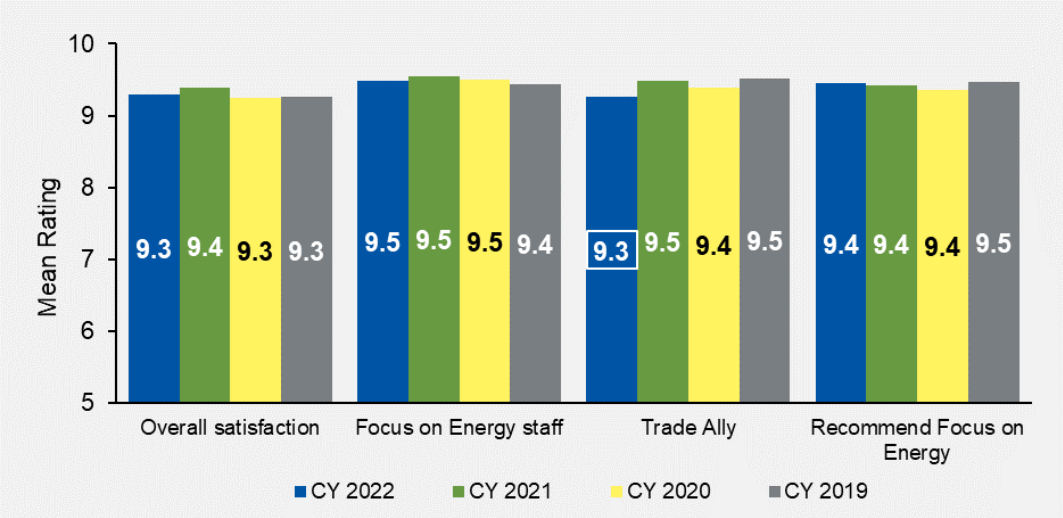
Participant Experience

When asked about satisfaction with the solution and the likelihood to recommend Focus on Energy, respondents gave ratings on a scale of 0 to 10, where 10 indicated the highest degree of satisfaction or likelihood and 0 the lowest.[26] As Figure 45 shows, CY 2022 respondents rated the offerings they participated in with an average overall satisfaction score of 9.3. This is statistically equivalent to the average CY 2021 rating (9.4) and significantly higher than the portfolio target (8.9).[27] in CY 2022, respondents gave high ratings for their satisfaction with Focus on Energy staff (9.5), also consistent with ratings from CY 2021. However, the average rating for trade allies declined by a statistically significant amount from 9.5 in CY 2021 to 9.3 in CY 2022.

[26] The number of participants who completed a survey does not always match the number of responses for each question, as some participants skipped or did not know answers to questions.

[27] The administrator's contract established a portfolio target of 8.9 to maintain or increase customer satisfaction.

Figure 45. Satisfaction and Likelihood Ratings for the Business and Industry Solution

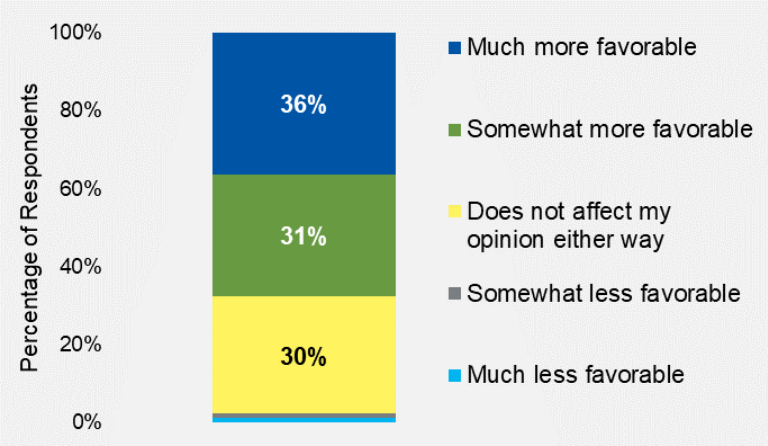


Source: Business and Industry Solution Participant Satisfaction Survey Questions. "Overall, how satisfied are you with your most recent experience with Focus on Energy?" (CY 2022 n=193; CY 2021 n=359; CY 2020 n=848; CY 2019 n=1,339). "How satisfied are you with the Energy Advisor or Focus on Energy staff member who assisted you with your project?" (CY 2022 n=153; CY 2021 n=248; CY 2020 n=585; CY 2019 n=992). "How satisfied are you with the contractor that provided your business upgrades?" (CY 2022 n=140; CY 2021 n=269; CY 2020 n=656; CY 2019 n=1,069). "How likely are you to recommend Focus on Energy to others?" (CY 2022 n=192; CY 2021 n=360; CY 2020 n=845; CY 2019 n=1,335).
Boxes around ratings indicate a statistically significant difference between CY 2022 and CY 2021 ($p<0.10$ using t-tests).

Using the survey data, the evaluation team calculated a net promoter score (NPS) based on customers' likelihood to recommend Focus on Energy. The NPS is expressed as an absolute number between -100 and +100 that represents the difference between the percentage of promoters (respondents giving a rating of 9 or 10) and detractors (respondents giving a rating of 0 to 6). High NPS scores (+70 or higher) are theoretically predictive of customer behaviors, such as participating in another offering, implementing additional energy improvements, and referring Focus on Energy offerings to others. The Business and Industry Solution's NPS was +83 for CY 2022, consistent with +86 for CY 2021.

Respondents were asked if they were aware that the Business and Industry Solution was offered in partnership with their local utility before receiving the satisfaction survey. Seventy-six percent (n=190) were aware in CY 2022, similar to 80% (n=352) in CY 2021. Respondents were also asked if Focus on Energy offerings affected their opinion of their utilities. As Figure 46 shows, 67% reported that their opinion had become *much more favorable* or *somewhat more favorable,* while only 2% of participants reported that their opinion had become *much less favorable* or *somewhat less favorable*. These results were almost identical to results in CY 2021 (67% more favorable, 1% less favorable).

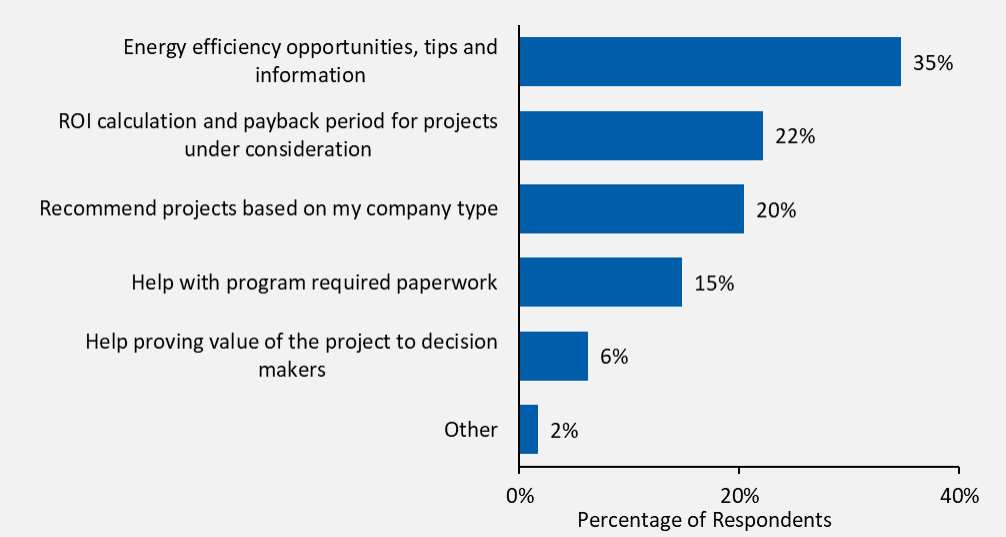
Figure 46. Participant Opinion of Utilities



Source: Trade Ally Solutions Participant Satisfaction Survey Question. "How have these offerings affected your opinion of your energy utility, if at all?" (n=179).
Note: Unlabeled segments represent 3% or less of respondents.

Survey respondents identified how Focus on Energy could best support their organization with future projects (Figure 47). The most frequent response from CY 2022 participants was energy efficiency opportunities, tips, and information (35%), followed by return on investment (ROI) calculations (22%) and recommending projects based on company type (20%).

Figure 47. CY 2022 Business and Industry Solution Participants' Most Valued Support



Source: Business and Industry Participant Satisfaction Survey Question. "Aside from providing project incentive dollars, how can Focus on Energy best support your organization going forward?" (n=176).

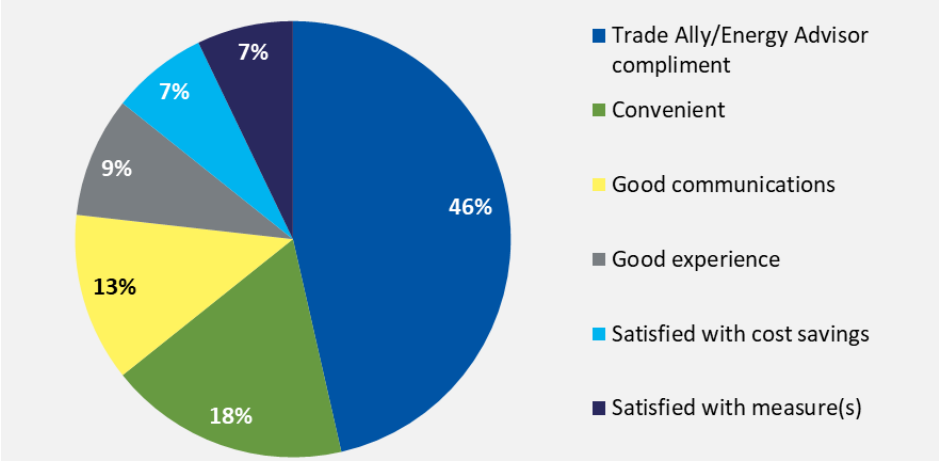
Participant Feedback and Suggestions for Improvement

The survey asked participants if they had any comments or suggestions to improve the solution. Of the 193 participants who responded to the survey, 27% provided open-ended feedback, which the

evaluation team coded into a total of 83 mentions. Of these mentions, 56 were positive or complimentary (67%), and 27 suggested improvements (33%).

Figure 48 shows a breakdown of positive comments. Respondents overwhelmingly complimented their trade allies and Focus on Energy staff (46%). This was followed by comments about the ease and convenience of participating in the offering (18%) and good communications (13%). There were fewer mentions of cost savings in CY 2022 (7%) than CY 2021 (22%); however, CY 2022 mentions of cost savings were comparable to CY 2020 (11%).

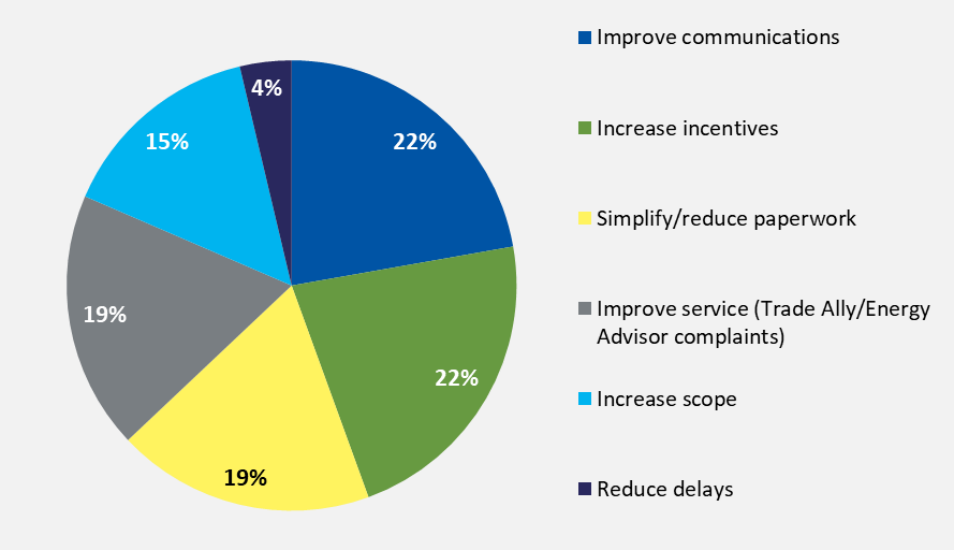
Figure 48. Positive Comments about the Business and Industry Solution



Source: Trade Ally Solutions Participant Satisfaction Survey Question. "Please tell us more about your experience and any suggestions for improvement." (Total positive mentions n=56)

Figure 49 shows a breakdown of suggested improvements. In CY 2022, the most common suggestions were evenly spread between improve communications (22%), increase incentives (22%), simplify or reduce paperwork (19%), and improve customer service (19%). These suggestions correspond with the most common suggestions in CY 2021, except for fewer mentions of improving communications (22% in CY 2022, down from 41% in CY 2021).

Figure 49. Suggestions for Improving the Business and Industry Solution



Source: Trade Ally Solutions Participant Satisfaction Survey Question. "Please tell us more about your experience and any suggestions for improvement."
(Total suggestions for improvement mentions n=27)

Cost-Effectiveness

Evaluators commonly use cost-effectiveness tests to compare the benefits and costs of a DSM offering. The benefit/cost test used in Wisconsin is a modified version of the TRC test. *Appendix I. Cost-Effectiveness and Emissions Methodology and Analysis* in Volume III includes a description of the TRC test.

Table 103 lists the CY 2022 incentive costs for the Business and Industry Solution.

Table 103. CY 2022 Business and Industry Solution Incentive Costs

Offering	Incentive Costs
Commercial and Industrial	$6,449,271
Large Industrial	$5,525,622
Agribusiness	$3,084,543
Renewables	$16,623
Total	**$15,076,059**

The evaluation team found that the CY 2022 Business and Industry Solution was cost-effective with T&D benefits (3.34) and without T&D benefits (3.06). Table 104 lists the evaluated costs and benefits.

Table 104. Business and Industry Solution Costs and Benefits

Cost and Benefit Category	Total
Costs	
Administration Costs	$774,108
Delivery Costs	$10,469,002
Incremental Measure Costs	$60,719,129
Total Non-Incentive Costs	**$71,962,239**
Benefits	
Electric Benefits (kWh)	$89,471,495
Electric Benefits (kW)	$47,726,097
T&D Benefits (kW)	$20,532,220
Gas Benefits	$43,464,696
Emissions Benefits	$39,408,510
Total TRC Benefits with T&D benefits	**$240,603,019**
Net TRC Benefits with T&D benefits	**$168,640,780**
TRC Benefit/Cost Ratio with T&D benefits	**3.34**

Outcomes and Recommendations

The evaluation team identified the following outcomes and recommendations for improving the Business and Industry Solution.

Outcome 1. Some larger and more complex projects lacked consistency in documentation, detailed savings calculations, and data. This lack of information caused some discrepancies in calculations in the reported and verified savings. The evaluation team found some of the largest discrepancies during the virtual site visits when using actual customer trend or meter data to inform savings analysis. The results showed that verified savings deviated from reported savings.

Recommendation 1. Conduct a more comprehensive review and analysis of project savings for large custom projects that accommodate more complexity and variability than usual. Consider amending the standard protocol for developing savings estimates for these types of projects, which might include the following elements:

- Establish a threshold of savings or incentive value, above which final project savings verification will require following the established protocol.
- Continue having advanced discussions with the evaluation team and other stakeholders regarding project details to deliberate and agree upon the best available savings calculation specific to the project and any known data limitations.
- Consider requiring a standardized technical analysis summary (TAS) report, in which the implementer provides details about the methodologies used and assumptions made to calculate savings.

- Consider designing a standardized verification report, in addition to the verification sheet, in which assumptions in the TAS are verified, pictures and invoices collected, and any changes to the project accounted for.
- Obtain trend data collected and provided by the customer or vendor to establish an accurate picture of the baseline and post-installation sequencing, operation, loading, production, and run time, as applicable to the metrics involved in the project. Encourage less reliance on specification data and engineering assumptions when actual data are available to support savings estimates and verification.
- Consider conducting power metering of baseline and installed equipment, as applicable to the metrics involved in the project. The duration of metering should be determined by the pattern of use of the equipment involved. Weather-dependent equipment (most HVAC) will likely require seasonal timing to accurately capture annual performance, whereas weather-independent equipment (mostly process measures) will likely require only a couple of weeks of normal operation to extrapolate annual performance.
- If trend data are not available, consider developing metering guidelines to be used internally and potentially by vendors externally that specify standard metering practices to be followed and the installation documentation to be generated as part of a metering installation. Consider using IPMVP Option C as a foundation for this guideline.
- To ensure receipt of the above data, fully discuss the requirements with the customer before issuance of the offer and consider linking incentive delivery to the receipt of data.

Outcome 2: For measures involving VFD on milking pumps where the number of milking cows is an important input, the language in the TRM and on the application may be causing confusion.

Recommendation 2: Clarify and align language in the TRM and on the application to clearly specify the input required to accurately calculate savings. The TRM currently defines the number of milking cows as "the average number of animals being milked throughout the entire year, including dry cows, but excludes heifers not yet fresh." The number of milking cows naturally varies throughout the year so an attempt should be made to estimate the average number of cows that are actively milking at any given time of the year. This could be done by estimating the average number of milking cows for each of the next 12 months and then taking the average of the 12 months. The monthly averages should be based on when the farmer expects dry cows to start lactating again, when heifers that are not yet fresh will start lactating, and when milking cows will turn dry. Clarify the language in both documents to avoid different definitions being used in future applications.

Schools and Government Solution

The Schools and Government Solution provides technical assistance and prescriptive and custom incentives to K-12 schools, colleges, universities and local, county, and state government facilities. Participation in the Schools and Government Solution is tracked within the two offerings: Schools (private/public K-12, colleges and universities, technical colleges) and Government (local municipalities, tribal nations, state and federal government).

The solution is administered by APTIM and implemented by CESA 10, supported by Leidos as a subcontractor.

Table 105 lists actual spending, savings, participation, and cost-effectiveness of the Schools and Government Solution for CY 2022.

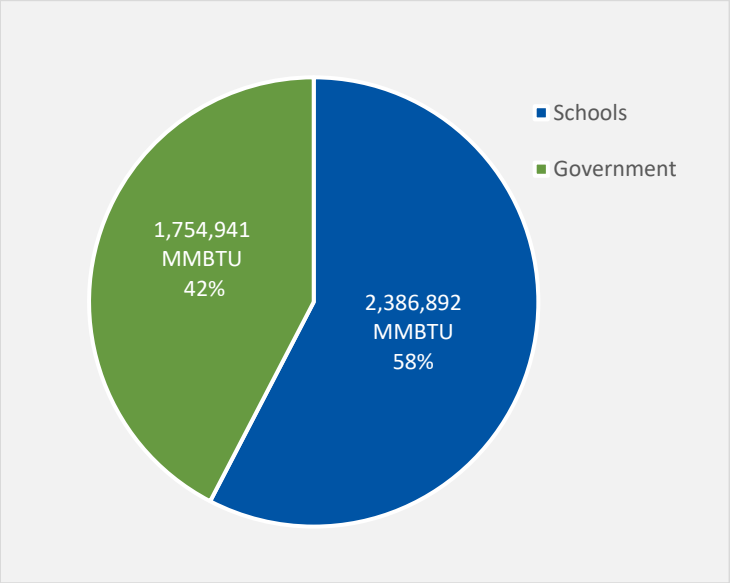
Table 105. CY 2022 Schools and Government Solution Summary

Item	Units	CY 2022	Quad (CY 2019-CY 2022)[a]
Incentive Spending	$	$5,235,051	$25,652,215
Participation	Number of Participants	732	3,319
Verified Gross Lifecycle Savings	kWh	825,936,226	4,141,545,395
	kW	7,755	39,695
	therms	28,556,500	180,377,978
Verified Gross Lifecycle Realization Rate	% (MMBtu)	96%	101%
Annual NTG Ratio	% (MMBtu)	73%	72%
Net Annual Savings	kWh/year	44,106,727	209,208,327
	kW	5,661	28,194
	therms/year	1,554,999	8,531,800
Net Lifecycle Savings	MMBtu	4,141,833	22,937,478
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio	1.25	1.88

[a] Quad totals include Agriculture spending and savings from 2019 when Agriculture, Schools, and Government were organized as a single program.

Figure 50 shows that the Schools Offering contributed 2,386,892 MMBtu, 58% of the net lifecycle MMBtu savings to the Schools and Government Solution, and the Government Offering contributed 1,754,941 MMBtu, the remaining 42%.

Figure 50. Proportion of Schools and Government Solution Net Lifecycle Savings by Offering



Achievement Against Goals

As shown in Table 106, the Schools and Government Solution achieved 72% of its electric energy savings goal, 68% of its peak demand savings goal, and 59% of its therm savings goal in CY 2022 based on verified gross lifecycle savings at the solution level.

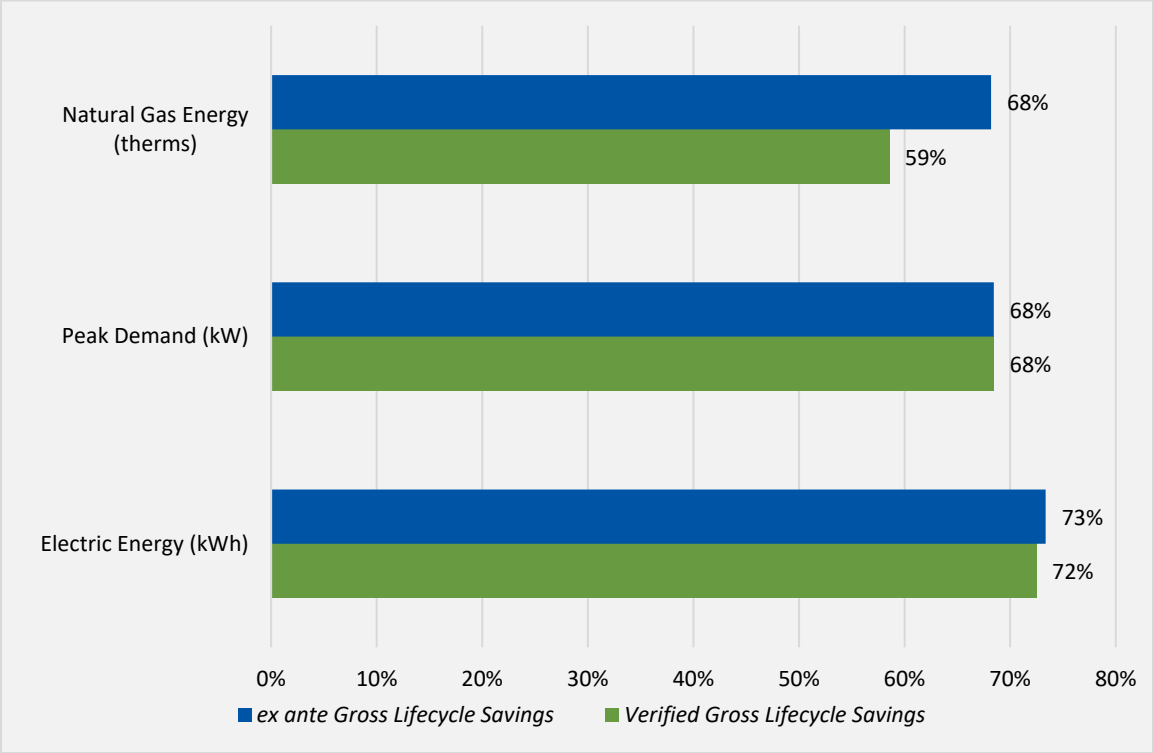
Table 106. CY 2022 Schools and Government Solution Achievement of Gross Lifecycle Savings Goals

Savings	*Ex Ante* Gross Lifecycle Savings		Verified Gross Lifecycle Savings		Percent Achieved	
	Goal	Actual	Goal	Actual	*Ex Ante*	Verified Gross
Electric Energy (kWh)	1,139,777,843	836,171,519	1,139,777,843	825,936,226	73%	72%
Peak Demand (kW)	11,330	7,755	11,330	7,755	68%	68%
Natural Gas Energy (therms)	48,775,500	33,263,189	48,775,500	28,556,500	68%	59%
Total Energy (MMBtu) [a]	**8,766,472**	**6,179,453**	**8,766,472**	**5,673,860**	**70%**	**65%**

[a] Verified kWh and therm savings may not sum to verified MMBtu values due to conversion/rounding associated with measure level application of realization rates.

Figure 51 shows the percentage of gross lifecycle savings goals achieved for the Schools and Government Solution in CY 2022.

Figure 51. CY 2022 Schools and Government Solution Achievement of Gross Lifecycle Savings Goals



100% *ex ante* gross lifecycle savings reflects the implementer's contract goals for CY 2022. Verified gross lifecycle savings contribute to the administrator's portfolio-level goals.

Impact Evaluation

This section contains the findings for the CY 2022 impact evaluation of the Schools and Government Solution at the solution level, followed by a discussion of each offering.

Impact Evaluation Methodology

The evaluation team conducted an impact evaluation of the CY 2022 Schools and Government Solution. The team designed its evaluation, measurement, and verification approach to integrate multiple perspectives in assessing the performance of each offering and of the solution as a whole. Table 107 lists the specific data collection activities and sample sizes used in the evaluation. Additional details about these activities and their findings can be found in the offering-specific discussions below.

Table 107. CY 2022 Schools and Government Solution Impact Activities

Offering	Total Measures	Impact Evaluation Sample		
		Desk Reviewed Measures	Verified Measures	Proportion Sampled (by *Ex Ante* MMBTU Savings)
Schools	2,643	25	16	19%
Government	1,414	17	8	20%
Total	**4,057**	**42**	**24**	**20%**

Tracking Database Review

The evaluation team reviewed the census of records in Focus on Energy's database, SPECTRUM. This involved thoroughly reviewing the data to ensure SPECTRUM totals matched the administrator's reported totals and to check that complete and consistent information was applied across data fields (e.g., measure names, first-year savings applications, effective useful life [EUL]).

Evaluation Sampling

To conduct the impact analysis, the team selected a representative sample of measures to evaluate then extrapolated findings to the larger offering population. In CY 2022, this process used both purposive and proportional sampling.

The purposive sampling selected the largest saving measures by offering. Because these measures were sampled with certainty (100% of eligible highest saving measures were sampled), the results were not extrapolated to the offering population. These measures are referred to as census measures. The proportional sampling measures were randomly selected from the population of offering measures. These measures are referred to as randomly sampled measures. The cumulative realization rate of randomly sampled measures by offering was extrapolated to the remainder of the offering population.

Engineering Desk Review and Interview

The evaluation team conducted engineering desk reviews of a sample of 25 Schools Offering projects and 17 Government Offering projects. Several of these reviews also involved an interview or email exchange with the site contact to verify key parameters, collect additional site photos, discuss operating schedules, and obtain additional trend data.

For all sampled measures, the team reviewed all available project documentation in SPECTRUM and assessed the savings calculations and methodology applied by the implementer. The team relied on the applicable TRMs and other relevant primary and secondary sources as needed. The Focus on Energy TRM and associated work papers were the primary sources to determine methodology and data in nearly all cases. For hybrid and custom measures, the team reviewed the SPECTRUM savings analysis workbooks and adjusted inputs and methodologies as necessary based on engineering judgment and project documentation.

Verification Site Visits

The evaluation team additionally conducted on-site visits or phone interviews to a sample of 16 schools and eight government entities. The site visit involved verification of the type and quantity of equipment installed, asking the site contact how the installed equipment was controlled, and documenting the operating hours of the installed equipment. The team verified savings calculation input parameters based on operational and occupancy schedules, claimed and observed setpoints, trend data, utility data, and any other relevant details identified.

Verified Gross Savings Results for Schools and Government Solution

Table 108 lists the first-year and lifecycle realization rates for CY 2022. Table 109 is a summary of verified first-year and lifecycle savings by offering. Overall, the Schools and Government Solution

achieved a first-year evaluated realization rate of 97%, weighted by total (MMBtu) energy savings. Realization rates are determined by stratum, such as census and sample strata, and claimed and verified savings are summed to the offering level to arrive at savings and realization rates. Detailed findings for each offering, including factors affecting the realization rates, are discussed in the next sections of this report.

Table 108. CY 2022 Schools and Government Solution First-Year and Lifecycle Realization Rates

Offering	First-Year Realization Rate				Lifecycle Realization Rate		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
Schools	98%	100%	99%	99%	97%	88%	98%
Government	100%	100%	84%	95%	100%	80%	93%
Total Schools and Government Solution	**99%**	**100%**	**95%**	**97%**	**100%**	**86%**	**96%**

Table 109. CY 2022 Schools and Government Solution First-Year and Lifecycle Verified Energy Savings Summary

Offering	Verified First-Year Savings				Verified Lifecycle Savings		
	kWh	kW	therms	MMBtu [a]	kWh	therms	MMBtu [a]
Schools	25,221,435	3,827	1,675,340	253,590	330,941,130	21,405,440	3,269,715
Government	35,198,739	3,928	454,796	165,578	494,995,096	7,151,060	2,404,029
Total Schools and Government Solution	**60,420,174**	**7,755**	**2,130,136**	**419,167**	**825,936,226**	**28,556,500**	**5,673,744**

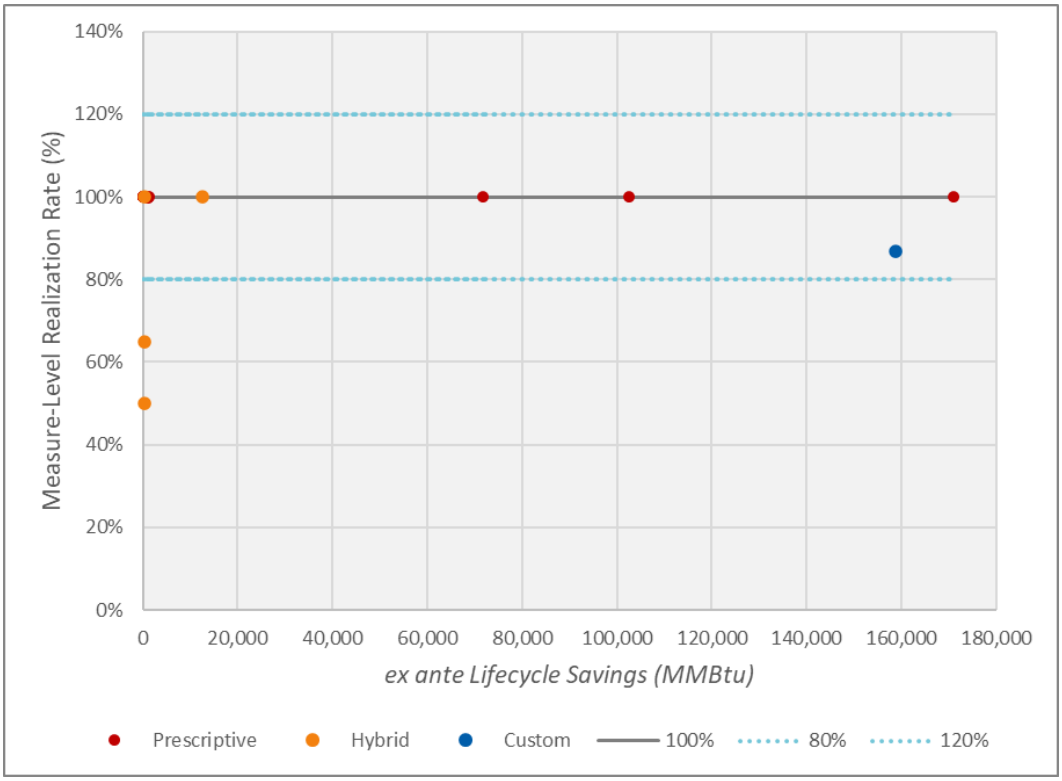
[a] Verified kWh and therm savings may not sum to verified MMBtu values due to conversion/rounding associated with measure-level application of realization rates.

Schools Offering: Verified Gross Savings Results

For the Schools Offering, the evaluation team conducted a database review, desk reviews, interviews, and virtual site visits to 16 schools to inform verified gross savings. The offering had a gross lifecycle realization rate of 98% MMBtu. Figure 52 presents the magnitude of and associated realization rates for reported MMBtu savings of the sampled projects.

As seen in the figure, all prescriptive projects in the sample had a 100% realization rate, but two small hybrid projects and one large custom project were below 100%.

Figure 52. CY 2022 Schools and Government Solution - Schools Offering Sampling Results



The following describes the main factors affecting the realization rate:

- For one small hybrid measure, two new boilers received incentives through the Schools Offering. However, an interview with the on-site contact and review of operational data demonstrated that only one boiler carries the full load of the building and the other is for redundancy. The evaluation team modified the total input MBH, which reduced *ex post* verified therms savings by half.
- For one small hybrid measure, the school facility installed a process make-up air and exhaust system. *Ex ante* savings calculations assumed a run time of eight hours per day for the 38-week school season. However, an interview with the on-site contact and a review of the operational parameters used at the school demonstrated that the system ran closer to four hours per day during the 38 weeks. The evaluation team modified hours of use, resulting in a therms realization rate of 65%.
- For a large custom project, *ex ante* savings from a large-scale HVAC and controls upgrade project were determined through modeling software. To verify *ex post* savings, the evaluation team calibrated models with actual utility data from the building following implementation. The results reduced electric savings and confirmed the therm savings, resulting in an overall MMBtu *ex post* realization rate of 87%.

Table 110 lists the CY 2022 *ex ante* and verified gross savings for the Schools Offering.

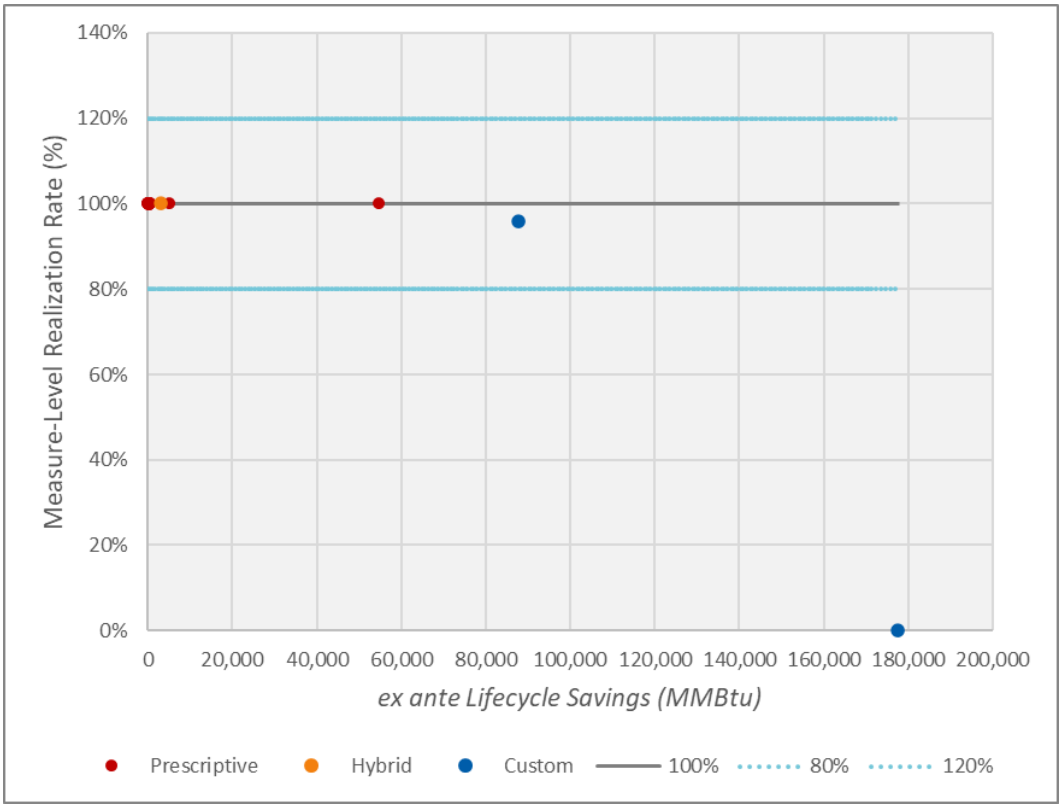
Table 110. CY 2022 Schools Offering *Ex Ante* and Verified Gross Savings

Schools Offering	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First-Year Gross Savings	25,764,045	3,827	1,692,262	25,221,435	3,827	1,675,340
Lifecycle Gross Savings	341,315,857	3,827	24,324,363	330,941,130	3,827	21,405,440

Government Offering: Verified Gross Savings Results

For the Government Offering, the evaluation team conducted a database review, desk reviews, interviews, and virtual site visits to eight government entities to inform verified gross savings. The offering had a gross lifecycle realization rate of 100% MMBtu. Figure 53 presents the magnitude of and associated realization rates for reported MMBtu savings of the sampled projects. Most *ex post* savings calculations did not deviate from *ex ante* savings in the Government Offering sample for CY 2022. One large custom project had a realization rate of 0%.

Figure 53. CY 2022 Schools and Government Solution - Government Offering Sampling Results



The following describes the main factor affecting the realization rate:

- One large custom measure resulted in a 0% realization rate because the project did not meet the original design parameters on which the *ex ante* savings were built. Data collected from the site included four years of natural gas and biogas consumption data, run times on all related

electrical motors, and plant loading data. All data demonstrated an increase in natural gas consumption rather than the decrease the measure was designed to accomplish.

Table 111 lists the CY 2022 *ex ante* and verified gross savings for the Government Offering.

Table 111. CY 2022 Government Offering *Ex Ante* and Verified Gross Savings

Government Offering	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First-Year Gross Savings	35,198,739	3,928	541,424	35,198,739	3,928	454,796
Lifecycle Gross Savings	494,995,096	3,928	8,938,826	494,995,096	3,928	7,151,060

Verified Net Savings Results for the Schools and Government Solution

The evaluation team did not conduct a participant survey to assess net savings for the Schools and Government Solution at the offering level in CY 2022. Instead, the evaluation team applied offering level NTG results from the CY 2020 participant survey. The team weighted the offering-level NTG estimates developed in CY 2020 by total population lifecycle MMBtu savings to calculate an NTG ratio of 73% for the CY 2020 solution. The team used this 73% NTG ratio in the CY 2022 solution analysis.

Verified Net Savings Results

The evaluation team calculated freeridership and participant spillover for the Schools and Government Solution using findings from a survey conducted in CY 2020 with 75 participants.[28] To calculate the NTG, the team combined self-reported freeridership and participant spillover results using the following equation:

$$NTG = 1 - Freeridership\ Ratio + Participant\ Spillover\ Ratio$$

Table 112 shows the NTG results that were applied to the Schools and Government Solution in CY 2022. Two projects with the greatest savings represented 27% of the NTG analysis sample lifecycle gross verified savings in CY 2020.[29] Their combined savings-weighted average freeridership is 37.5%, accounting for 10 percentage points of the Schools and Government Solution freeridership ratio of 27%.

Table 112. CY 2022 Schools and Government Solution NTG Ratio

Freeridership	Spillover	NTG Ratio
27% [a]	0%	73%

[a] Weighted by lifecycle gross verified MMBtu savings.

Table 113 shows the weighted average NTG ratio by offering as well as the total lifecycle gross verified savings and lifecycle net savings for CY 2022.

[28] In CY 2020, there were 39 Government Offering participants and 36 Schools Offering participants.

[29] In CY 2020, there were two energy-efficient boiler projects by Schools Offering participants.

Table 113. CY 2022 Schools and Government Solution Lifecycle Net Savings and NTG

Offering	Total Lifecycle Gross Verified Savings (MMBtu)	Total Lifecycle Net Savings (MMBtu)	NTG Ratio
Schools	3,269,715	2,386,892	73%
Government	2,404,029	1,754,941	73%
Total	**5,673,744**	**4,141,833**	**73%**

Process Evaluation

The CY 2022 process evaluation focused on these key topics:

- Solution design, delivery, and goals
- Participant satisfaction and experience

Process Evaluation Methodology

In CY 2022, the evaluation team designed the process evaluation of the Schools and Government Solution to assess performance and to understand any changes from CY 2021. The process evaluation involved in-depth interviews with the administrator and implementer as well as an analysis of the results of the ongoing online participant satisfaction survey.

Table 114 lists the data collection activities and sample sizes for all primary data collection.

Table 114. CY 2022 Schools and Government Solution Process Evaluation Sample Sizes

Group	Data Collection Method	Sample
Administrator and Implementer	Interviews	2
Ongoing Participant Satisfaction	Online survey	100

Administrator and Implementer Interviews

In October 2022, the evaluation team interviewed the administrator and the implementer to learn about their objectives, performance, and challenges and resolutions. The team also asked about their marketing, outreach, and training efforts for engaging trade allies and customers.

Ongoing Participant Satisfaction Survey

Throughout CY 2022, the administrator emailed participants a link to the web-based satisfaction survey. The survey covered overall satisfaction, satisfaction with Focus on Energy advisors and staff and trade allies, likelihood of recommending Focus on Energy, likelihood to initiate another energy-efficient project, and other feedback.

The satisfaction survey had two objectives:

- Understand customer satisfaction on an ongoing basis and respond to any changes in satisfaction before the end of the annual reporting schedule
- Help facilitate timely follow-up with customers to clarify and address service concerns

As in previous years, the evaluation team analyzed the survey results. According to SPECTRUM data, 100 Schools and Government Solution participants responded to the CY 2022 survey.

Solution Design and Delivery

The Schools and Government Solution offers technical assistance to identify energy-saving opportunities and equipment and various prescriptive and custom incentives to reduce the upfront cost of projects to improve energy efficiency. Any local, county, or state government agency and public or private school or university that is also in the service territory of a Focus on Energy participating utility is eligible.

The solution is delivered through energy advisors who reach out to school and government customers and help them identify projects and submit applications. They also conduct energy calculations to determine savings and available incentive dollars for custom projects. Some energy advisors are assigned to key accounts, the majority are assigned to a particular region, and one is assigned to wastewater agencies. Participants can also apply directly to Focus on Energy for prescriptive incentives for eligible products.

Eligible customers are from one of three segments: higher education (including all two-year and four-year institutions), K-12 schools, and government (including all state and local government, tribal-owned organizations, and wastewater).

Special Offerings and Initiatives

In CY 2022, some solution offerings and initiatives were offered broadly, while others targeted specific customer segments. In addition, Focus on Energy added laboratory energy efficiency measures targeted at higher education and K-12 schools.

Custom Bonus Program. Custom projects that received preapproval by June 30, 2022, and were completed by November 30, 2022, were eligible for up to $20,000 in additional custom incentives.

Competitive Incentive RFP. Focus on Energy offered all business customers an opportunity to receive additional financial support, and incentives were rewarded based on demonstrated financial need, cost-effectiveness, and energy savings.

Practical Energy Management (PEM). The goal of PEM training is for Focus on Energy to nurture relationships with customers to increase participation and engage participants. Participants learn to implement long-range energy plans, benchmark and analyze facility usage, evaluate and select new energy-efficient equipment, and create a business case for energy-efficient upgrades. PEM training includes a toolkit to guide participants in starting an energy team. Training originated as day-long sessions but was shortened to a few hours per day to lessen the time required for participation.

Higher Education Strategic Energy Management (SEM). Higher education customers can enroll in SEM to advance their energy-management capabilities for achieving low- and no-cost operational energy improvements and establish a process for continuing to do so. Participants receive an enrollment incentive of $1,500, energy performance and tracking tools, and support for energy management

system development. Focus on Energy enrolled three new universities in CY 2022, bringing its higher education SEM enrollment to a total of eight customers.

Higher Education Kit Challenge: This challenge engaged colleges and universities to expand their energy efficiency initiatives to their students living in off-campus housing. The Focus on Energy team enrolled campuses, created co-branded marketing materials, and tracked participation through the standard Focus on Energy Pack Offering using PromoCodes. Seven universities participated in 2022 and 523 packs were ordered. University of Wisconsin-Oshkosh won the challenge with 6.5% of their off-campus housing requesting a kit.

Tribal Energy Plan: This offering provided tribal nations the opportunity to expand an existing energy plan or begin the energy planning process. The tribal nation could create a plan with internal labor or using an outside contractor. The offering provided up to $15,000 for development of a plan.

Wastewater Plant Energy Assessments. Wastewater plants can work with Focus on Energy's wastewater service providers to receive an assessment of the plant's energy use and opportunities to reduce energy costs through capital projects and low- to no-cost improvements. Participants can receive up to $5,000 (up to 90% of an assessment's cost). However, the implementer said no assessments were completed in 2022 and that the Wisconsin Rural Water Association offers similar assessments for free.

Wastewater Plant Pump Assessment. Focus on Energy offers a $500-per-pump incentive for a comprehensive pump assessment, up to 100% of the assessment cost. Participants can receive a 50% bonus (up to $2,000) for installing a variable speed drive on the plant's pump system following the assessment. As of October 2022, Focus on Energy incentivized six assessments, but no pumps had subsequently had a variable speed drive installed.

Retrocommissioning Audit. All Schools and Government Solution customers are eligible for Focus on Energy's retrocommissioning initiative. Customers who completed a retrocommissioning audit to identify low-cost measures involving adjustments, calibrations, and process changes are eligible for an incentive if they also reduced their energy-use intensity. The solution links retrocommissioning to available federal COVID-19 pandemic assistance funding by associating qualifying energy-use improvements with improved indoor air quality.[30]

Market Relief Bonus. Focus on Energy, due to supply chain disruptions and market conditions, provided nonresidential customers 25% in additional incentives for equipment installed between July 4, 2022, and December 2, 2022.

Project Planning Bonus. As a new bonus in CY 2022**,** tribal customers who completed a project planning workbook with their energy advisor prior to the purchase of equipment are eligible for a 100% bonus on custom and prescriptive rebates up to $5,000 per customer and 25% bonus on all other project incentives. Schools and government customers who completed a project planning workbook with their

[30] Federal assistance is available through Coronavirus Aid, Relief, and Economic Security (CARES) Act Fund and Elementary and Secondary Schools Emergency Relief (ESSER) funds.

energy advisor prior to the purchase of equipment are eligible for a 10% bonus on rebates. Project preapproval was required by September 30, 2022. The implementer said this bonus was very successful in encouraging project completion in CY 2022 and to build a pipeline of projects for future years.

90 by 90. Focus on Energy offers nonresidential customers reimbursement for up to 90% of their operational improvement costs if the project is initiated within 90 days of receiving an energy-saving opportunity from an energy advisor.

Schools and Government Benchmark. Focus on Energy offered energy usage benchmarking to 10 schools in 2022. Upon completion of the 12-month initiative, which included training, participants received $1,200.

Renew Our Schools. This initiative challenged enrolled K-12 schools to reduce their energy usage by 6% during a six-week period. Nine schools participated in spring semester 2022, and 17 schools participated in fall semester 2022. Half the schools achieved the 6% energy reduction. Schools earned points for energy reduction actions, and each semester the school that reduced its energy usage the most won $2,500. The spring 2022 cohort also incorporated points for the school to promote a standard energy efficiency kit to families. The fall 2022 cohort provided smart energy kits to families at no cost. These kits included items such as smart plugs, smart power strips, and a Sense energy monitor that can assess plug loads of various appliances. In addition to these initiatives, the implementer offered an additional incentive of $100 for smart thermostats.

Challenges

The implementer and the administrator said the main challenges in CY 2022 stemmed from funding constraints, inflation, and supply chain issues, and their impacts varied by segment. The implementer said overall participation has declined for the following reasons:

- **Lower enrollment in technical colleges.** Lower student enrollment led to a corresponding reduction in revenue that could be spent on facility projects.
- **Lower state budgets for public universities, K-12 schools, and governments.** The 2022/2023 state budget for public entities was lower than recent prior budgets. To encourage participation in Focus on Energy, the implementer mitigated the effects of lower tax revenue by promoting federal funding through the Coronavirus Aid, Relief, and Economic Security (CARES) Act and Elementary and Secondary Emergency Relief (for K-12). This funding shifted the mix of CY 2022 projects away from lighting upgrades and toward HVAC and ventilation upgrades that improved indoor air quality. The implementer expressed a concern that K-12 participation may further decline once federal funding subsides.
- **Inflation and supply chain issues.** Across all segments, the implementer said inflation and supply chain issues for needed equipment caused some participants to narrow the project scope and/or delay project completion. These supply chain issues pushed some customers to prioritize timeline over efficiency gains. Customers were likely to keep a project on schedule by incorporating lower efficiency equipment and forfeiting energy efficiency incentives.

Marketing and Outreach

The Schools and Government Solution tailored its marketing strategy to different customer segments. Larger customers, such as water utilities and universities, continued to receive direct individual outreach, primarily through energy advisors, as was previously the standard for all customer types. The implementer said it continued to increase energy advisor outreach to higher education customers in CY 2022, which resulted in three new enrollments in SEM, for a total of eight.

The implementer continued to run promotional email campaigns and conduct virtual meetings, particularly for K-12 institutions, the most likely to have to limit in-person visits. The implementer also successfully resumed in-person presentations and conferences as COVID-19 restrictions subsided and reported that customers responded eagerly to these in-person opportunities.

The market engagement plan for the Schools and Government Solution identified three target markets for CY 2022. The implementer conducted the following strategies to target these specific market segments:

- **Education.** Developed a sustainable kit challenge for students living in off-campus housing, sent a follow-up e-blast targeting private school customers who had not participated in the past two years, and created a month-long digital campaign for Earth Day highlighting school districts that participated in the spring 2022 Renew Our Schools Energy Challenge. Also sent a targeted e-blast to school districts that passed referendums in 2022.
- **Tribes.** Distributed an e-blast campaign promoting educational resources and highlighted technical training opportunities with trusted organizations in the tribal industry.
- **Wastewater.** Submitted editorial content in the Wisconsin Department of Natural Resources (DNR) Environmental Loans E-Bulletin, developed an e-blast campaign to wastewater engineering firms, and attended and/or presented at industry events and conferences.

Midway through CY 2022, the implementer hired a special programs manager to analyze trade ally participation and identify trade allies who have had lower participation than others and trade allies who could use additional outreach. This trade ally outreach will continue in CY 2023.

Awareness

The ongoing participant satisfaction survey asked respondents how they learned about the Schools and Government Solution. Of 98 respondents in CY 2022, the most common sources were previous experience with Focus on Energy programs (39%), Focus on Energy advisors and staff (21%), trade allies (16%), and manufacturers and distributors (8%).

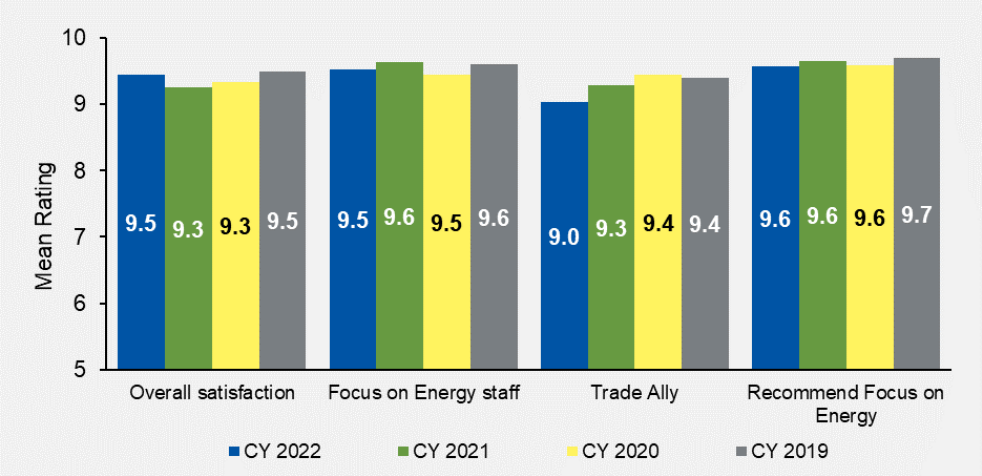
Ongoing Participant Satisfaction Survey

Throughout CY 2022, the administrator invited Schools and Government Solution participants to take a web-based satisfaction survey. Respondents answered questions related to satisfaction and the

likelihood to recommend the offering on a scale of 0 to 10, where 10 indicated the highest degree of satisfaction or likelihood and 0 the lowest.[31]

Figure 54 shows that Schools and Government Solution participants gave the offering they participated in an average overall satisfaction rating of 9.5 in CY 2022, which was statistically equivalent to the average rating of 9.3 in CY 2021 and statistically higher than the portfolio target for CY 2022.[32] Respondent ratings for satisfaction with Focus on Energy advisors and staff (9.5) and trade allies (9.0) remained high in CY 2022 and were statistically equivalent to the corresponding CY 2021 ratings.

Figure 54. CY 2022 Satisfaction and Likelihood Ratings for the Schools and Government Solution



Source: Schools and Government Solution Participant Satisfaction Survey Questions.
"Overall, how satisfied are you with your most recent experience with Focus on Energy?"
(CY 2022 n=100, CY 2021 n=92, CY 2020 n=208, CY 2019 n=263).
"How satisfied are you with the Energy Advisor or Focus on Energy staff member who assisted you with your project?"
(CY 2022 n=88, CY 2021 n=76; CY 2020 n=159, CY 2019 n=217).
"How satisfied are you with the contractor that provided your school or government building update?"
(CY 2022 n=73, CY 2021 n=78; CY 2020 n=178, CY 2019 n=189).
"How likely are you to recommend Focus on Energy to others?" (CY 2022 n=99, CY 2021 n=91;
CY 2020 n=207, CY 2019 n=174).
There are no statistically significant differences between CY 2022 and CY 2021 ratings.

Using these survey data, the evaluation team calculated a net promoter score (NPS) based on customers' likelihood to recommend Focus on Energy. The NPS is expressed as an absolute number between -100 and +100 that represents the difference between the percentage of promoters (respondents giving a rating of 9 or 10) and detractors (respondents giving a rating of 0 to 6). 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

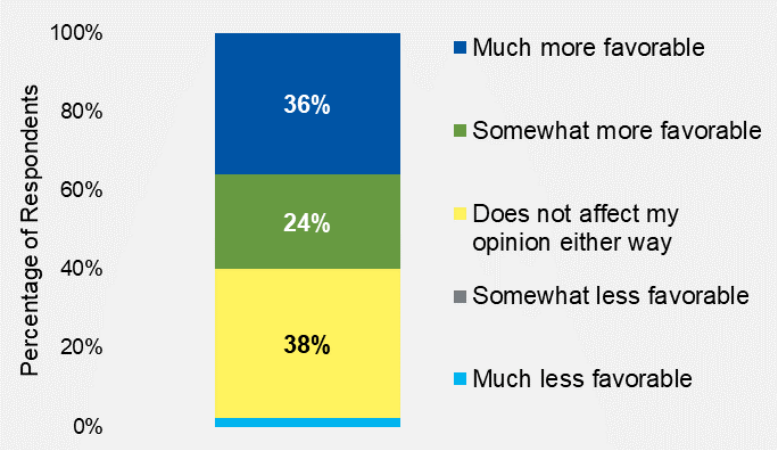
[31] The number of participants who completed a survey does not always match the number of responses for each question, as some participants skipped or did not know answers to questions.

[32] The administrator's contract established a portfolio target of 8.9 to maintain or increase customer satisfaction.

to others. The NPS was +87 for the Schools and Government Solution in CY 2022, consistent with the +91 NPS for this solution in CY 2021.

In CY 2022, participants were asked if they were aware before receiving the satisfaction survey that the Schools and Government Solution was offered in partnership with their local utility, and 85% (n=99) were aware, similar to the CY 2021 rate (84%, n=91). Respondents were also asked if Focus on Energy offerings affected their opinion of their utilities, and 60% reported that their opinion had become *much more favorable* or *somewhat more favorable* (Figure 55). Only 2% of survey respondents said their opinion had become less favorable, and 38% said their opinion of their utility was not affected.

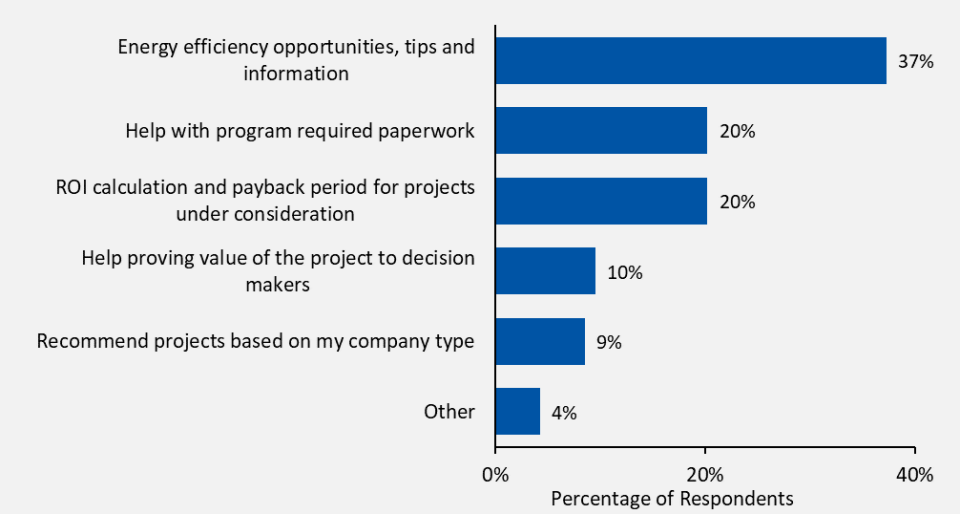
Figure 55. CY 2022 Effect of Focus on Energy Offerings on Schools and Government Solution Participants' Opinion of Utilities



Source: Schools and Government Solution Participant Satisfaction Survey Question.
"How have these offerings affected your opinion of your energy utility, if at all?" (CY 2022 n=92).

Survey respondents identified how Focus on Energy can best support their organization with future projects (Figure 56). The most frequent responses from Schools and Government Solution participants in CY 2022 were energy efficiency opportunities, tips, and information (37%) followed by help with paperwork (20%) and return on investment (ROI) calculations (20%), similar to previous years.

Figure 56. CY 2022 Participants' Most Valued Support



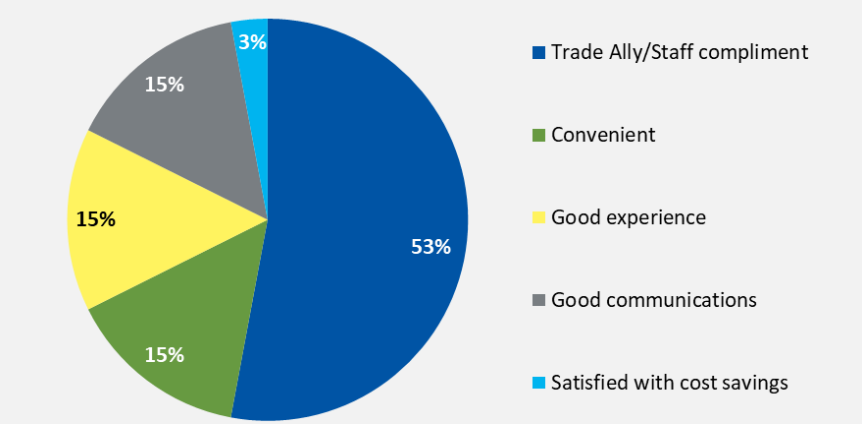
Source: Schools and Government Solution Participant Satisfaction Survey Question. "Aside from providing project incentive dollars, how can Focus on Energy best support your organization going forward?" (CY 2022 n=94).

Participant Feedback and Suggestions for Improvement

The customer satisfaction survey asked participants if they had any comments or suggestions for improving the offering. Of the 100 participants who responded, 28% provided open-ended feedback, which the evaluation team coded into a total of 38 mentions. Of these, 43 were positive or complimentary comments (89%), and four were suggestions for improvement (11%). The percentage of positive comments was much higher than in CY 2021 (64%), and the percentage of suggestions for improvement was much lower than in CY 2021 (36%).

Positive responses are shown in Figure 57. More than half the respondents had compliments for Focus on Energy staff and trade allies (53%). Only 3% of respondents mentioned satisfaction with cost savings compared to 17% in CY 2021.

Figure 57. CY 2022 Positive Comments about the Schools and Government Solution



Source: Schools and Government Solution Participant Satisfaction Survey Question. " Please tell us more about your experience and any suggestions for improvement." (Total positive mentions n=34)

Only four respondents offered suggestions for improvement in CY 2022. Only one respondent suggested improving communications (wanted the energy advisor to visit the facility more often.) Two respondents suggested increasing the scope of the offering to further promote conservation and emissions reductions, though they did not mention any specific technologies. The fourth wanted incentives to be increased. In CY 2021, the most common suggestions were to improve communications (62%, n=13) and increase the scope of the offering (23%), also the two most common suggestions in CY 2020.

Cost-Effectiveness

Evaluators commonly use cost-effectiveness tests to compare the benefits and costs of a DSM offering. The benefit/cost test used in Wisconsin is a modified version of the TRC test. See *Appendix I. Cost-Effectiveness and Emissions Methodology and Analysis* in Volume III for a description of the TRC test.

Table 115 lists the CY 2022 incentive costs for the Schools and Government Solution.

Table 115. CY 2022 Schools and Government Incentive Costs

	Incentive Costs
Schools	$3,196,237
Government	$1,867,068
Total	**$5,235,051**

The evaluation team found that the CY 2022 Schools and Government Solution was cost-effective (1.64). Table 116 lists the evaluated costs and benefits.

Table 116. Schools and Government Costs and Benefits

Cost and Benefit Category	Total
Costs	
Administration Costs	$286,803
Delivery Costs	$3,635,285
Incremental Measure Costs	$45,114,840
Total Non-Incentive Costs	**$49,018,928**
Benefits	
Electric Benefits (kWh)	$22,681,833
Electric Benefits (kW)	$11,882,303
T&D Benefits (kW)	$5,149,409
Gas Benefits	$11,373,892
Emissions Benefits	$10,111,186
Total TRC Benefits with T&D Benefits	**$61,198,622**
Net TRC Benefits with T&D Benefits	**$12,179,695**
TRC Benefit/Cost Ratio with T&D Benefits	**1.25**

Outcomes and Recommendations

The evaluation team synthesized information from the CY 2022 evaluation activities to inform the following outcomes and recommendations for the Schools and Government Solution. The team offers the following recommendations to improve the accuracy of quantifying the energy savings resulting from this solution.

Outcome 1: To mitigate the long-term effects of lower tax revenue on Focus on Energy participation levels, the implementer promoted federal funding through the CARES Act and Emergency and Secondary Emergency Relief (for K-12) as ways to finance improvements in air quality and energy efficiency. However, the implementer said most energy projects that receive funding from the CARES Act and Emergency and Secondary Emergency Relief will not be completed until CY 2023 and CY 2024.

Recommendation 1. As part of future customer survey evaluation efforts in CY 2023 and CY 2024, ask participants if they used funding from the CARES Act and/or Emergency and Secondary Emergency Relief (for K-12) for their energy efficiency projects.

Outcome 2: Evaluation results uncovered several discrepancies that led to a realization rate differing from 100%. Most issues found in the Schools and Government Solution related to inaccuracy in projections of equipment operating hours made in *ex ante* calculations.

Recommendation 2: To improve the accuracy of *ex ante* savings, have the implementer confirm with the on-site contact how the equipment will be operated following the installation, including any limitations or constraints on the operation that would affect the hours of use. Implementers should gather data from the customer to understand the expected schedule of operation and whether the method of control is manual or automated.

Outcome 3: The evaluation found that one large custom project was unable to achieve the design parameters of the originally designed project due to several risk factors that were present before and after the project was implemented.

Recommendation 3: Identify and attempt to address all risk factors that might impede successful implementation of custom projects while the project is under development. Risk factors might include the following:

- 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.

Nonresidential New Construction Solution

Through the New Construction Solution, Focus on Energy provides incentives to participating nonresidential customers and their design teams to design and build new energy-efficient buildings or to complete substantial renovations of existing buildings. This chapter reports on the Nonresidential New Construction Solution. The Residential New Construction Solution is reported separately.

For nonresidential buildings, which include multifamily buildings, Focus on Energy targets new construction projects as well as major renovation projects of 5,000 square feet or more.

The New Construction Solution is administered by APTIM and implemented by Willdan, with CESA 10 as a subcontractor. Focus on Energy offers three participation paths for nonresidential new construction:

- **Energy Design Assistance** provides a free customized, whole-building analysis of energy-saving options in the planning phase and early design phase.
- **Energy Design Review** offers plan review for buildings late in the design phase and uses whole-building energy simulation analysis to investigate and capture savings associated with energy efficiency improvements included in the final design.
- **Prescriptive**
  - **Product and equipment incentives** offer prescriptive equipment incentives for buildings in the construction phase or move-in phase.
  - **Multifamily product and equipment performance** offers incentives for multifamily buildings not participating in Energy Design Assistance or Energy Design Review and uses a hybrid approach.

These participation paths recognize that commercial building construction is complex and long term and offer solutions for building designers and builders at progressive phases of a new construction project.

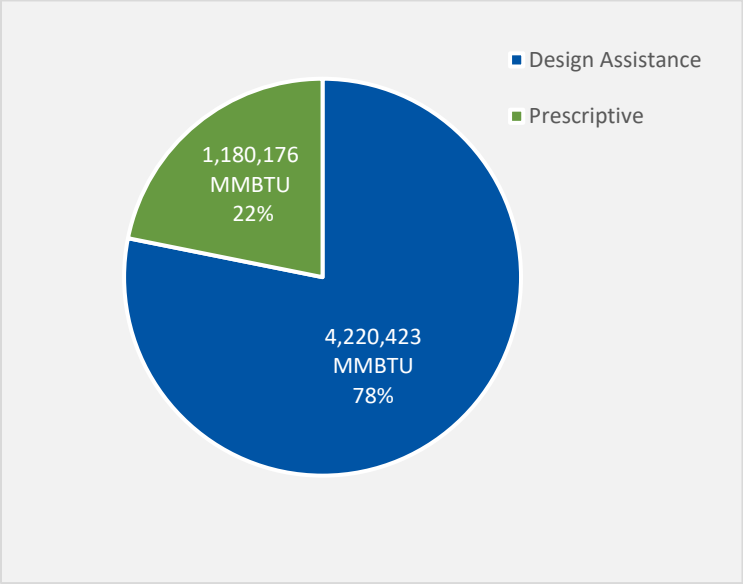
Table 117 lists actual spending, savings, participation, and cost-effectiveness of the Nonresidential New Construction Solution in CY 2022.

Table 117. CY 2022 Nonresidential New Construction Solution Summary

Item	Units	CY 2022	Quad (CY 2019-CY 2022
Actual Incentive Spending	$	$5,535,871	$21,281,176
Participation	Number of Participants	266	969
Verified Gross Lifecycle Savings	kWh	1,083,666,994	3,868,441,646
	kW	9,216	33,987
	therms	29,699,342	137,448,618
Verified Gross Lifecycle Realization Rate	% (MMBtu)	102%	101%
Annual NTG Ratio	% (MMBtu)	81%	79%
Net Annual Savings	kWh/year	46,650,236	168,031,420
	kW	7,465	27,029
	therms/year	1,217,859	5,575,134
Net Lifecycle Savings	MMBtu	5,407,378	21,368,022
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio	2.74	2.48

Figure 58 shows the proportion of savings by offering. For impact reporting purposes, the evaluation team combined the Energy Design Assistance and Energy Design Review offerings. Of the total solution savings, the combined offerings contributed 78% and the Prescriptive offering contributed 22%.

Figure 58. CY 2022 Proportion of Nonresidential New Construction Solution Net Lifecycle Savings by Offering



Achievement Against Goals

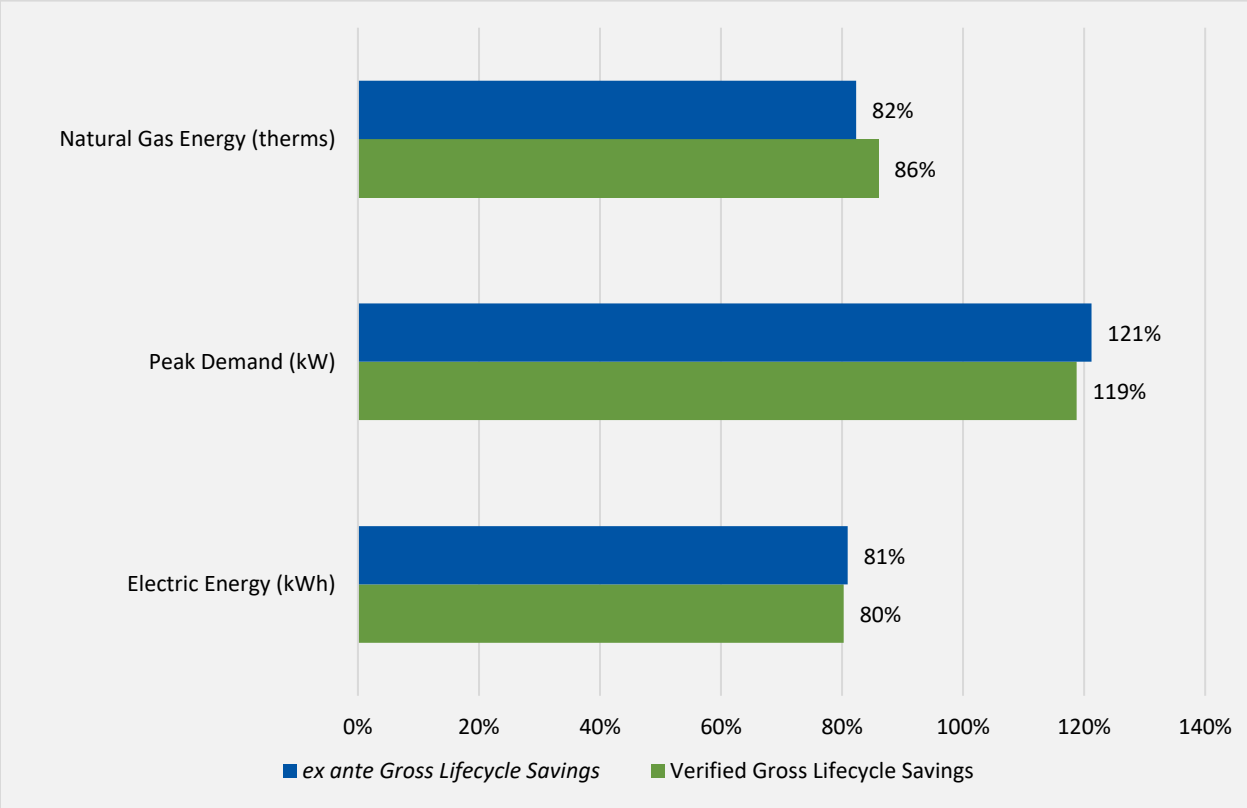
As shown in Table 118, the Nonresidential New Construction Solution exceeded its peak demand goal but did not meet its electric energy savings and natural gas savings goals. Figure 59 shows the percentage of gross lifecycle savings goals the Nonresidential New Construction Solution achieved in CY 2022.

Table 118. CY 2022 Nonresidential New Construction Solution Achievement of Gross Lifecycle Savings Goals

Savings	*Ex Ante* Gross Lifecycle Savings		Verified Gross Lifecycle Savings		*Ex Ante* Percent Achieved	Verified Gross Percent Achieved
	Goal	Actual	Goal	Actual		
Electric Energy [kWh]	1,350,000,000	1,092,495,628	1,350,000,000	1,083,666,994	81%	80%
Peak Demand [kW]	7,760	9,407	7,760	9,216	121%	119%
Natural Gas Energy [therms]	34,538,000	28,438,101	34,538,000	29,699,342	82%	86%
Total Energy (MMBtu) [a]	8,060,000	6,571,558	8,060,000	6,667,558	82%	83%

[a] Verified kWh and therm savings may not sum to verified MMBtu values due to conversion/rounding associated with measure-level application of realization rates.

Figure 59. Nonresidential New Construction Solution Achievement of CY 2022 Gross Lifecycle Savings Goals



100% *ex ante* gross lifecycle savings reflects the implementer's contract goals for CY 2022. Verified gross lifecycle savings contribute to the administrator's portfolio-level goals.

Impact Evaluation

This section contains the findings for the CY 2022 impact evaluation at the solution level, followed by a discussion of each offering.

Impact Evaluation Methodology

The evaluation team conducted an impact evaluation of the CY 2022 Nonresidential New Construction Solution. The team designed its evaluation, measurement, and verification approach to integrate multiple perspectives in assessing the performance of each offering and of the solution as a whole. Table 119 lists specific data collection activities and sample sizes used in the evaluation. Additional details about these activities and their findings can be found in the offering-specific discussions below.

Table 119. CY 2022 Nonresidential New Construction Solution Impact Activities

Solution	Offering	Total Measures	Impact Evaluation Sample		
			Desk Reviewed Measures	Verified Measures	Proportion Sampled (by *Ex Ante* MMBtu Savings)
Nonresidential New Construction	Energy Design Assistance/ Energy Design Review	261	22	8	42%
	Prescriptive	491	21	8	31%
Total		**752**	**43**	**16**	**33%**

Engineering Desk Reviews

The evaluation team reviewed all available project documentation in SPECTRUM for a sample of 43 measures. This review included an assessment of the savings calculations and methodology applied by the implementer. The team relied on the applicable TRMs and other relevant secondary sources as needed. Secondary sources included energy codes and standards, case studies, other energy efficiency program evaluations of comparable measures (based on location, sector, measure application, and date of issue), and the Focus on Energy Design Assistance Energy Modeling Protocol.

For prescriptive measures, the team used the Focus on Energy TRM and associated work papers as primary sources to determine methodology and data in nearly all cases. For hybrid and custom measures, the team reviewed the SPECTRUM savings analysis workbooks and adjusted inputs and methodologies as necessary based on engineering judgment and project documentation.

To conduct the impact analysis, the evaluation team selected a representative sample of measures to evaluate, then extrapolated findings to the larger population. In CY 2022, this process used both purposive and proportional sampling.

The purposive sampling selected the largest-saving measures by offering. Because these measures were sampled with certainty (100% of eligible highest-saving measures were sampled), the results were not extrapolated to the offering population. These measures are referred to as census measures.

The proportional sampling measures were randomly selected from the population of offering measures. These measures are referred to as randomly sampled measures. The cumulative realization rate of randomly sampled measures in each offering was extrapolated to the remainder of the offering population.

Verification Site Visits

The evaluation team conducted 16 virtual and on-site verification visits for the CY 2022 Nonresidential New Construction Solution. Site visits and customer interviews involved verifying the type and quantity of equipment installed, determining how the installed equipment is controlled, and documenting the operating hours of the installed equipment. The team verified savings calculation input parameters based on plans, designs, specification data, and any other relevant details identified prior to contact with the site. The team performed most of the verification at the site or virtually (11 measures). For the remaining sites where in-person observation was not as critical to the data collection, the team conducted interviews remotely with the site contacts through several technology interfaces (five measures).

Verified Gross Savings Results for Nonresidential New Construction Solution

Table 120 lists the first-year and lifecycle realization rates for CY 2022. Table 121 contains a summary of verified first-year and lifecycle savings by offering. For reporting purposes, the evaluation team combined the Energy Design Assistance and Energy Design Review offerings. Overall, the solution achieved a first-year evaluated realization rate of 102%, weighted by total (MMBtu) energy savings. Detailed findings for each offering, including factors affecting the realization rates, are discussed in detail in the next section of this chapter.

Table 120. CY 2022 Nonresidential New Construction Solution
First-Year and Lifecycle Realization Rates

Offering	First-Year Realization Rate				Lifecycle Realization Rate		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
Energy Design Assistance/ Energy Design Review	99%	97%	106%	102%	99%	106%	102%
Prescriptive	100%	101%	100%	100%	100%	100%	100%
Overall Realization Rate	99%	98%	105%	102%	99%	105%	101%

Table 121. CY 2022 Nonresidential New Construction Solution
First-Year and Lifecycle Verified Energy Savings Summary

Offering	Verified First-Year Savings				Verified Lifecycle Savings		
	kWh	kW	therms	MMBtu [a]	kWh	therms	MMBtu [a]
Energy Design Assistance/ Energy Design Review	43,701,738	6,919	1,114,096	260,520	874,034,766	22,281,921	5,210,521
Prescriptive	13,891,146	2,297	389,434	86,342	209,632,228	7,417,421	1,457,037
Overall Savings	**57,592,884**	**9,216**	**1,503,530**	**346,862**	**1,083,666,994**	**29,699,342**	**6,667,558**

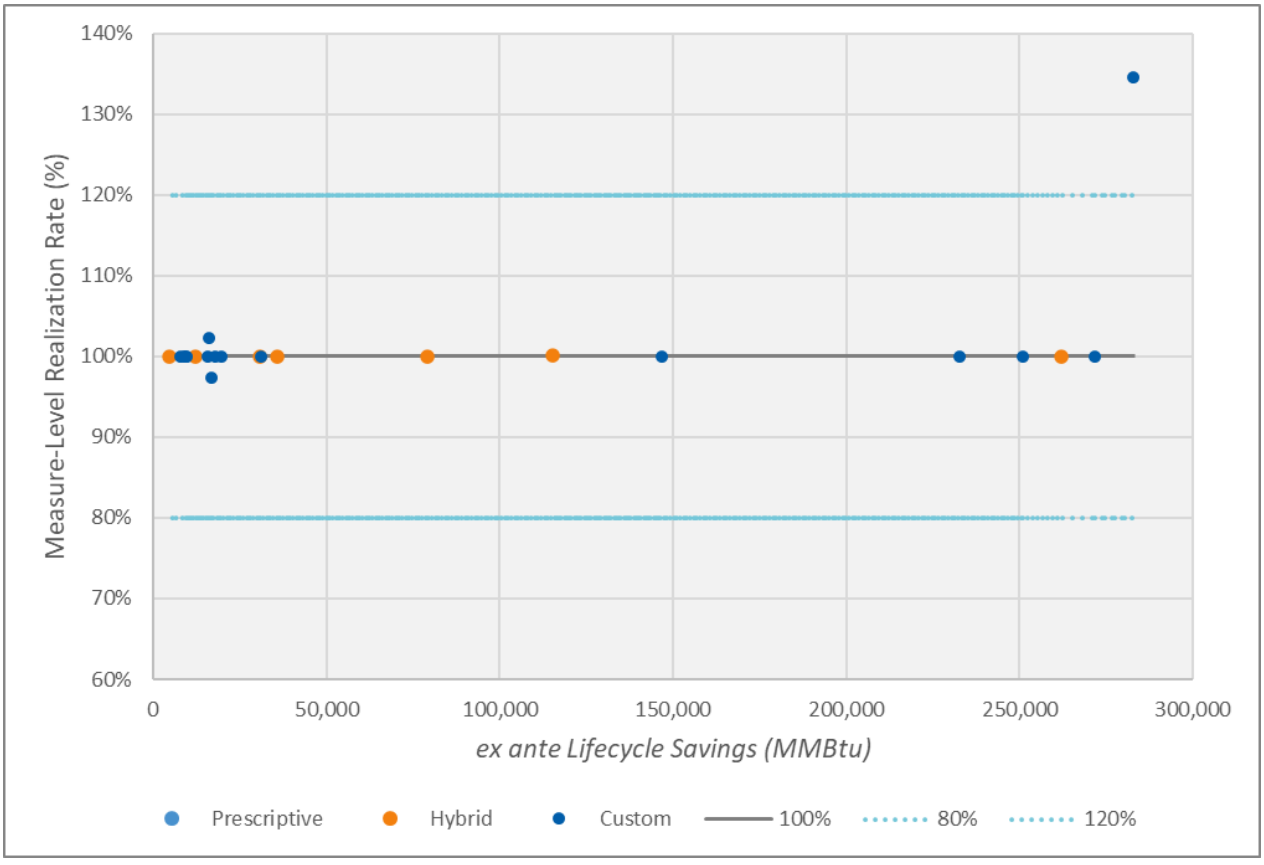
[a] Verified kWh and therm savings may not sum to verified MMBTU values due to conversion/rounding associated with measure-level application of realization rates.

Nonresidential New Construction Solution Energy Design Assistance/Energy Design Review: Verified Gross Savings Results

For the Energy Design Assistance and Energy Design Review offerings, the evaluation team conducted a database review, engineering desk reviews, and site visits. The combined offerings had a gross lifecycle realization rate of 102% MMBtu. Figure 60 presents the magnitude of and associated realization rates for reported MMBtu savings of the 22 sampled projects.

As the figure shows, there was little deviation between *ex post* and *ex ante* savings in the sample for CY 2022. The evaluation team found that the administration and implementation processes for providing energy design assistance and review and calculating energy savings using simulation modeling were thorough, well-documented, and technically correct. Most sampled projects achieved an individual realization rate of 100%.

Figure 60. Nonresidential New Construction Solution – Energy Design Assistance Offering Sampling Results



A few sampled projects had inconsistencies in their project documentation. For the sampled project with the largest deviation in realization rate, the energy model output reports yielded significantly higher natural gas savings from the *ex ante* savings. The *ex post* savings reflect the model output reports, which were the most definitive piece of documentation available for the evaluation team to review.

Table 122 lists the CY 2022 *ex ante* and verified gross first-year and lifecycle savings for the Energy Design Assistance and Energy Design Review offerings.

Table 122. CY 2022 Nonresidential New Construction Solution Energy Design Assistance and Energy Design Review Offerings *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First-Year Gross Savings	44,143,170	7,133	1,051,034	43,701,738	6,919	1,114,096
Lifecycle Gross Savings	882,863,400	7,133	21,020,680	874,034,766	6,919	22,281,921

Nonresidential New Construction Solution Prescriptive: Verified Gross Savings Results

For the Prescriptive Offering, the evaluation team conducted a database review, a TRM review, engineering desk reviews, and virtual site visits. The offering had a gross lifecycle realization rate of 100% MMBtu. Figure 61 represents the magnitude of and associated realization rates for reported MMBtu savings among the 21 sampled projects. As shown in the figure, there was little deviation from *ex ante* savings for most sampled projects in CY 2022.

Figure 61. Nonresidential New Construction Solution – Prescriptive Offering Sampling Results

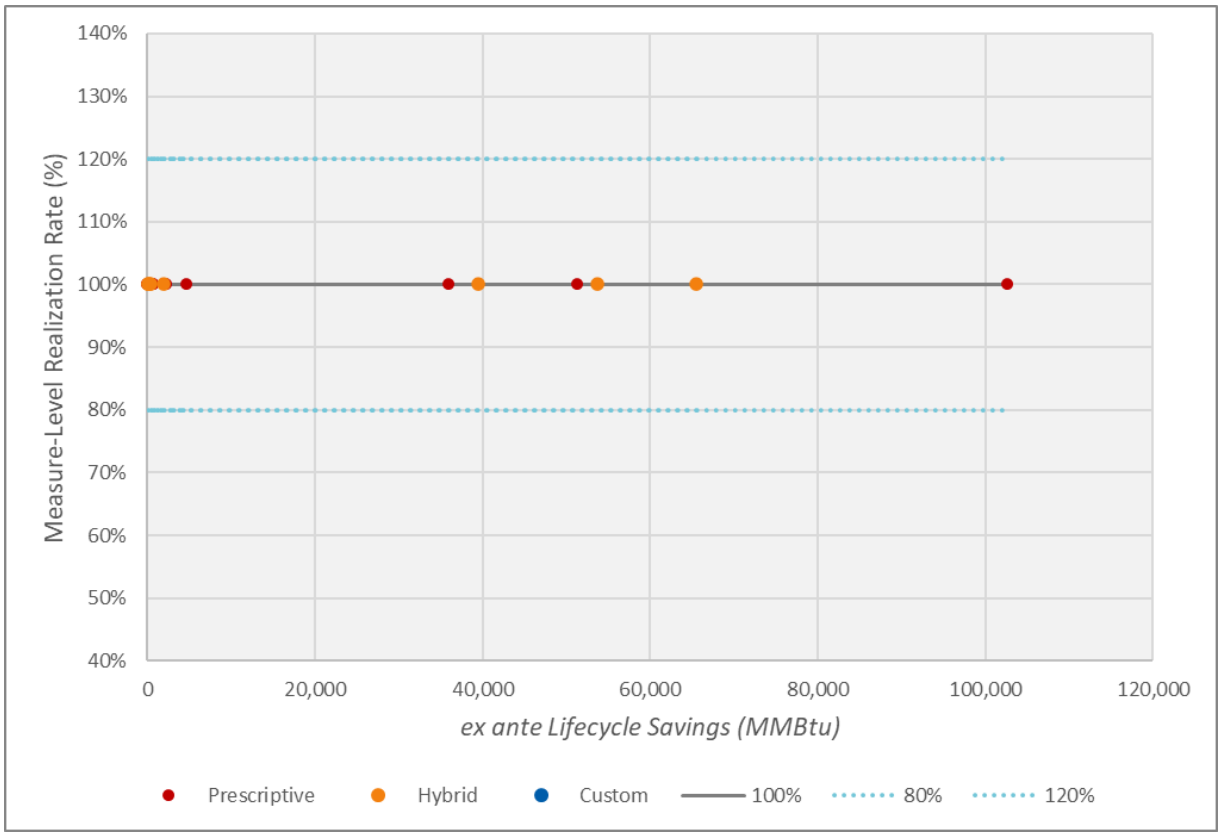


Table 123 lists the CY 2022 *ex ante* and verified gross first-year and lifecycle savings for the Prescriptive Offering.

Table 123. CY 2022 Nonresidential New Construction Solution Prescriptive Offering *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First-Year Gross Savings	13,891,146	2,274	389,434	13,891,146	2,297	389,434
Lifecycle Gross Savings	209,632,228	2,274	7,417,421	209,632,228	2,297	7,417,421

Verified Net Savings Results for Nonresidential New Construction Solution

The evaluation team used CY 2020 participant surveys to assess net savings for the Nonresidential New Construction Solution at the offering level. The team weighted the offering-level NTG estimates by total population lifecycle MMBtu savings to calculate a NTG ratio of 81% for the CY 2020 solution and used this percentage in the CY 2022 solution analysis.

Verified Net Savings Results

The evaluation team calculated freeridership and participant spillover at the offering level for the Nonresidential New Construction Solution. No additional customer survey activity occurred in CY 2022 beyond the ongoing participant satisfaction surveys, so the team used CY 2020 freeridership and participant spillover data in the CY 2022 verified net savings analysis. To calculate the NTG for each offering in CY 2020, the team combined the self-reported freeridership and participant spillover results using the following equation:

$$NTG = 1 - Freeridership\ Ratio + Participant\ Spillover\ Ratio$$

Table 124 shows the offering-level NTG results for the Nonresidential New Construction Solution. The CY 2020 evaluation report contains the full detailed analysis of NTG completed in 2020.[33]

Table 124. Nonresidential New Construction Solution NTG Ratios by Offering

Offering	Respondents (n)	Freeridership	Spillover	NTG Ratio
Energy Design Assistance/Energy Design Review	17	19% [a]	0%	81%
Prescriptive	9	19% [a]	0%	81%

[a] Weighted by lifecycle gross verified MMBtu savings.

Table 125 shows the weighted average NTG ratio by offering, as well as the total lifecycle gross verified savings and lifecycle net savings.

[33] Public Service Commission of Wisconsin. May 21, 2021. *Focus on Energy Calendar Year 2020 Evaluation Report.* Prepared by Cadmus, Apex Analytics, and Nexant. https://focusonenergy.com/evaluation-reports/2020-evaluation-report-volume-ii

Table 125. CY 2022 Nonresidential New Construction Solution Lifecycle Net Savings and NTG

Offering	Total Lifecycle Gross Verified Savings (MMBtu)	Total Lifecycle Net Savings (MMBtu)	NTG Ratio
Energy Design Assistance/Energy Design Review	5,210,521	4,220,423	81%
Prescriptive	1,457,037	1,180,176	81%
Total	**6,667,558**	**5,400,599**	**81%**

Process Evaluation

The CY 2022 process evaluation focused on these key topics:

- Solution design, delivery, and goals
- Participant experience

Process Evaluation Methodology

In CY 2022, the evaluation team evaluated the Nonresidential New Construction Solution offerings to assess performance and to understand any changes from CY 2021. The process evaluation involved in-depth interviews with the administrator and implementer as well as an analysis of the ongoing participant satisfaction survey.

Table 126 lists specific data collection activities and sample sizes used in the evaluation.

Table 126. CY 2022 Nonresidential New Construction Solution Process Evaluation Activities and Sample Sizes

Activity	Measure Group or Offering	CY 2022 Sample Size (n)
Administrator and Implementer Interviews	N/A	4
Ongoing Participant Satisfaction Survey	Prescriptive	6
	Energy Design Assistance/ Energy Design Review	3

Administrator and Implementer Interviews

Cadmus conducted interviews with three staff members from the administrator and the implementer during the third quarter of CY 2022 to obtain the following:

- Perspectives on offering delivery, achievements, challenges, and changes
- Understanding of Nonresidential New Construction Solution goals
- Documentation of outreach strategies and assessment of impact of marketing activities to date

Ongoing Participant Satisfaction Survey

Throughout CY 2022, the administrator emailed Prescriptive Offering participants a link to the web-based satisfaction survey. There were two objectives for this ongoing survey:

- Understand customer satisfaction on an ongoing basis and respond to any changes in satisfaction before the end of the annual reporting schedule

- Help facilitate timely follow-up with customers to clarify and address service concerns

As in previous years, the evaluation team analyzed the survey results received for Nonresidential New Construction Solution participants in the Prescriptive and Energy Design Review offerings. The survey covered topics including overall satisfaction, satisfaction with offering staff and trade allies, the likelihood of recommending Focus on Energy, and other feedback.

Solution Design and Delivery

In CY 2022, the Nonresidential New Construction Solution maintained a similar design, staffing structure, and delivery processes as in CY 2021. The implementer manages solution services, such as reviewing and approving applications, monitoring project-level savings, planning and implementing outreach activities, conducting training sessions, and maintaining communication and accountability with the administrator. The administrator oversees solution activities throughout the year, monitors progress on goals, and coordinates with the implementer.

Participants have opportunities for incorporating energy-efficient design measures at three stages. In the initial building design planning as part of the Energy Design Assistance Offering, the implementer and the project design team evaluate possible energy-saving design strategies and select a bundle of strategies to include in the project design. For projects that are beyond the initial design phase, the Energy Design Review Offering includes incentives to capture savings associated with energy efficiency improvements in late stages of design and for projects that were not initially part of the Energy Design Assistance Offering in the early design phase. Prescriptive incentives are also available for equipment and products implemented in the construction or move-in phases of a new construction project.

After construction is completed, the implementer verifies execution of the energy-saving strategies and that all project savings are associated with the verified project-savings measures. Note that design and modeling assistance do not have associated energy savings.

The administrator and the implementer said fewer customers participated in the CY 2022 Nonresidential New Construction Solution, particularly the Prescriptive Offering, than in CY 2021. The primary drivers were economic and supply chain conditions that made procuring equipment and skilled labor more difficult and the costs associated with borrowing capital that have impacted all Focus on Energy nonresidential offerings. These are described in more detail in the *Challenges* section.

The implementer said the Energy Design Assistance Offering (projects in the pipeline) was on track with expectations, but the Energy Design Review Offering has had less success than desired and far fewer Prescriptive Offering applications were submitted than in previous years. At the time of the interview, the administrator estimated that energy savings would be 88% of its goal by the end of 2022. Indeed, *ex ante* energy savings achieved 86% of the CY 2022 goal (see Figure 59 above).

Offering Updates

In CY 2022, processes and incentives for the Energy Design Assistance and Energy Design Review offerings remained the same as in CY 2021.

For multifamily building new construction, 25 projects were projected by the end of CY 2022. This offering has gained traction over the year, so the administrator and the implementer plan to apply successes with multifamily buildings to the broader energy design offerings in CY 2023. Plans include giving more control to customers to assess available options, developing software solutions that expand the Nonresidential New Construction Solution tool, and allowing participants to self-direct the energy design process so they can put together their own package and incentives in real time. These plans will require additional budget, yet to be identified.

The Solar Ready initiative was introduced in CY 2022. Customers can receive up to $2,500 to offset costs associated with modifying commercial building plans to accommodate a future roof-mounted solar system. Participants in the Energy Design Assistance or Energy Design Review offerings are eligible for the incentives. The implementer said it had received some inquiries about the initiative, but no applications had been received as of the interview.

Challenges

Though the COVID-19 pandemic has had a significant effect on businesses of all types in 2020 and 2021, many Nonresidential New Construction Solution participants were able to resume construction activities in CY 2022 and complete some of the projects initiated in previous years. Project delays caused by supply chain shortages and labor availability, however, persisted in CY 2022 and were compounded by inflation in financial markets, making supplies and transportation more expensive, raising interest rates, and making capital financing less accessible. These economic conditions resulted in fewer applications, particularly in the Prescriptive Offering. Though the pipeline of projects for Energy Design Assistance and Energy Design Review offerings is on target, these projects have longer timelines and savings are not counted until project completion. The administrator and the implementer expect the lower participation in the Prescriptive Offering will be similar in CY 2023.

Although the solution cannot influence or mitigate supply chain and skilled labor challenges, the administrator and the implementer plan to continue moving it forward and keeping incentives and services available to projects in the pipeline. The implementer actively promotes the solution, as described in the *Marketing and Outreach* section and provides training to continue filling the pipeline with projects for later years.

The administrator reported starting to see some effects from the pandemic dissipating, such as more in-person interaction between energy advisors, customers, and trade allies. However, the implementer said many participants still work remotely and are reluctant to meet in person, so group lunch-and-learn meetings are less tenable.

Marketing and Outreach

The implementer, with support from the administrator, conducted direct outreach to design professionals, such as architects, engineers, and design contractors, through several channels:

- Sponsorship of the American Institute of Architects (AIA) conference and network with architectural and design firms in attendance.

- Continued enhancements for the New Construction Solution website with new videos, descriptions of each participation path, a new construction online tool that provides information on incentives and a calculator for estimating energy savings from energy-efficient equipment, and connection to construction resources.[34] This tool also provides an online application form and a resource for customer questions and requests, it also generates notifications for implementers to follow up with customers.
- Continued development of a dedicated website for multifamily new construction projects or the Product and Equipment Performance (PEP) offering.[35]
- Continued quarterly trade ally newsletter, promotional emails, and online training webinars and continued engagement with architectural and engineering firms on an individual and by-request basis.
- Continued coordination and collaboration with utilities.

In CY 2022, the implementer attempted to interact with utility representatives and account managers with varied success. The implementer said one utility is very engaged with the New Construction Solution, but the implementer has not had the same level of engagement with other utilities.

Ongoing Participant Satisfaction Surveys

Throughout CY 2022, the administrator invited Prescriptive and Energy Design Review participants to take web-based satisfaction surveys. Respondents answered questions related to satisfaction and the likelihood to recommend Focus on Energy on a scale of 0 to 10, where 10 indicated the highest degree of satisfaction or likelihood and 0 the lowest.[36]The team received six survey responses from Prescriptive participants and three from Energy Design Review participants. The response proportions and mean scores should be interpreted with caution due to the low number of survey responses.

Prescriptive participants gave the offering they participated in an average overall satisfaction rating of 9.2 in CY 2022, while Energy Design Review participants gave their offering an average rating of 9.3 in CY 2022. The ratings for both delivery channels were statistically equivalent to the portfolio target.[37] Table 127 shows the average satisfaction and likelihood ratings for the offering in CY 2022. All ratings for Energy Design Review were at least 9.3, while two aspects of the Prescriptive offering had average ratings below 8.0: satisfaction with incentive amounts and information about energy-saving opportunities provided by Focus on Energy (both 7.8).

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[34] For more information, see the Focus on Energy website. “New Construction & Renovations.” https://www.focusonenergy.com/business/new-construction

[35] For more information, see the Focus on Energy website. “Multifamily.” https://www.focusonenergy.com/business/multifamily

[36] The number of participants who completed a survey does not always match the number of responses for each question, as some participants skipped or did not know answers to questions.

[37] The administrator’s contract established a portfolio target of 8.9 to maintain or increase customer satisfaction.

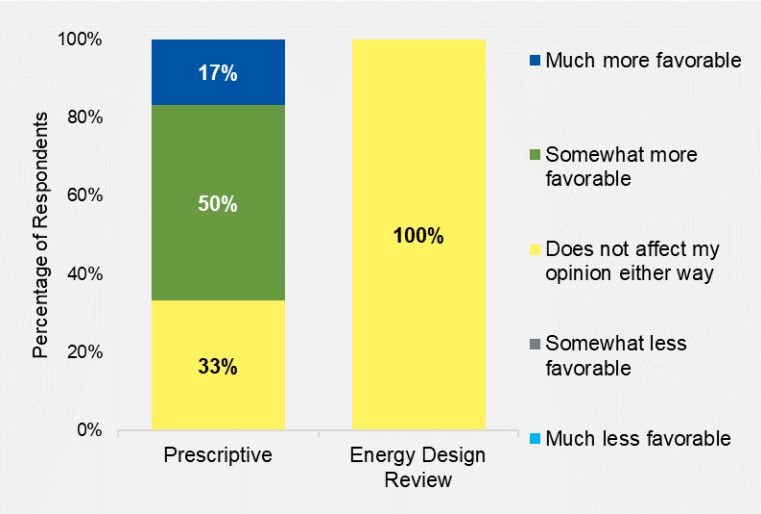
Table 127. CY 2022 Average Ratings for Nonresidential Prescriptive and Energy Design Review Offerings

Item	Prescriptive Participants CY 2022	Energy Design Review Participants CY 2022
Satisfaction with the offering overall	9.2 (n=6)	9.3 (n=3)
Satisfaction with Focus on Energy staff	9.8 (n=6)	10.0 (n=3)
Satisfaction with Trade Ally	9.2 (n=6)	*Not asked*
Satisfaction with the variety of measures available for incentives	8.4 (n=5)	*Not asked*
Satisfaction with the incentive amount	7.8 (n=6)	*Not asked*
Satisfaction with information provided by Focus on Energy	7.8 (n=6)	*Not asked*
Satisfaction with ease of online enrollment	*Not asked*	9.3 (n=7)
Satisfaction with information presented at results meeting	*Not asked*	9.7 (n=3)
Likelihood of recommending Focus on Energy	8.5 (n=6)	10.0 (n=3)

Using these survey data, the evaluation team calculated the net promoter score (NPS) based on customers' likelihood to recommend Focus on Energy. The NPS is expressed as an absolute number between -100 and +100 that represents the difference between the percentage of promoters (respondents giving a rating of 9 or 10) and detractors (respondents giving a rating of 0 to 6). High NPS scores (+70 or higher) are theoretically predictive of customer behaviors such as participating in another offering, implementing additional energy improvements, and referring Focus on Energy offerings to others. The Nonresidential Prescriptive Offering's NPS was +50 for CY 2022, similar to the NPS of +64 for this offering in 2021. The Energy Design Review's NPS was +100 for CY 2022 since all three respondents gave ratings of 10 for their likelihood to recommend Focus on Energy.

CY 2022 participants were asked if they were aware before receiving the satisfaction survey that the offering they participated in was offered in partnership with their local utility, and 100% (n=6) of Prescriptive respondents but only 33% (n=3) of Energy Design Review respondents were aware. Respondents were also asked if Focus on Energy offerings affected their opinion of their utilities (Figure 62), and 67% of Prescriptive respondents reported their opinion had become *much more favorable* or *somewhat more favorable*. None of the Prescriptive respondents reported their opinion had become less favorable, and 33% said their opinion of their utility was not affected. However, only one Energy Design Review respondent answered this question, reporting that their opinion of their utility was not affected.

Figure 62. Focus on Energy Offerings Impact on New Construction Solution Participants' Opinion of Utilities



Source: Business and Industry Participant Satisfaction Survey Question. "How have these offerings affected your opinion of your energy utility, if at all?" (Prescriptive n=6, Energy Design Review n=1).

CY 2022 participants were asked how they learned about the Nonresidential New Construction Solution Prescriptive Offering, and most respondents mentioned trade allies (33%) or word-of-mouth (33%). One respondent mentioned previous experience with Focus on Energy (17%) and one respondent mentioned Focus on Energy advisors (17%). In comparison, in 2021 most prescriptive respondents mentioned Focus on Energy advisors (54%, n=11). Respondents were also asked how Focus on Energy could support their organization going forward, and five respondents suggested energy efficiency opportunities, tips and information (two respondents), help with required paperwork (two respondents), and performing facility audits on a regular basis (one respondent).[38]

Participant Feedback and Suggestions for Improvement

During the customer satisfaction surveys, the evaluation team asked participants if they had any comments or suggestions for improving the offering. Of the six participants who responded to the Prescriptive survey, two (33%) provided open-ended feedback. Both comments expressed a positive experience with Focus on Energy advisors, though one respondent also suggested that the application and reporting requirements were onerous for their volunteer-led organization.

Only one of the three Energy Design Review respondents offered any comments (33%), and they merely praised the level of communication they received about the offering.

[38] Energy Design Review respondents were not asked for their source of awareness or how Focus on Energy could further support their organizations

Cost-Effectiveness

Evaluators commonly use cost-effectiveness tests to compare the benefits and costs of a DSM offering. The benefit/cost test used in Wisconsin is a modified version of the TRC test. *Appendix I. Cost-Effectiveness and Emissions Methodology and Analysis* in Volume III includes a description of the TRC test. Table 128 lists the CY 2022 incentive costs for the Nonresidential New Construction Solution.

Table 128. CY 2022 Nonresidential New Construction Solution Incentive Costs

	Incentive Costs
Whole-Building	$4,691,993
Prescriptive only	$843,878
Total	**$5,535,871**

The evaluation team found that the CY 2022 Nonresidential New Construction Solution was cost-effective (2.55). Table 129 lists the evaluated benefits and costs.

Table 129. CY 2022 Nonresidential New Construction Solution Costs and Benefits

Cost and Benefit Category	Total
Costs	
Administration Costs	$284,250
Delivery Costs	$3,844,178
Incremental Measure Costs	$28,897,351
Total Non-Incentive Costs	**$33,025,778**
Benefits	
Electric Benefits (kWh)	$33,880,551
Electric Benefits (kW)	$20,546,681
T&D Benefits (kW)	$8,613,062
Gas Benefits	$13,145,658
Emissions Benefits	$14,152,325
Total TRC Benefits with T&D benefits	**$90,338,277**
Net TRC Benefits with T&D benefits	**$57,312,499**
TRC Benefit/Cost Ratio with T&D benefits	**2.74**

Outcomes and Recommendations

The evaluation team synthesized information from the CY 2022 evaluation activities to inform the following outcomes and recommendations for the Nonresidential New Construction Solution. Overall, the solution performed well in CY 2022, realizing 102% of its projected energy savings and achieving 86% of its total energy MMBtu savings goal while maintaining high satisfaction with participants. The team identified some suggestions for improving the accuracy of quantifying the energy savings resulting from this solution.

Outcome 1: The evaluation team identified multiple instances of project data discrepancies, leading to project-level realization rates that varied from 100%. Several Design Assistance and Design Review projects had inconsistencies between the energy model output report, the verification summary report, and/or the *ex ante* data. The evaluation team could not discern if the documentation or the model had not been properly updated and which should be considered the most current.

Recommendation 1: Consider enacting or formalizing a quality control (QC) process for aligning verification reports with the energy model inputs and outputs and ensuring that the correct final documents are uploaded to SPECTRUM.

Commercial Training Offering

Through the Commercial Training Offering, Focus on Energy provides trade allies, building managers, efficient equipment sales personnel, and other energy management professionals with increased knowledge about how to sell, use, and manage energy-saving equipment and implement energy-saving behaviors. The offering does not track *ex ante* savings; however, spillover savings are attributable to the offering when participants implement energy-efficient projects based on knowledge they gained from the Commercial Training Offering.

The Commercial Training Offering was administered and managed by APTIM throughout the CY 2019-CY 2022 quadrennium. APTIM partnered with multiple trade allies and technical experts to deliver online and in-person training across a wide range of topics.

The evaluation team conducted participant surveys in CY 2021 and CY 2022 to assess participant perceptions about and satisfaction with the Commercial Training Offering and to calculate energy savings attributable to the training courses. This chapter presents key process and impact evaluation findings for training conducted in the CY 2019-CY 2022 quadrennium. This is the first time these savings have been reported for the offering in this quadrennium.

Course Offerings

Focus on Energy offers in-person and online training to customers in the commercial, industrial, and school and government sectors, as well as to contractors working in residential HVAC and whole-home trades. Table 130 lists the training and education courses offered through the Commercial Training Offering in the CY 2019-CY 2022 quadrennium.

Table 130. CY 2019-CY 2022 Focus on Energy Commercial Training Courses

Course Titles		
Achieving EE Improvements for Industrial Refrigeration Systems	Focus on Energy Presents - Electricity Is Shaping the World: Industrial Process Electro-technologies	HVAC + O&M
Advanced Lighting	Focus on Energy Presents - Energy Efficiency for Commercial Customers	HVAC Applications for Commercial, Small Industrial, Schools, & Gov't
Advanced Lighting Control Systems	Focus on Energy Presents - Energy Management Systems for Small Business	HVAC Applications for Commercial, Small Industrial, Schools, & Gov't Indoor Air Quality
Advanced Management of Compressed Air	Focus on Energy Presents - Fluid Motion: Achieving Energy Efficient Pumping Systems	Industrial Ventilation and Process Heat Recovery
Air Sealing	Focus on Energy Presents - Green Building Certification	Intro to Motors, Fans & Pumps with VFD
Building Operator Certification Level l	Focus on Energy Presents - How to Analyze Steam Systems for Maximum Efficiency	Introduction to Retro-Commissioning
Building Operator Certification, Level II Series	Focus on Energy Presents - How to Improve Energy Efficiency in a Compressed Air System	Money Talks
Compressed Air Challenge	Focus on Energy Presents - Making the Grade: Energy Saving Opportunities for Schools	More Than Hot Air
Converting Energy Audits to Business Plans	Focus on Energy Presents - The Alternative to Outside Air: Air Scrubbing	O&M Practices for Energy Efficiency
DLC Advanced Lighting Control Systems	Focus on Energy Presents - The Fourth Utility: Compressed Air Energy Management	Optimizing BAS Control Strategies to Maximize Commercial Building Energy Savings
Energy Efficiency and Public Assembly Buildings	Fueling Innovation: Gas Technology Institute New Development	Photovoltaic Systems O&M
Energy Efficiency Investment Analysis	Fundamentals of Compressed Air	Photovoltaic Training
Energy Management & Technology	Get More Boiler for your Buck with Controls	Questline - Gas Fueled Manufacturing Processes Webinar
Energy Management for Grocery & Convenience Stores	Getting More Energy Projects Approved with Concise and Compelling Financials	Refrigeration Energy Efficiency
Energy Management Opportunities for Restaurants		Rethinking Energy Efficiency in Healthcare Facilities
Energy Management Opportunities for Industrial Customers		Rethinking Energy Solutions Sales in the Wake of Market Disruption
Energy Savings Opportunities for Schools		Save Energy Dollars
Finding and Motivating the Right Decision-Makers and Influencers		Selecting Natural Gas Burners for Maximum Efficiency Webinar
Focus on Energy Presents - Breathe Easy: Energy Efficient Building Ventilation		Strategic Energy Management & 50001 Ready for You EnMS Webinar
Focus on Energy Presents - Dehumidification Solutions		Variable Refrigerant Flow
Focus on Energy Presents - Developing an Energy Plan Webinar		Water/Wastewater Energy Savings

Training Offering Accomplishments

Although training courses are intended to generate energy savings and demand reduction through increased awareness of efficient measures and behaviors, the Commercial Training Offering does not have specific energy savings goals and does not track *ex ante* savings. In CY 2022, the evaluation team calculated participant spillover savings for the quadrennium using CY 2021 and CY 2022 participant

survey responses. These savings should be considered additional savings that have not yet been applied to the nonresidential portfolio.

Table 131 presents quadrennial portfolio spillover savings calculated by the evaluation team. These savings represent efficient projects completed by survey respondents who rated the offering as *very important* to their decision to complete the project and who did not receive a rebate for the project from another Focus on Energy offering. Offering savings in this quadrennium were slightly higher than savings in the CY 2015-CY 2018 quadrennium, which achieved approximately 2.1 MWh and 89,000 therms in spillover savings.

Table 131. CY 2019-CY 2022 Commercial Training Offering Net Annual and Lifecycle Savings Summary

Measure	Net Annual Savings			Net Lifecycle Savings		
	kWh	kW	therms	kWh	kW	therms
Offering Spillover	2,897,885	695.13	95,966	46,720,781	695.13	1,667,796

Many projects could not be attributed to spillover because they were rebated by another Focus on Energy offering or because survey respondents reported being only *somewhat influenced* by the Commercial Training Offering. Savings for projects receiving a rebate from another Focus on Energy offering are credited to that offering, so attributing them to the Commercial Training Offering would double-count savings.

Survey Methodology

The evaluation team surveyed training participants twice during the quadrennium.

- The team conducted the first survey between March 21 and May 11, 2022, inviting all training participants who had a valid email address and had taken a Focus on Energy training between January 2019 and December 2020. Of the first wave of participants, 44 took the survey.
- The team conducted the second survey between February 23 and March 10, 2023, resurveying 1,206 training participants who did not refuse to answer the first wave and had participated in a training between January 2019 and December 2022. Fifty-three participants responded to the second survey.

For both survey rounds, the evaluation team emailed a survey invitation with a link to the online survey to all eligible training participants and offered a $20 incentive for completing it. The team sent reminders following the initial email message to training participants who had not yet taken the survey.

Some survey respondents showed potential for offering savings but did not provide enough information in the online survey for the evaluation team to calculate the savings. The team tried to collect additional information; however, none of these respondents agreed to a follow-up survey by telephone.

Out of the population of 1,259 unique email addresses for the Commercial Training Offering, 97 training participants completed the online survey. All respondents answered questions related to feedback and satisfaction with the offering, and 87 respondents provided responses that allowed the team to generate spillover savings estimates.

Process Evaluation

As part of the CY 2021 and CY 2022 research tasks, the evaluation team conducted an online survey with Commercial Training Offering participants as part of the process evaluation activities. Survey respondents answered questions on a variety of topics, such as satisfaction with the offering and information about their businesses. Findings from these questions are described below.

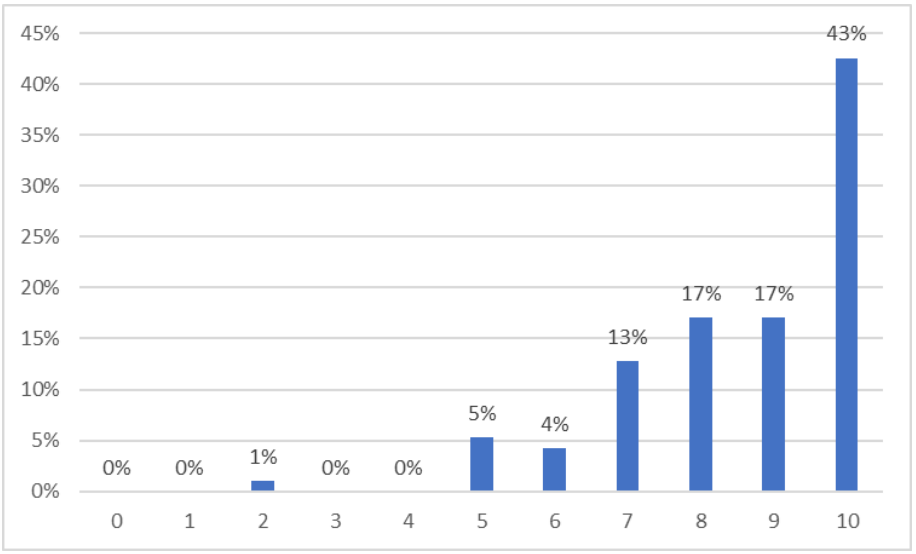
Customer Experience

The evaluation team used survey findings to gather information about training participants' experiences in the training sessions.

Likelihood to Recommend Training Courses

Respondents were asked to rate the likelihood of recommending a training course to a colleague on a 0 to 10 point scale, with 0 representing *not at all likely* and 10 representing *extremely likely*. Figure 63 shows the percentage of respondents who selected each rating. The average likelihood to recommend was 8.6, which is nearly identical to the 8.5 given the offering in the previous quadrennium. The majority of respondents (77%) rated their likelihood of recommending the offering to a colleague as at least 8, and 43% chose 10, the highest rating.

Figure 63. Likelihood to Recommend Training to Colleague

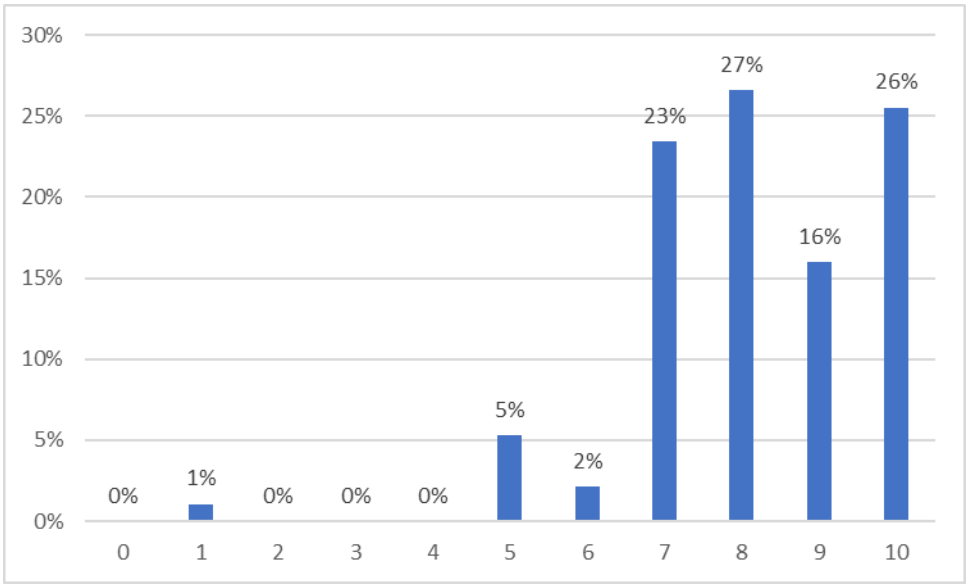


Source: Participant Survey Question E2. "On a scale of 0 to 10, where 0 is *not at all likely* and 10 is *extremely likely*, how likely are you to recommend Focus on Energy trainings to a colleague?" (n=94)

Satisfaction with Training Course

Participants were asked to rate their satisfaction with the training they attended on a similar 0 to 10 point scale, where 0 indicated *not at all satisfied* and 10 indicated *extremely satisfied*. As shown in Figure 64, 68% of participants rated their satisfaction as an 8 or higher on the scale, and 26% gave the offering the highest possible rating. The average satisfaction with the training components was 8.2, which was slightly lower than the 8.4 rating in the previous quadrennium. When asked if the course was a valuable use of their time, only two participants said it was not, out of 88 who answered that question.

Figure 64. Satisfaction with Components of Training Sessions



Source: Participant Survey Question E1. "On a scale of 0 to 10, where 0 is *not at all satisfied* and 10 is *extremely satisfied*, how satisfied are you with the Focus on Energy training program?" (n=94)

Survey respondents were also asked if they planned on attending future Focus on Energy commercial training. Out of the 80 training participants who answered that question,[39] 90% said they did plan on doing so, and no participants explicitly said they would not participate again. Respondents were also asked if they received continuing education credits for their participation. Only 17% said yes. Sixty-two percent said no, either because credits were not available for their specific course (20%) or because they did not pursue available credits (42%).

Course Improvements

Respondents were asked which parts of the offering were working well and what could be improved.

Many respondents offered specific feedback on what the offering was doing well, some of which addressed the quality of the instructors. One respondent noted that the instructor, "really knows this stuff and has systematized it for broad application to other situations." Others noted that instructors were enthusiastic, clear, and offered good follow-up responses to questions.

Survey respondents also noted that the course content was highly valuable and that the courses covered a wide variety of project designs and equipment types. As one respondent stated, "Although some of the concepts were initially complex, the instructor broke it down to easy-to-understand pieces." Others noted that the format of the presentations was very clear and straightforward and that the hands-on experience was particularly useful.

[39] Eighty-eight respondents answered the question, but eight responded "Don't know."

Respondents also noted the benefit of becoming more aware of various Focus on Energy offerings, incentives, and services. This included several mentions of how the training improved participants' understanding of how to fill out incentive forms or upsell equipment using the incentives.

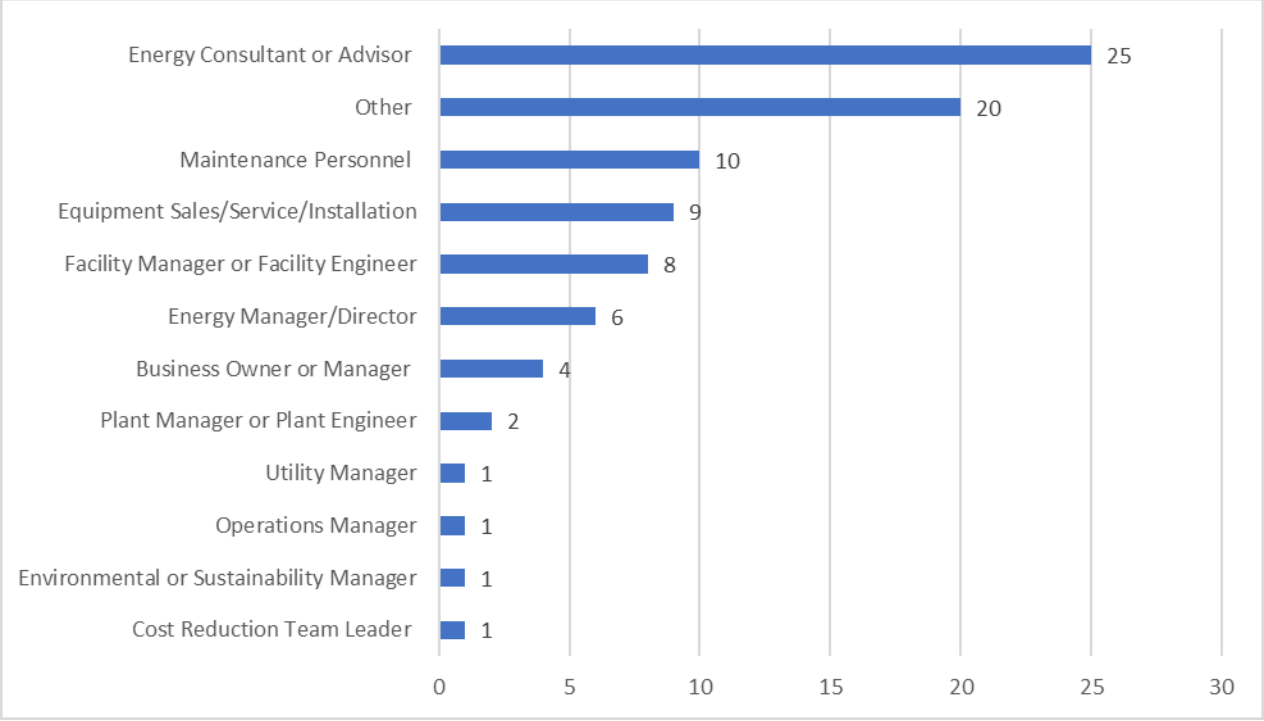
Many participants rated the webinars positively, noting that the online format reduced travel cost and time, provided multiple time slots for convenience, and offered the ability to rewatch content whenever was necessary.

Responses about suggested improvements varied, though the majority of respondents (54) said that they could not think of anything that could be done to improve the course. A few respondents mentioned that it would be good for online training to share a roster of attendees beforehand to provide an opportunity for networking. Others mentioned spending more time during training on the application process for Focus on Energy rebates and incentives.

Participant Firmographics

Survey respondents represented a wide range of professions—the most common was energy consultant or advisor, followed by maintenance personnel, equipment sales/service/installation contractor, and facility manager/engineer. Figure 65 shows the job titles of the Commercial Training Offering participants who responded to the survey.

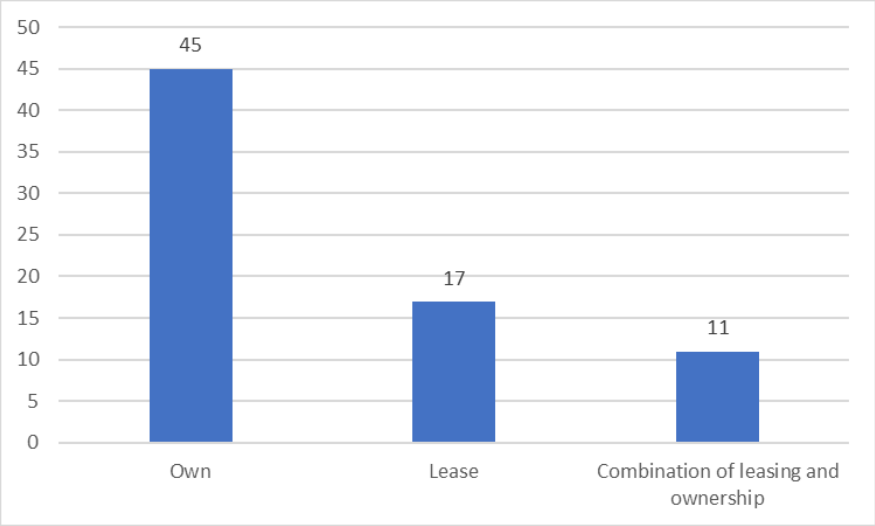
Figure 65. Self-Reported Job Title



Source: Participant Survey Question B2. "Which of the following best describes your title?" (n=84)

The majority of respondents work for firms that own their own facilities, and fewer than one in four reported working at a facility that is leased.[40] Figure 66 shows the distribution of these responses.

Figure 66. Self-Reported Firm Facility Status



Source: Participant Survey Question E3. "Does your organization lease or own the facility or facilities?" (n=73)

Impact Evaluation

Surveys also included questions about whether the participant implemented projects related to the training course and about savings associated with those projects. Of the respondents who answered a sufficient number of questions to be included in the spillover analysis, 17 completed projects that were influenced by the Commercial Training Offering and did not receive rebates or incentives from another Focus on Energy offering. This section describes the spillover projects, the methodology used to estimate energy savings, energy savings by project type and training course, and final offering-level spillover savings.

Methodology

For projects where participants rated the training as *very influential* in their decision to complete the project, the evaluation team calculated savings using information found in the TRM and SPECTRUM database. This approach was similar to the one employed in the CY 2015-CY 2018 quadrennium. However, instead of relying on the TRM more directly as in the CY 2015-CY 2018 quadrennium, the team used average offering savings for the appropriate MMIDs to account for project size when not all TRM inputs could be gathered reliably. The team multiplied spillover savings attributable to survey respondents by the ratio of survey participants (n=87) to overall offering participants (N=1,259) to determine total spillover savings.

[40] Fifteen respondents chose "Don't know" on this question or left it blank.

The evaluation team classified spillover projects as lighting, motors and pumps, HVAC, or water-using equipment. These categories are typical to most facilities that have achieved energy savings. The following describes the savings calculation methodology for each project category.

HVAC

The HVAC project category included six projects across five project types: one infrared heater, one boiler replacement, one boiler tune-up, one chiller replacement, and two smart thermostats. Survey respondents provided heating capacities for the infrared heater and boiler replacement projects, so the evaluation team calculated savings using deemed savings per unit from the TRM. For the remaining projects, the team assigned savings using the average per-unit savings from the SPECTRUM database for the appropriate measure category.

Lighting

Two respondents mentioned installing LED lighting because of their participation in a training course. The evaluation team assigned savings to these projects using the average nonresidential energy and demand savings from all lighting projects in the SPECTRUM database.

Motors and Pumps

Projects completed under the motors category included seven projects across three project types: two variable speed drives (VSDs), one electronically commutated motor (ECM) fan, and four pumps. The evaluation team assigned savings to these measures using the average per-unit values from the SPECTRUM database for the appropriate measure category.

Water-Using Equipment

Two respondents reported replacing lavatory fixtures with new water-saving faucets. The evaluation team assigned savings to these measures using the deemed per-unit values for faucet aerators installed in small office buildings from the TRM.

Similar to the previous quadrennium, after determining savings for each respondent, the team multiplied reported savings by the fraction of participants in the final sample who completed the survey and multiplied the total value of their savings by the total population of training participants. This allowed the team to account for nonresponse bias when calculating population level savings, as many course participants are expected to have completed projects even if they did not complete the survey.

Impact Findings

This section presents savings for Commercial Training Offering spillover projects completed by survey respondents and total offering spillover savings.

Savings for Spillover Projects

Table 132 shows calculated savings for the 17 spillover projects completed by survey respondents. Projects and savings are reported by the training course each survey respondent attended. These savings represent projects for which survey respondents did not receive a Focus on Energy incentive and

for which they rated participating in the training offering as *very important* to their decision to complete the project.

Table 132. CY 2019–CY 2022 Annual Savings for Spillover Projects by Training Course

Training Course Name	Annual Spillover Savings				Participants		Number of Spillover Projects[a]
	kWh	kW	therms	MMBtu	Surveyed	Total	
Focus on Energy Presents - The Alternative to Outside Air: Air Scrubbing	52,745	24.77	159	196	8	28	4
Energy Management and Technology Webinar	2,007	0.00	4,266	433	2	16	2
Operations & Maintenance Practices for Energy Efficiency	0	0.00	975	98	3	62	1
Building Operator Certification, Level I Series	101,365	17.05	0	346	2	13	3
Energy Management & Technology: Fundamentals & Beyond	22,991	4.32	11	80	6	38	4
Focus on Energy Presents - The Fourth Utility: Compressed Air Energy Management	243	0.02	0	1	3	7	1
Indoor Air Quality	20,900	1.88	1,220	193	2	47	2

[a] Number of projects completed that received spillover savings.

Table 133 shows the same spillover project savings by measure category along with the percentage of first-year savings from each.

Table 133. First-Year Annual Savings for Spillover Projects by Project Type

Measure Category	kWh Savings	kWh % of Savings	kW Savings	kW % of Savings	Therm Savings	Therm % of Savings
HVAC	75,266	37.59%	10.05	20.92%	6,620	99.83%
Lighting	28,420	14.19%	3.76	7.83%	0	0.00%
Motors and Pumps	96,145	48.01%	34.23	71.25%	0	0.00%
Water-Using Equipment	420	0.21%	0.00	0.00%	11	0.17%
Total	**200,251**	**100%**	**48.04**	**100%**	**6,631**	**100%**

Note: Savings are for surveyed participants only.

Table 134 shows these spillover project savings allocated to the course topic that respondents attended.

Table 134. First-Year Annual Savings for Spillover Projects by Training Course Topic

Training Course Topic	kWh Savings	kWh % of Savings	kW Savings	kW % of Savings	Therm Savings	Therm % of Savings
HVAC	73,645	36.78%	26.65	55.48%	1,379	20.79%
Energy Management	24,998	12.48%	4.32	8.99%	4,277	64.50%
Operations & Maintenance	101,365	50.62%	17.05	35.49%	975	14.70%
Compressed Air	243	0.12%	0.015	0.03%	0	0.00%
Total	**200,251**	**100%**	**48.04**	**100%**	**6,631**	**100%**

Note: Savings are for surveyed participants only

Total Spillover Savings

Surveyed participants represent a significant sample of all training participants. Therefore, it is reasonable to assume that the per-participant savings achieved by the surveyed participants are representative of the savings achieved by all training participants.

Table 135 shows the total first-year annual savings for all Commercial Training Offering participants (N=1,259) rolled up from the savings achieved by survey respondents (n=87) during the CY 2019-CY 2022 quadrennium.

Table 135. Total First-Year Spillover Savings, Commercial Training Offering

Savings (kWh)	Savings (kW)	Savings (therm)
2,897,885	695.13	95,966

Because the spillover measures continue to realize savings through the life of the equipment, the evaluation team calculated lifecycle savings by applying the individual measure effective useful lives from the TRM to the total savings for each project. Table 136 shows the total lifecycle savings built out across the total population of training participants.

Table 136. Lifecycle Spillover Savings, Commercial Training Offering

Lifecycle Total Savings (kWh)	Lifecycle Total Savings (therm)
46,720,781	1,667,796

Evaluation Outcomes and Recommendations

The evaluation team identified the following outcomes and recommendations to improve the offering.

Outcome 1. Commercial Training Offering participants completed projects between CY 2019 and CY 2022 with first-year spillover savings of approximately 2.9 MWh and 95,000 therms. The offering produced more spillover savings in the current quadrennium than it did in the previous quadrennium when the offering generated approximately 2.1 MWh and 89,000 therms in spillover savings.

Recommendation 1. Continue offering diverse training opportunities about topics with a high potential for savings.

Outcome 2. Participants are highly satisfied with the Commercial Training Offering and are likely to recommend it to their colleagues. A large majority of survey respondents rated their experience with the Focus on Energy Commercial Training Offering as at least an 8 out of 10, and a similar share reported being *very likely* to recommend the program using the same scale. Feedback from surveyed participants indicated that they liked the course offerings, course instructors, variety of courses, and course locations. Respondents also appreciated the increased number of online courses, finding them to be accessible and convenient. Some respondents did suggest a minor change to online training to improve participants' ability to network as they would at an in-person event.

Recommendation 2. Continue offering a mix of in-person and online courses to meet the varying needs of course participants. For online courses, consider sharing participant lists, adding networking facilitation during course introductions, and providing chat tools and/or follow-up emails.

PILOTS

This section presents the evaluation results for CY 2022 for Focus on Energy pilots and initiatives. These pilots are combined into one chapter.

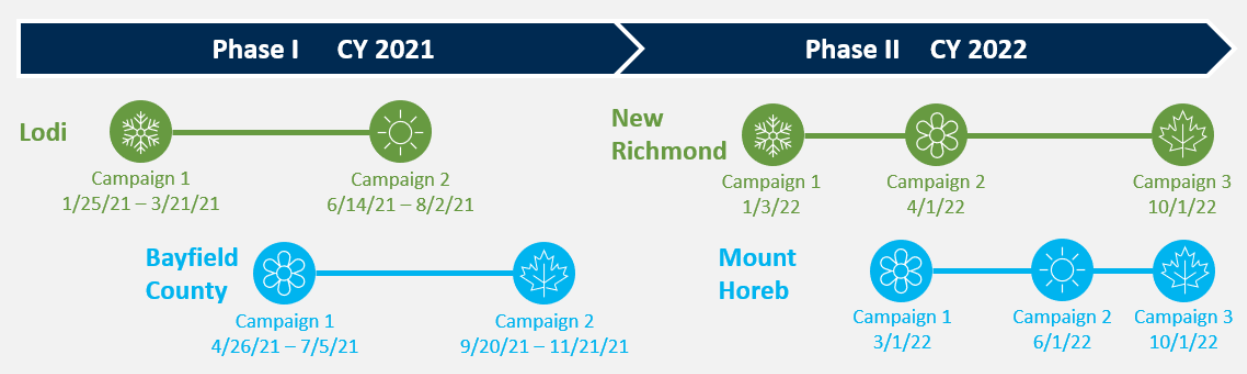
- **Save to Give Rural Behavior Pilot**
- **Multifamily Strategic Energy Management Pilot**

Save to Give Rural Behavior Pilot

In CY 2021, Focus on Energy launched the Save to Give Challenge, a behavioral pilot, to reach and serve rural residential utility customers in Wisconsin with a unique energy efficiency offering. This two-year pilot used a community-based behavior program design that encouraged customers in select rural communities to sign up to take on energy efficiency challenges. In exchange for completing those challenges, participants earned points toward a monetary donation to a local nonprofit.

APTIM, the administrator, and Vermont Energy Investment Corporation (VEIC), the administrator's subcontractor, enlisted Minnesota's Center for Energy and Environment (CEE) to design and implement this pilot. The pilot was organized in two phases, as shown in Figure 67. Phase I held two campaigns during CY 2021, and Phase II held three campaigns during CY 2022.

Figure 67. Save to Give Challenge Plan and Timeline



Focus on Energy selected the city of Lodi and Bayfield County to participate in the first year of the pilot. Lodi is a small town of roughly 3,060 people located in the Driftless Region of Wisconsin. Bayfield County, the second largest county in Wisconsin by area, is home to roughly 14,990 people and is located in the Northwoods of Wisconsin on the southern shore of Lake Superior.

In the second year of the pilot, Focus on Energy selected the communities of New Richmond and Mount Horeb. New Richmond, located in St. Croix County, is a thriving city located 40 miles from the Twin Cities with a population of around 10,541 people. Mount Horeb is a village in Dane County in the Driftless Region of Wisconsin and is home to around 7,742 people.

In addition to providing rural customers access to an energy efficiency offering, the pilot had these three objectives:

- Achieve high customer satisfaction with participants
- Demonstrate measurable energy savings for participants
- Test the efficacy of the behavioral program design with rural Wisconsin customers

This chapter covers the CY 2021 impact evaluation of Phase I communities and the CY 2022 process evaluation of Phase II communities. An impact evaluation of Phase II communities will be conducted and reported later in CY 2023.

Focus on Energy will not continue the Save to Give Challenge in the next quadrennium. However, some utility partners have expressed interest in offering the pilot to their customers.

Impact Evaluation

The evaluation team assessed the energy savings from the Phase I communities (Lodi and Bayfield County). This section describes the team's approach to estimating the treatment effect of the Save to Give Challenge on residential customer energy use during Campaign 1 in CY 2021.

Phase I Data and Methodology

The team collected billing data and participation data in Lodi and Bayfield County. Billing data spanned a year before and after Campaign 1 in each treatment group to allow for 12 months of pre- and post-treatment data. The team also collected billing data from a representative control group for each treatment community—Sauk City near Lodi and a group of towns near Bayfield County. Billing data contained customer name, address, meter read dates, and monthly usage by fuel type.

The team obtained daily average temperature data for the pre- and post-treatment periods from National Oceanic and Atmospheric Administration (NOAA) weather stations representing all zip codes associated with the participant and control groups. The team also used Typical Meteorological Year, version 3 (TMY3) Normals series (1991-2005) to weather-normalize the billing data.

Data from Lodi and its control group were cleaned separately from data from Bayfield County and its control group. Data were also cleaned separately by fuel type. The evaluation team followed these steps to prepare the data for analysis:

1. Clean participant tracking information and identify eligible participant population (customers with active accounts during the analysis period).
2. Clean billing data to remove any data anomalies (i.e., negative electric or natural gas reads, duplicated bills, and insufficient billing data with less than 25 days between meter reads or extended read dates across multiple months).
3. Map zip codes to nearest weather station, obtain daily average temperatures over pre- and post-treatment periods, and calculate the total heating degree days (HDDs) and cooling degree days (CDDs) that occurred during each billing period using a base temperature of 65°F.
4. Calendarize billing and weather data. The team allocated energy use, HDDs, and CDDs in each billing cycle to calendar months based on the number of days in the billing cycle falling in each calendar month.

Propensity Score Matching

The Save to Give Challenge functions as an opt-in program, meaning customers enroll at their own discretion rather than being enrolled automatically. The two control communities corresponded to the

two treatment communities, but had not been defined prior to the start of the challenge. To select the control groups, the evaluation team leveraged the population of residential billing data in control communities and performed a propensity score matching.[41]

Using logistic regression models specified through forward stepwise model selection, the team estimated the probability—or propensity—of participating in the Save to Give Challenge (in the treatment group) as a function of seasonal average daily energy consumption and/or monthly average daily energy consumption in the year preceding the launch of Campaign 1 in January 2021 (for Lodi) and March 2021 (for Bayfield County). The team matched each Save to Give participant to a nonparticipant in the control community whose propensity score was the closest match (that is, using nearest-neighbor matching). The team expected that Lodi participants and Bayfield County participants would differ in both their typical energy consumption patterns and their eventual Save to Give savings, so it conducted matching separately for the two sets of participants within each fuel type.

To ensure high-quality matching, the team conducted statistical equivalence tests to confirm that each matched control group had seasonal consumption levels similar to those of Save to Give participants before the first campaign was advertised. Ideally, there should be no statistically significant differences in annual or within-season electricity consumption between the groups.

Billing Analysis

The evaluation team used panel regression models to analyze the effects of Save of Give treatment on energy consumption. The analyses conformed to the approach described in the Uniform Methods Project.[42] The team used both post-only models and difference-in-differences models and tested different regression model specifications.[43] The models controlled for pre–Save to Give energy consumption patterns, customer-specific fixed effects (average consumption for each unique customer ID), time fixed effects (average consumption for each calendar month), and weather effects (HDDs and

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41 Given that the treatment is not randomly assigned, a quasi-experimental method must be employed to estimate the causal impact. A challenge to quasi-experimental studies is the occurrence of selection bias, which may lead to a loss of internal validity. Propensity score matching aims to reduce selection bias by matching on observable characteristics that could otherwise confound estimation of the treatment effect.

Abadie, Alberto, and Guido W. Imbens. 2016. "Matching on the Estimated Propensity Score." *Econometrica* (84, no. 2): 781–807.

42 Stewart, Jim, and A. Todd. 2020. *The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures*. "Chapter 17: Residential Behavior Evaluation Protocol." Prepared for National Renewable Energy Laboratory, Golden, Colorado. NREL/SR-7A40-77435. https://www.nrel.gov/docs/fy21osti/77435.pdf

43 Post-only model regresses each customer's average daily energy consumption (in a given month) on a treatment indicator variable and other control variables. The control variables (regressors) include the customer's pre-treatment energy use by month, month-by-year fixed effects, and weather.

Allcott, Hunt, and Todd Rogers. 2014. "The Short-Run and Long-Run Effects of Behavioral Interventions: Experimental Evidence from Energy Conservation." *American Economic Review* (104, no. 10): 3003–3037.

CDDs calculated at 65°F base temperature). The team clustered standard errors on each pair of participants and matched nonparticipants. Consistent with the matching, the team estimated separate models for Lodi and Bayfield County customers and for electric customers and natural gas customers.

Savings Calculation

The evaluation team estimated the percentage of unadjusted net savings,[44] which are the ratio of average daily savings per each Lodi or Bayfield County Save to Give participant to the average daily consumption of nonparticipants in the control group over the post-participation period. These savings serve as an estimate of the baseline energy use absent the pilot.

The team also estimated annual unadjusted net savings as the product of average daily savings per participant and the total number of days all participants were treated, referred to as treatment days. If a customer was active for the whole year (a full year starting from the start date of Campaign 1), the number of treatment days was 365. If a customer was inactive for part of the year, the number of treatment days was the number of days from the start date of Campaign 1 to the final active day in the dataset (less than or equal to 365 days).[45]

Impact Results

As summarized in Table 137, there are two main considerations from this evaluation:

- Save to Give Challenge participants achieved 2.2% electric savings and -2.9% natural gas savings in Lodi and 2.7% electricity savings and 1.8% natural gas savings in Bayfield County. However, due to the small number of participants, the savings were not statistically significant.
- The impact of the Save to Give Challenge on electricity consumption in Bayfield County (0.6 kWh average daily savings per customer) is greater than in Lodi (0.5 kWh average daily savings per customer). Again, these differences were not statistically significant.

Table 137. Save to Give Challenge Savings Summary

Location	Treated Customers	Control Customers	Average Daily Savings per Customer	Total Annual Savings	Savings (%)
Lodi, Electricity	119	116	0.517 kWh	21,917 kWh	2.2%
Lodi, Natural Gas	28	28	*-0.064 therm*	*-604 therm*	*-2.9%*
Bayfield, Electricity	74	73	0.64 kWh	17,421 kWh	2.7%
Bayfield, Natural Gas	44	43	0.05 therm	787 therm	1.8%

The evaluation team conducted separate analyses for Lodi and Bayfield County. Those results and methodology are summarized in *Appendix F. Measure Analysis* in Volume III.

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[44] The evaluation team did not adjust net savings by uplift savings, which occur when treatment customers participate in other Focus on Energy residential energy efficiency offerings at a higher rate than control group customers.

[45] If the number of days from the start date of Campaign 1 to the final active day in the dataset is greater than 365, the team used 365 treatment days.

Process Evaluation

The evaluation team conducted a process evaluation of the Phase II communities (New Richmond and Mount Horeb).[46] For the Phase II process evaluation, the team conducted a participant survey to assess customer satisfaction and experience.

Phase II Design and Delivery

For Phase II of the Save to Give Challenge, Focus on Energy selected two communities, the city of New Richmond and the village of Mount Horeb, and partnered with the communities' respective energy providers, New Richmond Utilities and Mount Horeb Utilities. As shown in Figure 67 above, the implementer organized three seasonal campaigns for each community. Each lasted five weeks, for a total of 15 weeks.

The implementer worked with the nonprofits and community leaders to recruit, engage, and encourage customers to participate in the challenge. Recruitment strategies included emails, bill inserts, newsletters, flyers, local signage, social media, print media, digital ads, and community meetings and events.

Once enrolled, participants received weekly challenge emails that encouraged them to adopt no- and low-cost energy-saving actions and to record their completed actions on the MyMeter online website. For completing and documenting their actions, participants earned points toward a monetary donation to one of the nonprofits selected by a community advisory committee. The more actions participants completed, the greater their energy savings and the greater the financial donation to the nonprofit.

Participants earned points on behalf of the nonprofits listed in Table 138.

Table 138. Community Nonprofits for Save to Give Challenge Phase II

New Richmond	Mount Horeb
Five Loaves Students' Opportunities with Agricultural Resources (SOAR) Will's Playground	Mount Horeb Area Historic Society Neighbors Helping Neighbors Optimist Club Mount Horeb

Each energy-saving action was assigned one to three points based on the level of effort it required and its impact. For example, participants received one point per week during the 15-week campaign for recurring actions such as unplugging unused electronics, for up to 15 points. Participants received more points for one-time actions, such as three points for ordering and installing a smart thermostat from Focus on Energy.

Phase I occurred during the COVID-19 pandemic, which limited the implementer's ability to conduct in-person community outreach. In Phase II, the implementer could conduct in-person community

[46] Findings from the process evaluation of the Phase I communities (Lodi and Bayfield County) can be found in the *Focus on Energy CY 2021 Evaluation Report Volume II*.

outreach, as originally intended. This more than doubled the number of enrolled participants, from 226 in Phase I to 577 in Phase II (394 from New Richmond and 183 from Mount Horeb).

Phase II Participant Survey Methodology

In January and February 2023, the evaluation team conducted an online survey with pilot participants from the communities of New Richmond and Mount Horeb. The team contacted participants with valid email addresses, and 55 completed the survey, for an overall response rate of 10%. Table 139 shows the number of participants contacted, survey completions, and response rates by community and overall.

Table 139. Save to Give Pilot Phase II Participant Survey Sample

Community	Participant Population	Survey Sample Frame (Customers with Valid Email Addresses)	Completions	Response Rate
New Richmond	394	388	25	6%
Mount Horeb	183	180	30	17%
Total	**577**	**568**	**55**	**10%**

To analyze the survey data, the evaluation team compiled frequency outputs and coded open-ended responses according to thematic similarities. The team compared Phase II and Phase I survey results.

Appendix K. Survey and Interview Instruments by Offering in Volume III contains a copy of the participant survey instrument.

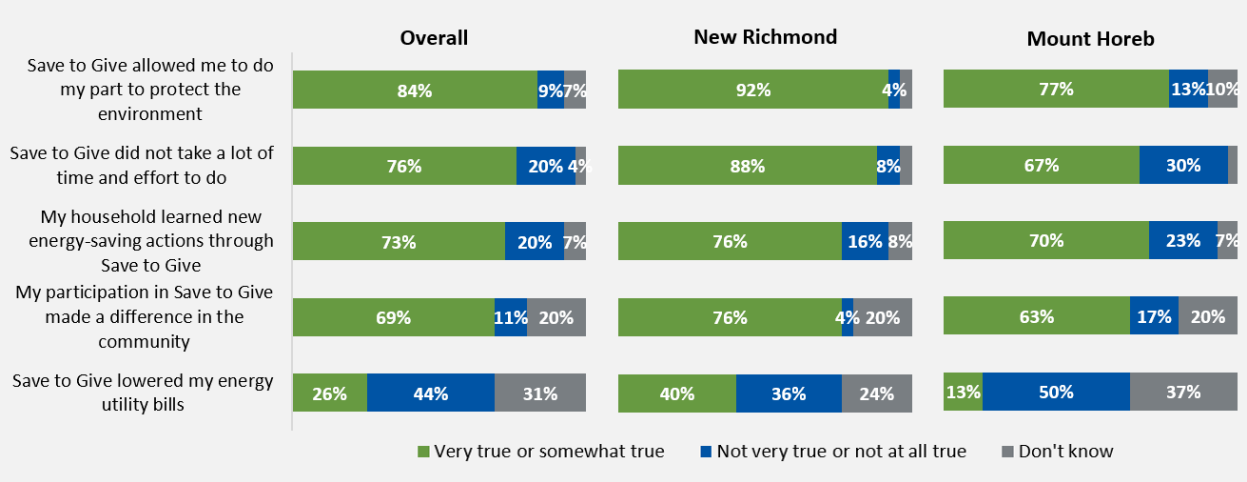
Phase II Overall Participant Experience

Phase II of the Save to Give Challenge delivered positive feelings and benefits to respondents. As shown in Figure 68, respondents were asked how well a series of statements applied. Most respondents selected *very true or somewhat true* for the following statements:

- Save to Give allowed me to do my part to protect the environment (84%)
- Save to Give did not take a lot of time and effort to do (76%)
- My household learned new energy-saving actions (73%)
- My participation in Save to Give made a difference in my community (69%)

Notably, more New Richmond respondents than Mount Horeb respondents reported that the Save to Give Challenge was a positive experience, and the possible reasons are discussed below.

Figure 68. Participant Experience with Save to Give Challenge Phase II

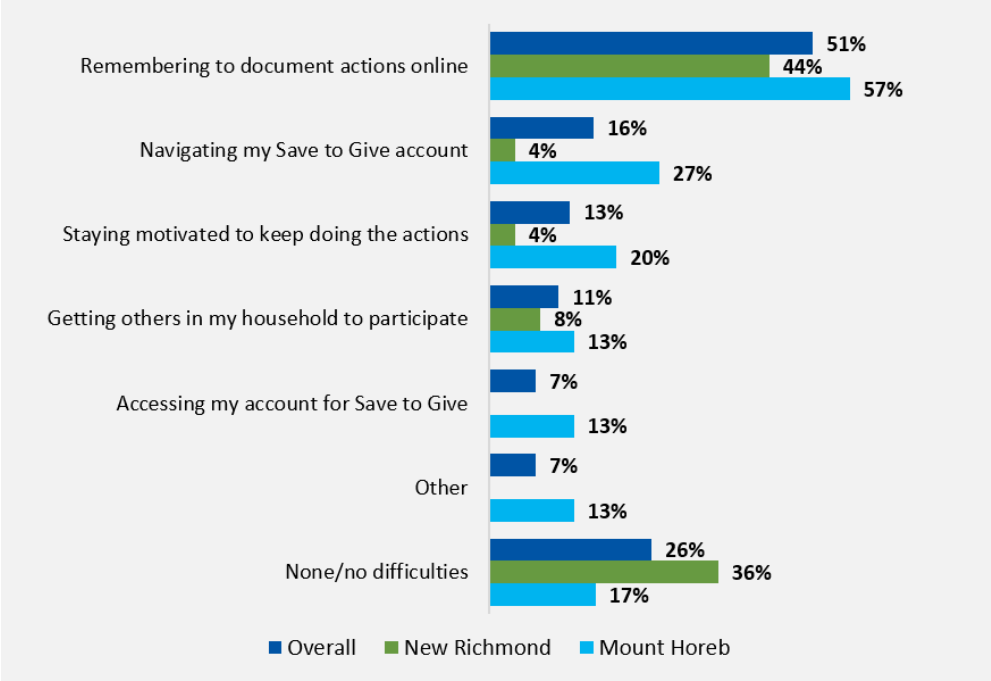


Source: Save to Give Participant Survey Question.
"Below are statements about the Save to Give Challenge. Please indicate how well each statement applies to you."
(Overall n=55, New Richmond n=25, Mount Horeb n=30).

Although one objective of the challenge was to demonstrate measurable energy savings for participants, most respondents did not see the benefit of lower utility bills. Only 26% responded *very true or somewhat true* to "Save to Give lowered my energy utility bills." These survey results were similar to Phase I survey results where 27% of respondents selected *very true or somewhat true* to the statement "Save to Give lowered my energy utility bills."

Like Phase I respondents, Phase II respondents' biggest obstacle to participating, according to 51% of respondents, was remembering to document their completed energy-saving actions online in the MyMeter website. Figure 69 shows several difficulties reported by Phase II respondents. Fewer Phase II respondents said it was difficult to remember to document their completed actions online (51%) compared with Phase I respondents (67%). This notable decrease may be due to changing the campaign structure—customers in Phase II participated in three sets of five-week campaigns whereas customers in Phase I participated in two sets of eight-week campaigns.

Figure 69. Participant Difficulties with Save to Give Challenge Phase II



Source: Save to Give Participant Survey Question.
"What other difficulties, if any, did you experience with the Save to Give Challenge? Select all that apply."
(Overall n=55, New Richmond n=25, Mount Horeb n=30).

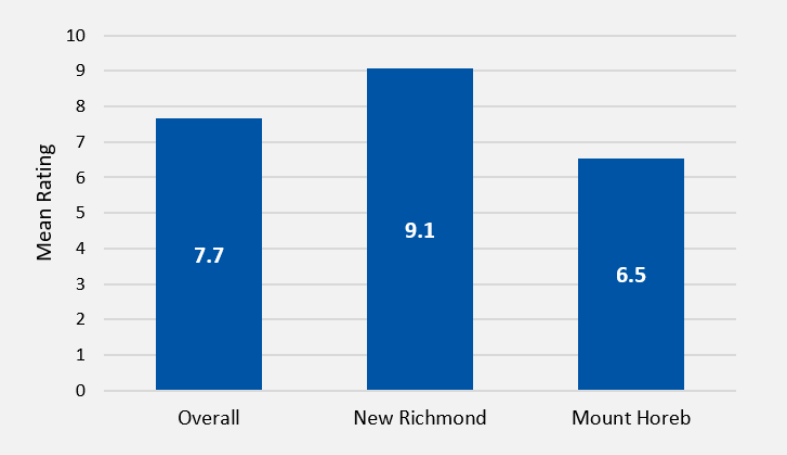
Most Phase II respondents (87%, n=55) said the points assigned to the energy-saving actions were reasonable. On average, Phase II respondents earned 46.6 points (n=55), markedly higher than Phase I respondents who earned 34.2 points (n=33). On average, New Richmond respondents earned more, 49.9 points (n=30), than Mount Horeb respondents, 44.5 points (n=25).

Phase II Satisfaction with Overall Pilot

The survey asked respondents to rate their overall satisfaction with the pilot on a scale of 0 to 10, where 0 meant *not at all satisfied* and 10 meant *extremely satisfied*. Phase II respondents gave a mean rating of 7.7 for their satisfaction with the Save to Give Challenge, as shown in Figure 70. Compared with Phase I satisfaction, which achieved a mean rating of 7.0 (n=32), overall satisfaction with the pilot improved in Phase II.

When asked why they gave the rating, Phase II respondents who gave a high rating tended to say it was easy to do, they liked supporting nonprofits, and it made them more aware of energy usage. Respondents who gave a low rating were more likely to say that the energy-saving actions were not applicable to their household and that they experienced difficulties logging into the MyMeter online website. Phase II respondents gave the same positive and negative feedback as Phase I respondents.

Figure 70. Satisfaction with Save to Give Pilot Phase II



Source: Save to Give Participant Survey Question.
"Overall, how satisfied are you with your experience with the Save to Give Challenge?"
(Overall n=54, New Richmond n=24, Mount Horeb n=30).

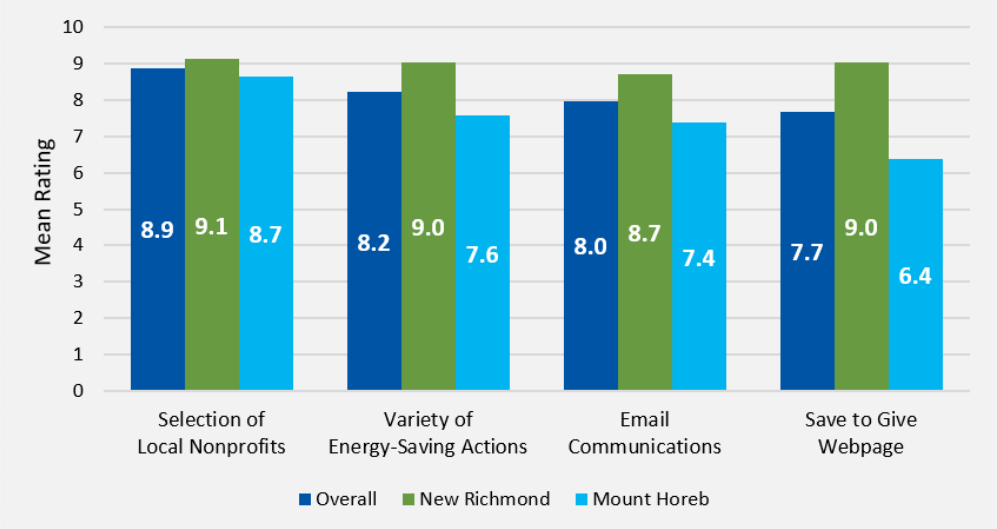
New Richmond respondents gave a higher mean satisfaction rating (9.1) than Mount Horeb respondents (6.5). The difference may be due to the seasonal timing of the campaigns: New Richmond had a winter campaign but no summer campaign, and Mount Horeb had a summer campaign but no winter campaign. The types of energy-saving actions that participants are able and willing to do might differ depending on time of the season.

Another explanation for differences in satisfaction may be demographics. New Richmond is a larger community with younger residents and lower income, while Mount Horeb is a smaller, tightknit community with older residents and higher income. These demographic differences could affect how participants perceive and engage with energy efficiency. For instance, lower-income participants may be more likely than higher-income participants to engage in recurring behavioral actions (e.g., turning off lights and adjusting the thermostat) because these are no-cost actions. On the other hand, higher-income participants may be more likely than lower-income participants to engage in one-time product installation actions because higher-income participants can afford to do so. The recurring behavioral actions could make lower-income participants feel like they are putting more time and effort into saving energy and earning points for nonprofits, which might increase their satisfaction.

Phase II Satisfaction with Challenge Components

Phase II respondents rated their satisfaction with the four components shown in Figure 71. The selection of local nonprofits received the highest mean rating (8.9), while the Save to Give Challenge webpage received the lowest mean rating (7.7). New Richmond and Mount Horeb respondents differed on satisfaction with each component. For all four components, New Richmond respondents gave a higher mean rating than Mount Horeb respondents, which aligns with New Richmond respondents giving a higher mean rating for overall satisfaction than Mount Horeb respondents.

Figure 71. Satisfaction with Save to Give Challenge Phase II Components



Source: Save to Give Participant Survey Question.
"How satisfied are you with the following aspects of the Save to Give Challenge?"
(Overall n=54, New Richmond n=24, Mount Horeb n=30).

Twenty-eight respondents answered the question about what improvements they would suggest for the Save to Give Challenge:

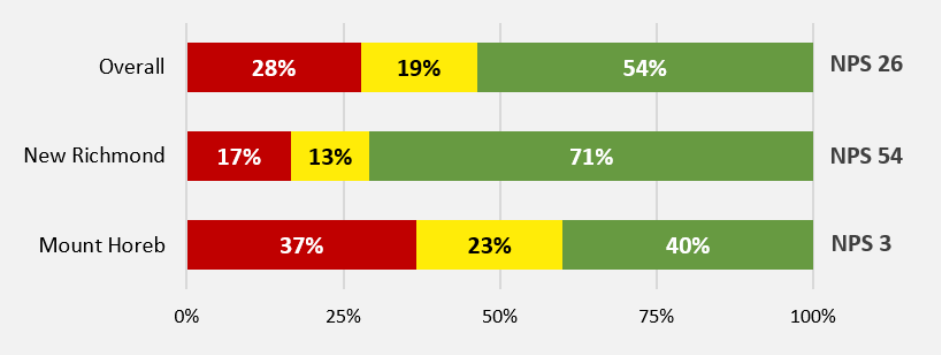
- Increase the variety of energy-saving actions (21%)
- Add more interactive features or actions (21%)
- Send reminders on energy-saving actions (11%)
- Get landlords on board (11%)
- Increase the campaigns or audience reach (11%)

Phase II Net Promoter Score: Likelihood to Recommend the Pilot

The net promoter score (NPS) is a metric of brand loyalty that measures how likely customers are to recommend the pilot to others. Respondents rate their likelihood to recommend the pilot on a 0 to 10 scale, where 0 means *not at all likely* and 10 means *extremely likely.* Respondents who give a rating of 9 or 10 are known as promoters, a rating of 7 or 8 are known as passives, and a rating of 0 to 6 are known as detractors. The NPS is expressed as a number between -100 and +100 that represents the difference between the percentage of promoters and detractors. The passives are excluded from the calculation. An excellent NPS is +50 and above.

As shown in Figure 72, Phase II of the Save to Give Challenge achieved an NPS of +26, indicating there were more promoters (54%) than detractors (28%) among the respondents. In comparison, Phase I achieved a lower NPS of +19. New Richmond achieved an NPS of +54, far higher than the NPS of +3 for Mount Horeb.

Figure 72. Net Promoter Score for Save to Give Pilot Phase II



Source: Save to Give Participant Survey Question.
"How likely would you be to recommend the Save to Give Challenge to others?"
(Overall n=54, New Richmond n=24, Mount Horeb n=30).

Phase II Awareness of Focus on Energy

Respondents were asked if they had heard about Focus on Energy prior to enrolling in the Save to Give Challenge. Two in three Phase II respondents (67%) had heard of Focus on Energy prior to enrollment (n=55). More Mount Horeb respondents (73%, n=30) had heard of Focus on Energy than had New Richmond respondents (60%, n=25). Phase I respondents showed higher awareness of Focus Energy (85%, n=33) than Phase II respondents.

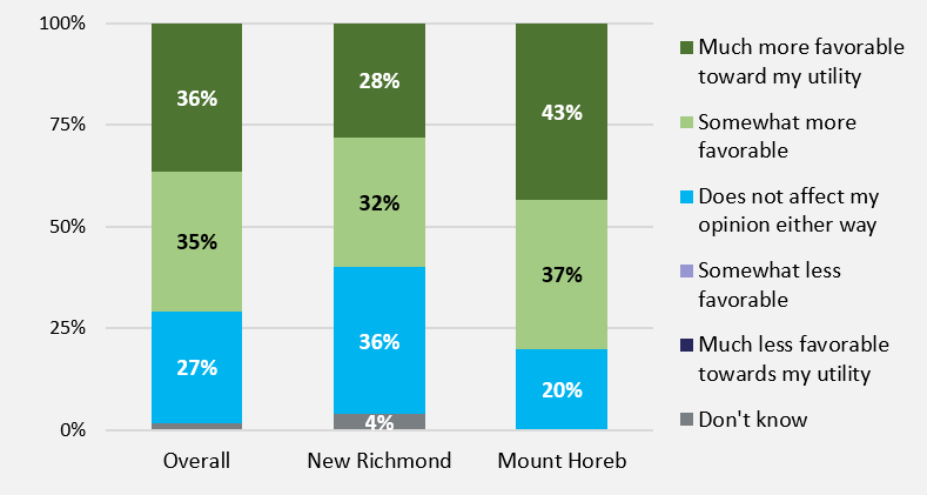
Only 40% of Phase II respondents (n=55) said they had participated in a Focus on Energy offering, with a higher participation rate from Mount Horeb respondents (43%, n=30) than New Richmond respondents (36%, n=25). In particular, 86% of Phase II respondents had participated in a Focus on Energy offering *before* enrolling in the challenge. These findings and the customer suggestions for more variety of energy-saving actions suggest that those who enrolled in the challenge were more likely to be familiar and experienced with energy efficiency.

Phase II Awareness of Utility Partnership and Opinion of Utility

Respondents were asked if they were aware before receiving the survey that the challenge was offered in partnership with their local utility. Most Phase II respondents (82%) were aware of the utility partnership (n=55). Mount Horeb respondents showed higher awareness of the utility partnership (87%, n=30) compared to New Richmond respondents (75%, n=25). Phase I respondents showed the same level of awareness (82%, n=33).

Participating in the challenge had a positive impact on Phase II respondents' opinion of their utility. Figure 73 shows that 71% of respondents said their opinion of their utility became more favorable, and 27% said their opinion had not changed after participating. None said their opinion of their utility had become less favorable. Here, more Mount Horeb respondents (80%) said their opinion of their utility had become much more favorable compared with New Richmond respondents (60%). This difference is surprising given that Mount Horeb respondents exhibited lower satisfaction with the challenge and its components.

Figure 73. Impact of Save to Give Pilot Phase II on Participant's Opinion of Utilities

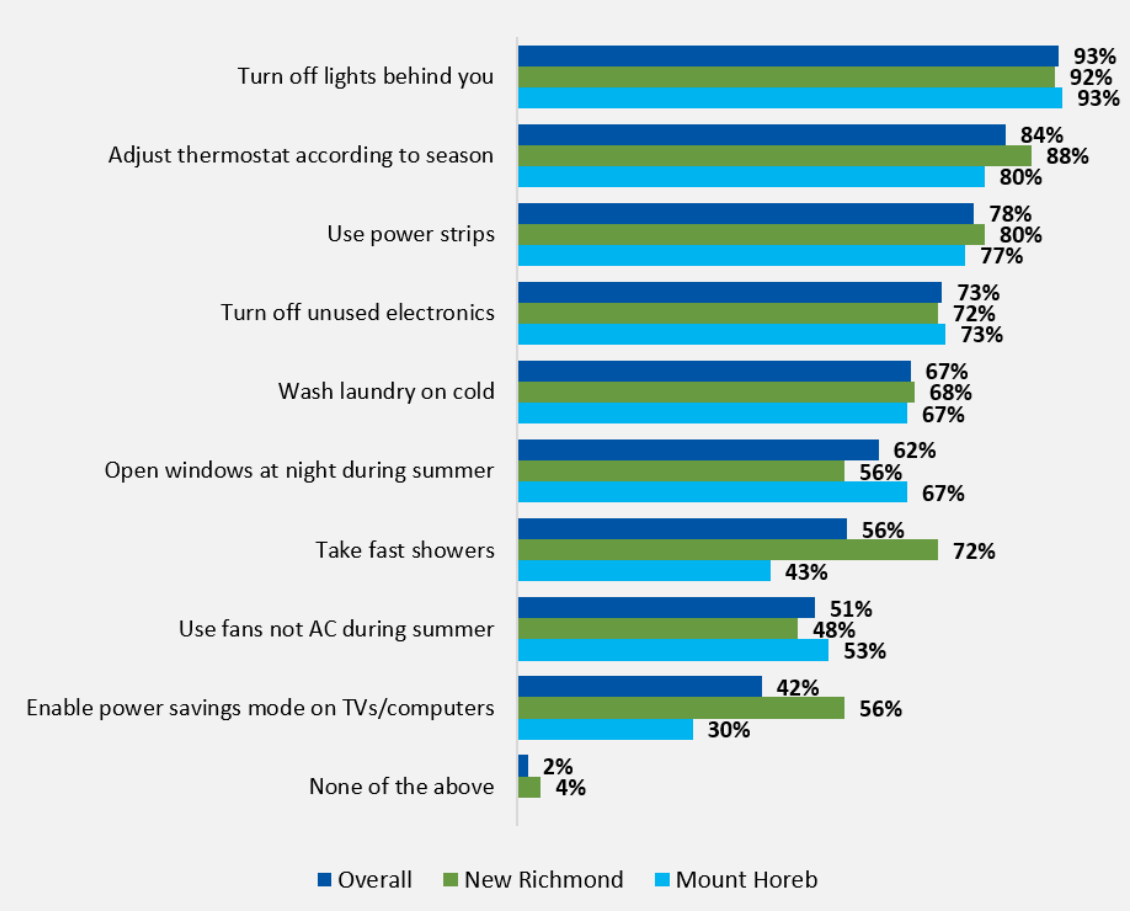


Source: Save to Give Participant Survey Question. "How has the Save to Give Challenge affected your opinion of [New Richmond Utilities or Mount Horeb Utilities], if at all?" (Overall n=55, New Richmond n=25, Mount Horeb n=30).

Phase II Behavioral Persistence

The survey explored the persistence of the behavioral energy-saving actions encouraged by the challenge after the campaigns ended. Many behaviors did persist, as shown in Figure 74. Overall, 98% of respondents (n=55) reported continuing the behavioral energy-saving actions on a regular basis, with Mount Horeb (100%) and New Richmond (96%) showing similar persistence. Specifically, most respondents continued to turn off lights (93%), turn off unused electronics (72%), adjust the thermostat according to the season (84%), and use power strips (78%). These were the top four persistent behaviors among Phase I respondents as well.

Figure 74. Behaviors that Phase II Participants Continue Regularly Post Pilot



Source: Save to Give Participant Survey Question.
"Which of the Save to Give actions have become something you now do on a regular basis? Select all that apply."
(Overall n=55, New Richmond n=25, Mount Horeb n=30).

Phase II Uplift and Spillover

As detailed in Table 140, the survey found a very small uplift in the pilot's influence on Phase II participants' uptake of Focus on Energy offerings. Forty percent of Phase II respondents said they had participated in a Focus on Energy offering. Of these respondents, 86% said they had participated in the Focus on Energy offering prior to enrolling in the Save to Give Challenge. Only 9% of respondents said they had participated after enrolling. These uplift results are based on a small number of survey respondents.

Table 140. Uplift: Participants Subsequent Uptake of Other Focus on Energy Offerings after Save to Give Challenge Phase II

Have you ever participated in a Focus on Energy program offering where you received a rebate/incentive from Focus on Energy? (n=55)	You enrolled in the Save to Give Challenge on [Date]. Did you participate in the Focus on Energy program offering before or after enrolling in the Save to Give Challenge? (n=22)
Yes 40%	Before enrolling in Save to Give 86%
	After enrolling in Save to Give 9% (uplift)
	Don't know 5%
No 42%	Question not asked
Don't know 18%	Questions not asked

Source: Save to Give Participant Survey Questions.

As detailed in Table 141, the survey found some evidence of spillover in Phase II (the influence of the challenge on participants' uptake of non-rebated energy-efficient improvements). Fourteen Phase II respondents (26%) said they purchased or installed energy-efficient products or upgrades without a Focus on Energy rebate after participating in the Save to Give Challenge. Of these, nine said the challenge was an important factor in their decision.

Table 141. Spillover: Participants' Other Energy-Efficient Actions after Save to Give Challenge Phase II

After [Date], have you purchased or installed any energy-efficient products or upgrades at your home for which you did not receive a Focus on Energy rebate or incentive? (n=55)	Which of the following energy-efficient products or upgrades did you install for which you did not receive a Focus on Energy rebate or incentive? Select all that apply. (n=14)	How important was the Save to Give Challenge in your decision to purchase and install the energy-efficient products or upgrades for which you did not receive a Focus on Energy rebate/incentive? (n=14)
Yes 26%	**LEDs** (10 respondents) **Insulation** (3 respondents) **Water heating equipment** (2 respondents) **Recycled fridge or freezer** (2 respondents) **Smart or Wi-Fi thermostat** (1 respondent) **Central air conditioner** (1 respondent) **Air sealing** (1 respondent) **Duct sealing** (1 respondent) **Other** (5 respondents)	**5 – Very important** (5 respondents)
		4 (4 respondent)
		3 (1 respondent)
		2 (2 respondent)
		1 – Not at all important (2 respondents)
		Don't know (0 respondent)
No 55%	Question not asked	Question not asked
Don't know 20%	Question not asked	Question not asked

Source: Save to Give Participant Survey Questions.

Outcomes and Recommendations

The evaluation team offers these outcomes and recommendations based on the Phase I billing analysis and the Phase II participant survey.

Outcome 1. The analysis of Phase I indicated that the Save to Give Challenge produced electric and natural gas savings in CY 2021. However, because of the small number of participants, the savings were not statistically significant in both fuel types and selected communities.

Outcome 2. The magnitude of effects varied between the two treated Phase I communities: Bayfield County observed greater treatment effects and a larger percentage of electric savings than Lodi. This discrepancy suggests that regional or implementation variances led to different impacts. The evaluation team anticipates that in future cycles this pilot may achieve greater total savings. Launching Phase I during the COVID-19 pandemic made face-to-face recruitment and education much more difficult than can be achieved currently.

Recommendation 1. The evaluation team used propensity score matchings to construct control groups with pre-treatment period energy consumption patterns similar to those of the treatment groups. However, due to limitations in data availability, matching did not control for households' specific characteristics. To improve the quality of the matches, the team recommends gathering and using data on household characteristics (such as account age, bill payment methods, and customer-level demographic data), if available, for treatment and control group customers.

Outcome 3. From Phase I to Phase II, the Save to Give Challenge improved on customer participation, experience, and satisfaction. Phase I took place during the COVID-19 pandemic and limited the implementer's ability to conduct in-person community outreach. In Phase II, the implementer conducted in-person community outreach, as originally intended, which led to a huge increase in enrollments, from 226 participants in Phase I to 577 participants in Phase II. Moreover, Phase II respondents earned, on average, a total of 46.6 points for completing energy-saving actions, markedly higher than the total points for Phase I respondents who earned, on average, 34.2 points. Phase II respondents also gave a higher mean rating (7.7) for their satisfaction with the Save to Give Challenge compared with Phase I respondents (7.0). Fewer Phase II respondents found it difficult to remember to document their completed actions online (51%) compared with Phase I respondents (67%). This notable decrease in forgetfulness may be because Phase II customers participated in three sets of five-week campaigns whereas Phase I customers participated in two sets of eight-week campaigns.

Recommendation 2. Should utility partners opt to offer the Save to Give Challenge to their customers, they should consider in-person outreach as a key recruitment effort and consider running more-frequent, shorter campaigns to increase enrollments and engagement.

Outcome 4. Phase I and Phase II of the Save to Give Challenge demonstrated persistence of energy-saving behaviors. Ninety-four percent of Phase I respondents and 98% of Phase II respondents said they continued to do the behavioral actions learned through the challenge on a regular basis. The top persisting energy-saving behaviors in both phases were turning off lights, turning off unused electronics, adjusting the thermostat according to the season, and using power strips.

Multifamily Strategic Energy Management Pilot

Focus on Energy partnered with Madison Gas & Electric (MGE) to initiate the Multifamily Strategic Energy Management (SEM) Pilot in the fourth quarter of 2021. The pilot recruited 3,308 apartment units across five property management portfolios. In early CY 2022, the pilot created opportunity registers for each building and kicked off workshops and planning processes for resident engagement. Through the pilot, participants assembled energy teams to identify and adopt behavioral, operations and maintenance, and capital improvements to reduce on-site energy consumption. The pilot was implemented by CLEAResult. Focus on Energy plans to integrate Multifamily SEM into core programming in CY 2023.

The evaluation team designed the 2022 Multifamily SEM evaluation approach to estimate net energy savings achieved in CY 2022 and to support program improvements.

Impact Evaluation Methodology

The evaluation team reviewed project files to verify savings at each site. The implementer provided meter and site data that covered the beginning of the baseline period through the end of the reporting period. The implementer also produced regression models and provided the evaluation team with a summary of its model parameters and findings. If the implementer used bottom-up engineering calculations to estimate residential multifamily savings, it provided the appropriate workbooks.

For the regression models, the evaluation team did not build independent baseline models but instead qualitatively verified energy savings by confirming that baseline and reporting period definitions and the model specification followed industry best practices for evaluating facility-level savings as described in the Uniform Methods Project (UMP)[47] and aligned with IPMVP Option C [48] and ASHRAE Guideline 14-2014.[49]

For the engineering calculations, the team assessed the validity of the input values and calculation methodology, confirmed implementation of major projects in the opportunity register, reviewed the model validation, assessed whether capital projects were appropriately prorated and deducted from SEM savings, and verified that reporting period savings were correctly annualized.

When the evaluation team found computational errors in capital project savings or annualization of reporting period savings, it directly calculated realization rates. For other issues, such as missing variables in the energy model or poor model fit, the team assigned a realization rate of 90% or 110% depending on whether these issues likely over- or underestimated energy savings. If no issues were

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47 Stewart, James, PhD. May 2017. *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures.* "Chapter 24: Strategic Energy Management (SEM) Evaluation Protocol." Prepared for National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy17osti/68316.pdf

48 Efficiency Evaluation Organization. 2022. *International Performance Measurement and Verification Protocol. Option C Whole Facility.*

49 ASHRAE. December 2014. *Measurement of Energy, Demand, and Water Savings. ASHRAE Guideline 14-2014.*

found or if issues were likely to have had small, if any, impact on energy savings, the team assigned a realization rate of 100%. The team assumed that claimed savings were adequate by default and assigned realization rates other than 100% only with sufficient evidence.

Findings from the measurement and verification activities for the five property management portfolios are summarized in Table 142. Further details are in *Appendix E. Detailed Findings* in Volume III.

Table 142. CY 2022 Multifamily SEM Pilot Measurement and Verification Activities

	Baseline and Reporting Period Definitions	Opportunity Register	Energy Intensity Model	Bottom-Up Calculation	Savings Estimation Methods
Participant 1	✓	✓	✓	N/A	✓
Participant 2	✓	✓	✓	✓	✓
Participant 3	N/A	✓	N/A	✓	✓
Participant 4	N/A	✓	N/A	✓	✓
Participant 5	-	✓	-	-	-

Note: "✓" represents that the criteria have been verified. Participants have been anonymized.

Verified Gross Savings Results for Multifamily SEM Pilot

This section details the final SEM savings estimates and realization rates. Table 143 shows reported savings, verified gross savings, and gross realization rates for each participant in the pilot. The pilot achieved 147,779 kWh in verified gross energy savings with a 99.5% gross realization rate. Verified gross savings align well with the implementer's reported savings.

Table 143. CY 2022 Multifamily SEM Pilot Gross Savings and Gross Realization Rates

Participant	*Reported* Savings		Verified Gross Savings		Gross Realization Rates	
	kWh	therms	kWh	therms	kWh	therms
Participant 1 (model)	13,347	-	13,274	-	99.5%	-
Participant 2 (model)	63,165	-	62,821	-	99.5%	-
Participant 2 (engineering calculation)	8,864	-	8,864	-	100%	-
Participant 3 (engineering)	27,264	-	27,006	-	99.1%	-
Participant 4 (engineering)	35,814	1,350	35,814	1,350	100%	100%
Participant 5 (model)	-	-	-	-	-	-
Total	**148,454**	**1,350**	**147,779**	**1,350**	**99.5%**	**100%**

Differences in reported and evaluated facility savings largely resulted from Participant 3, for which the team used bottom-up engineering calculations. The team identified an error in calculations for a cold-line insulation opportunity. The reported savings calculation mislabeled ambient outdoor temperatures as 2.5 degrees Fahrenheit (°F) higher than their true value. The evaluation team recalculated verified gross savings with the correct temperatures.

For the two participants using energy models (Participant 1 and Participant 2), the gross realization rates were nearly, but not exactly, 100% because savings were not annualized for the reporting period. It is also important to note that, based on the cumulative sum (CUSUM) graph, the baseline model for

Participant 1 slightly underestimated electricity use.[50] The participant's energy model also omitted possibly important determinants of energy use, such as indicators for holidays or university breaks. Furthermore, savings from multifamily SEM during CY 2022 were likely higher than reported because the implementer did not report savings for all participant buildings.

Verified Net Savings Results for Multifamily SEM Pilot

Savings estimated through the energy model (regression analysis) are net savings. The NTG for the Multifamily SEM Pilot was 1.0 because the regression model already accounted for all factors that might reduce the actual energy savings achieved by the pilot. The pilot achieved total net savings of 147,779 kWh and 1,350 therms. For bottom-up engineering calculations, the NTG was also 1.0 because these represented individual projects.

Outcomes and Recommendations

The evaluation team offers these outcomes and recommendations for the Multifamily SEM Pilot.

Outcome 1. The Multifamily SEM pilot had a 99.5% realization rate. The small differences in reported and verified savings were driven by annualization and an error in bottom-up engineering calculations. The Multifamily SEM Pilot achieved savings across four participants that totaled 147,779 kwh and 1,350 therms. The team calculated an overall realization rate of 99.5%. The reasons the realization rate was not 100% were that the implementer did not annualize the reported savings and the bottom-up engineering calculations for Participant 3 mislabeled temperature values.

Recommendation 1. Implement quality control procedures to ensure accuracy and reliability of savings calculations.

Outcome 2. Accuracy could be improved for several engineering calculation measures by using system-specific calculations and local weather data. Nearly all HVAC-related measures require temperature data because system performance is highly dependent on indoor and outdoor temperature conditions. State TRMs typically provide estimates for weather inputs for major cities in the state or for the entire state. Weather can vary significantly across a state, so the accuracy of weather-dependent HVAC calculations is improved by using location-specific weather data.

The evaluation team identified two engineering calculations for which more-accurate data could have improved the energy savings estimates for Participant 4.

- **Decreased parking garage temperature.** Calculations use TRM inputs for heating days per year and average outdoor air temperature local to Madison; however, those inputs are based on a system that heats to 50°F. For one participating property, the system currently heats the garage to 62°F and is proposed to heat the garage to a temperature of 58°F. Because the current and proposed setpoints are both higher than the TRM's assumption of a 50°F setpoint, any savings associated with the change from heating air between 50°F and 62°F (existing scenario) and 50°F

[50] Given that the differences between actual energy use and estimated energy use in the baseline are under 2.5%, Cadmus verified its energy model.

and 58°F (proposed conditions) is not captured. Utilizing location-specific weather data would also increase the accuracy of this calculation.

- **Air filter change.** Calculations use hours of heating taken from the Missouri TRM. However, Missouri's climate can vary significantly from Wisconsin's, so the system's energy use could be calculated more accurately with weather data local to Madison.

Recommendation 2. Obtain raw local weather data and system-specific temperature data that can be analyzed to calculate inputs specific to location and measure.

Outcome 3. The evaluation team verified the implementer's energy models, except for model coverage for Participant 1. Energy models in the implementer's report met most criteria of model coverage, interpretability, and goodness-of-fit, and model residuals were also generally well-behaved. However, the team did not verify the model coverage for Participant 1. The model did not include a holiday or university breaks indicator, which could be an important factor influencing energy usage.

Recommendation 3. Assess and include all important energy usage determinants in the baseline energy model, such as holiday indicators, to lower the risk of omitted variable bias.

Outcome 4. Total savings achieved through the Multifamily SEM Pilot are underestimated because savings were not reported for all participating buildings. Participant 1 reported savings at one of four sites; Participant 2 reported savings at two of four sites; Participant 3 reported savings at three of eight sites; Participant 4 reported savings at one of five sites; and Participant 5 did not claim savings from any of its eight sites. The major reason for not including all participants' sites is the lack of available data and the challenges associated with modeling.

Recommendation 4. Collect additional and more-comprehensive data on energy consumption and the determinants of energy consumption for all participating sites.