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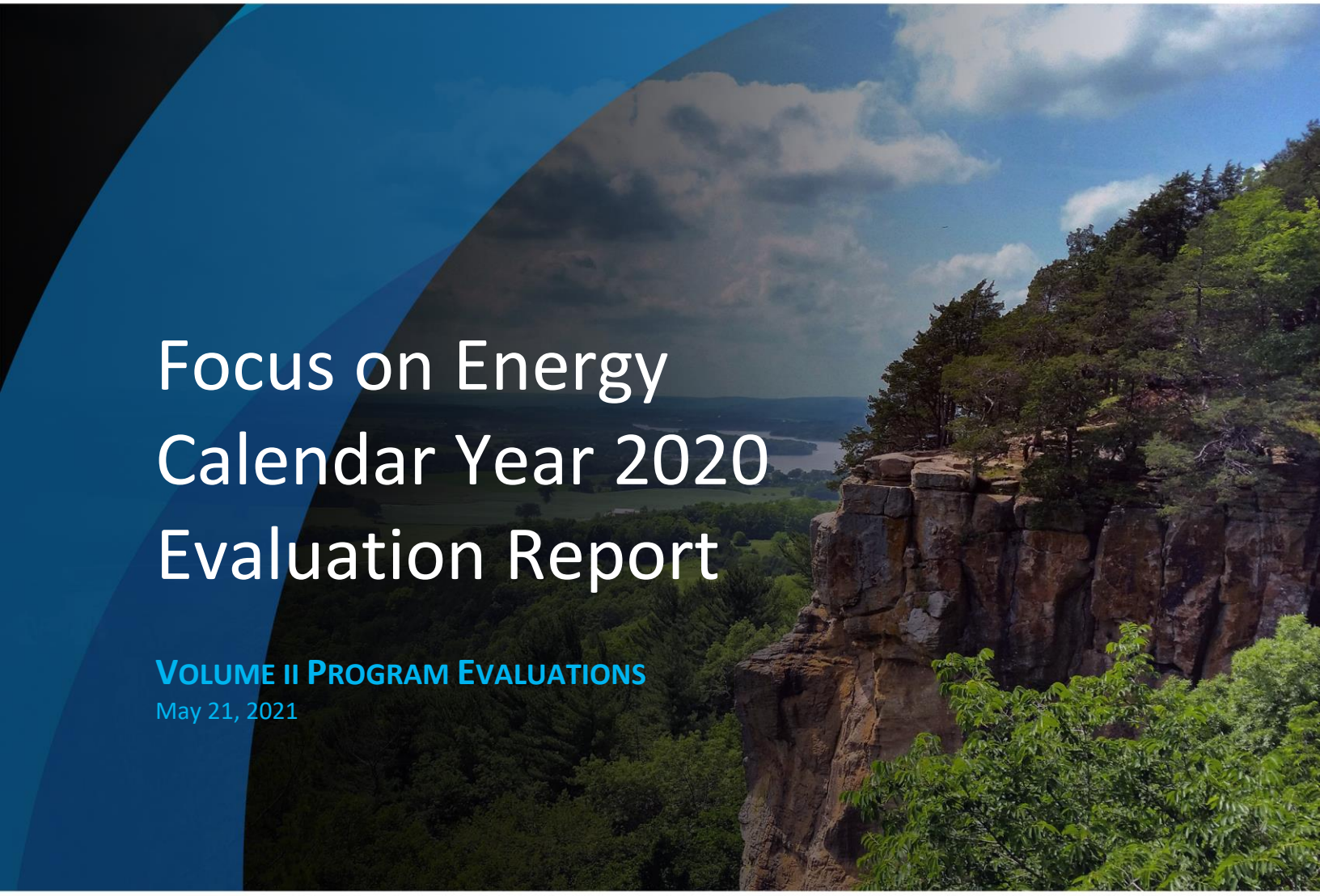

Focus on Energy Calendar Year 2020 Evaluation Report

VOLUME II PROGRAM EVALUATIONS

May 21, 2021

Prepared for:

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Acronyms

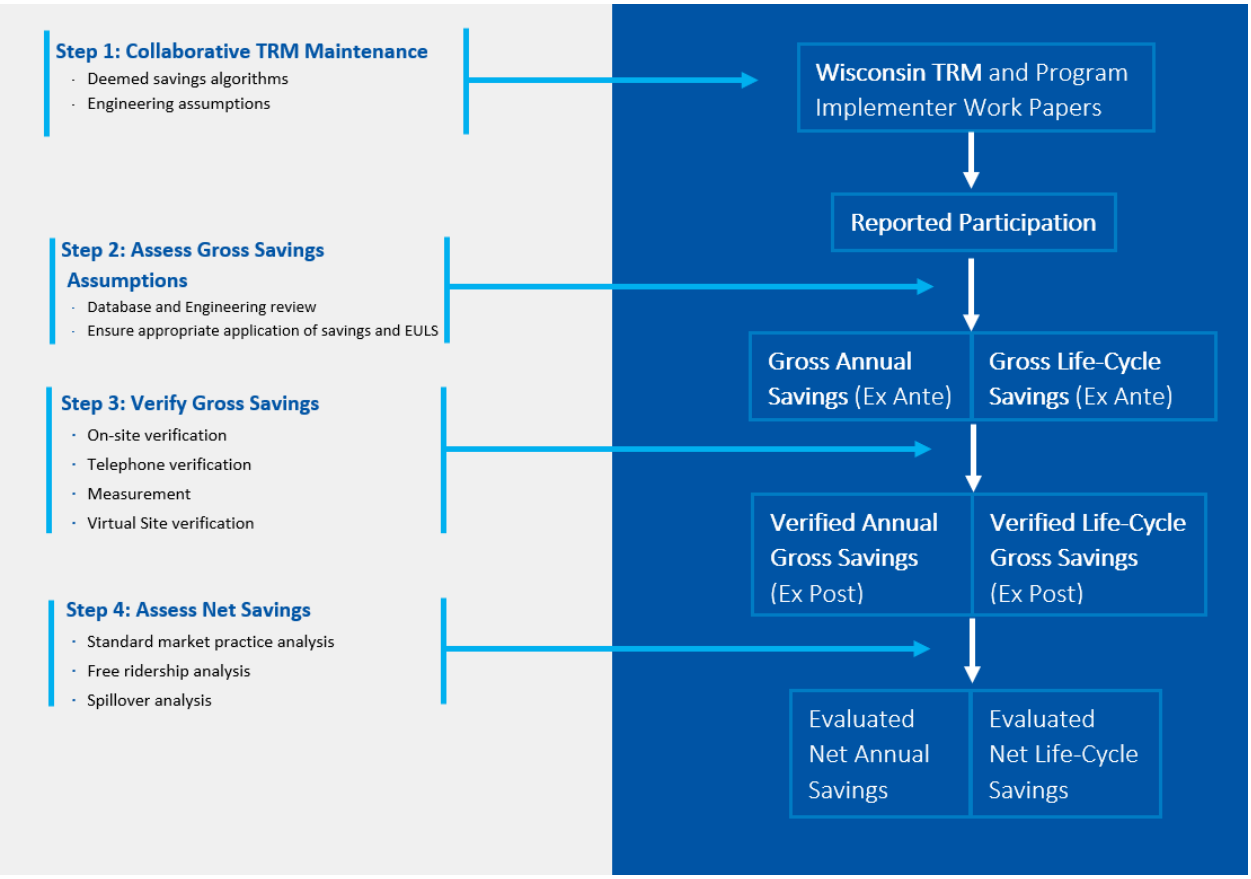
Acronym	Term
ACS	American Community Survey
AFUE	Annual fuel utilization efficiency
AHRI	Air Conditioning, Heating, & Refrigeration Institute
APS	Advanced power strip
Btu	British thermal unit
CFL	Compact fluorescent lamp
CREED	Consortium for Retail Energy Efficiency Data
CY	Calendar year
DDC	Digital direct control
DEET	Delivering Energy Efficiency Together
DIY	Do-it-yourself
DOE	U.S. Department of Energy
DSM	Demand-side management
ECM	Electronically commutated motor
EDA	Energy design assistance
EDR	Energy design review
EISA	Energy Independence and Security Act
EPA	U.S. Environmental Protection Agency
EUL	Expected useful life
HOU	Hours of use
HPwES	Home Performance with ENERGY STAR
ISR	In-service rate
kW	Kilowatt
kWh	Kilowatt hour
LED	Light-emitting diode
LMP	Locational marginal price
MMBtu	Million British thermal units
MMID	Master measure identification
MThms	Thousand therms
MW	Megawatt
MWh	Megawatts per hour
NAC	Normalized annual consumption
NCP	National Consumer Panel
NPS	Net Promoter Score
NREL	National Renewable Energy Laboratory
NTG	Net-to-gross
POS	Point-of-sale
PPA	Power purchase agreement
PRISM	PRInceton Scorekeeping Method
PSC	Public Service Commission of Wisconsin
PV	Photovoltaic
RECIP	Renewable Energy Competitive Incentive Program
RFP	Request for proposal
ROI	Return on investment
SEER	Seasonal energy efficiency rating
SMP	Standard market practice
SPECTRUM	Statewide Program for Energy Customer Tracking, Resource Utilization, and Data Management
T&D	Transmission and distribution
TRC	Total resource cost test
TRM	Technical reference manual
UEC	Unit energy consumption
UMP	Uniform Methods Project
UPC	Universal product code
VFD	Variable frequency drive

Introduction

Volume II of the Focus on Energy CY 2020 Evaluation Report presents offering-specific evaluation findings and details about specific 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 2020 Net Savings



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

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 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
- Have 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.

[2] Public Service Commission of Wisconsin. May 2021. Wisconsin *Focus on Energy 2020 Technical Reference Manual.* Prepared by Cadmus. https://www.focusonenergy.com/sites/default/files/Focus_on_Energy_2020_TRM.pdf

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.

Deemed Savings Report

The annual deemed savings report details changes or updates to deemed savings or savings algorithms in the TRM based upon evaluation measurement and verification activities. The evaluation team prepares and circulates the report for review among the primary members of the Focus on Energy team including the administrator, the implementers, and the PSC. After this review process, the evaluation team incorporates the findings into the next iteration of the TRM.

Work Papers

Although evaluation activities often initiate updates to the TRM through the deemed savings report process, implementers can also initiate revisions or additions to the TRM. 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 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 [CY], 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

Virtual Site Visit Inspections

For projects selected for evaluation, evaluation team inspectors verify the presence of equipment at a project site through verification video calls with participant facility staff, in which they provide 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.

On-Site Inspections

For projects selected for evaluation, 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 2020 for these residential solutions and their offerings.

Direct to Customer Solution

- Appliance Recycling
- Online Marketplace
- Packs
- Farmhouse Kits
- Retail
- Rural Retail Events

Trade Ally Solution

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

New Construction Solution

- Residential New Construction

Direct to Customer Solution

The Direct to Customer Solution is administered by APTIM. The implementer is ICF International, which oversees subcontractors, ARCA, TechniArt, and Crossmark. The solution provides customers with free energy-efficient products and services as well as incentives for purchasing efficient products through four statewide offerings and two rural offerings. Each offering is described in more detail later in this chapter.

- **Appliance Recycling** provides free pick-up and recycling of old appliances.
- **Online Marketplace** offers discounted efficient products through an online store.
- **Packs** provides free packs of efficient products.
- **Retail** offers discounts and rebates to customers who purchase efficient products through designated retailers or through special events coordinated by Focus on Energy.
- **Rural Farmhouse Kits** offers free packs of efficient products and insulation measures to customers in designated rural zip codes.
- **Rural Retail Events** offer discounted packs of efficient products to participating business employees or through community events in designated rural zip codes.[3]

Table 1 summarizes the impacts for CY 2020 for statewide and rural offerings as well as total impacts for the Direct to Customer Solution.

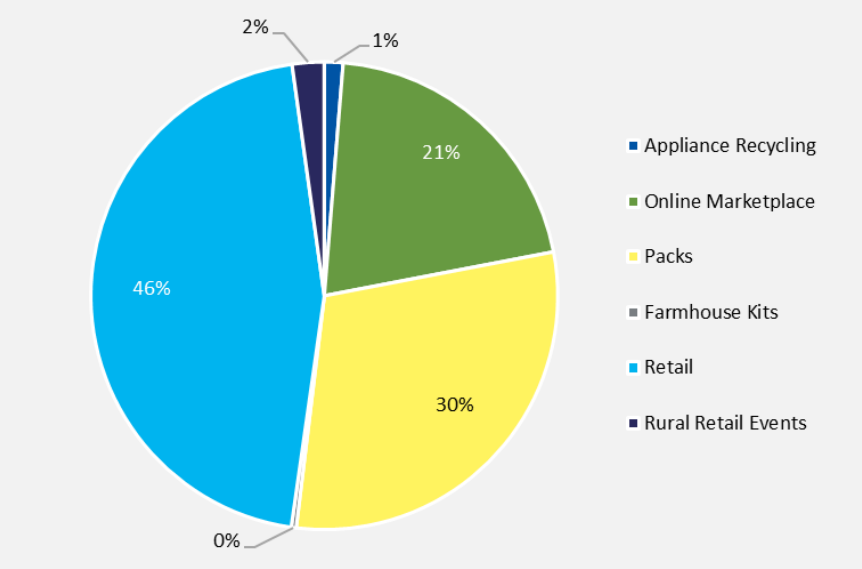
Table 1. CY 2020 Direct to Customer Solution Summary

Item	Units	Statewide Direct to Customer Offerings	Rural Direct to Customer Offerings	Total Direct to Customer Solution
Incentive Spending	$	$12,348,535	$261,610	**$12,610,146**
Participation	Number of Participants	1,111,750	3,325	**1,115,075**
Verified Gross Lifecycle Savings	kWh	3,661,514,430	39,198,473	**3,700,712,903**
	kW	26,024	225	**26,249**
	therms	14,234,118	241,254	**14,475,372**
Verified Gross Lifecycle Realization Rate	% (MMBtu)	99%	84%	**99%**
Annual NTG Ratio	% (MMBtu)	40%	86%	**40%**
Net Annual Savings	kWh/year	76,275,418	2,163,494	**78,438,912**
	kW	7,614	188	**7,803**
	therms/year	1,120,541	21,118	**1,141,659**
Net Lifecycle Savings	MMBtu	5,141,779	135,095	**5,276,873**
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio with T&D benefits	5.59	9.07	**5.64**

[3] Pop-up events were converted to online Etail events in March 2020 following onset of COVID-19 pandemic.

Figure 2 shows the proportion of savings by offering. The Retail offering contributed the largest amount of net lifecycle MMBtu savings to the Direct to Customer Solution.

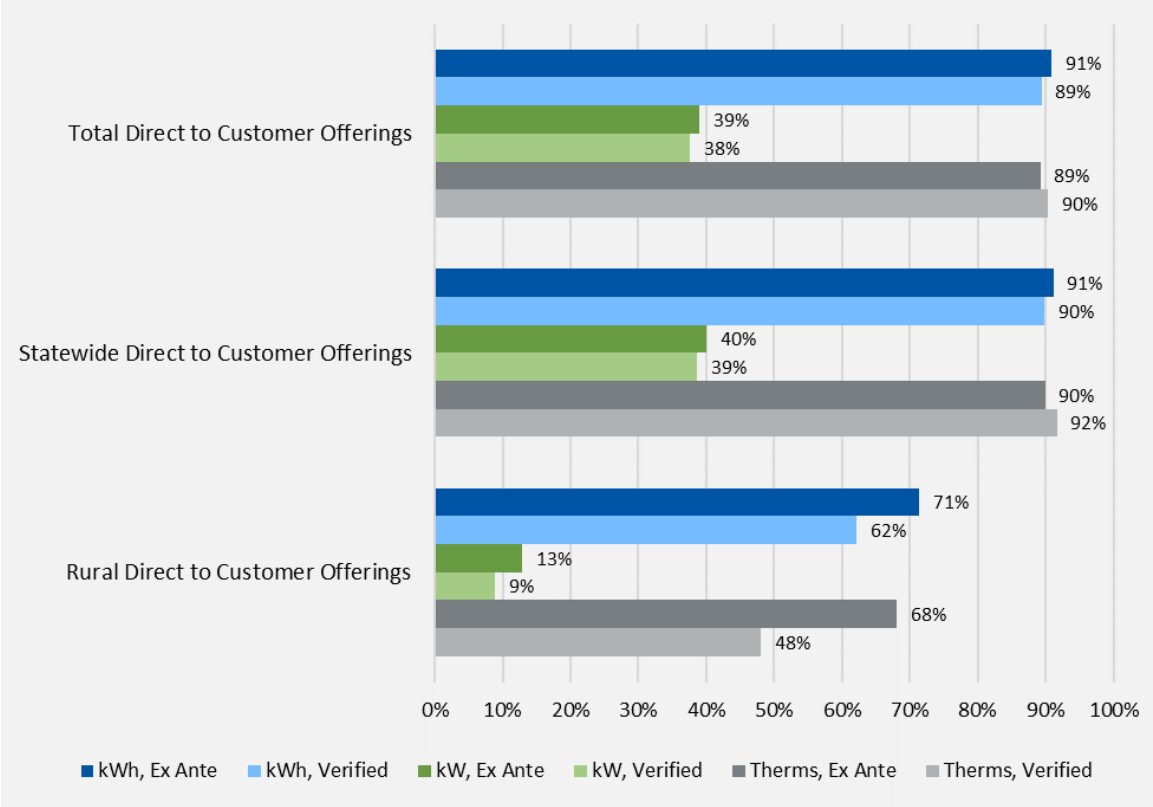
Figure 2. Net Lifecycle Savings by Offering



Achievement Against Goals

Figure 3 shows the percentage of gross lifecycle savings goals achieved by the Direct to Customer Solution in CY 2020. The solution did not achieve its electric or therms savings goals. The administrator reported that kW goals were miscalculated during planning, which resulted in the notably lower achievement.

Figure 3. Direct to Customer Solution Achievement of CY 2020 Gross Lifecycle Savings Goals



The 100% *ex ante* gross lifecycle savings reflects the program implementer's contract goals for CY 2020. Verified gross lifecycle savings contribute to the program administrator's portfolio-level goals.

Impact Evaluation

This section contains the findings for the CY 2020 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 2020 Direct to Customer Solution. The team designed its evaluation, measurement, and verification approach to integrate multiple perspectives in assessing performance of each offering and of the solution as a whole. Table 2 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 and in *Appendix K. Net Savings Analysis* in Volume III.

Table 2. CY 2020 Data Collection Activities and Sample Sizes – Impact Evaluation

Activity	Appliance Recycling	Online Marketplace	Packs	Retail	Rural Farmhouse Kits	Rural Retail Events	Total
Tracking Database Review	Census	Census	Census	Census	Census	Census	**Census**
Participant Surveys	173	576	884	777	N/A	Combined with Retail	**2,410**

To calculate gross verified savings, the evaluation team relied on three TRM sources, prioritized as follows:

- **2020 TRM.** The team followed 2020 TRM guidance for any measures in this TRM.
- **2019 TRM.** The team followed 2019 TRM guidance for legacy measures (measures that were removed from the 2020 TRM) that carried over into CY 2020 tracking data.
- **2021 TRM workpapers.** For new measures not in the 2020 or 2019 TRM, the team relied on savings approaches defined in new workpapers that will be included in the 2021 TRM.

Where possible, the evaluation team updated inputs to savings algorithms based on results from CY 2020 participant surveys. These updates included in-service rates (ISRs) for most offerings, appliance part-use factors for Appliance Recycling, LED sector distributions for Retail, and thermostat fuel adjustments for Online Marketplace and Retail. Discussions about these updates are included in the offering-specific sections below. These updated survey inputs were the largest driver of realization rates not equaling 100%.

Participant surveys also provided inputs to calculate measure-level self-report net-to-gross (NTG) ratios. The team calculated NTG ratios for all Direct to Customer offerings in CY 2020. Results of the NTG analyses are discussed in the *Verified Net Savings Results for Direct to Customer Solution* section below.

Verified Gross Savings Results for Direct to Customer Solution

Table 3 lists the first-year and lifecycle realization rates for CY 2020, and Table 4 contains a summary of verified first-year and lifecycle savings by offering. Overall, the solution achieved a first-year evaluated realization rate of 99%, 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.

Table 3. CY 2020 Direct to Customer First-Year and Lifecycle Realization Rates

Offering	First-Year Realization Rate				Lifecycle Realization Rate		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
Appliance Recycling	108%	108%	N/A	108%	108%	N/A	108%
Online Marketplace	87%	67%	111%	96%	85%	111%	93%
Packs	103%	102%	101%	102%	101%	100%	101%
Rural Farmhouse Kits	103%	101%	104%	103%	102%	102%	102%
Retail	99%	98%	90%	99%	99%	89%	99%
Rural Retail Events	85%	66%	56%	79%	86%	57%	82%
Overall Realization Rate	**99%**	**96%**	**102%**	**99%**	**98%**	**101%**	**99%**

Table 4. CY 2020 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
Appliance Recycling	4,431,570	517	0	15,121	44,315,695	0	151,205
Online Marketplace	16,795,694	1,173	456,192	102,926	238,545,690	4,561,918	1,270,110
Packs	20,112,988	1,953	650,130	133,639	279,241,762	8,113,219	1,764,095
Rural Farmhouse Kits	203,111	18	9,794	1,672	2,843,577	107,938	20,496
Retail	195,339,470	22,381	153,642	681,862	3,099,411,283	1,558,981	10,731,089
Rural Retail Events	2,380,663	207	12,117	9,335	36,354,896	133,316	137,375
Overall Energy Savings	**239,263,496**	**26,249**	**1,281,875**	**944,555**	**3,700,712,903**	**14,475,372**	**14,074,370**

Appliance Recycling: Verified Gross Savings Results

To calculate gross savings for the Appliance Recycling offering, the evaluation team reviewed SPECTRUM data and program tracking data provided by the implementer then combined these data with part-use factor information gathered from CY 2020 participant surveys. The program database review was necessary because SPECTRUM does not contain many of the appliance characteristics—most importantly, size, age, and configuration of units—that are necessary for estimating verified gross savings.

The offering had a gross lifecycle realization rate of 108% MMBtu. This is an increase from CY 2019 (97% realization rate), largely attributable to refrigerator part-use factors increasing from 77% in CY 2019 to 89% in CY 2020.

Table 5 lists the CY 2020 *ex ante* and verified gross first-year and lifecycle savings for the Appliance Recycling offering. Savings by measure can be found in *Appendix E. Detailed Findings* in Volume III.

Table 5. CY 2020 Appliance Recycling *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First-Year Gross Savings	4,112,206	480	N/A	4,431,570	517	N/A
Lifecycle Gross Savings	41,122,060	480	N/A	44,315,695	517	N/A

Verified Unit Energy Savings

In CY 2020, as in prior evaluations, the evaluation team followed these steps to calculate gross savings for the Appliance Recycling offering:

1. Model unit energy consumption (UEC) by applying CY 2020 measure characteristics to regression models that are based on metered data
2. Apply part-use factors (derived through CY 2020 participant surveys) to the UEC to calculate the average per-unit gross savings for the CY 2020 appliances
3. Apply the per-unit energy savings to all measures in the tracking data to calculate gross offering savings

A detailed explanation of the multivariate regression modeling and the part-use factor methodology and results can be found in *Appendix J. Measure Analysis* in Volume III.

Table 6 shows the modeled UEC and calculated part-use factors for refrigerators and freezers. The UEC increased from CY 2019 for both refrigerators and freezers. Refrigerator consumption increased from 1,014 kWh per unit in CY 2019 to 1,020 kWh per unit in CY 2020. Freezer consumption increased from 881 kWh per unit in CY 2019 to 949 kWh per unit in CY 2020. The part-use factor for refrigerators increased from 0.77 in CY 2019 to 0.89 in CY 2020.[4] The part-use factor for freezers decreased from 0.84 in CY 2019 to 0.74 in CY 2020. The change in part-use factors between CY 2019 and CY 2020 was statistically significant for refrigerators but was not significant for freezers.

Table 6. CY 2020 Appliance Recycling Offering Gross Per-Unit Savings by Measure

Measure	UEC (kWh/Year)	CY 2020 Part-Use Factors	Verified Gross Per-Unit Energy Savings (kWh/Year) (UEC x Part-Use Factor)
Refrigerator	1,020	0.89	905
Freezer	949	0.74	707

[4] Refrigerator part-use analysis excluded 21 respondents (11%, n=194) who responded "don't know" when asked if they had considered getting rid of their appliance without the Focus on Energy offering. The evaluation team has used this same approach in past evaluations, but few, if any, respondents have replied "don't know" in the past.

Online Marketplace: Verified Gross Savings Results

The evaluation team assessed savings from all measures sold through the Online Marketplace in CY 2020. This was the first year to assess omnidirectional LEDs, reflector LEDs, showerheads, and faucet aerators and the second year to assess smart thermostats and advanced power strips (APS).

The evaluation team was unable to use the CY 2020 TRM to calculate verified gross savings for most Online Marketplace measures because only three of 29 MMIDs were in the TRM. To calculate verified savings for the 26 unsourced MMIDs, the team relied on inputs and algorithms for similar reference measures from other Direct to Customer offerings. Where possible, the team used the equivalent Retail-based MMID as the reference measure since the design of the Online Marketplace is most similar to Retail. For some measures, the team used the Packs-based equivalents because there was no Retail option (as for the Tier 2 advanced power strips) or because the Packs-based equivalent used a deemed fuel distribution (as for the aerators and showerheads). In most cases, the team adjusted the reference measure inputs with the CY 2020 tracking data or participant survey results.

Table 7 lists the measure IDs and measures used in the CY 2020 Online Marketplace offering, the reference measure the team used as the basis for calculating savings for measures not in the 2020 TRM, and adjustments the team made to the reference measure assumptions. The adjustments are discussed further below.

Table 7. Online Marketplace Savings Algorithm Sources by Measure Type

MMID	Measure	Reference MMID	Adjustments to Reference Measure
5046, 4922	LED, Omnidirectional, 310-749 Lumens, Online Store	3553, Retail equivalent	• Used tracking data to determine single-family/multifamily weights • Used ISR from CY 2020 Online Marketplace Participant Survey
4914, 5060	LED, Omnidirectional, 310-749 Lumens, Long Lifetime, Online Store	4307, Retail equivalent	
4923, 5049	LED, Omnidirectional, 750-1,049 Lumens, Online Store	4308, Retail equivalent	
4915, 5059, 5096	LED, Omnidirectional, 750-1,049 Lumens, Long Lifetime, Online Store	4309, Retail equivalent	
4912, 5097	LED, Omnidirectional, 1,050-1,489 Lumens, Long Lifetime, Online Store	4311, Retail equivalent	
4921	LED, Omnidirectional, 1,490-2,600 Lumens, Online Store	4312, Retail equivalent	
4913, 5098	LED, Omnidirectional, 1,490-2,600 Lumens, Long Lifetime, Online Store	4313, Retail equivalent	
5041	LED, Reflector, 12 Watt, Long Lifetime, Online Store	4306, Retail equivalent	
5099	LED, Omnidirectional, 750-1,049 Lumens, Long Lifetime, 3-Way	4309, Retail equivalent for standard bulb in 750-1,049 lumen bin	• Used tracking data to determine single-family/multifamily weights • Used ISR from CY 2020 Online Marketplace Participant Survey • Updated to non-EISA baseline watts
4917	Advanced Power Strip, APS Tier 1, Online Store	4275, Retail advanced power strip Tier 1	Used ISR from CY 2020 Online Marketplace Participant Survey

MMID	Measure	Reference MMID	Adjustments to Reference Measure
4918	Advanced Power Strip, APS Tier 2, Online Store	4120, Pack-based advanced power strip Tier 2	Used ISR of 70% from a 2018 study on connected devices.[5] See 2021 Workpaper W0246 for source details.
4909, 5047	Faucet Aerator, Bathroom, 1.0 GPM, Online Store	3863, Pack-based equivalent	Used ISR from CY 2020 Online Marketplace Participant Survey
4910	Faucet Aerator, Kitchen, 1.5 GPM, Online Store	3862, Pack-based equivalent	
5043	Showerhead, Handheld, 1.5 GPM, Online Store	4274, Pack-based equivalent	Used ISR from CY 2020 Online Marketplace Participant Survey
4911, 5048	Showerhead, Upgraded, 1.5 GPM, Online Store	4273, Pack-based equivalent	
5044	Showerhead, ShowerStart TSV, 1.5 GPM, Online Store	No equivalent. Based savings on 2021 Workpaper W0268	Used ISR of 85% (ISR for Online Marketplace showerheads)
4301	Smart Thermostat, Existing Natural Gas Boiler	No reference needed, MMID present in 2020 TRM	Applied eligibility adjustments of 0.96 to kWh and 0.91 to therms, which are the ratios of the average electricity and therms savings for CY 2020 Online Marketplace participant survey respondents compared to savings calculations based solely on TRM inputs. The adjustment represents percentage of homes with ineligible heating systems and/or no cooling.
4302	Smart Thermostat, Existing Natural Gas Furnace	No reference needed, MMID present in 2020 TRM	
4303	Smart Thermostat, Existing Air Source Heat Pump	No reference needed, MMID present in 2020 TRM	
4919	Smart Thermostat, Online Store	4304, Pack-based equivalent	

Table 8 shows the *ex ante* and *ex post* verified savings for the offering.

Table 8. CY 2020 Online Marketplace *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First-Year Gross Savings	19,243,652	1,762	412,349	16,795,694	1,173	456,192
Lifecycle Gross Savings	281,537,862	1,762	4,123,495	238,545,690	1,173	4,561,918

In-Service Rates

The evaluation team used the CY 2020 participant survey to update ISRs where possible. For most measures, the team based the ISR on survey questions asking respondents to verify or correct the number of units they purchased and to report how many of those units were currently installed.

For LEDs, the team used a different approach to calculate the ISR. Similar to other Direct to Customer offerings, the team calculated lifetime ISRs for LEDs following the recommended approach in the

[5] Cadmus and Focus on Energy. 2018. *Only as Smart as Its Owner: A Connected Device Study.* Presented at the 2018 ACEEE Summer Study. https://cadmusgroup.com/papers-reports/only-as-smart-as-its-owner-a-connected-device-study/

Uniform Methods Protocol (UMP).[6] This approach accounts for the fact that many people purchase lightbulbs and install them over time. The UMP imputes the trajectory of lighting installations annually for the effective useful life (EUL) of the bulb or until a program stops claiming lighting savings, whichever comes first. The evaluation team adopted the latter approach, using a six-year trajectory. To account for the present value of future installations, the team discounted future savings annually at 2%. The team calculated separate single-family and multifamily ISRs for omnidirectional LEDs, which had the largest sample. The team did not disaggregate the reflector ISR by sector due to insufficient sample.

For Tier 2 advanced power strips, the team only received a single survey response and did not calculate an ISR. Instead, the team used an ISR of 70% from a 2018 study on connected devices.

Table 9 shows the evaluated ISRs for the Online Marketplace offering.

Table 9. ISRs for Online Marketplace Measures

Measure Name	*Ex Ante* Lifetime ISR	Verified First-Year ISR	Verified Lifetime ISR	Evaluated ISR Source
Smart Thermostat	N/A	100%[a]	100%[a]	2020 Participant Survey
Advanced Power Strip, Tier 1	68%	93%	93%	2020 Participant Survey
Advanced Power Strip, Tier 2	55%	70%	70%	2018 Connected Devices Study
Showerhead	65%	85%	85%	2020 Participant Survey
ShowerStart	65%	85%	85%	2020 Participant Survey
Faucet Aerator	54%	82%	82%	2020 Participant Survey
LED, Omnidirectional, Single-Family	87%	50%	84%	2020 Participant Survey
LED, Omnidirectional, Multifamily	87%	66%	88%	2020 Participant Survey
LED, Reflector	87%	68%	89%	2020 Participant Survey

[a] The CY 2020 participant survey found that 5% of Online Marketplace thermostats were not installed at the time of the survey; however, the team did not apply an ISR because the TRM algorithm is based on a previous billing analysis for downstream smart thermostats, which already accounts for the ISR.

Smart Thermostat Eligibility Adjustment

The TRM requires that eligible thermostats must control a natural gas boiler, natural gas furnace, or air source heat pump. Through the CY 2020 Online Marketplace participant survey, the team found that:

- 20% of participants had a different heating and/or cooling system. Some of these systems produce some savings for Focus on Energy even though they are not included in the TRM, such as electric resistance furnaces or propane furnaces with central air conditioning.
- The distribution of heating and cooling systems differed from the assumed distribution underlying the TRM savings estimates.

[6] National Renewable Energy Laboratory. October 2017. *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures.* "Chapter 6: Residential Lighting Evaluation Protocol." Prepared by Apex Analytics, LLC. https://www.nrel.gov/docs/fy17osti/68562.pdf

The team adjusted electricity and natural gas savings by determining the average electricity and gas savings per participant for the survey sample. The team then compared these values to the average per-unit savings for Online Marketplace smart thermostats based on TRM assumptions.[7] The ratio of survey respondent electric savings to TRM savings was 96% and for survey respondent therms to TRM therms was 91%.

To provide context, the team compared the Online Marketplace adjustments with the same adjustments calculated for Retail thermostats, based on the Retail participant survey results. The Retail adjustments were higher, 107% for electric savings and 98% for gas savings.

Though Retail and Online Marketplace incentives have similar delivery mechanisms, the Retail application process presents several small obstacles to participation that the Online Marketplace is designed to avoid:

- Retail requires after-purchase follow-up by customer. The Online Marketplace applies the discount at the point of purchase.
- Retail requires customer to provide a utility billing account number. The Online Marketplace requests the account number but does not require it.
- Retail requires customers to identify their heating equipment and fuel as well as a number of other details about the location where the smart thermostat will be installed. The Online Marketplace requests the purchaser's home heating system and fuel, but does not require it, and requests no other information about the home.

These design differences may be contributors to the different prevalence of ineligible systems across the two offerings.

LED Cross-Sector Sales

The primary factor driving the low LED realization rate was the sector-specific calculation of the hours of use (HOU). Participant survey responses did not indicate that Online Marketplace LEDs were installed in commercial settings. *Ex ante* savings assumed that 7% of total LEDs would be installed in commercial settings, which boosted *ex ante* savings because commercial bulbs have higher HOU than residential bulbs.

Table 10 shows the TRM assumptions for HOU and sector weights and the overall sector distribution from the tracking data. Based on the tracking data, 94% of bulbs were purchased by single-family households compared to 6% by multifamily households.

[7] The average TRM savings were calculated as the average per-unit savings across the four MMIDs used for the Online Marketplace smart thermostats, and then weighted by CY 2020 participation.

Table 10. Online Marketplace LED Sector Weights and Hours of Use

Sector	TRM		Program Data
	HOU	Weight	Weight
Multifamily	2.01	24%	6%
Single-Family	2.27	70%	94%
Commercial	10.20	7%	0%

Packs: Verified Gross Savings Results

The evaluation team reviewed CY 2020 Packs offering and Farmhouse Kits tracking data for soundness and accuracy and applied and ISRs from CY 2020 participant surveys to gross savings. As Table 11 shows, the Packs realization rate remained the same from CY 2019 to CY 2020 while the Farmhouse Kits realization rate increased in CY 2020. Realization rate changes are almost entirely attributable to ISR updates from CY 2020 participant surveys.

Table 11. First-Year Realization Rates by Offering (MMBtu)

Offering	CY 2020	CY 2019
Packs	102%	102%
Farmhouse Kits	103%	97%

Table 12 lists the CY 2020 *ex ante* and verified gross first-year and lifecycle savings for the Packs offering. Savings by measure can be found in *Appendix E*.

Table 12. CY 2020 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	19,603,098	1,906	643,172	20,112,988	1,953	650,130
Lifecycle Gross Savings	275,628,747	1,906	8,097,278	279,241,762	1,953	8,113,219
Rural Farmhouse Kits						
First-Year Gross Savings	197,855	18	9,457	203,111	18	9,794
Lifecycle Gross Savings	2,781,142	18	106,023	2,843,577	18	107,938
Total Packs and Farmhouse Kits						
First-Year Gross Savings	19,800,953	1,924	652,629	20,316,099	1,971	659,924
Lifecycle Gross Savings	278,409,888	1,924	8,203,301	282,085,339	1,971	8,221,156

In-Service Rates

In CY 2020, the evaluation team surveyed Packs participants to verify measure installation and estimate measure-level ISRs for each pack type. The team weighted first-year ISRs based on the quantity of measures distributed through various packs and applied the weighted ISRs to all similar measures in the offering.

The team also calculated lifetime ISRs for lighting measures because first-year ISRs do not account for the future installation of bulbs stored for later use.[8] To calculate lifetime ISRs for LEDs, the team followed the approach documented in the UMP.[9] Similar to LED ISRs in the Online Marketplace, the team applied a six-year trajectory for installations and accounted for the present value of future installations by discounting future savings annually at 2%.

Table 13 shows final first-year and lifetime ISRs used in verified savings as well as TRM ISRs used in *ex ante* savings.

Table 13. Measure-Level ISRs – Packs Offering

Measure Name	TRM Lifetime ISR		Verified First-Year ISR		Verified Lifetime ISR	
	Single-Family	Multi-family	Single-Family	Multi-family	Single-Family	Multi-family
Advanced Power Strip, Pack-Based, APS Tier 1	68%	68%	90%	88%	90%	88%
DHW Temperature Turn Down, Pack-Based	16%	16%	16%	14%	16%	14%
Faucet Aerator, Bathroom, 1.0 GPM, Pack-Based	54%	54%	55%	55%	55%	55%
Insulation, DHW Pipe, Pack-Based	40%	6%	35%	27%	35%	27%
Led, Pack-Based, 11 Watt	92%	92%	81%	91%	94%	97%
Led, Pack-Based, 5 Watt, B11	92%	92%	69%	74%	91%	93%
LED, Pack-Based, 5 Watt, G25	92%	92%	81%	75%	94%	93%
LED, Pack-Based, 8 Watt BR30	92%	92%	72%	73%	92%	92%
Led, Pack-Based, 9 Watt	92%	92%	85%	83%	96%	95%
Showerhead, Handheld, 1.5 GPM, Pack-Based	65%	65%	73%	58%	73%	58%
Showerhead, Upgraded, 1.5 GPM, Pack-Based	65%	65%	72%	66%	72%	66%

Table 14 shows verified ISRs for measures in the Farmhouse Kits offering and TRM ISRs used in *ex ante* savings. Verified ISRs reflect weighted averages of packs delivered to single-family participants in the CY 2020 Packs offering. Because the Packs offering delivers packs to single-family and multifamily customers, some ISRs in Table 14 differ from those in Table 13.

[8] The team did not apply this approach to non-lighting measures because there is no similar evaluation protocol for these products.

[9] National Renewable Energy Laboratory. October 2017. *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures.* "Chapter 6: Residential Lighting Evaluation Protocol." Prepared by Apex Analytics, LLC. https://www.nrel.gov/docs/fy17osti/68562.pdf

Table 14. Measure-Level ISRs – Farmhouse Kits Offering

Measure Name	TRM ISR	Verified ISR[a]
Faucet Aerator, Bathroom, 1.0 GPM, Pack-Based	54%	55%
Insulation, DHW Pipe, Pack-Based	40%	35%
Showerhead, Upgraded, 1.5 GPM, Pack-Based	65%	72%
Led, Pack-Based, 9 Watt	92%	85%
Led, Pack-Based, 11 Watt	92%	81%
High Performance EDPM Weatherstripping - Farmhouse Kit	N/A	N/A[b]
Outlet Gaskets (8) & Switch Gaskets (4) - Farmhouse Kit	N/A	N/A[b]
Led Nightlight - Farmhouse Kit	N/A	N/A[b]

[a] First-year ISRs for non-LED measures; lifetime ISRs for LEDs, per the UMP.

[b] There were no savings for these offering measures in CY 2020.

Domestic Hot Water Temperature Turndown

The tracking database review found that *ex ante* savings did not include savings for domestic hot water temperature turndown measures for multifamily customers. The evaluation team applied TRM savings to these measures and adjusted them for 14% of survey participants who adjusted their water heater temperature after using the hot water temperature card in their pack (see Table 13).

Retail: Verified Gross Savings Results

The evaluation team assessed savings from all measures sold through the Retail offering and Rural Retail Events offering in CY 2020. This was the first year the offerings included showerheads, faucet aerators, domestic hot water pipe insulation, and domestic hot water temperature turndown. Where possible, the team calculated verified savings following algorithms and inputs in the TRM. However, many of the new measures were not in the TRM so the team relied on inputs and algorithms used for the same measures in similar programs and CY 2020 participant survey results.

Table 15 lists new measure IDs and measures in the CY 2020 Retail tracking data, the reference measure the team used as the basis for calculating savings for measures not in the 2020 TRM, and adjustments the team made to the reference measure assumptions. More detailed descriptions of key adjustments and survey results are provided below. These updates are the primary drivers for the Retail and Rural Retail Events realization rates.

Table 15. New Retail Measure Savings Algorithm Sources

MMID	Measure	Reference MMID	Adjustments to Reference Measure
3017	Showerheads, Retail Store Markdown	4273, Pack-based equivalent	Assumed a 50/50 mix of single-family and multifamily measures. Used ISRs from 2020 Retail surveys.
5038	Faucet Aerator, Bathroom, 1.0 GPM, Retail Store Markdown	3863, Pack-based equivalent	
5042	Faucet Aerator, Kitchen, 1.5 GPM, Retail Store Markdown	3862, Pack-based equivalent	
5040	Insulation, DHW Pipe, Retail Store Markdown	4272, Pack-based equivalent	
5039	DHW Temperature Turn Down, Retail Store Markdown	4271, Pack-based equivalent	Applied ISR from 2020 Packs survey
5050	Smart Thermostat, Line Voltage, Electric Baseboard (WPPI pilot)	No equivalent	2021 Workpaper W0258

Table 16 lists the CY 2020 *ex ante* and verified gross first-year and lifecycle savings for the Retail offering and Rural Retail Events. Savings by measure can be found in *Appendix E*.

Table 16. CY 2020 Retail *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
Statewide Retail Offering						
First-Year Gross Savings	196,540,555	22,766	171,251	195,339,470	22,381	153,642
Lifecycle Gross Savings	3,118,601,145	22,766	1,745,385	3,099,411,283	22,381	1,558,981
Rural Retail Events						
First-Year Gross Savings	2,809,232	314	21,647	2,380,663	207	12,117
Lifecycle Gross Savings	42,275,916	314	235,362	36,354,896	207	133,316
Total Retail and Rural Retail Events						
First-Year Gross Savings	199,349,787	23,080	192,899	197,720,133	22,588	165,759
Lifecycle Gross Savings	3,160,877,062	23,080	1,980,747	3,135,766,179	22,588	1,692,298

Delta Watts Analysis

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

Using modeling 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 database values for lumens, efficient wattage, or both from the implementer's database or conducted internet searches based on product make and model numbers.

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 UMP provides lumen bins for standard, decorative, globe, and Energy Independence and Security Act (EISA)-exempt lamps.[10] For example, the bins and associated baseline halogen watts for standard bulbs are shown in Table 17.

Table 17. 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 in December 2016, the U.S. Department of Energy (DOE) issued two final rules: one proposing to keep the existing EISA Phase 2 backstop provision set to take effect on January 1, 2020, and one expanding the definition of EISA general service lamps (and thus the types of lamps impacted by the backstop provision) to include several previously exempted lamps, including globes, candelabras, reflectors, and lamps up to 3,300 lumens. In September 2019, the DOE issued a final rule that states the EISA 2020 backstop has not been triggered, allowing manufacturers and retailers to continue to produce and sell inefficient lighting products beyond January 1, 2020. Due to the legal challenges to DOE's rule, the litigation could be prolonged, allowing halogens and incandescent lamps to be available for the foreseeable future.

U.S. Department of Energy. September 2019. "Energy Conservation Program: Definition for General Service Lamps." 10 CFR Part 430, RIN 1904-AE26. https://s3.amazonaws.com/public-inspection.federalregister.gov/2019-18940.pdf

EISA only affects bulbs in the 310 lumen 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.

To determine the lumen bins for reflectors, the UMP defers to federal requirements and does not list lumen bins explicitly. Based on federal requirements, the Mid-Atlantic TRM defines lumen bins for six categories of reflector types and diameters.[11]

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[10] 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

[11] 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)

The average delta watts for each category compared to the *ex ante* delta watts are shown in Table 18 (Retail) and Table 19 (Rural Retail Events). The *ex ante* delta watts are based on values deemed in the 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 2019, the comparison shows strong agreement between the verified and *ex ante* delta watts values.

Table 18. CY 2020 Retail Offering *Ex Ante* and Verified Gross Delta Watts

Measure	*Ex Ante* Delta Watts	Average Verified Gross Delta Watts
LED, Reflector	53	52
LED, Omnidirectional, 310–749 Lumens	22	27
LED, Omnidirectional, 750–1,049 Lumens	32	34
LED, Omnidirectional, 1,050–1,489 Lumens	40	43
LED, Omnidirectional, 1,490–2,600 Lumens	55	58

Table 19. CY 2020 Rural Retail Events *Ex Ante* and Verified Gross Delta Watts

Measure	*Ex Ante* Delta Watts	Average Verified Gross Delta Watts
LED, Reflector	53	56
LED, Omnidirectional, 310–749 Lumens	22	34
LED, Omnidirectional, 750–1,049 Lumens	32	34
LED, Omnidirectional, 1,050–1,489 Lumens	40	42
LED, Omnidirectional, 1,490–2,600 Lumens	55	57

Cross-Sector Sales

Deemed savings in the TRM for Retail Store Markdown bulbs assume that assume 6.6% of bulbs are installed in commercial applications. The CY 2020 Retail Events survey found that participants installed bulbs only in residential applications. Therefore, the evaluation team applied only residential savings to bulbs distributed through statewide Retail Events or Rural Retail Events.

In-Service Rates

The team used the CY 2020 participant survey to update ISRs where possible. For most measures, the team based the ISR on survey questions asking respondents to verify or correct the number of units they purchased and to report how many of those units were currently installed. Table 20 lists the measure-specific ISRs that the team applied to all measures within the measure category.

Table 20. Measure-Specific In-Service Rates

Measure Name	*Ex Ante* Lifetime ISR	Verified First-Year ISR	Verified Lifetime ISR	Verified ISR Source
LED (Upstream)	87%	56%	87%	TRM
LED Pack A-Line 60W Equivalent	87%	72%	92%	CY 2020 Participant survey
LED Pack A-Line 75W Equivalent	87%	67%	90%	CY 2020 Participant survey
LED Pack A-Line 100W Equivalent	87%	58%	88%	CY 2020 Participant survey
LED Pack 3-Way	87%	57%	88%	CY 2020 Participant survey
LED Pack Candelabra	87%	59%	88%	CY 2020 Participant survey
LED Pack Globe	87%	61%	89%	CY 2020 Participant survey
LED Pack Reflector	87%	64%	90%	CY 2020 Participant survey
LED Pack Desk Lamp	87%	80%	94%	CY 2020 Participant survey
Low-E Storm Windows	100%	100%	100%	TRM
Advanced Power Strips	81%	81%	81%	TRM
Smart Thermostats	100%	100%[a]	100%[a]	CY 2020 Participant survey
Smart Thermostats (Line Voltage)	100%	100%	100%	Assumed
Showerheads	65%	55%	55%	CY 2020 Participant survey
Faucet Aerator: Bathroom	54%	40%	40%	CY 2020 Participant survey
Faucet Aerator: Kitchen	54%	42%	42%	CY 2020 Participant survey
DHW Temperature Turndown	16%	16%	16%	CY 2020 Packs Participant survey
DHW Pipe Insulation	40% single-family 6% multifamily	25%	25%	CY 2020 Participant survey

[a] The CY 2020 participant survey found that 95% of Retail thermostats were installed at the time of the survey; however, the team did not apply an ISR because the TRM algorithm is based on a previous billing analysis for downstream smart thermostats, which already accounts for the ISR.

Smart Thermostat Eligibility Adjustment

The TRM requires that eligible thermostats must control a natural gas boiler, natural gas furnace, or air source heat pump. Similar to findings in the Online Marketplace offering, the CY 2020 Retail participant survey found that 8% (n=110) of Retail smart thermostat participants did not have one of these eligible heating systems; however, some of these systems produce savings that are not accounted for in the TRM (such as a propane furnace with central air conditioning). The team also found that survey participants' distribution of heating and cooling systems did not align with the TRM assumptions.

Therefore, the team calculated adjustments to electricity and natural gas savings by determining the average electricity and gas savings per participant for the survey sample. The team then compared these values to the average per-unit savings for Retail smart thermostats based on TRM assumptions.[12] The presence of a small number of electric furnaces led to a small increase in electric savings and a small decrease in natural gas savings, producing adjustments of 107% and 98% respectively.

[12] The average TRM savings were calculated as the average per-unit savings across the three smart thermostat MMIDs used in the Retail Offering, and then weighted by CY 2020 participation.

Verified Net Savings Results for Direct to Customer Solution

The evaluation team used a variety of NTG analyses to calculate measure-level NTG ratios for Direct to Customer offerings. The team selected an approach based on the measure type and the level of project and market data available for those measures. Table 21 summarizes the NTG approaches used by each offering. These approaches are further detailed in the following sections.

Table 21. Direct to Customer Solution NTG Approaches

Offering	Measure/Delivery	NTG Approach
Appliance Recycling	All	Self-report from CY 2020 participant surveys
Online Marketplace	All	Self-report from CY 2020 participant surveys
Packs	All	Self-report from CY 2020 participant surveys
Retail	LEDs/Upstream	National lighting sales model
Retail	LEDs/Giveaways (e.g., food banks)	Assumed 100% NTG
Retail	LEDs/Retail Events	Self-report from CY 2020 participant surveys
Retail	Thermostats	Self-report from CY 2020 participant surveys

The evaluation team calculated an overall NTG estimate of 36% for the solutions in CY 2020. Table 22 shows the weighted average NTG ratio by offering, as well as the total lifecycle gross and net savings.

Table 22. Direct to Customer Lifecycle Net Savings and NTG

Offering	Total Lifecycle Gross Verified Savings (MMBtu)	Total Lifecycle Net Savings (MMBtu)	NTG Ratio
Appliance Recycling	151,205	68,142	45%
Online Marketplace	1,270,110	1,092,272	86%
Packs	1,764,095	1,579,467	90%
Rural Farmhouse Kits	20,496	18,237	89%
Retail	10,731,089	2,401,898	22%
Rural Retail Events	137,375	116,858	85%
Total	**14,074,370**	**5,276,873**	**37%**

Self-Report Surveys: Appliance Recycling

The evaluation team employed a decision-tree approach, described in the UMP,[13] to calculate net offering savings. The decision tree—populated by the CY 2020 survey findings and information gathered from interviewed market actors from other appliance recycling program evaluations—presents all of the offering's possible savings scenarios.

[13] U.S. Department of Energy. September 2017. *Uniform Methods Project for Determining Energy Efficiency Program Savings for Specific Measures.* "Chapter 7: Refrigerator Recycling Evaluation Protocol." https://www.nrel.gov/docs/fy17osti/68563.pdf

The decision tree accounts for what the participating household would have done independent of the offering *and* the possibility that the unit could have been transferred to another household, regardless of whether the would-be acquirer of that refrigerator or freezer found an alternate unit instead.

To calculate the NTG ratio, the team used the following equation to combine all of the net impacts:

$$Net\ Savings\ (MWh\ per\ year) = Gross\ Savings - Freeridership\ \&\ Secondary\ Market\ Impacts$$

The evaluation team applied the measure-level NTG ratios to the Appliance Recycling measures, resulting in an NTG of 45% at the offering level. Table 23 lists these results. A detailed description of the net savings analysis and the decision tree scenarios is presented in *Appendix K*.

Table 23. Appliance Recycling Offering Final NTG Ratio by Appliance

Measure	Freeridership and Secondary Market Impacts	NTG Ratio	Sample Size
Refrigerator	55%	45%	101
Freezer	56%	44%	69
Program Total	**55%**	**45%**	**171**

Self-Report Surveys: Online Marketplace, Packs, Retail Events

The evaluation team used participant surveys to assess net savings for measures distributed through Online Marketplace, Packs, and Retail Events. The surveys' self-report NTG batteries included questions that allowed the evaluation team to calculate measure-level freeridership (measures that would have been purchased without the offering's influence) and offering-level spillover (offering-induced energy-saving actions).

To calculate the measures' final NTG ratios, the evaluation team then combined self-reported freeridership and spillover results using the following equation. (*Appendix K* provides a complete review of the team's self-report NTG analysis and findings.)

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

Table 24 shows freeridership and spillover results for Online Marketplace, Packs, and Retail Events measures as well as their final NTGs. All NTGs are from CY 2020 self-report surveys unless indicated.

Table 24. Freeridership and Spillover Results by Offering and Measure

Offering	Measure	Freeridership	Spillover	NTG (1 – Freeridership + Spillover)
Online Marketplace	Advanced Power Strips	17%	5%	88%
	Faucet Aerators	20%	5%	85%
	LEDs, Omnidirectional	20%	5%	85%
	LEDs, Reflectors	24%	5%	81%
	Showerheads	19%	5%	86%
	Smart Thermostats	17%	5%	88%
Packs/ Farmhouse Kits [a]	Advanced Power Strips	21%	11%	90%
	Faucet Aerators	13%	11%	98%
	LED, 5W, G25	17%	11%	94%
	LED, 5W, B11	16%	11%	95%
	Water Heater Temperature Turndown [b]	0%	0%	100%
	Pipe Insulation	17%	11%	94%
	Showerhead, Upgraded	14%	11%	97%
	Showerhead, Handheld	16%	11%	95%
	LED, 8W, BR30	18%	11%	93%
	LED, 9W	37%	11%	74%
	LED, 11W	37%	11%	74%
Retail Events	Advanced Power Strips [c]	30%	2%	72%
	Faucet Aerators	6%	9%	103%
	LEDs, Omnidirectional	33%	9%	76%
	LEDs, Reflector	18%	9%	91%
	LEDs, 3-way	18%	9%	91%
	LEDs, Candelabras	15%	9%	94%
	LEDs, Globes	15%	9%	94%
	LEDs, Desk Lamps	6%	9%	103%
	Water Heater Temperature Turndown [b]	0%	0%	100%
	Pipe Insulation	25%	9%	84%
	Showerheads	15%	9%	94%
Retail	Smart Thermostats, Existing Gas Boiler, Furnace or Air Source Heat Pump	38%	0%	62%
	Smart Thermostats, Electric Baseboard	0%	0%	100%
	Low-E Storm Windows [s]	73%	0%	27%

[a] The evaluation team applied self-report NTGs to Farmhouse Kits that were ordered online and applied 100% NTG to Farmhouse Kits that were delivered by utility representatives.
[b] The team assumed 100% NTG for water heater temperature turndown measures.
[c] Focus on Energy stopped offering advanced power strips through Retail Events in March 2020. NTG is from the 2018 NTG self-report survey analysis.
[d] Low-E storm windows were discontinued at the end of 2019; measures in the CY 2020 tracking data are carried over from the CY 2019 program. NTG is from 2019 sales data analysis.

National Sales Data Model: Upstream Lighting

Following the upstream lighting NTG approach from previous years, the evaluation team used a national lighting sales model to determine upstream lighting attribution for the Wisconsin efficient lighting market. The model quantified the relationship between offering intensity (offering spending per household) and efficient lighting sales (the percentage of light bulb purchases that are efficient). This section provides a high-level overview of the team's analysis and findings. National sales data modeling findings are provided in more detail in *Appendix K. Net Savings Analysis*.

Data Sources

The evaluation team relied on a variety of data sources for the analysis, primarily sales data prepared by the Consortium for Retail Energy Efficiency Data (CREED).[14] This consortium of program administrators, retailers, and manufacturers work together to collect the data necessary for better planning and evaluation of energy efficiency programs. LightTracker is CREED's first initiative, focused on acquiring full-category lighting data including incandescent, halogen, CFL, and LED bulb types for all distribution channels in the entire United States. As a consortium, CREED speaks as one voice for program administrators nationwide as they request, collect, and report on the sales data needed by the energy efficiency community.

The sales data were primarily generated from two sources: point-of-sale (POS) state sales data (representing grocery, drug, dollar, discount, mass merchandiser, and selected club stores) and National Consumer Panel (NCP) state sales data (representing home improvement, hardware, online, and selected club stores). The evaluation team also purchased raw datasets from third-party vendors and through a CREED initiative. The evaluation team then cleaned and processed all data for analysis.[15, 16] Besides the sales data made available through LightTracker, the model inputs are a combination of program data collected by the evaluation team and household and demographic data collected through various publicly available websites. These are the sources for the primary model input data:

- National bulb sales
  - POS data (grocery, drug, dollar, discount, mass merchandiser, and selected club stores)
  - NCP data (home improvement, hardware, online, and selected club stores)
- U.S. Census Bureau import data (CFL and LED imports)
- DSM Insights, an E Source database of utility program data
- ENERGY STAR Lighting Program data (utility lighting program budgets)
- ENERGY STAR shipment data (released by the U.S. Environmental Protection Agency)
- North American Electrical Manufacturers Association shipment data
- American Community Survey (ACS) data (household characteristics and demographic data)

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[14] LightTracker. "Consortium for Retail Energy Efficiency Data." creedlighttracker.com

[15] The information contained herein is based in part on data reported by IRI, Inc., through its Advantage service for, and as interpreted solely by, LightTracker, Inc. Any opinions expressed herein reflect the judgment of LightTracker Inc. and are subject to change. IRI disclaims liability of any kind arising from the use of this information.

[16] Data presented include LightTracker calculations based in part on data reported by Nielsen through its Strategic Planner and Homescan Services for the lighting category for the 52-week period ending approximately December 31, 2020, for the available state-level markets and Expanded All Outlets Combined (xAOC) and Total Market Channels. Copyright © 2020, Nielsen.

- Retailer square footage per state (based on Internet searches)
- General population surveys, lighting saturation studies, and other secondary data collection made publicly available through evaluation reports

Modeling Methods

The primary objective of the model was to quantify the impact of state-level upstream lighting offering activity on the sales of LEDs, while controlling for demographic, household characteristics, and retail channel variables that could affect consumers' uptake of efficient lighting products.

Using the results of the regression models, efficient bulb sales data, and the program tracking databases, the evaluation team estimated NTG ratios for LEDs in 2020. The team derived NTG ratios by first using the model to predict the share of efficient bulbs with and without a program (determining the counterfactual of no program activity by setting the program spending variable to zero). This change in share represents the program lift, or net increase in the share of efficient bulbs resulting from program activity.

To then calculate NTG, the evaluation team multiplied the change in share by the total number of bulbs—for all bulb types—sold in 2020, as determined by the sales data analysis described above. This value represents the net impact of the program (i.e., the total lift in the number of LEDs sold), which the evaluation team then divided by the total number of program bulbs sold (the gross number of bulbs) to determine NTG:

$$NTGR = \frac{(\#\ LED\ bulbs\ sold\ with\ program - \#\ LED\ bulbs\ sold\ with\ no\ program)}{\#\ of\ program\ incented\ LED\ bulbs\ sold}$$

Results

As shown in Table 25, the estimated CY 2020 NTG modeled ratio for LEDs is 19.9%. This estimate considers current offering spending and current offering age; it does not include market effects (see *Upstream Lighting Market Effects* section below).

The evaluation team applied the NTG ratio that does not account for market effects (19.9%) to CY 2020 upstream lighting results. Adding market effects at the end of the quadrennium will result in a final quadrennium NTG ratio that is higher than the CY 2020 ratio.

Table 25. LED Net-to-Gross Calculations

Calculation Term	Current Offering Spending and Age Influence
Total (All technologies) Wisconsin Bulbs 2020 (A)	24,957,782
Offering $ per HH Actual (B)	$3.98
Offering $ per HH Counterfactual (C)	$0.00
Offering Age Actual (D)	18
Offering Age Counterfactual (E)	17

Calculation Term	Current Offering Spending and Age Influence
LED Market Share Counterfactual (F)	68.0%
LED Market Share Modeled (G)	71.9%
LED Market Share Actual (H)	80.1%
Ratio Actual: Modeled (I = H/G)	1.114
Adjusted LED Market Share Counterfactual (J)	75.8%
LED Qty Counterfactual (K = A*J)	18,914,626
LED Qty Actual (L)	19,985,580
Net LEDs Modeled (M = L-K)	1,070,954
Claimed Bulbs 2020 (N)	5,387,507
NTG Modeled (O = M/N)	**19.9%**

Upstream Lighting Market Effects

As in past evaluations, the evaluation team continued calculating longer-term market effects for the upstream lighting offering using the same national sales data model it uses to calculate annual NTG. By adjusting offering age in the NTG model, the team is able to calculate the offering's impact on the market considering current and past offering influence. Following guidance from the Evaluation Working Group, the evaluation team will calculate market effects annually throughout the quadrennium but will apply results cumulatively at the end of the quadrennium.

Focus on Energy uses offering incentives and marketing to impact customer awareness and demand for energy-efficient lighting as well as retailer stocking and promotion of efficient lighting. Therefore, program age can be thought of as a proxy for these effects, measuring long-term trends due to multiple years of running programs. These effects should reflect positively, rather than negatively, in the NTG estimate. Table 26 shows the CY 2020 NTG using current program spending and setting the program age counterfactual to zero.

CY 2020 market effects is the difference between NTG with past Program influence (39.2%) and NTG with current Program influence (19.9%), or 19.4%.

Table 26. CY 2019 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 2020 (A)	24,957,782	24,957,782
Offering $ per HH Actual (B)	$3.98	$3.98
Offering $ per HH Counterfactual (C)	$0.00	$0.00
Offering Age Actual (D)	18	18
Offering Age Counterfactual (E)	0	17
LED Market Share Counterfactual (F)	64.3%	68.0%
LED Market Share Modeled (G)	71.9%	71.9%

Calculation Term	Current and Past Influence	Current Offering Spending and Age Influence
LED Market Share Actual (H)	80.1%	80.1%
Ratio Actual: Modeled (I = H/G)	1.114	1.114
Adjusted LED Market Share Counterfactual (J)	71.6%	75.8%
LED Qty Counterfactual (K = A*J)	17,871,567	18,914,626
LED Qty Actual (L)	19,985,580	19,985,580
Net LEDs Modeled (M = L-K)	2,114,013	1,070,954
Claimed Bulbs 2020 (N)	5,387,507	5,387,507
NTG Modeled (O = M/N)	**39.2%**	**19.9%**
Market Effects (P = Difference of NTG of columns)	**19.4%**	**N/A**
Market Effects Lamps (Q = N*P)	**1,043,059**	**N/A**

Process Evaluation

For the process evaluation, the evaluation team collected primary data to assess how customers learned about the offerings in the Direct to Customer Solution, what motivated them to participate, and their overall satisfaction and experience.

Process Evaluation Methodology

The evaluation team conducted in-depth interviews with the administrator and the implementer and surveyed participants in five of the six Direct to Customer offerings. Table 27 lists specific data collection activities with the sample sizes. Process activities and findings are described in the discussion below. Additional details can be found in *Appendix G*.

Table 27. CY 2020 Data Collection Activities and Sample Sizes – Process Evaluation

Activity	Appliance Recycling	Online Marketplace	Packs	Retail	Rural Farmhouse Kits	Rural Retail Events	Total
Stakeholder Interviews	3 across all offerings						**3**
Participant Survey	173	576	884	777	N/A	Combined with Retail	**2,410**
Customer Satisfaction Survey	753	1,069	1,201	1,231	N/A	Combined with Retail	**4,254**

Administrator and Implementer Interviews

In July 2020, the evaluation team interviewed the administrator and the implementer to learn about how the new Direct to Customer Solution was working and to assess its objectives, performance, and implementation challenges and resolutions. The team also asked them about their marketing, engagement with customers, and COVID-19 impacts.

Participant Surveys

During fall and early winter of 2020, the evaluation team contacted random samples of CY 2020 Direct to Customer Solution participants to assess their experiences with the offerings. The survey asked about awareness of Focus on Energy, marketing, customer decision-making, and satisfaction, among other topics. Respondents' feedback also informed the impact evaluation. Detailed findings for each offering are available in *Appendix G*.

Ongoing Participant Satisfaction Surveys

The evaluation team conducted satisfaction surveys for the Direct to Customer Solution offerings beginning in CY 2020 for the CY 2019–CY 2022 quadrennium, continuing the practice established for the previous quadrennium in CY 2015. 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, and
- Help to facilitate timely follow-up with customers to clarify and address service concerns.

The team used SPECTRUM data to sample CY 2020 participants and administered web-based satisfaction surveys throughout the year. The number of completed surveys reported by offering are shown above in Table 27. Subsets of surveys for Packs and Online Marketplace were randomly selected for evaluation reporting.[17] The surveys covered several topics including overall satisfaction, satisfaction with program staff and trade allies, likelihood of recommending Focus on Energy, likelihood to initiate another energy efficient project, and other feedback.

Design and Delivery

Offerings in the Direct to Customer Solution provide rebates or discounts to residential customers who purchase efficient products or services directly through Focus on Energy or a participating retailer. The solution has these six offerings:

- Appliance Recycling
- Online Marketplace
- Packs
- Retail
- Rural Farmhouse Kits
- Rural Retail Events

In the following discussion, Rural Farmhouse Kits are discussed with Packs, and Rural Retail Events are discussed with Retail due to their similar delivery channels.

[17] In total, customers completed 16,659 Packs surveys and 3,213 Online Marketplace surveys. Since the evaluation team reports ratings only to the first decimal place, surveys with very large numbers of responses (over 2,000) were randomly sampled so that the precision level 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 that are reported as the same (to the first decimal place) are significantly different. The random sampling used a Monte Carlo technique so that the reported ratings for the random sample and the ratings for the larger population are identical to the first decimal place.

Appliance Recycling

The Appliance Recycling offering promotes the removal of old, inefficient refrigerators and freezers from customers' homes by arranging for the pick-up and environmentally responsible recycling of these appliances. The implementer oversees ARCA, which schedules pick-ups and arranges transport of the appliances to a recycling plant.

Customers participate in the offering by requesting and scheduling an appliance pick-up via Focus on Energy's web portal or call center. In March 2020, in response to COVID-19, the offering transitioned from in-home appliance collections to outdoor, contactless appliance pick-ups. On average, customers in CY 2020 waited 18.1 days between scheduling and appliance pick-up, an increase from an average of 11.8 days in CY 2019 but similar to 19.5 days in CY 2018 and 16.5 days in CY 2017.

Focus on Energy discontinued Appliance Recycling offering incentives in January 2020 and plans to sunset the full offering at the end of the year.

Online Marketplace

Focus on Energy launched the Online Marketplace in the fall of 2019. The offering uses an online shopping platform (Focus on Energy Marketplace, or Marketplace) to provide a new delivery channel for the purchase of efficient products. The Marketplace is available to all residential customers of Focus on Energy participating utilities and is targeted to those who prefer to shop online or who have limited access to Focus on Energy discounts offered at physical retail locations. The implementer oversees TechniArt, which fulfills Marketplace orders and maintains the Online Marketplace platform.

Table 28 shows the energy efficiency products and discounts available at the Online Marketplace.

Table 28. Online Marketplace Products and Discounts

Measure	Discount
Smart Thermostats	$50
Advanced Power Strips	Tier 1: $10 Tier 2: $20
LEDs, Omnidirectional, Specialty, and Reflector Models	$1.85 - $3.85, varies by model
ShowerStarts	$10
Low-Flow Showerheads	50% of cost
Faucet Aerators	20%-50%, depending on model

Packs Offering

The Packs offering gives single-family and multifamily customers the option to order one of six free energy-saving packs, each of which has an assortment of energy-efficient items. The implementer oversees TechniArt, which fulfills pack orders. Customers participate by requesting a pack via Focus on Energy's online web portal or call center. The implementer typically processes, ships, and delivers pack orders within four weeks of receipt of request.

Standard packs, in various combinations, contain general service and specialty LEDs, water-saving devices such as faucet aerators and low-flow showerheads, and other energy-saving items such as advanced power strips and pipe wrap insulation.

Farmhouse Kits are available exclusively to agricultural customers and include additional weatherization measures such as weatherstripping, switch outlet covers, and gasket outlet covers. When first introduced, Farmhouse Kits were delivered by utility account representatives directly to agricultural customers. These in-person visits were suspended in March 2020 due to the COVID-19 pandemic. In fall 2020, Focus on Energy began offering Farmhouse Kits to rural customers on a unique online portal that was available by invitation only. This transition eliminated the suspended in-person deliveries and allowed Focus on Energy to increase participation because they could invite more rural customers to participate. Table 29 shows the quantity of each measure in the standard (statewide) packs and Farmhouse Kits (rural zip codes).

Table 29. Packs Offering Contents by Pack Type

Measure	Standard Packs						Farmhouse Kit
	Lightbulb	Showerhead		Flood	Decorative	Focus Pack with APS	
		Fixed	Hand				
LED A19 (800 lumens)	4	2			2	3	4
LED A19 (1,100 lumens)	2						4
LED BR30 Reflector				6			
LED G25 Globe		3	3				
LED Candelabra					6		
Pipe Wrap (15 ft. roll)	1	1	1			1	1
Fixed Showerhead		1					1
Hand-Wand Showerhead			1				
Faucet Aerator		2	2				1
DHW Temperature Card	1	1	1			1	
Advanced Power Strip						1	
LED Nightlight							1
Weatherstripping							1
Outlet Gaskets							8 outlet, 4 switch

Retail Offering

The Retail offering provides point-of-sale discounts and downstream rebates on qualified consumer products. In CY 2020, the offering was delivered through various channels, including brick-and-mortar retail stores, discounts through participating manufacturer websites, and pop-up retail events at employer and community events. These pop-up events were converted to online Etail events in March 2020 following the onset of the COVID-19 pandemic. The implementer oversees TechniArt, which implemented pop-up retail events and fulfilled Etail event orders, and Crossmark, which implemented events in brick-and-mortar stores.

Table 30 lists measures, incentive types, and delivery channels available through the CY 2020 Retail offering.[18]

Table 30. Retail Eligible Products by Incentive Type and Delivery Channel

Product	Incentive Type/Retail Channel				
	Point-of-Sale Discount Brick and Mortar Stores	Point-of-Sale Discount Pop-Up Events	Point-of-Sale Discount Etail Events	Point-of-Sale Instant Discount Manufacturer Websites	Downstream Rebate Any Retail Location
LEDs	✓	✓	✓	✓	
Smart Thermostats				✓	✓
Advanced Power Strips		✓			
Faucet Aerators			✓		
Showerheads			✓		

Measures sold through Etail events were available in bundles:

- LED 6-Pack, containing six reflectors, candles, or globe LEDs
- LED Starter Kit, containing 11 A-lamp LEDs of varying wattages and an LED desk lamp
- Energy and Water Saving Kit, containing eight LEDs of varying wattages, a showerhead, three faucet aerators, pipe insulation, and a hot water temperature card

As part of the PSC's initiative to enhance Focus on Energy services to rural customers, the administrator assigned a separate budget to cover the Rural Retail Events effort and tracked results against a separate savings target. Rural Retail Events were managed the same way as standard Etail events.

Marketing and Outreach

In CY 2020, the implementer focused marketing on building awareness of broader services available through the Direct to Customer Solution rather than on marketing specific offerings or measures. Marketing materials conveyed Focus on Energy branding and were sometimes cobranded with participating utilities. Some marketing materials also mentioned additional discounts offered by manufacturers and retailers for measures offered through the solutions. However, coordination with the manufacturers and retailers was limited to the implementer's receiving advance notice about when such discounts would be offered (e.g., "Black Friday" sales).

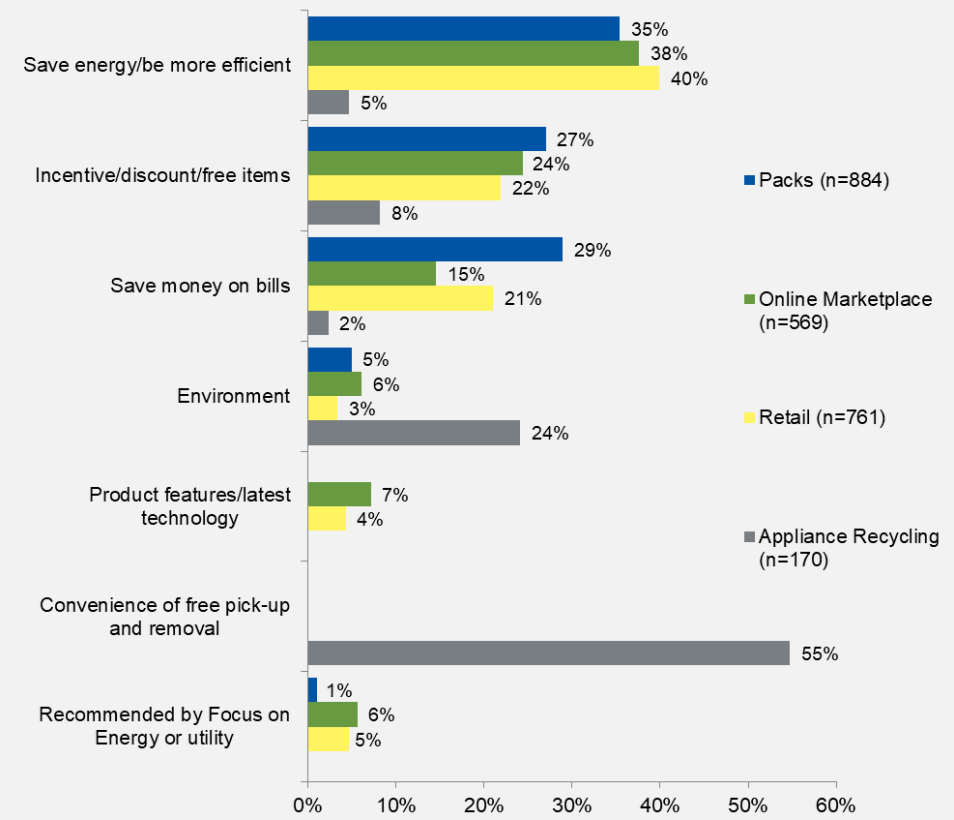
The implementer purchased media for advertising and tracked its effectiveness so funds could be shifted to better-performing channels as needed. The administrator maintained the Focus on Energy website with content provided by the implementer. The administrator reported that the implementer made no significant changes to the marketing channels and messaging used to promote the Direct to Customer Solution in CY 2020 from the precursor programs in CY 2019.

[18] Low-E storm windows, which were eligible in CY 2019, were phased out in February 2020.

Motivation for Participation

Customer motivations for participating in Direct to Customer offerings are shown in Figure 4. For most offerings, the top motivation was to save energy and be more efficient (35% to 40% of respondents), followed by saving money on energy bills (15% to 29%) and the incentive, discount, or free items (22% to 27%). However, Appliance Recycling respondents were most motivated by the convenience of free pick-up and removal (55%) and environmental concerns (24%).

Figure 4. Motivation for Participation – Direct to Customer Solution Offerings



Source: CY 2020 Packs Offering Participant Survey, Question B4. "What factor was the most important motivation for you to order your Energy Saver Pack?" CY 2020 Appliance Recycling Offering Participant Survey, Question B4. "What factor was the most important motivation for you to recycle your [APPLIANCE] through Focus on Energy?" CY 2020 Online Marketplace and Retail Offering Participant Surveys, Question C1. "What was the most important reason you purchased your [MEASURE]?" Only values of 20% or higher are labeled in the chart.

Customer Satisfaction Results for the Direct to Customer Solution

Throughout CY 2020, the evaluation team surveyed Direct to Customer Solution participants in the Packs, Online Marketplace, Appliance Recycling, Retail Smart Thermostat, and Retail Events offerings to measure their satisfaction with various aspects of their experience. Respondents answered questions

related to satisfaction and likelihood on a scale of 0 to 10, where 10 indicated the highest degree of satisfaction or likelihood and 0 the lowest.[19]

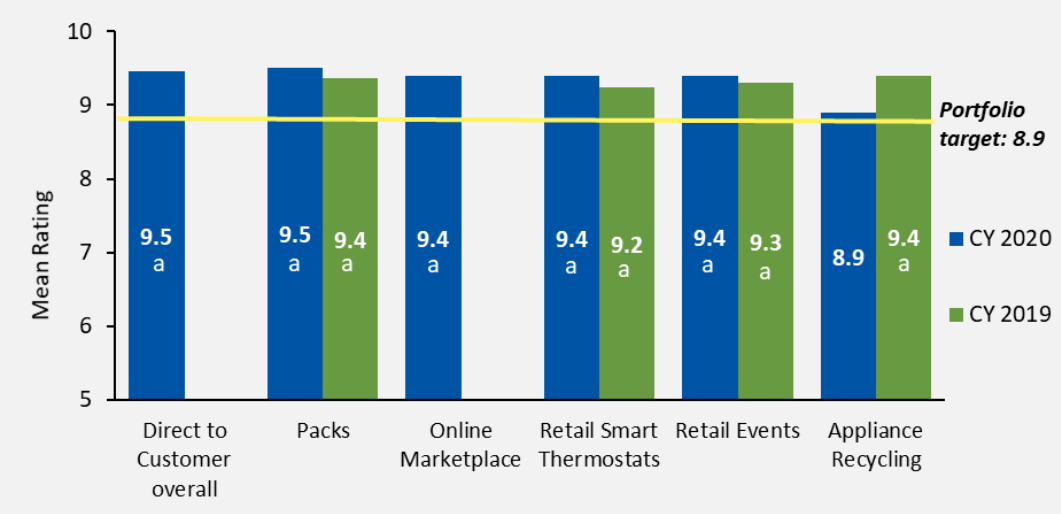
Prior to portfolio restructuring in CY 2020, the evaluation team fielded equivalent surveys for the predecessor programs to these Direct to Customer offerings, except for the Online Marketplace offering, which launched in September 2019 and was not surveyed prior to CY 2020.

Figure 5 shows that Direct to Customer Solution participants gave the offerings they participated in average overall satisfaction ratings of 9.4 or higher in CY 2020, except for Appliance Recycling, which received an average satisfaction rating of 8.9. The ratings for all offerings, except Appliance Recycling, were statistically higher than the portfolio target for CY 2020 (which was also the case for these offerings in CY 2019).[20] The overall satisfaction rating of 8.9 from CY 2020 Appliance Recycling respondents was statistically equivalent to the portfolio goal and significantly lower than the CY 2019 rating of 9.4 for this offering. CY 2020 respondents gave statistically higher ratings than CY 2019 respondents for Packs (up from 9.4 to 9.5) and Retail smart thermostats (up from 9.2 to 9.4). The participation-weighted average satisfaction rating for all Direct to Customer Solution offerings was 9.5 for CY 2020.

[19] 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.

[20] 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

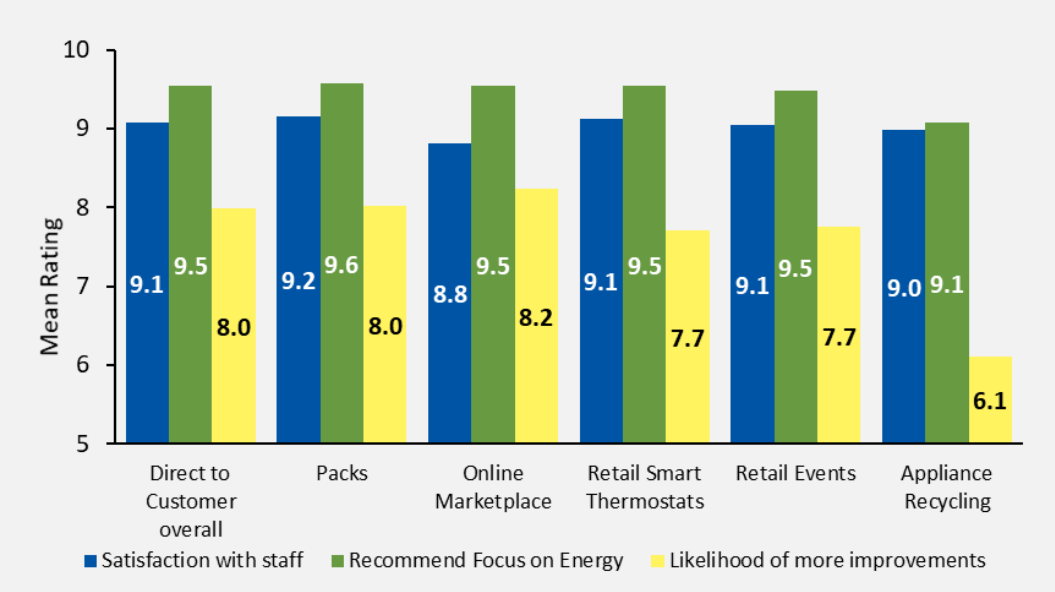


Source: Packs, Online Marketplace, Retail Smart Thermostats, Retail Events, and Appliance Recycling Offering Participant Satisfaction Survey Question. "Overall, how satisfied are you with your most recent experience with Focus on Energy?" (CY 2020 Packs n=1,199, Online Marketplace n=1,069, Retail Smart Thermostats n=428, Retail Events n=801, Appliance Recycling n=749; CY 2019 Packs n=1,336, Retail Smart Thermostats n=804, Retail Events n=175, Appliance Recycling n=1,561). The Online Marketplace offering was not surveyed in CY 2019.
"Direct to Customer overall" is the participation-weighted average of all surveyed Direct to Customer offerings; the weighted average is only presented for CY 2020 since this solution was not offered in CY 2019.
[a] This result is statistically significantly different from the portfolio target ($p<0.10$ or better using binomial t-tests).

Figure 6 shows the average satisfaction and likelihood ratings for Direct to Customer Solution offerings in CY 2020. Ratings for satisfaction with staff were consistent across offerings, averaging 9.1 overall and ranging from 8.8 to 9.2 by offering, though Appliance Recycling was the only offering where most respondents provided staff ratings.[21] Ratings for the likelihood of recommending Focus on Energy were consistently high at 9.5 or 9.6 for all offerings, except Appliance Recycling, which received an average rating of 9.1. Appliance Recycling respondents also gave lower average ratings for their likelihood of making more improvements (6.1) compared to the other Direct to Customer Solution offerings (7.7 to 8.2 by offering).

[21] 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. Appliance Recycling respondents were the most likely to provide staff ratings (68%), while minorities of respondents provided ratings for staff for the Retail Smart Thermostat (24%), Retail Events (17%), Online Marketplace (10%) and Packs (9%) offerings.

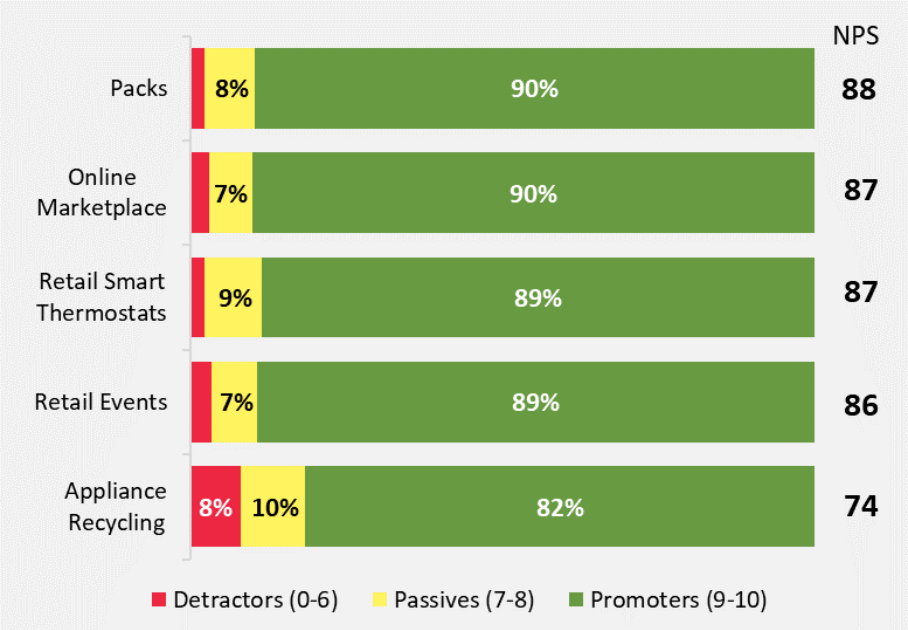
Figure 6. Average Ratings for Direct to Customer Solution Offerings



Source: Packs, Online Marketplace, Retail Smart Thermostats, Retail Events, and Appliance Recycling 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)?" (Packs n=113, Online Marketplace n=102, Retail Smart Thermostats n=103, Retail Events n=137, Appliance Recycling n=509). "How likely are you to recommend Focus on Energy to others?" (Packs n=1,196, Online Marketplace n=1,067, Retail Smart Thermostats n=426, Retail Events n=799, Appliance Recycling n=748). "How likely are you to initiate another energy-efficiency improvement in the next 12 months?" (Packs n=1,189, Online Marketplace n=1,066, Retail Smart Thermostats n=428, Retail Events n=798, Appliance Recycling n=744). "Direct to Customer overall" is the participation-weighted average of all surveyed Direct to Customer 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). The Appliance Recycling NPS was +74 for CY 2020, which is a high rating but was substantially lower than +90 for the CY 2019 predecessor program. The other Direct to Customer Solution offerings received a consistently high NPS between +86 and +88 in CY 2020, similar to the NPS for their comparable CY 2019 predecessor programs (+83 to +87). Net promoter scores and the distribution of promoters and detractors are shown in Figure 7.

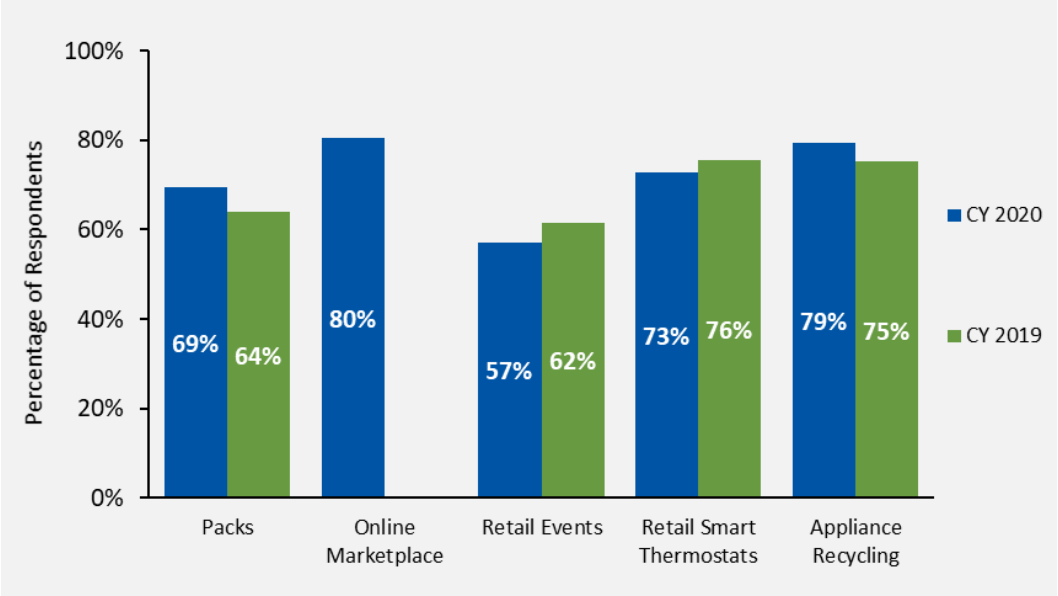
Figure 7. Net Promoter Scores for Direct to Customer Solution Offerings



Source: Packs, Online Marketplace, Retail Smart Thermostats, Retail Events, and Appliance Recycling Offering Participant Satisfaction Survey Question. "How likely are you to recommend Focus on Energy to others?" (Packs n=1,196, Online Marketplace n=1,067, Retail Smart Thermostats n=426, Retail Events n=799, Appliance Recycling n=748).
Note: Unlabeled segments represent 3% or less of respondents.

CY 2020 respondents 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 (Figure 8). Most survey respondents for each Direct to Customer Solution offering were aware of their utility's partnership with Focus on Energy, ranging from 57% for Retail Events to 80% for Online Marketplace respondents. Participants in the CY 2019 precursor programs showed similar levels of awareness.

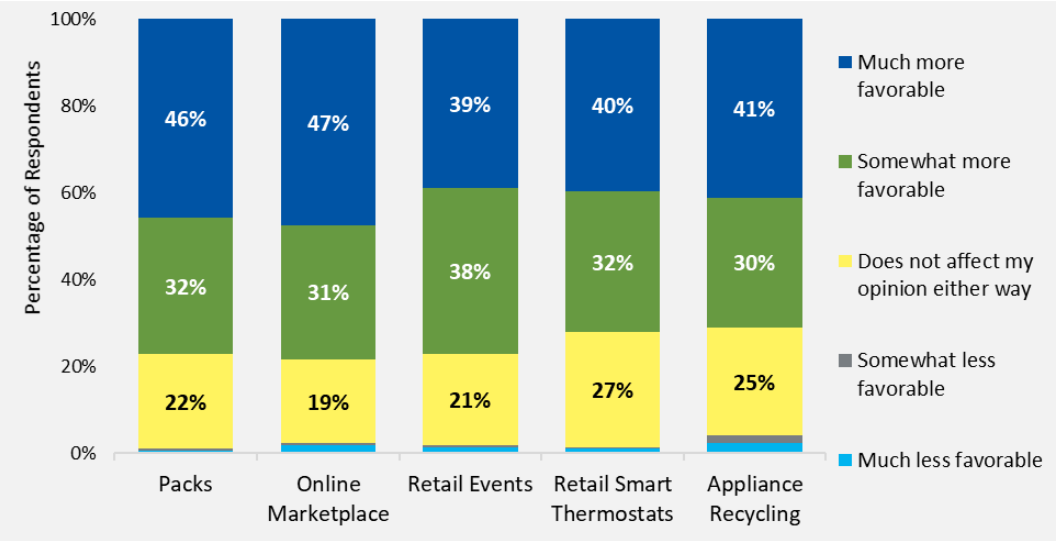
Figure 8. Awareness of Utility Partnership for Direct to Customer Solution Offerings



Source: Packs, Online Marketplace, Retail Smart Thermostats, Retail Events, and Appliance Recycling Offering Participant CY 2020 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?" (Packs n=1,197, Online Marketplace n=1,065, Retail Smart Thermostats n=428, Retail Events n=797, Appliance Recycling n=743).
Same question from corresponding CY 2019 Satisfaction Surveys (Packs n=1,320, Retail Smart Thermostats n=800, Retail Events n=172, Appliance Recycling n=1,552) The Online Marketplace Satisfaction Survey was not fielded in CY 2019.

CY 2020 participants were asked if Focus on Energy offerings affected their opinion of their utilities (Figure 9), and 71% to 78% (by offering) 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: 4% of Appliance Recycling respondents' opinions became *much less favorable* or *somewhat less favorable*, and for the other offerings, only 1% or 2% gave those ratings.

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



Source: Packs, Online Marketplace, Retail Smart Thermostats, Retail Events, and Appliance Recycling Offering Participant Satisfaction Survey Question. "How have these offerings affected your opinion of your energy utility, if at all?" (Packs n=1,106, Online Marketplace n=1,009, Retail Events n=741, Retail Smart Thermostats n=398, Appliance Recycling n=686).
Note: Unlabeled segments represent 2% or less of respondents.

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 offerings, which the team then coded into "mentions." Table 31 summarizes the number and types of comments and suggestions by offering. Most survey respondents did not offer any comments or suggestions, though the most likely to do so were Appliance Recycling participants (39%). Most mentions from Appliance Recycling respondents were suggestions for improvement (59%), while most mentions from participants in other Direct to Customer offerings were positive comments (57% to 69%). Comments and suggestions offered in the customer satisfaction surveys (summarized here) were very similar to open-ended feedback provided by Direct to Customer participant survey respondents (found in *Appendix G*).

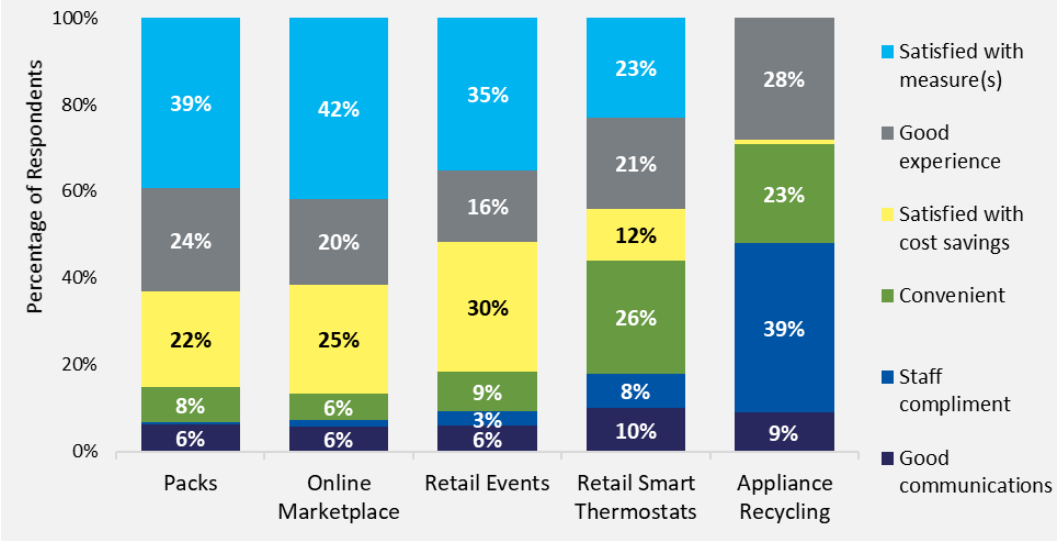
Table 31. Customer Comments and Suggestions for Direct to Customer Solution by Offering

Offering	Total Surveys	Gave Comments	Percent Giving Comments	Total Mentions	Percent Positive Comments	Percent Suggestions for Improvement
Packs	1,201	242	20%	305	69%	31%
Online Marketplace	1,069	280	26%	366	67%	33%
Retail Events	803	182	23%	267	57%	43%
Retail Smart Thermostats	428	95	22%	127	57%	43%
Appliance Recycling	753	295	39%	420	41%	59%

The positive mentions for each offering are shown in Figure 10. Satisfaction with the measures provided by the offering were the most common positive mentions from Packs (39%), Online Marketplace (42%), and Retail Events (35%) respondents, and the second most common for Retail Smart Thermostat

respondents (23%); Appliance Recycling participants did not receive measures through their offering so respondents did not mention this in their comments. The most common positive comments from Retail Smart Thermostat respondents related to the convenience of the offering (26%), while Appliance Recycling respondents were the most likely to compliment staff (39%). Satisfaction with cost savings (incentives, discounts, and lower utility bills) were frequently mentioned by Retail Events (30%), Online Marketplace (25%) and Packs (22%) respondents but were rarely mentioned by Appliance Recycling respondents (1%). Between 16% and 28% of mentions per offering reflected a generally positive experience (e.g., non-specific comments such as "everything was great.")

Figure 10. Positive Comments about Direct to Customer Solution Offerings



Source: Packs, Online Marketplace, Retail Smart Thermostats, Retail Events, and Appliance Recycling Offering Participant Satisfaction Survey Question. "Please tell us more about your experience and any suggestions for improvement." (Total positive mentions Packs n=209, Online Marketplace n=247, Retail Events n=153, Retail Smart Thermostats n=73, Appliance Recycling n=172). Note: Unlabeled segments represent 2% or less of respondents.

Figure 11 shows suggestions for improvement; the most common suggestion from Packs (23%), Retail Smart Thermostat (33%), and Appliance Recycling respondents (34%) was to improve communications about the offering, and this was also the second most common suggestion from Retail Events respondents (26%). Suggestions about improving communications typically focused on follow-up to orders and rebate applications, more or clearer information about items offered, requests for more information about saving energy, and more promotion for Focus on Energy offerings.

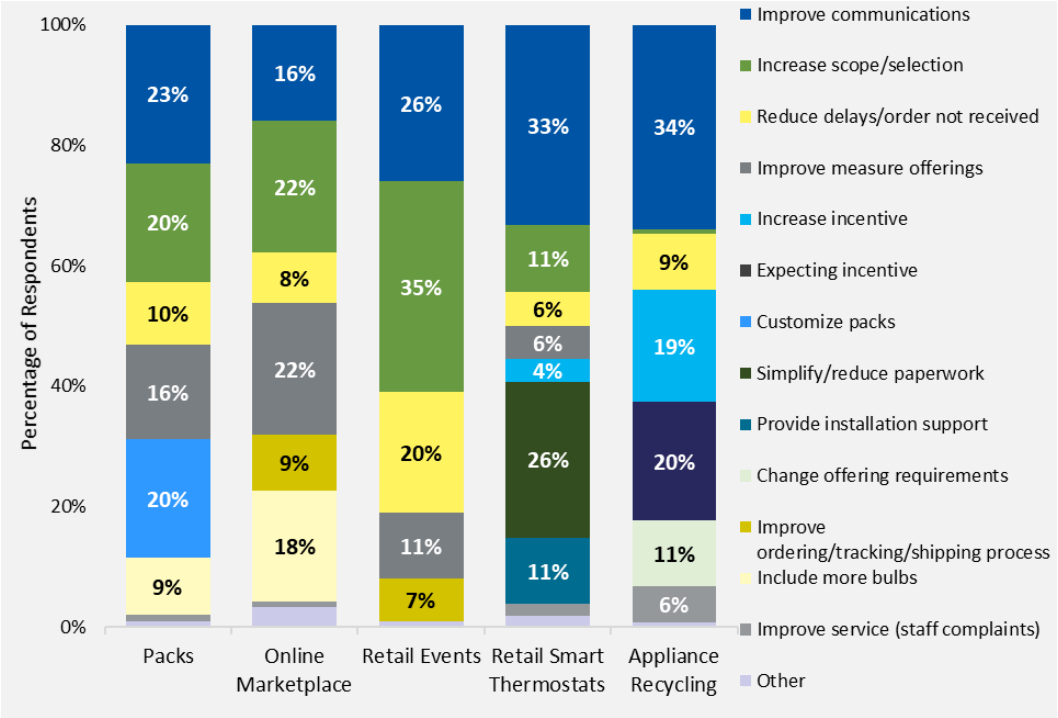
The most common suggestions from Online Marketplace respondents were to increase the offering's scope and selection to include more items and services (22%), improve the quality of measures offered (22%), and offer more options for lighting (18%). Increasing the scope and selection of measures offered was also mentioned frequently by Retail Events (35%) and Packs (20%) respondents.

Increasing incentives comprised only 19% of Appliance Recycling respondent suggestions and 4% of Retail Smart Thermostat suggestions, and it was not suggested by any respondents for the other offerings. Twenty percent of Appliance Recycling suggestions indicated that respondents were still

expecting to receive an incentive, and several Appliance Recycling suggestions coded as "improve communications" specifically related to communications about the elimination of the incentive for this offering at the beginning of CY 2020.

Some suggestions were unique to specific offerings: Packs respondents suggested allowing more customization of the measures in the packs (20%), while Retail Smart Thermostat respondents suggested simplifying and reducing the paperwork to receive rebates (26%) and offering installation support (11%). Retail Events respondents were the most likely to suggest reducing delays in the delivery process (20%), while reducing delays also made up between 6% and 10% of suggestions for other offerings.

Figure 11. Suggestions for Improving Direct to Customer Solution Offerings

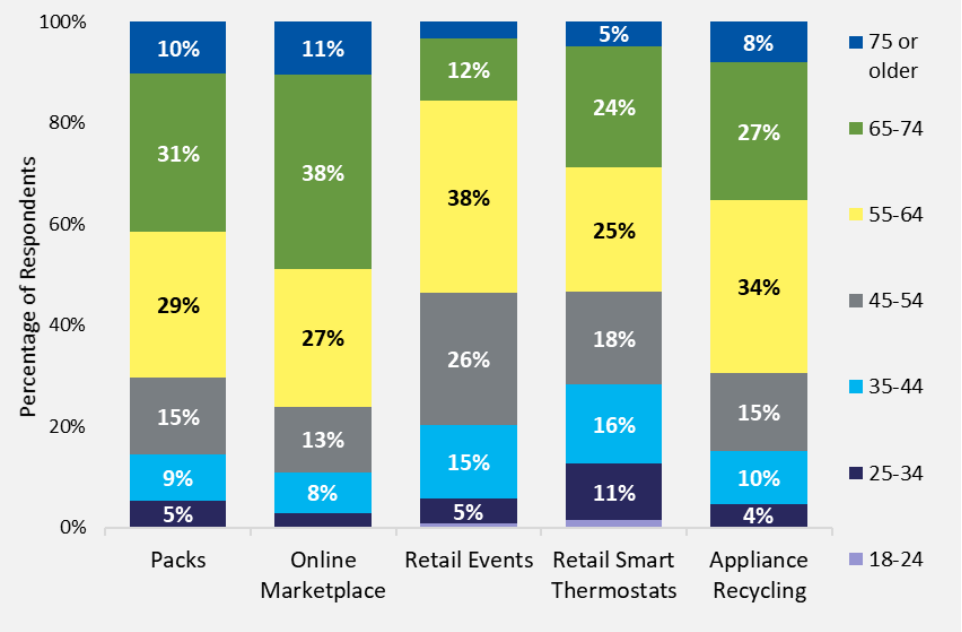


Source: Packs, Online Marketplace, Retail Smart Thermostats, Retail Events, and Appliance Recycling Offering Participant Satisfaction Survey Question. "Please tell us more about your experience and any suggestions for improvement." (Total suggestions for improvement Packs n=96, Online Marketplace n=119, Retail Events n=114, Retail Smart Thermostats n=54, Appliance Recycling n=248). Note: Unlabeled segments represent 3% or less of respondents.

Demographics

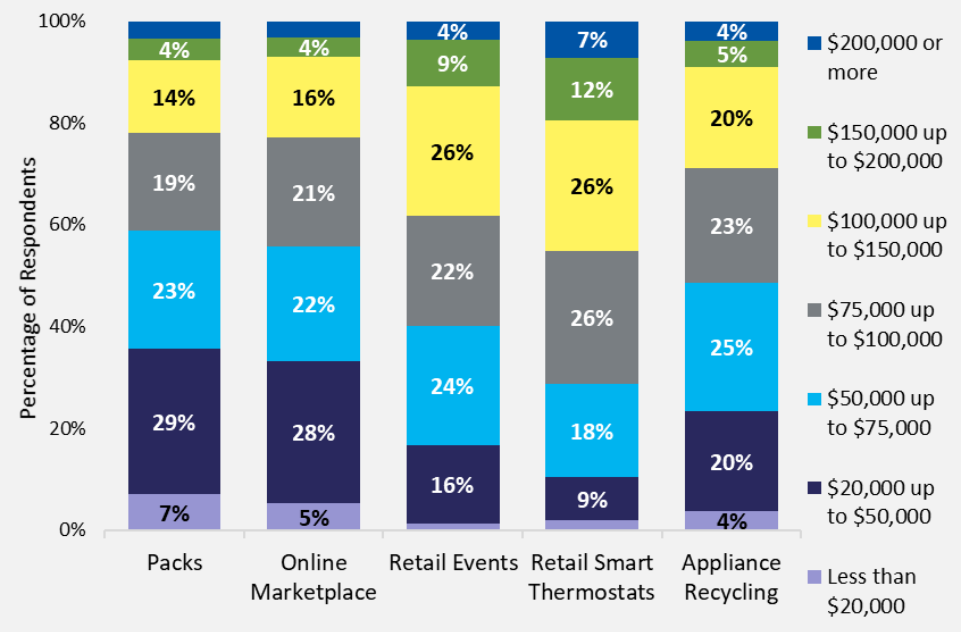
The customer satisfaction survey asked respondents their age (Figure 12) and income (Figure 13). Compared to the other Direct to Customer Solution offerings, Retail respondents had the highest percentages of age 54 or younger (47% Smart Thermostats, 46% Events) and with incomes over $100,000 (45% Smart Thermostats, 38% Events). Online Marketplace respondents tended to be older than participants in other offerings (49% age 65 or older), and Packs respondents were the most likely to have incomes under $50,000 (49%).

Figure 12. Direct to Customer Solution Participants' Age



Source: Packs, Online Marketplace, Retail Smart Thermostats, Retail Events, and Appliance Recycling Offering Participant Satisfaction Survey Question. "Which of the following categories best represents your age?" (Packs n=1,159, Online Marketplace n=1,043, Retail Events n=781, Retail Smart Thermostats n=416, Appliance Recycling n=725).
Note: Unlabeled segments represent 3% or less of respondents.

Figure 13. Direct to Customer Solution Participants' Income

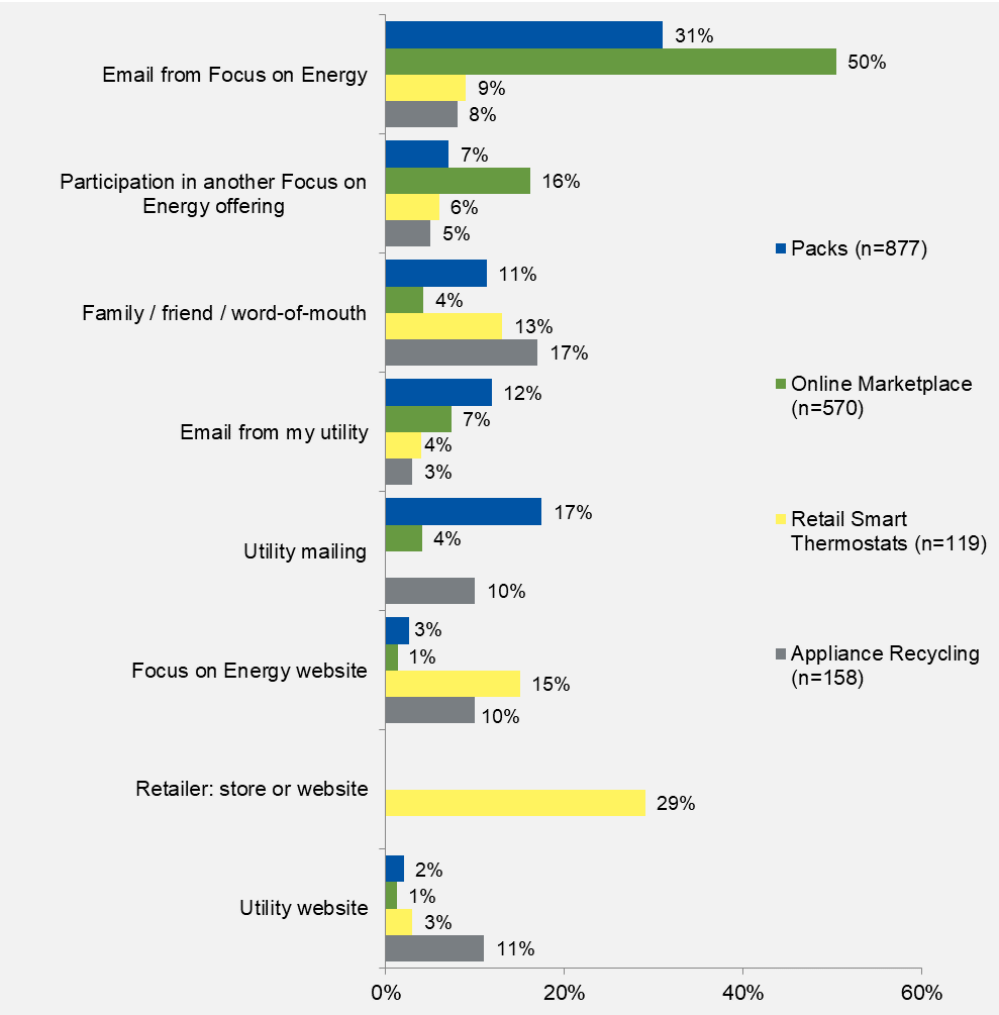


Source: Packs, Online Marketplace, Retail Smart Thermostats, Retail Events, and Appliance Recycling Offering Participant Satisfaction Survey Question. "Which category best describes your total household income before taxes?" (Packs n=879, Online Marketplace n=778, Retail Events n=600, Retail Smart Thermostats n=324, Appliance Recycling n=515).
Note: Unlabeled segments represent 3% or less of respondents.

Awareness

Respondents to the CY 2020 participant survey reported hearing about Direct to Customer offerings from diverse sources, as shown in Figure 14.

Figure 14. Most Recent Source of Customer Awareness – Direct to Customer Solution Offerings



Source: CY 2020 Packs Offering Participant Survey, Question B1. "Where did you most recently hear about Focus on Energy's Energy Saver Packs?" Online Marketplace Offering Participant Survey, Question B1. "Where did you most recently hear about Focus on Energy discounts for [MEASURE]s available through the Online Marketplace?" Retail Offering Participant Survey, Question B1. "Where did you most recently hear about Focus on Energy's rebates for smart thermostats?" Appliance Recycling Offering Participant Survey, Question B1. "Where did you most recently hear about Focus on Energy's Appliance Recycling offering?"

Packs respondents mentioned Focus on Energy email solicitations as the most frequent source of awareness (31%), followed by utility mailings (17%) and utility emails (12%).

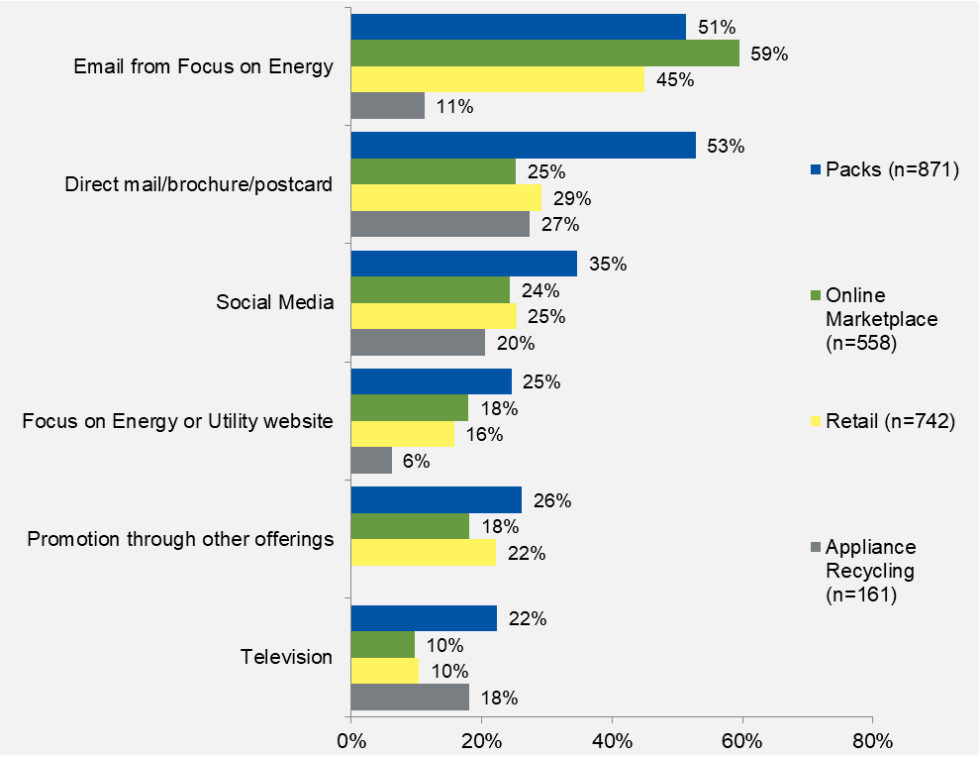
Most Online Marketplace respondents heard about the offerings from Focus on Energy email solicitations (50%). These respondents were also more likely than those who participated in other offerings to mention participation in another Focus on Energy offering (16%) and less likely to mention word-of-mouth (4%).

Retail smart thermostat respondents most often learned about the discount through retail stores and their websites (29%) and the Focus on Energy website (15%).[22]

Responses for Appliance Recycling were more uniform across source categories, with most respondents learning about it through word-of-mouth (17%), utility websites (11%), utility mailings (10%), or the Focus on Energy website (10%).

The survey also asked what respondents thought would be the best way for Focus on Energy to inform the public about energy efficiency offerings. Figure 15 shows that emails from Focus on Energy were the most popular suggestion from Online Marketplace (59%) and Retail (45%) respondents. Direct mail was the most frequent suggestion from Packs (53%) and Appliance Recycling (27%) respondents. Social media was the second or third most frequent suggestion from respondents in all four offerings.

Figure 15. Best Method to Inform About Energy Efficiency Offerings – Direct to Customer Solution Offerings



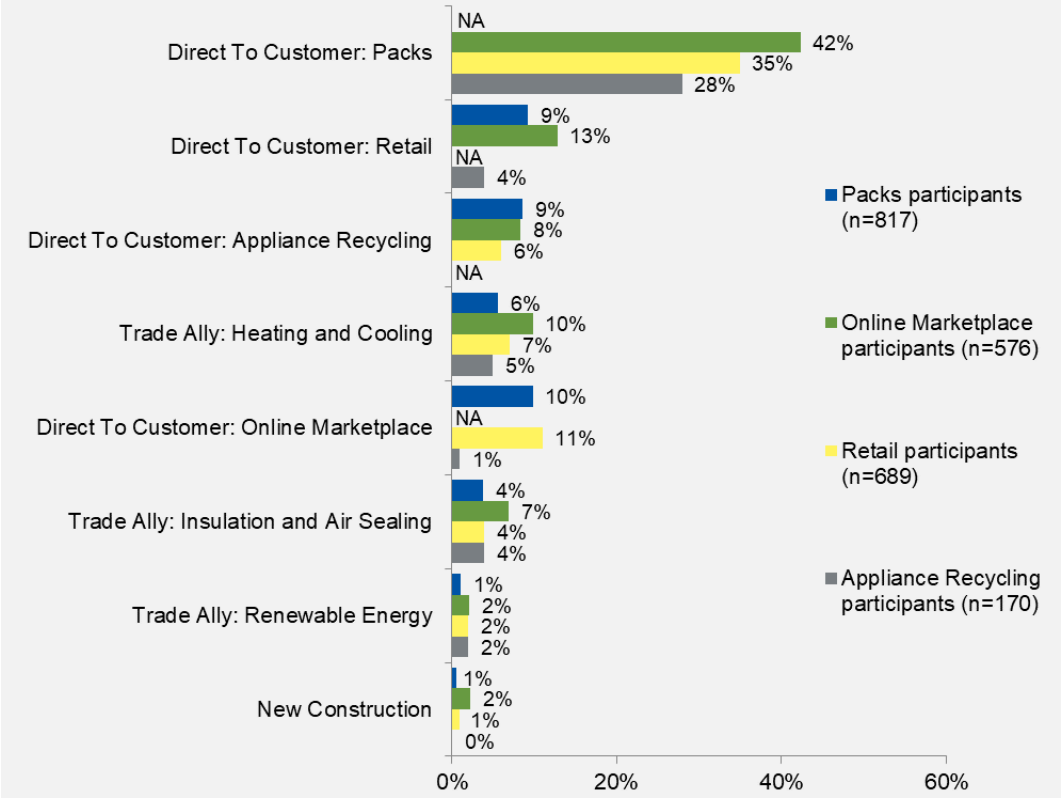
Source: CY 2020 Packs, Appliance Recycling, Online Marketplace and Retail Offering Participant Surveys, Question B4. "What do you think is the best way for Focus on Energy to inform the public about energy efficiency offerings?" Multiple responses allowed. Note: Appliance Recycling survey responses may be more limited because it was a phone survey and respondents were asked to come up with awareness methods; the other surveys were fielded online where respondents were presented with a list of awareness options to choose from.

[22] The Retail Offering participant survey did not ask pop-up and Etail event participants how they learned about the offering, since these events were only available by invitation from the event sponsors.

Other Focus on Energy offerings that Direct to Customer participants participated in are summarized in Figure 16. The largest participation overlap was between the Packs offering and the other Direct to Customer offerings, ranging from 28% of Appliance Recycling participants having ordered a pack up to 42% of Online Marketplace participants having done so. The next largest participation overlap was 13% of Online Marketplace participants having also participated in a Retail offering and 11% of Retail participants having shopped at the Online Marketplace.

Fewer than 10% of Packs, Online Marketplace and Retail participants recycled appliances through the Focus on Energy offering, and Appliance Recycling participants were less likely than other Direct to Customer offering participants to have participated in the Retail (4%) and Online Marketplace (1%) offerings. There was also overlap with Trade Ally offerings, with 5% to 10% of Direct to Customer participants (by offering) having participated in Heating and Cooling and 4% to 7% (by offering) having participated in Insulation and Air Sealing.

Figure 16. Participation in Focus on Energy Offerings – Direct to Customer Solution



Source: CY 2020 Packs (Question B8), Online Marketplace (Question B5), and Retail (Question C3) Offering Participant Surveys. "For the Focus on Energy offerings listed below, please indicate which ones you are aware of and which you have participated in." CY 2020 Appliance Recycling Offering Participant Survey, Question B8. "Which program(s) or offering(s) have you participated in?" Multiple responses allowed.

LED Market Share

Using the same national lighting sales data that the evaluation team used to calculate upstream lighting NTG (see *National Sales Data Model: Upstream Lighting* section above), the team assessed some of the key factors driving LED market share specifically in Wisconsin.

Some of the key lighting program attributes the evaluation team developed were these:

- **Market share distribution.** LED market share distribution for the United States, Wisconsin vs. the U.S., as well as across each state and across retail channels.
- **Program intensity.** LED lighting market share relative to overall program expenditures per household.
- **Program incentives.** Average LED lighting program incentives per bulb.
- **ENERGY STAR market share distribution.** LED market share distribution in Wisconsin compared to states that do not run an upstream lighting program.

Market Trends

Figure 17 shows the national market share of the four bulb types (incandescent, halogen, CFL, and LED) across the past six years. LEDs continue to gain substantial market share, rising from 19% in 2015 to 70% in 2020. From 2015 to 2017, LEDs largely displaced sales of CFLs only. In 2018, LEDs began to displace inefficient bulbs. Even so, inefficient lighting (incandescent bulbs and halogens) still represents almost a third of the lighting market.

Figure 17. Year-Over-Year Total U.S. Market Share by Lamp Type

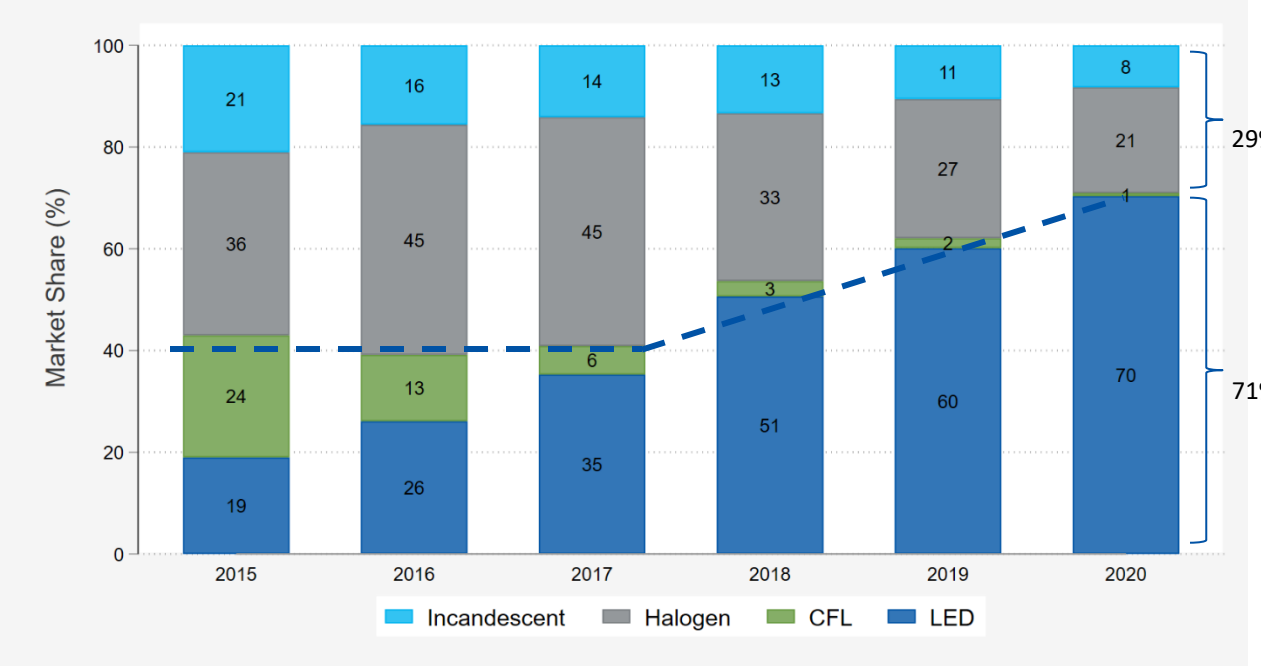


Figure 18 compares the data in Figure 17 to Wisconsin market shares. In terms of LED market share, Wisconsin distanced itself from the national market share in 2016. Since then, Wisconsin LED market share has consistently been greater than national market share. In 2020, LED market share in Wisconsin was nearly 10 percentage points greater than the national market share (80.1% and 70.4% respectively).

Figure 18. Wisconsin and Total U.S. Year-Over-Year Market Share by Bulb Type

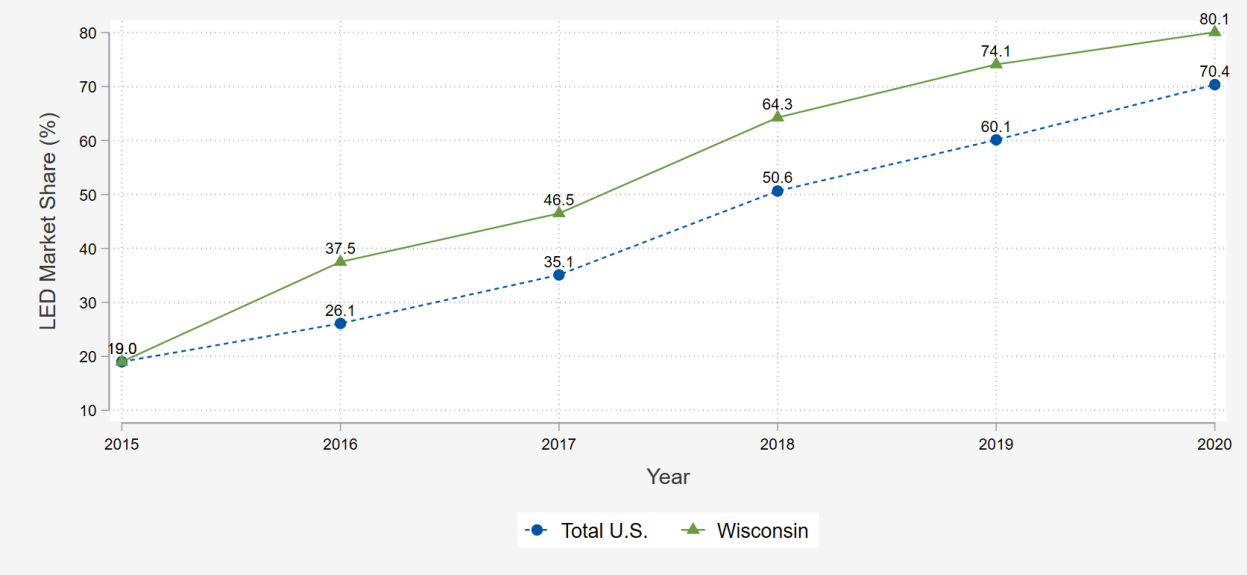
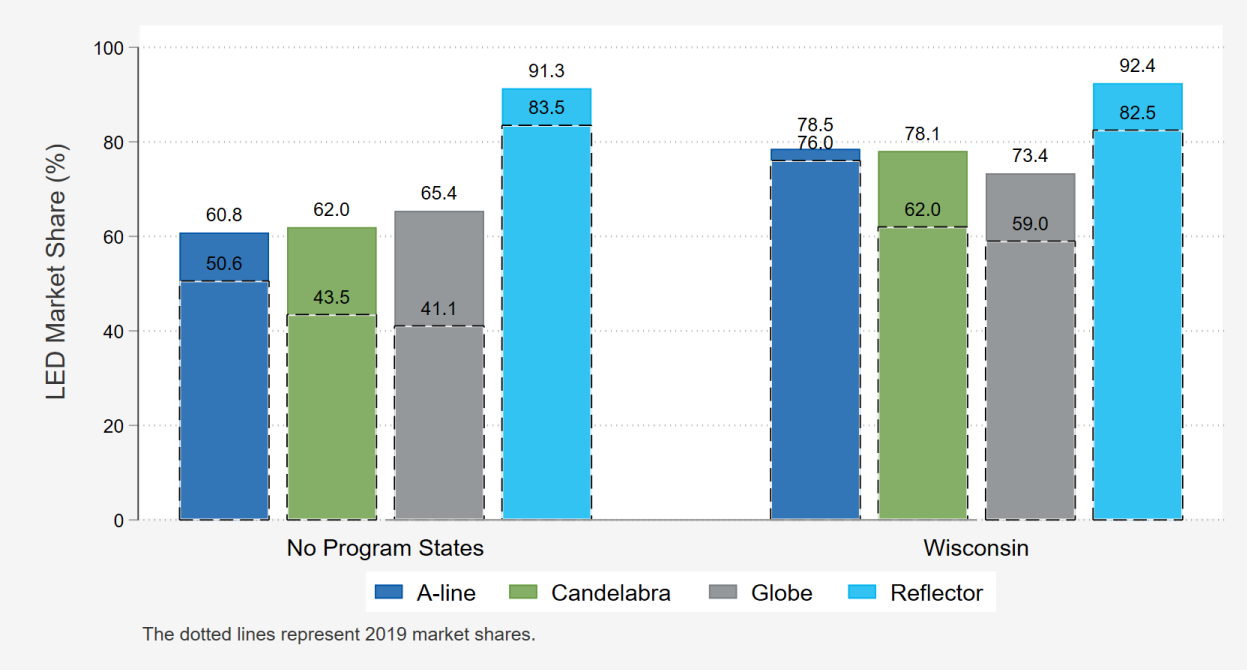


Figure 19 shows the LED market share by lamp style. Breakouts are shown for non-program states and Wisconsin across 2019 and 2020.[23] The market shares differ by style, with LEDs representing a majority of all bulb styles even in states without programs. LED market shares in Wisconsin tend to exceed LED market shares in non-program states by several percentage points. For A-lines in particular, the LED market share in Wisconsin is nearly 20 percentage points higher than the share in non-program states in 2020. Reflectors are on the other end of the spectrum, where the 2020 LED market share in Wisconsin is only slightly greater than the market share in states without upstream lighting programs.

[23] The "no program" states in 2020 are Alabama, Kansas, Kentucky, Mississippi, Nebraska, Tennessee, and Wyoming. California did not have programs in 2020 but has higher LED market shares than any other state due to the enforcement of EISA and prior program activity. California was therefore not included in the 2020 model or any "no program" state summaries.

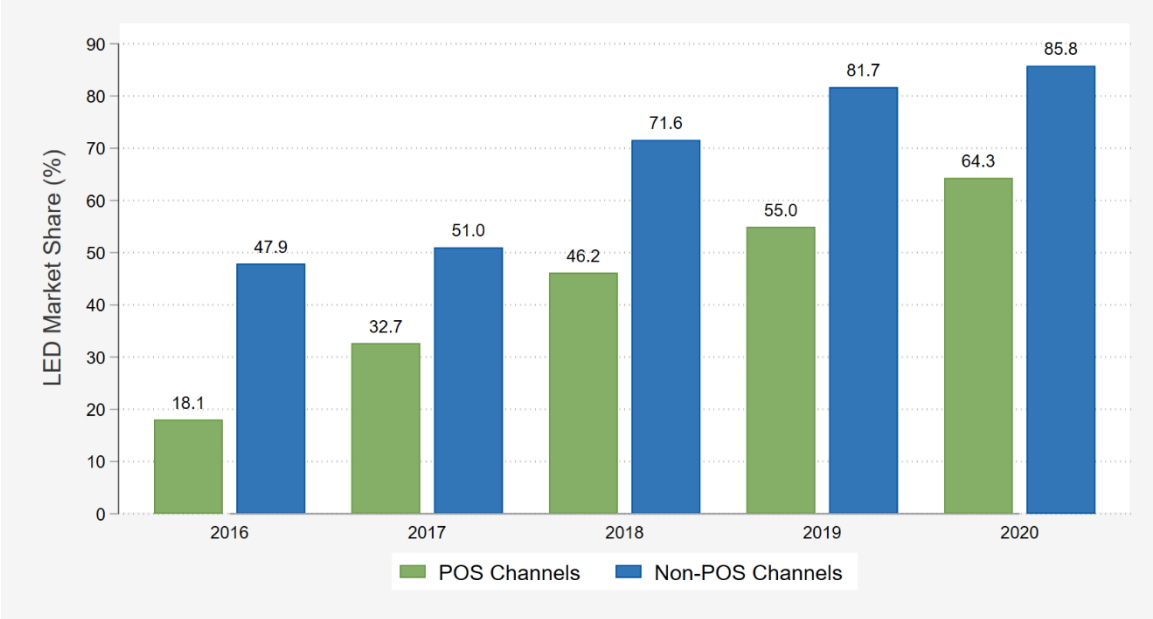
Figure 19. LED Market Share by Lamp Style (2019-2020)



Analysis of the sales data model revealed that sales of LEDs had greater market share in the non-POS retail channels than the POS retail channels, as shown in Figure 20.[24] In 2020, approximately 86% of the lighting purchases made in the non-POS channel were LEDs, compared to approximately 64% in the POS channel. LED market share has increased in both retail channels since 2016.

[24] In total, approximately 73.4% of bulbs were purchased in the non-POS channels.

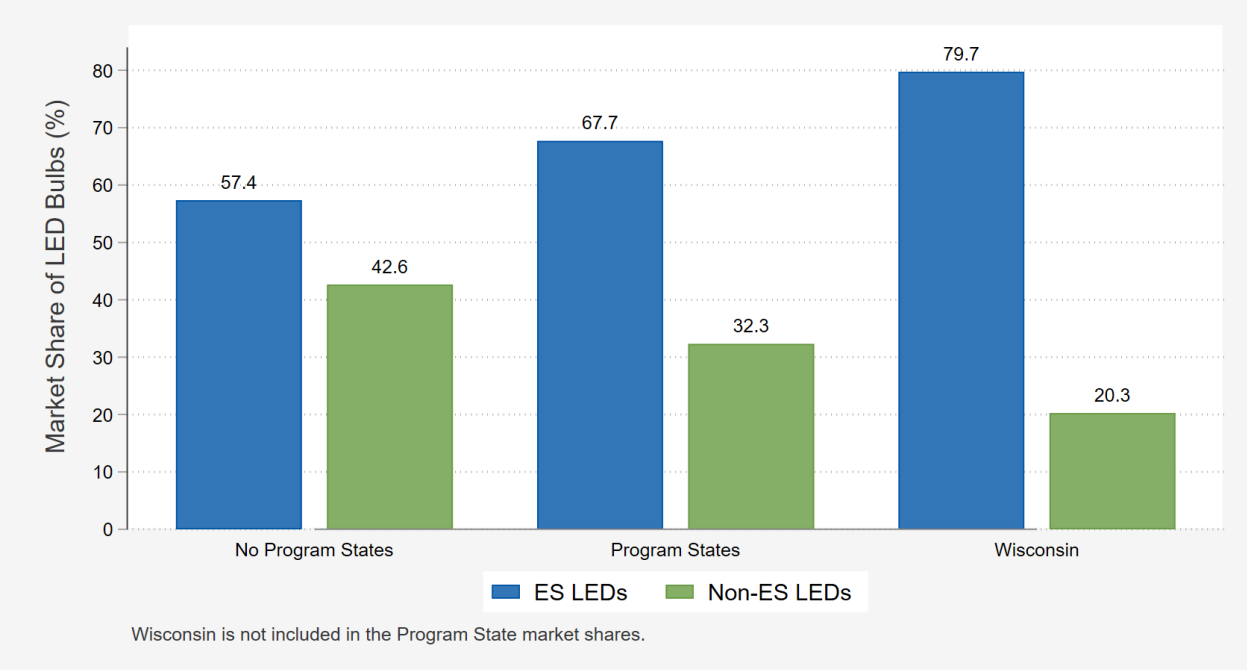
Figure 20. Wisconsin LED Market Share by Retail Channel



The evaluation team looked at ENERGY STAR LED distribution when there was sufficient resolution.[25] In Figure 21, the POS retail channel shows that 80% of LED purchases in Wisconsin were ENERGY STAR LEDs, compared to only 68% of LED purchases in other program states (excluding Wisconsin). States that did not run programs had the lowest share of ENERGY STAR LEDs of the three groups (57%).

[25] Because the ENERGY STAR website does not include the Universal Product Code (UPCs) of qualifying lamps, the evaluation team had to identify ENERGY STAR-qualified lamps using make, model, and rated lifetime. In total, the evaluation team was successful at attributing 97% of LED sales with an ENERGY STAR attribute (that is, an LED was designated ENERGY STAR or was not). The evaluation team could not identify the remaining 3% of LEDs, which are excluded in Figure 21. In addition, the evaluation team conducted this analysis using only the POS data, as the panel data did not contain sufficient sample size to stratify by ENERGY STAR designation.

Figure 21. ENERGY STAR LED Wisconsin Share (2020 POS Channels)

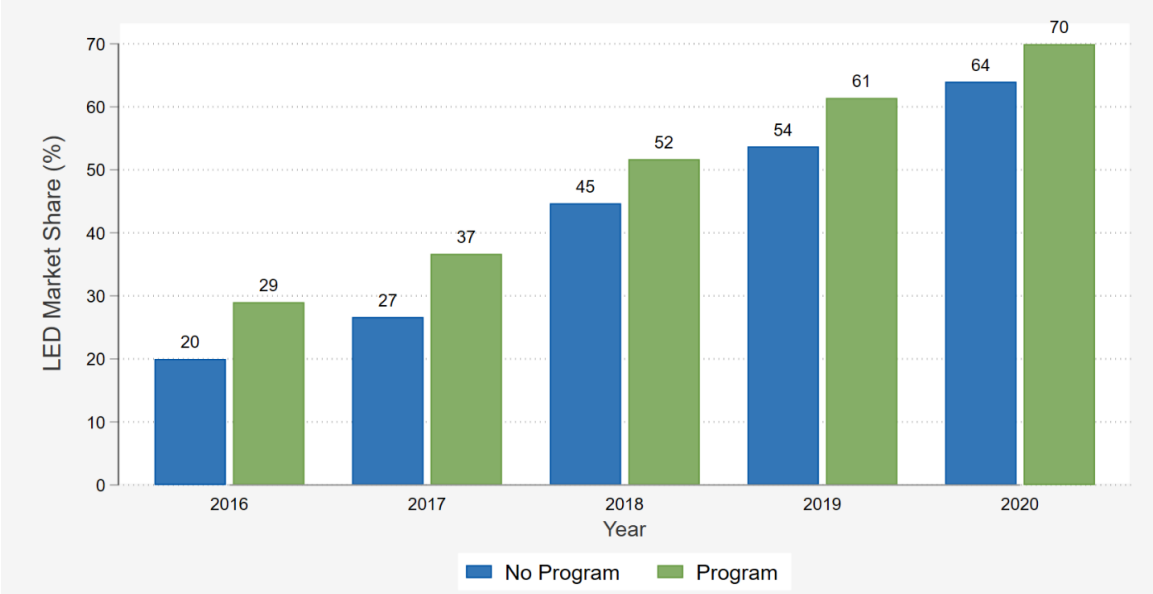


Program Activity

Figure 22 shows the state-level LED share as a function of program activity (program state or non-program state). It is important to note that the number of states in each bin varies by year. In 2020, there were seven states in the "no program" bin and 35 states in the "program moderate" bin.[26] There are two key takeaways from the figure: first, LED share is higher in program states, although the gap has decreased from about 10 percentage points in 2016 and 2017 to about six percentage points in 2020. Second, LED share in "no program" states typically lags LED share in program states by about one year (e.g., in 2018 the average LED market share was 52% in program states, and in 2019 the no program states had an LED market share of about 54%).

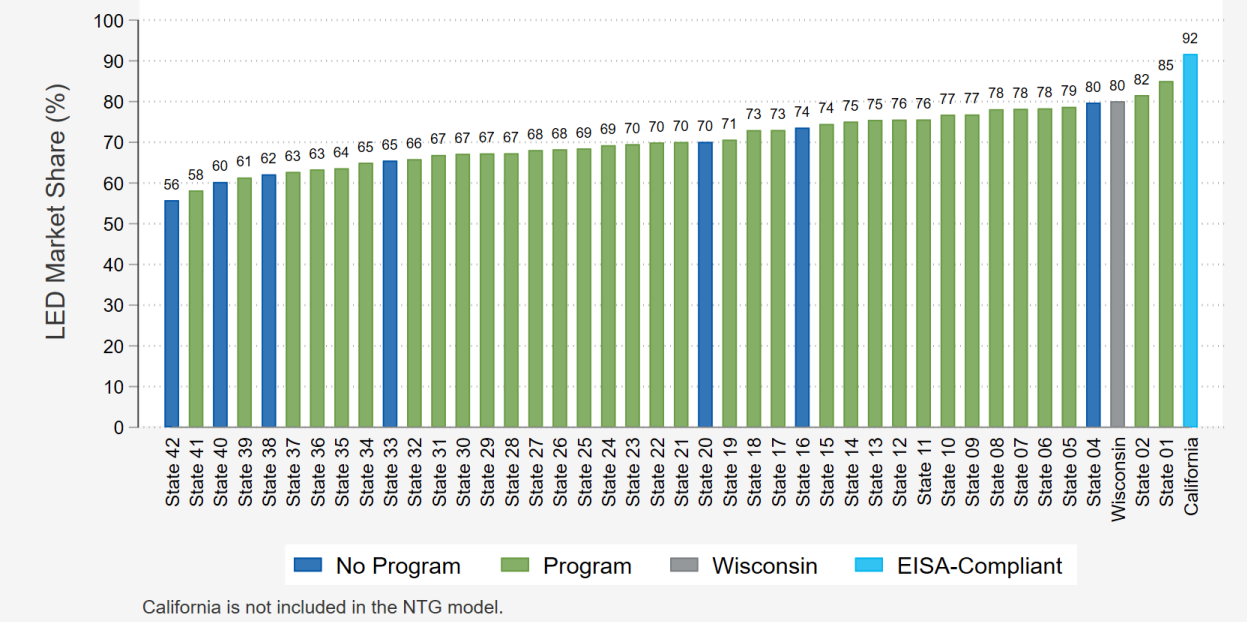
[26] As noted elsewhere, the "no program" states in 2020 are Alabama, Kansas, Kentucky, Mississippi, Nebraska, Tennessee, and Wyoming. California is not included in this figure or the model due to its activation of EISA in 2020. Two prior non-program states—Virginia and Delaware—offered programs in 2020.

Figure 22. Relationship Between Program Activity and LED Sales



Similarly, Figure 23 shows how LED sales in Wisconsin compare to the 42 modeled states. States highlighted in green represent states with programs. Blue bars represent states that did not offer a lighting program. There are a handful of program states with low LED market shares, but states without programs generally have lower LED market shares. Note that most of the non-program states have LED market share below 70% (the national average).

Figure 23. LED Sales Distribution Across States (2020)



Program Intensity

Figure 24 shows the distribution of programs lamps per household for states in which the evaluation team had sufficient data. Wisconsin's upstream lighting offering incented approximately two LED lamps per household. This ranks above the average (1.48 LEDs per household) and median (1.20 LEDs per household) values for the included states.

Figure 24. Average Number of Program Lamps per Household (2020)

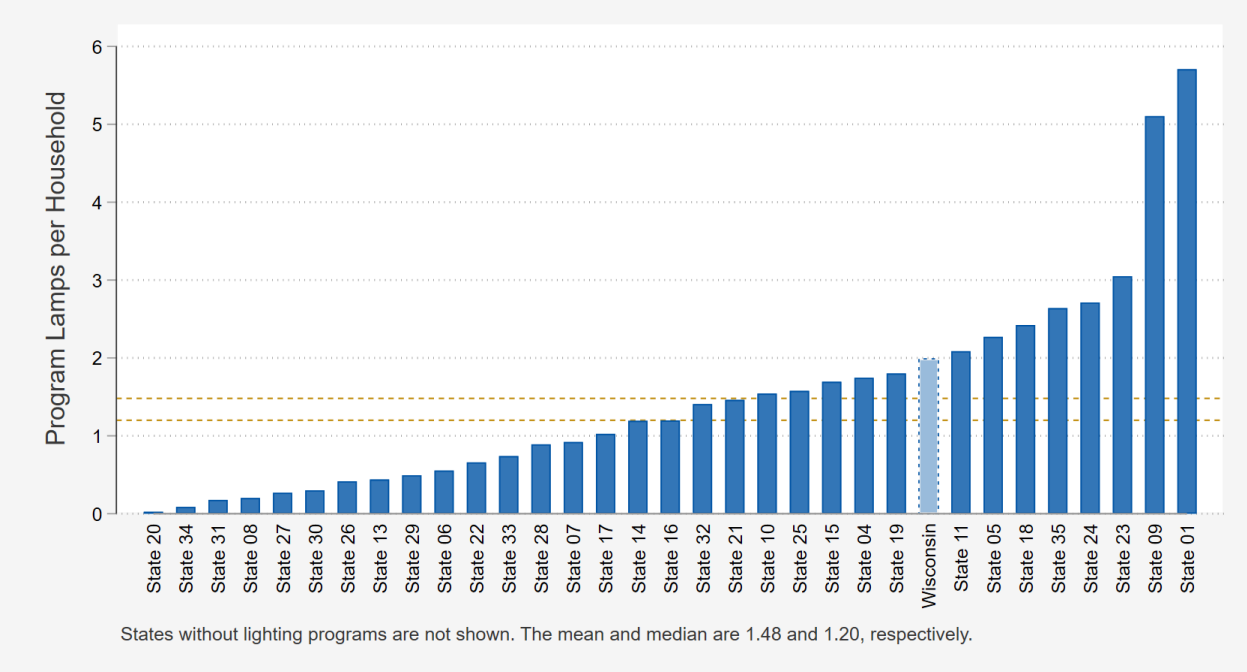
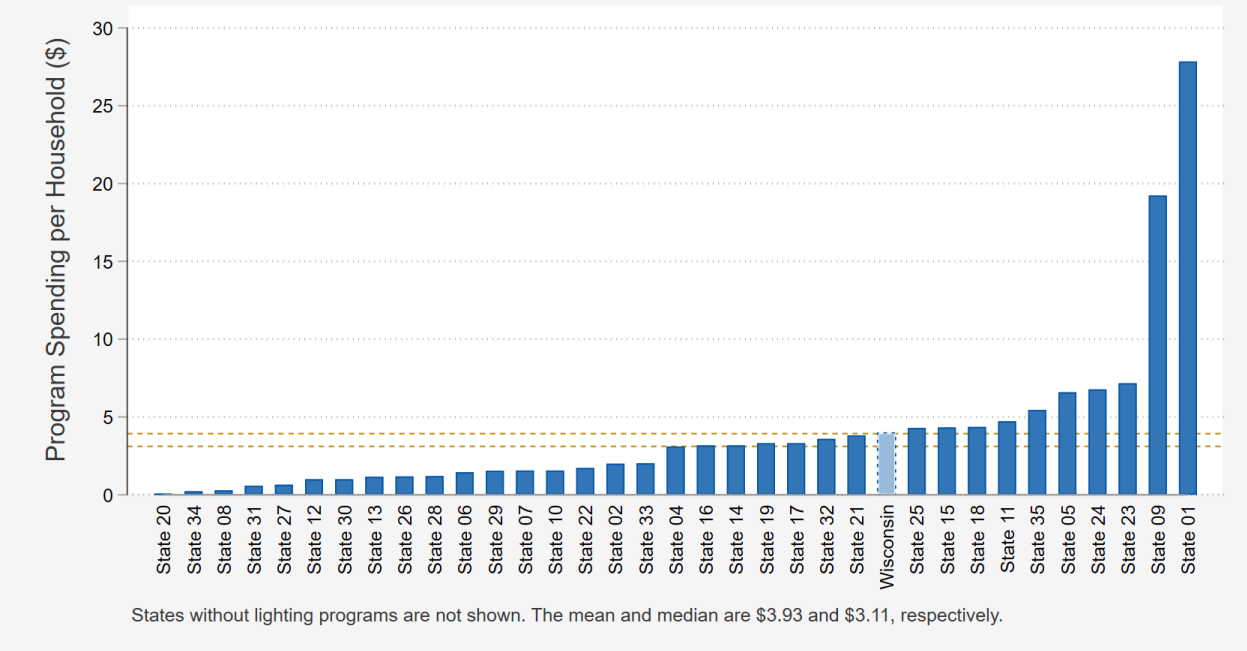


Figure 25 shows the distribution of program spending per household for states in which the team had sufficient data. In most states, upstream lighting offerings spend fewer than $5 per household. Across states, the average and median values were $3.93 and $3.11 per household. Wisconsin's upstream lighting offering falls slightly above the mean at $3.98 per household.

Figure 25. Average Program Spending per Household



As shown in Figure 26, the evaluation team also compared the average incentive offered per LED across states in which LED incentive information was collected. A simple calculation of incentive dollars divided by bulb units yielded average incentives per state. In the 16 states that had sufficient data, LED incentives ranged from approximately $0.75 to $4.50 per LED bulb, with most of these states offering between $1 and $2 per LED. The mean and median LED incentive are $1.83 and $1.78, respectively. At $1.47 per LED, Wisconsin is just slightly below the national average incentive.

Figure 26. Average Upstream Lighting Incentive Per LED (2020)

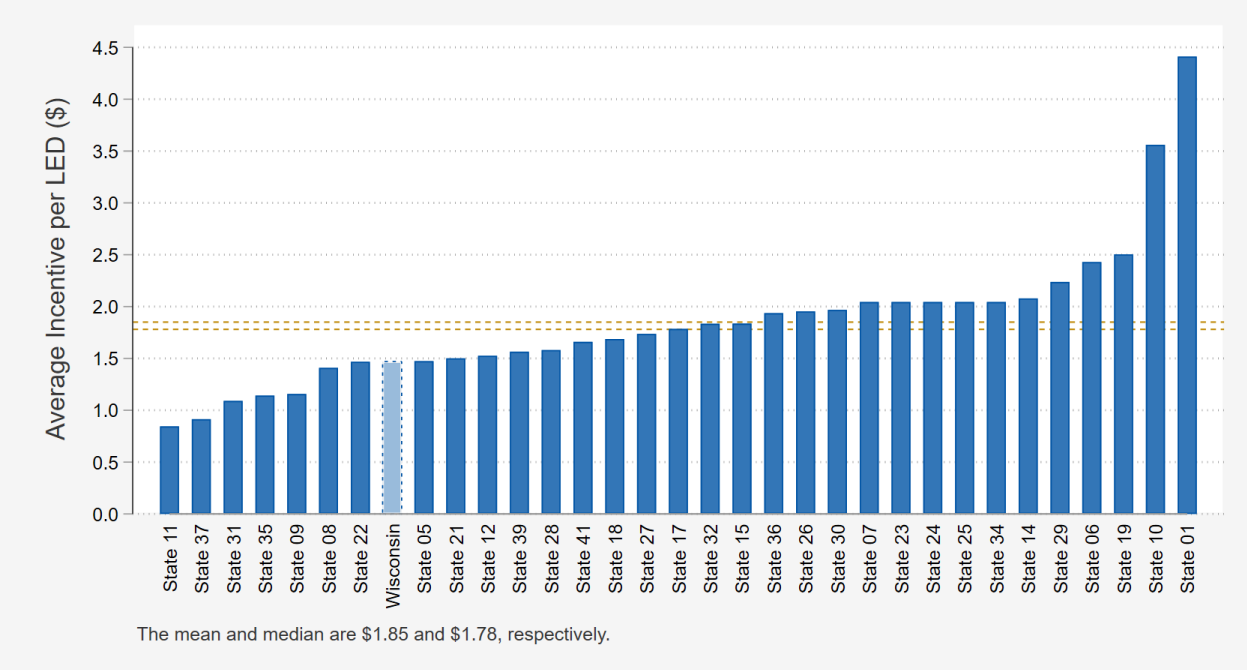
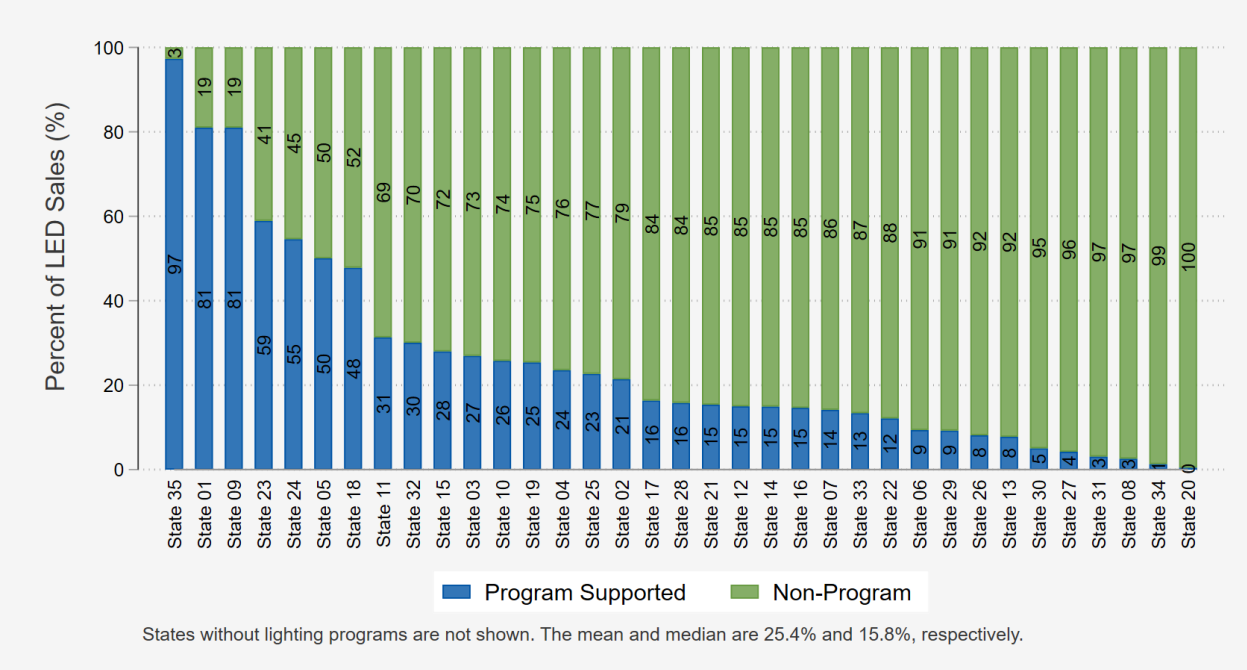


Figure 27 shows the percentage of LED sales, by state, that were incented by an upstream lighting program (where this percentage is calculated by dividing the number of incented LED bulbs by the total LED bulbs sold in the state). Across all states, the average percentage was 25% and the median was 16%. Wisconsin falls slightly above the average state at 27%.

Figure 27. Percentage of LED Sales Supported by Upstream Lighting Program



It is clear from the data used for the national sales model that program spending was at least partially responsible for an increased market share of LED sales. Although these figures help illustrate program activity in relation to LED sales, the regression analysis provided information about what other factors could be influencing the marketplace and a better understanding of the programmatic impacts. The next section presents the key findings from the national sales model.

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 H. Cost Effectiveness and Emissions Methodology and Analysis* in Volume III includes a description of the TRC test.

Table 32 lists the CY 2020 incentive costs for the Direct to Customer Solution.

Table 32. CY 2020 Direct to Customer Incentive Costs

Offerings	Incentive Costs
Appliance Recycling	$5,975
Online Marketplace	$1,672,091
Packs	$1,861,274
Retail	$8,809,196
Farmhouse Kits	$21,877
Pop Up Retail	$239,734
Total	**$12,610,146**

The evaluation team found that the CY 2020 Direct to Customer Solution was cost-effective when including the T&D benefits (5.64), and when excluding them (5.17). Table 33 lists the evaluated costs and benefits.

Table 33. Direct to Customer Costs and Benefits

Cost and Benefit Category	Total
Costs	
Non Incentive Costs	$7,435
Incremental Measure Costs	$8,471,580
Total Non-Incentive Costs	**$15,907,337**
Benefits	
Electric Benefits (kWh)	$41,415,544
Electric Benefits (kW)	$16,568,988
T&D Benefits (kW)	$7,438,098
Gas Benefits	$6,961,215
Emissions Benefits	$17,367,912
Total TRC Benefits with T&D benefits	**$89,751,756**
Net TRC Benefits with T&D benefits	**$73,844,418**
TRC B/C Ratio with T&D benefits	**5.64**

Outcomes and Recommendations

The evaluation team offers the following outcomes and recommendations based on the CY 2020 evaluation.

Outcome 1. In CY 2020, the implementer introduced several new MMIDs in SPECTRUM that did not go through the prescribed TRM review and approval process. In some cases, the evaluation team struggled to identify appropriate savings for these measures or understand *ex ante* assumptions, making it difficult to assign verified savings to these measures and understand measure-level realization rates.

Recommendation 1. The TRM management committee should enact regular reminders about agreed-upon steps for approving new measures or delivery channels and adding new measures to SPECTRUM. The team should also consider designing a process that allows for rapid creation of new measures in SPECTRUM before formally approving savings and costs while still ensuring savings and costs are finalized well before the evaluation team receives final data.

Outcome 2. Online Marketplace participant surveys indicate that customers' motivations for purchasing a specific product, and for purchasing through the Online Marketplace, vary by measure type. Survey responses show that LED and smart thermostat participants are more interested in specific features of the products themselves, that is, energy savings, for LEDs, and energy savings and other features, for smart thermostats. Survey responses indicated that these participants were more likely than other participants to shop around and prioritize obtaining the best price. Participants purchasing advanced power strips, showerheads, and faucet aerators were more likely than LED or smart thermostat participants to respond to suggestions from Focus on Energy and support Focus on Energy.

These participants were also more likely to say the Focus on Energy discount was an important factor in their purchasing decision than to say getting the best price. About half the participants (49% to 57%) did not shop anywhere other than the online marketplace.

Recommendation 2. The implementer should consider using targeted incentive and marketing strategies based on measure type and customer segment. Messaging for LEDs should promote competitive pricing relative to major retailers. For smart thermostats, messaging should highlight that the marketplace offers a variety of brands and models. For efficient water measures and advanced power strips, messaging should focus on reducing personal energy use, and being a part of a bigger, statewide effort to reduce energy use (i.e., Focus on Energy).

Outcome 3. Online Marketplace LEDs have a lower ISR than those distributed through Etail events or upstream lighting. Tracking and survey data suggests that Online Marketplace customers bought larger quantities of LEDs than customers in other channels, which led to a lower percentage of LEDs installed in the home. This could be driven by the fact that a large share of LEDs sold through the Online Marketplace were sold in packages of six or more, potentially requiring customers to purchase more bulbs than they needed (e.g., if a customer only needs three LEDs, they would be forced to buy six bulbs).

Recommendation 3. For CY 2021, the implementer has already added more options for single bulbs and multi-packs of fewer than six bulbs. The evaluation team supports this change, which will allow customers to purchase only the number of bulbs they need. To preserve the low barriers to participation offered by the online marketplace, the team does not recommend any limits on the number of bulbs customers can purchase through the Online Marketplace, but if the average number of bulbs per customer does not decrease, the ISR is likely to remain low.

Outcome 4. Participant Online Marketplace and Retail surveys indicate that the Online Marketplace is successfully distributing smart thermostats to a broader demographic of customers than the Retail offering. The easy process and broad accessibility of the Online Marketplace appear to successfully penetrate a broader demographic than the Retail rebates, which has both positive and negative implications. The deeper penetration of smart thermostats into segments with less education is a positive trend, especially since the concentration of advanced degrees among Retail smart thermostat participants tends to be particularly high and this is one of the most popular residential measures across all Focus on Energy offerings. (See discussion of these findings in *Appendix G*.) However, the Online Marketplace also has a greater prevalence of ineligible participants (customers who do not connect their thermostat to natural gas heating equipment or electric heating/cooling equipment) and has a negative impact on savings.

Recommendation 4: The implementer should maintain the current Online Marketplace design, including not requiring an account number to check out, since any change could limit penetration into less educated households. To account for ineligible customers, the implementer should incorporate an adjustment factor into savings projections for all smart thermostats, depending on offering delivery mechanism.

Outcome 5. Smart thermostat savings in the TRM are outdated and do not account for customers who connect their thermostat to only a central air conditioner or with oil or propane heat. TRM smart thermostat savings are based on a billing data analysis of the Focus on Energy CY 2015 Smart Thermostat Pilot. Savings were binned for thermostats connected to natural gas furnaces, boilers or air source heat pumps, with furnace and boiler electric savings reflecting the percentage of pilot homes with these equipment and central air conditioning. Electrical savings were not assessed for customers with electric resistance central heating or central air-conditioners used with oil or propane heating systems because these sites were ineligible to receive thermostats during the pilot.

Recommendation 5. The evaluation team should conduct an updated billing analysis of smart thermostat savings and update savings in the TRM. Research should focus on a broader range of heating and cooling options and define savings for additional configurations.

Outcome 6. Packs participant surveys revealed that 12% to 19% of participants may be incorrectly labeled as single-family or multifamily in SPECTRUM. Although it is possible some participants may have relocated between receiving their pack and the survey, it is unlikely that such a large percentage would have done so. This deviation could impact savings, as most Packs measures differentiate single-family and multifamily savings.

Recommendation 6. The implementer should consider options to improve housing type clarity on the Packs ordering page and improve quality control of the data imported to SPECTRUM.

Outcome 7. Retail offering tracking systems do not differentiate LEDs distributed through upstream lighting and Etail/pop-up events, making it difficult to assess savings for specific delivery methods. In CY 2020 the evaluation team calculated savings for Etail/pop-up LEDs differently than upstream lighting LEDs for the first time. Current data tracking in SPECTRUM and the implementer's database combines LEDs in these two sources, making it difficult to apply separate inputs and NTG ratios to bulbs in the two delivery paths and clearly show evaluation results from the two paths.

Recommendation 7. The implementer should consider tracking Etail and upstream LEDs separately, allowing a clearer differentiation of savings and evaluation results.

Outcome 8. Customer satisfaction is high across all Direct to Customer offerings, except Appliance Recycling. CY 2020 satisfaction ratings for Packs (9.5) and Retail Smart Thermostat (9.4) offerings were up significantly compared to their CY 2019 predecessor programs. Ratings for the Retail Events (9.4) and Online Marketplace (9.4) offerings were similarly high. Only Appliance Recycling (8.9) saw a significant decline in ratings from CY 2019, which seems to be mostly driven by the elimination of this offering's incentive at the beginning of CY 2020. The administrator ended the Appliance Recycling offering at the conclusion of CY 2020.

Outcome 9. Etail events customers were more likely than other customers to provide negative feedback on the amount of time it took to receive their products. It is likely that these customers ordered their products at the beginning of the Etail event and did not understand that products would not ship until the event closed.

Recommendation 8. The implementer should consider increasing or changing messaging to remind customers that their products will ship at the end of the event. These reminders could be included in the order confirmation page and in the order verification email.

Recommendation 9. The implementer should also consider ways to prevent long delays for customers who order early in an event, such as shipping multiple times during an event.

Outcome 10. The retail lighting market continues to tilt toward LEDs, with LEDs now making up 80% of the Wisconsin lighting market and 70% of the national lighting market. Even in states without upstream lighting offerings, LED market shares are now around 60% to 70%. However, sales data analysis continues to show that retailers in POS data—grocery, dollar, drug, discount, and mass merchandiser—have a lower LED market share than the big box and major club stores.

Recommendation 10. Focus on Energy should consider targeting retailers in the POS distribution channels to maximize the offering's influence.

Outcome 11. The increasing LED market share is not restricted to A-line bulbs. Both program and non-program states saw large gains in the LED market shares of specialty lamps in 2020. Most notably, in states without lighting programs, LEDs account for more than 90% of reflector sales.

Recommendation 11. Focus on Energy should consider discontinuing incentives for LED reflectors or consider supporting them only in hard-to-reach channels where LED sales still lag behind.

Trade Ally Solutions

Trade Ally Solutions is administered by APTIM and implemented by CLEAResult. It provides incentives to residential customers who make efficiency upgrades through three statewide offerings:

- **Insulation and Air Sealing.** Provides incentives for contractor-assisted or do-it-yourself insulation and air sealing improvements.
- **Heating and Cooling.** Provides incentives for HVAC equipment improvements.
- **Renewable Energy.** Provides incentives for residential and business solar photovoltaic installations. This offering includes a Rural Renewables bonus for residential customers in designated rural zip codes.

The Insulation and Air Sealing and Heating and Cooling offerings include two incentive tiers for energy efficiency improvements:

- Tier 1 offers incentives to all homeowners.
- Tier 2 offers enhanced incentives to homeowners with a household income at or below 80% of the state median income.

Additional details about each offering are provided in the *Process Evaluation* section of this chapter.

Table 34 summarizes Trade Ally Solutions impacts for CY 2020, including impacts for statewide and rural offerings as well as total impacts for the whole solution.

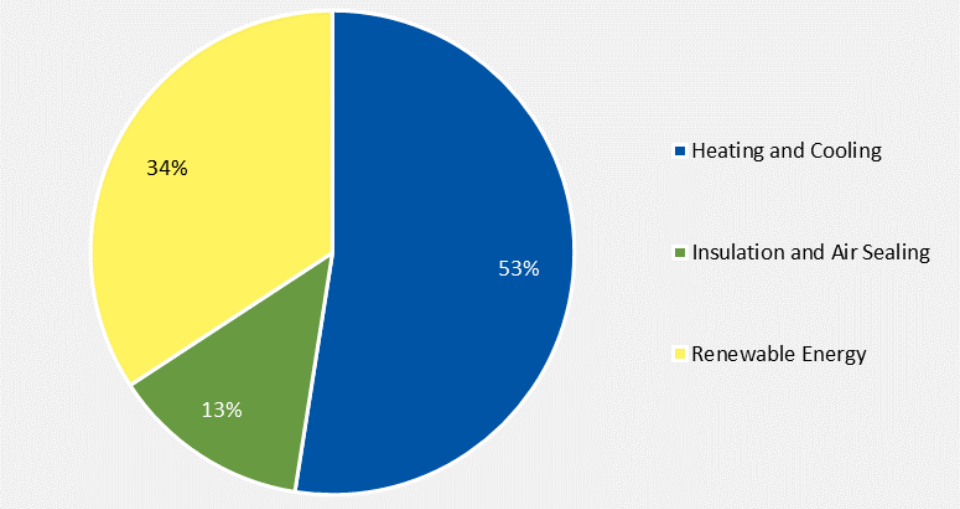
Table 34. CY 2020 Trade Ally Solutions Summary

Item	Units	Heating and Cooling/Insulation and Air Sealing Offerings	Renewable Energy Offering, Residential	Renewable Energy Offering, Commercial	Total Trade Ally Solutions
Incentive Spending	$	$6,453,448	$2,837,744[a]	$1,384,475	$10,675,667
Participation	Number of Participants	27,931	1,946	145	30,022
Verified Gross Lifecycle Savings	kWh	218,784,435	443,653,917	360,798,140	1,023,236,492
	kW	2,553	6,177	4,793	13,523
	therms	30,134,547	0	0	30,134,547
Verified Gross Lifecycle Realization Rate	% (MMBtu)	103%	100%	100%	102%
Annual NTG Ratio	% (MMBtu)	83%	60%	60%	75%
Net Annual Savings	kWh/year	10,887,503	10,647,694	8,659,683	30,194,880
	kW	2,366	3,706	2,876	8,948
	therms/year	1,352,418	0	0	1,352,418
Net Lifecycle Savings	MMBtu	3,165,246	908,248	738,626	4,812,120
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio with T&D Benefits	0.80	0.93	1.74	**0.98**

[a] Residential Renewable Energy spending includes $399,050 paid for Rural Renewables Bonuses.

Figure 28 shows the solution proportion of savings by offering. The Heating and Cooling offering contributed the largest amount of net lifecycle MMBtu savings to the Trade Ally Solutions.

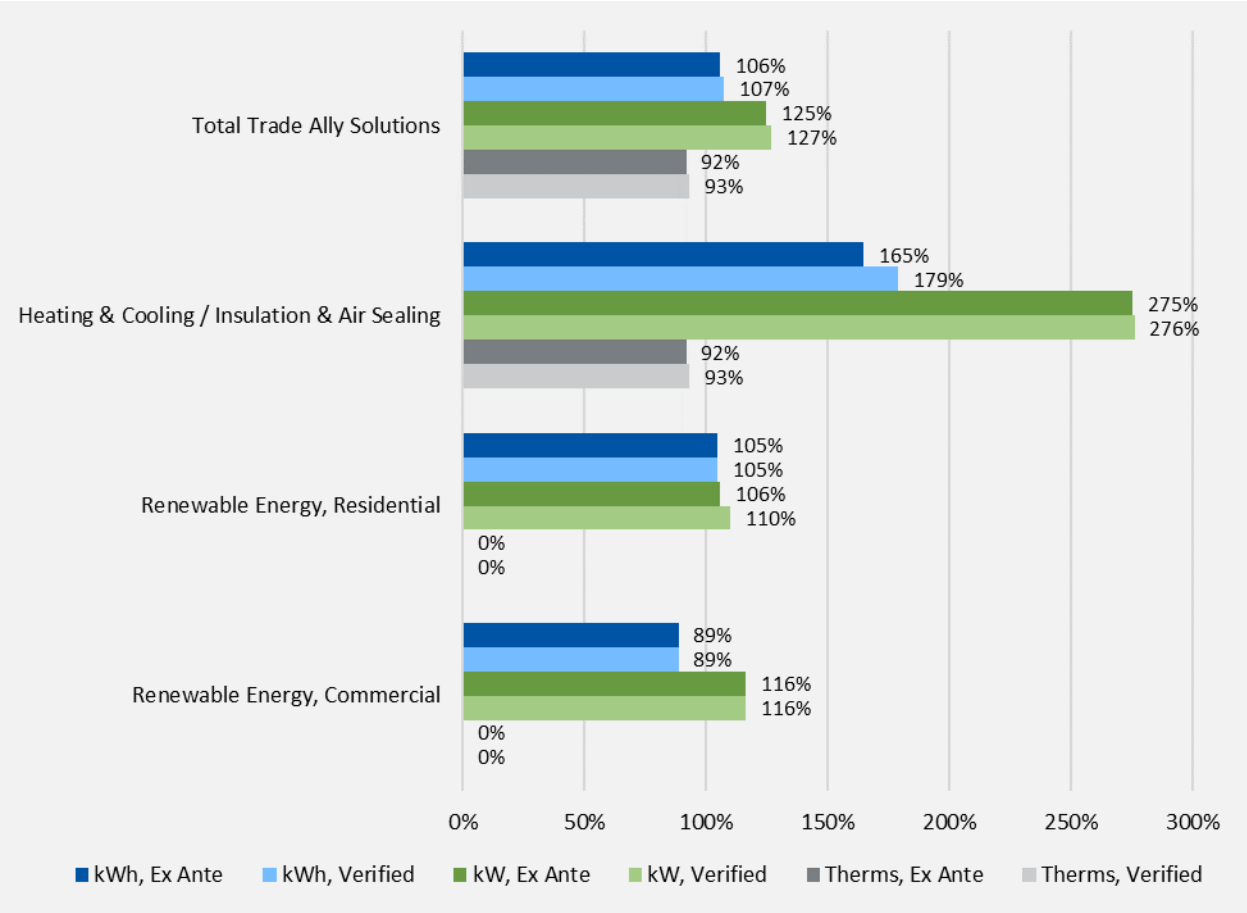
Figure 28. Net Lifecycle Savings by Offering



Achievement Against Goals

Figure 29 shows the percentage of gross lifecycle savings goals achieved by Trade Ally Solutions and its offerings in CY 2020. Overall, the offerings exceeded their kWh and kW goals but were slightly short of achieving their therms savings goals. The Heating and Cooling offering significantly exceeded its kW goal because the CY 2020 goals were determined before the CY 2020 TRM was finalized. Updated electronically commutated motor (ECM) savings in the final TRM allowed the offering to claim more kW savings than the implementer or administrator predicted when they set goals.

Figure 29. Trade Ally Solutions – Heating & Cooling and Insulation & Air Sealing Achievement of CY 2020 Gross Lifecycle Savings Goals



The 100% *ex ante* gross lifecycle savings reflects the implementer's contract goals for CY 2020. Verified gross lifecycle savings contribute to the administrator's portfolio-level goals.
Note: Focus on Energy had goals for the commercial and residential Renewable Energy offerings and had a combined goal for the Heating and Cooling and Insulation and Air Sealing offerings.

Impact Evaluation

This section contains the findings for the CY 2020 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 2020 Trade Ally Solutions. The team designed its evaluation, measurement, and verification approach to integrate multiple perspectives in assessing the performance of each offering and of the solutions as a whole. Table 35 lists specific data collection activities and sample sizes used in the evaluations. Additional details about these activities and their findings can be found in the offering-specific discussions below and in *Appendix J* in Volume III.

Table 35. CY 2020 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**
Participant Surveys	152	446	N/A [a]	N/A [a]	**598**
Standard Market Practice Analysis	Census	N/A	N/A	N/A	**Census Heating and Cooling**
Billing Data Analysis	N/A	Census	N/A	N/A	**Census Insulation and Air Sealing**
Desk Reviews	N/A	N/A	N/A	11	**11**
Desk Review + Interviews	N/A	N/A	N/A	9	**9**
Virtual Site Visit	N/A	N/A	N/A	5	**5**

[a] Renewable Energy participants were not surveyed in CY 2020 because they were surveyed in CY 2019 as part of an in-depth analysis of the Renewable Energy offering.

Verified Gross Savings Results for Trade Ally Solutions

Table 36 lists the first-year and lifecycle realization rates for CY 2020, and Table 37 contains a summary of verified first-year and lifecycle savings by offering. Overall, the solutions achieved a first-year evaluated realization rate of 101%, weighted by total (MMBtu) energy savings. Furnace savings adjustments made during the database review drove the solution-level realization rates above 100%. Detailed findings for each offering, including factors affecting the realization rates, are discussed in detail in the next sections of this report.

Table 36. CY 2020 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, Tier 1	108%	100%	103%	104%	110%	103%	105%
Heating and Cooling, Tier 2	122%	100%	93%	94%	122%	93%	94%
Heating and Cooling, Total	**108%**	**100%**	**102%**	**103%**	**111%**	**102%**	**103%**
Insulation and Air Sealing, Tier 1	100%	100%	100%	100%	100%	100%	100%
Insulation and Air Sealing, Tier 2	100%	100%	100%	100%	100%	100%	100%
Insulation and Air Sealing, Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Renewable Energy, Residential	100%	104%	0%	100%	100%	0%	100%
Renewable Energy, Commercial	100%	100%	0%	100%	100%	0%	100%
Renewable Energy, Total	**100%**	**102%**	**0%**	**100%**	**100%**	**0%**	**100%**
Overall Realization Rate	**102%**	**102%**	**101%**	**102%**	**102%**	**101%**	**102%**

Table 37. CY 2020 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, Tier 1	11,064,728	1,948	1,203,727	158,126	181,697,878	21,271,100	2,747,063
Heating and Cooling, Tier 2	207,783	31	158,305	16,539	4,173,306	3,163,025	330,542
Heating and Cooling, Total	**11,272,511**	**1,979**	**1,362,032**	**174,665**	**185,871,185**	**24,434,125**	**3,077,605**
Insulation and Air Sealing, Tier 1	1,429,561	493	232,996	28,177	29,562,370	4,667,503	567,617
Insulation and Air Sealing, Tier 2	167,544	80	51,646	5,736	3,350,880	1,032,920	114,725
Insulation and Air Sealing, Total	**1,597,105**	**574**	**284,642**	**33,914**	**32,913,250**	**5,700,423**	**682,342**
Renewable Energy, Residential	17,746,157	6,177	0	60,550	443,653,917	0	1,513,747
Renewable Energy, Commercial	14,432,806	4,793	0	49,245	360,798,140	0	1,231,043
Renewable Energy, Total	**32,178,963**	**10,970**	**0**	**109,795**	**804,452,057**	**0**	**2,744,790**
Overall Savings	**45,048,578**	**13,523**	**1,646,674**	**318,373**	**1,023,236,492**	**30,134,547**	**6,504,737**

Heating and Cooling: Verified Gross Savings Results

For the Heating and Cooling offering, the evaluation team conducted a database review and TRM review to inform verified gross savings. The offering had a gross lifecycle realization rate of 103% MMBtu.

Table 38 lists the CY 2020 *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*.

Table 38. CY 2020 Heating and Cooling *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
Heating and Cooling Offering Tier 1						
First-Year Gross Savings	10,245,383	1,938	1,170,810	11,064,728	1,948	1,203,727
Lifecycle Gross Savings	164,767,233	1,938	20,613,155	181,697,878	1,948	21,271,100
Heating and Cooling Offering Tier 2						
First-Year Gross Savings	170,645	31	169,403	207,783	31	158,305
Lifecycle Gross Savings	3,430,554	31	3,384,980	4,173,306	31	3,163,025
Total Heating and Cooling Offering						
First-Year Gross Savings	10,416,028	1,970	1,340,213	11,272,511	1,979	1,362,032
Lifecycle Gross Savings	168,197,787	1,970	23,998,135	185,871,185	1,979	24,434,125

The evaluation team calculated energy and demand savings following guidance in the 2020 TRM for most measures. Some measures in early CY 2020 tracking data were removed from the 2020 TRM, and for those, the team relied on the 2019 TRM. For MMID 2658 (water heater, indirect, 90% annual fuel utilization efficiency [AFUE] boiler, non-gas [NG]), there is no workpaper so the team set verified gross savings and incremental costs equal to *ex ante* savings and incremental costs. All other exceptions to TRM guidance are noted below.

Natural Gas Furnaces

The evaluation team combined natural gas furnace make and model information in SPECTRUM with AFUE rating and input capacity (MMBtu/h) data compiled and provided by the implementer.[27] The team then calculated average efficiency (AFUE) and capacity ratings weighted by the number of units of every make and model within each MMID.

To determine verified therm savings, the team calculated differences in consumption between actual installed units (using MMID-average capacities and AFUEs) and baseline units (assuming TRM-deemed baseline AFUEs based on participant sector). The team assumed both baseline and actual installed furnaces featured the same output capacities. Table 39 shows the average capacities, efficient and baseline AFUEs, and efficient and baseline energy consumption for each furnace MMID.

Table 39. CY 2020 Natural Gas Furnace Input Capacity and AFUE Ratings

Measure Name	MMID	Average Actual Capacity[a]	Reported Baseline		Average Actual Installed		Verified therms Savings
			AFUE	therms[b]	AFUE	therms[b]	
Tier 1 Furnaces Measures							
NG Furnace with ECM, 95%+ AFUE (Existing)	1981	64.5	92.8	804.9	95.3	784.0	**20.9**
NG Furnace with ECM, 95%+ AFUE (Existing)	1981	64.5	92.8	804.9	95.3	784.0	**20.9**
Furnace And A/C, ECM, 95% + AFUE, >= 16 SEER	2990	71.2	92.8	888.5	96.6	853.8	**34.7**
NG Furnace with ECM, 97%+ AFUE	3440	75.0	92.8	935.9	97.2	893.5	**42.4**
NG Furnace with ECM, 96%+ AFUE	3868	70.4	92.8	878.5	96.1	848.1	**30.3**
NG Furnace with ECM, 98%+ AFUE	3869	73.1	92.8	912.2	98.2	862.5	**49.7**
MF NG Furnace, Multistage+, 95% AFUE	4950	63.0	80.0	911.9	95.0	767.9	**144.0**
MF NG Furnace, Multistage+, 96% AFUE	4951	55.6	80.0	804.8	96.1	670.1	**134.7**
MF NG Furnace, Multistage+, 97% AFUE	4952	63.0	80.0	911.9	97.3	749.6	**162.4**
MF NG Furnace, Multistage+, 98%+ AFUE	4953	66.0	80.0	955.4	98.1	779.1	**176.3**
MF NG Furnace, Single-stage, 95% AFUE	4958	57.5	80.0	832.3	95.0	700.9	**131.4**
MF NG Furnace, Single-stage, 96% AFUE	4959	55.3	80.0	800.5	96.3	665.3	**135.1**
NG Furnace, Multistage+, 95% AFUE	4962	62.3	92.8	777.4	95.0	759.3	**18.1**
NG Furnace, Multistage+, 96% AFUE	4963	70.0	92.8	873.5	96.1	843.4	**30.1**
NG Furnace, Multistage+, 97% AFUE	4964	76.5	92.8	954.6	97.2	911.8	**42.8**
NG Furnace, Multistage+, 98%+ AFUE	4965	75.1	92.8	937.1	98.2	886.0	**51.2**
NG Furnace, Single-stage, 95% AFUE	4970	62.9	92.8	784.9	95.0	766.5	**18.4**
NG Furnace, Single-stage, 96% AFUE	4971	64.5	92.8	804.9	96.2	776.2	**28.7**

[27] Data provided by the implementer contained efficiency and capacity data for more than 1,700 unique furnace model numbers. The team merged this information with Heating and Cooling Offering data using the make and model numbers tracked in SPECTRUM through a combination of automatic and manual matching. In sum, the implementer's workbook provided efficiency and capacity information for 99.6% of installed Tier 1 natural gas furnaces and 98.2% of installed Tier 2 natural gas furnaces.

Measure Name	MMID	Average Actual Capacity[a]	Reported Baseline		Average Actual Installed		Verified therms Savings
			AFUE	therms[b]	AFUE	therms[b]	
Tier 2 Furnace Measures							
Furnace and A/C, Tier 2, ECM, 95% + AFUE, >= 16 SEER	3779	64.6	80.0	935.1	96.3	776.6	**158.4**
NG Furnace with ECM, Tier 2, 95%+ AFUE (Existing)	3782	52.8	80.0	764.3	95.2	642.1	**122.2**
NG Furnace, Tier 2, 95%+ AFUE	3783	66.0	80.0	955.4	95.9	796.7	**158.6**
NG Furnace with ECM, Tier 2, 96%+ AFUE	3870	63.9	80.0	925.0	96.1	770.1	**154.9**
NG Furnace with ECM, Tier 2, 97%+ AFUE	3871	70.0	80.0	1,013.3	97.1	834.7	**178.5**
MF NG Furnace, Multi-stage+, Tier 2, 95% AFUE	4954	60.0	80.0	868.5	95.0	731.4	**137.1**
MF NG Furnace, Multi-stage+, Tier 2, 96% AFUE	4955	50.8	80.0	735.3	96.1	612.3	**123.0**
MF NG Furnace, Multi-stage+, Tier 2, 97% AFUE	4956	60.0	80.0	868.5	97.4	713.3	**155.2**
MF NG Furnace, Single-stage, Tier 2, 95% AFUE	4960	42.0	80.0	608.0	95.0	512.0	**96.0**
MF NG Furnace, Single-stage, Tier 2, 96% AFUE	4961	44.0	80.0	636.9	96.5	528.0	**108.9**
NG Furnace, Multi-stage+, Tier 2, 95% AFUE	4966	65.6	80.0	949.6	95.0	799.6	**149.9**
NG Furnace, Multi-stage+, Tier 2, 96% AFUE	4967	64.5	80.0	933.6	96.1	777.3	**156.3**
NG Furnace, Multi-stage+, Tier 2, 97% AFUE	4968	69.1	80.0	1,000.2	97.1	824.3	**175.9**
NG Furnace, Multi-stage+, Tier 2, 98%+ AFUE	4969	63.3	80.0	916.3	98.0	747.7	**168.5**
NG Furnace, Single-stage, Tier 2, 95% AFUE	4972	61.2	80.0	885.9	95.0	746.0	**139.9**
NG Furnace, Single-stage, Tier 2, 96% AFUE	4973	61.8	80.0	894.6	96.1	744.4	**150.2**

[a] Average Actual Capacity is based on capacity of units installed and rebated in CY 2020.

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

For multistage natural gas furnace MMIDs introduced in the 2020 TRM, the evaluation team also used furnace make and model information to assign AHRI average annual auxiliary electrical energy consumption (E_{AE}) values to actual installed units.[28] 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 40 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).

[28] Using make and model information, the evaluation team successfully matched AHRI data to 99.6% of installed Tier 1 natural gas furnaces and 98.2% of Tier 2 natural gas furnaces.

Table 40. CY 2020 Multistage Natural Gas Furnace E_{AE} Ratings

Measure Name	MMID	Reported Baseline E_{AE}	Average Actual Installed E_{AE}[a]	Verified kWh Savings
Tier 1 Furnace Measures				
MF NG Furnace, Multistage+, 95% AFUE	4950	482.8	372.5	**110.3**
MF NG Furnace, Multistage+, 96% AFUE	4951	482.8	289.0	**193.8**
MF NG Furnace, Multistage+, 97% AFUE	4952	482.8	274.1	**208.7**
MF NG Furnace, Multistage+, 98%+ AFUE	4953	482.8	295.0	**187.8**
NG Furnace, Multistage+, 95% AFUE	4962	482.8	317.4	**165.4**
NG Furnace, Multistage+, 96% AFUE	4963	482.8	353.9	**128.9**
NG Furnace, Multistage+, 97% AFUE	4964	482.8	359.1	**123.7**
NG Furnace, Multistage+, 98%+ AFUE	4965	482.8	317.6	**165.2**
Tier 2 Furnace Measures				
MF NG Furnace, Multi-stage+, Tier 2, 95% AFUE	4954	468.5	321.0	**147.5**
MF NG Furnace, Multi-stage+, Tier 2, 96% AFUE	4955	468.5	269.0	**199.5**
MF NG Furnace, Multi-stage+, Tier 2, 97% AFUE	4956	468.5	213.0	**255.5**
NG Furnace, Multi-stage+, Tier 2, 95% AFUE	4966	468.5	325.8	**142.7**
NG Furnace, Multi-stage+, Tier 2, 96% AFUE	4967	468.5	331.1	**137.4**
NG Furnace, Multi-stage+, Tier 2, 97% AFUE	4968	468.5	303.1	**165.4**
NG Furnace, Multi-stage+, Tier 2, 98%+ AFUE	4969	468.5	285.6	**183.0**

[a] Average Actual Installed E_{AE} is based on units installed and rebated in CY 2020.

Multistage furnace MMIDs introduced in the 2020 TRM (described in Table 40) replaced legacy furnace MMIDs from the 2019 TRM. This transition occurred between March and May 2020; therefore, legacy furnace MMIDs appeared in Heating and Cooling tracking data through May 2020. Legacy furnace MMIDs assume higher electric savings because the PSC motor baseline was upgraded to an ECM. These savings were largely nullified after a July 3, 2019, update to federal furnace standards that required furnace motors to meet an efficiency standard that PSC motors generally did not exceed. This update made ECMs largely the standard, though there are multiple tiers of ECM efficiency and the updated TRM energy savings employ E_{AE} as a rough proxy for savings beyond the code requirement. Because legacy MMID electric savings are based on ECMs instead of E_{AE}, the evaluation team applied deemed kWh savings from the 2019 TRM to these measures and did not adjust for actual E_{AE}.

Air Conditioners

Similar to natural gas furnaces, the evaluation team used central air conditioner make and model information in SPECTRUM to assign efficiency (SEER) and input capacity ratings from the AHRI database to each installed air conditioner.[29] The team then derived an average efficiency and capacity value for each air conditioner MMID. To determine verified kWh savings, the team calculated differences in

[29] Using make and model information, the evaluation team successfully matched AHRI data to 81.0% of installed Tier 1 air conditioners. The team did not have sufficient make and model information for Tier 2 air conditioners to determine average efficiency and capacity ratings; therefore, the team applied TRM deemed savings to those measures.

consumption between actual installed measures (using MMID-average SEERs) and baseline measures (using the TRM-deemed baseline SEER). The team assumed efficient and baseline measures featured the same average output capacities. For each air conditioner MMID, Table 41 shows the average efficiency and capacity ratings based on AHRI and tracking data, as well as the TRM baseline efficiency.

Table 41. CY 2020 Air Conditioner Input Capacity and SEER Ratings

Measure Name	MMID	Capacity	Reported Baseline		Actual Installed		Verified kWh Savings
			SEER	kWh[a]	SEER	kWh[a]	
Furnace and A/C, ECM, 95% + AFUE, >= 16 SEER	2990	30.2	13.0	952.5	16.7	742.3	**210.1[b]**
Air Conditioner 16+ SEER	4974	30.5	13.0	961.9	16.8	743.9	**218.0**

[a] All air conditioner kWh savings assume 410 EFLH.

[b] These represent only the cooling portion of air conditioner savings; there are additional savings from the installation of an ECM that occur during heating and circulation modes.

For the combination furnace and air conditioner measure (MMID 2990), there are additional energy savings stemming from the operation of the added ECM while the system is in heating and circulation modes. As with other legacy furnace MMIDs, the evaluation team did not adjust the verified gross kWh savings attributable to the ECM. Thus, the total per-unit verified gross kWh savings for MMID 2990 (555.5 kWh) reflect a combination of TRM-deemed savings for the furnace ECM (345.4 kWh) and adjusted savings for the air conditioner (210.1 kWh, as shown in Table 41).

Insulation and Air Sealing Measures

Some insulation and air sealing measures were mistakenly recorded in SPECTRUM under the Heating and Cooling offering. Following evaluation efforts for the Insulation and Air Sealing offering, the team reviewed these measures' SPECTRUM savings for reasonableness and, finding no duplicates or outliers, accepted the *ex ante* savings.

Verified Gross Savings Adjustment Summary

For furnace and air conditioner measures for which the evaluation team adjusted savings, the two changes described below comprise the differences between *ex ante* and verified gross savings:

- **Actual installed efficiency.** Actual installed measure efficiencies were consistently equal to or higher than TRM-assumed baseline efficiencies. Slightly higher efficiency levels contribute to higher verified gross savings relative to *ex ante* savings.
- **Furnace input capacity.** Depending on the MMID, actual installed measures had capacities both larger and smaller than TRM-assumed capacities. Actual installed measures were typically smaller than deemed, contributing to lower verified gross savings relative to *ex ante* savings.

Insulation and Air Sealing: Verified Gross Savings Results

For the Insulation and Air Sealing offering, the evaluation team conducted a database review and TRM review to inform verified gross savings. The team did not find any duplicates or unreasonable savings in the tracking data and accepted *ex ante* savings. The offering had a gross lifecycle realization rate of 100% MMBtu.

The evaluation team applied TRM energy savings and demand reduction values for all Insulation and Air Sealing offering measures. Table 42 lists the CY 2020 *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*.

Table 42. CY 2020 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, Tier 1						
First-Year Gross Savings	1,431,606	494	233,508	1,429,561	493	232,996
Lifecycle Gross Savings	29,602,177	494	4,677,743	29,562,370	493	4,667,503
Insulation and Air Sealing, Tier 2						
First-Year Gross Savings	167,544	80	51,646	167,544	80	51,646
Lifecycle Gross Savings	3,350,880	80	1,032,920	3,350,880	80	1,032,920
Insulation and Air Sealing, Total						
First-Year Gross Savings	1,599,150	574	285,154	1,597,105	574	284,642
Lifecycle Gross Savings	32,953,057	574	5,710,663	32,913,250	574	5,700,423

Renewable Energy: Verified Gross Savings Results

For the CY 2020 evaluation of the Renewable Energy offering, the team combined results from the CY 2019 evaluation and new CY 2020 verification activities. Overviews of these activities by residential and commercial sector follow.

Residential

For residential Renewable Energy projects, the evaluation team applied realization rates calculated in the CY 2019 evaluation. The team based these realization rates on its desk review of 92 residential solar photovoltaic (PV) participant applications and verification of project savings in PVWatts. Table 43 lists CY 2020 residential realization rates for solar PV.

Table 43. Solar PV Realization Rates by Savings Type

kWh	kW
100%	104%

Commercial

For the Commercial Renewable Energy offering, the evaluation team conducted desk reviews, interviews, and virtual site visits (brief descriptions of each activity follow). The team also reviewed the database, TRM, application files, and measure-level engineering analyses to inform verified gross savings on a sample of projects in CY 2020. Due to the COVID-19 pandemic, the team did not conduct site visits during the 2020 evaluation year.

Engineering Desk Review

The evaluation team reviewed all available project documentation in SPECTRUM on 25 measures. The 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). The evaluation team used the Focus on Energy TRM and associated work papers to determine methodology and data in nearly all cases.

To conduct the impact analysis of the offering, the evaluation team selected a representative sample of measures to evaluate then extrapolated findings to the larger offering population. In 2020, 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 were extrapolated to the remainder of the offering population.

Engineering Desk Review + Interview

The evaluation team conducted engineering desk reviews with the addition of an interview on nine measures. This included all engineering desk review actions plus a telephone interview or email exchange with the site contact to verify key parameters, collect additional site photos, discuss operating schedules, and obtain additional trend data.

Virtual Verification Site Visits

The evaluation team conducted virtual verification site visits on five measures, which involved an engineering desk review then using software to connect virtually to the site contact's mobile device camera and microphone. The team then visually verified the type and quantity of equipment installed, asked the site contact how the installed equipment is controlled, and documented the operating hours of the installed equipment. The team also verified savings calculation input parameters.

The offering had a gross lifecycle realization rate of 100% MMBtu. The evaluation team found a consistent use of the methodology and deemed values from the 2020 TRM. From the participation numbers and *ex ante* savings claimed, it appears the COVID-19 pandemic did not significantly impact the Commercial Renewable Energy offering in CY 2020. Table 44 shows the CY 2020 commercial solar PV realization rates.

Table 44. Commercial Solar PV Realization Rates by Savings Type

kWh	kW
100%	100%

Table 45 shows the *ex ante* and *ex post* verified savings for the residential and commercial renewable offering by sector and overall.

Table 45. CY 2020 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	17,746,157	5,939	-	17,746,157	6,177	-
Lifecycle Gross Savings	443,662,217	5,939	-	443,653,917	6,177	-
Renewable Energy, Commercial						
First-Year Gross Savings	14,432,806	4,793	-	14,432,806	4,793	-
Lifecycle Gross Savings	360,798,140	4,793	-	360,798,140	4,793	-
Total Renewable Energy						
First-Year Gross Savings	32,178,963	10,732	-	32,178,963	10,970	-
Lifecycle Gross Savings	804,460,357	10,732	-	804,452,057	10,970	-

Verified Net Savings Results for Trade Ally Solutions

The evaluation team used a variety of NTG analyses to calculate measure-level NTG ratios for all offering in the Trade Ally Solutions. The team selected an approach based on the project type and the data available for measures within the offering. Table 46 summarizes the NTG approaches used by offering. These approaches are further detailed in the following sections.

Table 46. Trade Ally Solutions NTG Approaches

Offering	NTG Approach
Heating and Cooling, Tier 1	Standard market practice analysis Self-report responses from participant surveys
Heating and Cooling, Tier 2	Assumed 100% NTG
Insulation and Air Sealing, Tier 1 and Tier 2	Billing analysis
Renewable Energy, Residential	Self-report from CY 2019 participant surveys
Renewable Energy, Commercial	Self-report from CY 2019 participant surveys

The evaluation team calculated an overall lifecycle NTG estimate of 74% for the solution in CY 2020. Table 47 shows the weighted average NTG ratio by offering as well as the total first-year gross and net savings.

Table 47. Trade Ally Solutions Lifecycle Net Savings and NTG

Offering	Total Lifecycle Verified Gross Savings (MMBtu)	Total Lifecycle Net Savings (MMBtu)	NTG Ratio
Heating and Cooling, Tier 1	2,747,063	2,195,509	80%
Heating and Cooling, Tier 2	330,542	330,085	100%
Heating and Cooling, Total	**3,077,605**	**2,525,593**	**82%**
Insulation and Air Sealing, Tier 1	567,617	544,720	96%
Insulation and Air Sealing, Tier 2	114,725	94,932	83%
Insulation and Air Sealing, Total	**682,342**	**639,652**	**94%**
Renewable Energy, Residential	1,513,747	908,248	60%
Renewable Energy, Commercial	1,231,043	738,626	60%
Renewable Energy, Total	**2,744,790**	**1,646,874**	**60%**
Total Trade Ally Solutions	**6,504,737**	**4,812,120**	**74%**

Heating and Cooling Offering

The evaluation team analyzed market and home assessment data to calculate NTG ratios for furnaces and air conditioners and administered a participant survey to solicit self-response information that informed freeridership and spillover estimates for all other measures in the Heating and Cooling offering, such as boilers, heat pumps, and smart thermostats.

Standard Market Practice

The team had adequate market data for furnaces and air conditioners to calculate measure-level NTG using a standard market practice (SMP) methodology, whereas verified gross savings relied on deemed baseline efficiencies in the 2020 TRM and verified net savings relied on market-baseline efficiencies derived using SMP methodology from two sources of sales and installation data (i.e., 2019 D+R International market data[30] and historical Home Performance with ENERGY STAR Program [now the Trade Ally Solutions offering] home assessment data).[31]

The team conducted SMP analyses for Tier 1 measures in the 2020 TRM and for legacy measures in the 2019 TRM when there was sufficient information to apply SMP methodology. For all excluded legacy measures, the team assigned 2019 NTG ratios based on the SMP analysis conducted in CY 2017.

The evaluation team used the SMP methodology to assess the measures and savings types shown in Table 48. The following subsections describe the specific SMP method for each measure.

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30 The evaluation team contracted with D+R to purchase a report of residential HVAC measures sold in Wisconsin during CY 2019. This report used sales data reported to D+R International by HARDI members participating in the Unitary HVAC Market Report. The report contained summaries of quantities of observed sales by efficiency level and estimations of the size of each measure's total market in each year.

31 The Trade Ally Solutions implementer shared data collected from all home assessments conducted since CY 2012. Since the team conducted the last SMP analysis in CY 2017, it limited home assessment data to manufacture dates from CY 2017 onward for all furnaces and air conditioners for its CY 2020 analysis.

Table 48. Tier 1 Measures and Savings Assessed with Standard Market Practice Methodology

Tier 1 Measure Type [a]	TRM Year	Market Baseline Data Source(s)	
		Electric (kWh) Savings	Gas (therm) Savings
Natural Gas Furnaces	2019 TRM	CY 2017 SMP analysis [b]	D+R International market data HPwES home assessment data
	2020 TRM	Verified gross baseline [c]	
LP or Oil Furnaces	2019 TRM	CY 2017 SMP analysis [b]	None
Air Conditioners	2019 TRM	CY 2017 SMP analysis [b]	None
	2020 TRM	D+R International market data HPwES home assessment data	

[a] Tier 2 measures were not subject to SMP analysis, as noted in Table 46.

[b] For legacy measures (from the 2019 TRM) in the CY 2020 Heating and Cooling offering tracking data that lacked sufficient market and home assessment data, the evaluation team applied CY 2017 SMP results, consistent with CY 2019 and prior.

[c] For natural gas furnace electric savings with insufficient market and home assessment data, the evaluation team set market baselines (and, therefore, verified net savings) equal to verified gross savings baselines.

The evaluation team established a furnace market baseline efficiency by analyzing available D+R market data that showed all efficiency levels of furnaces sold throughout Wisconsin in 2019, the most recent year of sales and installation data available at the time of analysis. The result was a series of market baseline efficiency levels that represented a mixture of efficient and inefficient equipment sold in Wisconsin and already installed in Wisconsin homes.

The evaluation team then calculated verified net savings by comparing actual installed furnace baselines to market baselines. When the team calculated verified gross savings by comparing energy consumption based on actual installed furnace baselines to consumption based on TRM baselines, it captured the difference between net and verified gross savings by evaluating the differences between market baselines and TRM baselines.

Currently, 2020 TRM baselines are based on the SMP analysis conducted in CY 2015 rather than a federal standard or code. As such, the differences between CY 2020 market baselines and TRM baselines represent increases in efficiency that naturally occurred in appliance markets (irrespective of the Heating and Cooling offering's influence) starting in 2015 through 2020. Therefore, the team attributed differences in energy savings from comparing market and TRM baselines to the market rather than the offering. For the purposes of the SMP analysis, the team has labeled these savings as market-based freeridership. However, it is important to distinguish market-based trends observed here from consumer behavior, the latter of which is derived from self-reported participant survey responses and also typically called freeridership.

To calculate market savings, the evaluation team computed the difference between the average energy consumptions of market baseline measures and actual installed measures rebated through the Heating and Cooling offering (as described in *Heating and Cooling: Verified Gross Savings Results* section). Then, to calculate NTG, the team divided market savings by verified gross savings and added participant

spillover adjustments from self-report surveys. Finally, the team determined market-based freeridership by calculating the percentage difference between verified gross and market savings:

$$[\text{Market savings}] = \begin{bmatrix}\text{Baseline energy consumption}\\ \text{using average } \textbf{market} \text{ efficiency}\\ \text{and } \textbf{actual installed} \text{ capacity}\end{bmatrix} - \begin{bmatrix}\text{Efficient energy consumption}\\ \text{using } \textbf{actual installed} \text{ efficiency}\\ \text{and } \textbf{actual installed} \text{ capacity}\end{bmatrix}$$

$$[\text{Net-to-Gross}] = \frac{[\text{Market savings}]}{[\text{Verified gross savings}]} + [\text{Spillover \%}]$$

$$[\text{Market-Based Freeridership}] = \frac{[\text{Verified gross savings}] - [\text{Market savings}]}{[\text{Verified gross savings}]}$$

Natural Gas Furnaces

The evaluation team calculated market therm savings for each natural gas furnace measure by comparing the average consumption of furnaces rebated through the HVAC path to the market baseline. To accomplish this, the team followed these steps:

1. Cleaned and combined CY 2019 market data from D+R International and historical Home Performance with ENERGY STAR Program home audit data to calculate a market baseline AFUE
2. Calculated energy consumptions for actual installed furnaces and for market baseline furnaces[32]
3. Subtracted actual installed consumption from market baseline consumption to determine market savings for each furnace

The evaluation team calculated a market baseline AFUE of 93.34%, an increase from 92.76% in CY 2017 when the team last conducted an SMP analysis. The current *ex ante* value is 92.80%, a rounded value based on the CY 2015 SMP analysis. The team applied this market baseline AFUE to all natural gas furnaces installed in single-family homes.

To calculate market-based freeridership for natural gas furnaces installed in multifamily homes, the team averaged the market baseline AFUE of 93.34% with the TRM-deemed baseline AFUE of 80.00% to produce a multifamily-specific market baseline AFUE of 86.67%.[33] The difference between efficient and baseline AFUEs for multifamily furnaces (80.00% TRM baseline versus 86.67% market baseline) is larger than the difference for single-family furnaces (92.76% TRM versus 93.34% market). The TRM baseline

[32] As noted in the *Standard Market Practice* section, the evaluation team assumed that efficient and baseline measures shared the same input capacities (derived from Heating and Cooling tracking data) and estimated full-load hours from the TRM.

[33] The workpaper for these measures states: "Multifamily and income eligible measures (Tier 2) maintain an 80% AFUE baseline, the lowest AFUE for which sales were present in the sales data, due to income restraints for participating consumers." However, the evaluation team applied an averaged baseline because not all Tier 1 multifamily participants have income restraints. The TRM management committee should refine this assumption in a future evaluation year.

used to calculate verified gross savings for single-family furnaces is based on an estimated market baseline rather than a federal baseline; therefore, single-family furnaces absorb some of the freeridership impact in the gross savings.

Table 49 lists the average of actual AFUE values and market savings (therms) for natural gas furnaces rebated through the offering.

Table 49. CY 2020 Natural Gas Furnace therm Savings and Market-Based Freeridership

Measure Name	MMID	AFUE $_{EFF}$[a]	Actual Installed		Market		Market-Based Freeridership
			$AFUE_{BASE}$[b]	therms Savings	$AFUE_{BASE}$[c]	therms Savings	
NG Furnace with ECM, 95%+ AFUE (Existing)	1981	95.3	92.8	20.9	93.3	16.2	22%
Furnace And A/C, ECM, 95% + AFUE, >= 16 SEER	2990	96.6	92.8	34.7	93.3	29.5	15%
NG Furnace with ECM, 97%+ AFUE	3440	97.2	92.8	42.4	93.3	36.9	13%
NG Furnace with ECM, 96%+ AFUE	3868	96.1	92.8	30.3	93.3	25.3	17%
NG Furnace with ECM, 98%+ AFUE	3869	98.2	92.8	49.7	93.3	44.4	11%
MF NG Furnace, Multistage+, 95% AFUE	4950	95.0	80.0	144.0	86.7	73.8	49%
MF NG Furnace, Multistage+, 96% AFUE	4951	96.1	80.0	134.7	86.7	72.8	46%
MF NG Furnace, Multistage+, 97% AFUE	4952	97.3	80.0	162.4	86.7	92.2	43%
MF NG Furnace, Multistage+, 98%+ AFUE	4953	98.1	80.0	176.3	86.7	102.7	42%
MF NG Furnace, Single-stage, 95% AFUE	4958	95.0	80.0	131.4	86.7	67.4	49%
MF NG Furnace, Single-stage, 96% AFUE	4959	96.3	80.0	135.1	86.7	73.5	46%
NG Furnace, Multistage+, 95% AFUE	4962	95.0	92.8	18.1	93.3	13.6	25%
NG Furnace, Multistage+, 96% AFUE	4963	96.1	92.8	30.1	93.3	25.0	17%
NG Furnace, Multistage+, 97% AFUE	4964	97.2	92.8	42.8	93.3	37.3	13%
NG Furnace, Multistage+, 98%+ AFUE	4965	98.2	92.8	51.2	93.3	45.7	11%
NG Furnace, Single-stage, 95% AFUE	4970	95.0	92.8	18.4	93.3	13.9	25%
NG Furnace, Single-stage, 96% AFUE	4971	96.2	92.8	28.7	93.3	24.0	16%

[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 TRM, used as the base case to calculate verified gross savings.

[c] Market baseline AFUE determined using SMP methodology, used as the base case to calculate verified net savings.

The market baseline AFUE (93.34%) was higher than the TRM-deemed baseline AFUE (92.80%) used for *ex ante* and verified gross savings. The deemed baseline AFUE reflects the market AFUE from the 2015 SMP analysis. Because the furnace market AFUE has risen in the years since that analysis, natural gas savings market-based freeridership is positive for all furnace measures.

Appendix J provides a detailed discussion of the steps taken to combine the data sources, produce the average market baseline AFUE, and calculate market savings for these measures.

Air Conditioners

The evaluation team calculated market kWh savings for air conditioners that had sufficient make and model information in SPECTRUM.[34] It then applied SMP methodology to air conditioner savings but not ECM savings. As such, the team isolated air conditioner savings from ECM savings, applied SMP methodology to air conditioners, then combined air conditioner market savings with ECM-verified gross savings to estimate the market savings for the measure.

Similar to verified gross savings for natural gas furnaces, the team calculated market savings for electric air conditioners following several steps:

1. Cleaned and combined CY 2019 market data from D+R International and historical Home Performance with ENERGY STAR Program home audit data to calculate a market baseline SEER
2. Calculated energy consumptions for actual installed air conditioners and for market baseline air conditioners
3. Subtracted actual installed consumption from market baseline consumption to determine market savings for each air conditioner

The evaluation team calculated a market baseline SEER of 13.6, a decrease from 13.9 in CY 2017 when the team last conducted an SMP analysis. The current *ex ante* value is 13.0. Table 50 lists the average of actual SEER values and market savings (kWh) for electric air conditioners rebated through the offering (when there was sufficient make and model information in SPECTRUM).[35]

Table 50. CY 2020 Electric Air Conditioner kWh Savings and Market-Based Freeridership

Measure Name	MMID	$SEER_{EFF}$	Actual Installed		Market		Market-Based Freeridership
			$SEER_{BASE}$	kWh Savings	$SEER_{BASE}$	kWh Savings	
A/C 16+ SEER	4974	16.8	13.0	218.0	13.6	177.5	19%

[a] Efficient AFUE derived from actual installed air conditioners tracked in SPECTRUM, used as the efficient case to calculate verified gross and net savings.

[b] Baseline AFUE deemed by the TRM, used as the base case to calculate verified gross savings.

[c] Market baseline AFUE determined using SMP methodology, used as the base case to calculate verified net savings.

The market baseline SEER (13.6) was higher than the TRM-deemed baseline SEER (13.0) used for *ex ante* and verified gross savings. The deemed baseline SEER reflects the market SEER from the 2015 SMP analysis. Because the air conditioner market SEER has increased since the 2015 analysis, the team

[34] The evaluation team could not pair efficiency and capacity data from the implementer to actual installed furnaces that lacked make and model information.

[35] After reviewing tracking data, the evaluation team determined that legacy MMID 2990 Furnace And A/C, ECM, 95% + AFUE, >= 16 SEER did not have sufficient make and model information in SPECTRUM to assign SEER efficiency and cooling capacity ratings from AHRI data. As noted, the team assigned this measure market savings consistent with the CY 2017 SMP analysis (81.5% NTG).

determined that electric savings market-based freeridership is positive for air conditioner measures included in the current SMP analysis.

Standard Market Practice Summary

Table 51 summarizes the SMP results, showing the per-unit market savings by fuel type and the corresponding percentage of market-based freeridership for all furnace and air conditioner measures. Market savings derived from SMP analysis are highlighted in the table: green cells represent measures subject to current SMP analysis results, while blue cells represent market savings for legacy measures (for which the team applied CY 2017 SMP results).

Table 51. CY 2020 Summary of Market Savings by Measure

Measure	MMID	Electric (kWh) Savings			Natural Gas (therm) Savings		
		Verified Gross	Market[a]	Market-Based Free-ridership	Verified Gross	Market[a]	Market-Based Free-ridership
NG Furnace with ECM, 95%+ AFUE (Existing)	1981	416.0	338.9	18.5%	20.9	16.2	22.3%
Furnace And A/C, ECM, 95% + AFUE, >= 16 SEER	2990	555.5	452.5	18.5%	34.7	29.5	14.8%
NG Furnace with ECM, 97%+ AFUE	3440	416.0	338.9	18.5%	42.4	36.9	12.8%
LP Furnace with ECM, 90%+ AFUE (Existing)	3679	416.0	338.9	18.5%	0.0	0.0	N/A
NG Furnace with ECM, 96%+ AFUE	3868	416.0	338.9	18.5%	30.3	25.3	16.8%
NG Furnace with ECM, 98%+ AFUE	3869	416.0	338.9	18.5%	49.7	44.4	10.6%
MF NG Furnace, Multistage+, 95% AFUE	4950	110.3	110.3	0%	144.0	73.8	48.7%
MF NG Furnace, Multistage+, 96% AFUE	4951	193.8	193.8	0%	134.7	72.8	46.0%
MF NG Furnace, Multistage+, 97% AFUE	4952	208.7	208.7	0%	162.4	92.2	43.2%
MF NG Furnace, Multistage+, 98%+ AFUE	4953	187.8	187.8	0%	176.3	102.7	41.7%
MF NG Furnace, Single-stage, 95% AFUE	4958	0.0	0.0	N/A	131.4	67.4	48.7%
MF NG Furnace, Single-stage, 96% AFUE	4959	0.0	0.0	N/A	135.1	73.5	45.6%
NG Furnace, Multistage+, 95% AFUE	4962	165.4	165.4	0%	18.1	13.6	24.9%
NG Furnace, Multistage+, 96% AFUE	4963	128.9	128.9	0%	30.1	25.0	16.8%
NG Furnace, Multistage+, 97% AFUE	4964	123.7	123.7	0%	42.8	37.3	12.9%
NG Furnace, Multistage+, 98%+ AFUE	4965	165.2	165.2	0%	51.2	45.7	10.6%
NG Furnace, Single-stage, 95% AFUE	4970	0.0	0.0	N/A	18.4	13.9	24.7%
NG Furnace, Single-stage, 96% AFUE	4971	0.0	0.0	N/A	28.7	24.0	16.3%
A/C 16+ SEER	4974	218.0	177.5	18.6%	0.0	0.0	N/A

[a] The team included market savings highlighted in green in the current SMP analysis. For legacy furnace and air conditioner measures, the team applied CY 2017 SMP results to market savings highlighted in blue.

Overall, the evaluation team determined market savings (verified net savings specific to the SMP analysis) to be universally lower than verified gross savings, resulting in positive market-based freeridership values and NTG ratios less than 1.0 for air conditioners and natural gas furnaces. The team found market baseline efficiency levels to be consistently higher than the baseline efficiency levels

deemed in the 2020 TRM. This outcome departs from the results of the CY 2017 SMP analysis, which found the market baseline AFUE (92.72%) to be slightly lower than the TRM baseline AFUE (92.80%), producing negative market-based freeridership values and NTG ratios greater than 1.0.

Self-Report Freeridership

The evaluation team used CY 2020 participant surveys to assess net savings for Tier 1 Heating and Cooling measures that did not have sufficient data to calculate NTG using the SMP approach. The survey's self-report NTG battery 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 measures' final NTG ratios, the evaluation team then combined self-reported freeridership and spillover results using the following equation. *Appendix K* provides a complete review of the team's self-report NTG analysis and findings.

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

Table 52 shows freeridership, spillover and final NTG values for Tier 1 Heating and Cooling measures that were not analyzed using the SMP approach. Due to the low volume of most measures, the majority of measures were analyzed together and share combined freeridership, spillover, and NTG rates. Only smart thermostats had enough participation to support a measure-specific NTG result.

Table 52. Heating and Cooling Freeridership and Spillover Results

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

Insulation and Air Sealing Measures

For insulation and air sealing measures that were mistakenly recorded in SPECTRUM under the Heating and Cooling offering, the team applied net findings from CY 2020 Insulation and Air Sealing billing analysis, described below.

Insulation and Air Sealing Offering

In CY 2019, the implementer of the Insulation and Air Sealing offering began claiming prescriptive project completion *ex ante* savings based on the average per-participant savings from the CY 2017 billing analysis. Table 53 shows the *ex ante* savings estimates for the measure completion measures by Tier 1 (standard track) and Tier 2 (income-qualified track).

Table 53. CY 2019 Measure *Ex Ante* Estimates

Tracks	Project Completion Measure	Electric *Ex Ante* (kWh)	Gas *Ex Ante* (therms)
Tier 1	Natural Gas Heat	641	150
	Natural Gas Heat Only	0	150
	Electric Heat	2,465	0
Tier 2	Natural Gas Heat	749	238
	Natural Gas Heat Only	0	238
	Electric Heat	2,880	0

CY 2020 was the first year the evaluation team could conduct additional billing analyses to determine the continued accuracy of these savings. The team conducted a billing analysis of CY 2019 participants, which allowed comparison of one year pre-participation to one year of post-participation billing data. To conduct the billing analysis, the team used weather normalized regression models to measure the impact of energy efficiency measures on consumption for CY 2019 participants and compared them to the *ex ante* estimates from Table 53. By evaluating the pre- and post-installation energy consumption, and accounting for variables such as weather, the team measured impacts for offering-related installations.

The analysis included a control group of nonparticipants, which allowed the billing analysis to provide an estimate of net savings by comparing the change in energy consumption for participants to the results of a similar analysis conducted for nonparticipants. This difference resulted in total verified net savings from the offering. The team identified the nonparticipant group by sampling future participants—that is, customers who participated *after* the analysis period. This treatment group helped account for exogenous factors that may have occurred simultaneous to offering activity.

The evaluation team conducted six separate billing analyses to evaluate verified net savings for the Insulation and Air Sealing offering. Table 54 lists NTG rates and precision achieved for each analysis in CY 2019. The team applied these results to the CY 2020 projects.

Table 54. CY 2019 Insulation and Air Sealing Billing Analysis Results Applied to CY 2020 Projects

Offering Track	Completion Measure	Savings Type	NTG	Precision at 90% Confidence
Tier 1	Natural Gas Heat	Electricity	133%	±20%
Tier 1	Natural Gas Heat/ Natural Gas Heat Only	Natural Gas	90%	±9%
Tier 1	Electric Heat	Electricity	97%	±21%
Tier 2	Natural Gas Heat	Electricity	126%	±22%
Tier 2	Natural Gas Heat / Natural Gas Heat Only	Natural Gas	78%	±12%
Tier 2	Electric Heat	Electricity	97%[36]	±21%

[36] The team applied the Tier 1 electric heat realization NTG rate because of small analysis sample size for this measure.

Billing Analysis for Electric Savings

The evaluation team used PRInceton Scorekeeping Method (PRISM) models to estimate NTG rates and the standard errors around the savings estimates for each offering. Table 55 shows the *ex ante* and verified electric net energy savings as well as the NTG rates for each track. The PRENAC variable in the table represents the pre-installation weather-normalized usage.

Table 55. Insulation and Air Sealing Offering Verified Electric Net Energy Savings from Billing Analysis

Offering Track	Completion Measure	*Ex Ante* Savings per Participant (kWh)	Verified Net Model Savings (kWh)	NTG	PRENAC	*Ex Ante* Savings Per Customer	Verified Savings Per Customer
Tier 1	Gas Heat	641	854	133%	9,429	6.8%	9.1%
Tier 1	Electric Heat	2,465	2,395	97%	20,711	11.9%	11.6%
Tier 2	Gas Heat	749	945	126%	9,316	8.0%	10.1%
Tier 2	Electric Heat			97%[4]			

On average, Tier 1 participants with gas heat saved 854 kWh. Compared to the *ex ante* savings estimate of 641 kWh, this represents a NTG of 133%. With an average pre-installation period usage of 9,429 kWh, the savings represent a 9.1% reduction in usage.

Tier 1 participants with electric heat saved 2,395 kWh. Compared to the *ex ante* savings estimate of 2,465 kWh, this represents a NTG of 97%. With an average pre-installation period usage of 20,711 kWh, the savings represent an 11.6% reduction in usage.

Table 56 shows a comparison of CY 2013, CY 2015, CY 2017, and CY 2019 Tier 1 Home Performance with ENERGY STAR participants' *ex ante* and verified net electric savings as a percentage of total household electric consumption with billing analysis results from similar programs. The CY 2019 *ex ante* electric savings of 7% of total household consumption for gas heat participants is on the lower range of comparable program estimates, while the verified net savings of 9% is in the middle of the comparable ranges.

Table 56. Comparison of Tier 1 Insulation and Air Sealing Offering Electric *Ex Ante* and Verified Net Savings Per Customer

Program	Electric Savings as Percentage of Total Household Consumption		Modeling Software
	Ex Ante	Verified Net	
WI Focus on Energy Tier 1HPwES (CY 2013)	6%	8%	emHome
Midwest 1 Home Performance with ENERGY STAR (HES; 2012)	6%	12%	beacon-PST
WI Focus on Energy Tier 1 HPwES (CY 2019) Gas Heat	**7%**	**9%**	**Deemed per unit**
WI Focus on Energy Tier 1 HPwES (CY 2017)	7%	8%	Snugg Pro
WI Focus on Energy Tier 1 HPwES (CY 2015)	7%	9%	emHome
Northwest 1 (2015-2016)	7%	11%	Deemed per unit
Mid-Atlantic 1 HPwES (2013)	9%	7%	beacon-PST
Northwest 1 (2013-2014)	9%	9%	Deemed per unit
Mid-Atlantic 1 HPwES (2012)	10%	9%	beacon-PST
Mid-Atlantic 1 HPwES (2014)	10%	9%	beacon-PST
Mid-Atlantic 1 HPwES (2015)	10%	10%	beacon-PST
Mid-Atlantic 1 HPwES (2017)	10%	11%	beacon-PST
Southwest 1 HPwES (2011)	11%	9%	Real Home Analyzer
WI Focus on Energy Tier 1 HPwES (CY 2019) Electric Heat	**12%**	**12%**	**None**
Southeast 1 HPwES (2011-2012)	14%	8%	Deemed per unit
Northeast 1 HES (2011)	18%	14%	Deemed per unit

On average, Tier 2 participants with gas heat saved 945 kWh. Compared to the *ex ante* savings estimate of 749 kWh, this represents a NTG of 126%. With an average pre-installation period usage of 9,316 kWh, the savings represent approximately a 10% reduction in usage.

The sample sizes were too small to estimate Tier 2 savings for participants with electric heat. As a result, the team applied the 97% Tier 1 electric heat NTG to Tier 2.

Table 57 shows a comparison of CY 2019 Tier 2 Home Performance with ENERGY STAR participants *ex ante* and verified net electric savings as a percentage of total household electric consumption with billing analysis results from other similar programs. The CY 2019 *ex ante* savings per household of 8% is on the lower end of all programs in the comparison. The verified net electric savings of 10% of household consumption is in the middle range of other comparable program estimates.

Table 57. Comparison of Tier 2 Insulation and Air Sealing Offering Electric *Ex Ante* and Verified Net Savings

Program	Electric Savings as Percentage of Total Household Consumption		Modeling Software
	Ex Ante	Verified Net	
WI Focus on Energy Tier 2 HPwES (CY 2017)	6%	10%	Snugg Pro
Mid-Atlantic 2 Low-Income Usage Reduction Program (LIURP; 2011)	7%	7%	Deemed per unit
Northwest 1 (2009–2011)	7%	7%	Deemed per unit
Northwest 1 (2007–2009)	7%	7%	Deemed per unit
WI Focus on Energy Tier 2 HPwES (CY 2015)	8%	11%	emHome
WI Focus on Energy Tier 2 HPwES (CY 2019) Gas Heat	**8%**	**10%**	**Deemed per unit**
Mid-Atlantic 2 LIURP (2010)	9%	9%	Deemed per unit
Mid-Atlantic 2 LIURP (2012)	10%	10%	Deemed per unit
Mid-Atlantic 2 LIURP (2013)	10%	10%	Deemed per unit
Mid-Atlantic 2 LIURP (2015)	11%	11%	Deemed per unit
Northwest 2 (2009-2010)	12%	12%	TREAT (WA) and EA4 (ID)
Mid-Atlantic 2 LIURP (2014)	12%	12%	Deemed per unit
Northwest 1 (2003–2005)	12%	12%	Deemed per unit
Northeast 2 Low Income (2010)	14%	14%	Deemed
Mid-Atlantic 1 Low-Income Energy Efficiency Program (LIEEP; 2015)	15%	15%	Proprietary software
Midwest 2 Low Income (2016)	17%	15%	Deemed per unit
Northeast 1 Home Energy Services -Income Qualified (2011)	18%	14%	Deemed per unit
Midwest 2 Low Income (2014-2015)	18%	18%	Deemed per unit

Billing Analysis for Gas Savings

The evaluation team used PRISM models to estimate NTG and the standard errors around the savings estimates for each offering track. Table 58 shows the *ex ante* and verified electric net energy savings as well as the NTG rates for each Program track.

Table 58. HPwES *Ex Ante* and Verified Natural Gas Net Energy Savings from Billing Analysis

Offering Track	*Ex Ante* Savings per Participant (therms)	Verified Net Model Savings (therms)	NTG	PRENAC (therms)	*Ex Ante* Expected Savings Per Customer	Verified Savings Per Customer
Tier 1	150	135	90%	982	15.3%	13.7%
Tier 2	238	186	78%	1,138	20.9%	16.3%

On average, Tier 1 participants saved 135 therms. Compared to the *ex ante* savings estimate of 150 therms, this represents an NTG of 90%. With an average pre-installation period usage of 982 therms, the savings represent approximately 14% reduction in usage.

As with the electric savings, the evaluation team compared the results with billing analyses from other similar programs. Table 59 shows that in CY 2019 the offering predicted household *ex ante* natural gas savings of 15%, that is, on the low end of other programs in the comparison, including previous Focus on Energy Home Performance with ENERGY STAR Program evaluations. However, the billing analysis led to a verified 14% net household natural gas savings, that is, in the midrange of savings.

Table 59. Comparison of Tier 1 HPwES Natural Gas *Ex Ante* and Verified Net Savings Per Customer

Program	Natural Gas Savings as Percentage of Total Household Consumption		Modeling Software
	Ex Ante	Verified Net	
Mid-Atlantic 1 HPwES (2014)	14%	13%	beacon-PST
Northeast 2 HES (2010, 2011)	15%	12%	Deemed
WI Focus on Energy Tier 1 HPwES (CY 2019)	**15%**	**14%**	**Deemed per unit**
Mid-Atlantic 1 HPwES (2015)	16%	14%	beacon-PST
Mid-Atlantic 1 HPwES (2016)	18%	14%	beacon-PST
Mid-Atlantic 1 HPwES (2013)	18%	13%	beacon-PST
Northeast 1 HES (2011)	18%	9%	Deemed per unit
Mid-Atlantic 1 HPwES (2012)	21%	15%	beacon-PST
Midwest 1 HES (2012)	23%	15%	beacon-PST
WI Focus on Energy Tier 1 Track HPwES (CY 2015)	32%	15%	emHome
WI Focus on Energy Tier 1 Track HPwES (CY 2013)	35%	15%	emHome
WI Focus on Energy Tier 1 HPwES (CY 2017)	40%	15%	Snugg Pro

On average, Tier 2 participants saved 186 therms. Compared to the *ex ante* savings of 238 therms, this represents a 78% NTG. With an average pre-installation period usage of 1,138 therms, the savings represent approximately 16% reduction in usage.

Table 60 shows a comparison of the Tier 2 participant natural gas savings to billing analysis results of other similar programs. As with the Tier 1 participants, *ex ante* natural gas savings are on the lower end of other program savings estimates at 21%, while the verified net NTG from the billing analysis savings of 16% of household consumption is in the middle range of the savings estimates.

Appendix K provides more detail about the results and the methodologies used in the billing analyses.

Table 60. Comparison of Tier 2 HPwES Natural Gas *Ex Ante* and Net Savings Per Customer

Program	Natural Gas Savings as Percentage of Total Household Consumption		Modeling Software
	Ex Ante	Verified Net	
Northwest 2 (2009-2010)	14%	14%	TREAT (WA) and EA4 (ID)
Midwest 1 Low Income	13%	13%	Deemed per unit
Northeast 1 HES-Income Eligible (2011)	18%	9%	Deemed per unit
WI Focus on Energy Tier 2 HPwES (CY 2019)	**21%**	**16%**	**Deemed per unit**
Midwest 2 HWAP	21%	21%	Deemed per unit
Northeast 2 Low Income (2010)	22%	22%	Deemed per unit
ORNL (meta)	23%	23%	Meta evaluation
Mid-Atlantic 1 LIEEP (2015)	35%	11%	Proprietary software
Mid-Atlantic 2 Low Income (2012)	22%	22%	Deemed per unit
WI Focus on Energy Tier 2 HPwES (CY 2015)	35%	22%	emHome
WI Focus on Energy Tier 2 HPwES (CY 2017)	49%	21%	Snugg Pro
Mid-Atlantic 1 LIEEP (2016)	52%	13%	Proprietary software

Renewable Energy

The Renewable Energy offering decreased residential incentives twice in CY 2020 to address increased participation, ultimately decreasing maximum incentives from $1,500 at the start of CY 2020 to $500 at the end of the year. The offering also decreased maximum commercial incentives from $60,000 to $50,000. The residential incentive changes likely had a more significant impact on the offering's NTG than the commercial change due to the comparatively large decrease.

The evaluation team did not conduct participant surveys in CY 2020 to assess how these incentive changes affected NTG because the staged residential change made it difficult to survey a representative sample of participants at each incentive level. In addition, the latest participant surveys (CY 2019) found that Renewable Energy freeridership was relatively high (40%).

The team thinks the first residential CY 2020 incentive decrease ($1,500 to $1,000 in June 2020) would have had minimal impact on freeridership but acknowledges the second decrease ($1,000 to $500 in August 2020) might have had more impact. The administrator said it expects to maintain these latest incentives in CY 2021; therefore, the evaluation team will survey residential and commercial Renewable Energy participants in CY 2021 to calculate an updated NTG based on the latest incentive levels.

To calculate CY 2020 net savings, the team applied CY 2019 NTG results to both residential and commercial Renewable Energy measures. Table 61 shows the CY 2019 self-report freeridership and spillover results and final NTGs for Renewable Energy measures.

Table 61. Renewable Energy Path Freeridership and Spillover Results, Residential and Commercial

Freeridership	Spillover	NTG (1 – Freeridership + Spillover)
40%	0%	60%

Process Evaluation

The process evaluation collected primary data to assess how participants learned about Trade Ally Solutions offerings, motivations that influenced their participation, and their overall experience.

Process Evaluation Methodology

The process evaluation involved in-depth interviews with the administrator and implementer as well as a phone survey with participants of the Insulation and Air Sealing offering and an online survey with participants of the Heating and Cooling offering. Table 62 presents the sample sizes for all data collection activities. Additional details about these activities and their findings can be found in the offering-specific discussions below and in *Appendix G*.

Table 62. CY 2020 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	3			**2**	**5**
Participant Surveys	152	446	-- [a]	-- [a]	**598**
Satisfaction Surveys	1,365			**0**	**1,365**

[a] Renewable Energy participants were not surveyed in CY 2020 because they were surveyed in CY 2020 as part of an in-depth analysis of the Renewable Energy offering.

Administrator and Implementer Interviews

In July 2020, the evaluation team interviewed the administrator and the implementer to learn about how the Trade Ally Solutions were working and to assess the solutions' objectives, performance, and implementation challenges and resolutions. The team also asked them about their marketing, engagement with trade allies and customers, and COVID-19 impacts.

Participant Surveys

During fall and early winter of 2020, the evaluation team contacted random samples of CY 2020 Heating and Cooling and Insulation and Air Sealing participants to assess their experiences. The survey asked about awareness of Focus on Energy, marketing, customer decision-making, and satisfaction, among other topics. The Heating and Cooling respondents' feedback also informed the impact evaluation. Detailed findings for each offering are available in *Appendix G*.

Ongoing Participant Satisfaction Surveys

The evaluation team conducted satisfaction surveys for the Trade Ally Solutions offerings beginning in CY 2020 for the CY 2019-CY 2022 quadrennium, continuing the practice established for the previous quadrennium in CY 2015.

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

The team used SPECTRUM data to sample CY 2020 participants and administered web-based satisfaction surveys throughout the year. The team mailed a paper survey to participants with no email address on file and combined results from both modes to conduct the analysis. A total of 3,191 Trade Ally Solutions participants responded to the CY 2020 survey, of which 1,365 were randomly selected for evaluation reporting.[37] The survey covered several topics including overall satisfaction, satisfaction with offering staff and trade allies, likelihood of recommending Focus on Energy, likelihood to initiate another energy efficient project, and other feedback.

Solution Design and Delivery

Trade Ally Solutions encourages customers to save energy and improve home comfort by offering incentives to reduce the upfront cost of efficient home upgrades and the installation of efficient heating and cooling equipment or solar PV systems. Residential customers of participating Focus on Energy utilities are eligible to participate as well as business customers who install a solar PV system. Requirements for each offering differ depending on the customer type.

Incentives are provided through three offerings that target unique home improvement markets. These offerings are delivered primarily through certified trade allies who work with customers to complete their improvements and apply for incentives. As a result, much of the solutions' outreach is targeted directly at the trade allies to help encourage participation. Descriptions for the offerings are detailed in the next sections.

Insulation and Air Sealing

The Insulation and Air Sealing offering provides incentives for installing efficient building shell measures. The offering targets single-family and multifamily customers seeking to improve their home comfort, lower their energy costs, and/or increase their home's efficiency. Customers can take advantage of the offering through two paths:

- **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 sq. ft. of attic area must be improved to an insulation level of R42 or greater.
- **Home Energy Assessment.** Primarily, customers first work with a trade ally contractor (found on the Focus on Energy website) to conduct an energy assessment to analyze the performance of the home and identify areas of improvement. Customers wishing to complete ENERGY STAR-qualified air sealing must complete an energy assessment to receive the incentive. Following the home energy assessment, customers can choose which insulation and air sealing improvements

[37] Since the evaluation team reports ratings only to the first decimal place, surveys with very large numbers of responses (over 2,000) were randomly sampled so that the precision level 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 that are reported as the same (to the first decimal place) are significantly different. The random sampling used a Monte Carlo technique so that the reported ratings for the random sample and the ratings for the larger population are identical to the first decimal place.

to make and work with a trade ally to complete the project and apply for incentives. Customers can also opt to forego the assessment and air sealing incentive and still have insulation installed by a trade ally contractor.

The Insulation and Air Sealing offering provides two incentive tiers, Tier 1 (standard tier) and Tier 2 (income-qualified tier). Customers qualify for Tier 2 incentives if their household income is at or below 80% of the state median income by household size. Customers must live in single-family homes or own multifamily buildings with three or fewer units under one roof to be eligible for the flat incentives offered 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 spaces.

Focus on Energy updated Insulation and Air Sealing incentives in April 2020. Table 63 shows measures and tiered incentives for single-family and multifamily participants in buildings with three or fewer units, before and after April 2020.

Table 63. Single-Family and Multifamily (3 or fewer units) Insulation and Air Sealing Measures and Incentive

Measure	January - March 31, 2020		April 1 - December 2020	
	Tier 1 Incentive	Tier 2 Incentive	Tier 1 Incentive	Tier 2 Incentive
ENERGY STAR® Qualified Air Sealing	$600	$900	$500	$800
Attic Insulation	$500	$600	$400	$500
Foundation Insulation	$100	$150	$100	$150
Wall Insulation	$300	$300	$300	$300
Duct Sealing and Insulation	$50	$50	$50	$50

Table 64 shows measures and incentives for customers who own multifamily dwellings with four or more units under one roof, before and after April 2020.

Table 64. Multifamily (4 or more units) Insulation and Air Sealing Measures and Incentives

Measure	January - March 31, 2020 Incentive [a]	April 1 - December 2020 Incentive
Air Sealing	$0.10 per sq. ft. of conditioned space	$0.20 per sq. ft. of conditioned space
Attic Insulation, Existing ≤ R-11	$0.25 per sq. ft. of attic space	$0.50 per sq. ft. of attic space
Attic Insulation, Existing R-12 to R-19	$0.10 per sq. ft. of attic space	$0.20 per sq. ft. of attic space
Wall Insulation	$0.40 per sq. ft. of wall area	$0.80 per sq. ft. of wall area
[a] No projects were incented between January and March 2020.		

Heating and Cooling

The Heating and Cooling offering provides incentives to customers looking to upgrade their HVAC equipment. Participating customers must live in a single-family dwelling or multifamily dwelling with three or fewer units under a single roof. Multifamily dwellings of four or more units under a single roof are also eligible if the heating/cooling equipment is for a single unit. Eligible equipment includes furnaces, central air conditioners, air source heat pumps, boilers, geothermal or ground source heat

pumps, and smart thermostats. Customers work with trade allies to identify offering-eligible equipment and apply for an incentive.

The Heating and Cooling offering provides two incentive tiers, similar to the Insulation and Air Sealing offering. Tier 2 participation has the same eligibility requirements as those in the Insulation and Air Sealing offering. Incentives by tier type for the Heating and Cooling offering are shown in Table 65.

Table 65. Heating and Cooling Measures and Incentives

Measure	Tier 1 Incentive	Tier 2 Incentive
95% AFUE Single- or Multistage Natural Gas Furnace	$50	$350
96% AFUE Single- or Multistage Natural Gas Furnace	$100	$450
97%+ AFUE Multistage Natural Gas Furnace	$150	$550
16+ SEER Central A/C when installed at the same time as a qualifying furnace	$50	$50
Air Source Heat Pump 16+ SEER, 8.4+ HSPF (propane, oil or electric furnace only; cannot be a mini-split or ductless system)	$300	$300
ECM Replacement (must replace existing PSC Motor)	$50	$50
95%+ AFUE Natural Gas Home Heating Boiler	$400	$550
Indirect Water Heater Installed at the same time as a qualifying boiler	$100	$150
95%+ AFUE Natural Gas Combination Boiler	$500	$675
Smart Thermostat installed by a qualified HVAC contractor. For use with natural gas furnace, natural gas boiler or air source heat pump only.	$50	$50
Single Package Vertical Unit, ≥ 90%+ Thermal Efficiency, NG, ≥ 10.0 EER Cooling	$150	$150
Single Package Vertical Unit, ≥ 90%+ Thermal Efficiency, NG	$100	$100
Packaged Terminal Heat Pump < 8,000 BTUh, ≥ 10.7 EER and ≥ 3.1 COP	$100	$100
Packaged Terminal Heat Pump 8,000-9,999 BTUh, ≥ 10.4 EER and ≥ 3.0 COP	$100	$100
Packaged Terminal Heat Pump 10,000-12,999 BTUh, ≥ 9.9 EER and ≥ 2.9 COP	$100	$100
Packaged Terminal Heat Pump ≥ 13,000 BTUh, ≥ 9.3 EER and ≥ 2.9 COP	$100	$100
ENERGY STAR Certified Geothermal or Ground Source Heat Pump	$750	$750

Renewable Energy

The Renewable Energy offering provides incentives to residential customers living in a single-family home and to businesses that install a solar electric system. Customers work with trade allies to verify that their solar electric system meets the offering's eligibility requirements and to reserve an incentive. Customers can apply to receive their reserved incentive after their solar electric system installation is complete. In addition, residential rural customers can receive a bonus of up to $500 for installing a qualified system.

In response to increased demand for incentives, Focus on Energy reduced residential Renewable Energy incentives twice throughout 2020 to maintain the offering's budget. Table 66 and Table 67 show residential and commercial Renewable Energy incentives throughout CY 2020.

Table 66. Renewable Energy Incentives, Residential

January 1 – May 31, 2020		June 1 – August 13, 2020		August 14 - December 31, 2020	
Incentive	Max Incentive	Incentive	Max Incentive	Incentive	Max Incentive
$300 per kW (DC)	$1,500	$200 per kW (DC)	$1,000	$500 per system	$500

Table 67. Renewable Energy Incentives, Commercial

System Size in kW (DC)	January 1 – May 31, 2020		June 1 – December 31, 2020	
	Incentive	Max Incentive	Incentive	Max Incentive
Up to 5 kW	$300 per kW (DC)	$1,500	$200 per kW (DC)	$1,000
5-10 kW	$1,500 + $200 per kW above 5 kW	$2,500	$1,000 + $150 per kW above 5 kW	$1,750
10-100 kW	$2,500 + $150 per kW above 10 kW	$16,000	$1,750 + $125 per kW above 10 kW	$13,000
100-300 kW	$16,000 + $120 per kW above 100 kW	$40,000	$13,000 + $100 per kW above 100 kW	$33,000
300-500 kW	$40,000 + $100 per kW above 300 kW	$60,000	$33,000 + $85 per kW above 300 kW	$50,000

Changes Due to COVID-19

As a result of the COVID-19 pandemic and the Safer at Home order issued by the Governor of Wisconsin on March 25, 2020, field activities for the solutions staff were temporarily suspended to meet state-mandated COVID-19 protocols. The solutions implementer developed a number of "return to the field safety protocols," which included social distancing, wearing a mask, completing daily health screening surveys, calling customers ahead of time to assure they are not experiencing any symptoms, and establishing a walk-away policy for areas where workers feel unsafe.

During July 2020 interviews with the evaluation team, stakeholders noted that participation for all offerings increased in 2020, possibly because customers were spending more time at home and giving more thought to making improvements.

The implementer also mentioned a disruption in the supply chain for cooling equipment at the time of the interview and said suppliers it had spoken with advised them of this issue.

These interview responses were indicative of the current state of operations at the time of the interview (July 2020) and may not be representative of the entire year COVID-19 impacts changed frequently.

Marketing and Outreach

Trade Ally Solutions' marketing and outreach focused on promoting the benefits of the offerings and sharing customer testimonials. The implementer highlighted stories from real participants through videos that were posted and distributed online.

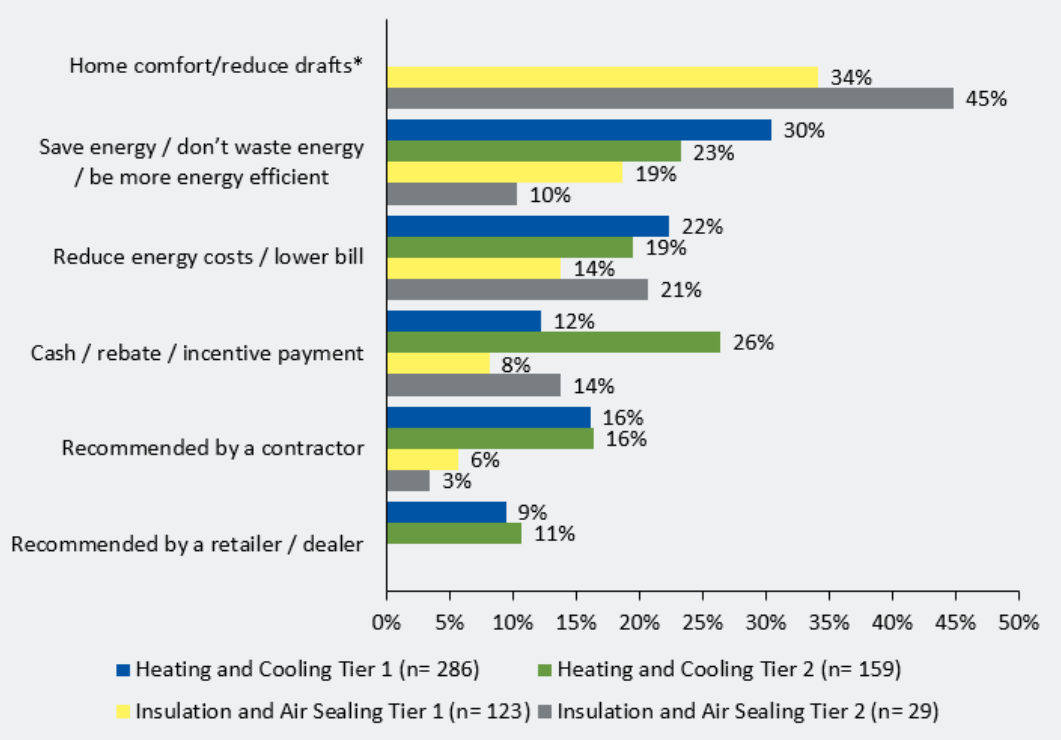
Insulation and Air Sealing survey respondents were asked about marketing through social media. Six percent (n=9) of respondents said they had viewed Focus on Energy posts on social media (n=150). Five

of these respondents said they viewed these posts on Facebook and all said they found the content helpful or useful. All respondents, even if they had not previously seen any Focus on Energy social media, were asked what type of social media content they would like to see more of from Focus on Energy, respondents most preferred information about the offerings and tips on saving energy (n=73).

Motivation and Experience

Respondents in both surveys were highly motivated to participate to increase home comfort, save energy, and reduce energy costs. Heating and Cooling respondents also reported that top motivations were receiving a recommendation from a contractor (16%, both tiers) and receiving the rebate (26%, Tier 2). Among Insulation and Air Sealing respondents, Tier 2 participants were more likely to select home comfort as their top motivation than were Tier 1 participants, although it was the top motivation for both tiers. Figure 30 shows the breakdown of responses by offering and tier.

Figure 30. Motivation to Participate in Focus on Energy Offerings



Source: CY 2020 Insulation and Air Sealing Offering Participant Survey, Question QB2, CY 2020 Heating and Cooling Offering Participant Survey, Question C2. "What factor was the most important motivation for you to participate in the Insulation and Air Sealing/Heating and Cooling offering?" Selected Choice. Only response options which accounted for at least 10% of a surveys total response were included in the figure.

"*" Denotes option which was exclusive to the Insulation and Air Sealing offering survey.

Respondents in both surveys said the top reasons for choosing their contractor was that the contractor appeared to provide the best quality and value and that they had received a referral. Insulation and Air Sealing respondents reported the contractor having knowledge or familiarity with additional Xcel Energy or We Energies incentives as a top reason. Heating and Cooling respondents reported having previously used the contractor as a top reason.

All respondents rated statements about attitudes concerning energy use. Across both offerings, most respondents agreed with the statement that they try to save energy to lower their bill and that they are willing to pay more for efficient products that will save money in the long term. Most respondents from both offerings disagreed with the statement that they are not interested in improving their home's efficiency.

All survey respondents were asked about the incentive application process. Responses showed that contractors are more likely to complete the Insulation and Air Sealing application, while customers are more likely to complete or help complete the Heating and Cooling application. Most respondents from both offerings who helped complete the application said it was very or somewhat easy to fill out.

Respondents who participated after the Safer at Home order went into effect on March 25, 2020, were asked about their experience. Most respondents from both offerings were satisfied with their contractor's sensitivity toward social distancing and contact. Two Heating and Cooling respondents said they were *somewhat dissatisfied* with their contractor's sensitivity, and both said the contractor did not wear a mask and/or maintain physical distancing.

Customer Satisfaction

Throughout CY 2020, the evaluation team surveyed Trade Ally Solutions participants to measure their satisfaction with various aspects of their experience. Respondents answered questions related to satisfaction and likelihood on a scale of 0 to 10, where 10 indicated the highest degree of satisfaction or likelihood and 0 the lowest.[38]

Prior to portfolio restructuring in CY 2020, the evaluation team fielded three separate surveys for the precursor programs that were consolidated into the Trade Ally Solutions: Home Performance with ENERGY STAR Whole Home Path, Home Performance with ENERGY STAR HVAC Path, and Renewable Energy. The evaluation team calculated participation-weighted average ratings from these three CY 2019 surveys for comparison to CY 2020 Trade Ally Solutions ratings.

Figure 31 shows that Trade Ally Solutions participants gave the offerings they participated in an average overall satisfaction rating of 9.2 in CY 2020, and this rating was statistically higher than the portfolio target in every quarter of the year and for CY 2020 overall.[39] The CY 2020 rating of 9.2 was statistically equivalent to the 9.3 average rating from CY 2019 participants in the Trade Ally Solutions' precursor programs.

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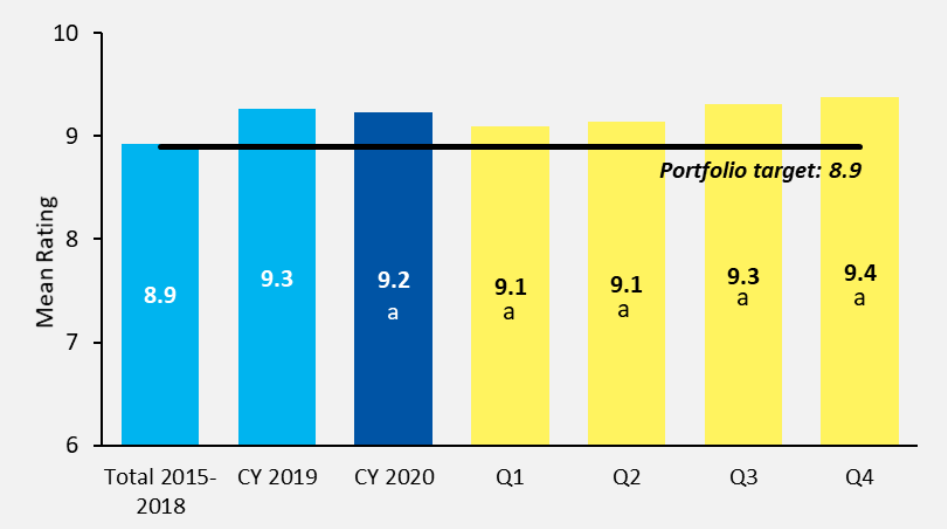
[38] The number of participants who completed a survey does not always match the number of responses for each question, as some participants skipped or did not know answers to questions.

[39] The administrator's contract established a portfolio target of 8.9 to maintain or increase customer satisfaction. The evaluation team found that some surveys did not include identifying information to match survey responses to offering participation dates. The team included survey responses without participation dates in the year-end total but not in the quarterly breakdown.

Figure 31. Overall Satisfaction with the Trade Ally Solutions



Source: Trade Ally Solutions Participant Satisfaction Survey Question. "Overall, how satisfied are you with your most recent experience with Focus on Energy?" (CY 2019 n=1,854, CY 2020 n=1,344, Q1 n=356, Q2 n=314, Q3 n=267, Q4 n=351). Total CY 2015-CY 2018 is the participation-weighted average of four annual results.

[a] This result is statistically significantly different from the portfolio target (p<0.10 or better using binomial t-tests).

Table 68 shows the average satisfaction and likelihood ratings for the Trade Ally Solutions in CY 2020 compared to a weighted average of survey results from the corresponding CY 2019 programs. In CY 2020, there was a statistically significant increase in ratings for trade allies who performed assessments[40] and a statistically significant decrease in the likelihood to recommend Focus on Energy. Ratings for satisfaction with Focus on Energy staff, trade allies who performed installations, and the likelihood of making more improvements were statistically equivalent to ratings for the corresponding CY 2019 programs.

Table 68. Average Ratings for Trade Ally Solutions

Item	CY 2019	CY 2020
Satisfaction with Focus on Energy staff	9.3	9.4
Satisfaction with Assessment Trade Ally [b]	9.1	9.4 [a]
Satisfaction with Installation Trade Ally	9.5	9.5
Likelihood of more improvements	5.1	5.1
Likelihood of recommending Focus on Energy	9.4	9.2 [a]

[a] This result is statistically significantly different from the result for CY 2019 (p<0.10 using a binomial t-test).

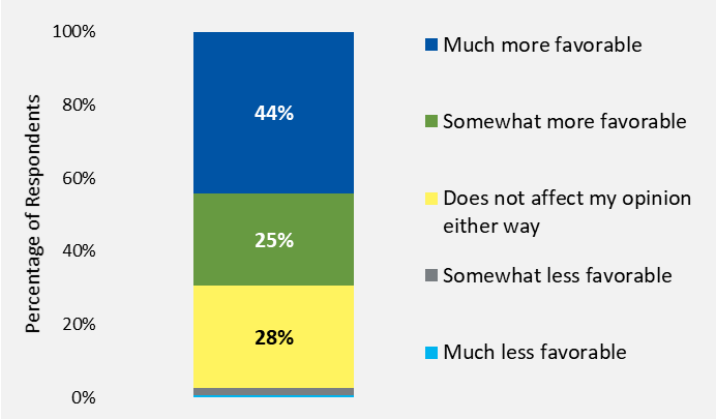
[b] This question was asked of all CY 2020 Trade Ally Solutions respondents, but in CY 2019 it was only asked for Home Performance with ENERGY STAR Whole Home Path respondents.

[40] In the CY 2020 Trade Ally Solutions survey, all respondents were asked to rate the trade allies who performed their assessment (797 of 1,364 survey respondents gave a rating). In CY 2019, only Home Performance with ENERGY STAR Whole Home Path respondents were asked to rate trade allies who performed assessments (n=195); HVAC Path and Renewable Rewards survey respondents were not asked to give this rating in CY 2019.

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). The Trade Ally Solutions' NPS was +77 for CY 2020, which was a small decrease from +82 for the weighted average of corresponding CY 2019 programs.

CY 2020 participants were asked if they were aware before receiving the satisfaction survey that the Trade Ally Solutions offering was offered in partnership with their local utility, and 53% (n=1,320) were aware, similar to the CY 2019 weighted average of precursor programs (55%, n=1,857). Respondents were also asked if Focus on Energy offerings affected their opinion of their utilities. As Figure 32 shows, 69% reported that their opinion had become *much more favorable* or *somewhat more favorable*. Only 2% of participants reported that their opinion had become less favorable and 28% said their opinion of their utility was not affected.

Figure 32. Focus on Energy Offerings Impact on Trade Ally Solutions Participants' Opinion of Utilities



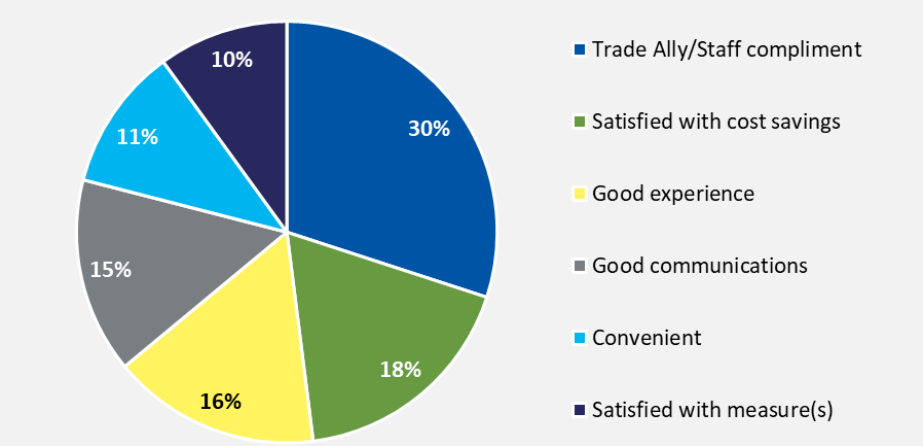
Source: Trade Ally Solutions Participant Satisfaction Survey Question. "How have these offerings affected your opinion of your energy utility, if at all?" (n=1,242)

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 solution. Of the 1,365 participants who responded to the survey, 24% provided open-ended feedback, which the evaluation team coded into a total of 426 mentions. Of these mentions, 279 were positive or complimentary comments (65%), and 147 were suggestions for improvement (35%). Compliments and suggestions offered in the customer satisfaction surveys (summarized here) were very similar to open-ended feedback provided by Trade Ally Solutions participant survey respondents (found in *Appendix G*).

The positive responses are shown in Figure 33, with most comments reflecting compliments for trade allies and Focus on Energy staff (30%), satisfaction with cost savings (18%), or a generally positive experience (16%).

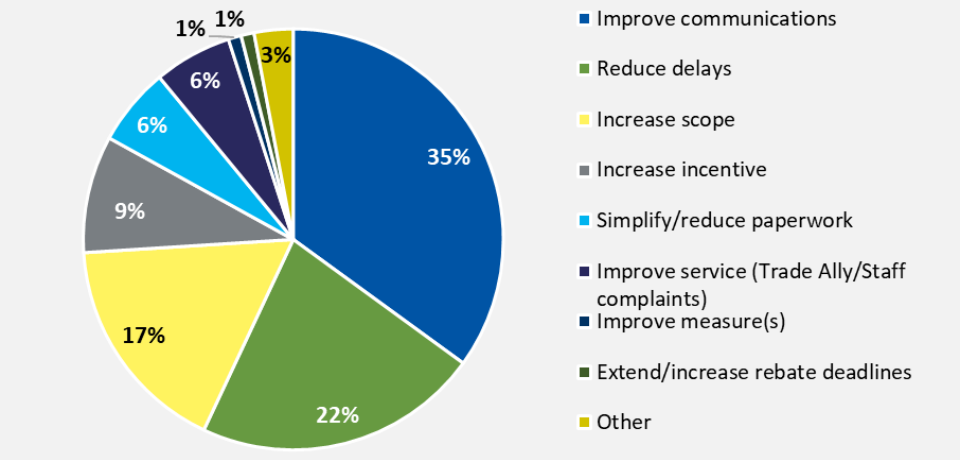
Figure 33. Positive Comments about the Trade Ally Solutions



Source: Trade Ally Solutions Participant Satisfaction Survey Question. "Please tell us more about your experience and any suggestions for improvement." (Total positive mentions n=279)

Suggestions for improvement are shown in Figure 34; the most common suggestions were to improve communications (35%), reduce delays (22%), and increase the scope of offerings (17%). Suggestions about improving communications typically focused on follow-up to rebate applications, requests for more information about saving energy, and more promotion for Focus on Energy offerings. Suggestions about increasing the scope typically mentioned equipment that was not covered by offering incentives (e.g., induction stoves, windows, roofs) or including models that do not currently qualify for incentives (e.g., Wi-Fi thermostats that are not smart and lower-SEER air conditioners).

Figure 34. Suggestions for Improving the Trade Ally Solutions

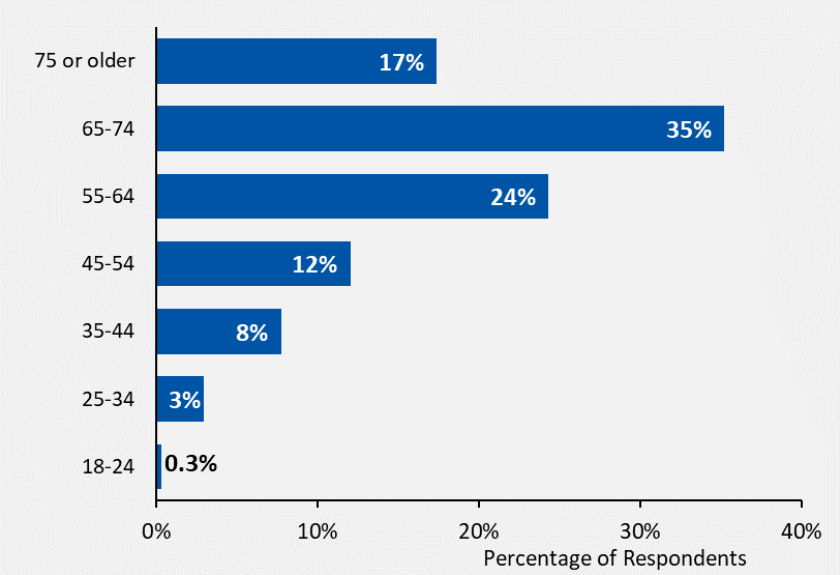


Source: Trade Ally Solutions Participant Satisfaction Survey Question. "Please tell us more about your experience and any suggestions for improvement." (Total suggestions for improvement mentions n=147)

Demographics

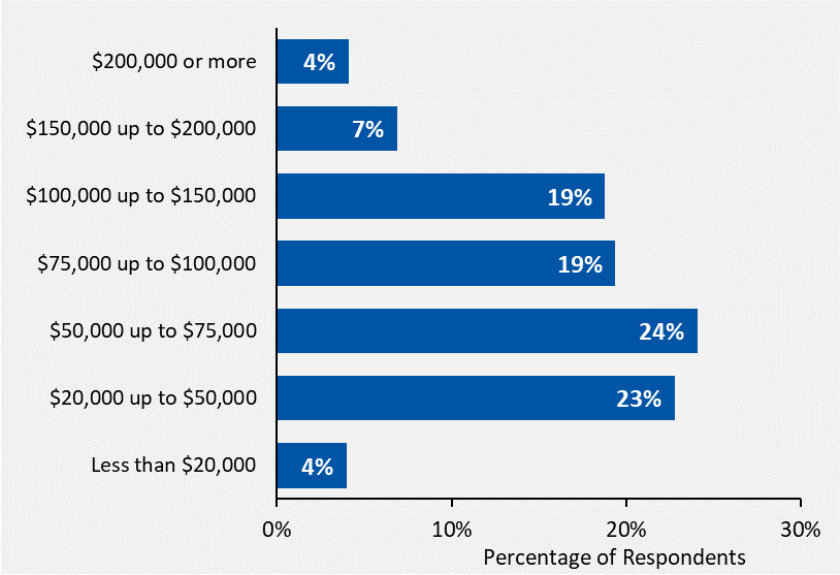
The customer satisfaction survey asked respondents their age (Figure 35) and income (Figure 36). The self-reported median age of Trade Ally Solutions participants was between 65 and 74, and only 23% were age 54 or younger. The median reported household income was between $50,000 and $75,000, with 30% earning more than $100,000.

Figure 35. Trade Ally Solutions Participants' Age



Source: Trade Ally Solutions Participant Satisfaction Survey Question. "Which of the following categories best represents your age?" (n=1,287)

Figure 36. Trade Ally Solutions Participants' Income

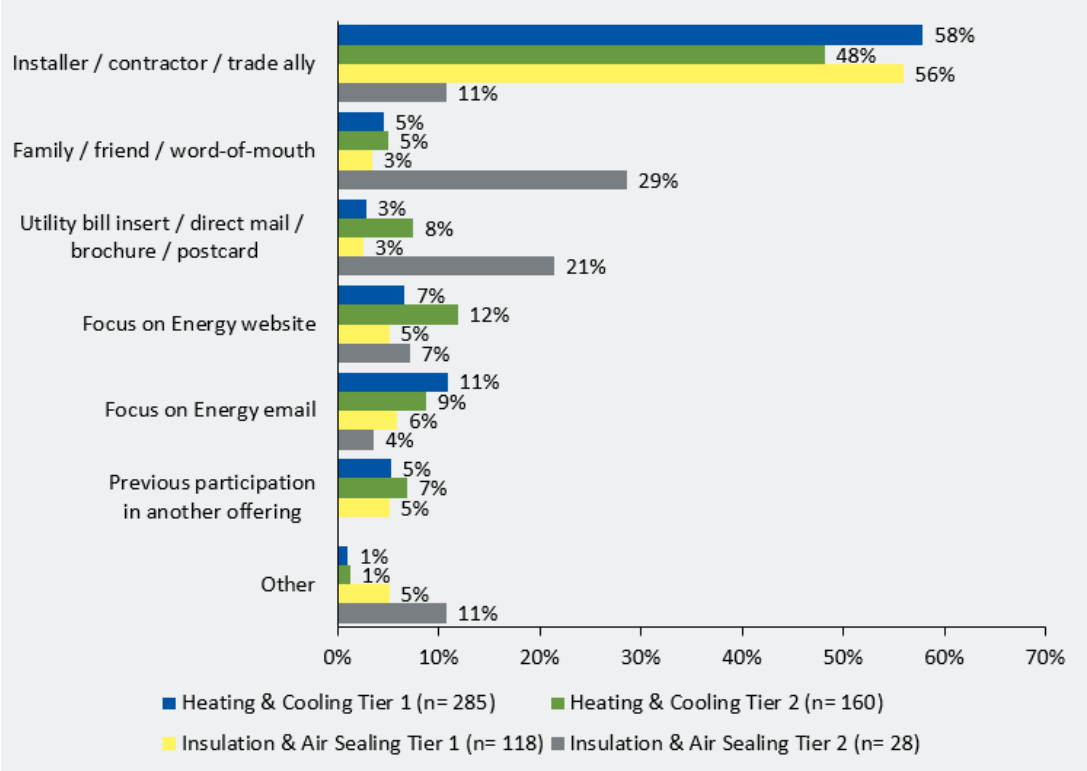


Source: Trade Ally Solutions Participant Satisfaction Survey Question. "Which category best describes our total household income before taxes?" (n=1,001)

Awareness

Across all survey respondents, the majority learned about the Trade Ally Solutions offerings through installers, contractors, and trade allies. Tier 2 Insulation and Air Sealing respondents were unique in that they were most likely to report learning about the offering through word of mouth (29%) or a utility mailing (21%). Other top sources of awareness included Focus on Energy emails and the Focus on Energy website. Figure 37 shows the breakdown of responses by offering and tier.

Figure 37. Sources of Awareness for Focus on Energy Offerings



Source: CY 2020 Insulation and Air Sealing Offering Participant Survey, Question QB3, CY 2020 Heating and Cooling Offering Participant Survey, Question C3. "Where did you most recently hear about Focus on Energy's Insulation and Air Sealing/Heating and Cooling Offering?" Selected Choice. Only response options which accounted for at least 5% of a surveys total response were included in the figure.

Survey respondents were also asked if they were aware of and had participated in other Focus on Energy offerings. Over half of the respondents from both surveys reported being aware of other offerings—the most common was Packs, followed by Insulation and Air Sealing or Heating and Cooling (the opposite of the offering they participated in). They also had high awareness of Appliance Recycling, retail discounts, and Online Marketplace. Awareness was fairly similar between Tier 1 and Tier 2 Heating and Cooling participants; however, Tier 2 Insulation and Air Sealing participants indicated a lower awareness of other Focus on Energy offerings than Tier 1 participants.

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 H. Cost*

Effectiveness and Emissions Methodology and Analysis in Volume III includes a description of the TRC test.

Table 69 lists the CY 2020 incentive costs for the Trade Ally Solution.

Table 69. CY 2020 Trade Ally Solution Incentive Costs

Offering	Incentive Costs
Heating and Cooling/Insulation and Air Sealing	$6,449,5738
Residential Renewables	$2,837,744
Commercial Renewables	$1,384,475
Healthy Homes – Rural	$3,875
Total	**$10,675,667**

The evaluation team found that the CY 2020 Trade Ally Solution was not cost-effective when including the T&D benefits (0.98), nor when excluding them (0.94), but approached 1.0. Table 70 lists the evaluated costs and benefits.

Table 70. Trade Ally Solution Costs and Benefits

Cost and Benefit Category	Total
Costs	
Non Incentive Costs	$5,253,853
Incremental Measure Costs	$79,392,340
Total Non-Incentive Costs	**$84,646,192**
Benefits	
Electric Benefits (kWh)	$24,999,667
Electric Benefits (kW)	$29,868,531
T&D Benefits (kW)	$3,005,414
Gas Benefits	$13,297,106
Emissions Benefits	$11,590,045
Total TRC Benefits with T&D benefits	**$82,760,764**
Net TRC Benefits with T&D benefits	**($1,885,429)**
TRC B/C Ratio with T&D benefits	**0.98**

Outcomes and Recommendations

The evaluation team offers the following outcomes and recommendations based on the CY 2020 evaluation.

Outcome 1. Furnace savings were higher than deemed savings in the TRM because the evaluation team found that the average installed auxiliary electric energy consumption (E_{AE}) was less than the predicted E_{AE} in the TRM. The TRM management committee estimated the TRM furnace E_{AE} based on the best data available at the time it finalized the 2020 TRM. Lower E_{AE} in rebated furnaces means the rebated furnaces use less energy than predicted in the TRM, leading to more energy savings.

Recommendation 1. The TRM management committee should consider adjusting furnace electric savings in the TRM to better reflect installed furnace E_{AE}. In CY 2021, the evaluation team should have access to more complete market E_{AE}, as well as rebated furnace E_{AE}, to inform this adjustment.

Outcome 2. The TRM deemed baseline for Tier 1 multifamily furnaces should be reassessed. The TRM assumes a baseline of 80% AFUE for Tier 1 multifamily furnaces, citing "income restraints for participating consumers." Because not all Tier 1 multifamily customers have "income restraints," the evaluation team applied an adjusted baseline for these measures, averaging the TRM baseline (80%) with the updated market baseline (92.8%).

Recommendation 2. The TRM management committee should review the TRM's multifamily furnace baseline assumptions and come to consensus about if and how to adjust the baseline.

Outcome 3. Heating and Cooling offering tracking data included Insulation and Air Sealing Measures that were mistakenly entered in the wrong offering. The administrator explained that this is an easy error to make in data entry because of the drop-down options. Although the miscategorized measures do not affect solution-level results, they do present possibly misleading results at the offering level.

Recommendation 3. The implementer should enhance QC practices to ensure offering measures are correctly categorized in the appropriate offering.

Outcome 4. Twenty-nine percent of Heating and Cooling survey respondents reported completing the application primarily on their own. Most of these customers did not report having any difficulty, but 6% said the application was either somewhat or very difficult to fill out. The main difficulties identified by these respondents were the application form being too confusing, having a hard time locating required information, and having trouble with submitting the application.

Recommendation 4. Though most customers are able to complete the incentive application without trouble, some would benefit from resources that explain the application field and required documentation. These resources could include online tutorials, "where to find" notes on the application for required information, or training contractors on how to complete an application so they can provide additional guidance to their customers.

Outcome 5: Heating and Cooling Tier 2 survey respondents reported they were most likely to learn about the Tier 2 incentives through the Focus on Energy website (41%) and trade allies (31%). Tier 2 respondents were also most likely to *prefer* learning about Focus on Energy offerings through direct mail (30%), Focus on Energy email (26%), social media (24%), and Focus on Energy or a utility website (24%).

Recommendation 5. Focus on Energy should consider expanding awareness of Tier 2 incentives using additional marketing approaches to targeted customers. The offering should also continue marketing Tier 2 eligibility criteria on the Focus on Energy website and educating trade allies about the Tier 2 incentive availability and requirements to maintain high visibility through those information sources.

Outcome 6. TRM savings assumptions for DIY Insulation and Air Sealing measures are based on results of the CY 2017 billing analysis. These savings should be updated, but DIY participation is too low to conduct a DIY billing analysis.

Recommendation 6. In absence of more DIY-specific research, the TRM management committee should consider an update to DIY savings based on a subset of customers in the 2020 billing analysis who only installed relevant measures. This is the same approach the team used when calculating the current TRM savings.

Outcome 7. A small percentage of Insulation and Air Sealing survey respondents reported viewing Focus on Energy social media posts, but most respondents would like to see an increase in social media activity. Only 6% of Insulation and Air Sealing survey respondents said they had viewed Focus on Energy posts on social media, but all of these respondents reported the content was helpful or useful. Seventy-seven percent of all respondents said they would like to see an increase in the social media presence for Focus on Energy, with 60% citing Facebook as their primary preferred social media platform. Respondents who replied that they would like to see an increase in social media from Focus on Energy said they preferred to see offering information as well as energy savings tips and information.

Recommendation 7. Focus on Energy should consider increasing its social media presence on Facebook as this platform was identified by respondents as preferred for viewing content. Content should focus on providing solution or offering information and energy savings tips.

Finding 8. Tier 2 Insulation and Air Sealing participants' awareness of other Focus on Energy offerings may be low. When asked about awareness of other offerings, less than half of Tier 2 survey respondents reported being aware of other Focus offerings (46% was the highest awareness, of both Packs and Heating and Cooling offerings) and only slightly over half had participated in other offerings (56% was the highest participation, again of both Packs and Heating and Cooling offerings). Although Tier 2 responses were low (n=13 awareness, n=9 participation), these findings suggest an opportunity to increase awareness of other Focus on Energy offerings among Tier 2 participants.

Recommendation 8. Focus on Energy should consider additional outreach efforts to Tier 2 participants to raise awareness of other Focus on Energy offerings, especially offerings that they might be more likely to take advantage of, such as Packs.

Residential New Construction Solution

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

The residential 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 Residential New Construction Offering are provided in the *Process Evaluation* section of this chapter.

Table 71 lists actual spending, savings, participation, and cost-effectiveness of the Residential New Construction Offering in CY 2020.

Table 71. CY 2020 Residential New Construction Offering Summary

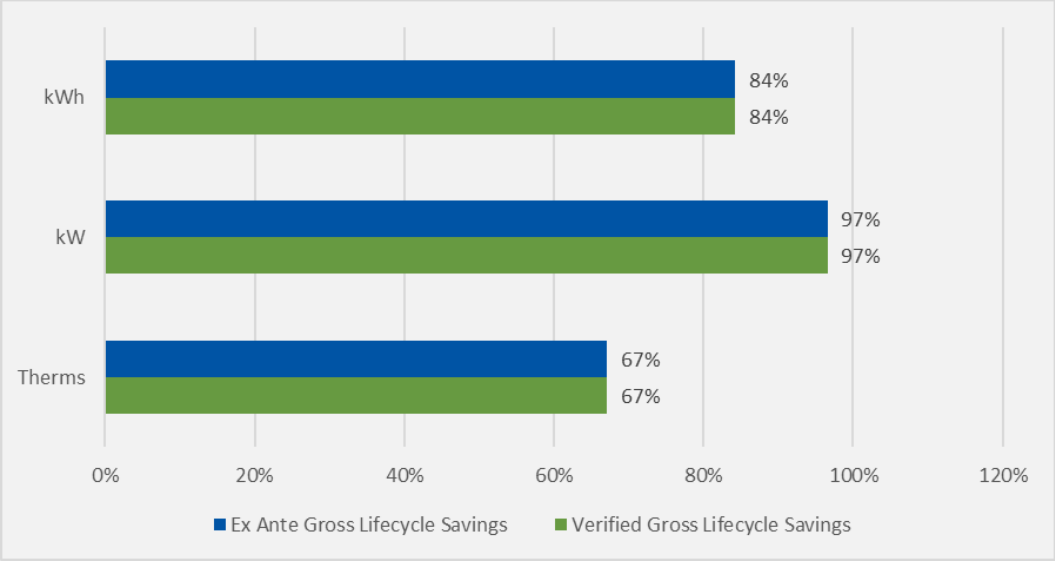
Item	Units	CY 2020
Incentive Spending	$	$1,256,900
Participation	Number of Participants	2,259
Verified Gross Lifecycle Savings	kWh	93,451,159
	kW	759
	therms	13,339,004
Verified Gross Lifecycle Realization Rate	% (MMBtu)	100%
Annual NTG Ratio [a]	% (MMBtu)	4%
Net Annual Savings	kWh/year	0
	kW	0
	therms/year	22,232
Net Lifecycle Savings	MMBtu	66,695
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio	0.46

[a] Does not include market effects.

Achievement Against Goals

Figure 38 shows the percentage of gross lifecycle savings goals achieved by the Residential New Construction offering in CY 2020. This offering achieved 84% of its kWh goal, 97% of its kW goal, and 67% of is natural gas (therms) savings goal. The administrator and implementer established CY 2020 savings goals before the onset of the COVID-19 pandemic. The implementer and administrator reported that the COVID-19 pandemic negatively impacted the overall construction market in Wisconsin by limiting available labor and construction materials, resulting in a slower overall rate of new construction and a lower than anticipated program participation rate.

Figure 38. Residential New Construction Offering Achievement of CY 2020 Gross Lifecycle Savings Goals



The 100% *ex ante* gross lifecycle savings reflects the program implementer's contract goals for CY 2020. Verified gross lifecycle savings contribute to the program administrator's portfolio-level goals.

Impact Evaluation

This section describes the methodology and presents the findings for the CY 2020 impact evaluation of the Residential New Construction offering.

Impact Evaluation Methodology

The evaluation team designed the impact evaluation to integrate multiple perspectives in assessing the performance of the CY 2020 Residential New Construction offering. Table 72 lists specific data collection activities and sample sizes used in the evaluation. Additional details about each activity can be found in the *Market Effects* section.

Table 72. CY 2020 Data Collection Activities and Sample Sizes – Impact Evaluation Residential New Construction Offering

Activity	Sample Size
Tracking Database Review	Census
REM/Rate Database Update	Census
Delphi Panel	11 (panel members)
Market Effects Analysis	3,355 (non-program homes)

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:

- Thorough review of the data to ensure that totals in SPECTRUM matched totals reported by the program administrator

- Check 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 2020, the evaluation team applied offering-level electric and natural gas NTG ratios that were calculated in the CY 2019 evaluation. The CY 2019 evaluation included a comprehensive analysis of energy consumption data (billing data) of newly constructed program and non-program homes.

Table 73 lists the electric and gas NTG ratios estimated during the CY 2019 billing analysis. NTG ratios were 0% for electric savings and 5% for natural gas savings.

Table 73. CY 2019 Residential New Construction Offering Program Billing Analysis Results

Savings Type	NTG Rate
Electric	0%
Gas	5%

Verified Gross Savings Results for Residential New Construction

Table 74 lists the CY 2020 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 (MMBtu) energy savings. Table 75 lists verified first-year and lifecycle savings.

Table 74. CY 2020 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 75. CY 2020 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
3,115,038	759	444,633	55,092	93,451,159	13,339,004	1,652,756

Verified Net Savings Results for Residential New Construction

The evaluation team calculated an overall NTG estimate of 4% for the offering in CY 2020. Table 76 also shows total first-year gross and net savings.

Table 76. CY 2020 Residential New Construction Offering Lifecycle Net Savings and NTG

Total Lifecycle Gross Verified Savings (MMBtu)	Total Lifecycle Net Savings (MMBtu)	NTG Ratio
1,652,756	66,695	4%

Market Effects Evaluation

In CY 2020, the evaluation team continued to examine the effect of the Residential New Construction offering on the construction of non-program homes in Wisconsin and the resulting impact on energy consumption of these non-program homes. This dynamic is described as market effects the offering has induced due to years of consistent messaging, trainings, incentives, and program marketing and material. The team began reporting research efforts and findings related to market effects in CY 2019, but CY 2020 is the first year the team quantified the impacts.

For the CY 2019 evaluation, market effects activities were geared toward understanding the drivers of these market effects, comparing the energy consumption of different types of homes, and analyzing the construction practices of program and non-program homes. Important outputs of the CY 2019 evaluation included a market effects theory of change, calculation of program home market share, and a detailed comparison of the construction techniques of program and non-program homes.

The evaluation team also analyzed non-program home energy consumption data, which showed that non-program homes built in zip codes where program homes were constructed consumed less energy than did non-program homes built in zip codes where program homes were not in close proximity.

In CY 2020, the evaluation team presented findings from the CY 2019 evaluation and additional background materials to a Delphi panel of market experts and asked the panel to determine the impacts of the offering on new non-program homes in close proximity to program homes. Feedback from the Delphi panel provided insight to counterfactual home characteristics—that is, what certain non-program home construction practices would be if the Residential New Construction offering had never existed.

Table 77 describes the evaluation activities related to market effects in CY 2019 and CY 2020. The activities and findings for CY 2020 are described in more detail below. Details about the CY 2019 activities can be found in the CY 2019 annual evaluation report.[41]

[41] Cadmus. June 2, 2020. *Focus on Energy Calendar Year 2019 Evaluation Report.* Prepared for Public Service Commission of Wisconsin. https://www.focusonenergy.com/evaluation_archives

Table 77. CY 2019 and CY 2020 Market Effects Evaluation Activities – Residential New Construction Offering

Year	Activity	Output
CY 2019	Interview market actors (builders, contractors) regarding impacts of program on construction practices.	• Market effects theory of change and logic model • Comparison of construction practices of program and non-program homes.
	Review database of program home features	Show long-term trends in program home construction practices
	Review database of new homes starts	Show long-term program home market share
	Conduct billing analysis of program and non-program homes	• Comparison of program home and non-program home energy consumption • Comparison of energy consumption of non-program homes in zip codes with program homes and non-program homes in zip codes without program homes
CY 2020	Convene Delphi panel	Impact of offering on construction practices of non-program homes (i.e., counterfactual home building characteristics)

Delphi Panel Approach

The evaluation team convened a Delphi panel of 11 market experts to determine whether the offering had affected specific building features of non-program homes and the magnitude of the effect. The team facilitated an iterative process to converge panel opinion about the offering's effect on non-program home construction. Because key research assessed by the Delphi panel was focused on new construction activity in areas near program home activity, the panel specifically focused on non-program home construction near program homes. The result was an inventory of counterfactual home characteristics —that is, how a non-program home would likely be built in absence of the Residential New Construction offering.

The evaluation team worked with the implementer to determine which types of market experts should be on the Delphi panel and to recruit qualified panelists. The Delphi panel consisted of market experts, builders, contractors, code officials, and the offering's Building Performance Consultants (BPCs). The team made efforts to ensure that panelists' expertise was broad and covered the state (urban and rural, program and non-program territories). Table 78 shows the composition of the Delphi panel.

Table 78. CY 2020 Delphi Panel Members – Residential New Construction Offering

Panelists Category	Number of Members
BPC	2
Code Official	2
Builder (Program homes)	1
Builder (Non-program homes)	1
Insulation Contractor	2
Residential New Construction Expert: Energy Efficiency Programs	2
Market Transformation Expert	1

To inform the decisions of the Delphi panel, the evaluation team presented information about the program's history, existing market research, and findings from Cadmus' CY 2019 market effects research. The team also provided the Delphi panel with non-program home characteristics, such as average insulation levels, from the 2017 market characteristics study.[42]

The team worked with the program implementer and program administrator to develop the list of specific home features to ask the Delphi panel about. The specific home features selected are listed in Table 79 in the *Delphi Panel Results* section below.

After briefing the Delphi panel on program background and research, the evaluation team gave panelists a survey that asked them to determine if the offering had impacted construction practices for specific home features in non-program homes and, if the offering had an effect, to what degree that feature would be different in absence of the program. Panelists were also given an opportunity to provide open-ended feedback about other features. Survey questions were framed to ask, "How would a standard Wisconsin home be constructed had the Residential New Construction offering not existed?" Panelists were shown current standard non-program home conditions and were also asked to include the reasons they chose their responses.

After panelists completed the survey, the evaluation team summarized the responses, including the panelists' reasons for their selections. The team then shared anonymized responses with the panel and gave panelists an opportunity to change their responses given other experts' responses and reasoning. The team completed this process twice, so panelists had two opportunities to revise their original responses.

Delphi Panel Results

The Delphi Panel concluded that the Residential New Construction offering has, over the course of its history, had an impact on the construction of non-program homes. Of the 13 home features listed in the survey, panelists determined that seven were impacted by the Residential New Construction offering. Panelists decided that in the absence of the offering a new counterfactual home would be less airtight, have a less efficient furnace, have lower insulation quality, be less likely to have a correctly sized heating or cooling system, and have a lower saturation of efficient lighting technology.

Table 79 shows the home characteristics that, according to Delphi panel determination, were affected by the Residential New Construction offering. The table also shows counterfactual home feature characteristics and average current market home characteristics. The Delphi panel's determination that homes in the Wisconsin market would have been constructed less efficiently without the Residential New Construction offering indicates that the offering is encouraging more efficient building practices in the Wisconsin new homes market. This assessment supports the program theory of change that the evaluation team developed in CY 2019.

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

Table 79. CY 2020 Effects of Program on a Standard Market Home as Determined by the Delphi Panel – Residential New Construction Offering

Home Feature	Would a counterfactual home have different characteristics if the offering had not existed?	Counterfactual Home Characteristic	Market Home Characteristic [a]
Airtightness	Yes	2.48 ACH50	1.91 ACH50
Furnace Efficiency (AFUE)	Yes	92% AFUE	94% AFUE
Furnace Efficiency (EAE)	Yes	620 EAE	580 EAE
Wall Insulation Quality	Yes	Insulation grade II	Insulation grade I
Gas Water Heater Energy Factor (EF)	Yes	65 EF	67 EF
Refrigerator Efficiency	No	ENERGY STAR	ENERGY STAR
Dishwasher efficiency	No	ENERGY STAR	ENERGY STAR
Clothes washer efficiency	No	ENERGY STAR	ENERGY STAR
Window U-factor	No	ENERGY STAR	ENERGY STAR
Window Solar Heat Gain Coefficient	No	ENERGY STAR	ENERGY STAR
Correctly Sized Furnace and Central Air Conditioners	Yes	39% of market homes would have oversized furnaces	Correctly sized furnace
Installation of Programmable or Smart Thermostats	No	Programmable or smart thermostat compared	Programmable or smart thermostat compared
Lamp Technology	Yes	Efficient lighting: • 44% interior • 49% exterior • 37% garage	Efficient lighting: • 60% interior • 70% exterior • 60% garage

[a] Based on data from the 2017 market study. Seventhwave. October 2017. *New Homes Baseline Final Report*. *https://www.focusonenergy.com/sites/default/files/2018-04/New%20Homes%20Baseline%20and%20Market%20Characterization%20Study.pdf*

Limitations and Next Steps

The Delphi panel analysis relied on data from the 2017 market characteristics study, which is the most current study of residential new construction practices in Wisconsin. Because homes in this study were built in areas with program activity, the Delphi panel's assessment compared current and counterfactual market homes in areas with program activity. Though the CY 2019 evaluation activities suggest that market effects would be most pronounced in these areas with program activity, there may be additional market effects farther away from program activity.

To further investigate statewide market effects, the evaluation team plans to conduct a market baseline study in CY 2021. In addition to gathering home characteristics and data on homes in areas with program activity, the new market study will gather data on homes built in areas with no or limited program activity. This research will allow the team to analyze market effects impacts in areas outside of concentrated program activity in addition to determining changes in market practices in program markets.

Process Evaluation

The CY 2020 process evaluation activities were designed to monitor the Residential New Construction offering performance and program home construction practices. Evaluation activities and findings are detailed in this section.

Process Evaluation Methodology

In CY 2020, the evaluation team interviewed the administrator and the implementer. The team also processed CY 2020 program home REM/Rate files to update trends in program home building characteristics. Table 80 summarizes process evaluation activities in CY 2020.

Table 80. CY 2020 Data Collection Activities and Sample Sizes – Residential New Construction Offering Process Evaluation

Activity	Sample Size
Stakeholder Interviews	2
Program Home Database Update	2,220 [a]

[a] The implementer provided 2,314 REM/Rate files to the evaluation team. After screening for duplicate homes, and removing files that could not be processed, the team added 2,220 CY 2020 program homes to the home features database.

Solution Design and Delivery

Focus on Energy delivers the Residential New Construction offering throughout Wisconsin through the administrator (APTIM), the implementer (Willdan), implementer subcontractor (PSD), participating trade allies (home builders), and BPCs. Participating home builders hire BPCs affiliated with the offering to guide them on better building techniques and to 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.

In CY 2020, Focus on Energy paired builders with BPCs to construct new homes that are between 25% and 100% more efficient than homes built to meet the minimum requirements of the Wisconsin Uniform Dwelling Code (WUDC). The offering's tiered design offers increasing incentives for more efficient homes, with the highest incentives for homes that are energy-neutral. Builders could receive an incentive for homes that are at least 30% more efficient than code. Builders could receive program certification from Focus on Energy, but no incentive, for homes between 25% and 29.9% more efficient than code.

Though offering requirements are expressed as percentage better than code, since CY 2018 Focus on Energy has measured the energy savings of program homes from a market characteristics baseline, which is based on results from the 2017 market characterization study. These savings are calculated directly by the REM/Rate modeling software used by the BPCs.

Participation

Table 81 lists the incentives and participation for performance levels in CY 2020. Incentives varied by performance level and also according to whether space heating systems were fueled by natural gas provided though a Focus on Energy participating utility. In CY 2020, participation was primarily in the middle tier for homes between 30% and 34.9% more efficient than minimum code requirements. There were no homes in the highest, energy-neutral, tier.

Table 81. CY 2020 Offering Tiers and Participation – Residential New Construction Offering

Certification Level	CY 2020 Incentives		CY 2020 Participation	
	Electric Only Homes	Electric and Natural Gas Homes	Electric Only Homes	Electric and Natural Gas Homes
25%-29.9% more efficient than code	$0	$0	3	512
30%-34.9% more efficient than code	$350	$600	31	1,111
35%-99.9% more efficient than code	$550	$1,000	51	551
Energy-Neutral (or 100% more efficient than code)	$1,000	$2,300	0	0

The offering administrator and implementer noted that the cost of constructing energy-neutral homes was the biggest inhibitor to participation in the energy-neutral tier and that there was not currently a strong market demand for energy-neutral homes in Wisconsin.

COVID-19 Impact

According to the administrator and the implementer, the COVID-19 pandemic impacted the Residential New Construction offering by slowing down the overall volume of construction. The pandemic reduced the available labor pool (which was already constrained) and impacted the manufacture of building materials. The pandemic also prevented program staff from offering training with building professionals as it had in previous years.

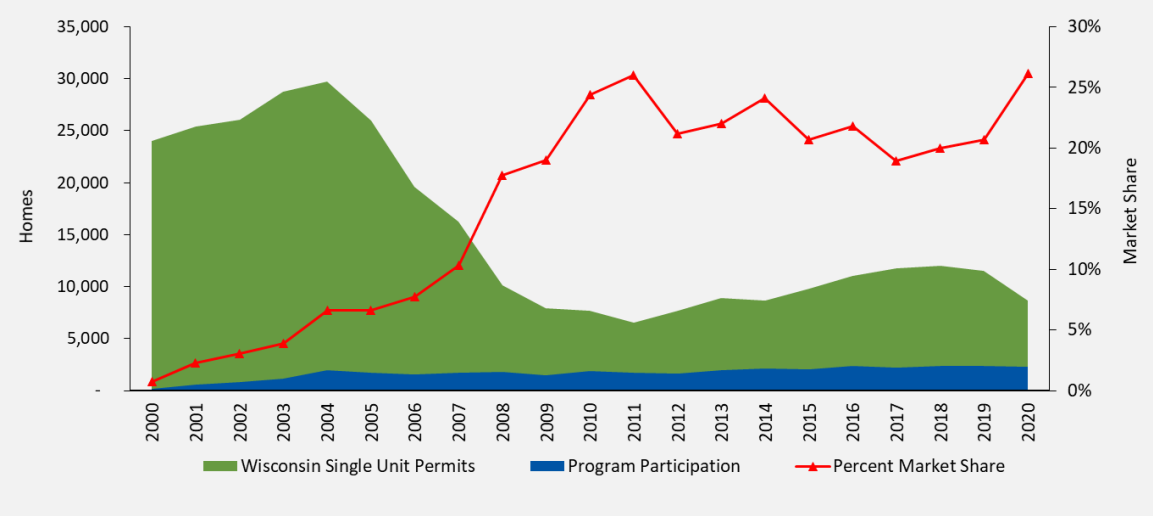
Marketing

In CY 2020, the Residential New Construction offering continued to market program homes to potential homebuyers through the Parade of Homes. Focus on Energy also joined six of Wisconsin's 21 Home Builder Associations (HBA)—one in each geographical region of Wisconsin—and is working with these associations to promote the offering.

Building Practices

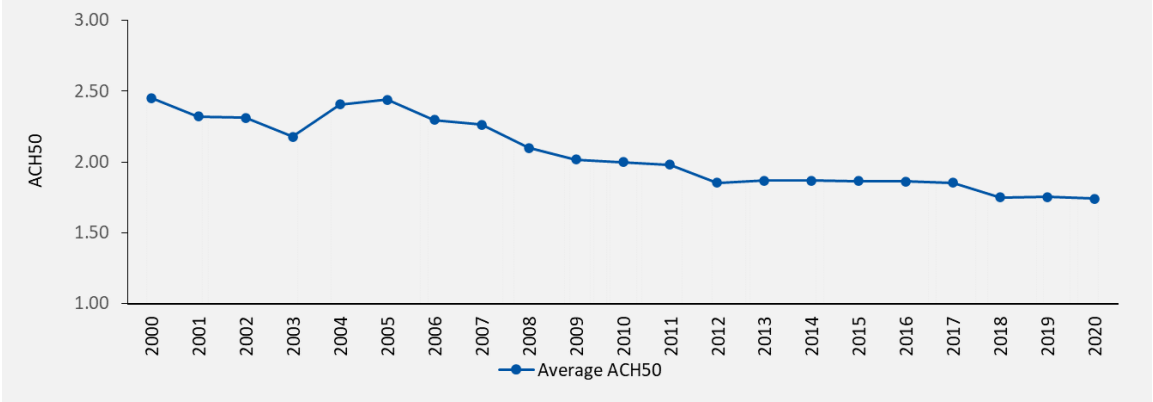
In CY 2019, the evaluation team created a database of historical program home REM/Rate files. The team updated this database with CY 2020 program home files to show how characteristics of homes that participate in the offering evolve over time. Figure 39 shows the historical participation rate and market share. Though overall construction in Wisconsin decreased, participation in the Residential New Construction offering remained steady in CY 2020, with a higher overall market share compared to previous years (since CY 2010).

Figure 39. Residential New Construction Offering Participation and Market Share



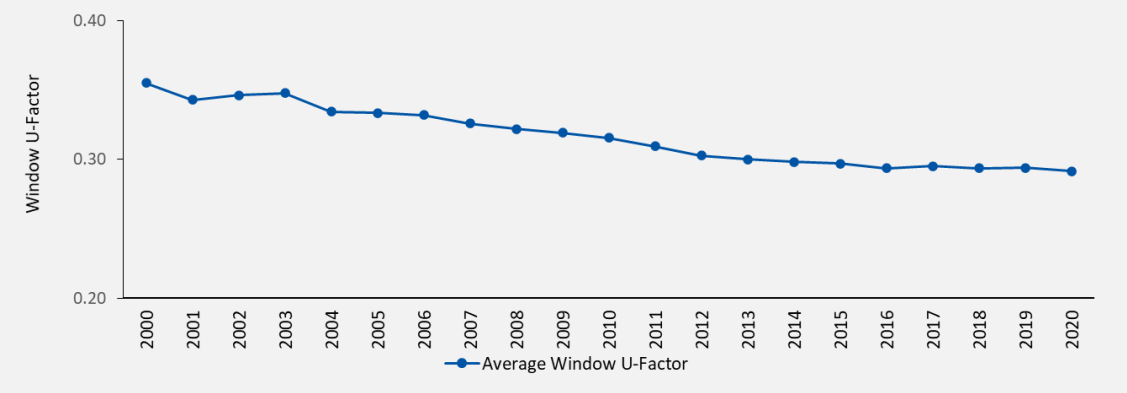
In CY 2020, Residential New Construction offering homes continued to show improvements in terms of airtightness, as measured in ACH50, since CY 2004 (as shown in Figure 40).

Figure 40. Residential New Construction Offering Home Airtightness



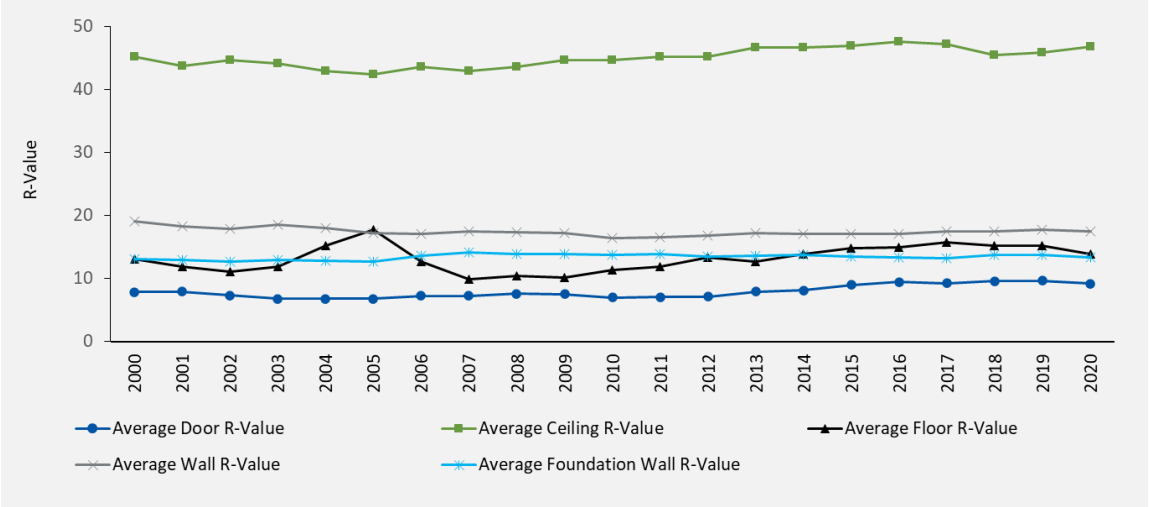
Window efficiency has also continued to improve, as shown by decreases in average window U-factors since CY 2000 (Figure 41).

Figure 41. Residential New Construction Window U-Factor



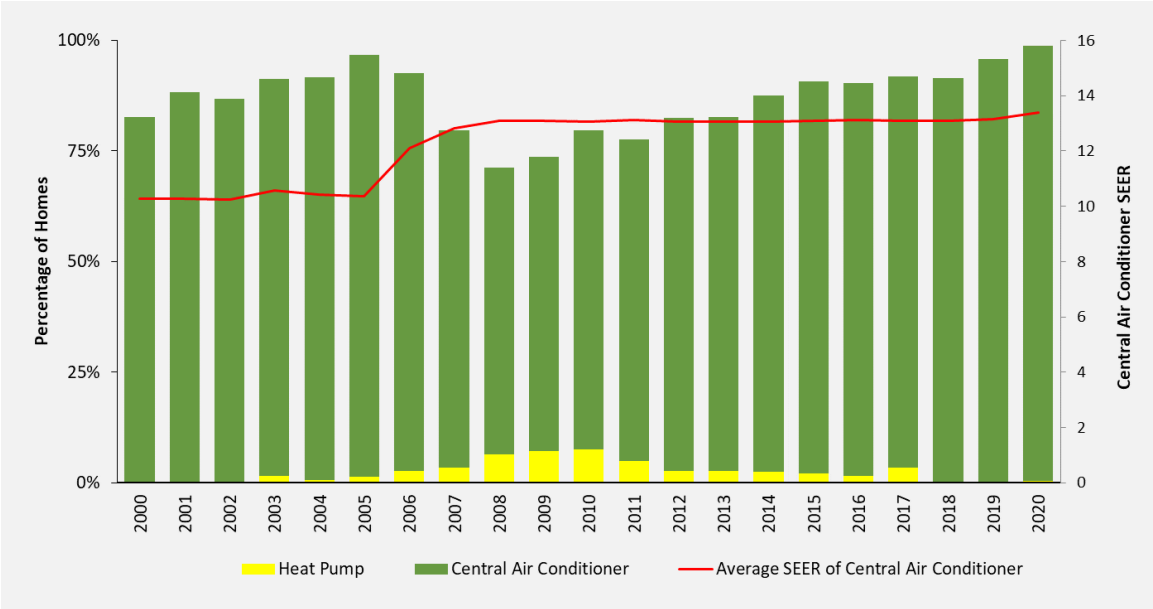
Various measures of home insulation levels have remained steady through CY 2020 (Figure 42).

Figure 42. Residential New Construction Offering Home Insulation Levels



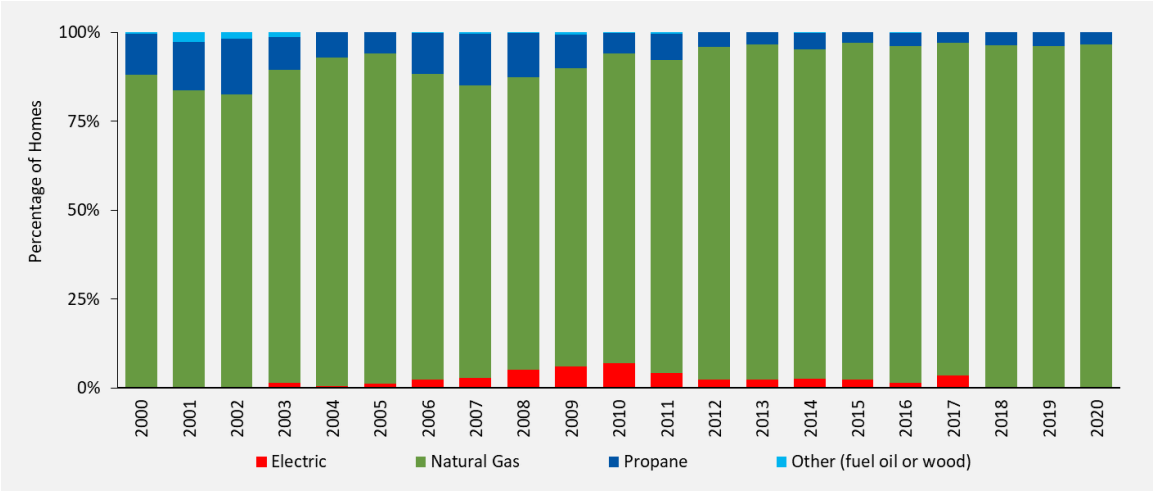
In CY 2020, program homes had slightly more central air conditioners installed compared to previous years (Figure 43). Program homes have not surpassed, on average, the federal minimum standard of SEER 13 for central air conditioners since CY 2007. However, CY 2020 saw a slight increase in the average central air conditioner SEER value compared to previous years.

Figure 43. Residential New Construction Offering
Home Cooling Systems Central Air Conditioner SEER Level



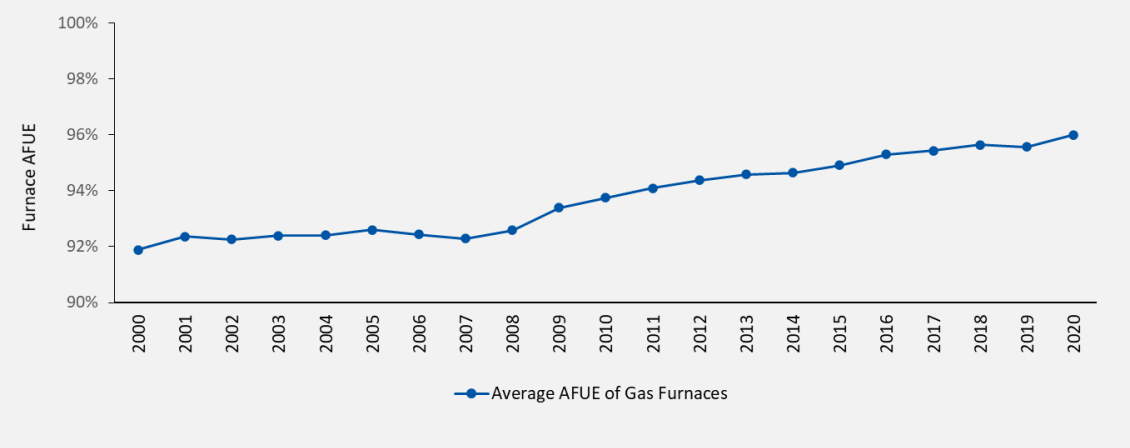
In CY 2020, program homes continued to be primarily heated by natural gas (Figure 44). A small percentage of homes are heated by propane.

Figure 44. Residential New Construction Offering Home Heating Fuel



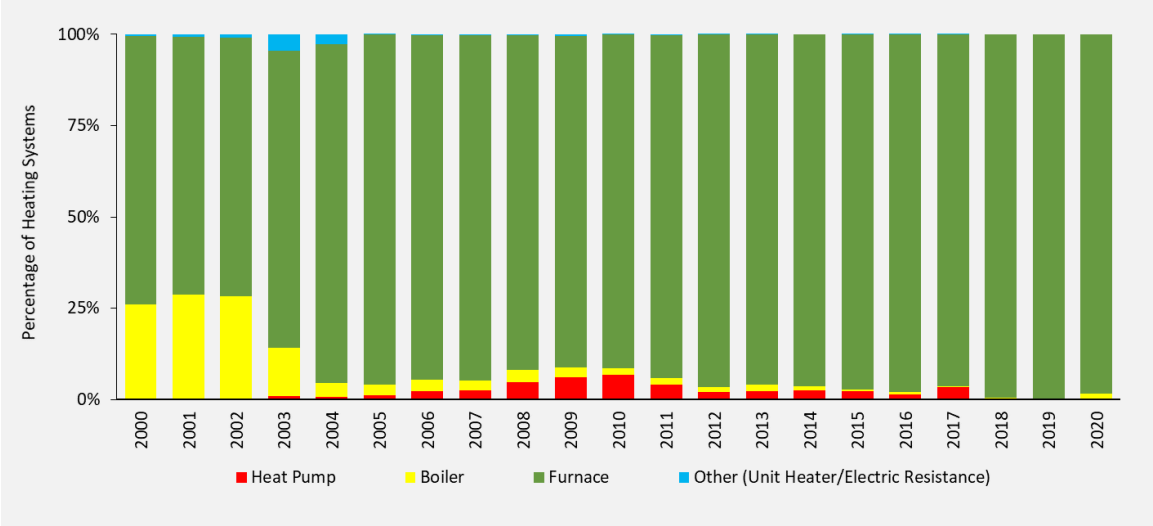
Program homes are primarily heated by natural gas-powered furnaces. In CY 2020, the efficiency of program home furnaces continued to increase, following a trend seen since CY 2007 (Figure 45).

Figure 45. Residential New Construction Offering Homes Furnace AFUE



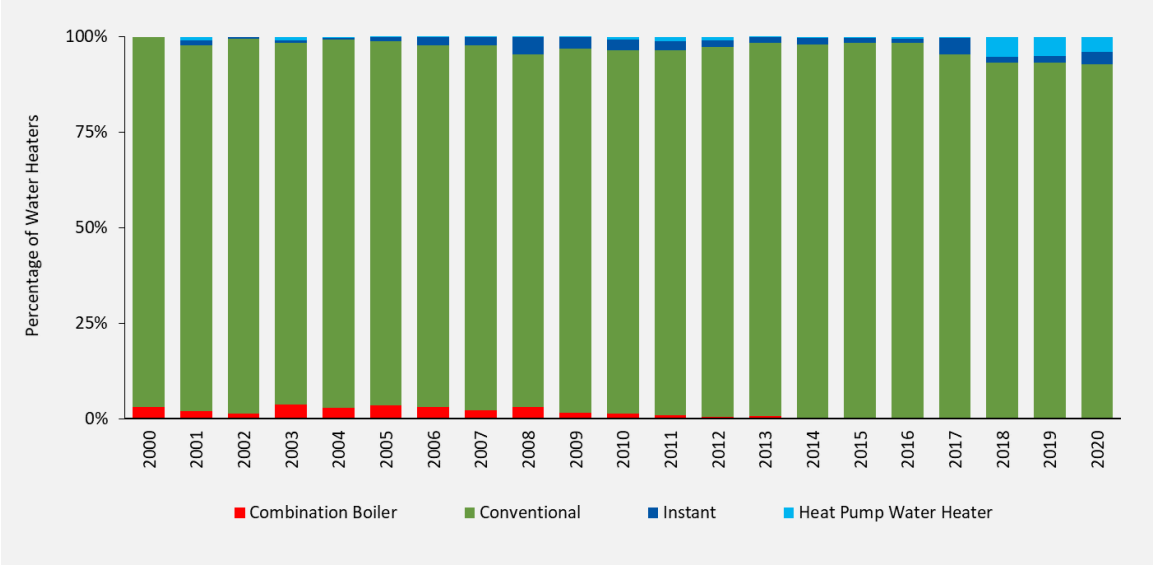
In CY 2020, though a furnace continued to be the primary equipment type for heating program homes, the percentage of homes that used boilers to provide space heating increased slightly (Figure 46).

Figure 46. Residential New Construction Offering Homes' Space Heating System



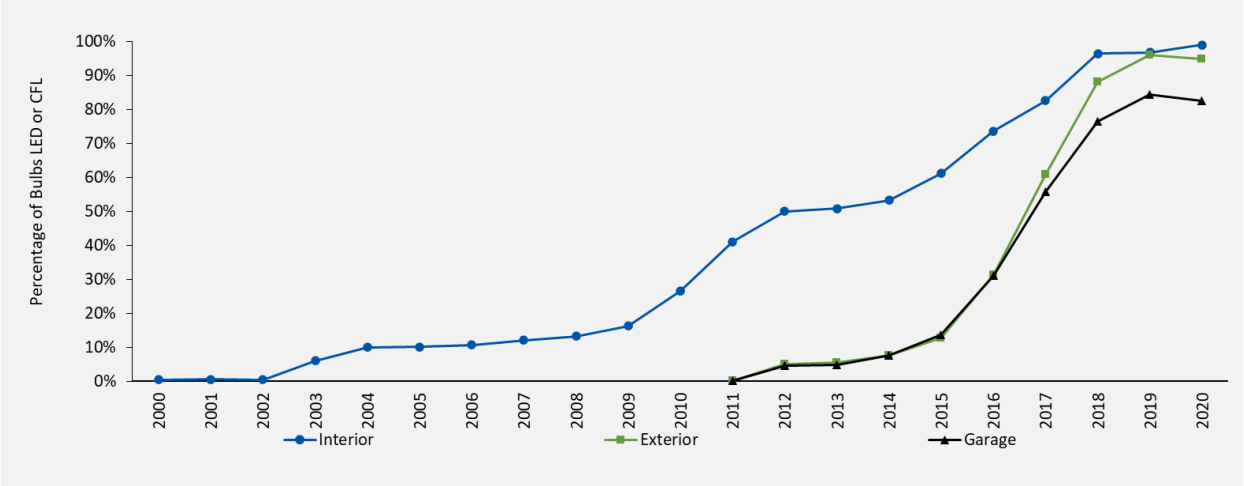
In CY 2020, water continued to be heated primarily with conventional (tank) water heaters (Figure 47). As in CY 2017 through CY 2019, some program homes also used more efficient water heating systems, including tankless and heat pump water heaters.

Figure 47. Residential New Construction Offering Homes' Water Heating System



In CY 2020, in almost 100% of program homes, interior and exterior lighting technology was efficient (LED or CFL) and over 80% efficient for garages. As shown in Figure 48, program homes have seen steady increases in efficient lighting technology since CY 2002. In CY 2020, LEDs were the primary contribution to the efficient lighting saturations.

Figure 48. Residential New Construction Offering Homes' Lighting



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 H* includes a description of the TRC test.

Table 82 lists the CY 2020 incentive costs for the Residential New Construction offering.

Table 82. CY 2020 Residential New Construction Incentive Costs

Offering	Incentive Costs
New Homes	$1,256,900

The evaluation team found that the CY 2020 Trade Ally Solution was not cost-effective (0.46). There were no T&D benefits associated with the solution. Table 83 lists the evaluated costs and benefits.

Table 83. CY 2020 Residential New Construction Costs and Benefits

Cost and Benefit Category	Total
Costs	
Non Incentive Costs	$863,554
Incremental Measure Costs	$0
Total Non-Incentive Costs	**$863,554**
Benefits	
Electric Benefits (kWh)	$0
Electric Benefits (kW)	$0
T&D Benefits (kW)	$0
Gas Benefits	$341,038
Emissions Benefits	$58,525
Total TRC Benefits with T&D Benefits	**$399,563**
Net TRC Benefits with T&D Benefits	**($463,991)**
TRC B/C Ratio with T&D Benefits	**0.46**

Outcomes and Recommendations

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

Outcome 1. The Residential New Construction offering has induced market effects in areas near program activity. The CY 2019 billing analysis showed that market homes consumed less energy when they were located close to program homes. Additionally, the CY 2019 logic model indicated that the Residential New Construction offering contributes the increased efficiency of Wisconsin homes through interactions between the offering's BPCs and market actors, such as contractors and builders. The CY 2020 Delphi panel results supported these findings, indicating that the offering had impacted the wider new construction market and has led to more energy efficient building practices.

Recommendation 1. Focus on Energy could expand the offering's market effects by expanding BPC and builder reach into less-active markets. Additionally, the offering should focus on activities that expand program engagement, such as trainings, seminars, and workshops in areas that don't have concentrated program activity.

Outcome 2. Further research is needed to understand market effects in Focus on Energy territory that has traditionally seen little to no program activity (non-program territory). A limitation of the market effects research is that it focused on new construction practices in close proximity to program activity. It

remains unclear to what degree the offering affects new home construction practices in homes built away from program activity.

Recommendation 2. To better understand how the offering affects building activity in non-program territories, Focus on Energy should continue researching construction practices and counterfactual home characteristics in these territories. The evaluation team's CY 2021 market baseline study will be a key factor in this research; it will inform market effects analysis in non-program territories and guide the need for additional research efforts.

Midstream Solutions

This section presents the evaluation results for CY 2020 for this midstream solution and its offering.

Midstream Solution

The Midstream Solution is administered by APTIM and implemented by ICF. The solution provides incentives to customers via residential and commercial distributors who sell efficiency upgrades through four statewide channels.[43] The following are measure channels through the Midstream Solution:

- **Commercial Kitchen Equipment** provides incentives for commercial food service equipment, including, but not limited to, fryers, hot food holding cabinets, steamers, dishwashers, and ice makers and refrigerators.
- **HVAC** provides incentives for HVAC equipment improvements, specifically ductless mini-split heat pumps. The measure is primarily intended for residential use, though some units are installed in small business settings.
- **Heat Pump Water Heaters** provides incentives for high-efficiency heat pump-based hot water heaters. This measure was launched in 2020 but has not yet sold any units.
- **Circulator Pumps** provides incentives for high-efficiency hot water variable speed circulator pumps, often used to move water in large buildings for heating or hot water end uses.

Table 84 summarizes impacts of the Midstream Solution's core measures for CY 2020.

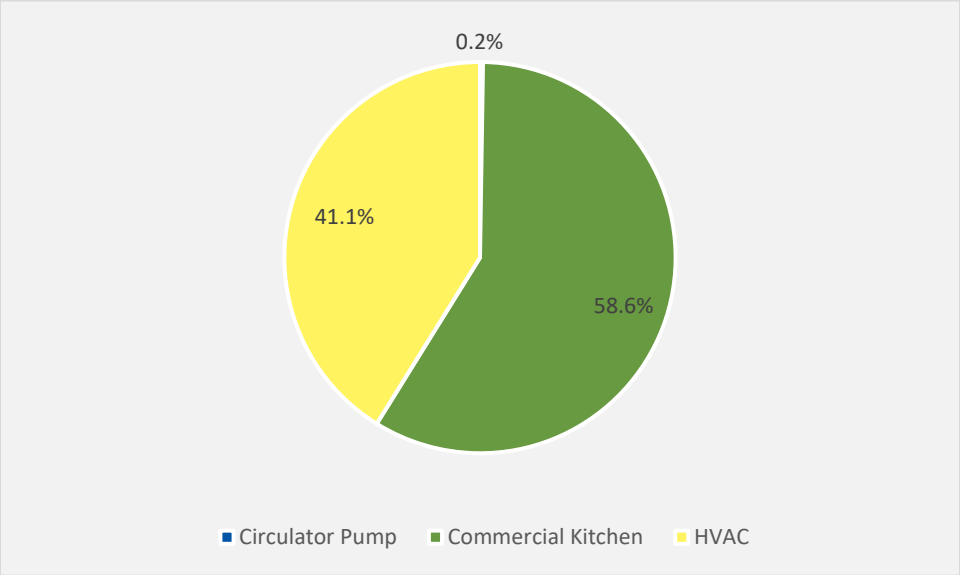
Table 84. Midstream Solutions Summary

Item	Units	CY 2020
Incentive Spending	$	$401,575
Participation	Number of Participants	740
Verified Gross Lifecycle Savings	kWh	8,351,599
	kW	N/A
	therms	4,608,448
Verified Gross Lifecycle Realization Rate	% (MMBtu)	100%
Annual NTG Ratio	% (MMBtu)	100%
Net Annual Savings	kWh/year	656,841
	kW	211.34
	therms/year	331,400
Net Lifecycle Savings	MMBtu	489,354.38
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio with T&D Benefits	1.45

Figure 49 shows the proportion of Midstream Solution savings by measure. Commercial Kitchen Equipment contributed the most net lifecycle MMBtu savings to the solution. Circulator Pumps contributed less than 1% of savings. There were no Heat Pump Water Heaters incented through the program in 2020.

[43] Sixty percent of incentives must be passed through to end-use participants.

Figure 49. Proportion of Net Lifecycle Savings by Measure

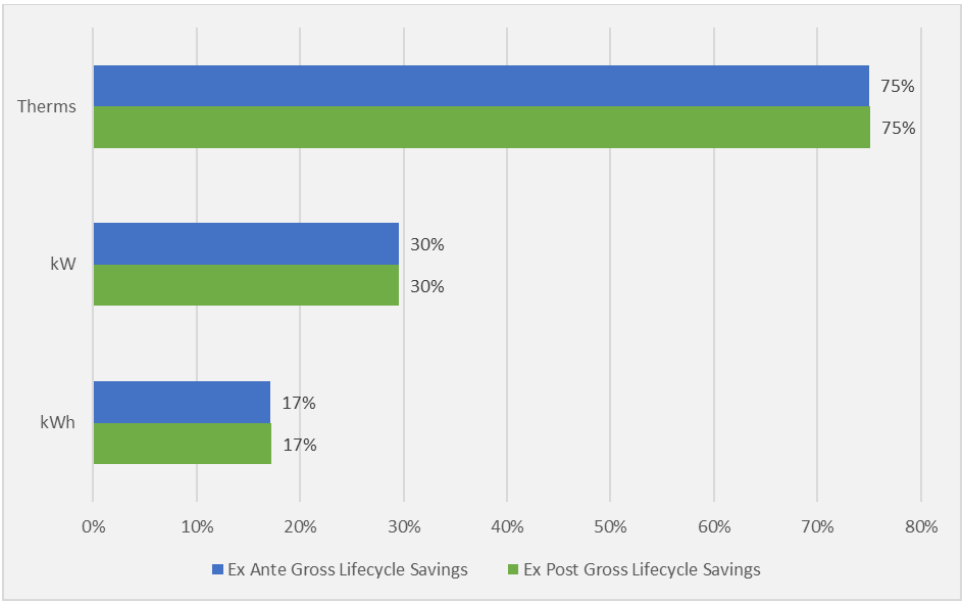


Note: No Heat Pump Water Heater measures were incented in CY 2020.

Achievement Against Goals

Figure 50 shows the percentage of gross lifecycle savings goals achieved by the Midstream Solution in CY 2020. The solution did not achieve its electric or gas savings goals. However, a substantial part of this underachievement can be attributed to the COVID-19 pandemic, which strongly affected the ability of participating retailers and customers to purchase new equipment.

Figure 50. Midstream Solutions Achievement of CY 2020 Gross Lifecycle Savings Goals



Impact Evaluation

This section contains the findings for the CY 2020 impact evaluation for the Midstream Solution. Findings are not reported by individual measure. A discussion of each measure follows.

Impact Evaluation Methodology

The evaluation team designed its evaluation, measurement, and verification approach to integrate multiple perspectives in assessing the performance of each measure and of the Midstream Solution as a whole. Table 85 lists specific data collection activities and sample sizes used in the evaluation. Additional details about these activities are in discussions about the specific measures below and in *Appendix K. Net Savings Analysis*.

Table 85. CY 2020 Data Collection Activities and Sample Sizes – Impact Evaluation

Activity	Commercial Kitchen Equipment	HVAC	Heat Pump Water Heaters	Circulator Pumps
Stakeholder Interviews	2			
Tracking Database Review	Census	Census	Census	Census
Distributor Surveys	6	6	0	0

The CY 2020 Midstream Solution was substantially and negatively affected by the COVID-19 pandemic. The rollout of all of the measures and the recruitment of participating distributors was considerably delayed due to the pandemic-related lockdown. Sales, especially in the Commercial Kitchen measure and particularly for the restaurant sector, were hampered by the economic downturn. Nevertheless, despite the pandemic, this measure 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.

Verified Gross Savings Results for Midstream Solution

Table 86 lists the first-year and lifecycle realization rates for CY 2020 by measure. Table 87 lists the verified first-year and lifecycle savings by measure. Overall, the Midstream Solution achieved a first-year evaluated realization rate of 100.2%, weighted by total (MMBtu) energy savings. Detailed findings for each measure, including factors affecting the realization rates, are discussed in the next section.

Table 86. CY 2020 Midstream First-Year and Lifecycle Realization Rates

Measure	First-Year Realization Rate				Lifecycle Realization Rate		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
Commercial Kitchen Equipment	100.5%	100.3%	100.3%	100.3%	100.6%	100.3%	100.3%
HVAC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Heat Pump Water Heaters[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Circulator Pumps	100.0%	N/A	N/A	100.0%	100.0%	N/A	100.0%
Overall Realization Rate	**100.3%**	**100.2%**	**100.2%**	**100.2%**	**100.3%**	**100.2%**	**100.2%**

[a] No Heat Pump Water Heaters were incented by the program in 2020.

Table 87. CY 2020 Midstream First-Year and Lifecycle Verified Energy Savings Summary

Measure	Verified First-Year Savings				Verified Lifecycle Savings		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
Core Measures							
Commercial Kitchen Equipment	455,382	161.33	225,605	24,114.26	4,795,756	2,704,138	286,790.55
HVAC	177,986	50.01	105,795	11,186.79	3,203,748	1,904,310	201,362.19
Heat Pump Water Heaters[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Circulator Pumps	23,473	0	0	80.09	352,095	N/A	1,201.64
Total Solution	**656,841**	**211.34**	**331,400**	**35,381.14**	**8,351,599**	**4,608,448**	**489,354.38**

[a] No heat pump water heaters were incented by the solution in 2020.

Commercial Kitchen Equipment: Verified Gross Savings Results

For the Commercial Kitchen Equipment measure, 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. The measure had a gross lifecycle realization rate of 100.3% MMBtu. There were no substantial deviations between *ex ante* and *ex post* gross savings for any measure.

Table 88 lists the CY 2020 *ex ante* and verified gross first-year and lifecycle savings for the Commercial Kitchen Equipment measure.

Table 88. CY 2020 Commercial Kitchen Equipment *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First Year Gross Savings	453,000	160.92	224,909	455,382	161.33	225,605
Lifecycle Gross Savings	4,767,326	N/A	2,695,917	4,795,756	N/A	2,704,138

HVAC: Verified Gross Savings Results

For the HVAC measure, 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 each measure. The measure had a gross lifecycle realization rate of 100.0% MMBtu. There were no deviations between *ex ante* and *ex post* gross savings for any measure.

Table 89 lists the CY 2020 *ex ante* and verified gross first-year and lifecycle savings for the HVAC measure.

Table 89. CY 2020 HVAC *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First Year Gross Savings	177,986	50.01	105,795	177,986	50.01	105,795
Lifecycle Gross Savings	3,203,748	N/A	1,904,310	3,203,748	N/A	1,904,310

Circulator Pumps: Verified Gross Savings Results

For the Circulator Pumps measure, 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 each measure. The measure

had a gross lifecycle realization rate of 100.0% MMBtu. There were no substantial deviations between *ex ante* and *ex post* gross savings for any measure.

Table 90 lists the CY 2020 *ex ante* and verified gross first-year and lifecycle savings for the Circulator Pumps measure.

Table 90. CY 2020 Circulator Pumps *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
Core Retail Measure						
First Year Gross Savings	23,473	0.0	0.0	23,473	0.0	0.0
Lifecycle Gross Savings	352,181	N/A	0.0	352,095	N/A	0.0

Verified Net Savings Results for Midstream Solution

The evaluation team is working with the PSC, the implementer, and other stakeholders to determine the appropriate approach to determining any freeridership and spillover attributable to the solution. That process will largely be complete at the start of CY 2022. In a program design like the Midstream Solution, the implementer works with distributors and, for some measures, contractors, to provide instant discounts for customers purchasing qualifying energy-saving equipment. This market intervention design seeks to overcome barriers to high-efficiency equipment sales and 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.

Verified Net Savings Results

In consultation with the administrator and the PSC, the evaluation team determined it was not appropriate to calculate net savings in the first year of the Midstream Solution given the effects of the COVID-19 pandemic. The lockdown delayed the rollout, uniquely impacted measures that require on-site installation, and disproportionately affected the restaurant sector. Therefore, the evaluation team applied a first-year-only NTG ratio of 1.0 to savings achieved in CY 2020.

Table 91 shows the weighted average NTG ratio by measure as well as the total lifecycle gross and net savings. Net savings did not vary by measure.

Table 91. Midstream Lifecycle Net Savings and NTG

Measure	Total Lifecycle Gross Verified Savings (MMBtu)	Total Lifecycle Net Savings (MMBtu)	NTG Ratio
Commercial Kitchen Equipment	286,790.55	286,790.55	100%
HVAC	201,362.19	201,362.19	100%
Heat Pump Water Heaters	N/A	N/A	N/A
Circulator Pumps	1,201.64	1,201.64	100%
Total	**489,354.38**	**489,354.38**	**100%**

Process Evaluation

The evaluation team conducted a process evaluation to assess the success of the CY 2020 Midstream Solution in meeting its objectives. The process evaluation is designed to incorporate perspectives from the administrator, the implementer, and participating distributors.

Process Evaluation Methodology

Table 92 lists the process evaluation activities for the measures in the CY 2020 Midstream Solution.

Table 92. CY 2020 Midstream Solution Process Evaluation Activities

Activity	CY 2020 Population	CY 2020 Sample Size
Program Administrator Interview	1	1
Program Implementer Interview	1	1
Tracking Database Review	Census	N/A
Commercial Kitchen Equipment Distributor In-Depth Interviews	11	6
HVAC Equipment Distributor In-Depth Interviews	11	6

Program Actor Interviews

In August 2020, the evaluation team interviewed the implementer to learn about the current state of the Midstream Solution and to assess its objectives, performance, and any implementation challenges and solutions. The interview covered the following topics:

- Solution goals and achievements
- Solution delivery changes
- Participation barriers

The evaluation team also participated in monthly calls with the administrator and implementer to discuss the activities and progress of the Midstream Solution and the challenges related to ramping up participation across multiple equipment categories.

Tracking Database Reviews

The evaluation team reviewed and summarized the Midstream Solution 2020 sales data in SPECTRUM, by equipment category and by distributor, to characterize the level of distributor participation and in preparation for distributor interviews.

Distributor Interviews

The evaluation team conducted interviews with six of 11 participating distributors in the Commercial Kitchen Equipment Measure and six of 11 participating distributors in the HVAC Measure. The interviews covered the following topics about the Midstream Solution:

- Motivations for and barriers to participation
- Successes and challenges
- Satisfaction

- Market share of qualifying equipment and participating distributors
- Retrospective and prospective counterfactual sales
- Influence on distributors' stocking, promotional, and pricing practices

The evaluation team developed an interview guide to ensure all topics were covered but conducted the interviews informally, that is, not as a structured survey, so the conversation could flow naturally and respondents could be comfortable giving a candid perspective.

Solution Design and Delivery

Focus on Energy engaged the implementer, ICF, via rebid, to transition the CY 2017-CY 2018 Midstream Commercial Kitchen Equipment Pilot into a full program in 2019 and to expand it to include HVAC equipment, heat pump water heaters, and circulator pumps in 2020. The implementer worked with the distributors who had participated in the pilot to transition their processes to the new system and recruited new distributors across all of the 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 the eligibility of equipment and incentive levels and to submit sales and customer data.

As in the pilot, incentives are paid directly to distributors. In CY 2020, distributors had some discretion regarding how much of the incentive was passed to the purchaser. Distributors had the option to keep up to 40% of the incentive to cover administrative costs related to participation or to offer spiffs to encourage sales staff to promote qualifying equipment, though most reported passing the full value of incentives on to their customers. The implementer allocated an incentive budget for each distributor, based on the distributor's forecasted sales of qualifying equipment.

In CY 2020, participation in the HVAC and Commercial Kitchen Equipment measures was relatively successful, after consideration of the COVID 19 pandemic. However, sales of circulator pumps were minimal, and no sales of heat pump water heaters were reported.

According to the implementer, circulator pumps are a new product for many installation contractors. The implementer was working with distributors and manufacturers to increase installer awareness of this technology.

The Heat Pump Water Heater Measure was impeded by significant supply chain issues in 2020, with distributors reporting up to 10 weeks to fulfill backorders, largely driven by the COVID-19 pandemic. This uncertainty, combined with the inexperience of plumbing contractors in Wisconsin, presented an insurmountable barrier to increasing the adoption rate for this technology. Nevertheless, the implementer has been working with manufacturers and distributors to prepare for renewed promotion of heat pump water heaters in 2021.

Process Evaluation Findings by Measure

Commercial Kitchen Equipment: Process Evaluation Findings

Measure Design, Delivery, and Changes

Eleven distributors participated in the Commercial Kitchen Equipment Measure in 2020. Five had participated in the pilot and six were new participants. Of the six distributors interviewed, five had incorporated the measure into their existing processes (one had not completed the entire setup and had processed incentives for only one large sale). Three distributors said setup took only a *small* amount of effort and one said a *very small* amount of effort. One distributor said setup took a *moderate* amount of effort, partly because the measure was not rolled out to the entire company. This distributor also said determining which discounts are applicable to which products was complex and prevented the company from measure it to more customers. None of the other interviewed distributors reported significant issues that were not easily addressed by the implementer.

Distributor Satisfaction and Motivations for Participating

Distributors were largely satisfied with the Commercial Kitchen Equipment Measure in 2020. Five of six rated their satisfaction as at least a 7 out of 10 (the distributor who cited issues with the measure rated satisfaction as 5). Most distributors gave unsolicited positive feedback about the implementer and level of support they received. One distributor mentioned challenges related to the implementer pushing out initial launch timelines and the uncertainty of sales staff about when incentives would be available to customers. However, this distributor still gave satisfaction an 8 out of 10. Two distributors mentioned relatively minor issues with the portal not being up to date about qualifying models or not being able to edit a submission after the fact. Three distributors expressed disappointment that refrigerators and freezers were to be removed from the measure in 2021.

General feedback about the benefits of the Commercial Kitchen Equipment Measure included staying competitive and/or increasing sales (five of six distributors) and demonstrating to customers that they offer the best and most efficient equipment (three of six distributors). The measure was new to two of the interviewed distributors and both expressed enthusiasm. One had worked with similar programs in other states and said they were successful. The other hoped that the incentives would help the company sell the more expensive energy-efficient equipment.

Impact on Distributor Sales, Stocking and Promotional Practices

The evaluation team asked interviewed distributors about their 2020 sales, stocking, and promotional practices and how participation in the Midstream Solution had impacted those practices. Though all six respondents said they would have sold all or most of the qualifying equipment units reported in absence of the Commercial Kitchen Equipment Measure, three rated their participation as having a *very important* (two distributors) or *somewhat important* (one distributor) impact on their 2020 sales of qualifying equipment. Given this seemingly contradictory finding, program evaluation in future years will attempt to dig deeper into the topic by adding additional follow-up questions to questionnaires.

When asked to estimate the market share of qualifying equipment models in Wisconsin, most interviewed distributors were unable to confidently give estimates. Responses about the anticipated percentage of 2021 qualifying equipment sales varied by distributor and equipment type, except for dishwashers. Four distributors anticipated that sales of ENERGY STAR dishwashers would be 85% to 96% of all dishwasher sales. Estimates for anticipated sales of other qualifying equipment types varied between 10% and 85%. Most of the distributors did not think the Midstream Solution was a major factor in these estimates, though one distributor thought sales of qualifying fryers might be 15% lower in absence of the measure.

When asked about stocking practices, three distributors said their company kept inventory in stock and their stocking decisions are based on market demand or turnover rate and not the availability of Midstream Solution incentives. Two distributors said they ordered as needed, and one was not involved in stocking. Only one distributor said the company kept a significant quantity of nonqualifying equipment in stock. The others said either all or the vast majority of the equipment they stock is high-efficiency and would have qualified for program incentives.

When asked about making recommendations to contractors or buyers, all six distributors said they make recommendations about equipment at least some of the time. Three said the incentives influence the efficiency level of the equipment they recommend, two said it depends on the situation, and one said the incentives are too small a portion of their sales to impact their promotional practices.

Only one distributor reported engaging in significant marketing efforts and that the company incorporates the ENERGY STAR brand and logo into its marketing materials.

Suggestions for Improvement

When asked how Focus on Energy could change the Commercial Kitchen Equipment Measure to improve participants' experience, distributors offered the following suggestions:

- Bring back refrigerators and freezers (four distributors, and one specified walk-ins)
- Add combination ovens (two distributors)
- Add high-speed ovens, exhaust hoods, and possibly heat lamps/warmers (one distributor)
- Incorporate a way to verify customer eligibility via address lookup (one distributor)
- Simplify the portal so there is only one source for information about available discounts (one distributor)
- Provide more information on the reimbursement check than just the rebate number (one distributor)
- Make quarterly budgets consistent, that is, not based on prior quarter's performance, which can limit sales ramp-up as year progresses and more customers decide to upgrade equipment (one distributor)

Four of six distributors thought the current incentives were sufficient. One thought the incentives were lower than those offered in other states (for example, the convection oven rebate in Wisconsin is approximately half of what is offered in Michigan). Another said the deciding factor for refrigeration

equipment tends to be its functionality and that energy efficiency is simply a bonus factor. Another said "$400 on a $12,000 machine doesn't make a big dent."

HVAC: Process Evaluation Findings

Measure Design, Delivery, and Changes

The HVAC Measure was new in 2020, and the implementer worked with distributors to train their sales staff on the measure's requirements and processes. The evaluation team interviewed six of the 11 HVAC distributors. All six said they sell solely or largely to contractors and all have locations in multiple states across the country.

In general, the distributors were enthusiastic about the Midstream Solution, with several lauding the support they received from the implementer.

When asked about the level of effort to get set up to participate in the HVAC Measure, half of the respondents said it took only a *small amount* and half said *a moderate amount.* More specific feedback regarding the setup process included the steep learning curves or complexity of the portal system (three distributors), not knowing what to expect about specifics of the measure (two distributors) or challenges in motivating sales staff or contractors to participate (two distributors).

One distributor was initially concerned about running through the company's incentive budget then having to tell customers rebates were no longer available; however, once comfortable with the process, this distributor was pleased to be able to expand the measure. One interviewed distributor had not yet reported sales through the Midstream Solution, having gotten a late start getting set up, but was able to provide feedback on the set-up process based on prior experience with similar programs.

Distributor Satisfaction and Motivations for Participating

Overall, distributors were very satisfied with the new HVAC Measure. Of a top score of 10, the lowest satisfaction rating was a 7 (one distributor). Two distributors rated their satisfaction as 9, one an 8, and one a 7.5. The one distributor who had not completed the setup process did not give a rating.

The general consensus among interviewed distributors was that participating in the HVAC Measure improved relationships with customers (contractors), specifically by facilitating the upselling of energy-efficient equipment. One distributor said the measure helped the company stay competitive and that approximately 60% of their competitors are able to offer similar discounts. When asked to speculate on the benefits to end-use customers, five distributors mentioned energy savings, two mentioned improved comfort, and one mentioned not having ductwork (which contributes to heat loss).

Impact on Distributor Sales, Stocking and Promotional Practices

The evaluation team asked interviewed distributors about their 2020 sales, stocking, and promotional practices and how participation had impacted those practices. Responses from the distributors in the HVAC Measure were somewhat different than were responses from distributors in the Commercial Kitchen Equipment Measure. Only two HVAC distributors said they would have sold the same number of

units in absence of the solution. One of these distributors added that the purchaser could have gone to somewhere else that offered discounts had the distributor not been participating.

Asked about its impact on their 2020 sales of qualifying equipment, one distributor said the HVAC Measure was *very important* (specifically because it enabled the company to sell equipment with even higher efficiency than the minimum required by the solution), two said it was *somewhat important,* and one each said it was either *neutral* or *not too important*. (Interestingly, the distributor who rated the impact on sales as *not too important* estimated the company would have sold only two of the four units in absence of the measure.)

When asked to estimate the market share of qualifying ductless mini-split models in Wisconsin, four of the five distributors who were willing to speculate thought market share was at least 60% (one of these thought it could be as high as 80%). One estimated the share of the larger HVAC cooling market to be 20% to 30% high efficiency. Most expected their sales of high-efficiency units to increase in 2021, but they did not think the Midstream Solution would be a major factor (two distributors qualified this statement by saying it was too early to say how much impact it will have).

Like distributors in the Commercial Kitchen Equipment Measure, distributors in the HVAC Measure said stocking is based on market demand and/or recent sales history. Three distributors said the instant discount was somewhat influential on the selection of the high-efficiency units they stock. One said incentives were a big factor, especially when layered with additional incentives such as federal tax credits and manufacturer incentives. However, none said they would stock fewer high-efficiency units in absence of the measure.

Of the four distributors who said they make recommendations about equipment to contractors or buyers, three said the incentive influences the efficiency level they recommend. When selling ductless mini-split heat pumps, all six distributors said they always (or almost always) recommend high efficiency, independent of the measure. One distributor said the measure helps them "double down on the message" and makes it easier to sell the more efficient units. All five distributors who had completely set up the Midstream Solution process said they *always* (four distributors) or *often* (one distributor) tell customers who are shopping for a ductless mini-split heat pump about the measure.

Suggestions for Improvement

When asked how Focus on Energy could change the HVAC Measure to improve the participant experience, distributors offered the following suggestions:

- Add other HVAC equipment (three distributors)
- Look for ways to make the process simpler (one distributor)
- Provide support in engaging/motivating the contractor network (one distributor)

Three of five distributors thought incentive levels were sufficient, one said incentives were *somewhat* sufficient, and one suggested they were not high enough to motivate contractors to embrace the Midstream Solution.

Cost-Effectiveness

Evaluators commonly use cost-effectiveness tests to compare the benefits and costs of a DSM measure. The benefit/cost test used in Wisconsin is a modified version of the TRC test. *Appendix H* includes a description of the TRC test.

Table 93 lists the CY 2020 incentive costs for the Midstream Solution.

Table 93. CY 2020 Midstream Incentive Costs

Measure	Incentive Costs
Commercial Kitchen Equipment	$163,300
HVAC	$231,030
Heat Pump Water Heaters	N/A
Circulator Pumps	$7,245
Total	**$401,575**

The evaluation team found that the CY 2020 Midstream Solution was cost-effective with T&D benefits (1.45) and without T&D benefits (1.38). Table 94 lists the evaluated costs and benefits.

Table 94. Midstream Costs and Benefits

Cost and Benefit Category	Total
Costs	
Non Incentive Costs	$535,198
Incremental Measure Costs	$2,118,513
Total Non-Incentive Costs	**$2,653,712**
Benefits	
Electric Benefits (kWh)	$293,032
Electric Benefits (kW)	$391,235
T&D Benefits (kW)	$178,562
Gas Benefits	$2,463,121
Emissions Benefits	$520,240
Total TRC Benefits with T&D Benefits	**$3,846,189**
Net TRC Benefits with T&D Benefits	**$1,192,478**
TRC B/C Ratio with T&D Benefits	**1.45**

Outcomes and Recommendations

Outcome 1: Participating distributors are highly satisfied with the program and would like to see it expanded to include more equipment types and models.

Outcome 2: There is also no current evidence that the Midstream Solution is changing distributors' behavior with regard to stocking for HVAC and commercial kitchen equipment. However, distributor feedback indicates that the solution does encourage them to recommend equipment with higher levels of efficiency. It is worth noting that this was the first year of the Midstream Solution's implementation and changes to stocking practices tend to take multiple years to come into full effect, so this result is not unexpected. The data will serve as a baseline for any changes observed in future years as the solution matures.

Outcome 3: Feedback with regard to the program's impact on qualifying equipment sales was inconsistent and, in some cases, somewhat contradictory. While most distributors estimated they would have sold roughly equivalent numbers of qualifying equipment in the absence of the program, they also rated their participation in the program as having a high impact on their sales of high-efficiency equipment.

Recommendation 1: Work with distributors to identify equipment categories and efficiency tiers that would most benefit from program incentives, in order to maximize the program's impact and minimize freeridership. For example, if most of the ductless mini splits carried by distributors are at least 18 SEER, consider limiting incentives to only higher SEER models. Consider eliminating incentives for equipment with significant market share and shifting these resources to increase incentive levels for equipment with higher incremental costs.

Recommendation 2. In future years, include more detailed follow-up questions about stocking, incentives, or marketing practices to get at any apparent contradictions between solution influence and distributor behaviors.

Nonresidential Solutions

This section presents the evaluation results for CY 2020 for these nonresidential solutions and their offerings.

Business and Industry

- Commercial and Industrial
- Large Industrial
- Agribusiness

Schools and Government

- Schools
- Government

Nonresidential New Construction

- Design Assistance/Design Review
- Prescriptive

Renewable Energy Competitive Incentive Program (RECIP)

Business and Industry Solution

Through the Business and Industry Solution, Focus on Energy offers prescriptive and custom incentives for nonresidential customers who install energy-efficient measures. APTIM is the solution administrator. The solution implementer, Franklin Energy, oversees management and delivery, and its subcontractors Leidos Engineering, CESA 10, and CleanTech Partners, provide subject matter expertise. The implementer's energy advisors, with support from trade allies and the administrator, promote and deliver the Business and Industry Solution to customers.

The Business and Industry Solution is internally divided into three offerings—Commercial and Industrial (C&I), Large Industrial, and Agribusiness. Each offering is discussed in further detail later in this chapter.

- **Commercial and Industrial (C&I**) supports commercial and small- and medium-sized industrial customers.
- **Large Industrial** supports industrial customers whose average monthly demand exceeds 1,000 kW of electricity or 100,000 therms of natural gas per month and whose combined utility bills were at least $60,000 in any month of the preceding year.
- **Agribusiness** is an offering with dedicated staff and enhanced incentives that supports Wisconsin's agricultural producers. Participants can receive incentives for agricultural equipment such as grain dryers and milking equipment and bonus incentives for trade allies whose customers implement agribusiness projects.

The rural initiative, which is complementary to the Business and Industry Solution, seeks to increase geographic equity for Focus on Energy participation. Industrial customers in rural areas can access additional incentives (referred to as a staffing incentive). Focus on Energy offers 20% more than its standard prescriptive and custom incentives, and up to 100% of the project cost or $25,000, to offset the administrative costs of implementing an energy-efficient project. Agribusiness is also a part of the rural initiative.

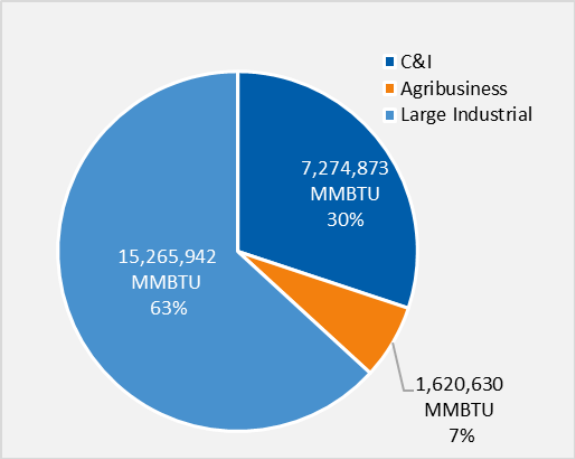
Table 95 summarizes the impacts for CY 2020.

Table 95. CY 2020 Business and Industry Solution Summary

Item	Units	CY 2020
Incentive Spending	$	$17,726,095
Participation	Number of Participants	3,974
Verified Gross Lifecycle Savings	kWh	4,222,190,005
	kW	37,253
	therms	174,325,234
Verified Gross Lifecycle Realization Rate	% (MMBtu)	92%
Annual NTG Ratio	% (MMBtu)	76%
Net Annual Savings	kWh/year	227,725,670
	kW	28,618
	therms/year	10,130,991
Net Lifecycle Savings	MMBtu	24,161,445
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio with T&D Benefits	3.69

Figure 51 contains the proportion of savings by offering. The Large Industrial offering contributed 63%, the Commercial and Industrial offering contributed 30%, and the Agribusiness offering contributed 7%.

Figure 51. CY 2020 Proportion of Business and Industry Solution Net Lifecycle Savings by Offering



Achievement Against Goals

As shown in Table 96, the Business and Industry Solution achieved 89% of its electric energy savings goal, 90% of its therm savings goal, and 94% of its peak demand savings goal in CY 2020 based on verified gross lifecycle savings at the solution level.

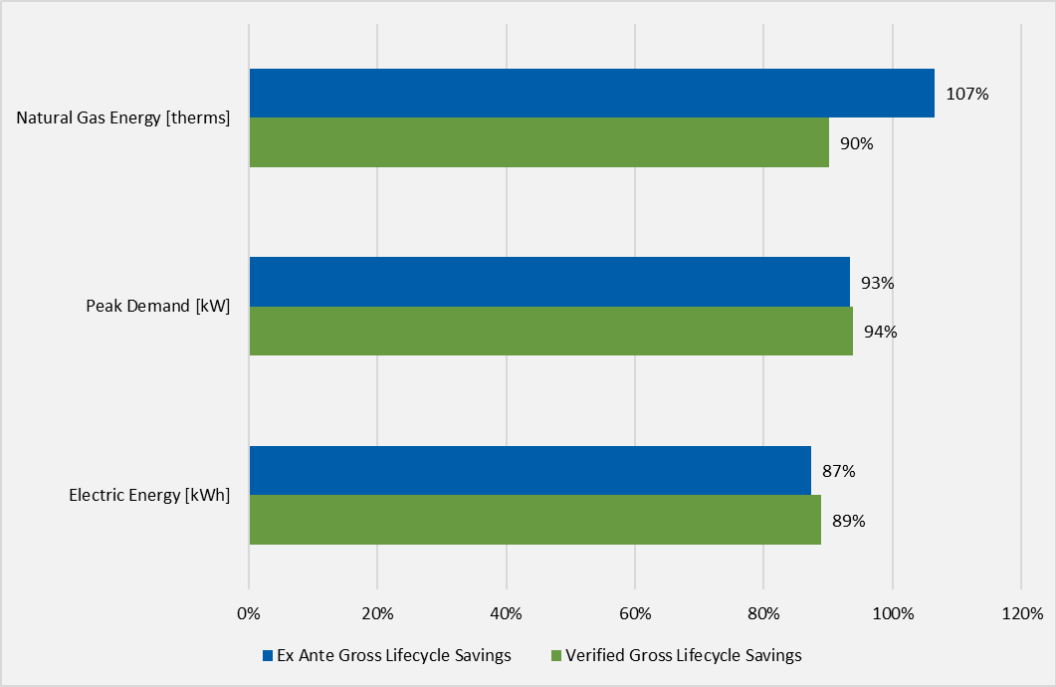
Figure 52 shows the percentage of gross lifecycle savings goals achieved for the Business and Industry Solution in CY 2020.

Table 96. CY 2020 Business and Industry 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 [a]		
Electric Energy [kWh]	4,747,240,928	4,147,861,149	4,747,240,928	4,222,190,005	87%	89%
Peak Demand [kW]	39,695	37,063	39,695	37,253	93%	94%
Natural Gas Energy [therms]	193,391,699	205,964,956	193,391,699	174,325,234	107%	90%
Total Energy (MMBTU)[a]	35,536,756	34,748,998	35,536,756	31,961,992	98%	90%

[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 52. CY 2020 Business and Industry Solution Achievement of Gross Lifecycle Savings Goals



The 100% *ex ante* gross lifecycle savings reflects the implementer's contract goals for CY 2020. Verified gross lifecycle savings contribute to the administrator's portfolio-level goals.

Impact Evaluation

This section contains the findings for the CY 2020 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 2020 Business and Industry 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. The team used the following approaches to measure the impact of the Business and Industry Solution.

- Tracking database review
- Engineering desk reviews
- Virtual verification site visits and interviews

Table 97 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 and in *Appendix K* of Volume III.

Table 97. CY 2020 Business and Industry Solution Impact Activities

Offering	Sub-Offering	Total Measures	Impact Evaluation Sample		
			Desk Reviewed Measures	Virtually Verified Measures	Proportion Sampled (by *Ex Ante* MMBTU savings)
Commercial and Industrial	Small and Medium Industrial	1,718	30	16	26%
	Small and Medium Commercial	9,266	46	18	0.4%
	Large Commercial	457	33	3	54%
Large Industrial		1,572	60	30	55%
Agribusiness		2,060	39	22	31%
Total		**15,073**	**208**	**89**	**41%**

Engineering Desk Reviews

The evaluation team reviewed all available project documentation in SPECTRUM for a sample of 208 measures in the CY 2020 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 TRM and associated workpapers 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 of the offering, the evaluation team selected a representative sample of measures to evaluate then extrapolated findings to the larger population. In 2020, 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 were extrapolated to the remainder of the offering population.

Virtual Verification Site Visits

The evaluation team conducted 89 virtual verification site visits, including interviews with the site contact, using several remote technology interfaces to abide by travel restrictions due to the COVID-19 pandemic. 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 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 prior to contact with the site.

Verified Gross Savings Results for Business and Industry Solution

Table 98 lists the first-year and lifecycle realization rates for the CY 2020 Business and Industry Solution. Table 99 lists verified first-year and lifecycle savings by offering. The sampled projects represent 41% of Business and Industry Solution lifecycle MMBtu savings. Overall, the solution achieved a first-year evaluated realization rate of 97%, weighted by total (MMBtu) energy savings. Realization rates are determined by strata, such as census and sample strata, and claimed and verified savings are summed to the offering level to arrive at offering savings and realization rates. Detailed findings for each offering, including factors affecting the realization rates, are discussed in detail in the next section of this chapter.

Table 98. CY 2020 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
C&I	99%	99%	99%	99%	99%	100%	99%
Large Industrial	102%	103%	95%	97%	107%	82%	89%
Agribusiness	98%	100%	90%	95%	94%	90%	93%
B&I Solution	**100%**	**101%**	**95%**	**97%**	**102%**	**85%**	**92%**

Table 99. CY 2020 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	148,426,127	20,033	1,926,196	699,049	1,959,046,524	27,915,361	9,447,887
Large Industrial	121,580,494	13,474	11,384,182	1,556,883	1,845,822,282	141,806,314	20,629,651
Agribusiness	27,288,356	3,746	259,914	117,693	417,321,199	4,603,559	1,884,453
B&I Solution	**297,294,977**	**37,253**	**13,570,291**	**2,373,625**	**4,222,190,005**	**174,325,234**	**31,961,992**

[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.

Gross Savings Results for Business and Industry Solution excluding COVID-19 impacts

The COVID-19 pandemic has resulted in significant and rapid changes to facility operations and caused uncertainty about the future. In 2020, the evaluation team found the pandemic had significantly disrupted production levels and hours of operation, resulting in temporary and permanent facility

closures. The team developed a protocol in collaboration with Focus on Energy to ascertain which disruptions were due to the pandemic.

The main impact on savings can be attributed to one customer with a permanent facility closure. This customer had two large projects associated with 11% of the evaluated savings for the Large Industrial offering.

Savings are reported in lifecycle MMBtu, so the evaluation team designed an approach that eliminates any temporary effects due to COVID-19. This section discusses the expected gross first-year and lifecycle savings excluding the known operational effects from COVID-19. Table 100 shows the first-year and lifecycle realization rates excluding temporary and permanent COVID-19 impacts. Table 101 shows the first-year and lifecycle verified energy savings excluding temporary COVID-19 impacts. COVID-19 affected only the Large Industrial offering quantifiably, and these effects are discussed further below.

Table 100. CY 2020 Business and Industry First-Year and Lifecycle Realization Rates, Excluding Measures Impacted by COVID-19

Offering	First-Year Realization Rate				Lifecycle Realization Rate		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
C&I	99%	99%	99%	99%	99%	100%	99%
Large Industrial [a]	101%	101%	99%	99%	101%	99%	99%
Agribusiness	98%	100%	90%	95%	94%	90%	93%
Total	**100%**	**100%**	**99%**	**99%**	**99%**	**98%**	**99%**

[a] Large Industrial was the only offering that was quantifiably impacted by COVID-19. Therefore, the Large Industrial offering realization rates have been adjusted to exclude COVID-19 effects.

Table 101. CY 2020 Business and Industry First-Year and Lifecycle Verified Energy Savings Summary, Excluding Measures Impacted by COVID-19

Offering	Verified First-Year Savings				Verified Lifecycle Savings		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
C&I	148,426,127	20,033	1,926,196	699,049	1,959,046,524	27,915,361	9,447,887
Large Industrial [a]	120,388,528	13,213	11,863,516	1,588,983	1,742,318,229	171,205,184	22,947,590
Agribusiness	27,288,356	3,746	259,914	117,693	417,321,199	4,603,559	1,884,453
Total	**296,103,011**	**36,991**	**14,049,625**	**2,405,726**	**4,118,685,952**	**203,724,104**	**34,279,930**

[a] Large Industrial was the only offering quantifiably impacted by COVID-19 and adjusted to exclude impacts.

COVID-19 Project Impacts

Projects at one large industrial site had pandemic-related issues that had a major impact on the verified savings shown in Table 101. The site was unexpectedly closed down on August 1, 2020, due to impacts related to COVID-19. This customer had pursued two impactful custom measures through the Large Industrial offering, and these two measures were selected in the census sample for that offering. The evaluation team verified MMBtu savings for most of the first year of measure implementation but could not verify any further lifecycle savings after the facility was closed. The savings impact of this facility and

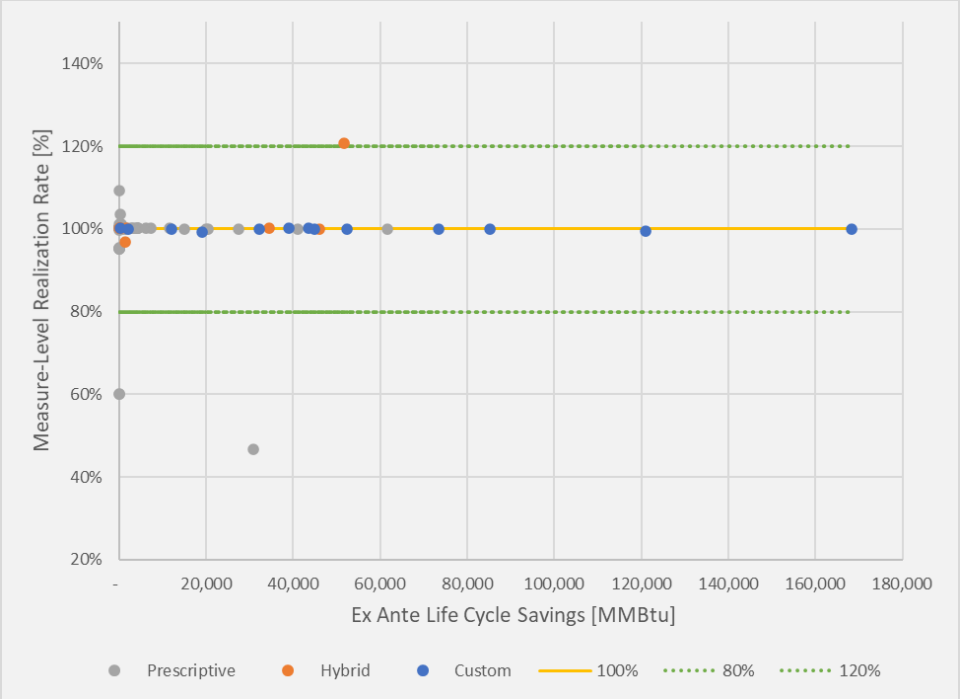
the lower realization rate achieved by these projects is included in the realization rate calculations for Table 98 and verified savings in Table 99.

To illustrate the Business and Industry Solution performance in CY 2020 without the impact of these projects, the evaluation team excluded the savings impact of this facility from the realization rate for Table 100 and verified savings in Table 101, effectively eliminating the projects from the CY 2020 population.

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 12% of Commercial and Industrial offering lifecycle MMBtu savings. The offering had a gross lifecycle realization rate of 99% MMBtu. Figure 53 presents the magnitude of and associated realization rates for reported MMBtu savings of the sampled projects.

Figure 53. CY 2020 Commercial and Industrial Offering Sampling Results



As Figure 53 shows, there were very few instances of *ex post* savings calculations deviating from *ex ante* savings in the Commercial and Industrial offering sample during CY 2020, particularly in the custom measures. Deviations were primarily in the prescriptive measures.

The following describe the main factors affecting the realization rate:

- A single grain dryer measure at a small industrial site had a lower production rate than the customer anticipated in 2020. This was due to equipment capacity limitations that resulted in lower production of the incented equipment. At the time of the evaluation team's virtual site

visit, the project was able to demonstrate that 2021 production rates (and subsequent years) would more closely match the *ex ante* projections. The realized first-year therms savings was reduced by 25%, but the savings in subsequent years will be unaffected.

- A single measure at a small industrial site had installed a desiccant dryer oversized for the existing compressed air systems it would serve. The corresponding compressed air system to right-size the dryer will be installed in 2021. The realized kWh savings for the first-year will be 50% of *ex ante* savings predictions, but the savings in subsequent years will be unaffected.
- For a single measure at a small commercial site, the quantity of installed lighting differed from the project documentation. The correct quantity was confirmed in the virtual site visit. The *ex post* verified kWh savings increased slightly as a result.
- There were a few instances of a lag in updating SPECTRUM where the *ex ante* savings had been derived from the prior year's TRM values. In CY 2020, there were notably fewer of these in the sampled projects than in CY 2019.
- In two instances, the incorrect space type was used for the *ex ante* deemed savings. *Ex post* savings were derived from the correct space type applicable to the specific project. In two instances the *ex ante* savings calculation for lifetime kWh or lifetime therms was derived from the first-year value multiplied by the EUL instead of using the lifecycle deemed TRM value. If available and applicable to the measure, the deemed lifecycle savings was used to determine *ex post* verified savings.

Table 102 lists the CY 2020 *ex ante* and verified gross savings by segment for the Commercial and Industrial offering.

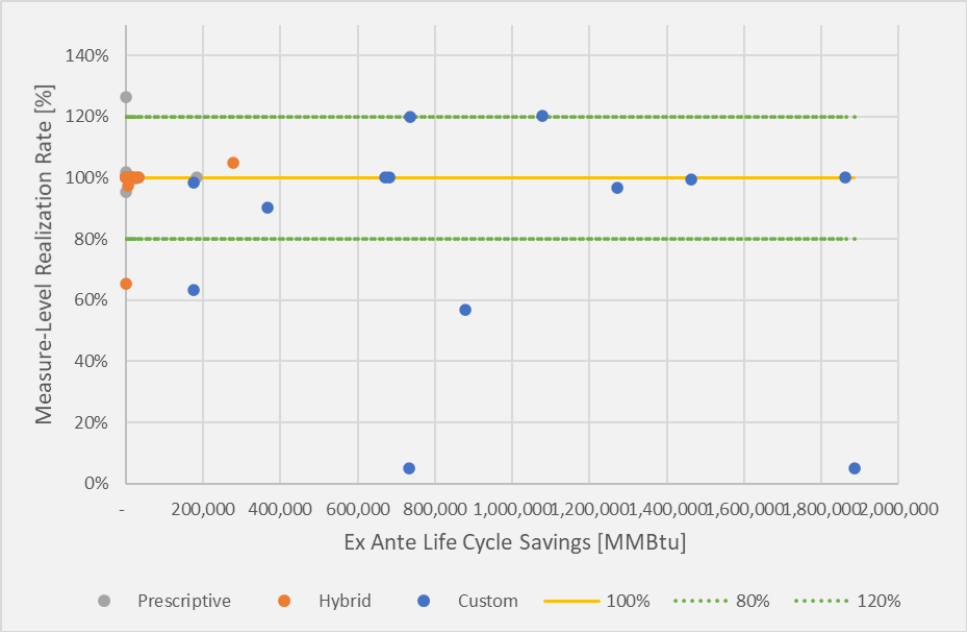
Table 102. CY 2020 Commercial and Industrial *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
Overall Commercial and Industrial						
First-Year Gross Savings	149,925,381	20,235	1,945,652	148,426,127	20,033	1,926,196
Lifecycle Gross Savings	1,978,834,873	20,235	27,915,361	1,959,046,524	20,033	27,915,361
Small and Medium Industrial						
First-Year Gross Savings	36,661,848	5,859	657,944	36,295,229	5,801	651,364
Lifecycle Gross Savings	557,210,286	5,859	9,688,335	551,638,183	5,801	9,688,335
Small and Medium Commercial						
First-Year Gross Savings	106,335,281	13,502	1,000,883	105,271,928	13,367	990,874
Lifecycle Gross Savings	1,342,530,095	13,502	14,388,629	1,329,104,794	13,367	14,388,629
Large Commercial						
First-Year Gross Savings	6,928,252	873	286,825	6,858,970	865	283,957
Lifecycle Gross Savings	79,094,492	873	3,838,398	78,303,547	865	3,838,398

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 55% of Large Industrial offering lifecycle MMBtu savings. The offering had a gross lifecycle realization rate of 89% MMBtu. Figure 54 presents the magnitude of and associated realization rates for reported MMBtu savings of the sampled projects.

Figure 54. CY 2020 Business and Industry Solution Large Industrial Offering Sample Results



As Figure 54 shows, the prescriptive and hybrid projects generally maintained a 100% realization rate. The sampled custom measures had more variability. Many had very impactful savings, and a few had low realization rates.

The following describes the main factors that affected the realization rate in the large custom measures:

- One industrial facility was directly impacted by COVID-19 and was completely shut down midyear. At this time, the facility is not expected to reopen, and therefore the evaluation team could verify partial first-year savings but not lifecycle savings. The two measures at this facility are shown in Figure 54 as the two lowest lifecycle realization rates. Given their scale, they had a major impact on the overall realization rates for Large Industrial offering and, by extension, the overall realization rate for the Business and Industry Solution. The impact of this project is discussed in more detail in the *COVID-19 Project Impacts* section above.
- In general, several large custom projects in the sample had negative kW and kWh *ex ante* savings due to the specific design of the project. For example, several measures involved reuse of preheated process water, where the result will be decreased therms usage but require additional electrical equipment (typically pumps) to accomplish the new configuration. These measures result in negative kW and kWh savings even though the project overall has positive

MMBtu savings. Where modifications were made to the projects with negative kW and kWh savings, the overall impact on the offering can be significant and counterintuitive. As another example, for the industrial facility affected by COVID-19 discussed above, both measures had negative kW and kWh savings that were significantly modified due to the shutdown. The result is counterintuitively higher kW and kWh savings for the offering overall since the additional electrical load was not realized as planned.

The remaining sampled measures in the Large Industrial offering had very few instances of *ex post* savings calculations deviating from *ex ante* savings. The following are the main factors affecting the realization rate:

- Two measures were modified to reflect the current equipment-specific hours of use reported by the customer. For one measure, this modification resulted in a 25% increase in kWh first-year and lifecycle savings. For the other measure, this modification resulted in a 2% decrease in first-year and lifecycle therms savings.
- A single variable frequency drive (VFD) measure was modified to reflect a high loading duty cycle to match the facility's specific application and operation of the equipment, as determined from customer-provided documentation during a virtual site visit. *Ex ante* calculations were determined using a default low duty loading cycle for the general type of equipment on which the VFD was installed. This modification resulted in a 35% decrease in first-year and lifecycle kW and kWh savings.
- There were a few instances of a lag in updating SPECTRUM where the *ex ante* savings had been derived from the prior year's TRM savings. In CY 2020, there were notably fewer of these in the sampled projects than in CY 2019.

Table 103 lists the CY 2020 *ex ante* and verified gross savings by segment for the Large Industrial offering.

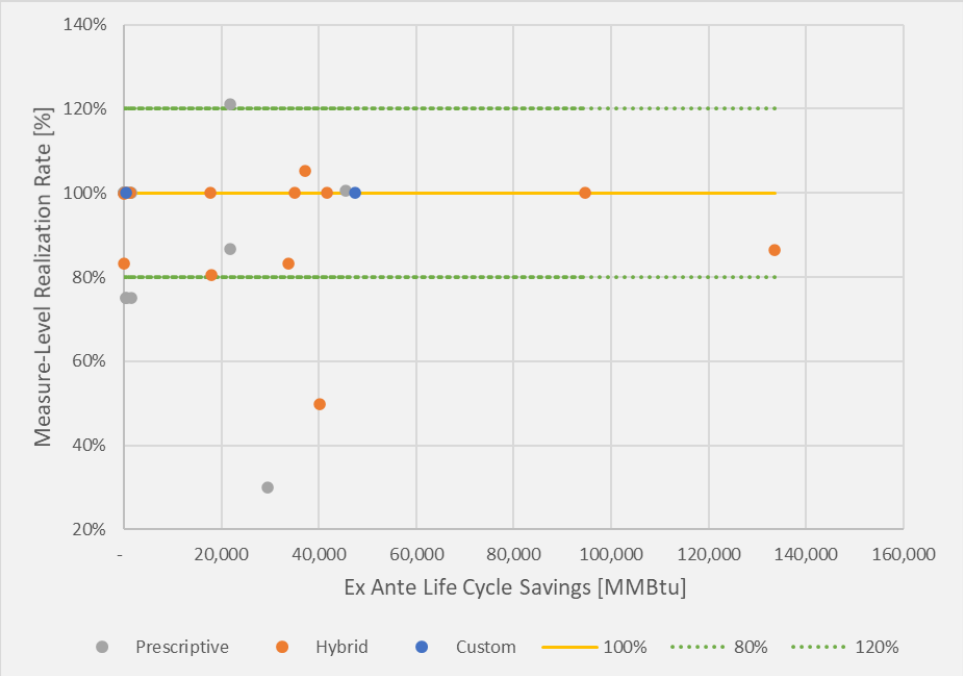
Table 103. CY 2020 Large Industrial Offering *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First-Year Gross Savings	119,196,563	13,082	11,983,350	121,580,494	13,474	11,384,182
Lifecycle Gross Savings	1,725,067,554	13,082	172,934,530	1,845,822,282	13,474	141,806,314

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 31% of Agribusiness offering lifecycle MMBtu savings. The offering had a gross lifecycle realization rate of 93% MMBtu. Figure 55 presents the magnitude of and associated realization rates for reported MMBtu savings of the sampled projects.

Figure 55. CY 2020 Business and Industry Solution Agribusiness Offering Sample Results



As Figure 55 shows, most sampled measures received high realization rates. In CY 2020, there were few instances of *ex post* savings calculations deviating from *ex ante* savings in the Agribusiness offering sample. Most were in the hybrid measures sampled. The following are the main factors that affected the realization rate:

- Several sample projects that involved replacing grain dyers (MMID 3386) had lower *ex post* savings than *ex ante* savings. This hybrid measure requires certain inputs from the participant to calculate savings. Two inputs are the amount of grain or beans processed per year and the amount of moisture content reduction (moisture shrink) in the processed grain, and these inputs can vary from year to year depending on harvest yield, initial moisture content, and humidity, among other factors. In four of the six sample projects, the 2020 harvest or average moisture content reductions were less than the expected amount stated on the application. The application collects the expected inputs for the 2020 as well as two years of actual values. Only the expected 2020 input values were used to calculate *ex ante* savings. The evaluators verified the the 2020 values which were verified to be less than the inputs used to calculate *ex ante* savings. The *ex post* savings calculations used the average of these three years of inputs instead of the projected 2020 inputs used in the *ex ante* savings.
- Two of the grain dryer projects just described also had new dryers installed that did not meet the minimum level of grain dryer efficiency allowed for approval (≤ 1,950 Btu/lb H_2O). This did not impact the verified savings, but it should be noted so the amount of savings from this measure can be maximized in future projects.
- One constant torque VFD sample project had significantly fewer verified annual operating hours and operated at a higher load than estimated on the application.

- One sample project involving a VFD on a dairy vacuum pump (MMID 3987) had lower *ex post* savings compared to *ex ante* savings because the TRM methodology was not scaled well to large milking operations. The TRM methodology uses data from historical participation to estimate the amount of savings per milking cow. These data were from farms with hundreds of cows. When applied to a farm with thousands of milking cows, the savings estimated using the per-milking-cow values from the TRM are not accurate or feasible.

Table 104 lists the CY 2020 *ex ante* and verified gross savings by segment for the Agribusiness offering.

Table 104. CY 2020 Agribusiness Offering *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First-Year Gross Savings	27,845,261	3,746	288,793	27,288,356	3,746	259,914
Lifecycle Gross Savings	443,958,722	3,746	5,115,065	417,321,199	3,746	4,603,559

Verified Net Savings Results for the Business and Industry Solution

The evaluation team used participant surveys to assess net savings for the Business and Industry 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 76% for the CY 2020 solution. For a detailed description of NTG analysis methodology and findings, refer to *Appendix K. Net Savings Analysis*.

Verified Net Savings Results

The evaluation team calculated freeridership and participant spillover at the offering-level for the Business and Industry Solution using findings from surveys conducted with CY 2020 solution participants. To calculate the NTG for each offering, the evaluation team combined the self-reported freeridership and participant spillover results using the following equation:

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

Table 105 shows the offering-level NTG results for the Business and Industry Solution.

Table 105. CY 2020 Business and Industry Solution NTG Ratios by Offering

Offering	Respondents (n)	Freeridership	Spillover	NTG Ratio
Commercial and Industrial	143	24% [a]	1%	77%
Large Industrial	49 [b]	28% [a]	2%	74%
Agriculture	70	15% [a]	1%	86%

[a] Weighted by lifecycle gross verified MMBtu savings
[b] Fifty participants completed the survey. One participant refused to answer the freeridership questions.

Table 106 shows the weighted average NTG ratio by offering as well as the total lifecycle gross verified savings and lifecycle net savings. The evaluation team calculated an overall NTG estimate of 76% for the solution in CY 2020.

Table 106. CY 2020 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	9,447,887	7,274,873	77%
Large Industrial	20,629,651	15,265,942	74%
Agriculture	1,884,453	1,620,630	86%
Total Business and Industry Solution	**31,961,992**	**24,161,445**	**76%**

Commercial and Industrial

Eleven percentage points of the 24% offering-level freeridership ratio are associated with the top-saving project in the NTG analysis sample. The variable speed drive project was estimated at 75% freeridership and represents 15% of the analysis sample lifecycle gross verified savings.

Large Industrial

Three projects with the greatest savings represent 34% of the analysis sample lifecycle gross verified savings.[44] Their combined savings weighted average freeridership is 42%, accounting for 14 percentage points of the 28% offering-level freeridership ratio.

Agriculture

Two projects with the greatest energy savings represent 27% of the analysis sample lifecycle gross verified savings.[45] Both projects were estimated at 0% freeridership. The third and fourth projects with the greatest energy savings represent 14% of the analysis sample lifecycle gross verified savings.[46] Their combined savings weighted average freeridership is 44%, accounting for six percentage points of the 15% offering-level freeridership ratio.

Process Evaluation

The CY 2020 process evaluation focused on these key topics:

- Solution design, delivery, and goals
- Trade ally satisfaction and engagement
- Participant satisfaction and experience

Process Evaluation Methodology

In CY 2020, the evaluation team conducted a process evaluation of the Business and Industry Solution, designing its evaluation approach to integrate multiple perspectives in assessing solution performance. Table 107 lists specific data collection activities and sample sizes used in the evaluation.

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[44] Two variable speed drive projects and one exhaust filtration system project.

[45] One LED lighting project and one variable speed drive project.

[46] One LED lighting project and one variable speed drive project.

Table 107. CY 2020 Business and Industry Solution Process Evaluation Activities and Sample Sizes

Activity	Measure Group or Offering	CY 2020 Sample Size (n)
Administrator and Implementer Interviews	N/A	4
Ongoing Participant Satisfaction Surveys	All	850
Annual Participant Experience Surveys	C&I	143
	Large Industrial	50
	Agribusiness	70

Administrator and Implementer Interviews

In June and July 2020, the evaluation team interviewed the administrator and the implementer to learn about 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 them about their marketing, outreach, and training efforts for engaging trade allies and customers.

Ongoing Participant Satisfaction Surveys

The evaluation team conducted satisfaction surveys for the Business and Industry Solution beginning in CY 2020 for the CY 2019 - CY 2022 quadrennium, continuing the practice established for the previous quadrennium in CY 2015. 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

The team used SPECTRUM data to sample CY 2020 participants and administered web-based satisfaction surveys throughout the year. The team mailed paper surveys to participants with no email address on file and combined results from both modes to conduct the analysis. A total of 850 Business and Industry Solution participants responded to the CY 2020 survey. The survey covered several topics including overall satisfaction, satisfaction with program staff and trade allies, likelihood of recommending Focus on Energy, likelihood to initiate another energy efficient project, and other feedback.

Annual Participant Experience Surveys

During fall of 2020, the evaluation team contacted CY 2020 Business and Industry Solution participants to assess their experiences. The annual survey asked about awareness of Focus on Energy, marketing, customer decision-making, satisfaction, and participation barriers, among other topics. The in-depth feedback regarding participants' experience also informed the impact evaluation. Of the 2,840 participants contacted, 263 participants completed the survey for a 9% response rate. Detailed findings for each offering are available in *Appendix F*.

Solution Design and Delivery

Beginning in 2020, Focus on Energy revised its offerings structure, shifting from an individual program-based delivery model to a solution that can more broadly serve several markets and simplify the customer experience.

With the Business and Industry Solution, Focus on Energy offers incentives for prescriptive measures and custom projects that accommodate most building and customer applications. Customers apply for incentives directly to Focus on Energy or through their trade ally, with support from energy advisors, other implementer staff, and occasionally from Wisconsin utility account representatives. All customers eligible for Business and Industry Solution incentives also have access to the Renewable Energy Competitive Incentive and Renewable Rewards for prescriptive solar electric incentives.

Over several years, the administrator and implementer have simplified incentive levels and the application processes, with similar incentive levels available across nonresidential customer segments. As part of the CY 2020 restructuring, the implementer centralized application processing, which it reported resulted in greater internal and external transparency and consistency and shorter application processing times. Under the new delivery structure, small business specific incentives were discontinued. The administrator and implementer reported receiving limited feedback from trade allies and small business customers about this change.

In CY 2020, Focus on Energy introduced the following incentives to the Business and Industry Solution:

- Comprehensive Lighting Solutions (CLS), which helps customers modify overlit building spaces to meet Illuminating Engineering Society (IES) light level recommendations by space and application, relying heavily on networked lighting controls. Incentives are $0.25 to $0.50 per watt reduced.
- Rural Industrial Striving for Efficiency (RISE), which invites large industrial customers to participate in a series of virtual meetings with an energy advisor to discover energy-savings opportunities in their facilities, calculate potential savings, and report results of implementing recommendations, with financial incentives tied to participation. Customers can also access energy training incentives.

In addition to the prescriptive and custom incentives, Focus on Energy also provides tailored resources for specific market segments. The implementer, Franklin Energy, manages and delivers the Business and Industry Solution and leads the Commercial and Industrial offering. The implementer's subcontractors Leidos Engineering and CESA 10 are responsible for providing subject matter expertise for the Large Industrial and Agribusiness offerings, respectively.

Commercial and Industrial offering. This offering supports commercial and small- and medium-sized industrial customers. In April, the implementer launched an online energy assessment platform targeting small businesses. Upon successful completion of the assessment, participants received a customized energy savings action plan and the opportunity to order a free energy-saving pack. Three packs were available including on targeting retail, offices, and restaurants. The implementer, along with 29 utilities, used historical SPECTRUM data and utility customer lists to market the assessment and the energy-saving pack. Over 10,000 email addresses were contacted, 103 customers completed an assessment, and 76 ordered an energy-saving pack.

Large Industrial offering. This offering supports industrial customers whose average monthly demand exceeds 1,000 kW of electricity or 100,000 therms of natural gas per month and whose combined utility bills were at least $60,000 in any month of the preceding year.

Agribusiness offering. This offering supports Wisconsin's agricultural producers. Focus on Energy has maintained specialty incentives and services for this sector similar to 2019, which includes incentives for agricultural equipment such as grain dryers and milking equipment and bonus incentives for trade allies whose customers implement agribusiness projects. In CY 2020, the implementer revised its horticulture lighting and dairy refrigeration tune-up measure incentives.

Impacts of COVID-19 on Design and Delivery

As a result of the COVID-19 pandemic, Focus on Energy discontinued in-person field outreach in mid-March. The implementer turned its attention to closing out existing projects and focusing on engaging markets where there were fewer impacts from the pandemic, such as retail and trade allies. Energy advisors replaced in-person engagement with more telephone and virtual meetings and email correspondence. The administrator said the pandemic combined with less in-field presence resulted in a decrease in project activity across the majority of nonresidential markets.

Initially, CY 2020 application activity was higher for most market sectors due to projects completed in CY 2019 and paid in CY 2020, but market activity declined in the second half of CY 2020. Table 108 shows the CY 2019 and CY 2020 *lifecycle ex ante* savings achievement percentages by quarter, indicating that savings were distributed more evenly across CY 2019, whereas the majority of CY 2020 savings occurred in the first half of the year.

Table 108. Percentage of 2019 and 2020 *Ex Ante* Gross Lifecycle Savings Achieved by Quarter for the Business and Industry Solution

Quarter	Percent of *Ex Ante* Gross Lifecycle Savings	
	kWh	Therm
CY 2019		
1	20%	9%
2	25%	31%
3	25%	19%
4	31%	40%
CY 2020		
1	35%	45%
2	30%	31%
3	11%	6%
4	24%	18%

The administrator and the implementer observed the effect of COVID-19 also varied by market sector. The implementer said project activity for large industrial customers declined in CY 2020 not only because of COVID-19 but also because manufacturers were concerned with the possibility of an economic downturn at the end of 2019. Though manufacturing showed improvement during CY 2020 as the year went on, large industrial businesses were more cautious about moving ahead with projects or

reduced the scale of projects. Of all the market sectors, the implementer reported the greatest difficulty connecting virtually with large industrial customers because energy advisors typically assist with identifying and guiding project opportunities in person.

For the agricultural market, which relies heavily on interpersonal relationships to support the application process, the implementer expressed concern about long-term impacts on participation from COVID-19. For commercial and industrial markets, the implementer saw limited impacts on project activity but said less in-person engagement with trade allies and implementer staff could have affected the pipeline of future projects.

The administrator said it was difficult to assess impacts to the small business market specifically but noted the slower economy, combined with incentive reductions in CY 2019 to CY 2020, likely affected participation.

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 outreach strategy. Focus on Energy coordinated marketing efforts with utilities through regular meetings and a shared marketing calendar and supplied cobranded bill inserts, postcards, and mailings through an online collateral portal.

In CY 2020, staff involved with the Business and Industry Solution concentrated on presenting Focus on Energy as a consistent, unified resource for all nonresidential organizations and aligned website and marketing materials with this message. Nonresidential customers have access to one Focus on Energy phone number and email address, and the implementer routes inquiries to energy advisors to work with customers on project opportunities.

In their market engagement plan for the Business and Industry Solution, the administrator and the implementer also identified three market segments—healthcare, small business, and non-dairy agriculture—as primary customer targets for CY 2020. The implementer created several new marketing materials, including small business utility-cobranded marketing campaigns and direct mail and email, a horticultural lighting sell sheet, and advertisements placed with the Wisconsin Paper Council, Midwest Food Producers, Wisconsin Cheesemakers. The implementer also presented at numerous in-person and virtual events, including to the Wisconsin Healthcare Engineering Association, which was better attended than past in-person events.

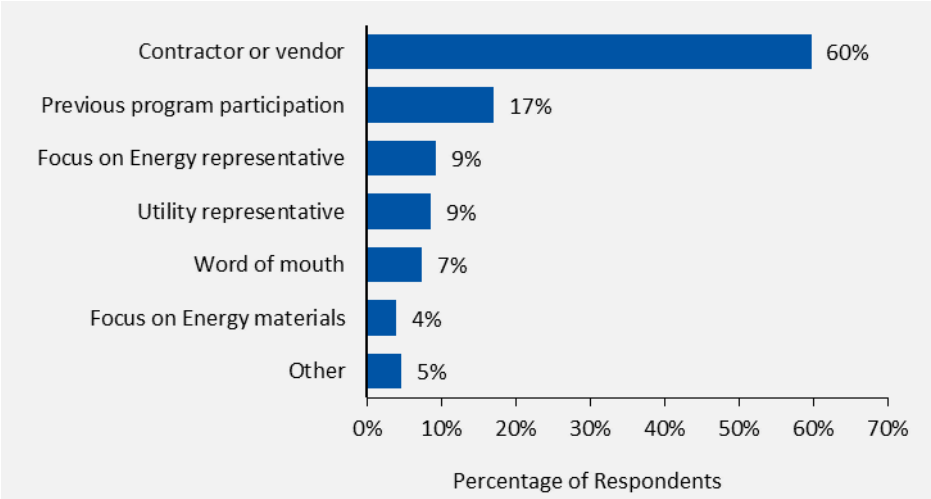
Trade allies are also critical in ensuring customers are aware of and using Focus on Energy. As in previous years, the implementer internally ranked trade ally performance, setting corresponding outreach goals that focused internal staff time on top-performing trade allies. Similar to customer outreach, the implementer adjusted its approach with trade allies from in-person to virtual meetings and increased email and telephone communications. The implementer said these modifications had no major impact to trade ally engagement. The implementer also set goals to retain trade allies who participated in the previous year, which encouraged outreach staff to keep trade allies engaged throughout the changes in CY 2020 design and delivery. The implementer contacted a total of 1,281

trade allies, and 1,178 registered and nonregistered trade allies participated in the Business and Industry Solution in CY 2020.

Participation Awareness

In the annual participant survey, the evaluation team asked nonresidential customers about their experience with the Business and Industry Solution. In CY 2020, respondents heard about the solution mainly from contractors and vendors (60%, n=258), previous experience with Focus on Energy offerings (17%), and a Focus on Energy or utility representative (9% each). Figure 56 lists all responses.

Figure 56. CY 2020 Customer Source of Awareness



Source: CY 2020 Participant Survey Question B3. "How did your organization learn about the Focus on Energy incentives available for this project?" Multiple responses allowed (n=258)

Seventy-seven percent of participants (n=260) said their contractor or vendor was involved in initiating their energy efficiency projects, and 40% and 18% mentioned support from energy advisors and utility account managers, respectively. To optimize savings potential from large industrial businesses, Focus on Energy typically pairs these customers with an energy advisor who maintains regular contact with the organization. Therefore, more large industrial respondents (77%) reported receiving project initiation support from an energy advisor than agriculture and C&I respondents (20% and 32%, respectively).[47]

Customer Satisfaction Results for the Business and Industry Solution

The evaluation team explored participant experience through the annual phone participant survey as well as through ongoing customer satisfaction surveys mailed and emailed to participants. In the annual phone survey, respondents were asked whether they had previously participated in a Focus on Energy offering and, if so, whether their experience had changed after the CY 2020 restructuring. Given the larger volume of C&I nonresidential organizations in Wisconsin, significantly fewer C&I respondents

[47] $p<0.01$ using binomial t-test. Sample sizes: Large Industrial n=48, Agriculture n=20, C&I n=137.

(55%) had participated in Focus on Energy projects prior to CY 2020 compared to agriculture and large industrial respondents (77% and 78%, respectively).[48]

Similarly, of participants who previously worked with an energy advisor, only 36% of C&I respondents worked with the same Focus on Energy representative or energy advisor in CY 2020 as they had in previous years, compared to 83% of large industrial and 60% of agriculture respondents.[49] Despite some who experienced a change in the energy advisor network, 79% of respondents (n=164) said their experience with Focus on Energy was about the same compared to prior years, 19% reported a more positive experience this year, and only 2% reported a less positive experience. Respondents who reported a more positive experience mentioned a streamlined process, improved communication, and a better relationship with their energy advisor.

Of respondents who worked with an energy advisor, 99% (n=99) said they were *very satisfied* or *somewhat satisfied* with the support they received. Eighty-seven percent (n=260) said project eligibility requirements were *very clear* or *mostly clear*, and 10% said it was *a mix of clear and not clear.* Only 1% said the eligibility requirements were *mostly not clear,* and 2% said it was *not clear at all*.

Contractors or vendors most commonly took the lead role in completing the application for agriculture and C&I respondents (57% and 48%, respectively), while large industrial respondents most commonly reported taking the lead role themselves (48%).[50] Of all respondents who completed the application themselves, 87% (n=96) said completing the paperwork was *very easy* or *mostly easy*, 6% said it was *very challenging* or *mostly challenging*, and the remaining 7% said it was *a mix of easy and challenging.*

Customer Satisfaction Survey Results

Throughout CY 2020, the evaluation team surveyed Business and Industry Solution participants to measure their satisfaction with various aspects of their experience. Respondents answered questions related to satisfaction and likelihood on a scale of 0 to 10, where 10 indicated the highest degree of satisfaction or likelihood and 0 the lowest.[51]

Prior to portfolio restructuring in CY 2020, the evaluation team fielded five separate surveys for the precursor programs that were consolidated into the Business and Industry Solution: Small Business, Large Energy Users, Agribusiness, Multifamily Energy Savings, and Business Incentive programs. The evaluation team calculated participation-weighted average ratings from these five CY 2019 surveys for comparison to CY 2020 Business and Industry Solution ratings.

Figure 57 shows that Business and Industry Solution participants gave the solution an average overall satisfaction rating of 9.3 in CY 2020, and this rating was statistically higher than the portfolio target in

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[48] $p<0.01$ using binomial t-test. Sample sizes: Large Industrial n=29, Agriculture n=15, C&I n=25.

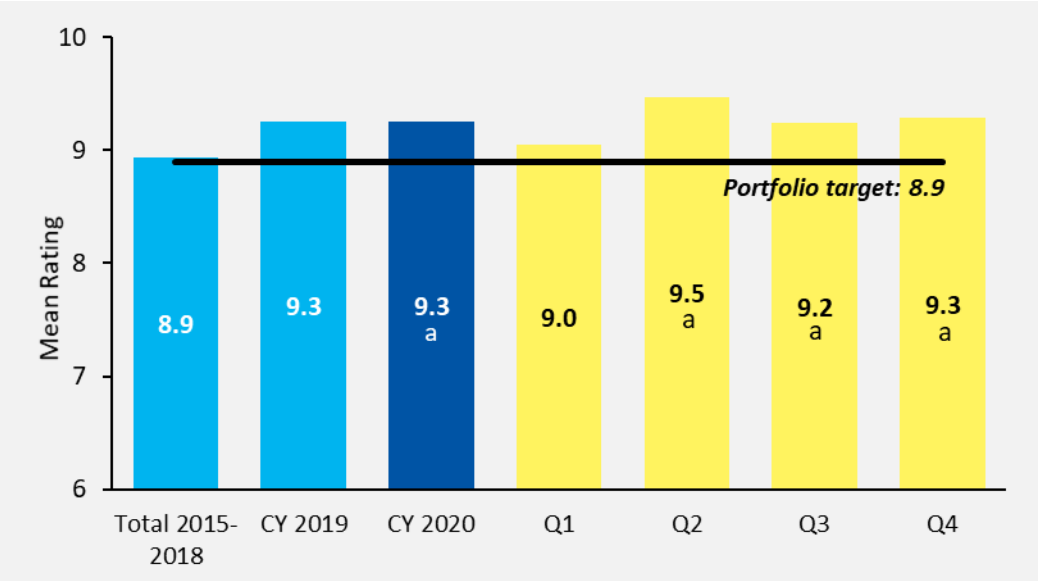
[49] $p<0.01$ using binomial t-test.

[50] $p<0.01$ using binomial t-test.

[51] 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.

the last three quarters of the year and for CY 2020 overall.[52] The weighted average of CY 2019 predecessor programs was also 9.3.

Figure 57. CY 2020 Overall Satisfaction with the Business and Industry Solution



Source: Business and Industry Solution Participant Satisfaction Survey Question. "Overall, how satisfied are you with the Program?" (CY 2019 n=1,339, CY 2020 n=848, Q1 n=237, Q2 n=183, Q3 n=167, Q4 n=221). Total CY 2015-CY 2018 is the participation-weighted average of four annual results.

[a] This result is statistically significantly different from the portfolio target ($p<0.10$ or better using binomial t-tests).

Table 109 shows the average satisfaction and likelihood ratings for the Business and Industry Solution in CY 2020 compared to a weighted average of survey results from the corresponding CY 2019 programs.

Table 109. CY 2020 Average Ratings for Business and Industry Solution

Item	CY 2019	CY 2020
Satisfaction with Focus on Energy staff	9.4	9.5
Satisfaction with Trade Ally	9.5	9.4 [a]
Likelihood of more improvements	7.4	7.5
Likelihood of recommending Focus on Energy	9.5	9.4 [a]

[a] This result is statistically significantly different from the result for CY 2019 ($p<0.10$ using a binomial t-test).

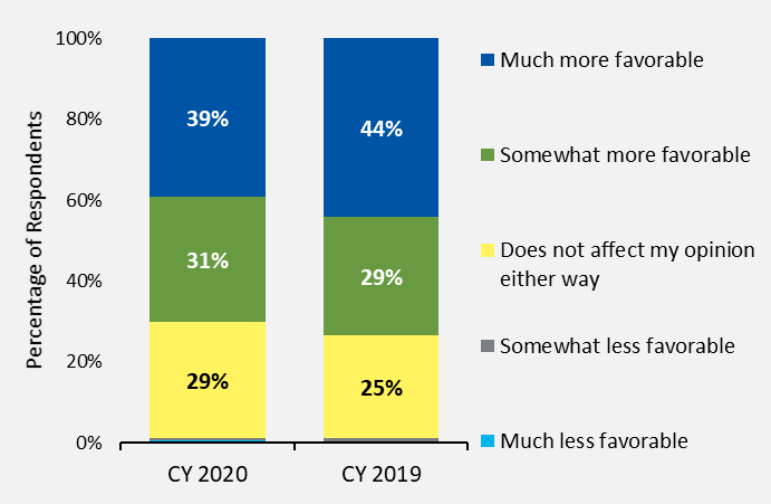
Using these survey data, the evaluation team calculated a Net Promoter Score (NPS) based on customers' likelihood to recommend Focus on Energy. The NPS is expressed as an absolute number between -100 and +100 that represents the difference between the percentage of promoters (respondents giving a rating of 9 or 10) and detractors (respondents giving a rating of 0 to 6). The

[52] The administrator's contract established a portfolio target of 8.9 to maintain or increase customer satisfaction. The evaluation team found that some survey responses did not include identifying information to match to participation dates. The team included survey responses without participation dates in the year-end total but not in the quarterly breakdown.

Business and Industry's Solution's NPS was +84 for CY 2020, which was equivalent to +84 for the weighted average of CY 2019 predecessor programs.

CY 2020 participants were asked if they were aware before receiving the satisfaction survey that the Business and Industry Solution was offered in partnership with their local utility, and 75% (n=835) were aware, representing a statistically significant increase from the CY 2019 weighted average of precursor programs (69%, n=1,330).[53] Respondents were also asked if Focus on Energy offerings affected their opinion of their utilities, and 70% reported that their opinion had become *much more favorable* or *somewhat more favorable* (Figure 58). Only 2% of participants reported that their opinion had become less favorable and 29% said their opinion of their utility was not affected. Compared to the weighted average of CY 2019 predecessor programs, there was a significant decrease in participants reporting they were *much more favorable* (down from 44% to 39%) and a significant increase in those reporting their opinion was not affected (up from 25% to 29%).[54]

Figure 58. CY 2020 Effect of Focus on Energy Offerings on Business and Industry Solution Participants' Opinion of Utilities



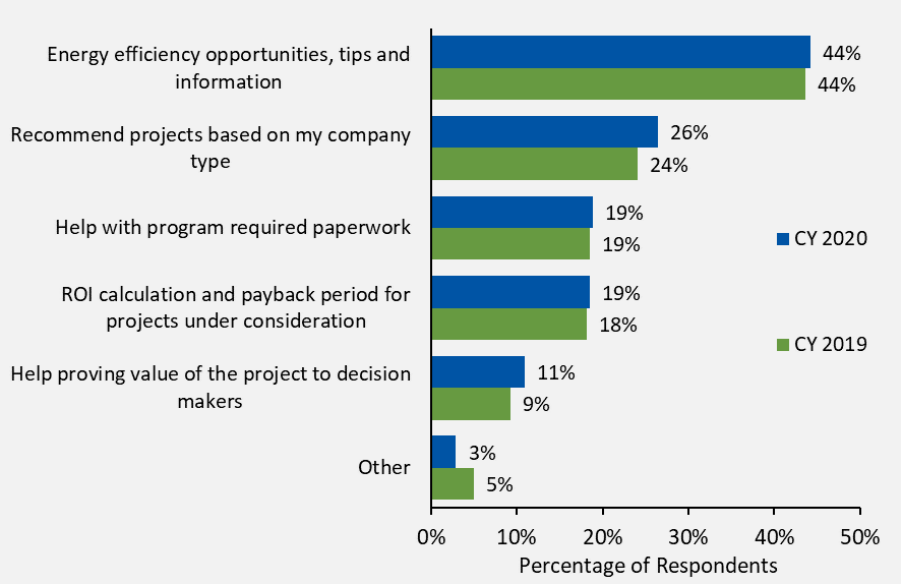
Source: Business and Industry Participant Satisfaction Survey Question. "How have these offerings affected your opinion of your energy utility, if at all?" (CY 2020 n=783, CY 2019 n=1,236).

Survey respondents identified how Focus on Energy could best support their organization with future projects (Figure 59). The most frequent responses from Business and Industry Solution participants were energy efficiency opportunities, tips, and information (44%) and making recommendations based on company type (26%). The weighted results from CY 2019 predecessor programs were very similar to CY 2020.

[53] $p<0.01$ using binomial t-test.

[54] $p<0.05$ using binomial t-tests.

Figure 59. CY 2020 Participants' Most Valued Support



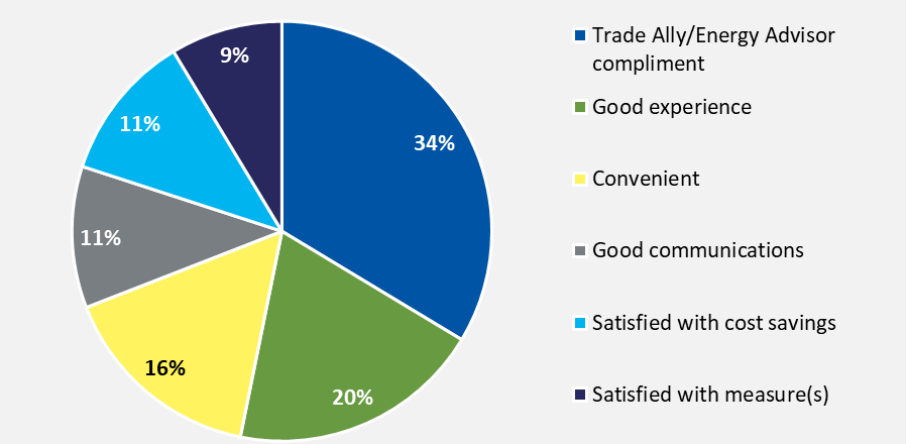
Source: Business and Industry Participant Satisfaction Survey Question. "Aside from providing project incentive dollars, how can Focus on Energy best support your organization going forward?" (CY 2020 n=836, CY 2019 n=1,294). Responses total to more than 100% because multiple responses were allowed.

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 offerings. Of the 850 participants who responded to the survey, 26% provided open-ended feedback, which the evaluation team coded into a total of 307 mentions. Of these mentions, 220 were positive or complimentary comments (72%), and 87 were suggestions for improvement (28%).

The positive responses are shown in Figure 60, with most comments reflecting compliments for trade allies and Focus on Energy staff (34%), a generally positive experience (20%), or convenience of the offering (16%)

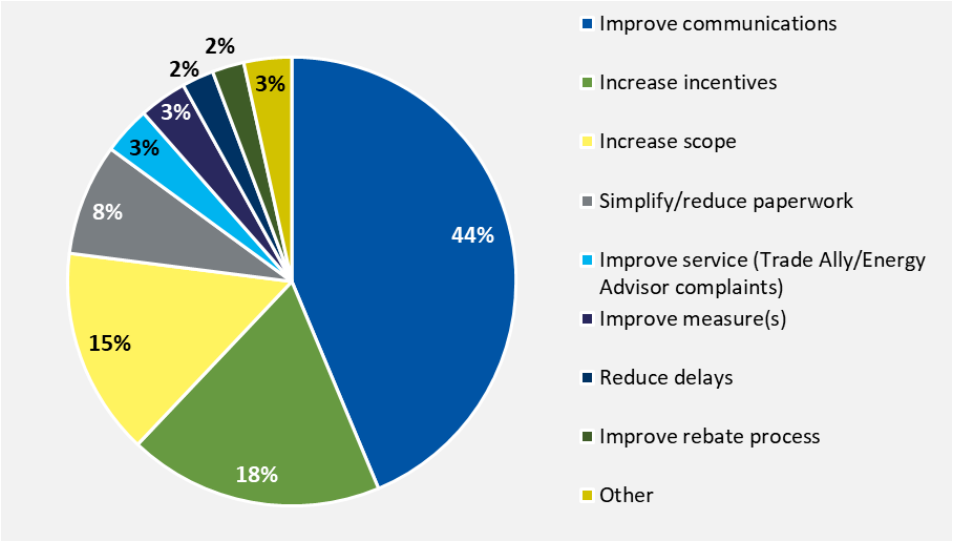
Figure 60. Positive Comments about the Business and Industry Solution



Source: Business and Industry Solution Participant Satisfaction Survey Question. "Please tell us more about your experience and any suggestions for improvement." (Total positive mentions n=220)

Suggestions for improvement are shown in Figure 61; the most common suggestions were to improve communications (44%), increase incentives (18%), and increase the scope of the offering (15%). Suggestions about improving communications typically focused on sharing rebate information before completion of the project, notification when energy advisors change, and clearer communication of program deadlines. Suggestions about increasing the scope included assistance with solar and site visits with a Focus on Energy representative to assist with additional upgrades.

Figure 61. CY 2020 Suggestions for Improving the Business and Industry Solution

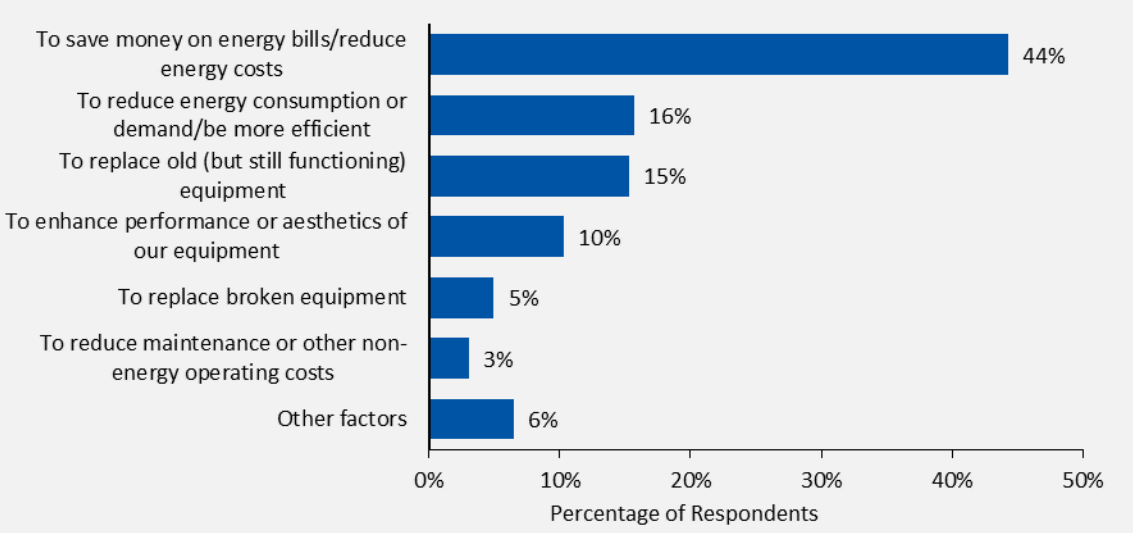


Source: Business and Industry Participant Satisfaction Survey Question. "Please tell us more about your experience and any suggestions for improvement." (Total positive mentions n=87)

Motivations and Decision-Making

The top drivers for participation were saving money on energy costs (44%, n=262), reducing energy usage or achieving environmental goals (16%), and replacing old but functional equipment (15%). Figure 62 shows the full breakdown of responses.

Figure 62. CY 2020 Motivation to Participate in the Business and Industry Solution



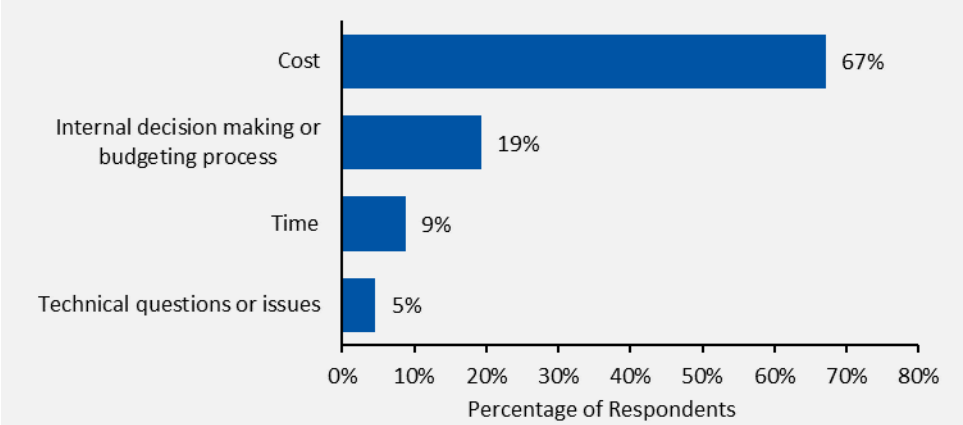
Source: CY 2020 Participant Survey Question C1. "What factor was most important to your company's decision to make the energy efficient upgrades for which you received an incentive?" (n=262)

Only 15 respondents (9%, n=189; agriculture participants were not asked about training) attended an in-person or web-based Focus on Energy training in the past two years. Ten of these respondents said the training was *very important* or *somewhat important* in their decision to move forward with the energy-efficient upgrades for which they received an incentive, while four said the training was *not too important* or *not at all important*, and one had a neutral opinion.

Barriers

When asked to choose the greatest challenge of implementing energy efficiency projects at their organization, respondents most commonly mentioned cost (67%, n=259). Figure 63 lists all responses.

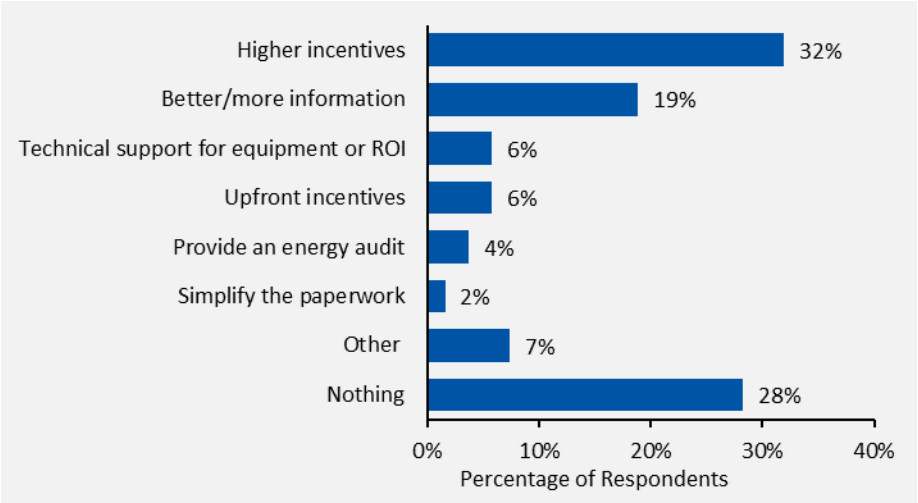
Figure 63. CY 2020 Largest Challenges to Project Implementation in the Business and Industry Solution



Source: CY 2020 Participant Survey Question D1. "If you had to choose just one, what would you say is normally the largest challenge in implementing energy efficiency projects and upgrades at your organization?" (n=259)

Respondents were asked what could be done to help them overcome challenges with energy efficiency improvements. Thirty-two percent (n=191) mentioned higher incentives, and 19% mentioned more information about the offerings. Figure 64 shows all respondents' answers. Respondents who suggested more information asked for explanations of how participation can benefit them, information on what rebates are available to them, and education on new, energy-efficient technologies.

Figure 64. CY 2020 Suggestions for Overcoming Energy Efficiency Challenges



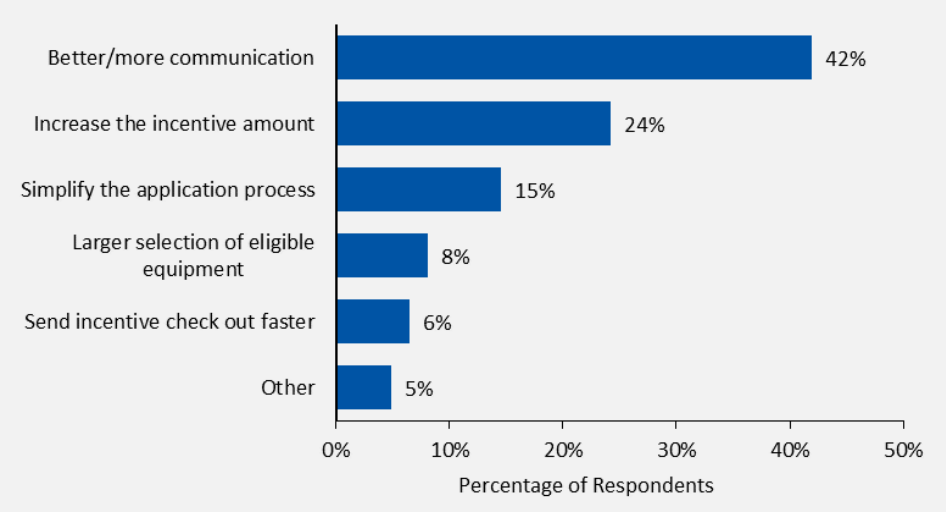
Source: CY 2020 Participant Survey Question D2. "What could be done to help your company overcome challenges with energy efficiency improvements?" Multiple responses allowed. (n=191)

Suggestions for Improvement

The evaluation team asked respondents what could be done to improve their overall experience, and responses were similar to those suggested for overcoming challenges to energy efficiency improvements. As shown in Figure 65, of those who offered a suggestion, the most common was to *provide better/more communication* (42%), followed by *increase the incentive amount* (24%), and

simplify the application process (15%). Suggestions to improve communication included clearer guidelines on submitting applications, more proactive notification about new or changing incentives, and more frequent communication with energy advisors.

Figure 65. CY 2020 Suggestions to Improve Overall Experience



Source: CY 2020 Participant Survey Question B16. "What could Focus on Energy have done to improve your overall experience, if anything?" Multiple responses allowed. (n=62)

Respondents had many positive comments for Focus on Energy as well. When asked if they had anything additional to share, 101 respondents made comments, and the vast majority (78%) complimented Focus on Energy on the smooth process, the helpfulness of the team, and the overall positive experience.

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 H* includes a description of the TRC test.

Table 110 lists the CY 2020 incentive costs for the Business and Industry Solution.

Table 110. CY 2020 Business and Industry Incentive Costs

	Incentive Costs
C&I	$7,859,815
Large Industrial	$7,078,021
Agribusiness	$2,231,388
Rural Non-Agribusiness	$551,652
Small Biz	$5,219
Total	**$17,726,095**

The evaluation team found that the CY 2020 Business and Industry Solution was cost-effective with T&D benefits (3.69) and without T&D benefits (3.39). Table 111 lists the evaluated costs and benefits.

Table 111. Business and Industry Costs and Benefits

Cost and Benefit Category	Total
Costs	
Non Incentive Costs	$11,850,904
Incremental Measure Costs	$76,962,165
Total Non-Incentive Costs	**$88,813,069**
Benefits	
Electric Benefits (kWh)	$114,775,963
Electric Benefits (kW)	$59,880,967
T&D Benefits (kW)	$26,857,255
Gas Benefits	$69,750,352
Emissions Benefits	$56,462,612
Total TRC Benefits with T&D Benefits	**$327,727,148**
Net TRC Benefits with T&D Benefits	**$238,914,079**
TRC B/C Ratio with T&D Benefits	**3.69**

Outcomes and Recommendations

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

Outcome 1. Focus on Energy successfully transitioned from program-based to solution-based delivery, and the Business and Industry Solution performed very well in garnering savings and achieving a positive customer experience. The administrator and implementer transitioned the various programs to a singular, unified resource for Wisconsin businesses pursuing energy-efficient retrofits. Managing the solution under one primary implementer allowed the Business and Industry Solution team to standardize its delivery strategy and procedures, from marketing and outreach to application processing. In turn, the Business and Industry Solution *ex ante* savings were between 98% and 116% of goals, with the majority of CY 2020 savings achievement occurring in the first half of the year. Most participants found their experience with Focus on Energy similar to or even more positive than prior years, attributing this to a simplified process, improved communication, and a better relationship with their energy advisor.

Outcome 2. The solution experienced a decline in savings during the second half of the year that can be attributed to COVID-19, though different segments were affected differently. The slow-down will likely impact projects in CY 2021 as well. For example, much of the volume of first quarter 2020 activity can be attributed to projects carried over from 2019, and possibly some from organizations taking advantage of pandemic-related slowdowns to focus on facility improvements during the second quarter. Savings slowed over the second half of the year. Without as much carryover, this suggests that for CY 2021, savings in the early part of the year will likely be lower than usual as well. Many nonresidential markets that comprise the Business and Industry Solution may not be fully recovered to pre-pandemic levels. The impact of COVID-19 on small businesses was unclear, due in part to the change in how these businesses were being tracked and the simplification of eligibility requirements.

Recommendation 1. In the first part of CY 2021, the administrator and implementer should consider COVID-19 impacts by market sector to formulate realistic CY 2021 goals and market action plans, taking into consideration in-person outreach and field activities as well. For example, market sectors that experienced stable or strong revenue streams in CY 2020, such as grocery stores and retail, may be better suited to take advantage of opportunities through Focus on Energy compared to those hit hardest by the pandemic—restaurants, office, and healthcare environments—that are likely still operating on lower revenues or recovering from losses. If small businesses remain a high priority segment in CY 2021 and beyond, the administrator and implementer should consider ways to improve tracking of participation, such as including a checkbox on the application with a definition for small businesses. Though this classification would not impact incentive levels or eligibility, it may help improve internal tracking, projections, and marketing.

Outcome 3. The evaluation team's desk reviews and site visits uncovered several minor discrepancies that led to a realization rate less than 100%. These issues included incorrect savings assigned to some measures in SPECTRUM, incorrect calculations of lifecycle savings, and discrepancies in operational parameters in the installed measure. To improve the accuracy of *ex ante* savings, the evaluation team made several recommendations.

Recommendation 2. The implementer should verify the project is fully installed and operational to ensure complete implementation before the incentive is finalized. This would reduce discrepancies in savings stemming from verification site visits in the future. Though verification of 100% of projects would be cost-prohibitive, the implementer should consider expanding its verification activities, particularly for custom and hybrid projects where calculating energy savings are dependent on specific operating parameters.

Recommendation 3. The implementor should review the MMID savings in SPECTRUM to ensure they are accurate to the current TRM.

Outcome 4. For some sites, the customer did not fully implement specified projects or was not able to operate at the specified capacities used to estimate reported energy savings. In some cases, the customer needed to modify the operational parameters, the equipment, loading, or run hours to fine-tune the new equipment to the specific operation. This resulted in a deviation in savings once the final operating specifications were considered.

Recommendation 4. The evaluation team recommends ensuring that verification visits to facilities are conducted only after the project is fully implemented. Focus on Energy can then be certain the incented measure is fully installed and operating. There should also be regular communication with the participant about any changes to the project after the application has been preapproved. If major changes occur, the implementer should update the baseline and adjust estimated energy savings in SPECTRUM accordingly. This recommendation also applies to permanent production changes at the site that may require an adjustment to energy savings.

Outcome 5. Some larger and more complex projects lacked detailed savings calculations, documentation, and data. This lack of information caused some discrepancies in calculations in the

reported and verified savings. Some of the largest discrepancies were found during the virtual site visits when the evaluation team was using actual customer trend or meter data to inform savings analysis and the results showed that verified savings significantly deviated from reported savings.

Recommendation 5. The evaluation team recommends a more comprehensive review and analysis of project savings for large custom projects that could be more complex and variable than usual. For projects provided large incentives for high energy savings, the team recommends requiring a technical analysis summary report, in which the implementer provides details about the methodologies used and assumptions made to calculate savings. The team also recommends a verification report, in addition to the verification sheet, in which assumptions in the technical analysis summaries are verified, pictures and invoices collected, and any changes to the project accounted for. Whenever possible, meter or trend data should also be included in the analysis to ensure a more accurate representation of savings.

Outcome 6. Cadmus found that virtual site visits had both benefits and drawbacks. Many customers stated that virtual site visits were convenient and took less time than in-person visits. Cadmus found many customers reviewed the data collection checklist, and this led to a shorter visit. However, there were occasional internet connectivity issues and it was difficult to verify some equipment from a distance, such as plants that installed thousands of LEDs.

Benefits of virtual site visits included the following:

- Convenient for customers
- No travel time for Cadmus staff
- Shorter visit, especially if site contact was knowledgeable about the installed measure and reviewed the data collection checklist in advance

There were also a handful of drawbacks, such as:

- Internet connectivity issues, especially in certain areas of plants such as boiler rooms
- Frequent rescheduling of visits when customers did not show up to the meeting
- Possible decrease in evaluation rigor due to not working with the equipment directly

Recommendation 6. Cadmus recommends Focus on Energy maintain the use of virtual site visits as another viable evaluation tool for verifying savings moving forward, especially for straight-forward measures that do not require additional metering or spot measurements.

Schools and Government Solution

The Schools and Government Solution provides technical assistance and prescriptive and custom incentives to K-12 schools, colleges, and universities and local, county, and state government facilities. The solution is administered by APTIM and implemented by CESA 10, supported by Leidos as a subcontractor.

The Schools and Government Solution is available to 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. Energy advisors provide 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.

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

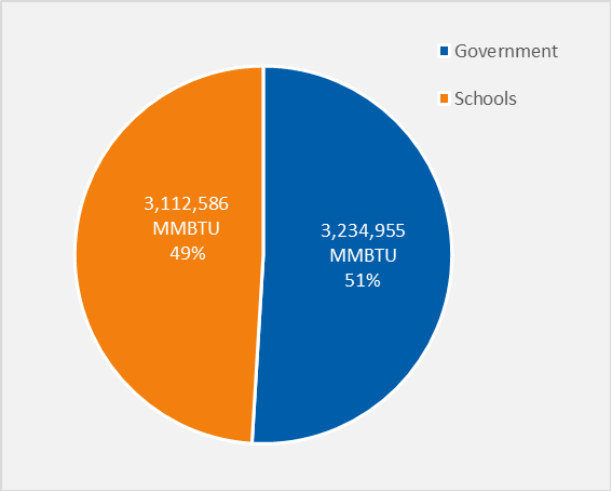
Table 112 lists actual spending, savings, participation, and cost-effectiveness of the Schools and Government Solution for CY 2020.

Table 112. Schools and Government Solution Summary

Item	Units	CY 2020
Incentive Spending	$	$6,187,369
Participation	Number of Participants	549
Verified Gross Lifecycle Savings	kWh	973,812,046
	kW	10,988
	therms	53,718,408
Verified Gross Lifecycle Realization Rate	% (MMBtu)	109%
Annual NTG Ratio	% (MMBtu)	73%
Net Annual Savings	kWh/year	51,651,531
	kW	8,021
	therms/year	2,464,860
Net Lifecycle Savings	MMBtu	6,347,542
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio with T&D benefits	1.61

Figure 66 contains the proportion of savings by offering. The offerings have nearly equivalent total net lifecycle savings, with the Government offering contributing 51% of the net lifecycle MMBtu savings to the Schools and Government Solution.

Figure 66. Proportion of Schools and Government Solution Net Lifecycle Savings by Offering



Achievement Against Goals

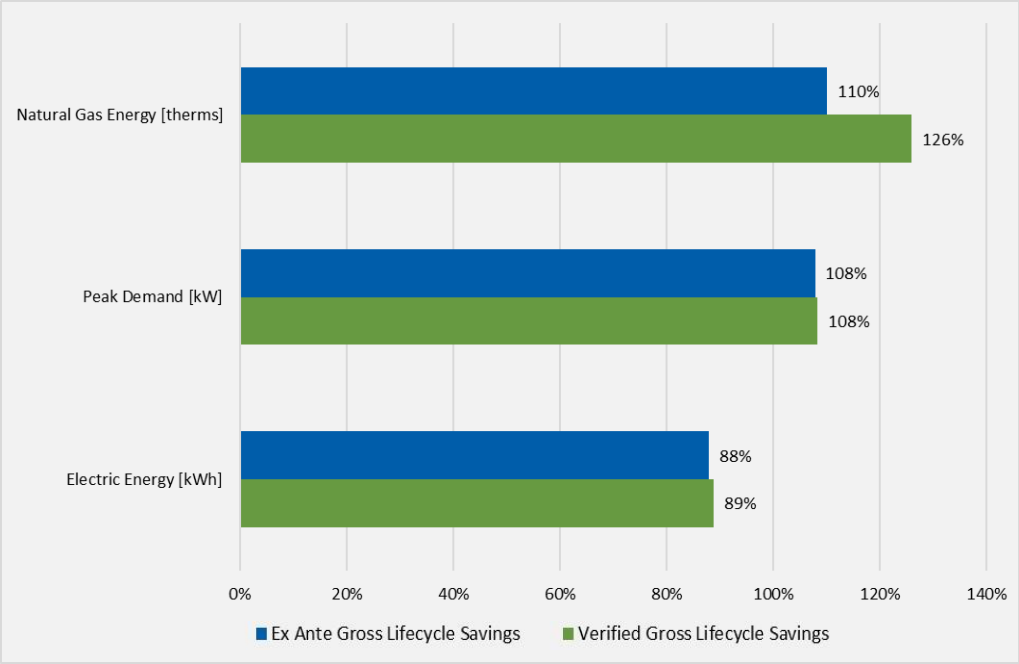
As shown in Table 113, the Schools and Government Solution achieved 89% of its electric energy savings goal, 108% of its peak demand savings goal, and 126% of its therm savings goal in CY 2020 based on verified gross lifecycle savings at the solution level. Figure 67 shows the percentage of gross lifecycle savings goals achieved for the Schools and Government Solution in CY 2020.

Table 113. CY 2020 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)	1,095,926,000	964,763,991	1,095,926,000	973,812,046	88%	89%
Peak Demand (kW)	10,145	10,950	10,145	10,988	108%	108%
Natural Gas Energy (therms)	42,607,000	46,959,460	42,607,000	53,718,408	110%	126%
Total Energy (MMBTU)[a]	8,000,000	7,987,721	8,000,000	8,695,262	100%	109%

[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 67. CY 2020 Schools and Government Solution Achievement of Gross Lifecycle Savings Goals



The 100% *ex ante* gross lifecycle savings reflects the implementer's contract goals for CY 2020. Verified gross lifecycle savings contribute to the administrator's portfolio-level goals.

Impact Evaluation

This section contains the findings for the CY 2020 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 2020 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 114 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 and in Appendix J of Volume III.

Table 114. CY 2020 Schools and Government Solution Impact Activities

Offering	Total Measures	Impact Evaluation Sample		
		Desk Reviewed Measures	Virtually Verified Measures	Proportion Sampled (by *ex ante* MMBTU savings)
Schools	2,547	26	7	27%
Government	1,256	21	9	57%
Total	**3,803**	**47**	**16**	**41%**

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, EUL).

Engineering Desk Review

The evaluation 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 Wisconsin 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.

To conduct the impact analysis of the offering, the evaluation team selected a representative sample of measures to evaluate then extrapolated findings to the larger offering population. In 2020, 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 were extrapolated to the remainder of the offering population.

Engineering Desk Review and Interview

The evaluation team conducted engineering desk reviews on all sampled 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.

Virtual Verification Site Visits

The evaluation team also conducted virtual verification site visits that involved an engineering desk review then the use of software to connect to the site contact's mobile device camera and microphone. This allowed the evaluation team to visually verify the type and quantity of equipment installed, ask the site contact how the installed equipment was controlled, and document 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 115 lists the first-year and lifecycle realization rates for CY 2020. Table 116 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 100%, weighted by total (MMBtu) energy savings. Realization rates are determined by strata, 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 115. CY 2020 S&G Solution First-Year and Lifecycle Realization Rates

Offering	First-Year Realization Rate				Lifecycle Realization Rate		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
Government	101%	101%	126%	115%	102%	131%	119%
Schools	100%	100%	100%	100%	100%	100%	100%
Total S&G Solution	**100%**	**100%**	**111%**	**107%**	**101%**	**114%**	**109%**

Table 116. CY 2020 S&G Solution First-Year and Lifecycle Verified Energy Savings Summary

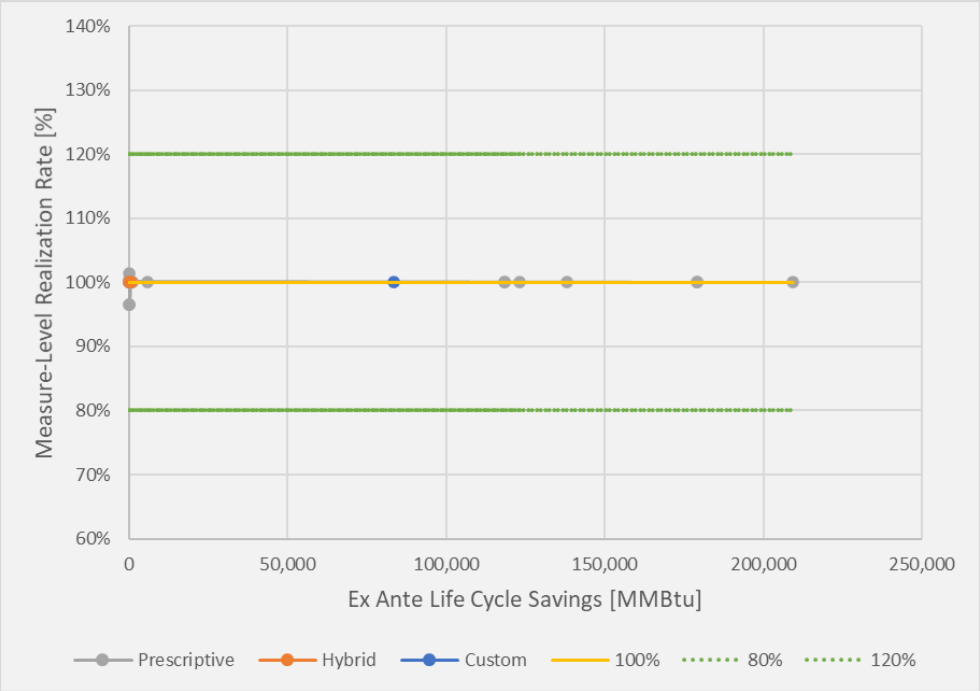
Offering	Verified First-Year Savings				Verified Lifecycle Savings		
	kWh	kW	therms	MMBtu[a]	kWh	therms	MMBtu[a]
Government	32,201,346	3,852	1,625,509	273,461	461,450,798	28,562,005	4,431,446
Schools	38,554,177	7,136	1,751,011	306,648	512,361,248	25,156,403	4,263,817
Total S&G Solution	**70,755,522**	**10,988**	**3,376,520**	**580,109**	**973,812,046**	**53,718,408**	**8,695,262**

[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: Verified Gross Savings Results

For the Schools offering, the evaluation team conducted a database review, desk reviews, interviews, and virtual site visits to inform verified gross savings. The offering had a gross lifecycle realization rate of 100% MMBtu. Figure 68 presents the magnitude of and associated realization rates for reported MMBtu savings of the sampled projects.

Figure 68. Schools & Government Solution Schools Offering Sampling Results



As seen in the figure above, prescriptive, hybrid and custom projects generally maintained a 100% realization rate, with very little variability in the sample. The main factors that affected the realization rate of the Schools offering were minor discrepancies between the values used to calculate the *ex ante* savings and the values in the 2020 TRM. It was not clear what source was used to calculate the *ex ante* savings, however lag in SPECTRUM updates is a likely source of the discrepancies.

Table 117 lists the CY 2020 *ex ante* and verified gross savings for the Schools offering.

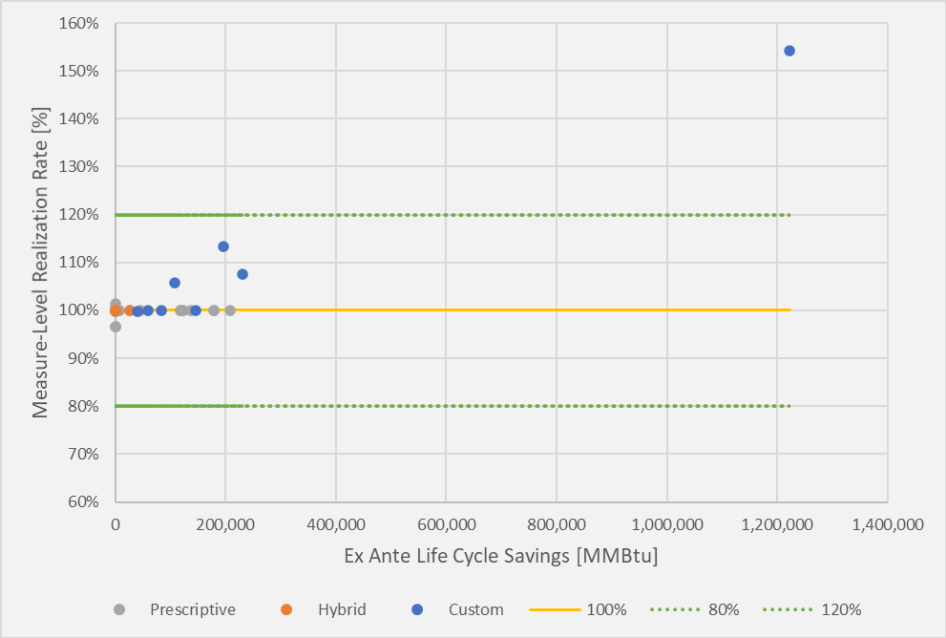
Table 117. CY 2020 Schools Offering *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
Schools Offering						
First-Year Gross Savings	38,554,177	7,136	1,751,011	38,554,177	7,136	1,751,011
Lifecycle Gross Savings	512,361,248	7,136	25,156,403	512,361,248	7,136	25,156,403

Government: Verified Gross Savings Results

For the Government offering, the evaluation team conducted a database review, desk reviews, interviews, and virtual site visits to inform verified gross savings. The offering had a gross lifecycle realization rate of 119% MMBtu. Figure 69 presents the magnitude of and associated realization rates for reported MMBtu savings of the sampled projects.

Figure 69. Schools & Government Solution Government Offering Sampling Results



As seen in the figure above, there were very few instances of *ex post* savings calculations deviating from *ex ante* savings within the Government offering sample this year, particularly in the prescriptive and hybrid measures sampled. There was some deviation primarily in the custom measures. The following are the main factors that affected the realization rate for the Government offering:

- Projects with conservative *ex ante* savings estimates that increased with more advanced analysis
- Different size (horsepower) blower motors installed
- One very large project that used more reclaimed landfill gas than expected for an on-site drying operation

Table 118 lists the CY 2020 *ex ante* and verified gross savings for the Government offering.

Table 118. CY 2020 Government *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
Government Offering						
First-Year Gross Savings	31,882,520	3,814	1,290,087	32,201,346	3,852	1,625,509
Lifecycle Gross Savings	452,402,743	3,814	21,803,057	461,450,798	3,852	28,562,005

Verified Net Savings Results for the Schools and Government Solution

The evaluation team used participant surveys to assess net savings for the Schools and Government Solution. The team calculated a NTG of 73% for the CY 2020 solution. For a detailed description of NTG analysis methodology and findings, refer to *Appendix K. Net Savings 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 with 75 participants.[55] To calculate the solution NTG, the evaluation team combined the self-reported freeridership and participant spillover results using the following equation:

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

Table 119 shows the NTG results for the Schools and Government Solution.

Table 119. CY 2020 Schools and Government Solution NTG Ratio

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

[a] Weighted by lifecycle gross verified MMBtu savings

Two projects with the greatest savings represent 27% of the NTG analysis sample lifecycle gross verified savings.[56] 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 120 shows the weighted average NTG ratio by offering as well as the total lifecycle gross verified savings and lifecycle net savings.

Table 120. CY 2020 Schools and Government Solution Lifecycle Net Savings and NTG

Offering	Total Lifecycle Gross Verified Savings (MMBtu)	Total Lifecycle Net Savings (MMBtu)	NTG Ratio
Government	4,431,446	3,234,955	73%
Schools	4,263,817	3,112,586	73%
Total	**8,695,262**	**6,347,542**	**73%**

Process Evaluation

The process evaluation collected primary data to assess how participants learned about the offerings in the Schools and Government Solution, how the offerings impacted the way participants made decisions, whether the offering process presented any barriers to participation, and participants' overall satisfaction and experience. The process evaluation also considered what other barriers remained to customers wanting to achieve greater energy efficiency and how Focus on Energy might help customers overcome those barriers.

Process Evaluation Methodology

The process evaluation involved in-depth interviews with APTIM, the administrator, and CESA 10, the implementer and with college and university participants and nonparticipants. The evaluation team also

[55] Thirty-nine Government offering participants and 36 Schools offering participants.

[56] Two energy-efficient boiler projects by Schools offering participants.

conducted a phone survey with K-12 schools and government participants and surveyed participants online and by mail for the ongoing satisfaction survey. Table 121 presents the sample sizes for all primary data collection.

Table 121. Schools and Government Solution Process Evaluation Sample Sizes

Group	Data Collection Method	Sample
Administrator and Implementer	Interviews	2
K-12 Schools and Government Participants	Phone survey	70
Ongoing Participant Satisfaction	Online and mail surveys	208
Higher Education Participants	In-depth Interviews	5
Higher Education Nonparticipants	In-depth Interviews	3

Ongoing Participant Satisfaction Surveys

The evaluation team conducted satisfaction surveys for the School and Government Solution beginning in CY 2020 for the CY 2019 - CY 2022 quadrennium, continuing the practice established for the previous quadrennium in CY 2015.

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

The team used SPECTRUM data to sample CY 2020 participants and administered web-based satisfaction surveys throughout the year. The team mailed paper surveys to participants with no email address on file and combined results from both modes to conduct the analysis. A total of 208 School and Government Solution participants responded to the CY 2020 survey. The survey covered several topics including overall satisfaction, satisfaction with Focus on Energy staff and trade allies, likelihood of recommending Focus on Energy, likelihood to initiate another energy-efficient project, and other feedback.

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 10 energy advisors who perform outreach to school and government customers and help identify projects and submit applications. They also conduct energy calculations to determine savings and available incentive dollars for custom projects. Six of the energy advisors are assigned to a particular region; three are assigned to key accounts and one is assigned to wastewater agencies. Participants can also apply directly to Focus on Energy for prescriptive incentives for eligible products.

APTIM, the administrator, created the Schools and Government Solution in CY 2020 as part of a larger reorganization of Focus on Energy activity. Under this solution, the administrator brought together the offerings for K-12 schools, technical and two-year community colleges, and government customers that had been part of the Agriculture, Schools, and Government Program and the offerings for larger customers such as four-year universities, some wastewater facilities, and some state government facilities that had been part of the Large Energy Users Program. The Schools and Government Solution categorizes eligible customers into three sectors: Higher Education (including all two-year and four-year institutions), K-12 Schools, and Government (including all state and local government, and wastewater).

CESA 10, which had implemented the CY 2019 Agriculture, Schools, and Government Program, implemented the Schools and Government Solution in CY 2020 and was supported by Leidos.

Special Offerings and Initiatives

The implementer ran different campaigns to engage target customers in 2020. The implementer continued to work with participants at K-12 schools in the School Energy Benchmarking initiative, begun in CY 2018, and transferred energy use data from the B3 Benchmarking software tool into the U.S. Department of Energy's ENERGY STAR Portfolio Manager tool.[57] For more active schools, the implementer has been able to make additional recommendations, such as how to reduce peak electric use and reduce natural gas consumption. The Delivering Energy Efficiency Together (DEET) initiative for K-12 schools, launched in CY 2015, was not offered in CY 2020 because accurate monthly energy usage was difficult to measure during COVID-19 building closures.

Changes Due to COVID-19 Shutdowns

According to the implementer, COVID-19 shutdowns had a limited impact on the overall achieved savings from the Schools and Government Solution in CY 2020 and a mixed impact on operations. Some projects in early planning stages were cancelled or postponed because staff were laid off or furloughed. Many other projects, closer to implementation, continued as planned or were rescheduled after a slight delay. The shutdowns also accelerated some projects because scheduling was easier for an unoccupied building. The implementer indicated tribal-owned organizations were an exception to this rule; for some tribes, revenue comes from gaming, which experienced significant loss of income due to the shutdown and is expected to have a long-term effect.

Governments and public schools, funded through tax dollars collected in prior years, did not see an immediate impact on their budgets. However, these sectors expect lower tax revenue in 2020, as well as lower student tuition and fee revenue for universities, may have a chilling effect on participation in CY 2021. However, local ballot initiatives passed in April and November 2020, including a $317 million bond issuance in Madison Metropolitan School District to fund facility renovations, may help public K-12

[57] Free access to the B3 Benchmarking software tool is no longer offered after June 30, 2020. Portfolio Manager is available at no charge from the U.S. Department of Energy.

schools continue to have funding for energy efficiency improvements.[58] According to the implementer, customers without public revenue streams, such as private K-12 schools, colleges, and universities, may have more financial difficulty than public institutions.

Some initiatives the implementer planned for CY 2020 had to be cancelled or postponed because changes in energy use patterns as a result of COVID-19 made it impossible to set a baseline or compare use to a baseline. The DEET initiative, scheduled to phase out in the middle of the year, was cancelled early because energy use after February 2020 was no longer relevant to the baseline. The Utility Bill Verified Savings initiative, which the implementer intended to roll out as an alternative to DEET, was postponed until customer energy use patterns could allow the setting of an appropriate baseline. The energy management program for wastewater facilities was also delayed for the same reason.

Marketing and Outreach

The Schools and Government Solution primarily targets customers through direct outreach by energy advisors. This outreach is typically supplemented through presentations and distribution of print materials at conferences and events. However, in-person events were curtailed due to COVID-19. To compensate, the implementer issued additional promotional email campaigns, targeted to subgroups such as wastewater agencies, K-12 schools, and municipal governments. In addition, it partnered with utilities to co-promote Focus on Energy's and utilities' incentive offerings.

Customer Satisfaction Results for the Schools and Government Solution

Throughout CY 2020, the evaluation team surveyed Schools and Government Solution participants to measure their satisfaction with various aspects of their experience. Respondents answered questions related to satisfaction and likelihood on a scale of 0 to 10, where 10 indicated the highest degree of satisfaction or likelihood and 0 the lowest.[59]

Prior to portfolio restructuring in CY 2020, the evaluation team fielded a satisfaction survey for the predecessor Agriculture, Schools and Government Program. The team used CY 2019 results for the predecessor program for comparison to CY 2020 School and Government Solution results, although the agriculture component of the predecessor program was consolidated into the Business and Industry Solution in CY 2020.

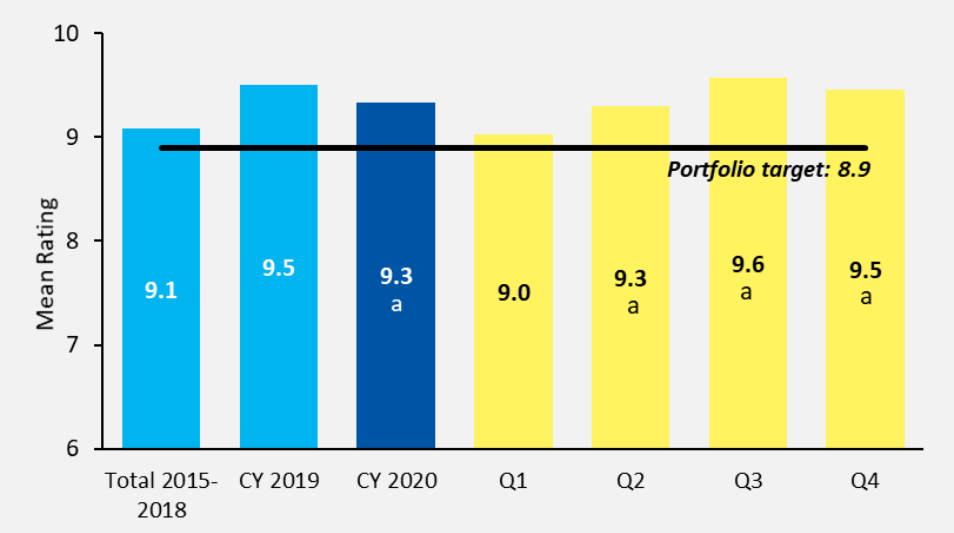
Figure 70 shows that Schools and Government Solution participants gave the offering they participated in an average overall satisfaction rating of 9.3 in CY 2020, and this rating was statistically above the

[58] The Capital Times, November 5, 2020. "Voters approve 43 of 51 school ballot measures around Wisconsin." Available online: https://madison.com/ct/news/local/education/local_schools/voters-approve-43-of-51-school-ballot-measures-around-wisconsin/article_b1de70ba-c367-53d3-80b4-973a4edc63ba.html

[59] 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.

portfolio target for the last three quarters of the year and for CY 2020 overall.[60] However, overall satisfaction with the CY 2020 solution was statistically lower than the CY 2019 precursor Agriculture, Schools and Government program (9.5).[61]

Figure 70. Overall Satisfaction with the School and Government Solution



Source: Schools and Government Solution Participant Satisfaction Survey Question. "Overall, how satisfied are you with your most recent experience with Focus on Energy?" (CY 2019 n=263, CY 2020 n=208, Q1 n=46, Q2 n=51, Q3 n=33, Q4 n=65). Total CY 2015-CY 2018 is the participation-weighted average of four annual results.

[a] This result is statistically significantly different from the portfolio target (p<0.10 or better using binomial t-tests).

Table 122 shows the average satisfaction and likelihood ratings for the Schools and Government Solution in CY 2020 compared to the corresponding CY 2019 program.

Table 122. Average Ratings for the Schools and Government Solution

Item	CY 2019	CY 2020
Satisfaction with Focus on Energy staff	9.6	9.5
Satisfaction with Trade Ally	9.4	9.4
Likelihood of more improvements	8.6	7.9 [a]
Likelihood of recommending Focus on Energy	9.7	9.6

[a] This result is statistically significantly different from the result for CY 2019 (p<0.10 using a binomial t-test).

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

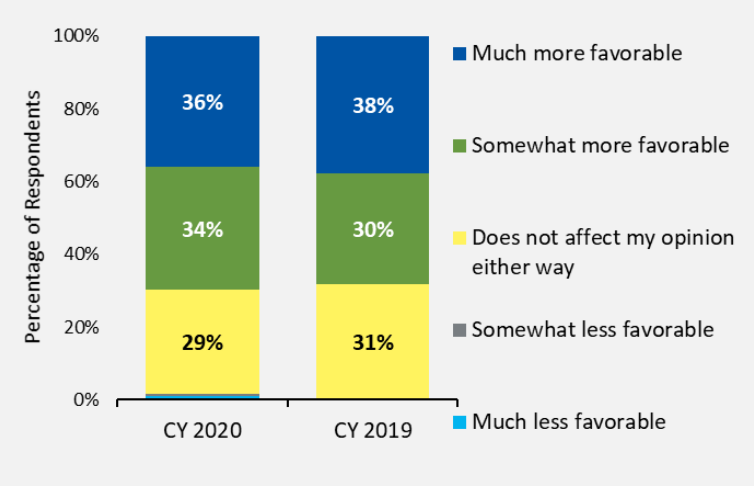
[60] The program administrator's contract established a portfolio target of 8.9 to maintain or increase customer satisfaction. The evaluation team found that some responses did not include identifying information to match to participation dates. The team included survey responses without participation dates in the year-end total but not in the quarterly breakdown.

[61] p<0.10 using a binomial t-test.

(respondents giving a rating of 9 or 10) and detractors (respondents giving a rating of 0 to 6). The Schools and Government Solution's NPS was +90 for CY 2020, which was the same as CY 2019 (also +90).

CY 2020 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 78% (n=206) were aware, similar to the CY 2019 weighted average of precursor program (81%, n=261). Respondents were also asked if Focus on Energy offerings affected their opinion of their utilities, and 70% reported that their opinion had become *much more favorable* or *somewhat more favorable* (Figure 71). Only 2% of participants reported that their opinion had become less favorable and 29% said their opinion of their utility was not affected. These ratings were similar to the CY 2019 predecessor program.

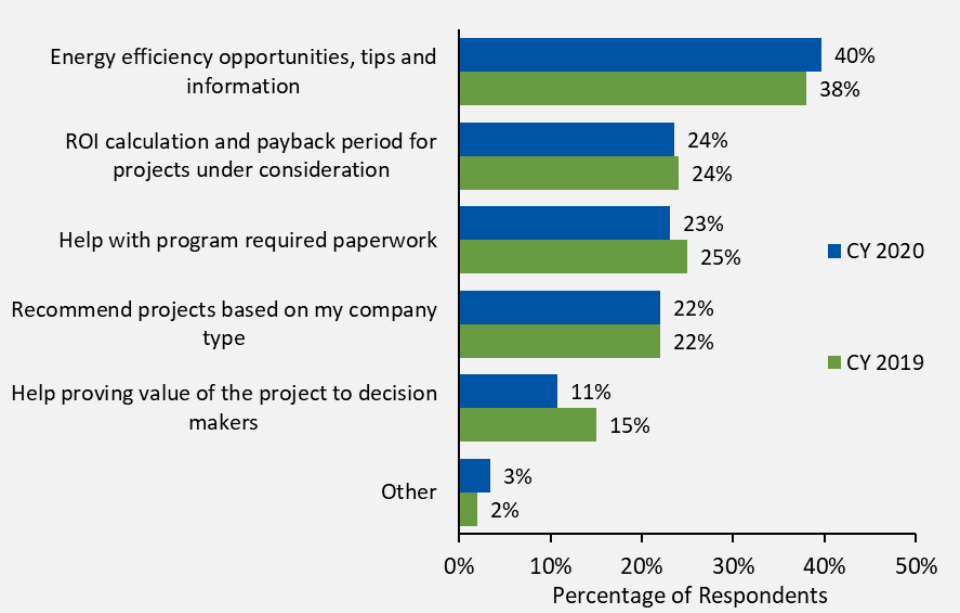
Figure 71. Effect of Focus on Energy Offerings on Schools and Government Participants' Opinion of Utilities



Source: Schools and Government Solution Participant Satisfaction Survey Question. "How have these offerings affected your opinion of your energy utility, if at all?" (CY 2020 n=189, CY 2019 n=243)

Survey respondents identified how Focus on Energy can best support their organization with future projects (Figure 72). The most frequent responses from Schools and Government Solution participants were energy efficiency opportunities, tips, and information (40%), return-on-investment (ROI) calculation and payback period for projects under consideration (24%), and help with paperwork (23%). These results were very similar to the CY 2019 predecessor program. The weighted results from CY 2019 predecessor programs were very similar to CY 2020.

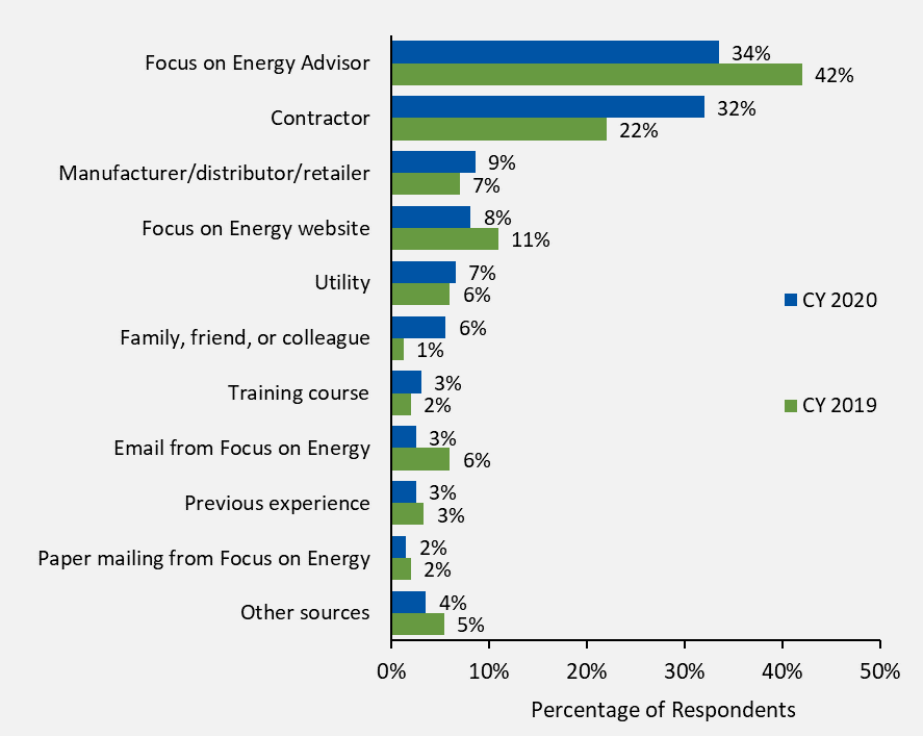
Figure 72. CY 2020 Participants' Most Valued Support



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 2020 n=204, CY 2019 n=259). Responses total to more than 100% because multiple responses were allowed.

As shown in Figure 73, about a third of Schools and Government Solution participants learned about the offering from a Focus on energy advisor (34%) and another third learned from contractors (32%). Compared to the CY 2019 predecessor program, these results represented a shift to fewer learning about the offering through energy advisors (34%, down from 42%) and more through contractors (32%, up from 22%).

Figure 73. CY 2020 Sources of Awareness



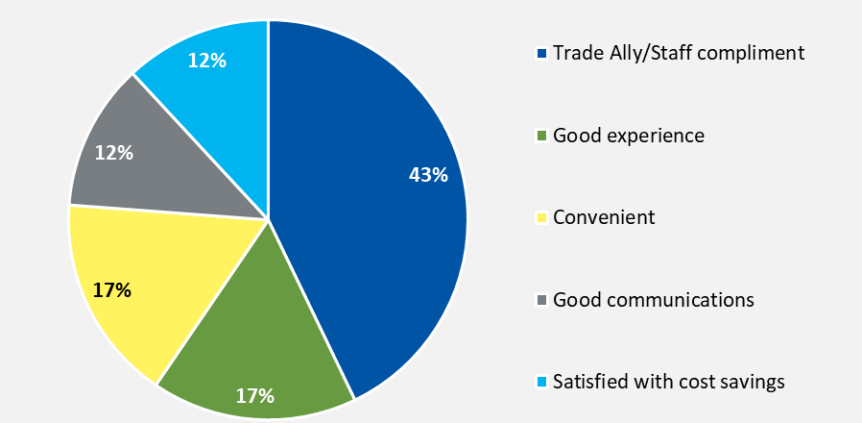
Source: Schools and Government Solution Participant Satisfaction Survey Question. "How did you learn about this particular opportunity from Focus on Energy?" (CY 2020 n=197, CY 2019 n=241). Responses total to more than 100% because multiple responses were allowed.

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 208 participants who responded to the survey, 20% provided open-ended feedback, which the evaluation team coded into a total of 58 mentions. Of these mentions, 42 were positive or complimentary comments (72%), and 16 were suggestions for improvement (28%).

The positive responses are shown in Figure 74, with most comments reflecting compliments for Trade Allies and Focus on Energy staff (43%), a generally positive experience (17%), or the convenience of the offering (17%)

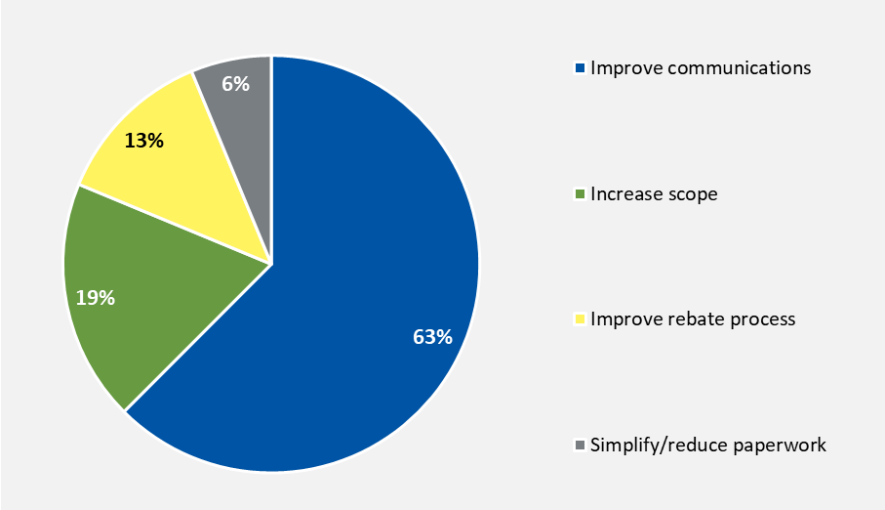
Figure 74. Positive Comments about the Schools and Government Solution



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=42)

Suggestions for improvement are shown in Figure 75; the most common suggestions were to improve communications (63%), increase the scope of the offering (19%), and improve the rebate process (13%). Suggestions about improving communications typically focused on timeliness of communications. Suggestions about increasing the scope mentioned expanding the offering to include incentives for energy use management and roof top solar.

Figure 75. Suggestions for Improving 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 suggestions for improvement n=16)

Government and K-12 Schools Participation Experience

The evaluation team conducted a phone survey to provide additional information about the experience of government and K-12 school participants in the Schools and Government Solution in CY 2020. Table 123 shows the distribution of customer and project types in the survey sample. Because responses

across the two groups in the survey (government and K-12 schools) were generally not statistically different, Cadmus did not disaggregate survey results.

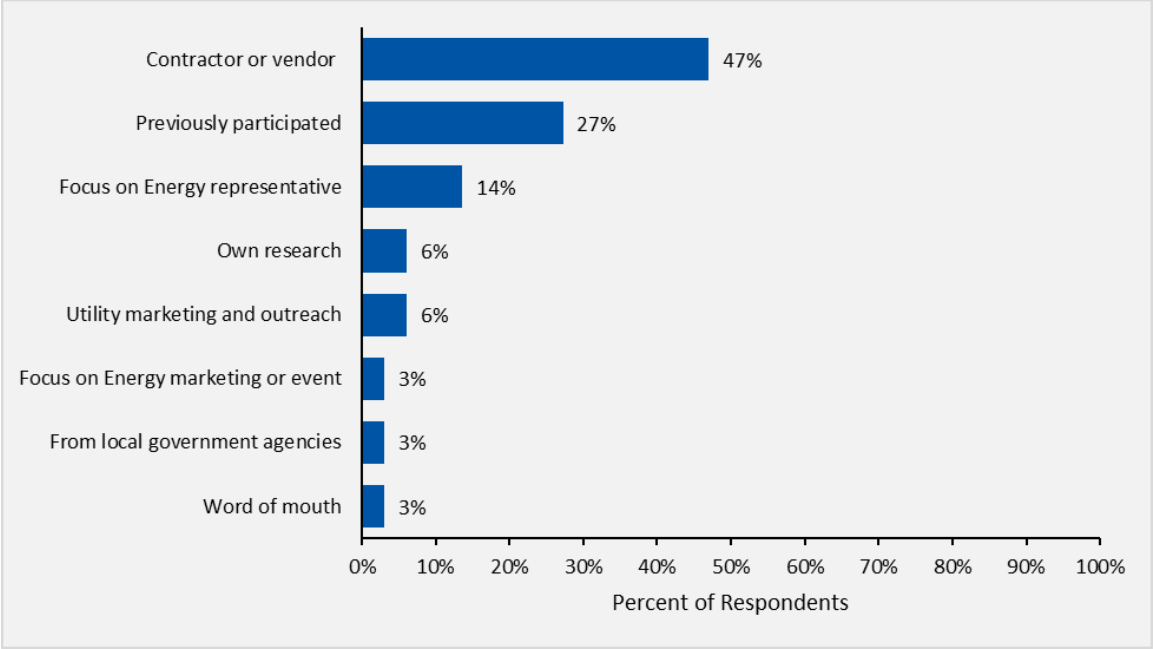
Table 123. Measure and Customer Types in Participant Survey Sample

Measure Type	Government	K-12 Schools	Total
LEDs	33	22	**55**
HVAC/Water Heater	3	7	**10**
Variable Speed Drive	1	1	**2**
Insulation	1	0	**1**
Process improvements	1	0	**1**
Retrocommissioning	0	1	**1**
Total	**39**	**31**	**70**

Program Awareness

Most respondents were familiar with Focus on Energy offerings, with 69% (n=65) indicating they had previous experience. As shown in Figure 76, although most respondents had some experience with Focus on Energy, they most commonly mentioned contractor or vendors as their source of awareness for the Focus on Energy incentives they received in CY 2020. The second and third most frequently mentioned sources were previous participation (27%) and Focus on Energy representatives (14%), with other channels of awareness mentioned by 6% or fewer of respondents.

Figure 76. Channel of Awareness for Focus on Energy Incentives



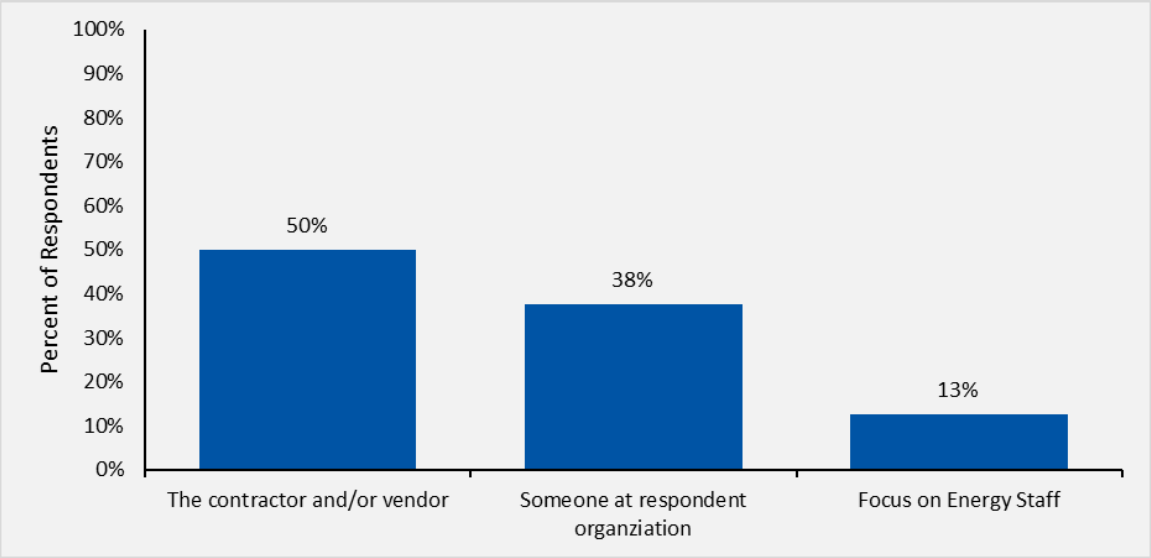
Source: CY 2020 Participant Survey Question B1. "How did your organization learn about the Focus on Energy incentives available for this project?" Multiple responses allowed. (n=66)

Project and Application Support

Most K-12 schools and government participants said several actors helped them initiate their project. Contractors or vendors were the most frequently involved, helping to initiate 75% of projects (n=69). Focus on Energy representatives were also frequently involved, helping to initiate projects for 57% of the survey respondents (n=65). Over a quarter of respondents (27%) reported they had an internal energy or sustainability team that helped initiate their project. For most participants, this support helped them clearly understand what Focus on Energy incentives were available, with 94% reporting that project eligibility information was *very clear* or *mostly clear*.

Contractors and vendors played an important role in the application process as well, with 50% of respondents reporting their contractor or vendor took the lead in completing paperwork. Figure 77 shows the person primarily responsible for completing applications, according to respondents. Of 14 respondents who said they completed the paperwork themselves, 13 said it was *very easy* or *mostly easy*.

Figure 77. Primary Responsibility for Completing Application



Source: CY 2020 Participant Survey Question B12. "Who took the lead role in completing the application for the financial incentive?" (n=70). May not sum to 100% due to rounding.

Experience with New Structure

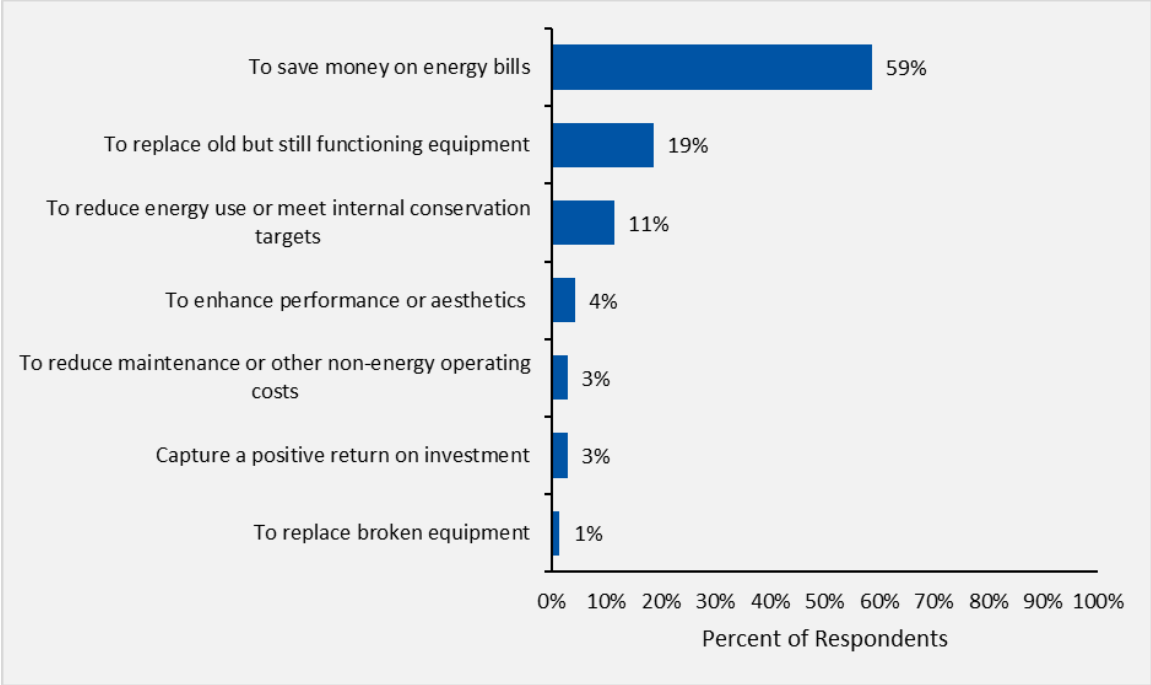
Most participants who had previously participated in Focus on Energy said their CY 2020 experience was about the same as before (80%, n=45), but 18% said it was more positive and only 2% reported it was less positive. All but one respondent, 97% of the sample, were *very* or *somewhat satisfied* with the support they received from their energy advisor.

Motivations and Decision-Making

As shown in Figure 78, the primary motivation for most respondents to complete energy improvements was to save money on energy use (59%). Though mentioned much less frequently, the second most

common motivation was to replace old but still functioning equipment (19%). Of these 13 respondents, nine completed an LED projects and four completed a non-lighting project.

Figure 78. Primary Motivation for Implementing Project



Source: CY 2020 Participant Survey Question C1. "What factor was most important to your company's decision to make the energy-efficient upgrades for which you received an incentive?" (n=70)

The survey also asked K-12 school participants about prior technical assistance received from Focus on Energy through its School Benchmarking Initiative. Seven K-12 school respondents said they were familiar with their school's participation in this initiative. Though all seven said they did not consider benchmarking results when deciding to implement the project they completed in CY 2020, one said the initiative was *very helpful* and four said it was *mostly helpful* in understanding their facilities' energy use. The program implementer said this was not unexpected, since the timeline for many K-12 capital improvement projects is so long that project implemented in 2020 were likely scoped before Focus began its benchmarking

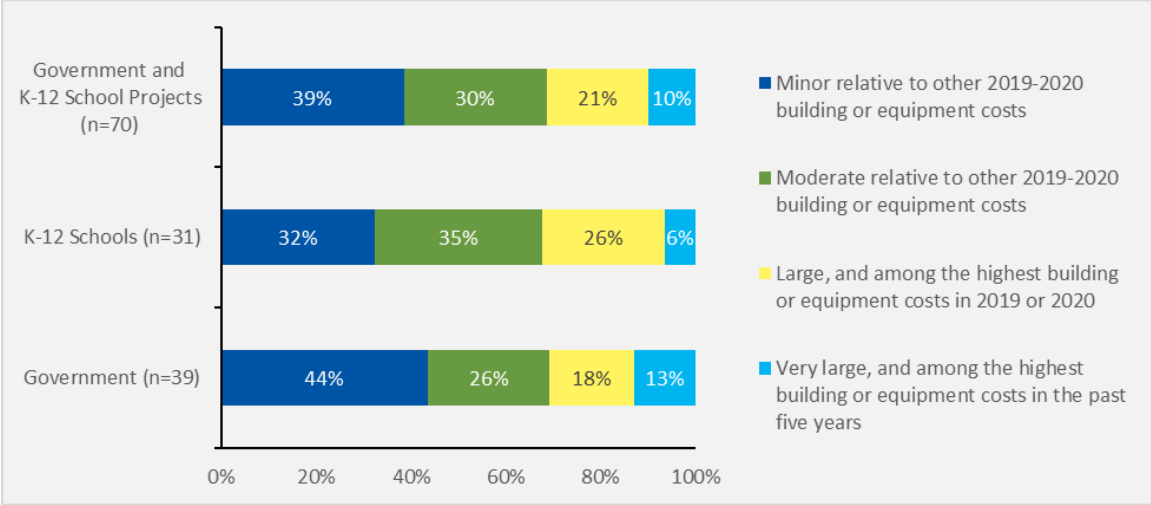
The survey asked about other possible factors in making decisions about a project:

- 12 respondents (18%, n=67) had attended a Focus on Energy in-person or online training in the past two years; of these, five said the training was *very* or *somewhat important* in their decision to complete their project.
- 22 respondents (31%, n=70) said their project was part of a larger renovation or equipment replacement project.
- 7 respondents (10%, n=69) said they received additional financial assistance for their project; of these, two received a grant from the state, four received money from a utility, and one could not remember the source of additional funds.

- 12 respondents (17%, n=63) said their organization has energy conservation targets, and all of these organizations said their Focus on Energy project contributed to meeting that target.

Respondents said the projects they completed with Focus on Energy incentives ranged from minor to very large, as shown in Figure 79.

Figure 79. Cost of Projects Completed with Focus on Energy Incentives Compared to Typical Capital Expense



Source: CY 2020 Participant Survey Question C7. "Thinking just about the upgrades for which you received a Focus on Energy incentive, how would you characterize the cost of this project relative to typical building or equipment upgrade projects?" (n=70)

Barriers and Suggestions for Improvement

A majority (57%, n=69) of K-12 school and government survey respondents said cost was normally the greatest challenge in implementing energy efficiency projects. The second most common barrier, mentioned by 32% of respondents, was the organization's internal decision-making process. In comments, respondents provided some additional insight on these responses. Two respondents said that though money was the primary barrier for their organization, they thought the best solution was to improve internal budgeting practices, rather than receive additional incentive dollars. Two other respondents said their organizations consider the long-term payback for projects, but because their organizations are small, there is less opportunity for meaningful energy savings.

When asked what could help their organizations overcome challenges to energy efficiency, the most common response was to offer higher incentives (52%, n=42). The second most common response, selected by 29% of respondents (n=42), was to provide more information about available offerings, including more information on what measures are eligible, how to identify energy-saving opportunities, and how to set priorities. Two additional respondents requested training for staff to promote energy efficient behaviors and to explain return-on-investment calculations. In addition to technical assistance, respondents requested financing options (7%) and energy audits (5%).

Higher Education Interviews

Cadmus interviewed eight facilities directors at Wisconsin universities, five who had participated in Focus on Energy in the past year and three who had not. These participant and nonparticipant respondents represented both public and private universities.

Decision-Making Processes at Public and Private Universities

At all universities, the facilities director oversees routine maintenance and repairs and manages staff, organized by systems or specialty, who identify energy projects as part of routine maintenance and repairs. Several respondents said very large projects, such as full building renovations or new construction, may be led by a different department such as planning and the respondent's role on these projects varied from very involved to not at all involved.

Public universities. Capital expenditures by public universities in Wisconsin are controlled by Wisconsin Act 237, passed in 2017.[62] As indicated in this Act, individual campuses must solicit approval and funding for projects greater than $300,000 through the Wisconsin Department of Administration, a centralized department of the state university system that oversees capital project planning for the University of Wisconsin System as a whole. Each campus submits a template-based plan every two years, listing capital improvement needs for the next six years. Public university respondents reported it is often difficult to get a project approved the first time it is submitted, and the projects with the greatest need, such as replacing failed equipment, are usually prioritized. Projects are evaluated for lifetime payback and return on investment, and energy costs are included in these calculations.

Smaller projects, under $300,000, are easier to accomplish because they do not require approval outside of campus management. Public schools have sufficient resources to do proactive maintenance, generally to avoid situations that require them to react to failed equipment. Campuses are expected to conduct some financial analysis to identify the most cost-effective option for equipment replacement and upgrades, taking lifetime operation and maintenance costs into account. But campuses are not necessarily expected to dedicate time and resources to considering more radical improvements to systems or structures. For example, if a boiler needs to be replaced, the expectation is that it will be replaced with the most cost-effective boiler available, which typically corresponds to a higher-efficiency model. But alternative heating and cooling systems might not be considered.

Private universities. In many aspects, the project-planning process at private universities is similar to public schools. Facilities managers and their staff identify projects and submit proposals to upper management. One private university respondent said projects over $1 million will typically be reviewed by a committee of decision-makers from multiple departments. Smaller projects typically require approval from only a single individual, such as the vice president of campus operations. Staff create project proposals, often relying on contractors or vendors to provide energy use estimates for proposed equipment. Though some private universities, like public universities, considered lifetime operational costs when comparing equipment options, others did not. One respondent said the university's

[62] Wisconsin State Legislature. "2017 Wisconsin Act 237." Enacted April 3, 2018. https://docs.legis.wisconsin.gov/2017/related/acts/237.

management was so sensitive to upfront costs that it would sometimes select lower upfront costs over lower lifetime costs, even if the difference was substantial.

In general, private universities have greater need, and less available funding, than public universities. Three of four private universities reported substantial deferred maintenance needs. For example, one respondent said he had identified $14 million of existing deferred maintenance needs and had an annual maintenance budget of $500,000. Another private university respondent said at least one building on the campus was locked up and considered unusable due to unaddressed maintenance needs. Two private university respondents said projects that are cost-effective in the long-term are often not implemented because the upfront costs are too high.

Because private campuses often take a more reactive approach to building and system maintenance, they also have fewer systems in place to identify, prioritize, and design projects. One respondent described taking the time and resources to create a project register and long-term project schedule as a significant beneficial outcome of the school's initiative to tackle deferred maintenance, even though by the second year after the plan was completed all projects were put on hold and funding redirected.

Motivations for Capital Improvements

Private universities have different priorities for capital improvements than do public universities (and different abilities to commit funding). The public university system has specific capital maintenance budgets, allowing more flexibility for facilities staff to focus on overall building performance and long-term maintenance. Private universities are more likely to allocate scarce resources to projects with direct student impact. Projects that support new programs or initiatives, and projects that improve campus aesthetics, are higher priority than are facility maintenance or controlling operating costs. For example, one private university respondent described a recent project to update lighting fixtures on campus. Though the facilities manager proposed using all LEDs, some metal halide fixtures were installed to match other fixtures already on campus. Most respondents, from both public and private universities, said energy savings and energy costs are considered in developing a project, but these are not a primary consideration for a major capital improvement.

At both public and private universities, the facilities staff tasked with identifying energy-saving projects typically do not have any access to the dollars saved through reduced energy costs, though one respondent at a private university reported that a boiler replacement had saved so much money on energy costs the university increased his budget the following year. Typically, however, when the utility bill is reduced, the budgeting authority simply reduces the amount dedicated to utility bills for the year and redirects funds elsewhere. One private university respondent said students living in dorms pay electric bills, which makes electricity savings even less of a priority in those buildings from the university's perspective. Though this respondent had recently completed a major lighting retrofit to install LEDs, the school's motivation for the project was to install more attractive lighting rather than to save energy or money.

The University of Wisconsin System's 2020-21 Annual Operating Budget incorporated a new approach to funding that better aligns the capture of energy savings with the ability to benefit from reduced utility

costs. The 2020-21 Annual Operating Budget allocates each four-year campus funding equal to its past four-year average utility costs and indicates that the campus can retain any amount of funds in excess of actual utility costs.[63] Though this retained amount is likely to be a relatively small percentage of the funded amount on an annual basis, one public university respondent said the budget change presented an opportunity for campuses to build up a discretionary fund over time.

Focus on Energy incentives, on the other hand, are retained by facilities staff. Several respondents, at both public and private schools, said they had a dedicated account where they deposited incentive dollars and used this account to fund other projects. Two respondents said they used these dollars specifically for energy-related projects.

Reduction targets for greenhouse gas emissions were a motivating factor for two of three public campuses but not at any private universities. These two public campuses were also the only respondents who reported that student or faculty sustainability groups had any impact on energy efficiency. One of these respondents said a student-led organization dedicated to sustainability had identified an LED retrofit project that used Focus on Energy incentives and that had paid for the project from a fund that receives a portion of student segregated fees. The second respondent said the campus hosted energy-savings competitions between dorms with individual meters and similar footprints. The competitions had been successful in the past but were less active in 2020 because of the reduced occupancy due to COVID-19.

Barriers to Energy Efficiency

The primary barrier to energy efficiency at all schools is that it is a lower priority for management than other needs. However, identifying energy efficiency opportunities and monitoring energy use are also challenges at most schools. The two public universities who reported having emissions reduction targets also had the most sophisticated resources and established practices for identifying and analyzing energy efficiency opportunities. One of these respondents said energy meters were installed throughout campus and connected to a building automation system. Facilities staff monitor energy use regularly and analyze changes in energy use after completing an energy improvement to ensure they see the expected decrease. This respondent said facility staff are currently developing a networked lighting controls project.

Other campuses, including the one public campus without climate change goals, did not report the same level of awareness of energy use. Two private university respondents had meters on each building for one or more fuels but did not monitor data closely. A third did monitor gas use data, because it was collected at the building level, but did not monitor electricity since the school had a single meter for 30 buildings. One private university respondent was not aware of any energy audits completed on the campus in the past five years and did not know what energy efficiency opportunities existed on the

[63] University of Wisconsin System. 2020-21 University of Wisconsin Annual Operating Budget. https://www.wisconsin.edu/budget-planning/download/budget_documents/annual_budget_documents/Final-2020-21-Board-Document.pdf

campus. Another had held the position for 14 months but had so many immediate needs there was not yet an opportunity to complete a full review of the campus.

For larger projects, two respondents said not only did campus management have competing priorities, so did the architects or engineers hired to develop a project. According to one of these respondents who worked at a public university, these firms typically want to emphasize features such as appearance or end-user comfort over energy efficiency. The architects or engineers view this as their obligation to their client. This respondent's perspective was since these vendors are not judged by the energy efficiency of the final project design, they tend to resist any decision that improves energy outcomes if it means compromising other objectives. For this reason, the respondent observed sometimes vendors even resist communication or coordination with the energy advisors from Focus on Energy.

However, another public university respondent said for large projects of over $1 million, all parties involved had a general understanding the standard practice should be to install the most energy-efficient system that was still cost-effective. This respondent said that greater emphasis and awareness was on payback periods and return on investment than he observed a decade ago.

Experience with Focus on Energy

Application process. Several respondents expected contractors to include any available Focus on Energy incentives in their bid and then to manage the application paperwork if they won the bid.

For smaller projects, respondents said their own staff often manage the application process. Some universities dedicate a staff person to research incentives for projects once they are planned. One private university respondent, who was the primary person handling the Focus on Energy paperwork, said the university often does not apply for incentives even when installing an eligible project because it does not have the staff resources to fill out applications. This respondent consulted frequently with the facility's energy advisor, reporting the energy advisor was very helpful but still could not keep up with the paperwork burden. Another respondent said the university would sometimes not bother to get incentives for eligible equipment because the incentive amount was not worth the time needed to complete the application, even though the respondent had set up an internal system to prepopulate some application fields.

Energy advisor support. All respondents had some relationship with their energy advisor, and all were *somewhat* or *very satisfied* with the service they received. However, the nature of the relationship varied by respondent. One public university respondent frequently consulted his energy advisor about custom and prescriptive options for projects expected in the near-term. But most respondents did not consult with their energy advisor in the early stages of developing a project. Instead, they relied on their own staff or supply-side actors such as manufacturer representatives, vendors, or installers to suggest equipment and provide specification details and energy cost estimates. Two respondents did not have a reason when asked why they did not involve the energy advisor sooner, and a third said the thought had not occurred. A public university respondent said he was an experienced sustainability officer himself, so he already knew anything the energy advisor could tell him and that the energy advisor was more

responsive and knowledgeable when asked about prescriptive incentives than about options for custom projects.

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 H* includes a description of the TRC test.

Table 124 lists the CY 2020 incentive costs for the Schools and Government Solution.

Table 124. CY 2020 Schools and Government Incentive Costs

Offering	Incentive Costs
Schools	$3,778,175
Government	$2,409,195
Total	**$6,187,369**

The evaluation team found that the CY 2020 Schools and Government Solution was cost-effective with T&D benefits (1.61) and without T&D benefits (1.47). Table 125 lists the evaluated costs and benefits.

Table 125. Schools and Government Costs and Benefits

Cost and Benefit Category	Total
Costs	
Non Incentive Costs	$3,869,341
Incremental Measure Costs	$47,486,538
Total Non-Incentive Costs	**$51,355,879**
Benefits	
Electric Benefits (kWh)	$25,163,990
Electric Benefits (kW)	$16,301,329
T&D Benefits (kW)	$7,338,965
Gas Benefits	$20,752,418
Emissions Benefits	$13,334,835
Total TRC Benefits with T&D Benefits	**$82,891,536**
Net TRC Benefits with T&D Benefits	**$31,535,657**
TRC B/C Ratio with T&D Benefits	**1.61**

Outcomes and Recommendations

Outcome 1. Some smaller universities are unable to take advantage of some incentives because rebate dollars are insufficient to change the priorities of upper management or help facility staff who are overwhelmed with basic maintenance needs that go far beyond making systems more energy-efficient.

Recommendation 1. Provide more holistic interventions, such as combinations of equipment discounts, on-site energy manager services, financing assistance that structures monthly payments to be equal to monthly bill savings, and pay-for-performance incentives. These incentive structures should minimize disrupting cashflow available for projects prioritized by management (which may not be energy-related

projects) and include in-depth technical assistance to help facility managers identify deeper savings opportunities (including behavior and process changes) and prioritize projects. In addition, provide support for universities to more directly engage their student body and faculty in energy conservation activities to build awareness and support for ongoing energy conservation.

Outcome 2: The Government offering may need additional support developing accurate estimates of savings from complex non-lighting measures. This was evident in projects where more simplistic and conservative calculations were used, which underestimated or overestimated savings. Examples of more advanced methods include using a temperature bin analysis, on-linear VFD curves, and pump curves to better estimate performance across various loads.

Recommendation 2: Provide added technical assistance to participants engaged in more complex non-lighting measures to enable more accurate savings and incentive value.

Nonresidential New Construction

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. The solution also offers incentives for residential homebuilders. (See *Residential New Construction Solution* chapter for more information.)

For nonresidential buildings, Focus on Energy targets new construction projects as well as major renovation projects of 5,000 square feet or more. Multifamily buildings are also included in the nonresidential category of the New Construction Solution.

The New Construction Solution is administered by APTIM and implemented by Willdan, with CESA 10 as a subcontractor.

In 2020, Focus on Energy offers three nonresidential participation paths though these New Construction Solution offerings:

- **Energy Design Assistance (EDA) [whole-building analysis]** provides a free customized, whole-building analysis of energy-saving options for buildings in the planning phase and early design phase.
- **Energy Design Review (EDR) [whole-building review]**, new in 2020, offers energy design review for buildings later in the design phase and uses whole-building energy simulation analysis to investigate and capture savings associated with energy efficiency improvements that are feasible given the proposed design and project's place in the design/construction schedule.
- **Prescriptive** offers equipment incentives for buildings in the construction or move-in phase.

Table 126 lists actual spending, savings, participation, and cost-effectiveness of the Nonresidential New Construction Solution in CY 2020.

Table 126. CY 2020 Nonresidential New Construction Solution Summary

Item	Units	CY 2020
Incentive Spending	$	$6,090,236
Participation	Number of Participants	312
Verified Gross Lifecycle Savings	kWh	1,222,848,459
	kW	11,112
	therms	31,182,586
Verified Gross Lifecycle Realization Rate	% (MMBtu)	100%
Annual NTG Ratio	% (MMBtu)	81%
Net Annual Savings	kWh/year	57,387,244
	kW	9,001
	therms/year	1,351,774
Net Lifecycle Savings	MMBtu	5,898,223
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio with T&D Benefits	2.62

Achievement Against Goals

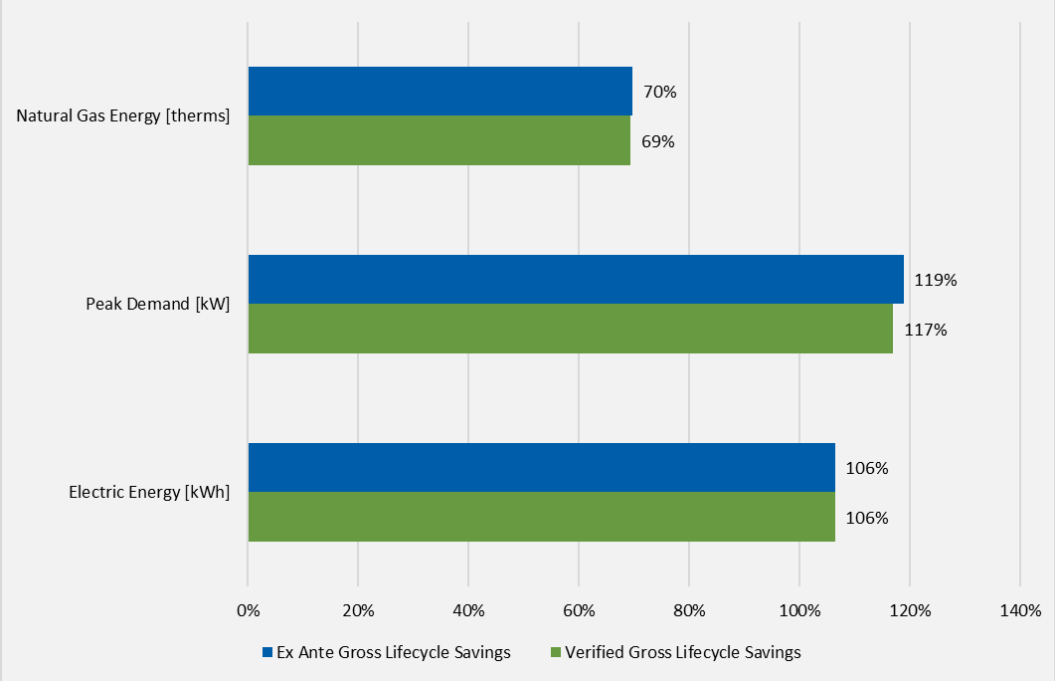
As shown in Table 127, the Nonresidential New Construction Solution exceeded its peak demand and electric energy savings goals but did not achieve its natural gas savings goal. Figure 80 shows the percentage of gross lifecycle savings goals achieved by the Nonresidential New Construction Solution in CY 2020.

Table 127. CY 2020 Nonresidential NC 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]	1,149,963,130	1,222,848,459	1,149,963,130	1,218,729,839	106%	106%
Peak Demand [kW]	9,505	11,290	9,505	11,094	119%	117%
Natural Gas Energy [therms]	45,047,338	31,370,192	45,047,338	31,059,226	69%	69%
Total Energy (MMBTU)[a]	8,428,408	7,309,378	8,428,408	7,255,369	86%	86%

[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 80. Nonresidential New Construction Solution Achievement of CY 2020 Gross Lifecycle Savings Goals



The 100% *ex ante* gross lifecycle savings reflects the implementer's contract goals for CY 2020. Verified gross lifecycle savings contribute to the administrator's portfolio-level goals.

Impact Evaluation

This section contains the findings for the CY 2020 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 2020 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 128 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 and in *Appendix K* of Volume III.

Table 128. CY 2020 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	136	29	10	62%
	Energy Design Review	1	1	1	100%
	Prescriptive	994	30	11	43%
Total		**1,131**	**60**	**22**	**55%**

Engineering Desk Reviews

The evaluation team reviewed all available project documentation in SPECTRUM for a sample of 60 Solution measures. This review included an assessment of the savings calculations and methodology applied by the solution implementer. The evaluation team relied on the applicable TRMs and other relevant secondary sources as needed. Secondary sources included energy codes and standards, case studies, energy efficiency program evaluations of comparable measures (based on geography, sector, measure application, and date of issue), and the Focus on Energy Design Assistance Energy Modeling Protocol.

For prescriptive measures in Wisconsin, the team used Focus on Energy TRM and associated workpapers 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 2020, 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 measures. These are referred to as randomly sampled measures. The cumulative realization rate of randomly sampled measures were extrapolated to the remainder of the offering population.

Virtual Verification Site Visits

The evaluation team conducted 22 virtual verification site visits for the CY 2020 Nonresidential New Construction Solution. Virtual 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. Given the inability to travel to measure sites in CY 2020, the evaluation team conducted these visits and interviews remotely with the measure specific customers through several technology interfaces.

Verified Gross Savings Results for Nonresidential New Construction Solution

Table 129 lists the first-year and lifecycle realization rates for CY 2020. Table 130 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 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 section of this report.

Table 129. CY 2020 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	100%	98%	100%	100%	100%	100%	100%
Prescriptive	100%	99%	98%	99%	100%	98%	99%
Overall Realization Rate	**100%**	**98%**	**99%**	**100%**	**100%**	**99%**	**100%**

Table 130. CY 2020 Nonresidential New Construction Solution
First-Year and Lifecycle Verified Energy Savings Summary

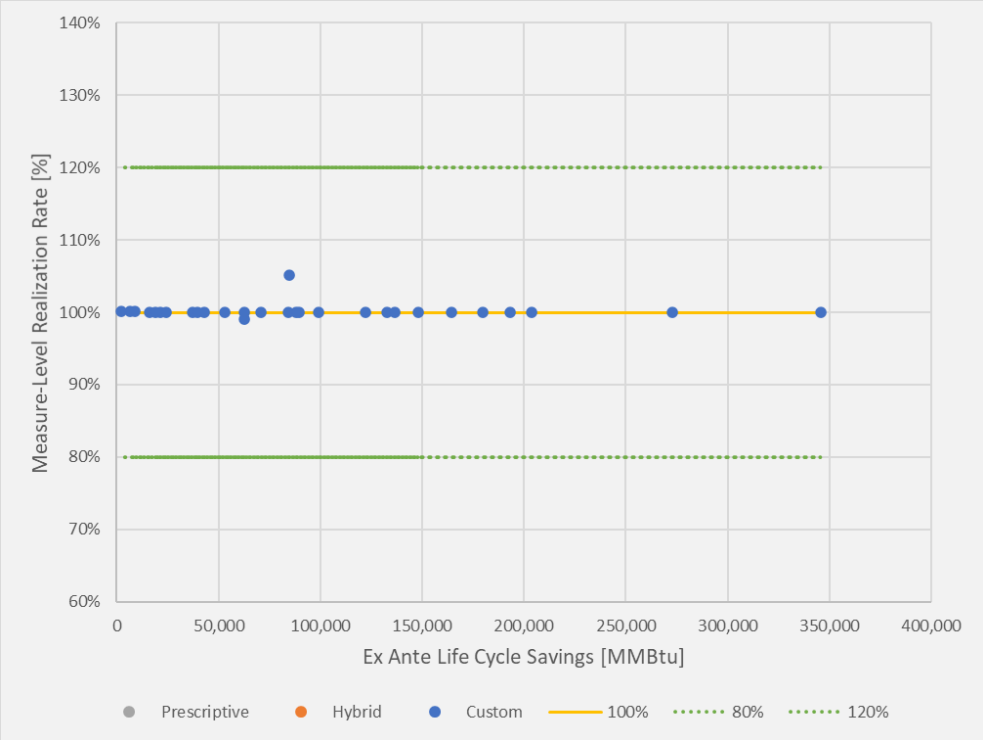
Offering	Verified First-Year Savings				Verified Lifecycle Savings		
	kWh	kW	therms	MMBtu[a]	kWh	therms	MMBtu[a]
Energy Design Assistance/ Energy Design Review	34,412,314	6,301	1,099,494	227,364	688,246,280	21,989,880	4,547,284
Prescriptive	36,436,136	4,812	569,363	180,594	534,602,179	9,192,706	2,734,473
Overall Savings	70,848,450	11,112	1,668,857	407,958	1,222,848,459	31,182,586	7,281,757

[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 virtual site visits. The combined offerings had a gross lifecycle realization rate of 100% MMBtu. Figure 81 presents the magnitude of and associated realization rates for reported MMBtu savings of the sampled projects.

Figure 81. Nonresidential New Construction Solution – Energy Design Assistance Offering Sampling Results



As seen in figure above, there was very little deviation from *ex ante* savings in the sample this year. 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%.

For two sampled projects, minor inconsistencies between reported values and energy model inputs led to small decreases in realization rates. During a virtual site visit, the evaluation team found that one project had implemented two energy-saving measures not accounted for in the *ex ante* savings. Including these energy savings increased the realization rate for this project.

Table 131 lists the CY 2020 *ex ante* and verified gross first-year and lifecycle savings for the Energy Design Assistance and Energy Design Review offerings.

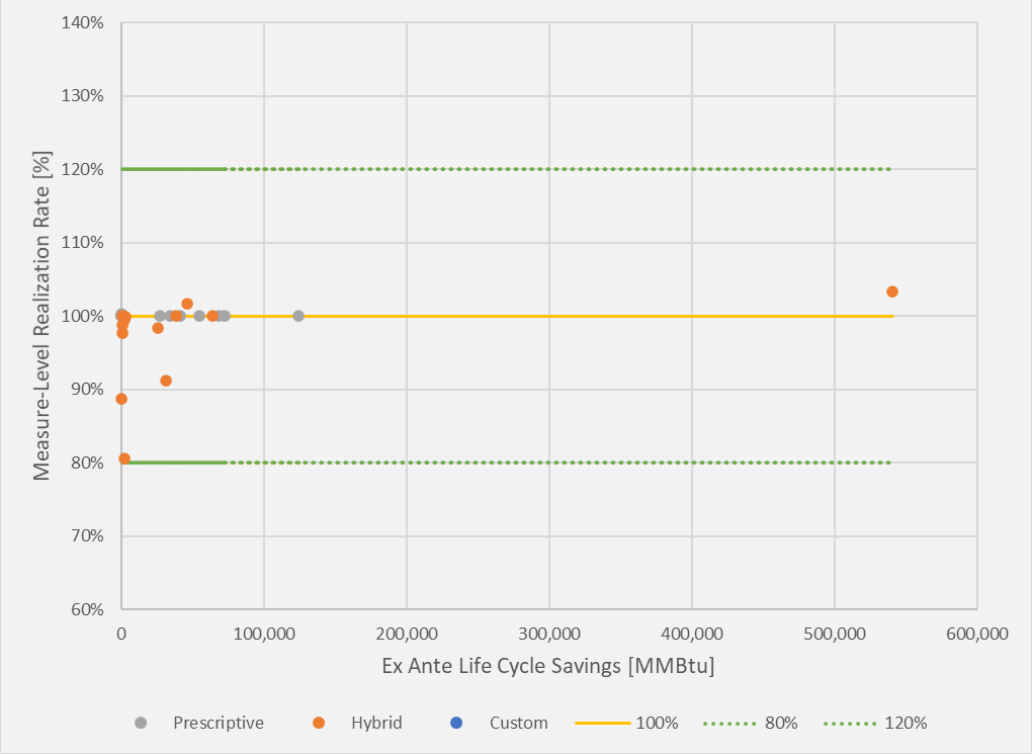
Table 131. CY 2020 Nonresidential New Construction Solution Energy Design Assistance and Energy Design Review Offerings *Ex Ante* and Verified Gross Savings

	Ex Ante Gross			Verified Gross		
	kWh	kW	therms	kWh	kW	therms
First-Year Gross Savings	34,412,314	6,429	1,099,494	34,412,314	6,301	1,099,494
Lifecycle Gross Savings	688,246,280	6,429	21,989,880	688,246,280	6,301	21,989,880

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 99% MMBtu. Figure 82 represents the magnitude of and associated realization rates for reported MMBtu savings among sampled projects.

Figure 82. Nonresidential New Construction Solution – Prescriptive Offering Sampling Results



As seen in figure above, there was very little deviation from *ex ante* savings in the sample this year, particularly in the prescriptive measures. There was some deviation in the realization rates for primarily hybrid measures. The main factors affecting the realization rate were slight differences between values used in the *ex ante* savings calculations and values used in equipment cutsheets for inputs such as heating or cooling efficiency rating, capacity, and light fixture wattage.

Table 132 lists the CY 2020 *ex ante* and verified gross first-year and lifecycle savings for the Prescriptive offering.

Table 132. CY 2020 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	36,436,136	4,860	580,983	36,436,136	4,812	569,363
Lifecycle Gross Savings	534,602,179	4,860	9,380,312	534,602,179	4,812	9,192,706

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. For a detailed description of NTG analysis methodology and findings, refer to *Appendix K. Net Savings Analysis*.

Verified Net Savings Results

The evaluation team calculated freeridership and participant spillover at the offering-level for the Nonresidential New Construction Solution using findings from surveys conducted with CY 2020 solution participants.

For the Energy Design Assistance/Energy Design Review offering, the evaluation team considered two factors—modeling assistance and incentives offered through the offering—in assessing the offering's net savings for CY 2020. The analysis estimated two intention-based freeridership scores, one addressing the modeling assistance from design team's perspective and one addressing the incentives from the building owner's perspective. It also included an influence-based freeridership score from building owners that was combined with the average of the modeling assistance and incentive intention-based freeridership scores.

The evaluation team estimated net savings for the Nonresidential New Construction Prescriptive offering from surveys with CY 2020 participants and the methods followed the standard nonresidential downstream rebate offering NTG protocol detailed in *Appendix K. Net Savings Analysis*.

To calculate the NTG for each offering, the evaluation team combined the self-reported freeridership and participant spillover results using the following equation:

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

Table 133 shows the offering-level NTG results for the Nonresidential New Construction Solution.

Table 133. CY 2020 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.

The evaluation team calculated an overall NTG estimate of 81% for the solution in CY 2020. Table 134 shows the weighted average NTG ratio by offering, as well as the total lifecycle gross verified savings and lifecycle net savings.

Table 134. CY 2020 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	4,520,896	3,661,925	81%
Prescriptive	2,734,473	2,214,923	81%
Total	7,255,369	5,876,849	81%

Nonresidential New Construction Energy Design Assistance/Energy Design Review

Two projects with the greatest energy savings represent 57% of the analysis sample lifecycle gross verified savings,[64] and both projects were estimated at 0% freeridership.

Nonresidential New Construction Prescriptive

Thirteen percentage points of the 19% offering-level freeridership ratio are associated with the top saving project in the NTG analysis sample. The project was estimated at 37.5% freeridership and represents 35% of the analysis sample lifecycle gross verified savings.

Another project estimated at 37.5% freeridership represents 11% of the analysis sample lifecycle gross savings and three percentage points of the overall 19% offering-level freeridership ratio.

Process Evaluation

Process Evaluation Methodology

In CY 2020, the evaluation team conducted a survey of participants and interviewed design teams, building owners, and administration and implementation staff to evaluate the nonresidential offerings of the New Construction Solution.

Ongoing Participant Satisfaction Surveys

The evaluation team conducted satisfaction surveys for the Nonresidential New Construction Solution Prescriptive offering beginning in CY 2020 for the CY 2019 - CY 2022 quadrennium, continuing the

[64] One LED lighting project and one variable speed drive project.

practice established for the previous quadrennium in CY 2015. Two objectives informed 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, and
- Help to facilitate timely follow-up with customers to clarify and address service concerns.

The team used SPECTRUM data to sample CY 2020 participants and administered web-based satisfaction surveys throughout the year. The team mailed paper surveys to participants with no email address on file and combined results from both modes to conduct the analysis. A total of 25 Nonresidential New Construction Solution Prescriptive offering participants responded to the CY 2020 survey. The survey covered several topics including overall satisfaction, satisfaction with Focus on Energy staff and trade allies, likelihood of recommending Focus on Energy, likelihood to initiate another energy efficient project, and other feedback.

Offering Staff Interviews

Cadmus conducted interviews with three staff members from APTIM, the administrator, and Willdan, the implementer, to obtain the following:

- Gather perspectives on the portfolio organizational structure and offering changes
- Understand New Construction Solution goals and the impact of COVID-19 on those goals
- Confirm changes made to the Nonresidential New Construction Solution
- Document outreach strategies and assess impact of marketing activities to date
- Understand how the implementer interacts with design teams

Design Team and Building Owner Interviews

The evaluation team received participant contact information from the SPECTRUM database and sent email invitations to a census of participating building owners and design teams to schedule an interview. All received up to two interview invitations via email. As shown in Table 135, the team completed 28 telephone interviews, 11 with design teams and 17 with building owners.

Table 135. CY 2020 Nonresidential New Construction Solution Sample Sizes

Participant	Mode	Population Size	Target Completes	Offering		Total Completes
				Legacy Design Assistance	Prescriptive Only	
Design Team	Telephone in-depth interview	139	20-30	6	5	11
Building Owner	Telephone in-depth interview	198		13	4	17
Total		**337**	**–**	**20**	**9**	**28**

The interviews focused on these topics:

- Program awareness, promotion, and past participation
- Participant experience with modeling tools and report

- Impacts of COVID-19
- Factors motivating participants to pursue the program and energy-efficient building in general
- Satisfaction with program components and the program overall
- Program influence on participant decisions and behavior

Solution Design and Delivery

Nonresidential New Construction Solution projects involve three types of activities at different project stages: initial (design and modeling assistance); middle to late (whole building review); and final (project savings verification). Each Energy Design Assistance project is initiated with design and modeling assistance, in which the implementer and the project design team evaluate potential energy-saving design strategies and select a bundle of strategies for inclusion in the project design. Energy Design Review projects use whole-building energy simulation analysis to investigate and capture savings associated with energy efficiency improvements that are feasible given the proposed design and project's place in the design/construction schedule.

Participants have the option to use the solution's Net Energy Optimizer (NEO) tool for modeling a building's energy savings. This tool enhances discussions with customers by providing rapid access to the model information, answering technical questions for specific projects, and providing peace of mind for the process to come. Participants may use their own tools as well; that is, using NEO is not required.

After building construction is completed, the implementer verifies that energy-saving strategies have been executed and all project savings are associated with the subsequent project savings verification. No energy savings are claimed for design and modeling assistance.

In CY 2020, Focus on Energy added the whole-building review path and incentives for ground source heat pumps to the New Construction Solution. Previously, incentives for ground source heat pumps were offered through Focus on Energy's renewable energy offerings. Incentives are now calculated based on dollars per MMBtu saved for the Energy Design Assistance and Energy Design Review paths of the Nonresidential New Construction Solution.

Participants who do not participate in Energy Design Assistance or Energy Design Review can apply for incentives on qualifying prescriptive measures associated with new construction projects. Though prescriptive measures do not require preapproval, the implementer allows preapproval for projects estimating to involve an incentive of $10,000 or greater and strongly encourages preapproval for projects estimating an incentive at or above $25,000.

COVID-19 Impact

Administrator and Implementer Interviews

According to the administrator and implementer, the impact of COVID-19 on participation was minimal as of August 2020, the time of the interview. Because most projects went through the whole-building path (Energy Design Assistance and Energy Design Review offerings), COVID-19 restrictions did not negatively affect the design phase, which takes place in the earlier months of a construction project.

The administrator and implementer reported strong enrollments in early 2020, particularly for multifamily and commercial projects through the Energy Design Assistance and Energy Design Review offerings but observed lower participation in the Prescriptive offering and for projects enrolled toward the end of the construction phase.

Staff said some projects experienced pandemic-related supply chain delays and thought these delays could result in a decrease in prescriptive path incentives. However, several outstanding prescriptive applications from 2019 programs, shifted to the New Construction solution in 2020, offset the impacts of COVID-19. This deficit, however, was more than made up by the end of the year due to several prescriptive applications from other offerings that were not previously accounted for under the New Construction solution. The administrator increased the incentive budget to accommodate rollover applications for prescriptive measures.

The administrator and implementer also engaged in operational changes such as suspending on-site meetings, conducting virtual site verifications, and shifting to online outreach. The implementer continued to engage trade allies using virtual lunch-and- learn webinars. The main challenge was that some customers were not open to a virtual approach.

Design Team Interviews

Though the administrator and implementer noted supply chain delays, design team respondents who were interviewed about COVID-19 restrictions did not report major impacts on their business or services (n=11). Two design team respondents said their business was not impacted at all, and nine respondents reported minimal impacts. Respondents noted a shift toward virtual meetings with clients rather than in-person meetings. They also noted some delays in project start dates for non-COVID–related projects but quick turnarounds for COVID-related projects (e.g., field hospitals and air filtration systems) due to shifting priorities. Delays in non-COVID related projects were mostly due to the client's uncertainty of the future and a higher incidence of businesses shutting down in the beginning of COVID restrictions.

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:

- Sponsored the U.S. Green Building Council annual meeting, American Institute of Architects (AIA) virtual conference, and ASHRAE events
- Introduced the New Construction Solution online tool, which provides an online application form and is a resource for customer questions and requests. The tool also generates notifications for the implementer to follow up with customers and helps route customers and design teams to the appropriate incentive path. Staff reported that this tool has streamlined the application process, making it easy to update and integrate information with SPECTRUM.
- Enhanced coordination and collaboration with utilities
- Developed promotional emails and lunch-and-learn webinars with trade allies

Design Team Interviews

Six of 10 design team respondents learned about the New Construction Solution incentives from previous experience with Focus on Energy or through a Focus on Energy representative. Five respondents said at least half of their clients were aware of these incentives before coming to them. Ten design team respondents said they promoted the incentives through direct discussions with clients.

Building Owner Interviews

Of 17 building owner respondents, 11 said they learned about the New Construction Solution incentives from previous experience or through a Focus on Energy representative. Ten respondents said they were independently motivated to pursue Focus on Energy incentives, and three were prompted by their design team. Of these three building owners, two were motivated by the incentive and one by energy savings. Nearly all (16 of 17 building owner respondents) were aware of the incentives before the construction phase, nine of the 16 respondents were aware due to previous participation.

Six building owner respondents did not take advantage of whole-building energy modeling offered by Focus on Energy (four Energy Design Assistance/Energy Design Review participants used their own design team energy modeling, and for two Prescriptive participants an energy model was not required). Five respondents said fast-moving timelines shortened the project design phase and planning decisions had already been made. One missed the opportunity because an ongoing relationship with Focus on Energy was not in place.

Customer Satisfaction

Overall, the design team and building owner respondents were satisfied with the Nonresidential New Construction Solution. They were most satisfied with the Focus on Energy staff they worked with and least satisfied with the incentive amount. Table 136 presents mean ratings (on a scale of 0 to 10 where 0 is *not at all satisfied* and 10 is *extremely satisfied*) and number of responses for questions about satisfaction.

Table 136. CY 2020 Nonresidential New Construction Solution Customer Satisfaction

Respondent	Ease of Enrolling for Incentives	Focus on Energy Staff	Incentive Amount	Energy Modeling Assistance	Focus on Energy Overall
Design Team Interviews	8.44 (n=9)	9.10 (n=10)	7.80 (n=10)	8.50 (n=4)	8.09 (n=11)
Building Owner Interviews	8.80 (n=15)	9.00 (n=16)	8.35 (n=17)	8.43 (n=7)	8.82 (n=17)
Participant Survey [a]	*Not asked*	9.30 (n=23)	*Not asked*	*Not asked*	9.04 (n=25)
Total	**8.62 (n=24)**	**9.18 (n=50)**	**8.08 (n=27)**	**8.47 (n=11)**	**8.64 (n=53)**

[a] The satisfaction survey was sent only to participants in the Prescriptive path.

Source: Survey Question D2 "On a scale of 0-10, where 0=not at all satisfied and 10=extremely satisfied, how satisfied are you with…"and D1 "On a scale from 0-10, where 0=not at all easy and 10=extremely easy, how would you rate the ease of enrolling for new construction incentives [DT]/applying for the New Construction rebate(s)?"

Design Team Interviews

Three design team respondents expressed dissatisfaction with the incentive amount. Two said the incentive was too small to influence their projects, and one said incentives have decreased over time.

Design team respondents were also asked what they thought was the largest benefit from working with Focus on Energy. Ten respondents mentioned several different benefits, including these:

- Obtaining more project leads from word-of-mouth (3 respondents)
- Value of third-party review (2 respondents)
- Ability to help offset client costs (1 respondent)
- Focus on Energy's helpful customer service and information about energy efficiency improvements (2 respondents)
- Help with improving their standard practice/staying competitive (2 respondents)

Overall, design team respondents were *extremely likely* to recommend the New Construction Solution and gave an average rating of 9.3 (n=11).

Seven design team respondents said they had not yet used the NEO modeling tool (n=10). Respondents who had used the tool said it was simple to use and helpful when educating clients on potential energy savings options.

Building Owner Interviews

Building owner respondents gave an overall satisfaction rating of 8.82. Two Energy Design Assistance building owner respondents expressed dissatisfaction with the amount of the incentive. One expected a larger incentive, and one said there was too much paperwork for too low an incentive.

Building owner respondents were extremely likely to recommend the Nonresidential New Construction Solution and gave an average rating of 9.3 (n=17). Eleven respondents cited improved standard practice and access to energy efficiency knowledge as the two largest benefits of working with Focus on Energy.

Suggestions for Improvement

Design team and building owners offered suggestions for how the Nonresidential New Construction Solution could be improved.

Of the 11 design team respondents, four provided a comment for improvement, three of which related to faster communication. Specifically, one respondent wanted to receive updates on the solution more quickly, and two mentioned better timing of communication so projects can stay on schedule. The other design team respondent wanted lifecycle analysis incorporated into the projects.

Of the 17 building owner respondents, eight provided a comment for improvement. Of these, seven wanted faster communication, especially when the construction process was moving quickly, and one Energy Design Assistance path participant wanted the approval process streamlined so equipment orders could be placed in time to keep pace with a fast moving project timeline. It is possible this

respondent may have been relaying feedback from previous project experiences with custom incentives, however.[65]

Customer Satisfaction Survey Results – Prescriptive Offering

Throughout CY 2020, the evaluation team surveyed Prescriptive offering participants to measure their satisfaction with various aspects of their experience. Respondents answered questions related to satisfaction and likelihood on a scale of 0 to 10, where 10 indicated the highest degree of satisfaction or likelihood and 0 the lowest.[66]

Prescriptive participants gave the offering they participated in an average overall satisfaction rating of 9.0 in CY 2020, which was statistically equivalent to the portfolio target for CY 2020.[67] Table 137 shows the average satisfaction and likelihood ratings for the offering in CY 2020, which were all above 9.0.

Table 137. CY 2020 Average Ratings for Nonresidential Prescriptive Offering

Item	CY 2020
Satisfaction with the offering overall (n=25)	9.0
Satisfaction with Focus on Energy staff (n=23)	9.3
Satisfaction with Trade Ally (n=24)	9.1
Likelihood of recommending Focus on Energy (n=25)	9.4

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). The Nonresidential Prescriptive offering's NPS was +80 for CY 2020, similar to the NPS for other nonresidential offerings in CY 2020 and recent years.

CY 2020 participants were asked if they were aware before receiving the satisfaction survey that the Nonresidential Prescriptive offering was offered in partnership with their local utility, and 76% (n=25) were aware. Respondents were also asked if Focus on Energy offerings affected their opinion of their utilities, and 76% (n=25) reported their opinion had become *much more favorable* or *somewhat more favorable*. None of the survey respondents reported their opinion had become less favorable, and 24% said their opinion of their utility was not affected.

CY 2020 participants were asked how they learned about the Nonresidential New Construction Solution Prescriptive offering, and most (52%, n=25) learned about it from their contractor, with Focus on Energy Advisors (24%) and previous experience with Focus on Energy offerings (12%) accounting for most of the

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65 The respondent specifically mentioned approval for custom incentives.

66 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.

67 The program administrator's contract established a portfolio target of 8.9 to maintain or increase customer satisfaction.

awareness of the remaining respondents. Respondents were also asked how Focus on Energy could support their organization going forward, and the top responses were *energy efficiency opportunities, tips and information* (40%, n=25 with multiple responses allowed), *ROI calculation and payback period for projects under consideration* (28%), *help with program required paperwork* (24%), and *help proving value of the project to decision makers* (24%).

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 25 participants who responded to the survey, six (24%) provided open-ended feedback. Four of these respondents gave only positive comments, praising the staff and contractors they worked with and expressing satisfaction with the results of their projects. The other two comments suggested that Focus on Energy streamline the application process and offer further assistance identifying opportunities to save energy.

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 H* in Volume III includes a description of the TRC test.

Table 138 lists the CY 2020 incentive costs for the Business and Industry Solution.

Table 138. CY 2020 Nonresidential New Construction Solution Incentive Costs

Offering	Incentive Costs
Whole-Building	$4,023,298
Prescriptive only	$2,066,939
Total	**$6,090,236**

The evaluation team found that the CY 2020 Nonresidential New Construction Solution was cost-effective with T&D benefits (2.62) and without T&D benefits (2.36). Table 139 lists the evaluated costs and benefits.

Table 139. CY 2020 Nonresidential New Construction Solution Costs and Benefits

Cost and Benefit Category	Total
Costs	
Non Incentive Costs	$3,448,231
Incremental Measure Costs	$33,700,222
Total Non-Incentive Costs	**$37,148,453**
Benefits	
Electric Benefits (kWh)	$35,697,143
Electric Benefits (kW)	$22,424,150
T&D Benefits (kW)	$9,847,105
Gas Benefits	$13,385,074
Emissions Benefits	$16,003,068
Total TRC Benefits with T&D Benefits	**$97,356,540**
Net TRC Benefits with T&D Benefits	**$60,208,087**
TRC B/C Ratio with T&D Benefits	**2.62**

Outcomes and Recommendations

The evaluation team synthesized information from the CY 2020 evaluation activities to inform the following outcomes and recommendations for the Nonresidential New Construction Solution. Overall, the solution performed well in 2020, meeting its goals and garnering high satisfaction. Though satisfied with the overall services, some respondents suggested improvements, including for incentives and communication.

Outcome 1: Respondents were satisfied with the Nonresidential New Construction Solution overall but thought incentives could be larger. Incentive amounts received the lowest satisfaction score compared to other solution components. Three design team and two building owner respondents expressed dissatisfaction. They said the incentive was too small to influence their projects, there was misalignment with incentive expectations, and the incentive was not worth the time it took to complete the paperwork. One participant with projects in previous years said incentives had decreased over time.

Recommendation 1: Consider enhancing marketing to emphasize the value of the long-term energy savings and nonmonetary benefits of the Nonresidential New Construction Solution incentives. This will help participants factor in other project considerations rather than only the initial upfront cost.

Outcome 2: Design teams and building owners would like timelier project-related communication. Four design team and seven building owner respondents suggested communication enhancements would improve their participation experience. For example, two respondents said they would like to receive updates on the solution earlier in the year (before February 2020), and two mentioned better timing of communication so projects can stay on schedule. Simplifying the application process and additional help for identifying energy saving opportunities were also suggested for improvements.

Recommendation 2: Consider enhancing the New Construction Solution online tool so participants can access their application status, check project timelines and milestones, get timely updates on solution changes (if any), and submit requests or questions throughout the project.

Renewable Energy Competitive Incentive Program

Through the Renewable Energy Competitive Incentive Program (RECIP) Solution, Focus on Energy offers financial incentives to Wisconsin business customers that install eligible, cost-effective renewable energy systems. Eligible projects include the installation of solar electric, solar thermal, geothermal, biogas, biomass, or wind systems.

The administrator, APTIM, issues a request for proposals (RFP) three times a year and selects winning proposals through a competitive bid process. The implementers, Franklin Energy and CESA 10, process the awarded projects through the specific Focus on Energy business solution for which the customer is eligible.

Table 140 summarizes RECIP Solution impacts for CY 2020.

Table 140. CY 2020 RECIP Solution Summary

Item	Units	CY 2020
Incentive Spending	$	$521,526
Participation	Number of Participants	19
Verified Gross Lifecycle Savings	kWh	87,260,134
	kW	858
	therms	0
Verified Gross Lifecycle Realization Rate	% (MMBtu)	104%
Annual NTG Ratio	% (MMBtu)	93%
Net Annual Savings	kWh/year	3,578,867
	kW	798
	therms/year	0
Net Lifecycle Savings	MMBtu	276,890
Cost-Effectiveness	Total Resource Cost Test: Benefit/Cost Ratio with T&D Benefits [a]	2.30

[a] T&D Benefits are not applied to renewable projects in 2020.

Achievement Against Goals

The RECIP Solution has no energy-savings goals for CY 2020 and has not established goals in the past.

Impact Evaluation

This section contains the findings for the CY 2020 impact evaluation for the RECIP Solution.

Impact Evaluation Methodology

The evaluation team conducted an impact evaluation of the CY 2020 RECIP Solution. The team designed its evaluation, measurement, and verification approach to integrate multiple perspectives in assessing the performance of the solution. Table 141 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 and in *Appendix K*.

Table 141. CY 2020 Data Collection Activities and Sample Sizes – Impact Evaluation RECIP Solution

Activity	RECIP
Tracking Database Review	Census
Desk Reviews	1
Desk Review + Interviews	6
Virtual Site Visit	2

Tracking Database Review

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

Engineering Desk Review

The evaluation 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 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).

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 evaluation 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 then extrapolated findings to the larger population. In 2020, 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 larger population. These measures are referred to as census measures. The proportional sampling measures were randomly selected from the population and are referred to as randomly sampled measures. The cumulative realization rate of randomly sampled measures by offering was extrapolated to the remainder of the population.

Engineering Desk Review & Interview

The evaluation team conducted engineering desk reviews and a phone interview or email exchange with the site contact to verify key parameters, collect additional site photos, discuss operating schedules, and obtain additional trend data.

Virtual Verification Site Visits

The evaluation team conducted virtual verification site visits, which involved an engineering desk review then using software to connect virtually to the site contact's mobile device camera and microphone. The

team could then visually verify the type and quantity of equipment installed, ask the site contact how the installed equipment was controlled, and document 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 RECIP

Table 142 lists the first-year and lifecycle realization rates for CY 2020. Table 143 lists verified first-year and lifecycle savings by offering. Overall, RECIP achieved a first-year evaluated realization rate of 103%, weighted by total (MMBtu) energy savings. Detailed findings, including factors affecting the realization rates, are discussed in detail in the next section of this chapter.

Table 142. CY 2020 RECIP Solution First-Year and Lifecycle Realization Rates

Offering	First-Year Realization Rate				Lifecycle Realization Rate		
	kWh	kW	therms	MMBtu	kWh	therms	MMBtu
RECIP	103%	94%	N/A	103%	104%	N/A	104%

Table 143. CY 2020 RECIP Solution First-Year and Lifecycle Verified Total Energy Savings Summary

Offering	Verified First-Year Savings				Verified Lifecycle Savings		
	kWh	kW	therms	MMBtu[a]	kWh	therms	MMBtu[a]
RECIP	3,848,244	858	0	13,130	87,260,134	0	297,732

[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.

For RECIP, the evaluation team reviewed the database, the TRM, and the application file reviews, interviewed the site contact, and conducted measure-level engineering analyses to inform verified gross savings. The solution had a gross lifecycle realization rate of 104% MMBtu.

The RECIP population was made up of 19 projects—17 involved solar PV measures, one implemented a biogas project, and another involved a biogas feasibility study that did not result in any savings. Of the biogas project savings, 100% were verified. The main factor that affected the realization rate of solar photovoltaic (PV) measures was the systemic difference between methods used to calculate *ex ante* and *ex post* savings estimates. All sampled PV projects The evaluation team calculated *ex ante* savings for all sampled PV projects with a hybrid approach that uses site-specific data (e.g., panel orientation, site location, system size, and power) and National Renewable Energy Laboratory (NREL) PV Watts software to estimate PV system performance. The team calculated *ex post* savings estimates using the deemed per-unit TRM values based on the project location and panel orientation.

The team did not find any sampled projects for which the COVID-19 pandemic adversely impacted the savings from participating in RECIP.

Table 144 lists the *ex ante* and verified gross first year gross for the CY 2020 year by measure type.

Table 144. CY 2020 RECIP Solution First Year Verified Savings Summary by Measure

Measure	*Ex Ante Gross First Year*			Verified Gross First Year		
	kWh	kW	therms	kWh	kW	therms
Geothermal	1,900,000	200	0	1,957,000	188	0
Photovoltaics	1,826,159	713	0	1,891,244	670	0
Wind Electric	0	0	0	0	0	0
Total First Year	**3,736,159**	**913**	**0**	**3,848,244**	**858**	**0**

Table 145 lists the *ex ante* and verified gross lifecycle savings for the CY 2020 year by measure type.

Table 145. CY 2020 RECIP Solution Lifecycle Verified Savings Summary by Measure

Measure	*Ex Ante Gross Lifecycle*			Verified Gross Lifecycle		
	kWh	kW	therms	kWh	kW	therms
Geothermal	38,000,000	200	0	39,520,000	188	0
Photovoltaics	45,903,975	713	0	47,740,134	670	0
Wind Electric	0	0	0	0	0	0
Total Lifecycle	**83,903,975**	**913**	**0**	**87,260,134**	**858**	**0**

Verified Net Savings Results for RECIP

The evaluation team did not perform any new NTG evaluation activities in CY 2020 for RECIP and therefore did not calculate new freeridership or spillover estimates.

Verified Net Savings Results

The evaluation team applied the CY 2019 NTG of 93% to 2020 verified gross savings to determine net savings for RECIP in CY 2020. Table 146 lists total verified first year and lifecycle MMBtu savings for the CY 2020 along with NTG.

Table 146. RECIP Solution Lifecycle Net Savings and NTG

Offering	Total Lifecycle Gross Verified Savings (MMBtu)	Total Lifecycle Net Savings (MMBtu)	NTG Ratio
RECIP	297,732	276,890	93%

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 H* in Volume III includes a description of the TRC test.

Table 147 lists the CY 2020 incentive costs for the RECIP Solution.

Table 147. CY 2020 RECIP Solution Incentive Costs

	Incentive Costs
Total	**$521,526**

The evaluation team found that the CY 2020 RECIP Solution was cost-effective (2.30). T&D benefits were not applied to renewable projects. Table 148 lists the evaluated costs and benefits.

Table 148. CY 2020 RECIP Solution Costs and Benefits

Cost and Benefit Category	Total
Costs	
Non Incentive Costs	$76,074
Incremental Measure Costs	$2,889,288
Total Non-Incentive Costs	**$2,965,362**
Benefits	
Electric Benefits (kWh)	$3,005,237
Electric Benefits (kW)	$2,675,012
T&D Benefits (kW)	$0
Gas Benefits	$0
Emissions Benefits	$1,127,720
Total TRC Benefits with T&D Benefits	**$6,807,968**
Net TRC Benefits with T&D Benefits	**$3,842,606**
TRC B/C Ratio with T&D Benefits	**2.30**

Outcomes and Recommendations

The evaluation team identified the following outcomes and recommendations for RECIP.

Outcome 1: *Ex ante* energy and demand savings for PV systems require site-specific information and deviate from deemed TRM values. The atypical realization rates of PV measures can be explained by the systemic difference between methods used to calculate *ex ante* and *ex post* savings estimates. All projects calculated *ex ante* savings using a hybrid approach. This hybrid method uses site-specific data (e.g., panel orientation, site location, system size, and power) and the PV Watts software to estimate PV system performance. The evaluation team calculated *ex post* savings estimates using the deemed per-unit TRM values based on the project location and panel orientation.

Recommendation 1: These prescriptive measures should reference the deemed savings in the current TRM.

Outcome 2: *Projects involving reconfiguring existing systems have a greater potential to be freeriders.* One of the sampled projects involved an existing biogas-powered microturbine that had been used to generate power sold back to the grid under a purchase power agreement (PPA). This was a very large project with savings equal to 51% of the total RECIP Solution's MMBtu lifetime savings. The PPA was set to expire and be replaced with less favorable terms. Modifications were needed to the plant's electrical distribution system to either allow it to use the electricity generated on site or to flare the biogas to the atmosphere. This second alternative was used as the baseline to which energy savings were calculated. In the evaluation team's review of the project and conversations with the participant, it became clear that this alternative was not considered a serious option.

Recommendation 2: Projects involving modifications to existing equipment or systems need to be carefully assessed to make sure the project would not proceed unless the incentive from the RECIP Solution is provided.